# CITY OF MERCER ISLAND

9611 SE 36th Street
Mercer Island, WA 98040

## SEWER SCADA SYSTEMS REPLACEMENT

BID SET

Project Number: 153585
Bid Number: 22-31

VOLUME 1 OF 2
CONTRACT DOCUMENTS
September 2022

Brown AND Caldwell
701 Pike Street Suite 1200
Seattle, WA 98101

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## FOREWORD

THE ITEMS WHICH MAKE UP THE CONTRACT DOCUMENTS ARE AS FOLLOWS:

<u>DIVISION 0</u>

**NOTICES, BIDDING REQUIREMENTS, AND AGREEMENT FORMS**

Notices, Bidding Requirements, and Agreement Forms have been copied and bound together with the remainder of the Contract Documents to facilitate the bidder's submittal of this proposal and other required documents.

<u>GENERAL TERMS AND CONDITIONS</u>

<u>TECHNICAL SPECIFICATIONS</u>

<u>DRAWINGS</u> (Bound Separately)

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The Project Manual for the Sewer SCADA Systems Replacement Project for the City of Mercer Island has been prepared under the direction of the following Registered Professional Engineers.


Sep 26 2022 8:07 AM

Caitlin Bliesner
Divisions 01 and 40


Sep 23 2022 2:36 PM

Drew Tucker
Division 26

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## TABLE OF CONTENTS

## TECHNICAL SPECIFICATIONS

Division 26 – Electrical



Division 40 – Process Integration



## VOLUME 2 OF 2 – DRAWINGS (Bound Separately)

# NOTICES

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# Advertisement for Bids
# City of Mercer Island

Project Title: Sewer SCADA Systems Replacement
Bid No.: 22-31
Engineers Estimated Cost (range): $2,168,000 - $3,060,000

Sealed bids will be received, not sent, electronically by the City until **2:00 PM on October 21, 2022**. Due to the COVID-19 pandemic and the temporary closure of the City Hall building, bidders shall submit bids in PDF format to the Public Works email address at: publicworks@mercerisland.gov. There will be no public bid opening for this project; bid results will be posted on the City's web page at: https://www.mercerisland.gov/rfps.

Bidder questions are to be directed to Samantha Brittain, Brown and Caldwell, by email only at sbrittain@brwncald.com. The City will receive questions until **5:00 PM on October 7, 2022**. Questions received after this date will not be answered. All questions and responses will be posted in an addendum by **October 13, 2022,** to the Builders Exchange site.

Work to be performed under this contract, includes, but is not limited to: furnishing all labor, equipment, and materials necessary in upgrading the City's supervisory control and data acquisition (SCADA) equipment at seventeen (17) remote sewer pump station sites. This will consist of programmable logic controller (PLC) panel replacement, instrument demolition and replacement, go/no-go panel installation, generator monitoring improvements, field testing and commissioning services for the new control system equipment, all associated electrical work, and training. The remote sewer pump station sites include the following, as indicated on the Contract drawings:

1. Pump Station 1
2. Pump Station 4
3. Pump Station 10
4. Flush Station 12
5. Pump Station 13
6. Pump Station 14
7. Pump Station 15
8. Pump Station 16
9. Pump Station 17
10. Pump Station 18
11. Pump Station 19
12. Pump Station 20
13. Pump Station 21
14. Pump Station 22
15. Pump Station 23
16. Pump Station 24
17. Pump Station 25

The City reserves the right to reject any and all bids and to waive minor irregularities.

Plans, specifications, addenda, and bidders list are available on-line through Builders Exchange of Washington, Inc. at http://www.bxwa.com. Click on “Posted Projects”, “Public Works”, “City of Mercer Island”, “Projects Bidding”. Builders Exchange manages the official bidders list. Bidders are encouraged to register in order to receive automatic email notification of future addenda and to be placed on the official bidders list.

Plans and specifications are also available at the City of Mercer Island website https://www.mercerisland.gov/rfps. Addenda may not be available or updated on this website.

A bid deposit in the amount of five percent (5%) of the bid total price must accompany each bid.

The City of Mercer Island, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises as defined at 49 CFR Part 23 will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, or sex in consideration for an award.

Andrea Larson, City Clerk

Published:  Seattle Daily Journal of Commerce – September 26, 2022, October 3, 2022, October 10, 2022, and October 17, 2022

# City of Mercer Island
# Instructions to Bidders

1. ELIGIBILITY TO BID:

It is the intent of the City to award a contract to the low responsible bidder. Before award, the bidder must meet the following bidder responsibility criteria to be considered a responsible bidder. To be eligible to bid, each Bidder must, at the time of the bid submittal:

A. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW; and

B. Have a current Washington Unified Business Identifier (UBI) number; and

C. If applicable:

   i. Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW; and
   ii. Have a Washington Employment Security Department number, as required in Title 50 RCW; and
   iii. Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW; and
   iv. Have an electrical contractor license, if required by Chapter 19.28 RCW; and
   v. Have an elevator contractor license, if required by Chapter 70.87 RCW; and

D. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3); and

E. Completed the L&I online training or meet the prior experience requirements in RCW 39.04.350(1)(f); and

F. Within the three-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48 or 49.52 RCW; and

G. Have a minimum of five (5) years of documented company experience for projects of similar scope, size, and complexity.

A contract shall only be awarded to a Bidder that demonstrates to the City's satisfaction that the Bidder is qualified to perform the Work and is, therefore, a responsible bidder.

2. SUBCONTRACTOR RESPONSIBILITY CRITERIA:

The Bidder must verify responsibility criteria for each first-tier subcontractor, and each subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Upon request of the City the Bidder shall promptly provide documentation to the City demonstrating that the subcontractor(s) meets the subcontractor responsibility criteria below. The requirements of this section apply to all subcontractors regardless of tier.
At the time of subcontract execution, the Bidder shall verify that each of its first-tier subcontractors meets the following bidder responsibility criteria:

A. Have a current certificate of registration in compliance with chapter 18.27 RCW; and

B. Have a current Washington Unified Business Identifier (UBI) number; and

C. If applicable:

   i. Have Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW; and
   ii. Have a Washington Employment Security Department number, as required in Title 50 RCW; and
   iii. Have a Washington Department of Revenue state excise tax registration number as required in Title 82 RCW; and
   iv. Have an electrical contractor license, if required by Chapter 19.28 RCW; and
   v. Have an elevator contractor license, if required by Chapter 70.87 RCW; and

D. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3); and

E. Not be disqualified or debarred or ineligible to be awarded contracts for which Federal funds have been requested or received; and

F. Completed the L&I online training or meet the prior experience requirements in RCW 39.04.350(1)(f); and

G. Key personnel must hold an appropriate license in the applicable discipline.

3. EXAMINATION OF PLANS, SPECIFICATIONS AND SITE:

Each bidder is instructed to examine the Plans, Specifications, Addenda, the site of the proposed improvements, and conduct any other examination and investigation which the bidder may desire to make as to the accuracy of the nature of the work and the difficulties to be encountered. The Bidder shall be responsible for all costs associated with these additional examinations including all restoration work and damages which may be a result of such investigation. Bidders shall consider Federal, State, and local laws and regulations that may affect cost, progress, or performance of the work.

4. ADDITIONAL INFORMATION:

All questions about the meaning or intent of the Contract Documents are to be directed to Samantha Brittain, Brown and Caldwell, in writing by email only at sbrittain@brwncald.com. No telephone questions will be accepted or considered. Bidders should include a reference to the specific Specification Section and paragraph number and/or Drawing number in the Contract Documents and should quote the passage being questioned.

The City will receive questions until **5:00pm on October 7, 2022**. Questions received after this date will not be answered. All questions and responses will be posted by **October 13, 2022** to the Builders Exchange site. The City will delete bidder names from the text of question(s) and answers being sent.

Interpretations or clarifications considered necessary by the City in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the Engineer or City as having received the Contract Documents. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5. WAGES:

This Contract is subject to Chapters 39.12 and 49.28 RCW, amendments thereto and regulations issued thereunder, relating to prevailing wages, benefits and other requirements. Bidders shall examine and be familiar with such requirements. No claim for additional compensation will be allowed which is based upon a lack of knowledge or a misunderstanding of any such requirements by the Bidder or a failure to include in Bidder's price adequate increases in such wages during the performance of this Contract. Current prevailing wage rates for King County can be obtained from the Washington State Department of Labor and Industries at https://lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-rates/.

If this Contract is for a project that receives Federal funds, the labor and wage and benefits standards in 29 CFR part 5 may also apply, so Bidders shall examine and be familiar with such requirements.

6. PROGRESS AND COMPLETION:

Time is of the essence for this Project. Progress and completion of the Work shall comply with all requirements herein, and intermediate and final completion dates as may be set forth in the specifications. The submission of a bid constitutes the Bidder's acknowledgement that such progress and completion requirements have been taken into account in formulating a price for this Work.

7. PREVENTION OF ENVIRONMENTAL POLLUTION AND PRESERVATION OF PUBLIC NATURAL RESOURCES:

If awarded the Contract, the Bidder shall fully comply with all such environmental protection laws, ordinances and regulations dealing with prevention and environmental pollution and the preservation of public natural resources that may be applicable to this Project. The cost of such compliance shall be included in the bid prices.

8. BID FORM:

The Bid Form is included in the Contract Documents. The Bid Form must be completed in ink. Bids that contain omissions, erasures or irregularities of any kind may be rejected. Any qualification, addition, limitation or provision attached to or contained in a bid may render the bid non-responsive and not eligible for award. No oral, facsimile, telegraphic or telephonic bids or modifications will be considered.

All bids shall be signed by the Bidder, or the Bidder's authorized representative. If the bid is made:

A. By an individual, the Bidder's name, signature, and address must be shown;

B. By a partnership or joint venture, it shall contain the names of each partner, the mailing address of the partnership or joint venture and shall be signed in the firm name, followed by the signature of the person signing, indicating that person's position in the partnership or joint venture;

C. By a corporation or limited liability company ("LLC"), the name of the state under the laws of which the corporation or LLC is chartered, the name and post office address of the corporation or LLC and the title of the person who signs on behalf of the corporation or LLC must be shown.

Upon the City's request, the Bidder shall provide copies of the articles of incorporation, bylaws, resolutions of board of directors, partnership papers, joint venture agreements, and any other documents evidencing the legal status of the Bidder and the authority of the Bidder's officer or representative who signed the bid on behalf of the Bidder.

The City is not responsible for any cost incurred in responding to this Call for Bids.

9. ACKNOWLEDGEMENT OF ADDENDA:

Each Bidder shall include on the Bid Form specific acknowledgment of receipt of each Addendum issued by the City during the bidding period. If the Bidder does not specifically acknowledge each addendum, the City may reject the bid as non- responsive unless the City determines from delivery records or from inclusion of information in the bid of information contained in the addenda that the Bidder received constructive notice of the addenda.

10. BID SECURITY:

The Bid shall be accompanied by a bid deposit in the amount equal to at least 5% of the Total Bid Price. The bid deposit shall be in one of the following formats and made payable to the City:

A. A bid guaranty bond, in accordance with and using a form acceptable to the City which contains provisions substantially similar to those in the bid bond form included with the Contract Documents, duly completed by a guaranty company authorized to carry on business in the state of Washington; or

B. A postal money order, a certified check, or cashier's check drawn upon a banking institution with a branch office in the state of Washington.

The surety signing the bid guaranty bond shall be registered with the Washington State Insurance Commissioner, and the surety's name shall appear in the current Authorized Insurance Company List in the State of Washington published by the Office of the Insurance Commissioner. A Power of Attorney must accompany the bid guaranty bond and must appoint the surety's true and lawful attorney-in-fact to make, execute, seal and deliver the bid guarantee bond. Failure to submit the required bid security with the Bid shall render the bid non-responsive and the Bid shall be rejected.

11. NON-COLLUSION:

Each bid shall be accompanied by a signed Non-Collusion Declaration in accordance with, and using the form provided by the City. Failure to submit a signed Declaration with the Bid shall render the bid non-responsive and the Bid shall be rejected.

More than one Bid from an individual, firm, partnership, corporation, or association under the same or different names will not be considered. If the City believes that any Bidder is interested in more than one Bid for the work contemplated, all Bids in which such Bidder is interested will be rejected. If the City believes that collusion exists among the Bidders, all Bids will be rejected.

12. DELIVERY OF BID:

Each Bid shall be submitted in PDF format via electronic transmission to the Public Works email address at: publicworks@mercerisland.gov. The City will not consider bids received after the time fixed for opening bids in the Advertisement for Bids. A Bid is deemed submitted as evidenced by the receipt date and time shown in the source code of the email received by the City's computer system. Contractors accept all risk of late delivery, regardless of fault. Any submittal received after the due date and time shall be deemed non-responsive and will eliminate their Bid from any further consideration. All respondents will receive an email confirmation within the next business day indicating their submittal has been successfully received.

The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of these instructions, that without exception the Bid is premised upon performing the work required by the Contract Documents and such means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

13. MODIFICATION OF BID:

A modification of a Bid will be considered only if the modification is received prior to the time announced for the opening of Bids. All modifications shall be made in writing executed and submitted in the same form and manner as the original Bid.

14. RETURN OF BID SECURITY:

After the bid prices have been compared, the City may return the bid security if, in the City's judgment, the Bidder would not be considered for award. All other Proposal Guarantees will be held until the Contract and the Performance Bond of the successful bidder have been executed.

15. EVALUATION OF BIDS AND BID ERRORS:

After opening the Bids, the City will check them for correctness of extensions of the prices per unit and the total price. If a discrepancy exists between the price per unit and the extended amount of any bid item, the price per unit will control. The total of extensions, corrected where necessary, will be used by the City for award purposes.

Irregular Bids:

A. A Bid will be considered irregular and will be rejected if:

   i. The authorized Bid Form furnished by the City is not used or is materially altered;
   ii. The completed Bid Form contains any unauthorized additions, deletions, alternate bids, or conditions;
   iii. The bidder adds provisions reserving the right to reject or accept the Award, or enter into the Contract;
   iv. A price per unit cannot be determined from the Bid Form;
   v. The Bid Form is not properly executed;
   vi. An executed non-collusion certificate is not provided; or
   vii. Proper bid security does not accompany the Bid.

B. A Bid may be considered irregular and may be rejected if:

   i. The Bid Form does not include a unit price for every Bid item;
   ii. Any of the unit prices are excessively unbalanced (either above or below the amount of a reasonable Bid) to the potential detriment of the City;
   iii. Receipt of Addenda is not acknowledged;
   iv. A member of a joint venture or partnership and the joint venture or partnership submit Bid Forms for the same project (in such an instance, both Bids may be rejected); or
   v. If Bid Form entries are not made in ink.

Bids will be evaluated by the City to determine which bid is the apparent lowest, responsive bid.

Bid results will be posted on the City's website at https://www.mercerisland.gov/rfps.

The City, in its sole discretion, reserves the right to waive minor bid errors, informalities, and immaterial irregularities when it is in the City's best interest to do so.

16. EVALUATION OF BIDDER RESPONSIBILITY:

A Contract shall only be awarded to a Bidder that demonstrates to the City's satisfaction that the Bidder is qualified to perform the Work and is, therefore, a responsible bidder.

A. Bidder Responsibility Criteria. To be determined responsible, the Bidder must, in addition to satisfying the bidder responsibility criteria listed in Section 1. ELIGIBILITY TO BID above:

 i. Have adequate financial resources to perform the contract, or the ability to obtain them;
 ii. Have a satisfactory performance record;
 iii. Have a satisfactory record of integrity and business ethics;
 iv. Have the necessary production, construction, and technical equipment and facilities or the ability to obtain them;
 v. Be otherwise qualified and eligible to receive an award under applicable laws and regulations;
 vi. Be in compliance with training requirements in RCW 39.04.350(1)(f); and
 vii. Provide a statement in accordance with RCW 9A.72.085 verifying compliance with responsible bidder criteria requirement of RCW 39.04.350(1)(g).

B. Reference Checking. To assist the City in the review of the Bidder's qualifications, the Bidder shall, within five (5) days of being requested to do so by the City, provide the following information:

 i. Past Experience in Similar Projects. Provide a list of all construction contracts (whether completed or in progress) entered into or performed by the Bidder within the past five (5) years for projects similar in scope, time and complexity to the work called for under this Contract. Provide the names of the contracts, the total contract price, the name of the foreman, systems integrator, and process control system (PCS) testing manager, the foreman's previous project experience as a foreman on 3 similar construction contracts, the system integrator's previous 3 year experience working Siemens SIMATIC ET200SP, the PCS testing manager's previous 3 year experience managing testing and startup of similar electrical and instrumentation control systems, and the names and phone numbers of the owners.

 ii. References. Provide a list of five (5) references. References will be asked to rate performance on the following items: overall impression of the company; firm experience and technical knowledge; experience and quality of work; effective coordination of subcontractors; ability to coordinate and work with utility companies and governmental entities; responsiveness to owner requests; attention to safety; quality and timeliness of submittals, change order proposals, project schedule, schedule updates and other applicable paperwork.

iii. Systems Integrator Qualifications. The bidder shall list as part of its Bid either itself or the name of the subcontractor for performance of the work of Systems Integrator specified in Division 40, and meeting the qualifications specified in Section 40 61 13. The City may request references for the Systems Integrator.

If the Bidder is a joint venture, the Bidder shall submit information for the joint venture if the members have worked together in the past and also information about each member of the joint venture. The Joint Venture Agreement shall be included in the submission.

If the Bidder fails to supply information requested concerning responsibility within the time and the manner specified, the City may base its determination of responsibility upon any available information related to the responsibility criteria or may find the Bidder is not responsible.

The City reserves the right to inspect records, reports and other information which may be maintained by or for the Bidder to the extent necessary, as determined by the City to verify, clarify or otherwise consider the information provided by the Bidder.

17. DETERMINATION OF NON-RESPONSIBILITY:

If the City determines a Bidder to be not responsible, the City will provide, in writing, the reasons for the determination. The Bidder may appeal the determination within ten (10) days of its receipt of the City's determination of non-responsibility by presenting additional information to the City. The City shall consider the additional information before issuing its final determination. If the City's final determination affirms that the Bidder is not responsible, the City shall not execute a contract with any other bidder until two (2) business days after the Bidder determined to be not responsible has received the final determination.

18. CONTRACT AWARD:

If a Contract is awarded, the City will award the contract to the responsible bidder that submits the lowest total responsive bid for the schedule(s) selected by City after bid opening and prior to award.

If the Contract is to be awarded, City will give the successful Bidder a Notice of Award within sixty (60) days after the day of the Bid opening. No other act of the City or others will constitute acceptance of a Bid.

The City reserves the right to request bidders to extend the effective period of their bids.

19. REJECTION OF ALL BIDS:

The City reserves the right to reject any or all Bids at any time up to actual execution of the Public Works Contract, even if there has been an award of the Contract.

Any or all Bids will be rejected if the City has reason to believe that collusion exists among the Bidders.

20. EXECUTION OF PUBLIC WORKS CONTRACT:

The Bidder to whom award is made shall execute a written Public Works Contract with the City on the form provided, including any Addenda and any other Exhibits attached thereto, shall secure all insurance, and shall furnish all certificates, endorsements and bonds required by the Contract Documents within ten (10) calendar days after receipt of the forms from the City. Failure or refusal to execute the Public Works Contract, including any Addenda and any other Exhibits attached thereto, as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the Bid security. If the lowest responsive, responsible Bidder refuses or fails to execute the Public Works Contract, including any Addenda and any other Exhibits attached thereto, the City may award the Contract to the second lowest responsive, responsible Bidder. If the second lowest responsive, responsible Bidder refuses or fails to execute the Public Works Contract, including any Addenda and any other Exhibits attached thereto, the City may award the contract to the third lowest responsive, responsible Bidder. On the failure or refusal of such second or third lowest Bidder to execute the Agreement, including any Addenda and any other Exhibits attached thereto, each such Bidder's Bid securities shall be likewise forfeited to the City.

21. BID PROTEST PROCEDURES:

A. Form of Protest. In order to be considered, a Protest shall be in writing, addressed and delivered to the attention of the project manager at the City of Mercer Island, 9611 SE 36th Street, Mercer Island, Washington 98040. The Protest shall include the following:

   i. The name, address, and phone number of the Bidder protesting, or the authorized representative of the Bidder;
   ii. A complete, detailed statement of all grounds for protest, supporting authority, and any supporting documentation. Supplemental information will not be considered unless the supplementation contains information not available at the time of protest;
   iii. The specific ruling or relief requested; and
   iv. Evidence that all persons with a financial interest in the procurement have been given notice of the Protest or if such persons are unknown, a statement to that effect.

B. Who May Protest:

   i. Protests based on specifications: Any prospective Bidder.
   ii. Protests following Bid opening: Any Bidder with a substantial financial interest in the award of a Contract.

C. Time to Protest:

   i. Protests based on specifications or other terms in the Contract Documents must be received by the City no later than ten (10) calendar days prior to the date established for submittal of Bids.
   ii. The City must receive protests based on other circumstances within five (5) calendar days after the bids are opened and publicly read.
   iii. In no event shall a Protest be considered if all bids are rejected or after execution of the Contract.

D. Determination of Protest. Upon receipt of a timely written Protest, the City shall investigate the Protest and shall respond in writing to the Protest prior to the award of Contract. If protest is submitted in accordance with the procedures set forth above, the City will not execute a contract any sooner than two (2) business days after the City's decision on the Protest.

E. Failure to Comply. Failure to comply with the procedures set forth herein may render a Protest untimely or inadequate and may result in rejection thereof by the City.

F. Exhaustion of Administrative Remedies. By submitting a bid, the Bidder agrees the Bidder's compliance with the protest procedures set forth herein are a mandatory condition precedent to the Bidder initiating a lawsuit against the City.

G. Venue. By submitting a bid, the Bidder acknowledges and agrees that a lawsuit or action related to or arising out of this procurement shall be brought in the Superior Court of King County, Washington.

# Bidder's Checklist

**ALL BIDDERS** must properly complete, execute and submit the following with their bids:

1. NON-COLLUSION DECLARATION: Failure to submit the certificate shall make the bid non-responsive and not eligible for award.

2. BID FORM: Bidders must bid on all items contained in the Bid Form and the Form must be signed. The omission or deletion of any bid item may render the bid non-responsive and result in the rejection of the bid. Bidders are reminded to comply with RCW 39.30.060.

3. CONTRACTOR DECLARATION PURSUANT TO RCW 39.04.350(2): Failure to submit the declaration shall make the bid non-responsive and not eligible for award.

4. BID GUARANTY BOND: Failure to furnish a bid deposit of a minimum of five percent (5%) shall make the bid non-responsive and not eligible for award.

5. BIDDERS QUALIFICATION CERTIFICATE: To be completed and signed. The City reserves the right to check all statements and to judge the adequacy of the bidder's qualifications.

To assist the City in the review of the responsible Bidder's qualifications, the Bidder(s) shall, within five (5) days of being requested to do so by the City, provide the information required in Evaluation of Bidder Responsibility of the Instructions to Bidders, including a statement in accordance with RCW 9A.72.085 verifying compliance with responsible bidder criteria requirement of RCW 39.04.350(1)(g).

The **SUCCESSFUL BIDDER** shall properly complete, execute (as required) and submit the following after receiving notice of the award of the Project.

1. Public Works Contract,

2. Performance Bond,

3. Payment Bond,

4. Certificate of Insurance,

5. Retainage Agreement,

6. Statement of Intent to Pay Prevailing Wages,

7. Other documents requested by City.

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# BIDDING REQUIREMENTS

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# Bidder's Qualification Certificate

The undersigned hereby certifies and submits the following:

| | |
|---|---|
| Company Name | ______________________________ |
| Address | ______________________________ |
| | ______________________________ |
| Owner Name | ______________________________ |
| Contact Person | ______________________________ |
| Contact Person's Title | ______________________________ |
| Phone | ______________________________ |
| E-mail | ______________________________ |

| | |
|---|---|
| Washington State Contractor Registration # | ____________________ |
| Washington State Unified Business Identifier (UBI) # | ____________________ |
| Federal Tax ID # | ____________________ |
| City of Mercer Island Business License # (required prior to award of contract) | ____________________ |

| | Yes or No | Account / Registration Number (as applicable) |
|---|---|---|
| Does the contractor have industrial insurance coverage for its employees working in Washington as required by Title 51 RCW? | ______ | ____________________ |
| Does the contractor have a Washington State excise tax registration number as required by Title 82 RCW? | ______ | ____________________ |
| Does the contractor have a Washington State Employment Security Department number as required by Title 50 RCW? | ______ | ____________________ |
| Has the contractor been disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3)? | ______ | ____________________ |
| Has the contractor received training on the requirements related to public works contracts and prevailing wage requirements pursuant to RCW 39.04.350(f) and chapter 39.12 RCW, or is the contractor otherwise exempt from this requirement by the department of labor and industries? | ______ | ____________________ |
| Within the three-year period immediately preceding the date of the bid solicitation, has the contractor been determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW? | ______ | ____________________ |

**By:**

| | |
|---|---|
| ______________________________ | ______________________________ |
| **Signature** | **Print Name** |
| **Title** | **Date** |

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# Non-Collusion Declaration

**Project Name:** **SEWER SCADA SYSTEMS REPLACEMENT**

**Bidder/Contractor:** ______________________________________________

I, ______________________________, declare under penalty of perjury under the laws of the State of Washington that the following statements are true and correct:

1. I am the representative for the above-named bidder/contractor, and as its __________________________________, I am authorized to make the declaration herein on its behalf.
2. That the undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this proposal is submitted.

_______________________________________ _____________________________________

Date and Place Signature

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# BID FORM

(NOTE TO BIDDER: This BID FORM shall be completed in ink or typewritten)

| | |
|---|---|
| TO: | City of Mercer Island |
| ADDRESS: | 9611 SE 36th Street<br>Mercer Island, Washington 98040 |
| BID NO.: | 22-31 |
| PROJECT TITLE: | SEWER SCADA SYSTEMS REPLACEMENT |

<u>Bidder Declaration and Understanding</u>

The undersigned Bidder hereby declares that they have carefully examined the Contract Documents for the construction of the project, that they have personally inspected the site, that they have satisfied themselves as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the quantities with the detailed requirements of the Contract Documents, and that this Proposal is made according to the provisions and under the terms of the Contract Documents, which Documents are hereby made a part of this Proposal. The Bidder further declares that they have exercised their own judgment regarding the interpretation of subsurface information and has utilized all data, which they believe pertinent from the Engineer, Owner, and other sources and have made such independent investigations as the Bidder deems necessary in arriving at their conclusions.

The Bidder is hereby notified that no goal for disadvantaged business enterprise utilization has been established for this project. As part of the City's affirmative action effort, however, the City encourages participation of certified disadvantaged businesses and women business enterprises to act as prime contractors as well as subcontractors on this project.

The undersigned Bidder hereby declares that Bidder has carefully examined the Contract Documents including the following addenda, receipt of all is hereby acknowledged:

| | | | |
|---|---|---|---|
| Addendum Number | ________________ | Date | ________________ |
| | ________________ | | ________________ |
| | ________________ | | ________________ |
| | ________________ | | ________________ |

<u>Start of Construction and Contract Completion Time</u>

The Bidder agrees that he/she will begin work within 10 calendar days of the Notice to Proceed, and Final Completion of the entire project will be achieved by the Final Completion Date (except for extensions of time granted in accordance with the General Terms and Conditions). The Bidder further agrees he/she will, if necessary, accelerate his work, provide additional workers and equipment, and expedite materials delivery to meet these dates, all at no additional expense to the OWNER.

By submitting this bid, the bidder agrees that, if award this contract, they will achieve Final Completion within **631 calendar days** from the Notice to Proceed and the Substantial Completion Date will be 30 calendar days prior to the Final Completion Date.

Project timeline and work limitations for this contract are:

1. Notice to Proceed with construction is anticipated by the week of **January 9, 2023**.
2. The project shall be substantially complete no later than **September 30, 2024**.
3. Refer to Section 01 12 16 Work Sequence and Constraints for additional information on project milestones, construction sequencing requirements, work restrictions, and constraints for the Work.

Lump Sum or Unit Price Work

The Bidder proposes to accept as full payment for the work proposed herein the amounts computed under the provisions of the Contract Documents and based on the following lump sum or unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved. The Contractor shall be compensated for the actual unit quantities performed in accordance with the General Terms and Conditions set forth in theses Contract Documents. The Bidder agrees that the lump sum prices and the unit prices represent a true measure of the labor, services, and materials required to perform the work, including all allowances for Contractor-paid taxes, overhead, and profit for each type and unit of work, as well as any auxiliary costs associated with completing a unit of work called for in these Contract Documents. The City does not guarantee the quantities estimated for unit price items, nor does the City limit itself to the estimated number.

If any material, item, or service required by the Contract Documents has not been mentioned specifically, the same shall be furnished and placed with the understanding that the full cost to the Owner has been merged with the prices named in the Proposal.

To the extent possible, standard bid items have been utilized for the work listed in the Proposal. The Bidder is directed to review the Standard Specifications and the City of Mercer Island's Amendments (Special Provisions herein) for descriptions of bid item work, measurement, and payment.

Bid Schedule

Lump sum per site shall include the following:

1. The price to perform the general conditions and administrative work identified in Division 1 of the Contract Documents. To include, but not limited to the construction progress schedule, project meetings, construction facilities and temporary controls and traffic control.
2. The price to perform the electrical work identified in Section 26 05 00. Including, but not limited to trace existing electrical circuits, label or re-label external circuits, install and route conduit, pull and terminate cable, adding enclosure nameplate and warning signage, provide temporary power and control circuits, demolition of obsolete field wiring/raceway.
3. The price to perform the process control system work identified in Division 40. Including, but not limited to control panel work, instrumentation work, factory testing, field testing and commissioning in coordination with the Owner's Programmer, and control system hardware training.

| Item No. | Specification Reference Number Classification of Unit Price Work | Quantity Unit | Unit Price | Amount |
|---|---|---|---|---|
| 1 | Pump Station 1 | 1 Lump Sum | $-- | $ |
| 2 | Pump Station 4 | 1 Lump Sum | $-- | $ |
| 3 | Pump Station 10 | 1 Lump Sum | $-- | $ |
| 4 | Flush Station 12 | 1 Lump Sum | $-- | $ |
| 5 | Pump Station 13 | 1 Lump Sum | $-- | $ |
| 6 | Pump Station 14 | 1 Lump Sum | $-- | $ |
| 7 | Pump Station 15 | 1 Lump Sum | $-- | $ |
| 8 | Pump Station 16 | 1 Lump Sum | $-- | $ |
| 9 | Pump Station 17 | 1 Lump Sum | $-- | $ |
| 10 | Pump Station 18 | 1 Lump Sum | $-- | $ |
| 11 | Pump Station 19 | 1 Lump Sum | $-- | $ |
| 12 | Pump Station 20 | 1 Lump Sum | $-- | $ |
| 13 | Pump Station 21 | 1 Lump Sum | $-- | $ |
| 14 | Pump Station 22 | 1 Lump Sum | $-- | $ |
| 15 | Pump Station 23 | 1 Lump Sum | $-- | $ |
| 16 | Pump Station 24 | 1 Lump Sum | $-- | $ |
| 17 | Pump Station 25 | 1 Lump Sum | $-- | $ |
| 18 | Allowance to cover unforeseen items identified during construction. | 1 Lump Sum | $-- | $40,000 |

Subtotal Bid (Sum of Item No. 1-18) = $______________________

Washington State Excise Tax (10.25%) = $______________________

Washington State Sales Tax (10.1%) = $______________________

Total Bid (Sum of Subtotal and WA State Taxes) = $______________________

Bid Summary

Unit prices for all items, all extensions, and the total amount of bid must be shown on all Schedules. Where conflict occurs between the unit price and the total amount named for any item, the unit price shall prevail, and the totals shall be corrected to conform thereto.

The bidder shall bid on all items included in the Bid Form.

The successful bidder will be the bidder submitting the lowest responsible bid for the following project:

Sewer SCADA Systems Replacement
___________________________________________

(insert project name)

Date: ______________________

Total Bid Amount:

___________________________________________

(in words)

$ ___________________________________________

(in figures)

Subcontractor Listing – RCW 39.30.060

Pursuant to RCW 39.30.060, the Bidder shall list as part of its Bid either itself or the names of the subcontractors with whom the Bidder, if awarded the contract, will subcontract for performance of the work of heating, ventilation and air conditioning ("HVAC"), plumbing as described in chapter 18.106 RCW, and electrical as described in chapter 19.28 RCW. The bidder shall list as part of its Bid either itself or the name of the subcontractor for performance of the work of Systems Integrator specified in Division 40, and meeting the qualifications specified in Section 40 61 13. The Bidder shall not list more than one subcontractor for each category of work.

Failure of the Bidder to submit as part of the Bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same category of work shall render the Bidder's Bid nonresponsive and therefore, void.

The requirement of this section to name the Bidder's proposed HVAC, plumbing, electrical, and systems integration subcontractors applies only to proposed HVAC, plumbing, electrical, and systems integration subcontractors who will contract directly with the general contractor submitting the Bid to the City.

Electrical work must be performed by a licensed electrical contractor. Bidders are cautioned that installation of electrical equipment (PVC or metal conduit, junction boxes or similar work) may be considered electrical work even if for future use and no electrical current is involved.

If the subcontract work categories as described above are not applicable to the work being bid, the bidder must indicate that the subcontract category is "NOT APPLICABLE."

HVAC

Subcontractor Name: ______________________________

UBI Number: ______________________________

Plumbing

Subcontractor Name: ______________________________

UBI Number: ______________________________

Electrical

Subcontractor Name: ______________________________

UBI Number: ______________________________

Systems Integrator

Subcontractor Name: ______________________________

UBI Number: ______________________________

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## PROPOSAL SIGNATURE SHEET

If Sole Proprietor, Partnership or Joint Venture

IN WITNESS hereto the undersigned have set their hands this

_______________ day of ____________________ , 20 _________ .

Name of Bidder (name each partner or joint venture partner) ______________________________

Washington Contractor's Registration No. ______________________________

Address ______________________________

______________________________

Authorized Signature ______________________________

Position/Title ______________________________

If Corporation or Limited Liability Company (LLC)

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this

__________________ day of ________________ , 20 ________ .

Name of Corporation or Limited Liability Company (LLC) ______________________________

Washington Contractor's Registration No. ______________________________

Address ______________________________

______________________________

State of Incorporation or Organization ______________________________

Authorized Signature ______________________________

Position/Title ______________________________

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**Contractor Declaration Pursuant to RCW 39.04.350(2)**

**Project Name:** SEWER SCADA SYSTEMS REPLACEMENT

**Bidder/Contractor:**

I, , declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct:

1. I am the representative for the above-named bidder/contractor, and as its , I am authorized to make the declaration herein on its behalf.

2. Within the three-year period immediately preceding the date of the bid solicitation for the above-named project, the above-named bidder/contractor has not been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW.

| | |
|---|---|
| Date and Place | Signature |

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# BID GUARANTY BOND

KNOW ALL BY THESE PRESENTS: That we, ___________________________________,
as Principal, and ______________________________________, as Surety, are jointly and severally held and firmly bound unto the City of Mercer Island, hereinafter called the Obligee, each in the penal sum of five percent *(5%)* of the Principal's Total Bid Price for the work, this sum not to exceed ________________________________ DOLLARS ($________) (hereinafter referred to as "penal sum") of lawful money of the United States, for the payment whereof unto the Obligee.

WHEREAS, the Principal is herewith submitting its bid proposal for the

**SEWER SCADA SYSTEMS REPLACEMENT**
**Bid Number: 22-31**

NOW, THEREFORE, the condition of this obligation is such that if the Principal is awarded the Contract, and if the Principal, within the time specified, fulfills all of the requirements of the Contract Documents which are conditions precedent to the execution of the Agreement, enters into, executes and delivers to the Obligee an agreement on the form provided herein complete with evidences of insurance, and if the Principal, within the time specified, gives to the Obligee the performance and payment bond on the forms provided herein, then this obligation shall be void; otherwise, the Principal and Surety shall pay unto the Obligee the penal sum; provided however, in no event shall the Surety's liability exceed the penal sum. Provided further, if the difference in money between the Principal's Total Bid Price and the amount for which the Obligee legally contracts with another party to fulfill the Contract is greater than the penal sum, the Principal shall pay unto the Obligee the difference between the penal sum and the amount the Obligee pays another to fulfill the Contract.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal, and that nothing of any kind or nature whatsoever that will not discharge the Principal shall operate as a discharge or a release of liability of the Surety.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety and the Obligee and their respective heirs, executors, administrators, successors and assigns.

SIGNED this ______ day of ____________________, 20 ________.

Principal: ____________________________ Surety: ______________________________

By: ______________________________ By: _______________________________

Title: _____________________________ Title: _______________________________

Address: ____________________________ Address: _____________________________

Telephone: (     ) _______________________ Telephone: (     ) _________________________

**Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this bid guaranty bond.**

# PREVAILING WAGES

The State of Washington prevailing wage rates for King County apply to work performed under this contract. The applicable prevailing wage rates may be found at the following website address of the Department of Labor and Industries:

https://secure.lni.wa.gov/wagelookup/

Based on the bid submittal date for this project, the applicable date for prevailing wages for this project is October 21, 2022. A copy of the applicable prevailing wage rates are also available for viewing at the City of Mercer Island, Maintenance Department located at 9601 SE 36th Street.

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# AGREEMENT FORMS

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**CITY OF MERCER ISLAND, WASHINGTON**
**PUBLIC WORKS CONTRACT**
**FOR**
**SEWER SCADA SYSEMS REPLACEMENT**

THIS PUBLIC WORKS CONTRACT ("Contract") dated [insert date agreement drafted], is effective on the date the Contract is fully executed by the Parties. The Parties to this Contract are the CITY OF MERCER ISLAND, a Washington municipal corporation ("City" or "Owner"), and [INSERT FULL LEGAL NAME OF CONTRACTOR], a [insert state where formed] [choose type of person or entity] ("Contractor").

A. The City desires to retain an independent contractor to furnish all labor and materials necessary to perform work at 17 sewer pump stations (not including pump station 11), Mercer Island, Washington ("Property"); and

B. The Contractor has the requisite skill and experience to perform such work and has submitted a proposal dated [insert date proposal received] to complete such work ("Proposal").

NOW, THEREFORE, the parties ("Parties") agree to the following terms and conditions:

**1. SERVICES BY CONTRACTOR**

1.1 Description of Work. Contractor shall perform all work and furnish all tools, materials, supplies, equipment, labor and other items incidental thereto necessary for the construction and completion of the work, more particularly described in the Contract Documents for the Sewer SCADA Systems Replacement Project, including this Public Works Contract, the Contractor's completed Bid Form, the City's General Terms and Conditions (May 2020 ed.), any Supplemental and/or Special Conditions, Technical Specifications, Drawings and Addenda, which documents are incorporated by this reference, ("Work"), which Work shall be completed to the City's satisfaction, within the time period prescribed by the City and pursuant to the direction of the City Manager or his or her designee.

1.2 Completion Date. The Work shall be commenced within ten (10) days of receipt by the Contractor of the City's Notice to Proceed and shall be Substantially Completed by , (the "Contract Time") as may be extended in accordance with the Contract Documents. In the event the Work is not completed within the time specified, Contractor agrees to pay to the City liquidated damages in the amount set forth in Section 1.3 of this Contract.

1.3 Liquidated Damages. TIME IS OF THE ESSENCE OF THIS CONTRACT. Delays inconvenience the residents of Mercer Island and cost taxpayers undue sums of money, adding time needed for administration, engineering, inspection and supervision. It is impractical for the City to calculate the actual cost of delays. Accordingly, the Contractor agrees to pay liquidated damages as follows: Liquidated damages for failure to achieve timely Substantial Completion shall be in the amount of $150.00 per day.

1.4 Performance Standard. Contractor shall perform the Work in a manner consistent with accepted practices for highly skilled and competent contractors performing this type of work in this area.

1.5 Compliance with Laws. Contractor shall perform the Work in accordance with all applicable federal, state and City laws, including but not limited to all City ordinances, resolutions, standards, or policies, as now existing, or hereafter adopted or amended, and obtain all necessary permits and pay all permit, inspection, or other fees, at its sole cost and expense.

1.6 Utility Location. Contractor is responsible for locating any underground utilities affected by the Work and is deemed to be an excavator for purposes of Chapter 19.122 RCW, as amended. Contractor shall be responsible for compliance with Chapter 19.122 RCW, including utilization of the "one call" locator system before commencing any excavation activities.

1.7 Air Environment. Contractor shall fully cover any and all loads of loose construction materials including without limitation, sand, dirt, gravel, asphalt, excavated materials, construction debris, etc., to protect said materials from air exposure and to minimize emission of airborne particles to the ambient air environment within the City of Mercer Island.

## 2. TERM

This Contract shall commence on the effective date of this Contract and continue until the Work is complete, and formally accepted by City, and all warranties have expired.

## 3. REQUISITE SKILL

The Contractor warrants that it has the requisite skill to complete the Work and is appropriately accredited and licensed by all applicable agencies and governmental entities, including but not limited to being registered to do business in the City of Mercer Island by obtaining a City of Mercer Island business registration. Contractor represents that it has visited the site and is familiar with all of the plans and specifications in connection with the completion of the Work.

## 4. COMPENSATION

4.1 Total Compensation. In consideration of the Contractor performing the Services, the City agrees to pay the Contractor an amount not to exceed [insert maximum value of contract in words] Dollars ($[insert $ amount in figures]), based on the Proposal submitted by Contractor dated [insert date proposal received] and as may be adjusted under the Contract Documents.

4.2 Contractor Responsible for Taxes. Except as otherwise stated in the Contract Documents, the Contractor shall be solely responsible for the payment of any taxes imposed by any lawful jurisdiction as a result of the performance and payment of this Contract.

4.3 Method of Payment. Payment by the City for the Work will only be made after the Work has been completed, a voucher or invoice is submitted in a form satisfactory to the City, and such invoice is approved by the appropriate City representative. Payment shall be made within thirty (30) days of receipt of such invoice or voucher unless otherwise set forth in the Bid Form. The Contractor's acceptance of such payment for the Work shall constitute full compensation for the performance of the Work. Invoices shall be submitted to:

City of Mercer Island
ATTN: [enter City's project manager name, title]
9611 SE 36th Street
Mercer Island, WA 98040

4.4 Retainage. Pursuant to Chapter 60.28 RCW, five percent (5%) of the Total Compensation shall be retained by the City to assure payment of Contractor's state taxes as well as payment of subcontractors, suppliers, and laborers. Upon execution of this Contract, Contractor shall complete, execute, and deliver to the City the Contractor's Retainage Agreement set forth in the Contract Documents. No payments shall be made by the City from the retained percentage fund ("Fund") nor shall the City release any retained percentage escrow account to any person, until the City has received from the Department of Revenue a certificate that all taxes, increases, and penalties due from the Contractor and all taxes due and to become due with respect to the Contract have been paid in full or that they are, in the Department's opinion, readily collectible without recourse to the State's lien on the retained percentage. Upon non-payment by the general contractor, any supplier or subcontractor may file a lien against the retainage funds, pursuant to Chapter 60.28 RCW. Subcontractors or suppliers are required to give notice of any lien within thirty (30) days of the completion of the Work and in the manner provided in RCW 39.08.030. Within sixty (60) days after completion of all Work on this Contract, the City shall release and pay in full the money held in the Fund, unless the City becomes aware of outstanding claims made against this Fund.

## 5. EQUAL OPPORTUNITY EMPLOYER

In all Contractor services, programs or activities, and all Contractor hiring and employment made possible by or resulting from this Contract, there shall be no discrimination by Contractor or by Contractor's employees, agents, subcontractors or representatives against any person because of sex, sexual orientation, age (except minimum age and retirement provisions), race, color, creed, national origin, marital status or the presence of any disability, including sensory, mental or physical handicaps, unless based upon a bona fide occupational qualification in relationship to hiring and employment. This requirement shall apply, but not be limited to the following: employment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. Contractor shall not violate any of the terms of Chapter 49.60 RCW, Title VII of the Civil Rights Act of 1964, the Americans With Disabilities Act, Section 504 of the Rehabilitation Act of 1973 or any other applicable federal, state, or local law or regulation regarding non-discrimination. Any material violation of this provision shall be grounds for termination of this Contract by the City and, in the case of the Contractor's breach, may result in ineligibility for further City agreements.

## 6. INDEPENDENT CONTRACTOR/CONFLICT OF INTEREST

It is the intention and understanding of the Parties that the Contractor shall be an independent contractor and that the City shall be neither liable nor obligated to pay Contractor sick leave, vacation pay or any other benefit of employment, nor to pay any social security or other tax which may arise as an incident of employment. The Contractor shall pay all income and other taxes as due. Industrial or any other insurance which is purchased for the benefit of the City, regardless of whether such may provide a secondary or incidental benefit to the Contractor, shall not be deemed to convert this Contract to an employment contract. It is recognized that Contractor may perform work during the Term of this Contract for other third parties; provided, however, that such performance of other work shall not conflict with or interfere with the Contractor's ability to perform the Work. Contractor agrees to resolve any such conflicts of interest in favor of the City.

## 7. INDEMNIFICATION

7.1 Indemnification and Hold Harmless.

A. The Contractor shall protect, defend, indemnify, and hold harmless City, its elected officials, officers, agents, volunteers, and employees, from any and all claims, demands, suits, penalties, losses, damages, judgments, or costs of any kind whatsoever, including attorneys' fees (hereinafter "claims"), arising out of or in connection with the performance of this Contract except for injuries and damages caused by the sole negligence of the City. However, should a court of competent jurisdiction determine that this Contract is subject to RCW 4.24.115, then, in the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the Contractor and the City, its officers, officials, employees, and volunteers, the Contractor's liability hereunder shall be only to the extent of the Contractor's negligence.

B. The Contractor's obligations under this section shall include, but not be limited to,

i. The duty to promptly accept tender of defense and provide defense to City at the Contractor's own expense.

ii. The duty to indemnify and defend City, its elected officials, officers, agents, and employees, from any claim, demand, and/or cause of action brought by or on behalf of any of its employees, or agents. The foregoing duty is specifically and expressly intended to constitute a waiver of the Contractor's immunity under Washington's Industrial Insurance Act, RCW Title 51, as respects City with a full and complete indemnity and defense of claims made by the Contractor's employees. The parties acknowledge that these provisions were mutually negotiated upon by them.

iii. To the maximum extent permitted by law, the Contractor shall indemnify and defend City, its elected officials, officers, agents and employees, from and be liable for all damages and injury which shall be caused to owners of property on or in the vicinity of the work or which shall occur to any person or persons or property whatsoever arising out of the performance of this Contract, whether or not such injury or damage is caused by negligence of the Contractor or caused by the inherent nature of the work specified.

C. City may, in its sole discretion, (1) withhold amounts sufficient to pay the amount of any claim for injury, and/or (2) pay any claim for injury of which City may have knowledge, regardless of the formalities of notice of such claim, arising out of the performance of this Contract.

D. Any amount withheld will be held until the Contractor secures a written release from the claimant, obtains a court decision that such claim is without merit, or satisfies any judgment on such claim. In addition, the Contractor shall reimburse and otherwise be liable for claims costs incurred by City, including, without limitation, costs for claims adjusting services, attorneys, engineering, and administration.

E. In the event City incurs any judgment, award, and/or costs arising therefrom, including attorneys' fees, to enforce the provisions of this article, all such fees, expenses, and costs shall be recoverable from the Contractor.

F. This provision has been mutually negotiated by the City and the Contractor.

7.2 Survival. The provisions of this Section 7 shall survive the expiration or termination of this Contract with respect to any event occurring prior to such expiration or termination.

**8. INSURANCE**

8.1 The Contractor agrees to carry without interruption from commencement of the Contractors work through the term of the contract and for thirty (30) days after Physical Completion, unless otherwise indicated herein, the following insurance against claims for injuries to persons or damage to property which may arise from or in connection with the performance of the Work by Contractor, its agents, representatives, employees or subcontractors with a carriers having a current A.M. Best rating of not less than A:VII. The City, at its discretion, may require additional types and greater limits of insurance coverage commensurate with the risk associated with the performance of the Work.

A. Workers' Compensation and Employer's Liability Insurance in amounts sufficient pursuant to the laws of the State of Washington.

B. Commercial general liability insurance shall be written on a form at least as broad as Insurance Services Office (ISO) occurrence form CG 00 01 and shall cover liability arising from premises, operations, independent contractors, products-completed operations for three years following substantial completion of the Work, stop gap liability, personal injury and advertising injury, and liability assumed under an insured contract. The Commercial General Liability insurance shall be endorsed to provide the Aggregate Per Project Endorsement ISO form CG 25 03 05 09. There shall be no exclusion for liability arising from explosion, collapse, or underground property damage. The City shall be named as an additional insured under the Commercial General Liability insurance policy with respect to the Work performed for the City using ISO Additional Insured endorsement CG 20 10 10 01 and Additional Insured Completed Operations endorsement CG 20 37 10 01 or substitute endorsements providing coverage at least as broad, with limits of no less than $2,000,000 each occurrence, $2,000,000 general aggregate, and a $2,000,000 products-completed operations aggregate limit.

C. Automobile liability insurance covering all owned, non-owned, hired, and leased vehicles. Coverage shall be written on ISO form CA 00 01 or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage with combined single limits for bodily injury and property damage of not less than $1,000,000 per accident.

D. Asbestos Abatement or Hazardous Materials. If asbestos abatement or hazardous materials work is performed, Contractor shall review coverage with the City Attorney's office and provide scope and limits of coverage that are appropriate for the scope of Work and are satisfactory to the City. Contractor shall not commence any Work until its coverage has been approved by the City Attorney's office.

E. Builders Risk insurance covering interests of the City, the Contractor, Subcontractors, and Sub-subcontractors in the work. Builders Risk insurance shall be on a special perils policy form and shall insure against the perils of fire and extended coverage and physical loss or damage including flood, earthquake, theft, vandalism, malicious mischief, and collapse. The Builders Risk insurance shall include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site. This Builders Risk insurance covering the work will have a deductible of $5,000 for each occurrence, which will be the responsibility of the Contractor. Higher deductibles for flood and earthquake perils may be accepted by the City upon written request by the Contractor and written acceptance by the City. Any increased deductibles accepted by the City will remain the responsibility of the Contractor. The Builders Risk insurance shall be maintained until the City has granted substantial completion of the project. An installation floater may be acceptable in lieu of Builders Risk for renovation projects only if approved in writing by the City. Builders Risk insurance shall be written in the amount of the completed value of the project with no coinsurance provisions.

8.2 The City shall be named as additional insured on all such insurance policies, with the exception of workers' compensation coverages. The Contractor's insurance coverage shall be primary insurance as respect the City. Any insurance, self-insurance, or insurance pool coverage maintained by the City shall be excess of the Contractor's insurance and shall not contribute with it. If the Contractor maintains higher insurance limits than the minimums shown above, the City shall be insured for the full available limits of Commercial General and Excess or Umbrella liability maintained by the Contractor, irrespectively of whether such limits maintained by the Contractor are greater than those required by this Contract or whether any certificate of insurance furnished to the City evidences limits of liability lower than those maintained by the Contractor. Contractor shall provide certificates of insurance and amendatory endorsements, concurrent with the execution of this Contract, evidencing such coverage and, at City's request, furnish the City with copies of all insurance policies and with evidence of payment of premiums or fees of such policies. The Contractor shall provide the City and all Additional Insureds for this work with written notice of any policy cancellation within two business days of their receipt of such notice.

8.3 The Contractor shall cause each and every Subcontractor to provide insurance coverage that complies with all applicable requirements of the Contractor-provided insurance as set forth herein, except that the Contractor shall have sole responsibility for determining the limits of coverage required to be obtained by Subcontractors. The Contractor shall ensure that the City is an additional insured on each and every Subcontractor's Commercial General Liability insurance policy using an endorsement at least as broad as ISO CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

8.4. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the City may, after giving five business days notice to the Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the City on demand, or at the sole discretion of the City, offset against funds due the Contractor from the City.

8.5 Waiver of Subrogation. The Contractor and the City waive all rights against each other, any of their Subcontractors, Sub-subcontractors, agents, and employees, each of the other, for damages caused by fire or other perils to the extent covered by Builders Risk insurance or other property insurance obtained pursuant to the Insurance Requirements Section of this Contract or other property insurance applicable to the work. The policies shall provide such waivers by endorsement or otherwise.

8.6 The Contractor's maintenance of insurance, its scope of coverage and limits as required herein shall not be construed to limit the liability of the Contractor to the coverage provided by such insurance, or otherwise limit the City's recourse to any remedy available at law or in equity.

8.7 The provisions of this Section shall survive the expiration or termination of this Contract with respect to any event occurring prior to such expiration or termination.

## 9. PERFORMANCE/PAYMENT BOND OR ADDITIONAL RETAINAGE

Pursuant to RCW 39.08.010, Contractor shall provide Performance Bond and Payment Bond each in an amount equal to 100% of the amount of this Contract to cover the performance of all provisions of this Contract and the payment of all laborers and suppliers. The Contract bonds shall be in a form set forth in the Contract Documents. The Contract bond shall assure that the Contractor will faithfully perform all of the provisions of the Contract as well as pay all laborers, mechanic subcontractors, materialmen, and suppliers. Contractor's obligations under this Contract shall not be limited to the bond amount.

Alternatively, pursuant to RCW 39.08.010, on contracts of Fifty-Five Thousand Dollars ($55,000) or less, at the option of the Contractor, the City may, in lieu of a bond, retain ten percent (10%) of the Contract amount for a period of thirty (30) days after the date of final acceptance, or until receipt of all necessary releases from the Department of Revenue and the Department of Labor and Industries and settlement of any liens filed under Chapter 60.28 RCW, whichever is later.

## 10. SAFETY

Contractor shall take all necessary precautions for the safety of its employees on the work site and shall comply with all applicable provisions of federal, state, and municipal safety and health laws and codes, including without limitation, all OSHA/WISHA requirements, Safety and Health Standards for Construction Work (Chapter 296-155 WAC), General Safety and Health Standards (Chapter 296-24 WAC), and General Occupational Health Standards (Chapter 296-62 WAC). Contractor shall erect and properly maintain, at all times, all necessary guards, barricades, signals, and other safeguards at all unsafe places at or near the Work for the protection of its employees and the public, safe passageways at all road crossings, crosswalks, street intersections, post danger signs warning against known or unusual hazards and do all other things necessary to prevent accident or loss of any kind. Contractor shall protect from damage all water, sewer, gas, steam or other pipes or conduits, and all hydrants and all other property that is likely to become displaced or damaged by the execution of the Work. The Contractor shall, at its own expense, secure and maintain a safe storage place for its materials and equipment and is solely responsible for the same.

## 11. PREVAILING WAGES

11.1 Wages of Employees. This Contract is subject to the minimum wage requirements of Chapter 39.12 of the Revised Code of Washington, as now existing or hereafter amended or supplemented. In the payment of hourly wages and fringe benefits to be paid to any of Contractor's laborers, workpersons and/or mechanics, Contractor shall not pay less than the "prevailing rate of wage" for an hour's work in the same trade or occupation in the locality within the State of Washington where such labor is performed, as determined by the Industrial Statistician of the Department of Labor and Industries of the State of Washington. Prevailing wages paid pursuant to this Agreement shall be the prevailing wage rates which are in effect on the date when the bids, proposals, or quotes were required to be submitted to the City.

The State of Washington prevailing wage rates applicable for this public works project, which is located in King County, may be found at the following website address of the Department of Labor and Industries: https://lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-rates/. A copy of the applicable prevailing wage rates is also available for viewing at the office of the City located at 9611 SE 36th St, Mercer Island, WA 98040. Upon request, the City will mail a hard copy of the applicable prevailing wages for this project.

11.2 Reporting Requirements. Contractor shall comply with all reporting requirements of the Department of Labor and Industries of the State of Washington. Upon the execution of this Contract, Contractor shall complete and file a Statement of Intent to Pay Prevailing Wages with the Department of Labor and Industries. If requested by the City, the Contractor shall provide certified payroll records for its employees and the employees of its subcontractors. Upon completion of the Work, Contractor shall complete and file an Affidavit of Wages Paid with the Department of Labor and Industries. Contractor shall deliver copies of both the Statement of Intent to Pay Prevailing Wages and the Affidavit of Wages Paid, certified by the Department of Labor and Industries, to the City.

**12. SUBCONTRACTOR RESPONSIBILITY**

Contractor shall verify responsibility criteria for each first-tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility criteria listed in the Instructions to Bidders and possesses an electrical contractor license, if required by chapter 19.28 RCW, or an elevator contractor license, if required by chapter 70.87 RCW. This verification requirement must be included in every public works subcontract or every tier.

**13. OWNERSHIP OF DOCUMENTS**

All originals and copies of work product, including plans, sketches, layouts, designs, design specifications, records, files computer disks, magnetic media, all finished or unfinished documents or material which may be produced or modified by Contractor while performing the Work shall become the property of the City and shall be delivered to the City at its request.

**14. CONFIDENTIALITY**

If it is necessary to provide proprietary information, the Contractor shall clearly mark the information on each page of the document(s) as "Proprietary and Confidential". The City is subject to laws regarding the disclosure of public records and document. Proposals and other materials, submitted by the Contractor become public record and may be subject to public disclosure, in whole or in part, and may be released by the City in the event of a request for disclosure. In the event the City receives a public record request for information and the Contractor has marked the requested document as "Proprietary and

Confidential", the City shall notify the Contractor of such request and withhold disclosure of such information for not less than five (5) business days, to permit the Contractor to seek judicial protection of such information; provided that the Contractor shall be solely responsible for all attorney fees and costs in such action and shall save and hold harmless the City from any costs, attorneys fees or penalty assessments under Chapter 42.56 RCW for withholding or delaying public disclosure of such information.

## 15. BOOKS AND RECORDS

The Contractor agrees to maintain books, records, and documents which sufficiently and properly reflect all direct and indirect costs related to the performance of this Contract and such accounting procedures and practices as may be deemed necessary by the City to assure proper accounting of all funds paid pursuant to this Contract. These records shall be subject at all reasonable times to inspection, review or audit by the City, its authorized representative, the State Auditor, or other governmental officials authorized by law to monitor this Contract.

## 16. CLEAN UP

At any time ordered by the City and immediately after completion of the Work, the Contractor shall, at its own expense, clean up and remove all refuse and unused materials of any kind resulting from the Work. In the event the Contractor fails to perform the necessary clean up, the City may, but in no event is it obligated to, perform the necessary clean up and the costs thereof shall be immediately paid by the Contractor to the City and/or the City may deduct its costs from any remaining payments due to the Contractor.

## 17. GENERAL PROVISIONS

This Contract, the Contract Documents and any supporting contract documents contain all of the agreements of the Parties with respect to any matter covered or mentioned in this Contract and no prior agreements or understandings shall be effective for any purpose. No provision of this Contract may be amended except by written agreement of the Parties. Any provision of this Contract which is declared invalid, void or illegal shall in no way affect, impair, or invalidate any other provision hereof and such other provisions shall remain in full force and effect. The Contractor shall not transfer or assign, in whole or in part, any or all of its obligations and rights hereunder without the prior written consent of the City. In the event the City consents to any such assignment or transfer, such consent shall in no way release the Contractor from any of its obligations or liabilities under this Contract. Subject to the preceding sentence, this Contract shall be binding upon and inure to the benefit of the Parties' successors in interest, heirs, and assigns. In the event the City or the Contractor defaults on the performance of any terms in this Contract, and the Contractor or City places the enforcement of the Contract or any part thereof, or the collection of any monies due, in the hands of an attorney, or files suit, each Party shall pay all its own attorneys' fees and expenses. The venue for any dispute related to this Contract shall be King County, Washington. Failure of the City to declare any breach or default immediately upon occurrence thereof, or delay in taking any action in connection with, shall not waive such breach or default. This Contract shall be governed by and interpreted in accordance with the laws of the State of Washington. Each individual executing this Contract on behalf of the City and Contractor represents and warrants that such individuals are duly authorized to execute this Contract. Time is of the essence of this Contract and each and all of its provisions in which performance is a factor. Adherence to completion dates is essential to the Contractor's performance of this Contract.

IN WITNESS WHEREOF, the Parties have executed this Contract the day of , 20 .

| | |
|---|---|
| **CONTRACTOR:** | **CITY:** |
| [INSERT FULL LEGAL NAME OF CONTRACTOR] | CITY OF MERCER ISLAND |
| By: ___________________________________<br>[insert full legal name and title of signator] | By: _______________________________________<br>Jessi Bon, City Manager |
| Address: | Attest: |
| | By:_______________________________________<br>Andrea Larson, City Clerk |
| Phone:<br>Email: | |
| | Approved as to form: |
| | By: _______________________________________<br>Bio Park, City Attorney |

# CITY OF MERCER ISLAND
# CONTRACT CHANGE ORDER AGREEMENT

| | |
|---|---|
| **PROJECT TITLE** | |
| **DATE** | |
| **CHANGE ORDER NUMBER** | |
| **PROJECT NUMBER** | |
| **CONTRACTOR NAME** | |
| **CONTRACTOR ADDRESS** | |

| **CONTRACT CHANGE SUMMARY** (all prices include tax) | |
|---|---|
| Original contract amount | $ |
| Previous change orders total | $ |
| This change order | $ |
| New contract amount | $ |

**SUMMARY OF PROPOSED CHANGES:**

**TIMING:** The time provided for completion in the contract is ☐ UNCHANGED ☐ INCREASED ☐ DECREASED by ____ calendar days.

**INSURANCE:** Will this change affect expiration or extent of insurance coverage? ☐ YES ☐ NO
If 'yes', will the policies be extended? ☐ YES ☐ NO

**COST:** The total cost for the changes specified in this change order will ☐ INCREASE ☐ DECREASE ☐ NOT CHANGE the total contract cost by $ ___________ (must match net total from page 2). Cost changes are broken down on page 2 of this document.

**STATEMENT:** Payment for the above work will be in accordance with the applicable portions of the standard specifications, and with the understanding that all materials, workmanship, and measurements shall be in accordance with the provisions of the standard specifications, the contract plans, and the special provisions governing the types of construction. This document shall become an amendment to the contract and all provisions of the contract not amended herein will apply to this change order.

**CONTRACTOR**

SIGNATURE DATE

PRINTED NAME TITLE

**CITY OF MERCER ISLAND**

CITY MANAGER SIGNATURE DATE

## CHANGE ORDER COST BREAKDOWN

### UNIT COST ITEMS

| BID ITEM NUMBER | DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | ITEM TOTAL | ADD or DELETE |
|---|---|---|---|---|---|---|
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| SALES TAX (10%) if applicable | | | | | | |
| **NET TOTAL FOR UNIT COST ITEMS** | | | | | | |

### LUMP SUM ITEMS

| ITEM | DESCRIPTION | COST | ADD or DELETE |
|---|---|---|---|
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| SALES TAX (10%) if applicable | | | |
| **NET TOTAL FOR LUMP SUM ITEMS** | | | |

| | |
|---|---|
| **NET TOTAL FOR ALL UNIT COST & LUMP SUM ITEMS** (includes applicable tax) | $ |

# PERFORMANCE BOND

**To City of Mercer Island, WA**

Bond No.________________

The City of Mercer Island, Washington has awarded to ______________________________________(Principal), a contract for the construction of the project designated as Sewer SCADA Systems Replacement, Bid No. 22-31, in Mercer Island, Washington (Contract), and said Principal is required to furnish a bond for performance of all obligations under the Contract.

The Principal, and _____________________________________________ (Surety), a corporation, organized under the laws of the State of__________________and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the City, in the sum of ___________________________________________________________________US Dollars ($___________________) Total Contract Amount, subject to the provisions herein.

This statutory performance bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall well and faithfully perform all of the Principal's obligations under the Contract and fulfill all terms and conditions of all duly authorized modifications, additions, and changes to said Contract that may hereafter be made, at the time and in the manner therein specified; and if such performance obligations have not been fulfilled, this bond shall remain in force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts, and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the office executing on behalf of the surety.

| PRINCIPAL | | SURETY | |
|---|---|---|---|
| Principal Signature | Date | Surety Signature | Date |
| Printed Name | Date | Printed Name | Date |
| Title | | Title | |

Name, address, and telephone of local office/agent of Surety Company is:

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# PAYMENT BOND

## to City of Mercer Island, WA

Bond No.________________

The City of Mercer Island, Washington has awarded to _______________________________________________________(Principal), a contract for the construction of the project designated as Sewer SCADA Systems Replacement, Bid No. 22-31, in Mercer Island, Washington (Contract), and said Principal is required under the terms of that Contract to furnish a payment bond in accord with Title 39.08 Revised Code of Washington (RCW) and (where applicable) 60.28 RCW.

The Principal, and________________________________________________ (Surety), a corporation organized under the laws of the State of______________ and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the City, in the sum of____________________________________________________________________ US Dollars ($__________________) Total Contract Amount, subject to the provisions herein.

This statutory payment bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall pay all persons in accordance with RCW 39.08, 39.12, and 60.28 including all workers, laborers, mechanics, subcontractors, and materialmen, and all person who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work, and all taxes incurred on said Contract under Titles 50 and 51 RCW and all taxes imposed on the Principal under Title 82 RCW; and if such payment obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any changes, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts, and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the office executing on behalf of the surety.

| PRINCIPAL | | SURETY | |
|---|---|---|---|
| Principal Signature | Date | Surety Signature | Date |
| Printed Name | Date | Printed Name | Date |
| Title | | Title | |

Name, address, and telephone of local office/agent of Surety Company is:

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# RETAINAGE AGREEMENT

Contract Title: Sewer SCADA Systems Replacement
Bid Number: 22-31

Contract Date ____________________

Contractor Name ____________________

Contractor Address ____________________

____________________

Contractor Phone ____________________

Contractor Federal ID # ____________________

State Law on How Contract Retainage Monies can be Reserved:

RCW 60.28.010 Retained percentage, labor and material Contracts for public improvements or work other than for professional services, provides that there shall be reserved by the city from the monies earned by the contractor on estimates during the progress of the improvement or work, a sum of five percent of such estimates, said sum to be retained by the city as a trust fund for the protection and payment of any persons performing work or supplying provisions or supplies during the work. The monies reserved for contract retainage may be reserved by the contractor choosing one of the following four options:

**All investments selected below are subject to City approval.**

Contractor Options (Contractor shall place an "x" in one of the boxes below.)

[ ] (a) Retained in a non-interest bearing fund by the public body until released in accordance with applicable state statutes;

[ ] (b) Deposited by the public body in an interest bearing account in a bank, mutual savings bank, or savings and loan association, not subject to withdrawal until released in accordance with applicable state statutes, provided that interest on such account shall be paid to the contractor;

[ ] (c) Placed in escrow with a bank or trust company by the public body until released in accordance with applicable state statutes. The cost of the investment program and the risk thereof is to be borne entirely by the contractor.

[ ] (d) Contractor may submit a Retainage Bond equal to 5% of the total awarded bid amount for all schedules to be held by the public body until released in accordance with applicable state statutes.

Contractor's Bank

If Contractor selects options (b) or (c) above, Contractor shall designate below the bank in which the retainage is to be deposited:

ACCOUNT NO. ____________________

BANK NAME ____________________

BANK ADDRESS ____________________

____________________

BANK PHONE # ____________________

Agreement

Contractor and City agree that all or part of the monies in the account can only be approved for disbursement by Bank to Contractor upon written authorization of the City Finance Director, or his/her authorized designee.

| | |
|---|---|
| By ____________________ | By ____________________ |
| City of Mercer Island | Contractor |
| Date ____________________ | Date ____________________ |

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# GENERAL TERMS AND CONDITIONS

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**CITY OF MERCER ISLAND**
**GENERAL TERMS AND CONDITIONS**
**MAY 2020 EDITION**

# TABLE OF CONTENTS

# ARTICLE 1: GENERAL PROVISIONS

## 1.1 DEFINITIONS

A. "**Addendum**" or "**Addenda.**" Alteration or clarification of the plans or specifications provided to bidders by City prior to bid time, which becomes part of the Contract Documents when the Contract is executed.

B. "**Claim.**" A written demand by the Contractor seeking (1) a change to Contract Price; (2) a change of Contract Time; (3) a payment of money or damages; and/or, (4) any other relief arising out of or relating to this Contract.

C. "**Change Order.**" A written instrument designated to be a Change Order which alters the Contract, and identifies the following: (1) a change in the Work; (2) a change in Contract Price; and/or (3) a change in Contract Time.

D. "**Change Proposal.**" A document prepared by the Contractor at the request of City, which proposes changes to the Work and/or changes to the Contract Price and/or Contract Time. City initiates all requests for Change Proposals.

E. The "**Contract**" or "**Contract Documents.**" The entire integrated agreement between City and the Contractor for the performance of the Work in accordance with the Contract Documents. The Contract Documents include the following:

1. The signed Agreement between City and Contractor (the "Public Works Contract");
2. The Contractor's completed Bid Form;
3. The City's General Terms and Conditions (May 2020 ed.);
4. Any Supplemental or Special Conditions.
5. Technical Specifications;
6. Drawings;
7. Addenda; and
8. Any Change Orders.

F. "**Contract Execution**." occurs when City Manager or his/her designee signs the Contract, which shall only occur after the Contractor signs the Contract.

G. "**Contract Price**" means the total amount payable by City to the Contractor for performance of the Work in accordance with the Contract.

H. "**Contract Time.**" The number of days or the specific date set forth in the Contract to achieve Substantial Completion of the Work.

I. "**Contract Work**" or "**Work.**" The labor, supervision, materials, equipment, supplies, services, other items, and requirements of the Contract necessary for the execution, completion and performance of all requirements of the Contract by the Contractor to the satisfaction of City.

J. "**Contractor.**" The individual, association, partnership, firm, company, corporation, or combination thereof, including joint ventures, contracting with City to do the Contract Work.

K. "**Critical Path.**" The longest, continuous sequence of interrelated activities that begins at the start of the Project (Notice to Proceed) and extends to Substantial Completion of the Project. These activities are critical because delay to an activity on this path will extend Contract Time.

L. "**Day.**" A calendar day, unless otherwise specified.

M. "**Differing Site Conditions.**" (1) Subsurface or latent physical conditions at the site which differ materially from those indicated in the Contract Documents (Type I), or (2) Unknown physical conditions at the Site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in the construction activities of the character provided for in the Contract (Type II).

N. "**Engineer**." The City representative who administers the Contract for the City.

O. "**Final Acceptance.**" Written acceptance of the Project by City.

P. "**Force Majeure.**" An event that is unforeseeable at the time of Contract Execution and that is beyond the reasonable control of the Contractor and City and includes:

1. Natural Disaster declared by Governor of Washington or President of the United States, including but not limited to earthquakes;
2. Acts or omissions of any government entity acting within its governmental capacity;
3. Fire and/or flood for which the Contractor or its Subcontractors is not responsible;
4. Quarantine or epidemic;
5. Strike or defensive lockout;
6. Unusually Severe Weather Conditions; and
7. Acts of terrorism.

Q. "**Hazardous Material.**" Any pollutant, contaminant, toxic or hazardous waste, dangerous substance, potentially dangerous substance, noxious substance, toxic substance, flammable material, explosive material, radioactive material, urea formaldehyde foam insulation, asbestos, PCBs, or any other substances the removal of which is required, or the manufacture, preparation, production, generation, use, maintenance, treatment, storage, transfer, handling, or shipment of which is restricted, prohibited, regulated, or penalized by any and all federal, state, City, or municipal statutes or laws and regulations promulgated thereunder, now or at any time hereafter in effect, including, but not limited to, the Comprehensive Environmental Response, Compensation, and Liability Act (42 U. S. C. §§ 9601, *et seq.*), the Hazardous Materials Transportation Act (49 U. S. C. §§ 1801, *et seq.*), the Resource Conservation and Recovery Act (42 U. S. C. §§ 6901, *et seq.*), the Federal Water Pollution Control Act (33 U. S. C. §§ 1251, *et seq.*), the Clean Air Act (42 U. S. C. §§ 7401, *et seq.*), the Toxic Substances Control Act, as amended (15 U. S. C. §§ 2601, *et seq.*), the Occupational Safety and Health Act (29 U. S. C. §§ 651, *et seq.*, and the Model Toxics Control Act (RCW 70.105), or similar state or local statute or code), as the laws have been amended and supplemented.

R. "**City**" or "**Owner**" may be used interchangeably and refer to the City of Mercer Island.

S. "**Notice.**" A written document issued by the Engineer or Contractor's Representative which is submitted to the other party and delivered by:

1. Depositing in the U. S. Mail (or other method of commercial express mail), which notice shall be effective on the date of receipt;
2. Service on the Parties' representative or at the Contractor's home office or field office, which notice shall be effective on the date of service; or,
3. Facsimile to the Parties' representative or Contractor's home office or field office, which notice shall be effective upon receipt.

T. "**Notice To Proceed.**" A written directive issued by City authorizing the Contractor to perform some or all of the Work.

U. "**Overhead.**" Charges that may be incurred or allocated in support of the Contract but are not part of the cost of directly performing the physical Contract construction activity. Overhead includes Site or Field Overhead and Home Office Overhead.

1. **Site or Field Office Overhead**

   Site or Field Overhead costs are typically those costs that are related to, but are not limited to supervision, including general foremen and their supervisors, planners, schedulers, engineers, managers, etc. and the direct payroll costs of their project-related service, clerical salaries and their direct payroll costs, the costs of all vehicles, travel, meal and lodging costs associated with those personnel, Site or Field office and utility expense, expenses associated with all regulatory compliance, Hand and Other Small Tools provided by the Contractor for the use of its forces, all expendable supplies, and all other items incidental to or integral in supporting the physical completion of the Work.

2. **Home Office Overhead**

   Home office Overhead costs are typically those that include all general office expenses. Such costs include, but are not limited to those associated with officer and office salaries and related payroll taxes and benefits, costs of office occupancy and maintenance, all supporting services (such as utilities, office machines computers, and related items and support) related to the home office function, business taxes and licenses, and all such other costs necessary to operate the business entity. Home office overhead includes unabsorbed home office overhead.

3. In addition to the above, whether treated as Site or Field Overhead or as Home Office Overhead, costs of any and all bonds, insurance(s), and taxes associated with this Contract are to be considered as Overhead. All items as those identified above are to be treated as Overhead for this purpose regardless of how the Contractor chooses to account for them in its books of account.
4. Under no circumstances shall City pay the Contractor for direct or allocated costs or charges for officer bonus and profit sharing, project personnel bonuses, charitable contributions, income taxes, or any costs relating to illegal activity.

V. **"Parties."** The Contractor and City.

W. "**Project.**" All activity relative to this Contract including activity of the Contractor, its Subcontractors, and City.

X. “**Request for Change Order.**” A document, designated as a Request for a Change Order, prepared by the Contractor requesting either (1) a change in Contract Price; (2) a change in Contract Time; (3) a change in t Work; (4) a payment of money or damages; and/or, (5) any other relief arising out of or relating to this Contract.

Y. “**Request for Information.**” A request from the Contractor to City seeking an interpretation or a clarification of some requirement of the Contract Documents.

Z. “**Site**” or “**Project Site.**” The location, at which construction, equipment or services furnished by the Contractor under the Contract will be performed, completed and/or delivered.

AA. “**Subcontractor.**” An individual, firm, partnership, or corporation having a contract, purchase order, or agreement with the Contractor, or with any Subcontractor of any tier for the performance of any part of the Contract. When City refers to Subcontractor(s) in this document, for purposes of this document and unless otherwise stated herein, the term Subcontractor(s) includes, at every level and/or tier, all subcontractors and subconsultants.

BB. “**Supplier(s).**” Any person or firm who is not performing work or supplying labor on Site and is engaged in the business of supplying a manufactured product or resource to City, Contractor, or Subcontractors. The term Suppliers includes materialmen, manufacturers, and fabricators.

CC. “**Substantial Completion.**” That stage in the progress of the Work where:

1. City has full and unrestricted use and benefit of the Project for the purpose intended;
2. All the systems and parts of the Contract Work are functional;
3. Utilities are connected and operate normally;
4. Only minor incidental work or correction or repair remains to complete all Contract requirements; and
5. The City has received all certificates of occupancy and any other permits, approvals, licenses and other documents from any governmental authority with jurisdiction necessary for beneficial occupancy of the project.

### 1.2 INTENT AND INTERPRETATION OF THE DOCUMENTS

A. The Contract Documents constitute the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.

B. The Contract Documents shall not be construed to create a contractual relationship between any parties other than City and the Contractor. No contract between City and a third party shall be construed to create any duty on the part of City or such third party to the Contractor. The Contractor is not an intended or incidental beneficiary of any promises made in City’s contract with a third party, if any.

C. The Contract Documents are intended to be complementary. What is required by one part of the Contract shall be as binding as if required by all. Should any conflict or inconsistency be found in the Contract Documents, the provision imposing the more expensive duty or obligation on the Contractor shall take precedence.

D. The words “similar,” “typical” (or other equivalents) shall mean nearly corresponding or having a likeness. Such words shall not be construed to mean that all parts of the Work referred to are identical or substantially identical, or that such elements of the Work are connected identically or substantially identically to the rest of the Work. The Contractor has the responsibility to determine all details of the Work in relation to their location and connection to other parts of the Work. The singular includes the plural and vice versa. Male includes female and vice versa.

E. The organization of the specifications into divisions, provisions and articles and the organization of the drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

### 1.3 CLARIFICATION OF DRAWINGS AND DETAIL DRAWINGS

A. Where on any drawing a portion of the Work is drawn out and the remainder is indicated in outline, the drawn out parts shall apply also to other similar portions of the Work. Where ornament or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall apply to all other similar parts of the Work, unless otherwise indicated.

B. With regard to drawings the following shall apply:

1. Written dimensions shall be followed; drawings may not be to scale.
2. Figure dimensions on drawings shall govern over scale dimensions; and detail drawings shall govern over general drawings.

## ARTICLE 2: CITY

### 2.1 AUTHORITY

A. Unless City, in writing, indicates otherwise, the authority to (1) commit to or bind City to any Change Orders or change in the Work, Contract Price and/or Contract Time; or (2) sign the Contract or Change Orders rests solely in the City Manager or his or her designee.

B. The Engineer shall have the authority to administer the Contract. Administration of the Contract by the Engineer includes but is not limited to:

1. Receiving all correspondence and information from the Contractor;
2. Issuing request for Change Proposals;
3. Responding to Requests For Information;
4. Reviewing the schedule of values, project schedules, submittals, testing and inspection reports, substitution requests, and other documentation submitted by the Contractor;
5. Negotiating Change Proposals and Change Orders;
6. Recommending Change Orders for approval by the City Manager or its designee;
7. Issuing decisions with respect to Requests for Change Orders and Claims;
8. Processing payment requests submitted by the Contractor, and recommending payment;

9. Monitoring the quality of the Work, rejecting noncompliant Work, and recommending acceptance of the Work;
10. Transmitting executed Change Orders, amendments, and other Contract correspondence to the Contractor; and
11. Performing all other contract administrative functions.

C. All correspondence, questions, and/or documentation shall be submitted to the Engineer.

D. The Engineer may designate representatives to perform functions under the Contract, such as review and/or inspection and acceptance of supplies, services, including construction, and other functions of a technical or administrative nature.

## 2.2 INFORMATION SUPPLIED BY CITY

A. Unless otherwise specifically provided in the Contract, surveys and site information provided by City are intended to describe the general physical characteristics of the Site. City does not represent that this information is complete or sufficient for the Contractor's performance of the Work.

B. City shall furnish to the Contractor a copy of the Contract Documents. The Contractor shall pay City for any additional copies of Contract Documents.

## 2.3 WORK BY CITY OR SEPARATE CONTRACTORS

City reserves the right to perform work not included in the Contract or to let other contracts in connection with this Project. The Contractor shall coordinate its Work with City and other City contractors and, at City's request, participate in meetings for the purpose of coordinating the Contractor's construction schedule with those of other contractors at no additional cost to City.

# ARTICLE 3: CONTRACTOR

## 3.1 CONTRACTOR REPRESENTATIONS

The Contractor makes the following representations to City:

A. Before submission of its bid, the Contractor has:

1. Carefully reviewed the Contract Documents, and visited and examined the Site;
2. Become familiar with the general and local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of Contract Work, the labor, materials, equipment, goods, supplies, work, services and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and reasonably ascertainable subsurface conditions and other matters that may be encountered at the Site or affect performance of the Work or the cost or difficulty thereof;
3. Become familiar with and satisfied itself as to the conditions bearing upon transportation, disposal, handling, and storage of materials; and
4. Become familiar with and satisfied itself as to the availability of labor, water, electric power, and roads; and the uncertainties of access, traffic, parking and weather. Any failure of the Contractor to take the action described in this provision (3.0) or elsewhere in the Contract Documents will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of

successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to City.

B. The Contract Price is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work as represented by the Contract, site visit, and the general conditions (including but not limited to weather, site, soil) known or reasonably anticipated for the Site.

### 3.2 GENERAL DUTIES

A. The Contractor shall give sufficient supervision to the Work, using its best skill and attention. The Contractor is on notice that City will be relying on the accuracy, competence and completeness of the Work. The Contractor shall supervise and be solely responsible for the proper performance of the Work in accordance with the Contract, including the construction means, methods, techniques, sequences, procedures, and for coordination of all portions of the Work.

B. Unless specified elsewhere in the Contract, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction machinery, utilities, transportation, and other facilities and services (including federal and state tax, industrial insurance, social security liability and all other applicable taxes) necessary for the proper execution and completion of the Work.

C. The Contractor shall also provide sufficient staffing and supervision to process Requests for Information, Change Proposals, Submittals, Change Orders, close out documentation, and to perform all other requirements of the Contract and all Work.

D. The Contractor shall lay out its Work from baselines and benchmarks indicated in the Contract, if any, and shall be responsible for the accuracy of all field measurements and surveys used in the lay out.

### 3.3 DUTY TO INSPECT CONTRACT DOCUMENTS

A. The Contractor shall carefully study and compare all Contract Documents and check the conditions, dimensions, and instructions as stated therein. Contractor will not be required to provide professional services which constitute the practice of architecture and engineering except to the extent provided for in the technical specifications and drawings.

B. The Contractor shall immediately notify City in writing of any:

1. Error, inconsistency, or omission in the Contract Documents that a reasonable contractor knew or through the exercise of reasonable diligence should have discovered under the same and similar circumstances;

2. Requirement in the Contract Documents that conflict with any local, state, and federal laws, regulations and/or permits, licenses, and easement conditions that a reasonable contractor knew or through the exercise of reasonable diligence should have discovered under the same and similar circumstances.

C. The Contractor should not proceed with the work in question until the Contractor receives written direction from the Engineer.

D. If the Contractor proceeds with the work in question without written direction from the Engineer, the Contractor shall be responsible for any costs or damages associated with:

1. Fines or penalties;
2. Demolition, tear out, removal, cleanup, remediation, or fixing the work in question; and
3. Delay, disruption, and loss of productivity.

### 3.4 CONTRACTOR'S SUPERVISION AND EMPLOYEES

A. Contractor shall provide qualified and competent people to administer the contract and perform all the Work.

B. During performance of the Work the Contractor shall have supervisory personnel on-site and available to administer, manage and coordinate the Work. City shall not be responsible for the acts or omissions of the supervisory personnel or their assistants.

C. The Contractor shall at all times enforce good order among all persons furnishing labor or materials on-site and shall only employ workers skilled in the work assigned. If requested by the Project Representative, Contractor shall provide the Project Representative with copies of licenses, registrations, and certifications.

1. City shall have the right to require the Contractor to remove personnel from the Site that do not have the appropriate qualifications and experience to meet or uphold the requirements of the Contract. City shall also have the right to order the Contractor to replace personnel who demonstrate unprofessional behavior.
2. Failure by City to require removal of any Contractor personnel shall not be deemed an admission that any such personnel are satisfactory, nor shall such failure relieve the Contractor from any contractual responsibility.

### 3.5 SUBCONTRACTORS AND SUPPLIERS

A. This Contract is between City and the Contractor.

1. The Contractor's subcontracting shall not create a contract between City and the Subcontractor and Suppliers. Subcontractors and Suppliers are not intended as incidental third party beneficiaries to the Contract. The Subcontractor and Suppliers shall have no rights against City by reason of their agreements with the Contractor.
2. The Contractor is responsible for performing all work required by the Contract. The Contract has not been written with the intent of, and City shall not be a party to, defining the division of work between the Contractor and its Subcontractors and Suppliers.

B. **Selection of Subcontractors and Suppliers**

1. Subcontractors and Suppliers shall be properly licensed, registered or certified, as applicable, and capable to perform the assigned work.
2. If requested by City, the Contractor shall provide documentation that the proposed Subcontractors and Suppliers have adequate experience and skill.
3. The Contractor shall require each Subcontractor and Supplier to comply with all provisions of this Contract. At the request of Subcontractors or Suppliers, Contractor shall make available for copying all Contract Documents.

C. **Responsibility for Work of Subcontractors and Suppliers**

The Contractor shall be responsible for the acts and omissions of Subcontractors and Suppliers. The Contractor shall also be responsible for the suitability of any materials, components, equipment or supplies furnished by a Subcontractor and/or Supplier irrespective of whether such were designated or approved by City.

### 3.6 SCHEDULE OF WORKING HOURS

A. As specified in the Contract, the Contractor shall submit a schedule of working hours, including overtime to City for acceptance. This schedule shall comply with all Contract requirements. Except as permitted elsewhere in the Contract Documents or in the case of an emergency, all Work at the Site shall be performed between the hours of 7am and 6 pm Monday through Friday.

B. The schedule of working hours accepted by City shall be the only schedule used by the Contractor during performance of the Contract, unless amended to maintain Work progress.

C. The Contractor shall provide 48 hours advance written Notice of any intent to work outside of approved working hours. Any work at the Site performed outside approved working hours shall be performed without additional expense to City, except as otherwise provided in the Contract Documents. Contractor shall comply with Mercer Island Code Section 8.24.020 (Q) which prohibits construction related noise outside designated hours except in cases of emergency or demonstrated necessity.

### 3.7 RECORD DOCUMENTS

A. The Contractor shall maintain an accurate, readable, and orderly set of drawings and specifications, updated as the job progresses to show all approved changes, options, alternates, and all actual deviations from the original Contract Documents. This set of drawings and specifications shall be the Record Documents.

1. The Record Documents shall be maintained in hard copy.
2. In addition to all approved changes, options, alternates, and all actual deviations from the original Contract Documents, the Record Documents shall be marked as follows:
    a. Record all materials used where options, alternates and/or change orders were indicated, specified and/or authorized;
    b. Accurate measurements referenced as required by the technical specifications shall be recorded to show the exact location and changes in direction of all underground services and utilities, as well as their depth below finished grade; and
    c. Record all other requirements as specified in the Technical Specifications.

B. The Record Documents shall be kept up-to-date and be available for review by City at all times, including but not limited to at each job progress meeting. Failure to have the record set up-to-date shall be sufficient reason for City to withhold payment in accordance with paragraph 7.2, *Payments Withheld*, until all such information is recorded.

C. Record Documents may be used to assist City to verify the appropriate progress payment.

D. Neither Final Acceptance nor Final Payment will be issued until a complete set of Record Documents is submitted and the Engineer is satisfied as to its quality and accuracy.

### 3.8 COST RECORDS

A. The Contractor, Subcontractors, and Suppliers shall maintain Project cost records by cost codes and shall segregate and separately record at the time incurred all costs (1) directly associated with each work activity and (2) directly or indirectly resulting from any event or condition for which the Contractor seeks an adjustment in the Contract Price, Contract Time, and/or damages.

1. Any costs claimed to result from any such event or condition, including, but not limited to, delay and impact costs, acceleration costs, loss of productivity or efficiency, and increased or extended overhead shall be recorded at the time incurred and be fairly and reasonably allocated to each such event or condition and to other causes of such costs.
2. City shall be provided with a detailed description of all such costs and the basis of allocation. The Contractor, Subcontractors, and Suppliers shall maintain a monthly summary of all costs and shall make all underlying cost records and monthly summary of costs available for review, inspection, and copying by City upon request.
3. Any work performed for which the Contractor intends to seek an adjustment in Contract Price and/or Contract Time shall be recorded on the same day the work is performed and kept separate so as to distinguish it from Contract Work.

B. In addition to the requirements set forth in Article 5, *Changes to the Contract*, and Article 6, *Time and Price Adjustments*, the Contractor shall be entitled to extra compensation for an event or condition and/or the recovery of damages only to the extent that the Project cost records are kept in full compliance with all Contract requirements and the cost allocations support entitlement to such compensation.

### 3.9 MAINTENANCE AND INSPECTION OF DOCUMENTS

A. All Contractor's, Subcontractors', and Suppliers' documents and records relating to the Contract shall be open to inspection, audit, and/or copying by City or its designee:

1. During the Contract Time; and
2. For a period of not less than six years after the date of Final Acceptance of the Contract ("Preservation Period"); or if any Claim, audit or litigation arising out of, in connection with, or related to this Contract is initiated, all documents shall be retained until such Claim, audit or litigation involving the records is resolved or completed, whichever occurs later.

B. The Contractor shall also guarantee that all Subcontractor and Supplier documents shall be retained and open to similar inspection, audit and/or copying during the Contract Time and also the Preservation Period. The Contractor, Subcontractor, and Supplier shall use its best efforts to cooperate with the inspection, auditing, and/or copying.

C. Inspection, audit, and/or copying of all documents described herein, may be performed by City or its designee at any time with not less than seven (7) days' Notice. Provided however, if an audit or inspection is to be commenced more than sixty (60) days after the Final Acceptance date of the Contract, the Contractor will be given twenty (20) days' Notice of the date of the audit.

D. The Contractor, Subcontractors, and Suppliers shall provide adequate facilities, acceptable to City, for inspection, auditing, and/or copying during normal business hours.

E. If the Contractor is formally dissolved, assigns or otherwise divests itself of its legal capacity under this Contract, then it shall immediately notify City and preserve such records, at its expense, as directed by City.

F. The Contractor, Subcontractor, and Supplier, shall be subject to audit at any time with respect to this Contract. Failure to maintain and retain sufficient records to allow City to verify all costs or damages or failure to permit City access to the books and records shall constitute a waiver of the rights of the Contractor Subcontractor and Supplier to Claim or be compensated for any damages, additional time or money under this Contract.

G. At a minimum, the following documents, including the machine readable electronic versions, shall be available for inspection, audits, and/or copying:

1. Daily time sheets and all daily reports, Supervisor's reports, and inspection reports;
2. Collective bargaining agreements;
3. Insurance, welfare, and benefits records;
4. Payroll registers;
5. Earnings records;
6. All tax forms, including payroll taxes;
7. Material invoices and requisitions;
8. Material cost distribution worksheet;
9. Equipment records (list of Contractor's, Subcontractors', and Suppliers' equipment, rates, etc.);
10. Contracts, purchase orders and agreements between the Contractor and each Subcontractor and Supplier;
11. Subcontractors' and Suppliers' payment certificates;
12. Correspondence, including email, with Subcontractors and/or Suppliers;
13. All meeting notes by and between Contractor, Subcontractors, Suppliers and/or any third parties related to the Project;
14. Canceled checks (payroll and vendors);
15. Job cost reports, including monthly totals;
16. Job payroll ledger;
17. Certified payrolls;

18. General ledger;
19. Cash disbursements journal;
20. Take off sheets, and calculations used to prepare the bid and/or quotes;
21. Take off sheets, calculations, quotes, other financial data to support change proposals, request for change order and/or claims;
22. Financial statements for all years during the Contract Time. In addition, City may require, if it deems appropriate, additional financial statements for 3 years preceding execution of the Contract and 6 years following Final Acceptance of the Contract;
23. Depreciation records on all Contractor's, Subcontractor's, and Supplier's equipment, whether these records are maintained by the Contractor, Subcontractors, and Suppliers involved, its accountant, or others;
24. If a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents;
25. All documents which relate to each and every Claim together with all documents which support the amount of damages as to each Claim;
26. Worksheets or software used to prepare the Claim establishing the cost components for items of the Claim including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors, Suppliers, all documents which establish time periods, individuals involved, the hours for the individuals, and the rates for the individuals;
27. Worksheets, software, and all other documents used (a) by the Contractor to prepare its bid and schedule(s) and/or (b) to prepare quotes and bids to the Contractor;
28. All schedule documents, including electronic versions, planned resource codes, or schedules and summaries;
29. All submittals; and
30. All other documents, including email, related to the Project, Claims, or Change Orders.

H. The Contractor shall mark any documentation it considers proprietary or confidential accordingly. Such information will be treated as such by City; however, City cannot ensure that this information will not be subject to release pursuant to a public records request. In the event City receives a request for such information, City will advise the Contractor and will not release the requested information for a period of not less than ten (10) days in order to give the Contractor an opportunity to obtain a court order prohibiting the release of the information in response to the public records request.

**3.10 MAINTENANCE AND SITE CLEANUP**

A. The Contractor shall at all times keep the Site, access points, and public rights-of-way free from accumulation of dirt, mud, waste materials or rubbish caused by the Contractor or Subcontractors. At the completion of the Contract Work, the Contractor shall remove and lawfully dispose of all its dirt, mud, waste materials, rubbish, tools, scaffolding and surplus or partly used materials from the Site and shall leave the Site broom clean unless some stricter standard is specified in the Contract.

B. The Contractor shall obey all applicable laws and regulations relating to the storage, use, and disposal of Hazardous Materials. The Contractor shall promptly notify City of all Contractor or Subcontractor caused spills or releases of Hazardous Materials, and pay the cost to promptly clean up all such spills or releases and any associated fines or penalties. The Contractor shall maintain documentation of the clean up and disposal all Contractor or Subcontractor caused spills or releases of Hazardous Materials.

C. If the Contractor fails to adequately maintain or cleanup the Site, City may, after written Notice to the Contractor, sweep surfaces or remove the dirt, mud, waste materials, rubbish, or hazardous materials and charge all reasonable costs of such work to the Contractor.

### 3.11 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, VEGETATION, UTILITIES, AND IMPROVEMENTS

A. Contractor shall protect from damage all existing structures, curbs, gutters, sidewalks, equipment, improvements, utilities, trees, and vegetation not shown in the Contract Documents to be removed or modified at or near the Site. Contractor shall repair, at no cost to City, any such damage resulting from failure to comply with the requirements of the Contract or failure to exercise reasonable care in performing the Work. If Contractor fails or refuses to repair the damage promptly, City may have the necessary work performed and deduct or charge the cost to Contractor or exercise its rights under the Performance and Payment Bond. If there are insufficient funds remaining, excluding retention, the Contractor shall pay City for the costs associated with protection and repairing the damages.

### 3.12 PERMITS, LAWS, REGULATIONS AND TAXES

A. Except those permits, easements, and variances specified in the Contract as having been previously obtained by City, all permits, licenses, easements and variances necessary for the execution of the Work shall be secured and paid for by the Contractor. The Contractor shall identify, apply for, and pay for such permits and licenses at the earliest possible time so as to avoid any delay to the Work arising from the permitting and/or licensing process. No actions taken by City to aid the Contractor in securing any permit or license shall relieve the Contractor of any obligations to secure any such permit or license.

B. The Contractor shall maintain all stamped permit sets of documents at the Site during construction, in good condition and as required by local ordinances.

C. The Contractor shall perform the Work in full compliance with local, state and federal laws, ordinances, resolutions and regulations, and with permit, license, easement, and variance conditions pertaining to the conduct of the Work. The Contractor shall defend, indemnify, and hold City, its elected officials, officers, agents and employees harmless from any assessment of fines, penalties, or damages arising from violations of the same by the Contractor or Subcontractors. The Contractor shall pay and provide proof of payment for any assessments of fines, penalties or damages. The Contractor shall cooperate with all governmental entities regarding inspection of the Work and compliance with such requirements.

D. The bid form may include a line item for sales tax on the whole amount, or on items which are not exempt from tax under Washington State Department of Revenue rules, including WAC 458-20-170 and WAC 458-20-171. Unless there are separate line items in the bid form for Washington State sales tax, Contractor shall include all sales tax in its lump sum bid or unit prices. The Contractor should contact the Washington State Department of Revenue for answers to questions in this area. The City will not adjust its payment if the Contractor bases a bid on a misunderstood tax liability. Except as provided above, the Contractor is required to pay all applicable taxes. No adjustment will be made in the amount to be paid by City under the Contract because of any change in law or regulations covering any applicable taxes, or because of any misunderstanding by the Contractor as to its liability for or the amount of any taxes.

### 3.13 PATENTS AND ROYALTIES

A. The Contractor shall assume all costs or fees relating to royalties or claims for any patented invention, article, process or method that may be used upon or in a manner connected with the Work under this Contract or with the use of completed Work by City.

### 3.14 CONTRACTOR'S CERTIFICATION

A. **Conflict of Interest**

The Contractor certifies (and shall require each Subcontractor to certify) that it has no direct or indirect pecuniary or proprietary interest, and that it shall not acquire any such interest, which conflicts in any manner or degree with the work, services or materials required to be performed and/or provided under this Contract and that it shall not employ any person or agent having any such interest. In the event that the Contractor or its agents, employees or representatives acquires such a conflict of interest, the Contractor shall immediately disclose such interest to City and take action immediately to eliminate the conflict or to withdraw from this Contract, as City may require.

B. **Contingent Fees and Gratuities**

The Contractor, by entering into this Contract with City to perform or provide work, services or materials, has thereby covenanted:

1. That no person or selling agency except bona fide employees or designated agents or representatives of the Contractor has been or will be employed or retained to solicit or secure this Contract with an agreement or understanding that a commission, percentage, brokerage, or contingent fee may be paid; and
2. That no gratuities, in the form of entertainment, gifts or otherwise, have been or will be offered or given by the Contractor or any of its agents, employees or representatives, to any official member or employee of City or other governmental agency with a view toward securing this Contract or securing favorable treatment with respect to the awarding or amending thereof, or the making of any determination with respect to the performance of this Contract. The Contractor certifies that it has not made any contributions to any person or entity as a condition of doing business with City and it has disclosed to City all attempts by any person to solicit such payments.

### 3.15 DEVIATION FROM CONTRACT

A. The Contractor shall not make an alteration, variation, addition, deviation, or omission from the requirements of the Contract Documents without the prior written consent of the Engineer.

B. Any alteration, variation, addition, deviation, or omission by the Contractor shall not result in any extra compensation or extension of time.

### 3.16 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

A. **Temporary Buildings and Utilities**

Temporary buildings (including storage sheds, shops, and offices) and utilities may be erected by Contractor on the Site only with the consent of City and without expense to City. The temporary buildings and utilities shall remain the property of Contractor and shall be removed by the Contractor at its expense upon completion of the Work.

B. **Disposal/Removal of Materials**

The Contractor shall be responsible for compliance with all laws governing the storage and ultimate disposal of all materials and components. The Contractor shall provide City with a copy of all manifests and receipts evidencing proper disposal when required by City or applicable law.

C. **Protection and Care of Contractor's Materials and Equipment**

The Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Site. Materials and equipment may be stored on the Site at the Contractor's own risk and with prior written approval from City. When the Contractor uses any portion of the Site as a shop, the Contractor shall be responsible for any repairs, patching, or cleaning arising from such use and for obtaining any necessary permits to establish such shop or temporary storage facilities.

### 3.17 CONTRACTOR'S OVERALL RESPONSIBILITY FOR PROTECTION OF WORK, PROPERTY, AND PERSONS

A. The Contractor shall be responsible for conditions of the Site, including safety of all persons and property, during performance of the Work. The Contractor shall maintain the Site and perform the Work in a manner which meets all statutory and common law requirements or other specific contractual requirements for the provision of a safe place to work and which adequately protects the safety of all persons and property on or near the Site. This obligation shall apply continuously and shall not be limited to normal working hours. City's inspection of the Work or presence at the Site does not and shall not be construed to include review of the adequacy of the Contractor's safety measures in, on or near the site of the Work.

B. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs, including adequate safety training, in connection with the Work. The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

C. The Contractor shall protect and be responsible for any damage or loss to the Work or to the materials and equipment associated with the Work until the date of

Substantial Completion. The Contractor remains responsible for any damage or loss caused directly or indirectly by the acts or omissions of the Contractor, Subcontractors, Suppliers, or third parties authorized or allowed on the Site by the Contractor until Final Acceptance.

D. The Contractor shall also be solely and completely responsible for damages arising from the Work that affect property adjacent to the Site.

E. The Contractor shall repair or replace without cost to City any damage or loss that may occur, except damages or loss caused by the acts or omissions of City.

F. The Contractor shall erect and maintain adequate steel plates, signs, fencing, barricades, lights or security measures and persons to protect the Work until the Engineer authorizes in writing the removal of signs, fencing, barricades, lights or security measures.

G. The Contractor shall conduct all operations with the least possible obstruction and inconvenience to the public. To disrupt public traffic as little as possible, the Contractor shall permit traffic to pass through the Project Site with the least possible inconvenience or delay. The Contractor shall maintain existing roads, streets, sidewalks and paths within the Project Site, keeping them open and in good, clean, safe condition at all times.

**3.18 PROTECTION OF PERSONS**

A. The Contractor shall take all reasonable precautions for the safety of all employees working on this Contract and all other persons who may be affected by such Work. The Contractor shall designate a responsible member of its organization at the Site whose duty shall be to manage and coordinate the safety programs and to prevent accidents of the Contractor and Subcontractors.

B. Except as otherwise stated in the Contract, if the Contractor encounters, on the Site, material reasonably believed to be Hazardous Material that Contractor shall immediately stop work in the area affected and give Notice of the condition to City. Work in the affected area shall not be resumed without written direction by City.

C. To protect the lives and health of persons performing work under this Contract, the Contractor shall comply with the Federal Occupational Safety and Health Act of 1970 (OSHA), including all revisions, amendments and regulations issued thereunder, and the provisions of the Washington Industrial Safety Act of 1973 (WISHA), including all revisions, amendments and regulations issued thereunder by the Washington State Department of Labor and Industries including, without limitation, all excavation, tunneling, trenching and ditching operations. In case of conflict between any such requirements, the more stringent regulation or requirement shall apply. There is no acceptable deviation from these safety requirements, regardless of practice in the construction industry. Any violation of OSHA, WISHA or other safety requirements applicable to the Work may be considered a breach of this Contract.

**3.19 SAFETY PROGRAM**

The Contractor shall prepare and maintain a written site specific “Safety Program” demonstrating the methods by which all applicable safety requirements of this Contract will be met. The Contractor shall ensure its Subcontractors and Suppliers have a written “Safety Program” or formally adopt the Contractor’s site specific “Safety Program.” The

Contractor shall conduct a weekly safety meeting with all Subcontractors and others on the Site to discuss general and specific safety matters.

### 3.20 ARCHAEOLOGICAL AND HISTORICAL PRESERVATION

The Contractor shall comply fully with the requirements set forth in Chapter 27.53 RCW entitled Archaeological Sites and Resources. The Contractor shall immediately notify the City if any artifacts, skeletal remains or other archaeological resources (as defined under RCW 27.53.040 now and as hereinafter amended) are unearthed during excavation or otherwise discovered on the Site.

### 3.21 WATER POLLUTION CONTROL REQUIREMENTS

The Contractor shall comply with and be liable for all penalties, damages and violations under Chapter 90.48 RCW including any regulations issued pursuant thereto in the performance of the Work.

### 3.22 EASEMENTS

If the Contractor makes arrangements for use of additional public and/or private property, the Contractor, prior to using such property, shall provide the Engineer with written permission of the landowner, or duly authorized agent of such landowner, for such use.

### 3.23 TITLE VI / NONDISCRIMINATION ASSURANCES

During the performance of this contract, the contractor/consultant, for itself, its assignees and successors in interest (hereinafter referred to as the “contractor”) agrees as follows:

1. **Compliance with Regulations**
   The contractor shall comply with the Regulations relative to non-discrimination in federally assisted programs of United States Department of Transportation (USDOT), Title 49, Code of Federal Regulations, part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination**
   The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, sex, or national origin in the selection and retention of sub-contractors, including procurement of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

3. **Solicitations for Sub-contracts, Including Procurement of Materials and Equipment**
   In all solicitations either by competitive bidding or negotiations made by the contractor for work to be performed under a sub-contract, including procurement of materials or leases of equipment, each potential sub-contractor or supplier shall be notified by the contractor of the contractor’s obligations under this contract and the Regulations relative to non-discrimination on the grounds of race, color, sex, or national origin.

4. **Information and Reports**
   The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records,

accounts, other sources of information, and its facilities as may be determined by the contracting agency or the appropriate federal agency to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to WSDOT or the USDOT as appropriate, and shall set forth what efforts it has made to obtain the information.

5. **Sanctions for Non-compliance**
In the event of the contractor's non-compliance with the non-discrimination provisions of this contract, the contracting agency shall impose such contract sanctions as it or the USDOT may determine to be appropriate, including, but not limited to:

- Withholding of payments to the contractor under the contract until the contractor complies, and/or,
- Cancellation, termination, or suspension of the contract, in whole or in part.

6. **Incorporation of Provisions**
The contractor shall include the provisions of paragraphs (1) through (5) in every sub-contract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any sub-contractor or procurement as the contracting agency or USDOT may direct as a means of enforcing such provisions including sanctions for non-compliance.

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a sub-contractor or supplier as a result of such direction, the contractor may request WSDOT enter into such litigation to protect the interests of the state and, in addition, the contractor may request the USDOT enter into such litigation to protect the interests of the United States.

## ARTICLE 4: ADMINISTRATION OF THE CONTRACT

### 4.1 TIME OF ESSENCE

All time requirements set forth in the Contract Documents are of the essence.

### 4.2 WORK PROGRESS

A. The Contractor shall be required to:

1. Prosecute the Work diligently with adequate forces;
2. Plan, coordinate, and layout the Work in advance so as to avoid delay; and
3. Achieve Substantial Completion of the Work and Final Acceptance in accordance with the requirements of Contract Documents.

### 4.3 SCHEDULE OF VALUES

A. Unless otherwise specified, within fourteen (14) days after the date of Contract Execution, the Contractor shall submit to City a detailed Schedule of Values that identifies the various activities of the Work and their values and quantities, including the overhead and profit for each activity. The Contractor warrants that the values identified in its Schedule of Values accurately reflect the value of each work activity. The Schedule of Values shall be used as a basis for calculating all Progress Payments. Payment for Contract Work shall be made only for and in accordance with those activities identified in the Schedule of Values.

B. The Contractor shall not be entitled to, nor shall City be required to make, payment for any Contract Work until the Schedule of Values has been accepted by City. Such acceptance shall not be unreasonably withheld.

C. City shall review and accept the Schedule of Values or provide the Contractor with a written explanation of why the Schedule of Values was not acceptable. City shall use reasonable efforts to review the Schedule of Values within thirty (30) days of City's receipt of the Contractor's submittal of its Schedule of Values. City's acceptance of the Schedule of Values shall not relieve the Contractor from its sole responsibility for the accuracy of the Schedule of Values and its compliance with all Contract requirements. The Contractor shall revise the Schedule of Values as necessary to accurately reflect Change Orders.

D. Each Application for Payment shall include a current status of the Schedule of Values. No Application for Payment will be considered until the current status of the Schedule of Values has been submitted and accepted.

E. The activities, which the Contractor identifies within its Schedule of Values, shall be specifically referenced within, and conform and be consistent with the activities set forth within the Project Schedule.

**4.4 PROJECT SCHEDULE**

A. Unless otherwise specified, within fourteen (14) days after the date of Contract Execution, the Contractor shall submit to City a Project Schedule. The Project Schedule shall show the sequence in which the Contractor proposes to perform the Work, indicate the Critical Path, identify the dates on which the Contractor proposes to start and finish the scheduled activities of the Contract Work, indicate Substantial Completion within the Contract Time, indicate a date for Final Acceptance, and meet all the requirements as may be set forth in the Contract Documents.

B. Within thirty (30) days of City's receipt of the Contractor's submittal of its Project Schedule or unless stated elsewhere in the Contract, City shall review the Project Schedule and provide the Contractor with written comments. City will review the Project Schedule only to determine whether the Project Schedule meets the requirements in the Technical Specifications on Project Schedule. To the extent the Project Schedule does not meet such Technical Specifications, the Contractor shall revise the Project Schedule to make it compliant.

C. By reviewing the Project Schedule and providing written comments, City is not approving or adopting the Contractor's plan, schedule, means, methods, techniques, sequences, or procedures required to perform the Work. Review and comment by City of the Project Schedule shall not relieve the Contractor from the sole responsibility for the accuracy of a Project Schedule, and its compliance with all Contract requirements, and its responsibility to meet all required Contract completion dates. Failure by City to indicate items on the Project Schedule that do not conform with the Contract requirements shall not alter or waive the Contract requirements or relieve the Contractor from complying with all Contract requirements.

D. The Contractor shall not be entitled to, nor shall City be required to make payment for any Contract Work until the Project Schedule complies with all Contract requirements.

E. The Contractor shall schedule the Contract Work so that the Contract Work is completed within the Contract Time. Float in the project Schedule shall be defined as the period of time measured by the number of days each non-critical path activity may be delayed before it and its succeeding activities become part of the Critical Path. Contractor and Owner may both utilize float to offset delays to the Work.

F. The Contractor shall regularly enter the actual progress of the Work and Contract Time extensions, if any, approved by City on the Project Schedule. Updated Project Schedules shall reflect actual progress and completion within the Contract Time and shall be provided to City with each Application for Payment in format(s) as required by the Contract. Applications for Progress Payments will not be considered by City and the Contractor will not be paid until the Contractor complies with these requirements. The updated Project Schedule shall be used to assist City in verifying the appropriate payment.

G. If, in the opinion of City, the Contractor falls behind in its progress of the Work due to acts or omissions of the Contractor, Subcontractors, and Suppliers, the Contractor shall take all necessary steps to improve its progress and bring its progress back in-line with the accepted Project Schedule, without additional cost to City. In this circumstance the Contractor shall, as necessary, increase the number of shifts, overtime operations, and/or days of work, both on and off the Site, and submit for acceptance any supplementary schedule or schedules as City deems necessary to demonstrate how the accepted rate of progress will be regained. Failure of the Contractor to comply with the requirements under these provisions shall be grounds for a determination by City that the Contractor is not prosecuting the Work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, City may pursue any right it has under the law or the Contract, including but not limited to default termination.

## 4.5 SUBMITTALS

A. Submittals include shop drawings, setting and erection drawings, schedules of materials, product data, samples, certificates and other information prepared for the Work by the Contractor or a Subcontractor as set forth in the Technical Specifications (“Submittals”). The Contractor shall perform no portion of the Work requiring Submittals until the Submittals have been reviewed and returned by City with one of the following annotations: (1) no exceptions taken, or (2) note markings.

B. When submitting information, the Contractor shall identify and state reasons for any alteration, variation, addition, deviation, or omission from the Contract. The Contractor shall not perform work that alters, varies, adds to, deviates from, or omits any requirement of the Contract Documents without prior specific written acceptance by City.

C. The Contractor shall provide Submittals with reasonable promptness and in such sequence as to facilitate the timely completion of the Contract.

D. City shall review the Contractor’s Submittals and respond in writing with reasonable promptness so as not to unreasonably delay the progress of the Work. Unless otherwise agreed, no delay to the Work shall be attributable to the failure by City to respond to a Submittal until thirty (30) days after the Submittal is received by City, and then only if failure by City to respond is unreasonable and affects the Contract completion date.

E. If the Contractor is required to resubmit a Submittal, any revisions on resubmittals shall be specifically identified in writing and the resubmitted Submittal shall be sequentially alpha denoted (for example: 22A followed by 22B, etc.) and note revisions in numerical order. The cost of the review of the initial Submittal and the first revised submittal shall be borne by City. The costs of all additional revised Submittals shall be charged to the Contractor. The cost of review shall include, without limitation, administrative, design, and engineering activities directly related to review of Submittals. City may deduct these costs from any amounts due the Contractor.

F. City shall review the Contractor's Submittals only for conformance with the design of the Work and compliance with the Contract. Review of the Submittals are not conducted to verify the accuracy of dimensions, quantities, or calculations, the performance of materials, systems, or equipment, or construction means, methods, techniques, sequences, or procedures, all of which remain the Contractor's responsibility. Failure by City to take exception to a Submittal shall not relieve the Contractor from any duty, including its responsibility for errors or omissions in Submittals, its duty to make Submittals and duty to perform the Work according to the requirements of the Contract. City's review of a Submittal shall not alter or waive the requirements of the Contract unless City has issued prior written approval of such change or alteration of the Contract requirements.

G. The Contractor's failure to identify any error, deviation, or omission and subsequent acceptance of the Submittal by City shall not relieve the Contractor from complying with the Contract requirements.

**4.6 REQUESTS FOR INFORMATION**

A. If the Contractor determines that some portion of the drawings, specifications or other Contract Documents require clarification or interpretation by City because of an apparent error, inconsistency, omission, or lack of clarity in the Contract, the Contractor shall promptly submit a Request For Information ("RFI") and, unless otherwise directed, shall not proceed with the affected work until City has responded to the RFI. The Contractor shall plan its work in an efficient manner so as to allow for timely responses to RFIs.

B. City shall respond in writing with reasonable promptness to Contractor's RFI.

1. At the request of the Engineer, the Contractor shall prioritize its RFIs, identify a date by which the Contractor prefers the RFI be answered, and reasons for such priority.

2. If the Contractor submits a RFI on an activity less than thirty (30) days prior to the commencement of that activity, the Contractor shall not be entitled to any time extension or adjustment in Contract Price due to the time it takes City to respond to the RFI provided that City responds within fifteen (15) days. No delay to the Work or damages to the Contractor shall be attributable to the failure by City to respond to the RFI until fifteen (15) days after City's receipt of the RFI, and then only if the failure by City to respond is unreasonable and affects the Contract completion date.

C. City's response to a RFI shall not be considered a change to the Contract requirements unless it is accompanied by a Request for Change Proposal. If the Contractor believes that City's response to the RFI constitutes changed work impacting Contract Price or Contract Time, the Contractor shall submit a Notice of Claim, Supplemental Information and a Request for Change Order to City in accordance with Articles 5, *Changes to the Contract*.

## 4.7 TESTS, INSPECTIONS, AND ACCESS TO THE WORK

A. Contractor shall be responsible for inspection and quality assurance of all the Work including all work performed by any Subcontractor. The Contractor shall document and maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract. The Contractor shall maintain all documentation related to testing and inspection and make such documentation available to City at its request. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to City, or with the appropriate public authority. If any governmental, regulatory, or permitting authority requires any portion of the Work to be inspected, tested, or approved, the Contractor shall make all arrangements for and cooperate with such inspections, tests, and approvals so as not to delay completion of the Work. The Contractor shall bear all related costs of tests, inspections, and approvals. The Contractor shall give City at least three (3) days' Notice of: (1) when the work is ready to be tested and inspected and (2) when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to City upon request.

B. The Contractor shall cooperate with City in the performance of any tests and inspections of the Work. The Contractor has the duty to coordinate all tests and inspections in a manner, which does not negatively impact Contractor's compliance with the Contract.

C. If any Work required to be inspected, tested, or approved is covered without such inspection, testing or approval being obtained, it must, if requested by City, be uncovered for observation, and such uncovering shall be at Contractor's expense.

D. City may, at any reasonable time and at its own cost, conduct inspections and tests as it deems necessary to ensure that the Work is in accordance with the Contract. City shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract. City inspection and tests are for the sole benefit of City and do not:

1. Constitute or imply acceptance;
2. Relieve Contractor of responsibility for providing adequate quality control measures;
3. Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment;
4. Relieve Contractor of its responsibility to comply with the requirements of the Contract; or
5. Impair City's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.

E. Neither observations by an inspector retained by City, the presence or absence of such inspector on the Site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract. Inspectors are not authorized to change any term or condition of the Contract.

F. Contractor shall promptly furnish, without additional charge, all facilities, labor, material and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by City. City may charge

Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes reinspection or retest necessary. City shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

### 4.8 CORRECTION OF WORK OR DAMAGED PROPERTY

A. If material, equipment, workmanship, or work proposed for, or incorporated into the Work, does not meet the Contract requirements or fails to perform satisfactorily, City shall have the right to reject such work by giving the Contractor written notice and may require the Contractor to promptly repair, replace or correct it at no cost to the City.

B. If the Contractor does not repair, replace or correct and/or remove defective or non-conforming Work or repair damaged property as required by City, in manner and/or schedule, City or City's designee may repair, replace or correct and/or remove it and deduct the cost of such effort from any payment due the Contractor.

   1. If the remaining payments due the Contractor are not sufficient to cover City's cost of remedying the defective or non-conforming Work, the Contractor shall pay the difference to City.

C. The Contractor shall be liable for all damages and costs incurred by City caused by defective or non-conforming work or workmanship, including but not limited to all special, incidental, or consequential damages incurred by City.

### 4.9 SUBSTITUTION OF PRODUCTS & PROCESSES

A. Substitutions requested by the Contractor will be subject to City's prior written acceptance and at City's sole discretion.

B. Requests for substitution must specifically identify:

   1. Material, equipment, and labor costs included in the Contractor's bid associated with the original item to be substituted;

   2. All costs for material, equipment, labor associated with the proposed substitution, including any impact costs;

   3. Proposed change to the Contract Price and/or Contract Time; and

   4. Compatibility with or modification to other systems, parts, equipment or components of the Project and Contract Work.

C. Contractor shall provide all documentation supporting its request as requested by City.

D. All costs of any redesign or modification to other systems, parts, equipment or components of the Project or Contract Work, which result from the substitution, shall be borne by the Contractor.

E. When City approves a substitution proposed by the Contractor, the Contractor shall guarantee the substituted article or materials to be equal to, or better than, those originally specified and shall be compatible with all other systems, parts, equipment or components of the Project and Contract Work. City has the right to order an unaccepted, substituted article removed and replaced without additional cost to City.

F. City has a right to a deductive Change Order if the substituted product or process is less costly than the contractually required product or process.

G. If City does not accept the substitution proposal the Contractor shall proceed, without delay or cost to City, with the Contract Work as originally specified.

### 4.10 INCREASED OR DECREASED QUANTITIES

A. Payment to the Contractor will be made only for the actual quantities of work performed and accepted in conformance with the contract. When the accepted quantity of work performed under a unit item varies from the original proposal quantity, payment will be at the unit contract price for all work unless the total accepted quantity of any contract item, adjusted to exclude added or deleted amounts included in change orders accepted by both parties, increases or decreases by more than 25 percent from the original proposal quantity. In that case, payment for contract work may be adjusted as described herein:

1. The adjusted final quantity shall be determined by starting with the final accepted quantity measured after all work under an item has been completed. From this amount, subtract any quantities included in additive change orders accepted by both parties. Then, to the resulting amount, add any quantities included in deductive change orders accepted by both parties. The final result of this calculation shall become the adjusted final quantity and the basis for comparison to the original proposal quantity.

   a. Increased Quantities: Either party to the contract will be entitled to renegotiate the price for that portion of the adjusted final quantity in excess of 1.25 times the original proposal quantity. The price for excessive quantities will be determined by agreement of the parties, or, where the parties cannot agree, the price will be determined by the City based upon the actual costs to perform the work, including markup for overhead and profit in accordance with Paragraph 6.3, *Allowable Costs*.

   b. Decreased Quantities: Either party to the contract will be entitled to an equitable adjustment if the adjusted final quantity of work performed is less than 75 percent of the original bid quantity. The equitable adjustment shall be based upon and limited to three factors:

      i. Any increase or decrease in unit costs of labor, materials or equipment, utilized for work actually performed, resulting solely from the reduction in quantity;

      ii. Changes in production rates or methods of performing work actually done to the extent that the nature of the work actually performed differs from the nature of the work included in the original plan; and

      iii. An adjustment for the anticipated contribution to unavoidable fixed cost and overhead from the units representing the difference between the adjusted final quantity and 75% of the original plan quantity.

B. The following limitations shall apply to renegotiated prices for increases and/or equitable adjustments for decreases:

1. Labor, materials and equipment rates shall be actual costs but shall not exceed the rates set forth in Paragraph 6.3, *Allowable Costs* nor shall overhead and profit exceed the rates set forth in Paragraph 6.3, *Allowable Costs*.

2. No payment for consequential damages or loss of anticipated profits will be allowed because of any variance in quantities from those originally shown in the proposal form, contact provisions, and contract plans.

3. The total payment (including the adjustment amount and unit prices for work performed) for any item which experiences an equitable adjustment for decreased quantity shall not exceed 75% of the amount original bid for the item.

C. If the adjusted final quantity of any item does not vary from the quantity shown in the proposal by more than 25% then the Contractor and the City agree that all work under that item will be performed at the original contract unit price and within the original time for completion.

D. When ordered by the Engineer, the Contractor shall proceed with the work pending determination of the cost or time adjustment for the variation in quantities.

E. The Contractor and the City agree that there will be no cost adjustment for decreases if the City has entered the amount for the item in the proposal form only to provide a common proposal for bidders.

## ARTICLE 5: CHANGES TO THE CONTRACT

### 5.1 GENERAL

A. No provisions of the Contract may be amended or modified except by written agreement signed by the City.

B. All Change Order work shall be performed in accordance with the original Contract requirements unless modified in writing by City.

C. Any response to a Request For Information, or other directive, direction, instruction, interpretation, or determination (hereinafter referred to as "Direction" for the purposes of Article 5), provided by City is not considered a Change Order, a change to Contract requirements, and shall not constitute, in and of itself, entitlement to an adjustment in Contract Price and/or Contract Time.

D. The Contractor shall not be entitled to any change in the Contract Price and/or Contract Time under the following conditions or events:

1. They were reasonably foreseeable at the time the Contractor submitted its bid;

2. They were caused by the acts of the Contractor, Subcontractor and/or Supplier, including but not limited to the choice of means, methods, techniques, sequences, or procedures for the Work, failure to provide labor, materials or equipment in a timely manner, and failure to take reasonable steps to mitigate delays, disruptions, or conditions encountered.

E. The Contract requirements for time and price impacts related to Change Orders are set forth in Article 6, *Time and Price Adjustments*.

F. If there is a bid item for "Minor Changes," payments or credits for changes that cost $5,000 or less and do not affect time, may, at the discretion of the City, be made under that bid item in lieu of the procedures set forth in Sections 5.1 – 5.6. A Minor Change will be documented by a written Order for a Minor Change or by a notation confirming an oral agreement.

## 5.2 CONTRACTOR'S REQUEST FOR A CHANGE ORDER

A. Notice of Claim and Supplemental Information. If the Contractor believes that it is entitled to additional compensation and/or time for any reason (other than for a differing site condition under Section 5.2), or if the Contractor disagrees with any written or oral direction, instruction, interpretation or determination from the City, the Contractor shall

(1) Provide the Engineer with a written Notice of Protest before doing any work or incurring any costs for which it may seek additional compensation or time from the City.

(2) Supplement the written Notice of Protest within 14 days with a written statement that includes the following:

a. The date, circumstances, and basis of entitlement to additional compensation and/or time;

b. The estimated dollar cost of the protested work and a detailed breakdown showing how that estimate was determined;

c. An analysis of the progress schedule showing the schedule change or disruption if the Contractor is asserting a schedule change or disruption;

d. Substantive basis of the Request;

e. If the protest is continuing, the information required above shall be supplemented upon request by the Engineer until the protest is resolved; and

f. The Contractor waives all claims for additional compensation and time if it fails to provide both a timely Notice of Claim and Supplemental Information with the information required by this Section.

B. Request for Change Order.

1. A Request for a Change Order must be submitted in writing to the Engineer no later than thirty-five (35) days after the Contractor submitted its supplemental information pursuant to Paragraph 5.1(A)(2).

2. The Request for a Change Order shall include:

a. Specific dollar amount covering all costs associated calculated in accordance with Article 6, *Time and Price Adjustments*;

b. Specific request for time extension (number of days) calculated in accordance with Article 6, *Time and Price Adjustments*;

c. A copy of the written Notice of intent, including all attachments;

d. All documentation supporting the Request for a Change Order, including but not limited to a cost proposal prepared using the forms provided by City, all cost records, schedule analysis, and the documents identified in §00700, ¶3.10, *Maintenance and Inspection of Documents*, that are in any way relevant to the Contractor's Request for Change Order; and

e. The Contractor waives all claims for additional compensation and time if it fails to provide a timely Request for Change Order with the information required by this Section.

C. City's Response to Contractor's Request for Change Order.

1. City will make a written determination with respect to the Contractor's Request for Change Order within thirty (30) days of receipt of said Request, unless one of the following activities occurs.

    a. City may request additional information and specify a time period for receipt of the information. The Contractor shall comply with City's request for additional information.

    b. City may inform the Contractor that additional time is needed to review the Contractor's Request for Change Order and identify a date certain when a decision will be rendered.

2. If City requests additional information, City will make a written determination within thirty (30) days receipt of Contractor's additional information.

3. If City does not make a determination within the applicable time period, the Request For Change Order is deemed denied.

D. Approval of Request for Change Order and Execution of Change Order. If City determines that a Change Order is necessary, the parties may negotiate acceptable terms and conditions and execute a Bilateral Change Order or City may issue a Unilateral Change Order.

E. Contractor Procedure upon Denial or Deemed Denial of a Request for a Change Order. If the Contractor disagrees with the denial, the Contractor's sole remedy shall be to file a fully documented Claim within thirty (30) days of deemed denial or the Contractor's receipt of the denial in accordance with Article 9, *Claims and Litigation*.

F. Contractor's Obligation to Continue to Work. Pending resolution of the Contractor's Request for a Change Order, the Contractor shall continue to perform all Work including, at the written request of City that work associated with the pending Request for Change Order. The Contractor shall maintain its progress with the Work.

G. Waiver. Failure to follow the provisions set forth herein shall constitute a waiver of the Contractor's right to receive any additional time or money as a result of any alleged direction, instruction, interpretation, determination by City and/or the event or impact to the Project.

**5.3 DIFFERING SITE CONDITIONS**

A. Immediate Written Notice to City. If the Contractor encounters a Differing Site Condition as defined in Article 1.0 the Contractor shall immediately, and before the conditions are disturbed, give written Notice to City of Differing Site Conditions.

B. Request for Change Order based on Differing Site Condition. Unless otherwise agreed upon in writing by the Engineer, within forty-five (45) days of the Contractor's initial written notification of the Differing Site Condition to City, the Contractor shall provide a Request for Change Order that includes all elements required for such a request, including:

    1. A detailed description of the Differing Site Condition; and

    2. Substantive, contractual, and technical basis supporting the existence of the Differing Site Condition and its impacts.

C. Waiver.

1. If the Contractor's actions disturb the Site such that City or City's designee cannot adequately and fully investigate the alleged differing site condition, the Contractor waives its right to receive any additional time or money as a result of the Differing Site Condition.

2. Failure by the Contractor to provide either (a) immediate Notice or (b) Request for Change Order shall constitute a waiver of the Contractor's right to receive any additional time or money as a result of the Differing Site Condition.

3. The Contractor shall be responsible for any and all costs or damages incurred by City resulting from the Contractor's failure to provide appropriate notice and/or the Detailed Description and Request for Change Order.

D. City's Response to the Differing Site Condition Request for Change Order. City shall investigate the alleged Differing Site Conditions and respond to the Differing Site Condition in accordance with the Request for Change Order procedures set forth above.

E. Contractor's Obligation to Continue to Work. The Contractor shall not disturb the condition until receipt of written authorization from the Engineer that work can resume at the location of the alleged Differing Site Condition. The Contractor shall continue with performance of all other Work.

## 5.4 SUSPENSION OF WORK

A. City Issues Directive Suspending Work

1. City may order the Contractor, in writing, to suspend all or any part of the Work of this Contract for the period of time that City determines appropriate for the convenience of City. The Contractor shall not suspend the Work without written direction from City specifically authorizing the Suspension of Work.

2. Upon receipt of a written Notice suspending the Work, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize costs attributable to such suspension. Within a period up to 120 days after the suspension notice is received by the Contractor, or within any extension of that period which City requires, City shall either:

   a. Cancel the written notice suspending the Work; or

   b. Terminate the Work for either default or convenience.

3. If a written notice suspending the Work is canceled or the period of the Suspension or any extension thereof expires, the Contractor shall resume Work as required by City.

4. If the performance of all or any part of the Work is, for an unreasonable period of time, suspended by the written direction of City, the Contractor may be entitled to an adjustment in the Contract Time, or Contract Price, or both, for increases in the time or cost of performance directly attributable to the suspension and provided that the Contractor sufficiently documents all costs and time impacts attributable to the suspension. No adjustments to Contract Price and/or Contract Time shall be allowed unless the Contractor can demonstrate that the period of suspension caused by City impacted Critical Path and delayed the Contractor from completing the Work on time.

B. Constructive Suspension of Work

1. If the Contractor believes that some action or omission on the part of City constitutes constructive suspension of Work, the Contractor shall immediately notify City in writing that the Contractor considers the actions or omission a constructive suspension of Work.

C. To the extent the Contractor believes it is entitled to any additional money or time as a result of the suspension of Work or constructive suspension, Contractor shall submit a Notice of Protest, Supplemental Information and Request for Change Order to City in accordance with Article 5, *Changes to the Contract*.

D. Failure to comply with these requirements shall constitute a waiver of Contractor rights to any adjustment in Contract Time and/or Contract Price.

E. No adjustment shall be made under this provision for any suspension to the extent that Contractor's performance would have been suspended, delayed, or interrupted as a result of actions, omissions, fault or negligence caused, in whole or in part, by the Contractor or any of its Subcontractors.

## 5.5 FORCE MAJEURE

A. To the extent the Contractor believes it is entitled to any additional time as a result of Force Majeure, Contractor shall submit a Notice of Protest, Supplemental Information and Request for Change Order to City in accordance with Article 5, *Changes to the Contract*.

B. Contractor shall not be entitled to a change in Contract Price resulting from an act of Force Majeure.

C. Contractor is not entitled to an adjustment in Contract Time if the act of Force Majeure did not impact progress of the Work on the Critical Path and delay the Contractor from completing the Work within the Contract Time.

D. When a Contractor experiences concurrent delay caused by either City or Contractor and an act of Force Majeure, the Contractor shall only be entitled to an change in Contract Time. No change to the Contract Price shall be allowed as a result of such concurrent delay.

## 5.6 CHANGE ORDERS

A. Bilateral Change Orders

1. If City and Contractor reach agreement on the terms and conditions of any change in the Work, including any adjustment in the Contract Price and Contract Time, such agreement shall be incorporated into a Change Order and signed by both Parties. Such Bilateral Change Orders shall represent full and complete payment and final settlement of all changes, Claims, damages or costs for all (a) time; (b) direct, indirect, and overhead costs; (c) profit; and (d) any and all costs or damages associated with delay, inconvenience, disruption of schedule, impact, ripple effect, loss of efficiency or productivity, acceleration of work, lost profits, stand-by, and any other costs or damages related to any work either covered or affected by the Change Order, or related to the events giving rise to the Bilateral Change Order.

B. Unilateral Change Order

1. City's Right to Issue Unilateral Change Order.

a. City may unilaterally issue a Change Order at any time, without invalidating the Contract and without notice to the sureties, making changes within the general scope of this Contract.

b. If any such Change Order causes an increase or decrease in the cost of, or time required for, performance of any part of the Work, City may make an adjustment in the Contract Price, Contract Time, or both, in accordance with Articles 5, *Changes to the Contract*, and 6, *Time and Price Adjustments*.

2. Contractor Disagreement with Unilateral Change Order. If the Contractor disagrees with the adjustment to the Contract Price and/or Time as indicated in the Unilateral Change Order, the Contractor must submit a Notice of Protest, Supplemental Information and Request for Change Order to City in accordance with Article 5, *Changes to the Contract*.

3. Contractor's Obligation to Continue to Work. The Contractor is required to continue with performance of all Work, including work associated with the Unilateral Change Order.

### 5.7 CITY REQUEST FOR A CHANGE PROPOSAL

A. Request. City may request a written Change Proposal from the Contractor for a change in the Work.

B. Contractor's Proposal. Contractor shall submit its written Change Proposal within the time specified in City's request with the costs shown in a form acceptable to the City. The Change Proposal shall represent the Contractor's offer to perform the requested work, and the pricing set forth within the proposal shall represent full, complete, and final compensation for the proposed change and any impacts to any other Work, including any adjustments in the Contract Time.

C. City's Acceptance of Contractor Proposal. If City accepts the Change Proposal as submitted by the Contractor or as negotiated by the parties, City shall notify the Contractor in writing of its acceptance of the Proposal and direct that the change in the Work be performed.

D. Execution of a Bilateral Change Order. After acceptance of the Change Proposal or acceptance of the negotiated Change Proposal, City shall direct the Contractor to perform the work in accordance with the agreed upon terms; thereafter, the Parties shall execute a bilateral Change Order in accordance with the terms of the Change Proposal or negotiated Change Proposal.

E. Execution of Unilateral Change Order. If City does not accept the Change Proposal or the Parties cannot agree upon the appropriate price or terms for the Change Proposal, City may issue a unilateral Change Order.

## ARTICLE 6: TIME AND PRICE ADJUSTMENTS

### 6.1 CHANGE IN THE CONTRACT TIME

A. The Contract Time shall only be changed by a Change Order.

B. No change in the Contract Time shall be allowed to the extent the time of performance is changed due to the fault, act, or omission of Contractor, or anyone for whose acts or omissions the Contractor is responsible.

C. Contractor is not entitled to a change in Contract Time unless the progress of the Work on the Critical Path is delayed and completion of the Contract Work within Contract Time is delayed.

D. When a Contractor experiences concurrent delays which impact the Critical Path and are caused by (1) City and the Contractor; (2) City and an act of Force Majeure; or, (3) the Contractor and an act of Force Majeure, the Contractor shall only be entitled to a change in Contract Time. No change to the Contract Price shall be allowed as a result of such concurrent delay.

E. A Request for Change Order that includes a request for an adjustment in the Contract Time shall:

1. Be in writing and delivered to City within the appropriate time period specified in Article 5, *Changes in the Contract.*

2. Include a clear explanation of how the event or conditions specifically impacted the Critical Path and overall Project Schedule and the amount of the adjustment in Contract Time requested.

3. Be limited to the change in the Critical Path of a Contractor's Project Schedule, and any updates, attributable to the event or conditions, which caused the request for adjustment. No extension of time or compensation for damages resulting from delay will be granted unless the delay affects the timely completion of all Work under the Contract or timely completion of a portion of the Work for which time of completion is specific. Contractor shall be responsible for showing clearly on the Project Schedule, and any updates, that the event or conditions:

a. Had a specific impact on the Critical Path and was the sole cause of such impact;

b. Could not have been avoided by resequencing of the Work or other reasonable alternatives; and

c. Will prevent the Contractor from completing the Project within the current Contract completion date.

F. Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of Force Majeure or otherwise.

## 6.2 CHANGE IN THE CONTRACT PRICE

A. The Contract Price shall only be changed by a Change Order.

B. No change in the Contract Price shall be allowed when:

1. Contractor's changed cost of performance is due to the fault, acts, or omissions of Contractor, or anyone for whose acts or omissions Contractor is responsible, including its subcontractors and suppliers;

2. The change is concurrently caused by Contractor and City; or

3. The change is caused by an act of a third party or Force Majeure.

C. City shall not be responsible for, and the Contractor shall not be entitled to any compensation for unallowable costs. Unallowable costs include, but are not limited to:

1. Interest or attorney's fees of any type other than those mandated by Washington state statute;
2. Claim preparation or filing costs;
3. The cost of preparing or reviewing Change Proposals or Requests for Change Orders;
4. Lost profits, lost income or earnings;
5. Costs for idle equipment when such equipment is not at the Site, has not been employed in the Work, or is not scheduled to be used at the Site;
6. Lost earnings or interest on unpaid retainage;
7. Claims consulting costs;
8. The costs of corporate officers or staff visiting the Site or participating in meetings with City;
9. Loss of other business; and/or
10. Any other special, consequential, or incidental damages incurred by the Contractor, Subcontractor, or Suppliers.

D. A Request for Change Order that includes a request for an adjustment in Contract Price shall:

1. Be in writing and delivered to City within the applicable time period specified in Article 5, *Changes to the Contract*.
2. Identify the following information:
   a. The event or condition which caused the Contractor to submit its request for an adjustment in the Contract Price;
   b. The nature of the impacts to Contractor and its Subcontractors, if any; and
   c. The amount of the adjustment in Contract Price requested calculated in accordance with Paragraph 6.3, *Allowable Costs*, and using forms provided by City.
3. Any requests by Contractor for an adjustment in the Contract Price and in the Contract Time that arise out of the same event or conditions shall be submitted together.

E. The adjustments to the Contract Price provided for in this Article represent full, final, and complete compensation for all work done in connection with the request for an adjustment in Contract Price and all costs related to, resulting from, or affected by such change in Work including, but not limited to, all direct and indirect costs, overhead, profit, and all costs or damages associated with delay, inconvenience, disruption of schedule, impact, dilution of supervision, inefficiency, ripple effect, loss of efficiency or productivity, acceleration of work, lost profits, and any other costs or damages related to any work either covered or affected by the change in the Work, or related to the events giving rise to the change.

## 6.3 METHOD TO CALCULATE ADJUSTMENTS TO CONTRACT PRICE

A. One of the following methods shall be used to calculate damages and/or adjustments to the Contract Price that result from or relate to Change Proposal, Request for Change Order, and/or Claim.

B. Determination of the method to be used to calculate adjustments in the Contract Price shall be at the sole discretion of City.

C. One of the following methods shall be used:

1. Unit Price Method;
2. Firm Fixed Price Method (also known as Lump Sum); or
3. Time and Materials Method.

D. **Unit Price Method**

1. The City may direct the Contractor to perform extra work on a Unit Price basis. Such authorization shall clearly state the:
   a. Scope of work to be performed;
   b. Applicable Unit Price; and
   c. Not to exceed amount of reimbursement as established by City.
2. The applicable unit price shall include reimbursement for all direct and indirect costs of the work, including Overhead and profit, as limited by paragraph 6.3, *Allowable Costs*.
3. Contractor shall only be paid under this method for the actual quantity of materials incorporated in or removed from the Work and such quantities must be supported by field measurement statements verified by City.

E. **Firm Fixed Price Method**

1. The Contractor and City may mutually agree on a fixed amount as the total compensation for the performance of changed work.
2. The Contractor shall provide a detailed cost breakdown supporting the Contractor's requested adjustment to Contract Price and any other financial documentation requested by the Engineer, as limited by paragraph 6.3, *Allowable Costs*.
3. Any adjustments to the Contract Price using the Firm Fixed Price Method shall include, when appropriate all reasonable costs for labor, equipment, material, Overhead and profit. Such labor, equipment, material, Overhead and profit shall be calculated in accordance with paragraph 6.3, *Allowable Costs*.
4. Whenever City authorizes Contractor to perform changed work on a Firm Fixed Price Method, City's authorization shall clearly state:
   a. Scope of work to be performed; and
   b. Total Fixed Price payment for performing such work.

F. **Time and Materials Method**

1. Whenever City authorizes the Contractor to perform work on a Time and Material basis, City's authorization shall clearly state:

a. Scope of work to be performed; and

b. A not to exceed amount of reimbursement as established by City.

2. Contractor shall:

a. Cooperate with City and assist in monitoring the work being performed;

b. Substantiate the labor hours, materials and equipment charged to work under the Time and Materials Method by detailed time cards or logs completed on a daily basis before the close of business each working day;

c. Present the time card and/or log at the close of business each day to the Engineer so that City may review and initial each time card/log;

d. Perform all work in accordance with this provision as efficiently as possible;

e. Not exceed any cost limit(s) without City's prior written approval; and

f. Maintain all records of the work, including all records of the Subcontractor, Supplier, and Materialmen, and make such records available for inspection as required in paragraphs 3.8, *Record Documents*, 3.9, *Cost Records*, and 3.10, M*aintenance and Inspection of Document.*

3. Contractor shall submit costs and any additional information requested by City to support Contractor's requested price adjustment.

4. The Contractor shall only be entitled to be paid for reasonable costs actually incurred by the Contractor. The Contractor has a duty to control costs. If City determines that the Contractor's costs are excessive or unreasonable, City, at its discretion, shall determine the reasonable amount for payment.

G. **Deductive Changes to the Contract Price**

1. A deductive change to the Contract Price may be determined by taking into account:

a. Costs incurred and saved by the Contractor as a result of the change, if any;

b. The costs of labor, material, equipment, and overhead saved and profit unearned by the deleted work. These costs shall be calculated following as closely as possible with the provisions identified in Article 6, Time and Price Adjustments; and/or,

c. At the discretion of City, costs set forth in the documents used by the Contractor to develop its bid.

2. Where City has elected not to correct incomplete or defective Work, the adjustment in the Contract Price shall take into account:

a. The costs the City would have to expend to correct the Work;

b. The decreased value to City resulting from the incomplete or defective Work; and,

c. The increased future costs which City may incur by reason of the incomplete or defective Work.

H. **Full Compensation**

An adjustment calculated in accordance with the provisions of this Article shall be full and complete payment and final settlement of all changes, claims, damages and costs for all (a) time; (b) direct, indirect, and overhead costs; (c) profit; and (d) any and all costs or damages associated with delay, inconvenience, disruption of schedule, impact, ripple effect, loss of efficiency or productivity, acceleration of work, lost profits, standby, and/or any other costs or damages related to any Work either covered or affected by the changed Work, or related to the events giving rise to the change.

**6.4 ALLOWABLE COSTS**

A. Any adjustments to the Contract Price shall be based on the following categories and shall incorporate markups for Overhead and profit as provided herein.

1. **Labor**. For all labor, including foreman supervision but excluding superintendents and other project management and consultants, the Contractor shall be reimbursed for labor costs provided herein. The labor cost of an event or condition shall be calculated as the sum of the following:

    a. **Labor Rate**. The Labor Rate is the actual reasonable wage paid to the individual plus the actual reasonable costs incurred by the Contractor to cover costs associated with Federal Insurance Compensation Act (FICA), Federal Unemployment Tax Act (FUTA), State Unemployment Tax Act (SUCA), industrial insurance, fringe benefits, and benefits paid on behalf of labor by the Contractor. The applicable Labor Rates shall be multiplied by the number of hours reasonably expended in each labor classification because of the event or condition to arrive at a total cost of labor.

    b. **Travel Allowance and/or Subsistence**. The labor calculation shall include the actual costs of travel and/or subsistence paid to the Contractor's employees engaged upon the Work when said payments are required by a labor agreement.

2. **Materials**. The cost of materials resulting from an event or condition shall be calculated in one or more of the following methods, at City's election:

    a. **Invoice Cost**. The Contractor may be paid the actual invoice cost of materials including actual freight and express charges and applicable taxes less all available discounts, rebates, and back-charges,. This method shall be considered only to the extent the Contractor's invoice costs are reasonable and the Contractor provides copies of vendor invoices, freight and express bills, and other evidence of cost accounting and payment satisfactory to City. As to materials furnished from the Contractor's stocks for which an invoice is not available, the Contractor shall furnish an affidavit certifying its actual cost of such materials and such other information as City may reasonably require;

    b. **Wholesale Price**. The Contractor may be paid the lowest current wholesale price for which the materials are available in the quantities required, including customary costs of delivery and all applicable taxes less all available discounts, rebates, and back-charges; or

c. **City Furnished Material**. City reserves the right to furnish such materials as it deems advisable, and the Contractor shall have no Claim for any costs, Overhead or profit on such materials. However, should the Contractor be required to pick up, transport and/or unload such materials the Contractor will be reimbursed for reasonable costs thereof.

3. **Equipment**. The additional cost, if any, of machine-power tools and equipment usage shall be calculated in accordance with the following rules:

   a. **Equipment Rates**. The Contractor's own charge rates may be used if verified and approved by City and based on the Contractor's actual ownership and operating cost experience. Rental rates contained in published rate guides may be used if their cost formulas and rate factors are identifiable, reflect the Contractor's historical acquisition costs, utilization, and useful life, and do not include replacement cost, escalation contingency reserves, general and administrative expense, or profit. Rates shall be based on the Contractor's actual allowable costs incurred or the rates established according to the Rental Rate Blue Book for Construction Equipment, published by Equipment Watch, PRIMEDIA, whichever is less. The Rental Rate Blue Book established hourly equipment rate shall be the monthly rental rate for the equipment plus the monthly rental rate for required attachments, divided by 176 work hours per month, multiplied by the appropriate regional adjustment factor, plus the hourly operating cost. The established equipment rate shall apply for actual equipment usage up to eight hours per day. For all hours in excess of eight hours per day or 176 hours per month, the established equipment rate shall be the monthly rental rate plus the monthly rental rate for required attachments, divided by 352, multiplied by the regional adjustment factor, plus the hourly operating cost.

   b. **Transportation**. If the necessary equipment is not already at the Site and it is not anticipated that it would be required for the performance of other work under the terms of the Contract, the calculation shall include a reasonable amount for the costs of the necessary transportation of such equipment.

   c. **Standby**. The Contractor shall only be entitled to standby equipment costs if (a) the equipment is ready, able, and available to do the Work at a moment's notice; (b) Contractor is required to have equipment standby because of an event or condition solely caused by City and (c) the Contractor can demonstrate that it could have and intended to use the equipment on other projects/jobs. The Contractor shall be compensated at 50% of the monthly rental rate for the equipment, divided by 176, and multiplied by the appropriate regional adjustment factor, as identified in the Rental Rate Blue Book for Construction Equipment, published by Machinery Information Division of PRIMEDIA Information Inc. Standby shall not be paid during periods of Contractor-caused delay, concurrent delay, Force Majeure, during any seasonal shutdown, routine maintenance, down-time or broken equipment, late delivery of equipment or supplies, or other anticipated occurrence specified in the Contract Documents. No payment shall be made for standby on any piece of equipment, which has been used on the Project in any 24 hour period. Standby costs shall not be paid for weekends, holidays, and any time the equipment was not intended to be used on the Project as demonstrated by the Project Schedule.

4. **Subcontractor & Supplier**. Direct costs associated with Subcontractors and Suppliers shall exclude Overhead and Profit markups and shall be calculated and itemized in the same manner as prescribed herein for Contractor. Contractor shall provide detailed breakdown of Subcontractor and Supplier invoices.

5. **Overhead and Profit Markup**.

   a. On a change to the Contract Price or any other claim for money by the Contractor, City will only pay Overhead, including Home Office Overhead, Site or Field Office Overhead, and unabsorbed home office overhead, and Profit pursuant to the Overhead and Profit Markups set forth herein. The Overhead and Profit Markups cover all overhead regardless of how the Contractor chooses to account for various costs in its books of account.

   b. Overhead and Profit markups shall not be applied to freight, delivery charges, express charges, and sales tax.

   c. The allowed Overhead and Profit markup shall not exceed the following:

      i. If the Contractor is self-performing work: 18% combined Overhead and Profit markup on the Contractor's Direct Costs;

      ii. If a Subcontractor or Supplier is performing work: 18% for the Subcontractor's Direct Cost for performing the work and 7% on the Direct Costs of the Subcontractors' or Suppliers'; provided that the 7% is to be divided among upper tier Subcontractors and the Contractor when a Subcontractor or Supplier is performing the work;

      iii. If the value of material and equipment is greater than 50% of the total value of the change, the Overhead and Profit Markup shall only be 10% for material and equipment; and

      iv. In no event shall the total combined Overhead and Profit markup for the Contractor and all Subcontractors and Suppliers of any tier exceed 25% of the Direct Cost to perform the Change Order work.

## ARTICLE 7: PAYMENT AND COMPLETION

### 7.1 APPLICATIONS FOR PAYMENT

A. On or about the first day of each month, the Contractor shall submit to City an Application for Payment. Each application shall be completed on a form acceptable to City and designated as an "Application for Payment."

B. The Contractor is not entitled to payment for any work unless the Application for Payment includes all required documentation. City reserves the right to withhold payment pursuant to paragraph 7.2, *Payments Withheld* if it is subsequently determined that all required documentation was not provided by the Contractor or is in error.

C. The application shall correlate the amount requested with the Schedule of Values and with the state of completion of the Work.

D. The Contractor shall submit a breakdown of the cost of lump sum items to enable the Engineer to determine the Work performed on a monthly basis. Lump sum breakdowns shall be submitted prior to the first progress payment that includes payment for the Bid Item. Absent a lump sum breakdown, the Engineer will make a determination based on information available.

## 7.2 PAYMENTS

A. City shall comply with RCW 39.76, as amended, and promptly review each Application for Payment and identify in writing any cause for disapproval within 8 working days. In addition to withholding payment for unsatisfactory performance or failure to comply with Contract requirements, if the Contractor's Application for Payment fails to recognize any back-charges, off-sets, credits, change orders, or deductions in payment made in accordance with paragraph 7.2, *Payments Withheld*, City shall have the right to revise or disapprove Contractor's Application For Payment because the Application for Payment is not considered a properly completed invoice.

B. The City shall withhold retainage from each Application for Payment as required by RCW 60.28, as amended.

C. If an Application for Payment is accepted by City, it shall be paid within thirty (30) days of City's receipt of the properly prepared invoice (Application for Payment).

## 7.3 PAYMENT WITHHELD

A. In addition to retainage withheld pursuant to RCW 60.28 and without waiver of any other available remedies, City has the right to withhold, nullify, or back-charge, in whole or in part, any payment or payments due or that have been paid to the Contractor as may be necessary to cover City's costs or to protect City from loss or damage for reasons including but not limited to:

1. Failure of the Contractor to submit or obtain acceptance of a Progress Schedule, Schedule of Values, and any updated Schedules;
2. Defective or non-conforming Work;
3. Costs incurred by City to correct, repair or replace defective or non-conforming Work, or to complete the Work;
4. A reasonable doubt that the Contract can be completed for the balance then unpaid;
5. A reasonable concern by City that the materials, equipment or component parts are not in proper operating condition;
6. Assessment of Liquidated Damages;
7. Failure to perform in accordance with the Contract;
8. Cost or liability that may occur to City as the result of the Contractor's or Subcontractor's acts, omissions, fault, or negligence;
9. Deduction in the  Work;
10. Failure of Contractor to repair damaged materials, equipment, property, or Work;
11. Failure of the Contractor to obtain approval of Submittals pertinent to the work accomplished;
12. Failure to pay Subcontractors, Suppliers, employees or other obligations arising out of the Work;

13. Failure to keep Record Documents up to date;
14. Failure to comply with all applicable federal, state, and local laws, statutes, regulations, codes, licenses, easements, and permits;
15. Failure to obtain and maintain applicable permits, insurance, and bonds; and
16. Failure to provide Statement of intent to Pay Prevailing Wage and/or Affidavits of Wages Paid and, if requested, Certified Payroll Records for the Contractor and for Subcontractors of any tier.

B. The withholding, nullification, or back-charge of any payment(s) by City shall in no way relieve the Contractor of any of its obligations under this Contract.

## 7.4 TITLE

Title to all Work and materials covered by an accepted and paid Application For Payment shall pass to City at the time of such payment, free and clear of all liens, claims, security interest, and encumbrances. Passage of title shall not, however, (1) relieve Contractor from any of its duties and responsibilities for the Work or materials, including protection thereof, (2) waive any rights of City to insist on full compliance by Contractor with the Contract requirements, or (3) constitute acceptance of the Work or materials.

## 7.5 SUBSTANTIAL COMPLETION

A. When the Contractor has achieved Substantial Completion (as defined in Section 1 above), the Contractor shall give written Notice to City.

1. City shall promptly inspect the Work and prepare a Punch List (list of items to be completed or corrected).
   a. City reserves the right to add to, modify, or change the Punch List.
   b. Failure by City to include any items on such list does not alter the responsibility of the Contractor to complete or correct the Work in accordance with the Contract.

B. At the Contractor's request, City may identify those Punch List items that must be completed or corrected in order for the Contractor to achieve Substantial Completion.

1. When City determines that those Punch List items have been completed or corrected by the Contractor, City shall make a determination that the Work is Substantially Complete.
2. A Certificate of Substantial Completion will be issued by City, which shall establish the date of Substantial Completion.
3. This Certificate of Substantial Completion shall state the responsibilities of City and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance.

C. City shall assess liquidated damages for the Contractor's failure to Substantially Complete the Work within the Contract Time. The liquidated damage amounts, set forth elsewhere in the Contract Documents, will be assessed for Contractor's failure to achieve Substantial Completion within the Contract Time. These Liquidated Damages are not a penalty, but will be assessed against the Contractor for failure to achieve these Contract requirements. These Liquidated Damage amounts are fixed and agreed upon by and between the Contractor and City because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages City would in such events sustain. These amounts shall be construed as the actual amount of damages sustained by City, and may be retained by City and deducted from payments to the Contractor. Assessment of Liquidated Damages shall not release the Contractor from any further obligations or duties pursuant to the Work.

D. As provided in the Contract Documents, City may grant Substantial Completion to specific subsystems or portions of the Work. The dates of Substantial Completion shall be determined, in writing, by City.

## 7.6 FINAL INSPECTION

A. The Contractor shall correct all remaining Punch List items and complete all remaining Work within the time period stated in the Certificate of Substantial Completion or within 30 days, whichever is less. When all Punch List items have been successfully corrected and the work is complete the Contractor's shall give written notice to the City that the Work ready for final inspection. After verification by City that such completion was satisfactory, the Contractor shall submit a Final Application for Payment.

## 7.7 REQUIREMENTS FOR FINAL APPLICATION FOR PAYMENT

A. In addition to any other requirement identified in the Contract Documents, the Final Application for Payment shall include the following documents:

1. Affidavit of Wages Paid for Contractor and all Subcontractors in accordance with state law;
2. Contractor's release of claims against City, except for Claims specifically described in the release document and submitted in accordance with Article 9, *Claims and Litigation*; and
3. Contractor certification that all Subcontractors and Suppliers have been paid and there are no outstanding liens.

## 7.8 COMPLETION/FINAL ACCEPTANCE

A. Completion/Final Acceptance shall be achieved when all the obligations of the Contract have been successfully performed by the Contractor in accordance with the Contract and accepted by City. Should Contractor fail to achieve Final Acceptance within the required time the City may assess actual damages caused by its failure to do so.

B. Neither Final Acceptance, nor Final Payment, shall release Contractor or its sureties from any obligations under this Contract or the Performance and Payment Bonds, or constitute a waiver of any claims by City arising from or related to Contractor's performance or failure to perform the Work and to meet all Contractual obligations in accordance with the Contract, including but not limited to:

1. Unsettled liens, security interests or encumbrances;
2. Damaged, non-conforming, or defective Work discovered by City;
3. Terms of any warranties or guarantees required by the Contract; and
4. Payments made in error.

C. Except for any Claims properly submitted in accordance with Article 9, *Claims and Litigation*, acceptance of Payment on the Final Application for Payment by the Contractor shall, on behalf of itself and its Subcontractors or Sureties, forever and unconditionally release and discharge City, it officers, agents, employees, from:

   1. Any and all disputes or claims, including but not limited to claims for damages, fines, interest, taxes, attorney fees, or costs, demands, rights, actions or causes of actions, known or unknown, arising out of or in any way related to the parties' performance under the Contract and/or Project; and

   2. Any and all known and/or unknown liabilities, obligations, demands, actions, suits, debts, charges, causes of action, requests for money and/or payment under the Contract, outstanding invoices, or claims directly or indirectly arising out of or related to the Contract and/or Project.

### 7.9 WARRANTY AND GUARANTY

A. In addition to any special warranties provided elsewhere in the Contract, Contractor warrants that all Work conforms to the requirements of the Contract and is free from any defect in equipment, material, design, or workmanship performed by Contractor or its Subcontractors and Suppliers.

B. The warranty period shall be for the longer period of: one year from the date of Final Acceptance of the entire Project or the duration of any special extended warranty offered by a supplier or common to the trade.

C. With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract, Contractor shall:

   1. Obtain all warranties that would be given in normal commercial practice from the supplier and/or manufacturer;

   2. Prior to Final Acceptance require all warranties be executed, in writing, for the benefit of City;

   3. Enforce all warranties for the benefit of City; and

   4. Be responsible to enforce any warranty of a Subcontractor, manufacturer, or Supplier, should they extend beyond the period specified in the Contract.

D. If, within an applicable warranty period, any part of the Work is found not to conform to the Contract, the Contractor shall correct it promptly after receipt of written Notice from City to do so. In the event City determines that Contractor corrective action is not satisfactory and/or timely performed, then City has the right to either correct the problem itself or procure the necessary services, recommendations, or guidance from third parties. All damages incurred by City and all costs for City's remedy shall be reimbursed by the Contractor.

E. The warranty provided in this provision shall be in addition to any other rights or remedies provided elsewhere in the Contract or by applicable law.

### 7.10 PRIOR OCCUPATION

City shall have the right to occupy such part or parts of the Project in or upon which the Work is being done, as it may see fit, and such occupation shall not be construed as acceptance by City of the Work or constitute Substantial Completion of the Work.

## ARTICLE 8: TERMINATION

### 8.1 CITY'S RIGHT TO TERMINATE CONTRACT

A. **Termination for Default**

1. City may terminate, without prejudice to any right or remedy of City the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:

   a. Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;

   b. Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Final Acceptance of the Work in a timely manner;

   c. Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency;

   d. Contractor fails in a material way to repair, replace or correct Work not in conformance with the Contract;

   e. Contractor repeatedly fails to supply skilled workers or proper materials or equipment;

   f. Contractor repeatedly fails to make prompt payment to its employees or Subcontractors;

   g. Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, permits, easements or orders of any public authority having jurisdiction;

   h. Contractor fails to comply with all Contract safety requirements; or

   i. Contractor is otherwise in material breach of any provision of the Contract, including but not limited to quality control, environmental requirements, administrative requirements, coordination and supervision.

2. If City reasonably believes that one of the aforementioned events has occurred, City will provide the Contractor with written Notice of its intent to terminate the Contractor for default, specifying within such notice the ground(s) for such termination. City, at its option, shall require the Contractor to either promptly correct the deficiencies noted in City's intent to terminate or provide City with a corrective action plan as to how such deficiencies will be remedied or cured in a timely fashion. However, if after receipt of the proposed remedy, City has a reasonable basis for concluding that the Contractor has (a) failed or is unwilling to repair, replace or correct the deficiencies, or (b) failed or is unwilling to provide a reasonable and satisfactory corrective action plan, City shall thereafter have the right to terminate this Contract for default.

3. Upon termination, City may at its option:

   a. Take possession of the Site and possession of or use of all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor; and/or

b. Finish the Work by whatever other reasonable method it deems expedient; or

c. Call upon the surety to perform its obligations under the performance and payment bonds, if applicable.

4. The Contractor and its sureties shall be liable for all damages and costs, including but not limited to: (1) compensation for architect and engineering services and expenses made necessary thereby; (2) any other costs or damages incurred by City in completing and/or correcting the Work; and (3) any other special, incidental or consequential damages incurred by City which results or arises from the breach or termination for default.

5. In the event of termination for default City shall only pay the Contractor for Work successfully completed and accepted by City prior to the date of termination. City shall not be responsible for any other Contractor costs, expenses, or damages including any consequential, special, or incidental damages or lost profits associated with this Contract. In no event shall City reimburse the Contractor for any costs directly or indirectly related to the cause of this termination for default.

6. If, after termination for default, it is determined that the Contractor was not in default, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of City.

7. The rights and remedies of City in this provision are in addition to any other rights and remedies provided by law or under this contract.

B. **Termination for Convenience**

1. Upon written Notice City may terminate the Work, or any part of it, without prejudice to any right or remedy of City, for the convenience of City.

2. If City terminates the Work or any portion thereof for convenience, Contractor shall recover as its sole remedy:

   a. Reasonable costs for all Work completed prior to the effective date of the termination and not previously paid for by City; and

   b. A reasonable allowance for Overhead and profit for Work actually performed prior to the date of termination and accepted by City, at a rate not to exceed the percentage amount set forth in the Contract and in paragraph 6.3, *Allowable Costs*, subparagraph A.5, *Overhead and Profit*. The Contractor waives all other claims for payment and damages including without limitation, anticipated profit and overhead on work not performed and accepted by City.

3. The Contractor shall not be entitled to any other costs or damages, whatsoever. The total sum payable upon termination shall not exceed the Contract Price reduced by prior payments. Contractor shall be required to make its request for adjustment in accordance with Article 5, *Changes to the Contract*, and Article 6, *Time and Price Adjustments*.

4. If it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, City shall not reimburse Contractor any profit for the Work completed and shall reduce the settlement to reflect the indicated rate of loss.

C. **Contractor's Obligations During Termination**

Unless City directs otherwise, after receipt of a written Notice of termination for default or termination for convenience, Contractor shall promptly:

1. Stop performing Work on the date and as specified in the Notice of termination;
2. Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work not terminated;
3. Cancel all orders and subcontracts, upon terms acceptable to City, to the extent that they relate to the performance of Work terminated;
4. Assign as specifically requested by City all of the rights, title, and interest of Contractor in all orders and subcontracts;
5. Take such action as may be necessary or as directed by City to preserve and protect the Work, Site, and any other property related to this Project in the possession of Contractor in which City has an interest;
6. Continue performance of Work only to the extent not terminated; and
7. Take any other steps required by City with respect to this Project.

**8.2 CITY'S RIGHT TO STOP THE WORK FOR CAUSE**

A. If Contractor fails or refuses to perform its obligations in accordance with the Contract, City may order Contractor, in writing, to stop the Work, or any portion thereof, until satisfactory corrective action has been taken.

B. Contractor shall not be entitled to any adjustment in the Contract Time and/or Contract Price for any increased cost or time of performance attributable to Contractor's failure or refusal to perform its obligations under the Contract.

## ARTICLE 9: CLAIMS AND LITIGATION

**9.1 CONTRACTOR CLAIMS**

A. Condition Precedent to Filing a Claim.

1. The following actions are a condition precedent to filing a Claim:
   a. The Contractor submitted a timely Notice of Protest, Supplemental Information and Request for Change Order as required by paragraph 5.1;
   b. The Request for Change Order has been denied or deemed denied by City; or
   c. A Unilateral Change Order is issued by City.

B. Failure to file a Timely Claim.

1. At least seven (7) days prior to appropriate time to file a Claim, the Contractor may request an extension of time for filing its Claim. The Contractor shall state the reasons for the request and identify a date certain when the Contractor shall provide a fully documented Claim. Unless otherwise agreed to in writing by the Engineer, a fully documented Claim shall be received by the City within thirty (30) days after:
   a. Denial or deemed denial of a Request for Change Order; or

b. Contractor's receipt of an Executed Unilateral Change Order.

2. Failure to comply with the time requirements set for filing a Claim shall constitute acceptance by the Contractor, on behalf of itself and its Subcontractors and Suppliers, of the Unilateral Change Order and/or City's denial or deemed denial of a Request for Change Order. Such acceptance shall be considered complete, full, and final settlement of all costs, damages, and Claims related to or arising from the Request for Change Order and/or Unilateral Change Order.

C. Contractor's Obligation to Continue to Work. Pending final decision of a Claim hereunder, the Contractor shall proceed diligently with the performance of the Contract Work, including that work associated with the Claim, and maintain its progress with the Work.

D. Information required in a Fully Documented Claim. Every Claim must be submitted by the Contractor, in writing and clearly designated by the Contractor as a fully documented Claim. At a minimum, a fully documented Claim must contain the following information:

1. A detailed factual statement of the Claim providing all necessary details, locations, and items of Contract Work affected;

2. The date on which facts arose that gave rise to the Claim;

3. The name of each person employed or associated with the Contractor, Subcontractor, Supplier, and/or City with knowledge about the event or condition which gave rise to the Claim;

4. Copies of documents and a written description of the substance of any oral communications that concern or relate to the Claim;

5. The specific provisions of the Contract Documents on which the Claim is based;

6. If an adjustment in the Contract Price is sought, the exact amount sought, calculated in accordance with the Contract including paragraph 6.3, *Allowable Cost* and accompanied by (a) all records supporting the Claim and (b) all records meeting the requirements of paragraph 3.10, *Cost Records*;

7. If an adjustment in the Contract Time is sought, the specific days and dates for which it is sought; the specific reason the Contractor believes an adjustment in the Contract Time should be granted; and the Contractor's analyses of its Progress Schedule, any specific Schedule analysis as required by the Contract Documents, and all updates to demonstrate the reason for the adjustment in Contract Time; and

8. A statement certifying, under penalty of perjury, that after the exercise or reasonable diligence and investigation the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of the Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Price or Contract Time for which the Contractor believes City is liable.

E. Contractor's Duty to Cooperate. The Contractor shall cooperate with City or its designee in the evaluation of its Claim and provide all information and documentation requested by City, its auditors or its designee.

F. City's Evaluation of the Claim.

1. To assist City in the review of the Contractor's Claim, City or its designee may visit the Site, request additional information and/or documentation in order to fully evaluate the issues raised in the Claim and/or audit the Claim.

2. After the Contractor has submitted a fully documented Claim that complies with this provision, City shall respond, in writing, to the Contractor within sixty (60) days from the date the fully documented Claim is received with either:

   a. A decision regarding the Claim; or

   b. Written Notice extending for another thirty (30) days City's time to respond to the Claim.

3. Absent a thirty (30) day extension, the Claim shall be deemed denied upon the sixty-first (61st) day following receipt of the Claim by City. If City had a thirty (30) day extension, the Claim shall be deemed denied upon the ninety-first (91st) day following receipt of the Claim by City.

### 9.2 CONTRACTOR'S BURDEN OF PROOF ON CLAIM

A. The Contractor shall have the burden of proof to demonstrate entitlement and damages.

B. If the Contractor, on behalf of itself or its Subcontractors and Suppliers seeks an adjustment in the Contract Price or Contract Time not supported by Project cost records meeting the requirements of ¶3.10, *Cost Records,* the Claim is waived.

C. Compliance with the record keeping requirements set forth in this Contract is a condition precedent to recovery of any costs or damages related to or arising from performance of the Contract Work. If City establishes non-compliance of the record-keeping requirement set forth in ¶ 3.10, *Cost Records*, no adjustment shall be made to the Contract Price and/or Contract Time with respect to that Claim.

### 9.3 LITIGATION

A. As a mandatory condition precedent to the initiation of litigation by the Contractor against City, Contractor shall comply with all provisions set forth in this Contract including those stated in Article 5 and Article 9.

B. Any litigation brought against City shall be filed and served on City within 365 days from either the issuance of the Certificate of Substantial Completion for the entire Contract or Final Acceptance if no Certificate of Substantial Completion of the entire Contract is issued.

C. Venue and jurisdiction shall vest solely in the King County Superior Court.

D. Failure to comply with these mandatory condition time requirements shall constitute a waiver of the Contractor's right to pursue judicial relief from or against the City.

## ARTICLE 10: MISCELLANEOUS

### 10.1 COMPENSATION, WAGES, BENEFITS AND TAXES

City assumes no responsibility for the payment of any compensation, wages, benefits, or taxes owed by the Contractor by reason of this Contract. The Contractor shall indemnify and hold City, its elected officials, officers, agents and employees, harmless against all liability and costs resulting from the Contractor's failure to pay any compensation, wages, benefits or taxes.

### 10.2 PREVAILING WAGES

The Contractor shall comply with the minimum wage requirements of RCW 39.12, as amended, including the obligation to pay at least the hourly minimum wage and fringe benefits to workers as required by RCW 39.12. The Contractor shall also post all notices required by the Washington Department of Labor & Industries on forms provided by the Department of Labor & Industries. The Contractor shall timely provide a "Statement of Intent to Pay Prevailing Wages" and timely provide an "Affidavit of Prevailing Wages Paid."

### 10.3 SUCCESSORS AND ASSIGNS

City and the Contractor each binds itself, its partners, successors, assigns and legal representatives to the other with respect to all covenants, agreements and obligations contained in the Contract. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to it hereunder, without the previous written consent of City.

### 10.4 THIRD PARTY AGREEMENTS

Except as otherwise may be provided, the Contract shall not be construed to create a contractual relationship of any kind between: any architect, engineer, construction manager, Subcontractor, Supplier, or any persons other than City and Contractor.

### 10.5 NONWAIVER OF BREACH

No action or failure to act by City shall constitute a waiver of any right or duty afforded to City under the Contract; nor shall any such action or failure to act by City constitute an approval of or acquiescence in any breach hereunder, except as may be specifically stated by City in writing.

### 10.6 NOTICE TO CITY OF LABOR DISPUTES

A. If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract, Contractor shall immediately give Notice, including all relevant information, to City.

B. Contractor agrees to insert a provision in its Subcontracts and to require insertion in all sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by any actual or potential labor dispute, all Subcontractor or lower-tiered Subcontractor shall immediately notify the next higher tier Subcontractor. Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

### 10.7 HEADINGS

The headings used in the Contract are for convenience only and shall not be considered a part of or affect the construction or interpretation of any contractual provision therein.

### 10.8 CHOICE OF LAW

In the event that either party shall bring a lawsuit or action related to or arising out of this Contract, such lawsuit or action shall be brought in the Superior Court, King County, Washington. This Contract shall be governed by, and construed and enforced in accordance with the laws of the State of Washington.

### 10.9 SEVERABILITY

The provisions of this Contract shall be effective in all cases unless otherwise prohibited by Washington State Law or applicable Federal Law. The provisions of this Contract are separate and severable. The invalidity of any sentence, paragraph, provision, section, Article, or portion of this Contract shall not affect the validity of the remainder of this Contract.

SECTION 01 11 00

SUMMARY OF WORK

## PART 1 GENERAL

### 1.01 SUMMARY

A. Project Location:

1. The Work is located in the City of Mercer Island, Washington at the following locations as identified on the Contract drawings:

| Site | Address |
|---|---|
| Pump Station 1 | 8002 SE 20th St |
| Pump Station 4 | 5904 SE 20th St |
| Pump Station 10 | 9030 N Mercer Way |
| Flush Station 12 | 4008 E Mercer Way |
| Pump Station 13 | 3895 W Mercer Way |
| Pump Station 14 | 4315 Forest Ave SE |
| Pump Station 15 | 4765 Forest Ave SE |
| Pump Station 16 | 5495 W Mercer Way |
| Pump Station 17 | 6425 77th Ave SE |
| Pump Station 18 | 7201 W Mercer Way |
| Pump Station 19 | 7651 W Mercer Way |
| Pump Station 20 | 8444 Benotho Pl |
| Pump Station 21 | 8002 Avalon Pl |
| Pump Station 22 | 6228 E Mercer Way |
| Pump Station 23 | 5406 96th Ave SE |
| Pump Station 24 | 4606 E Mercer Way |
| Pump Station 25 | 9855 SE 42nd Pl |

B. Project Overview:

1. The project consists of providing a control system upgrade at the City’s sewer pump station sites identified above. The Work includes the following:
   a. Replacement of the programmable logic controllers (PLC) panels at the seventeen (17) sites.
   b. Instrument demolition and replacement.
   c. Modifications to motor control panels to remove motor reversing functionality.
   d. Addition of remote operation of flush valves at two (2) stations.
   e. Removal of “Operator in Trouble” panic buttons.
   f. Generator monitoring improvements.
   g. Addition of an exhaust fan low flow switch at fifteen (15) stations.
   h. Installation of go/no-go panels at fourteen (14) stations.

C. Work Summary:
   1. PLC and Remote I/O (RIO) Panel Work
      a. Replace PLC back panels at four (4) sewer pump station sites (Pump Stations 4, 14, 15, and 25) with new programmable logic controllers (PLCs) custom fabricated as new back panels for efficient cutover between the existing PLC to the new PLC. Replace operator interface terminal (OIT) at each site. Field verify and document the input/output (I/O) connections to the existing PLC panels, disconnect, and re-terminate power, I/O, and cellular communications to the new PLC back panel.
      b. Provide new PLC panels (custom fabricated back panel and enclosure) at thirteen (13) sewer pump station sites (Pump Stations 1, 10, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, and 24), where the existing PLC panel size is insufficient for the new control system equipment. Provide new OIT on the panels. Field verify and document the input/output (I/O) connections to the existing PLC panels, disconnect and pull back existing cables from conduit. Remove conduit as needed to allow for installation of new larger enclosure. Provide compression fittings on existing conduit to route to new panel. Re-terminate power, I/O, and cellular communications at the new PLC panel enclosure.
      c. Provide new remote input/output (RIO) panels (custom fabricated back panel and enclosure) at eight (8) remote generator sites (at Pump Stations 1, 13, 17, 18, 19, 20, 21, and 24) to facilitate monitoring of generator sites at the City's supervisory control and data acquisition (SCADA) system. Terminate power, I/O, and cellular communications at the new RIO panel enclosure.
      d. Provide specified PLC/RIO/OIT hardware based on the manufacturer/platform(s) the Owner has standardized on.
   2. Intrinsically Safe (IS) Panel Work
      a. Provide new IS panels (custom fabricated back panel and enclosure) at select sewer pump station sites (Pump Stations 1, 4, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25) to meet requirements for hazardous (classified) locations.
      b. Replace IS back panel at Pump Station 14 to meet requirements for hazardous (classified) locations. Provide new level control panel (custom fabricated back panel and enclosure) at Pump Station 14.
   3. Exhaust Fan Low Flow Switch and Go/No-Go Panel Work
      a. Provide instrumentation consisting of a low flow switch in existing exhaust fan duct, and provide new Go/No-Go panels and horn/beacon at select sites (Pump Stations 1, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25) to support NFPA 820 requirements for the sites.
      b. Provide instrumentation consisting of a low flow switch in existing exhaust fan duct at Pump Station 4.
   4. Process Instrumentation Work
      a. Provide new level instrumentation in existing wetwells at select sites (Pump Stations 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, and 25).
   5. Motor Control Panel Work
      a. Modifications to existing motor control panels to add remote operation of flush valves at select sites (Pump Stations 15 and 16).

b. Modifications to existing motor control panels to add hardwired level control of the wetwell pumps (Pump Stations 1, 4, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25).

6. Flush Valve Work

   a. New wiring/conduit at select sites to add remote SCADA operation for existing flush valves (Pump Stations 15 and 16).

7. Generator Monitoring Work

   a. Replacement of wiring between the sewer pump station and remote generator at select sites (Pump Stations 4, 10, 14, 15, 16, 22).

8. Demolition

   a. Demolition of existing control system equipment to be replaced.

   b. Demolition in existing motor control panels to remove motor reversing functionality.

   c. Demolition of obsolete equipment/instrumentation and conduit/wiring, including "Operator in Trouble" panic buttons and wetwell level instrumentation.

9. Testing

   a. Provide a process control system integrated factory acceptance test for the custom PLC panels and back panels, including testing of the PLC, RIO, OIT, and SCADA application programming in coordination with the Owner's Programmer.

   b. Field testing and commissioning in accordance with Sections 01 75 00 and 40 61 21.

10. Training

    a. Provide a comprehensive training program for City staff on the design, operation, configuration, and maintenance of the new instrumentation, IS panels, Go/No-Go panels, PLC/RIO panels and panel components.

11. Other Electrical Upgrades

    a. Trace existing electrical circuits interconnected to the existing PLC panels to document to/from locations. Provide new field labels to match documentation.

    b. Install and route new conduit at pump station locations.

    c. Pull and terminate new power, control, signal, and data cable at all pump station locations.

12. Work Sequence and Constraints

    a. Refer to Section 01 12 16 for project milestones, construction sequencing requirements, work restrictions, and constraints for the Work. The existing sewer collection system is currently and continuously in operation, and those functions shall not be interrupted except as specified in Section 01 12 16.

D. Background:

1. The City's sewer collection system comprises pump stations along the shoreline of Lake Washington that pump wastewater from one station to the next until discharging to King County for treatment. Stations are grouped hydraulically into systems called reaches, with each reach consisting of a series of pump stations and Lakeline pipe, ending at one of two King County Department of Natural Resources (KCDNR) connections. There are five reaches that make up the sewer collection system on the island.

2. The City's sewer pump station sites have existing PLCs for local control/monitoring and communicate remotely to a centralized SCADA/human machine interface (HMI) system. The City is replacing the existing SCADA/HMI system under a separate contract as part of the overall upgrade. PLC, RIO, OIT, and SCADA/HMI application programming is being performed under a separate contract by the Owner's Programmer.
3. The City has recently upgraded the remote communications system between the sewer pump stations and City's operation center to cellular communications as part of the overall system upgrade.

E. Site Access:

1. The sewer pump station sites are located either in public right-of-way or on private properties within easements. Access to the sewer pump station sites is limited and in some locations access may be feasible by water. Ability to utilize large equipment or vehicles for bringing equipment and materials to the project sites may also be limited. Refer to the "Sewer System Lakeline Access Evaluation" in Attachment A of this Section for an overview of sewer pump station sites and access information. Contractor shall be responsible for planning access to facilities including any necessary additional insurance provisions.

## 1.02 AMBIENT CONDITIONS

A. Site elevation: 16 feet to 338 feet (peak).

B. Outside temperature: 5 deg F to 100 deg F.

C. Inside temperature: 45 deg F to 90 deg F.

# PART 2 NOT USED

# PART 3 EXECUTION

## 3.01 ATTACHMENTS

A. 01 11 00 Attachment A: Reference Materials

1. The following documents from previous construction contracts were used as reference material in the design of work included in this contract. These documents from previous construction contracts are provided in Attachment A of this Section for the convenience of bidders and the Contractor. Because these documents do not necessarily reflect changes made during or after construction, they may not indicate existing conditions accurately. The information contained in these documents, therefore, cannot be guaranteed as to accuracy or completeness, and bidders and the Contractor are solely responsible for verifying any information shown on these documents.
   a. Pump Station 10 As-Built Drawings, Drawing No. 5814-27 to 5814-39 – Carey & Kramer Consulting Engineers, 1961.
   b. Sewer Pump Station As-Built Drawings, Drawing No. 6223-C300 to 6223-E331A – Carey & Kramer Consulting Engineers, 1967.
   c. Flush Station 12 Control Wiring Schematic, Drawing No. C1040821 –Stead and Baggerly (S&B) Inc., 1985.

d. Pump Station No. 1, 12, & 13 Plan and Sections, Project No. 0035-004-002 – HDR Engineering, Inc., 1991.
e. Pump Station Motor Control Panel As-Built Drawings, Drawing No. 9308-1287-D101 to 9308-1287-D135 – Electrical Packaging Co. (ELPAC) Inc., 1993.
f. Maintenance Department Telemetry System Phase 1 Installation, Job No. 0321-010 – Casne Engineering, Inc., 2004.
g. Sewer Lake Line and P.S. No. 4 Replacement Project, Sheets 1 to 77 – Tetra Tech, 2008.
h. Pump Station 4 MCC Drawings, Drawing No. F26200178-002-01 to E26200178-002-10 – Square D by Schneider Electric, 2009.
i. Pump Station 4 Control Panel Drawings, Job No. 7189 – Technical Systems Inc., 2010.
j. Phase 2 PLC As-Built Drawings, Job No. 7293 – Technical Systems Inc., 2011.
k. Pump Station #14 Modernization Construction Drawings, Job No. 218-2279-004 – Parametrix, 2013.
l. Pump Station 14 Design Drawings, Drawing No. PEI-Q140-000 to PEI-Q140-300 – Portland Engineering Inc., 2014.
m. Phase III Sewer Telemetry 2014 Updgrade, Drawings No. 3924-1 to 3824-5 – Superior Custom Controls, 2015.
n. Pump Station No. 18 Pump Replacement, Pump Stations 13, 17, & 24 Generators Replacement, Job No. 801703 – CHS Engineers, 2018.
o. Sewer System Lakeline Access Evaluation, Project No. 200-12528-18002 – Tetra Tech and Carollo Engineers, Inc., May 2019.
p. NFPA 820 Assessment – Carollo Engineers, Inc., March 2021.

**END OF SECTION**

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**SECTION 01 11 00_SUMMARY OF WORK**

**ATTACHMENT A**

**REFERENCE MATERIALS**

a. Pump Station 10 As-Built Drawings, Drawing No. 5814-27 to 5814-39 – Carey & Kramer Consulting Engineers, 1961.

b. Sewer Pump Station As-Built Drawings, Drawing No. 6223-C300 to 6223-E331A – Carey & Kramer Consulting Engineers, 1967.

c. Flush Station 12 Control Wiring Schematic, Drawing No. C1040821 –Stead and Baggerly Inc., 1985.

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e. Pump Station Motor Control Panel As-Built Drawings, Drawing No. 9308-1287-D101 to 9308-1287-D135 – Electrical Packaging Co. Inc., 1993.

f. Maintenance Department Telemetry System Phase 1 Installation, Job No. 0321-010 – Casne Engineering, Inc., 2004.

g. Sewer Lake Line and P.S. No. 4 Replacement Project, Drawing No. A300 to A303 – Tetra Tech, 2008.

h. Pump Station 4 MCC Drawings, Drawing No. F26200178-002-01 to E26200178-002-10 – Square D by Schneider Electric, 2009.

i. Pump Station 4 Control Panel Drawings, Job No. 7189 – Technical Systems Inc., 2010.

j. Phase 2 PLC As-Built Drawings, Job No. 7293 – Technical Systems Inc., 2011.

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n. Pump Station No. 18 Pump Replacement, Pump Stations 13, 17, & 24 Generators Replacement, Job No. 801703 – CHS Engineers, 2018.

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p. NFPA 820 Assessment – Carollo Engineers, Inc., March 2021.

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# SECTION 01 11 00_SUMMARY OF WORK

# ATTACHMENT A

# PUMP STATION 10 AS-BUILT DRAWINGS

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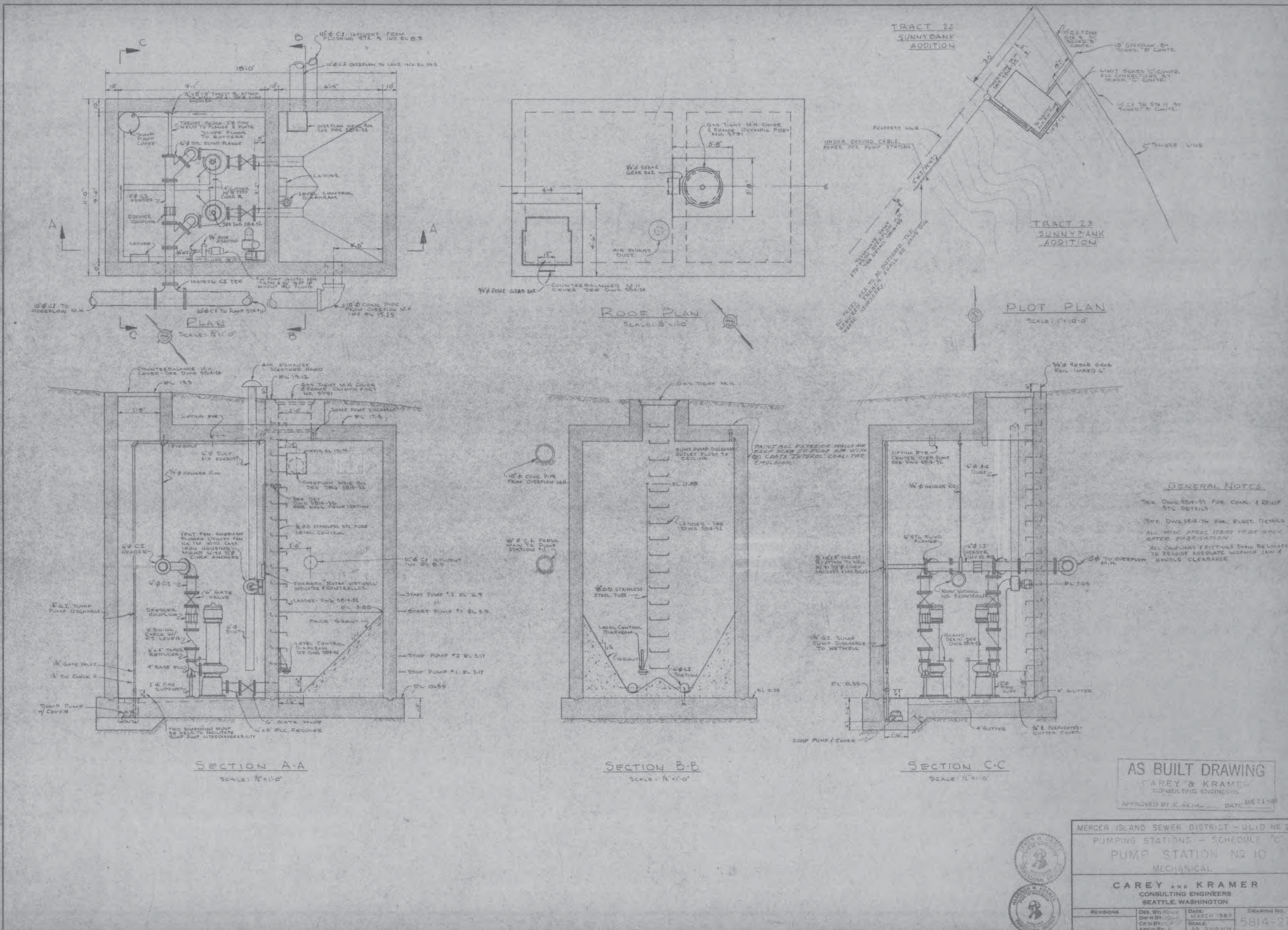
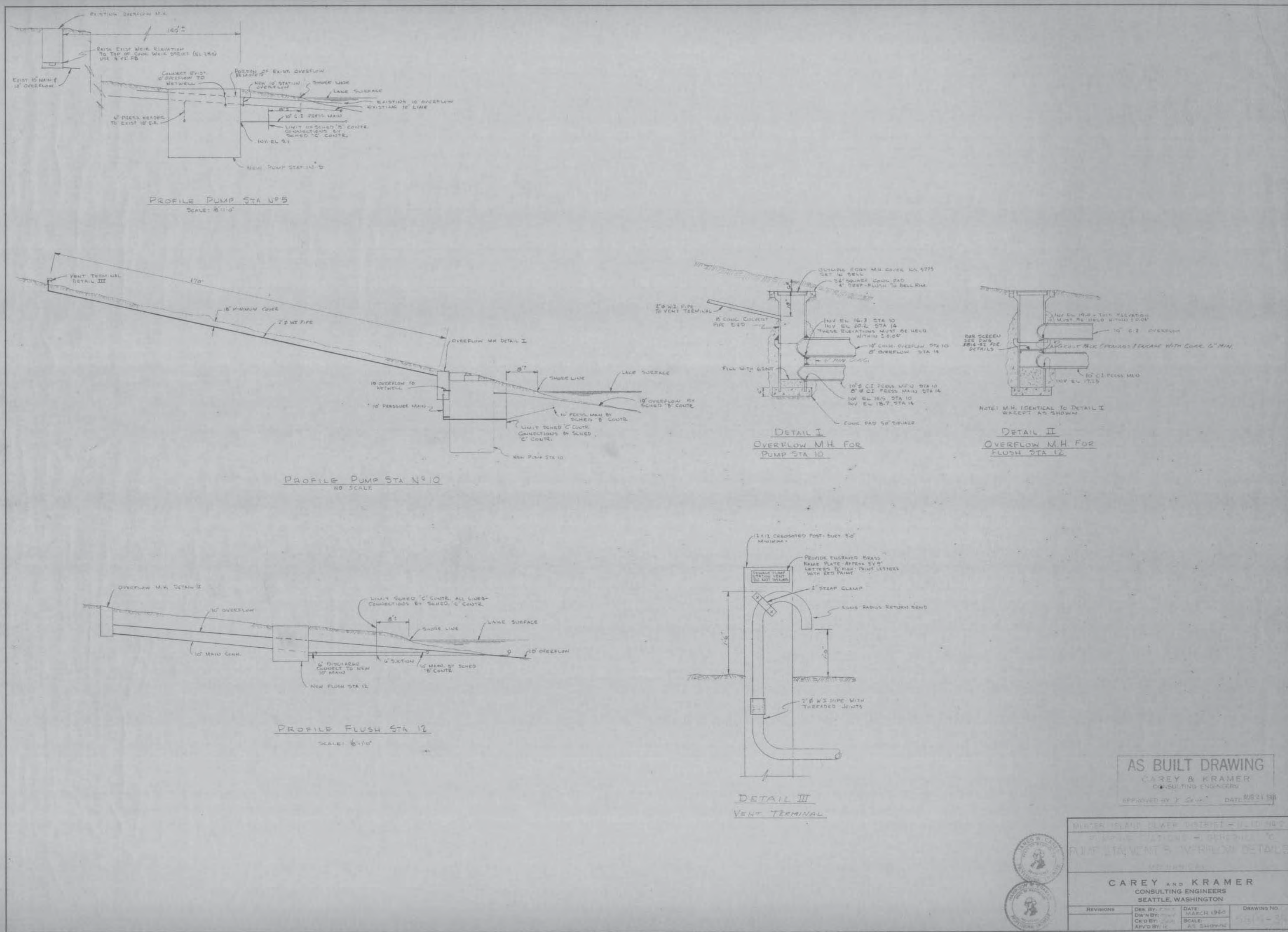
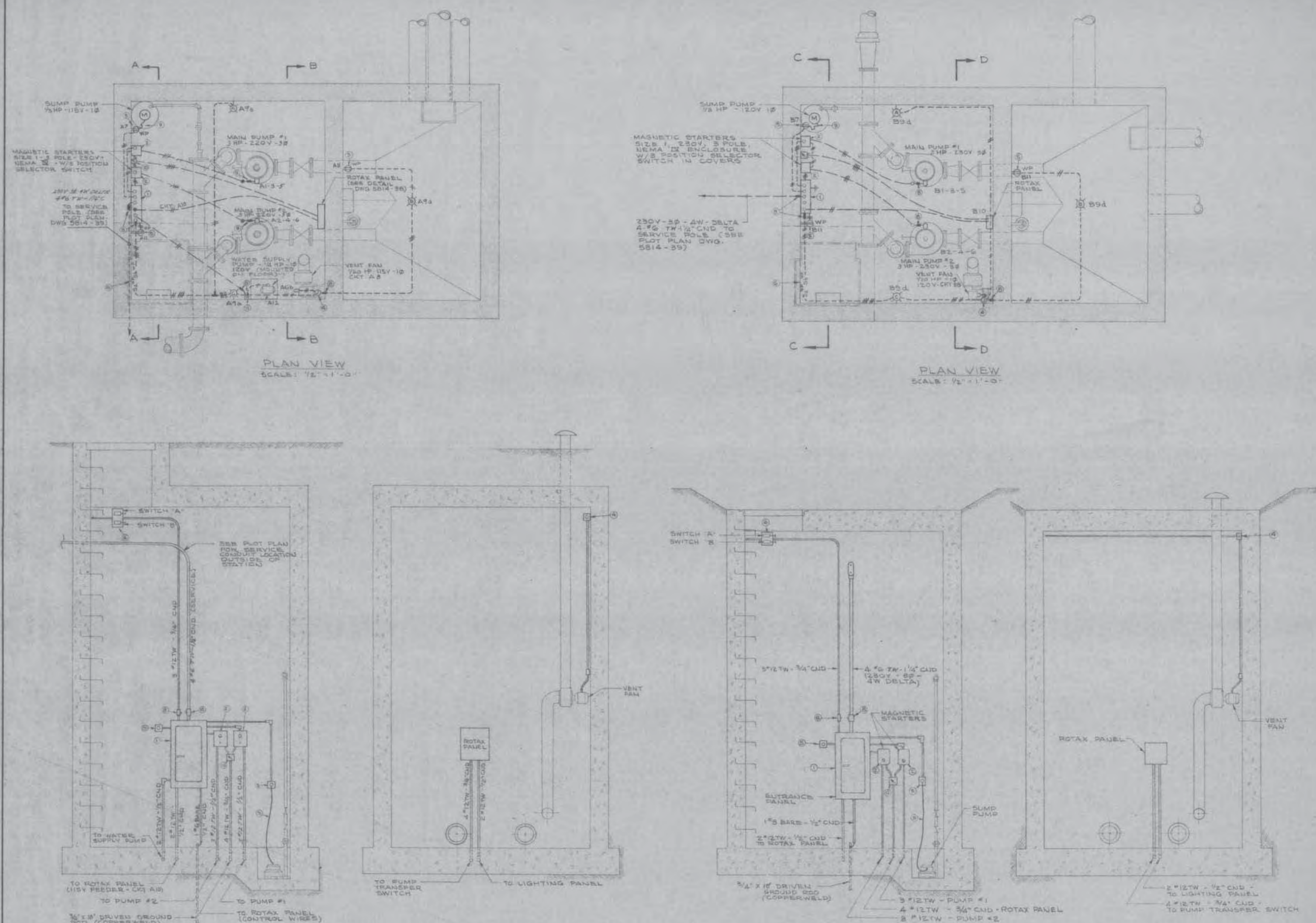


PLAN
SCALE: 1/2"=1'-0"
ROOF PLAN
SCALE: 1/2"=1'-0"
PLOT PLAN
SCALE: 1"=10'-0"
TRACT 22
SUNNYBANK ADDITION
TRACT 23
SUNNYBANK ADDITION
SECTION A-A
SCALE: 1/2"=1'-0"
SECTION B-B
SCALE: 1/2"=1'-0"
SECTION C-C
SCALE: 1/2"=1'-0"
GENERAL NOTES
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
MERCER ISLAND SEWER DISTRICT - ULID NO 2
PUMPING STATIONS - SCHEDULE "C"
PUMP STATION NO 10
MECHANICAL
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
REVISIONS
DATE: MARCH 1960
SCALE: AS SHOWN
DRAWING NO.
5814-27


PROFILE PUMP STA Nº5
SCALE: ⅛"=1'-0"
PROFILE PUMP STA Nº10
NO SCALE
PROFILE FLUSH STA 12
SCALE: ⅛"=1'-0"
DETAIL I
OVERFLOW M.H. FOR
PUMP STA 10
DETAIL II
OVERFLOW M.H. FOR
FLUSH STA 12
NOTE: M.H. IDENTICAL TO DETAIL I EXCEPT AS SHOWN
DETAIL III
VENT TERMINAL
LAKE SURFACE
SHORE LINE
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE AUG 21 1961
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
REVISIONS
DES. BY:
DW'N BY:
CK'D BY:
APV'D BY:
DATE: MARCH 1960
SCALE: AS SHOWN
DRAWING NO.




PLAN VIEW
SCALE: 1/2" = 1'-0"

PLAN VIEW
SCALE: 1/2" = 1'-0"

SECTION A-A
SCALE: 1/2" = 1'-0"

SECTION B-B
SCALE: 1/2" = 1'-0"

SECTION C-C
SCALE: 1/2" = 1'-0"

SECTION D-D
SCALE: 1/2" = 1'-0"

LIFT STATIONS #10
SCALE: 1/2" = 1'-0"

LIFT STATION #5
SCALE: 1/2" = 1'-0"

| SYMBOL LIST | | |
|---|---|---|
| SYMBOL | DESCRIPTION | |
| Ⓐ $AB_b$ | TYPE OF FIXTURE (A) (SEE SCHEDULE) CIRCUIT NUMBER SUPPLYING FIXTURE (AB) SWITCH CONTROLLING FIXTURE (b) | |
| WP | PLUG RECEPTACLE, WEATHERPROOF, SINGLE, 15A @ 125V, 2 WIRE, 3 POLE GROUNDING - CROUSE-HINDS DS 92 & WP PLUG | |
| $S^{WP}$ | SWITCH, SINGLE POLE, 15A @ 125V W/WEATHERPROOF SWITCH OPERATOR - CROUSE-HINDS DS128 | |
| Ⓙ | JUNCTION BOX, CAST W.T. WITH COVER & GASKET - SIZE AS REQUIRED | |
| | CONDULET, SIZE & TYPE AS REQUIRED | |
| | CONDUIT CONCEALED IN WALL OR CEILING | HASH MARKS INDICATE NUMBER OF WIRES - #12 UNLESS OTHERWISE NOTED |
| | CONDUIT CONCEALED IN FLOOR OR SLAB | |
| | CONDUIT RUN EXPOSED | |
| | CONDUIT SEAL | |

| MATERIAL SCHEDULE | |
|---|---|
| ITEM | DESCRIPTION |
| 1 | POWER & LIGHTING PANEL - SEE DETAIL DWG 5814-38 |
| 2 | MAGNETIC STARTER - SIZE & TYPE AS NOTED |
| 3 | TIME SWITCH - 24 HR DIAL - 115V OR 230V AS REQUIRED - WEATHERPROOF ENCLOSURE - PLAIN DIAL - 2 SETS OF TRIPPERS - SPDT CONTACT (GE TYPE TSA-40) |
| 4 | JUNCTION BOX - CAST WT. W/SCREW COVER & GASKET - SIZE & TYPE AS REQ'D |
| 5 | CONDULET - CROUSE HINDS FS1 W/RECEPTACLE DS 98 W/SCREW COVER & GASKET |
| 6 | CONDULET - CROUSE HINDS FD BOX W/COVER & 2 GANG SWITCH OPERATING MECHANISM DS1252 & GASKET |
| | |
| 8 | CONDUIT SEALS - CROUSE HINDS TYPE EYS |
| 9 | TYPE 'SO' RUBBER CORD WITH CROUSE HINDS WP822 ATTACHMENT PLUG CAP |
| 10 | PUMP TRANSFER SELECTOR SWITCH - SEE DETAIL DWG 5814-36 |
| 11 | MANUAL MOTOR STARTER - 1 POLE - W/I THERMAL OVERLOAD ELEMENT & HEATER - NEMA 4 ENCLOSURE (GE CR101 TYPE) |

| FIXTURE SCHEDULE | | |
|---|---|---|
| TYPE | DESCRIPTION | LAMP SIZE |
| Ⓐ | VAPORTITE FIXTURE - CROUSE HINDS VE12009 WITH SCREW TYPE GUARD & GLOBE | 150W I.F. |
| Ⓑ | VAPORTITE FIXTURE - CROUSE HINDS VC12009 WITH SCREW TYPE GUARD & GLOBE | 150W I.F. |
| Ⓒ | VAPORTITE FIXTURE - CROUSE HINDS VJ22007 WITH SCREW TYPE GUARD & GLOBE | 150W IF |

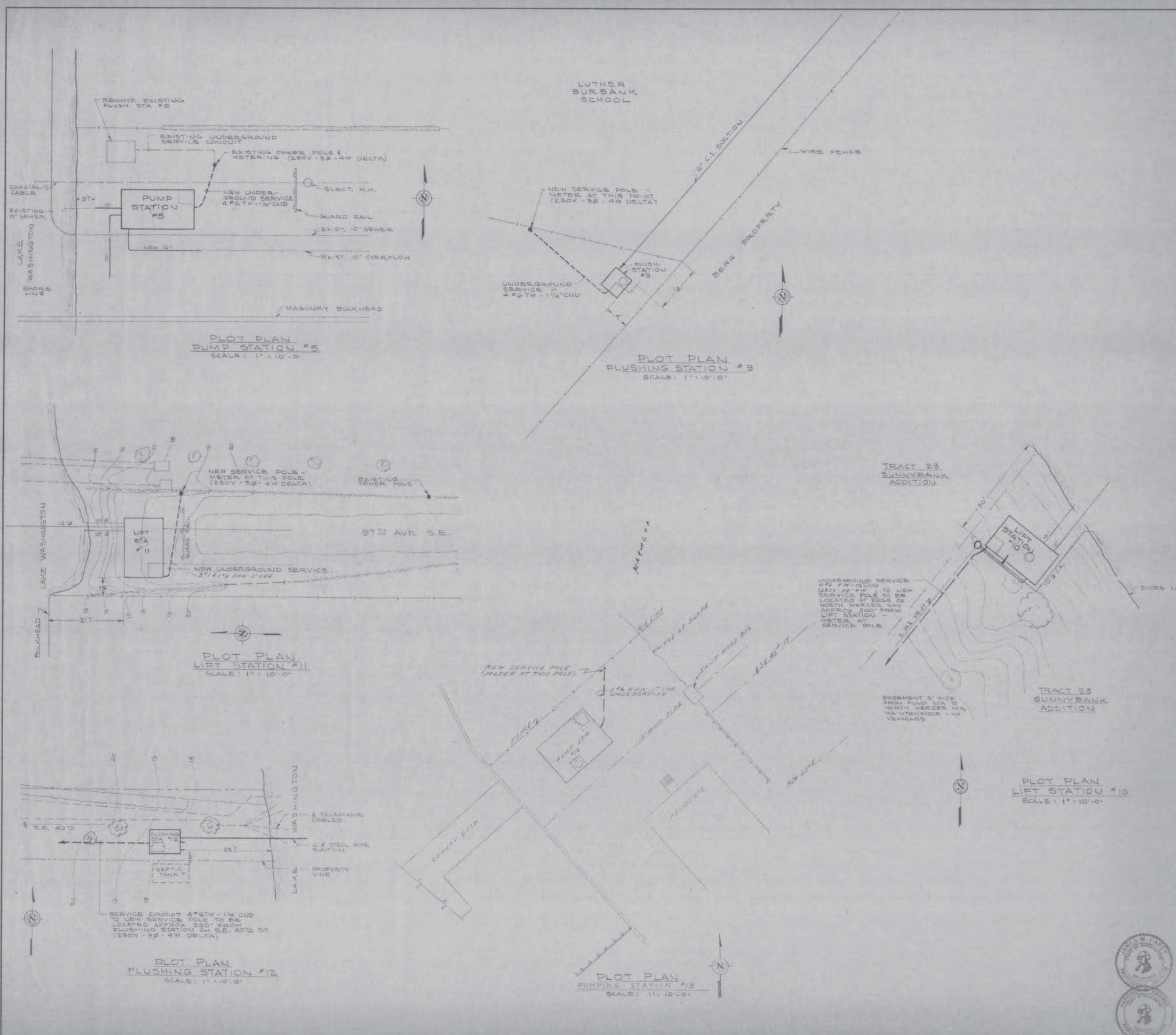
1. ALL CONDUIT SHALL BE RIGID GALVANIZED STEEL.
2. ALL WIRE SHALL BE #12 TW UNLESS OTHERWISE NOTED
3. ALL MOTORS SHALL BE CONNECTED USING SEALTITE FLEX

MERCER ISLAND SEWER DISTRICT
U.L.I.D. NO. 2

ELECTRICAL—
LIFT STATIONS 5–10

CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON

| REVISIONS | DES BY: | DATE: MARCH 1960 | DRAWING NO. |
|---|---|---|---|
| | DW'N BY: CK'D BY: APV'D BY: | SCALE: 1/2" = 1'-0" | 5814-36 |




MERCER ISLAND SEWER DISTRICT
U.L.I.D. NO. 2

ELECTRICAL — PLOT PLANS

CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON

| REVISIONS | DES. BY: | DATE: MARCH 1969 | DRAWING NO. |
|---|---|---|---|
| | DW'N BY: | SCALE: AS NOTED | 5814-39 |
| | CK'D BY: | | |
| | APP'D BY: | | |

# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## SEWER PUMP STATION AS-BUILT DRAWINGS

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# MERCER ISLAND SEWER DISTRICT
# ULID NO 3
## MERCER ISLAND WASHINGTON

### SCHEDULE H
### PUMP STATIONS

COMMISSIONERS

ROBERT T. LAMSON — PRESIDENT

PALMER G. LEWIS — SECRETARY

IVAN M. BRUCE — MEMBER


INDEX OF DRAWINGS

| SHEET NUMBER | DRAWING NUMBER | TITLE |
|---|---|---|
| CIVIL | | |
| 1 | 6223-C300 | VICINITY MAP |
| 2 | 6223-C301 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 14 & 15 |
| 3 | 6223-C302 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 16 & 17 |
| 4 | 6223-C303 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 18 & 19 |
| 5 | 6223-C304 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 20 & 21 |
| 6 | 6223-C305 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 22 & 23 |
| 7 | 6223-C306 | SITE PLAN, SOIL LOGS, PUMP STATIONS NO. 24 & 25 |
| 8 | 6223-C307 | SITE PLAN DETAILS, PUMP STATIONS NO. 14 THRU 25 |
| MECHANICAL | | |
| 9 | 6223-M308 | MECHANICAL, PUMP STATION NO. 14 |
| 10 | 6223-M309 | MECHANICAL, PUMP STATION NO. 15 |
| 11 | 6223-M310 | MECHANICAL, PUMP STATION NO. 16 |
| 12 | 6223-M311 | MECHANICAL, PUMP STATION NO. 17 |
| 13 | 6223-M312 | MECHANICAL, PUMP STATION NO. 18 |
| 14 | 6223-M313 | MECHANICAL, PUMP STATION NO. 19 |
| 15 | 6223-M314 | MECHANICAL, PUMP STATION NO. 20 |
| 16 | 6223-M315 | MECHANICAL, PUMP STATION NO. 21 |
| 17 | 6223-M316 | MECHANICAL, PUMP STATION NO. 22 |
| 18 | 6223-M317 | MECHANICAL, PUMP STATION NO. 23 |
| 19 | 6223-M318 | MECHANICAL, PUMP STATION NO. 24 |
| 20 | 6223-M319 | MECHANICAL, PUMP STATION NO. 25 |
| 21 | 6223-M320 | MECHANICAL, MISC. SECTIONS & DETAILS |
| STRUCTURAL | | |
| 22 | 6223-S321 | GENERAL STRUCTURAL NOTES |
| 23 | 6223-S322 | STRUCTURAL, PUMP STATIONS NO. 14, 15 & 25 |
| 24 | 6223-S323 | STRUCTURAL, PUMP STATIONS NO. 16, 17, 22, 23 & 24 |
| 25 | 6223-S324 | STRUCTURAL, PUMP STATIONS NO. 18, 19, 20 & 21 |
| 26 | 6223-S325 | STRUCTURAL DETAILS |
| 27 | 6223-S326 | STRUCTURAL, GRATING PLANS, MISC. METAL DETAILS |
| ELECTRICAL | | |
| 28 | 6223-E327 | ELECTRICAL, PUMP STATIONS NO. 14 & 25 |
| 29 | 6223-E328 | ELECTRICAL, PUMP STATION NO. 15 |
| 30 | 6223-E329 | ELECTRICAL, PUMP STATIONS NO. 16, 17, 22, 23 & 24 |
| 31 | 6223-E330 | ELECTRICAL, PUMP STATIONS NO. 18, 19, 20 & 21 |
| 32 | 6223-E331 | ELECTRICAL DETAILS, PUMP STATIONS NO. 14 THRU 25 |

TYPICAL SECTION NUMBERING DETAIL:

(1) SECTION CUT ON DWG 14

$\frac{65}{21}$ — SECTION NUMBER / DRAWING ON WHICH SECTION APPEARS

(2) ON DRAWING 21 THIS SECTION IS IDENTIFIED AS:

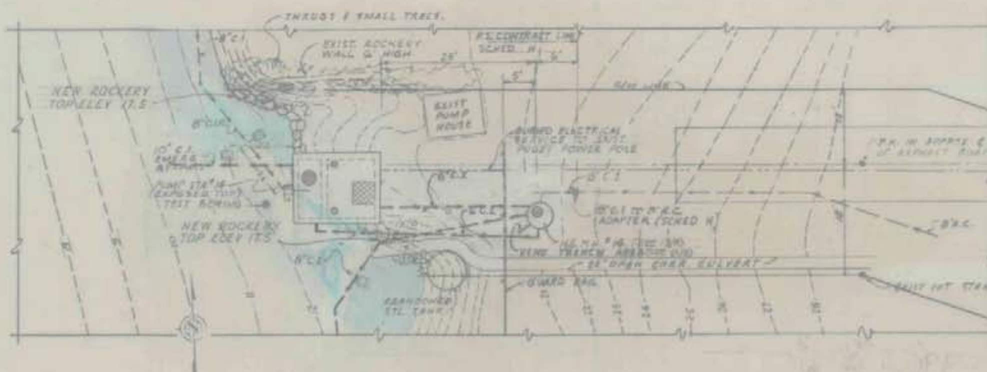
SECTION $\frac{65}{14}$ — SECTION NUMBER / DRAWING FROM WHICH SECTION WAS TAKEN

# CAREY & KRAMER
CONSULTING ENGINEERS
SEATTLE WASHINGTON


| REVISIONS | DWN. BY CAK | CKD. BY | DES. BY | APPD. BY ARG | DATE APRIL 1964 | SCALE NO SCALE | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO.3 SCHEDULE "H" VICINITY MAP — PUMP STATIONS | DRAWING NUMBER 6223-0300 SHEET NUMBER 1 OF 32 |
|---|---|---|---|---|---|---|---|---|---|---|

SITE PLAN

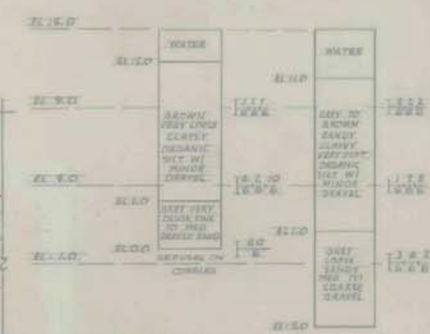
SCALE: 1" = 100'



PLOT PLAN

SCALE: 1" = 10'

PUMP STATION Nº 14 (1/2)



P.S. Nº 14 P.S. Nº 15

SOIL BORING LOGS

SCALE: 1" = 4' VERTICAL

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY DATE

## SOIL NOTES:

1. DATUM: USC & GS.
2. TEST DRILLING BY WASHBORING METHOD.
3. FOR ADDITIONAL SOILS INFORMATION REFER TO SPECIFICATIONS, PARA 3.02.3
4. STANDARD PENETRATION TEST CONSISTS OF DROPPING A 140 POUND WEIGHT 30" TO DRIVE A 2" O.D. SPLIT TUBE SAMPLER 18" WITH NUMBER OF BLOWS RECORDED IN 6" INCREMENTS.
5. ● APPROXIMATE LOCATION OF TEST BORING.

## GENERAL NOTES:

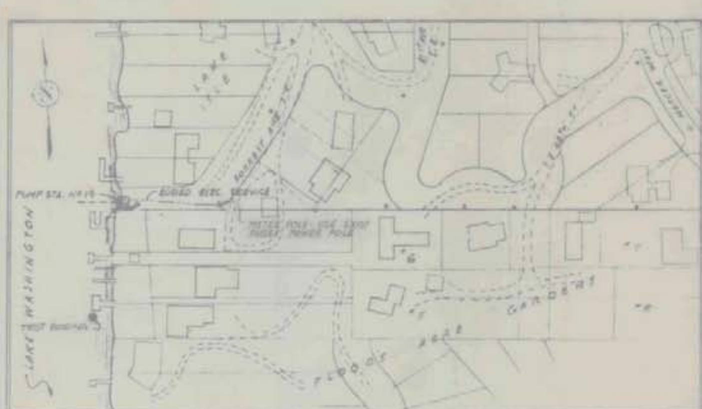
1. (C.L.) DENOTES CONTRACT LIMIT-SCHEDULE H, REFER TO MECH. DWGS. FOR C.L. DIMENSIONS NOT SHOWN; ELEC. CONTRACT LIMIT DEFINED BY SPECS.

### SITE RESTORATION & GRADING (PS-14)

1. A NEW ROCKERY SHALL BE INSTALLED AT THE SHORELINE BETWEEN THE LIMITS ESTABLISHED BY STREET RIGHT-OF-WAY OR CONSTRUCTION EXCAVATION LIMITS, LESS THE PORTIONS TO THE SOUTH NOT DISTURBED BY CONST.
2. SITE RESTORATION SHALL INCLUDE RESTORATION OF ORIGINAL SHORELINE TO ELEV 17.5. BACKFILL BEYOND THE SHORELINE SHALL BE TO ELEV 17.5. PROVIDE AN 18" BERM ADJACENT TO AND AT P.S. TOP SLAB LEVEL. EXCAVATION OR EMBANKMENT SLOPES BEGINNING AT THE BERM OUTER LIMITS SHALL BE SLOPED AT 1½:1
3. SEE SITE RESTORATION & CLEAN-UP SPECS.

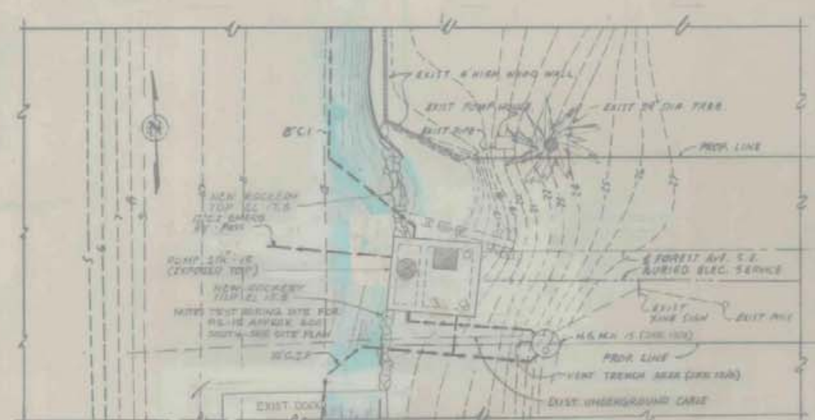
### SITE RESTORATION & GRADING (PS-15)

1. ROCKERY TO ELEV 17.5 WITHIN STREET R/W OR CONSTRUCTION EXCAVATION LIMITS SHALL CONSIST OF ORIGINAL ROCKS ON SITE REINSTALLED PLUS ADDITIONAL NEW ROCKS AS REQUIRED TO PROTECT EXCAVATED SHORELINE AREAS RESTORED TO ORIGINAL OR SPECIFIED GRADE. NEW OR REINSTALLED ROCKERY TO THE SOUTH SIDE OF THE PUMP STATION SHALL BE IN LINE WITH AND COMPARABLE TO THE ROCKERY ON THE ADJACENT SOUTHERLY PROPERTY.
2. SAME AS NOTE 3 - P.S.-14



SITE PLAN

SCALE: 1" = 100'



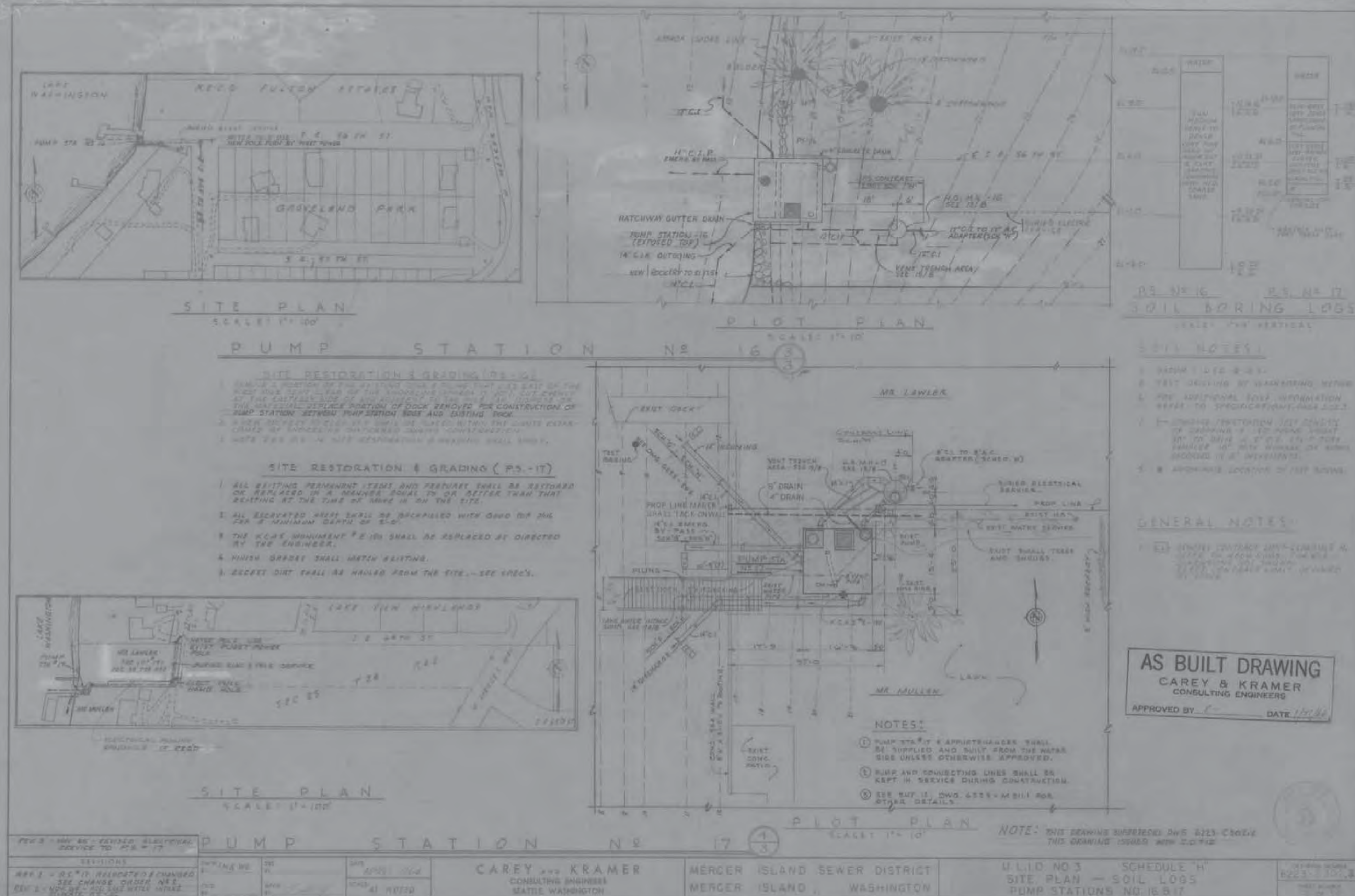
PLOT PLAN

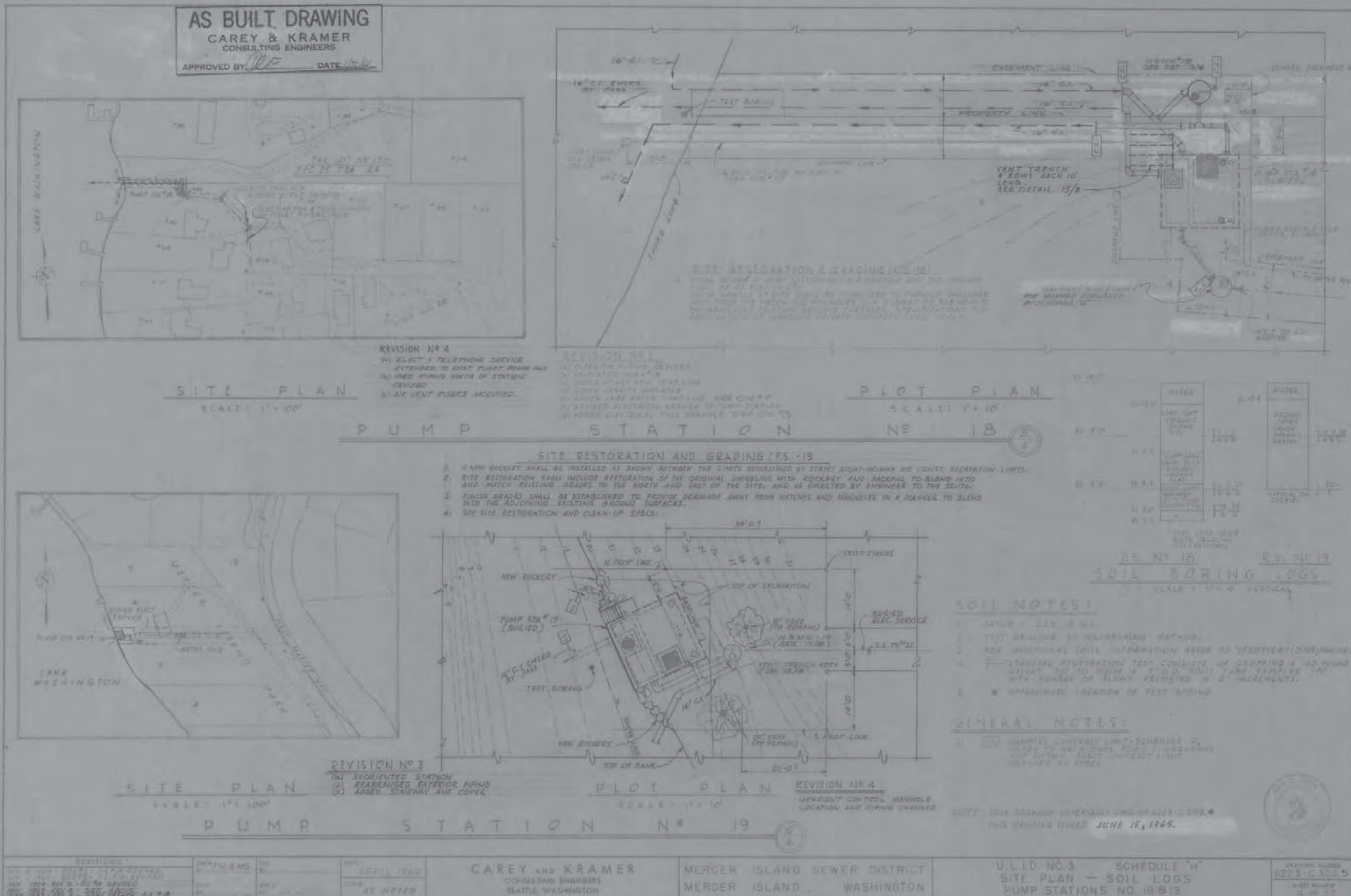
SCALE: 1" = 10'

PUMP STATION Nº 15 (2/2)

NOTE: THIS DRAWING SUPERSEDES DWG 6223-C301
THIS DRAWING ISSUED 20 NOV 1964

| REVISIONS | DWN BY: F.M. & W.G. | DES BY: | DATE: APRIL 1964 | CAREY AND KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H"<br>SITE PLAN — SOIL LOGS<br>PUMP STATIONS NO. 14 & 15 | DRAWING NUMBER 6223-C301.1 |
|---|---|---|---|---|---|---|---|
| REV. 1 - NOV. 1964 - CHANGE ELEC. SERVICE TO P.S.-14 & 15, RELOCATE P.S.-15 | CKD BY: | APPD BY: | SCALE: AS NOTED | | | | SHEET NUMBER 2 OF 32 |


SITE PLAN
SCALE: 1" = 100'
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 16
LAKE WASHINGTON
REG'D FULTON ESTATES
GROVELAND PARK
HATCHWAY GUTTER DRAIN
PUMP STATION-16 (EXPOSED TOP)
P.S. Nº 16
P.S. Nº 17
SOIL BORING LOGS
SOIL NOTES:
GENERAL NOTES:
SITE RESTORATION & GRADING (P.S.-17)
1. ALL EXISTING PERMANENT ITEMS AND FEATURES SHALL BE RESTORED OR REPLACED IN A MANNER EQUAL TO OR BETTER THAN THAT EXISTING AT THE TIME OF MOVE IN ON THE SITE.
2. ALL EXCAVATED AREAS SHALL BE BACKFILLED WITH GOOD TOP SOIL FOR A MINIMUM DEPTH OF 5'-0".
3. THE K.C.A.S. MONUMENT # E 101 SHALL BE REPLACED AS DIRECTED BY THE ENGINEER.
4. FINISH GRADES SHALL MATCH EXISTING.
5. EXCESS DIRT SHALL BE HAULED FROM THE SITE.—SEE SPEC'S.
MR. LAWLER
MR. MULLEN
LAWN
LAKE VIEW HIGHLANDS
SITE PLAN
SCALE: 1" = 100'
NOTES:
1. PUMP STA #17 & APPURTENANCES SHALL BE SUPPLIED AND BUILT FROM THE WATER SIDE UNLESS OTHERWISE APPROVED.
2. PUMP AND CONNECTING LINES SHALL BE KEPT IN SERVICE DURING CONSTRUCTION.
3. SEE SHT 12, DWG. 6223-M BILT FOR OTHER DETAILS.
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 17
NOTE: THIS DRAWING SUPERSEDES DWG 6223-C30Z-K
THIS DRAWING ISSUED WITH C.O.#12
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE
REVISIONS
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO 3 SCHEDULE "H"
SITE PLAN — SOIL LOGS
PUMP STATIONS NO 16 & 17


AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE
REVISION Nº 4
(a) ELECT. & TELEPHONE SERVICE EXTENDED TO EXIST. PUMP POWER POLE
(b) FREE PIPING NORTH OF STATION REVISED
(c) AIR VENT RISERS MODIFIED
SITE PLAN
SCALE: 1" = 100'
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 18
VENT TRENCH 4 ROWS, EACH 10' LONG. SEE DETAIL 15/8
EASEMENT LINE
PROPERTY LINE
TEST BORING
SITE RESTORATION AND GRADING (P.S. -19
1. A NEW ROCKERY SHALL BE INSTALLED AS SHOWN BETWEEN THE LIMITS ESTABLISHED BY STREET RIGHT-OF-WAY OR CONST. EXCAVATION LIMITS.
2. SITE RESTORATION SHALL INCLUDE RESTORATION OF THE ORIGINAL SHORELINE WITH ROCKERY AND BACKFILL TO BLEND INTO AND MATCH EXISTING GRADES TO THE NORTH AND EAST OF THE SITE, AND AS DIRECTED BY ENGINEER TO THE SOUTH.
3. FINISH GRADES SHALL BE ESTABLISHED TO PROVIDE DRAINAGE AWAY FROM HATCHES AND MANHOLES IN A MANNER TO BLEND INTO THE ADJOINING EXISTING GROUND SURFACES.
4. SEE SITE RESTORATION AND CLEAN-UP SPECS.
NEW ROCKERY
TOP OF EXCAVATION
EXIST. STAKES
PUMP STA.# 19 (BURIED)
BURIED ELEC. SERVICE
TEST BORING
TOP OF BANK
PROP. LINE
LAKE WASHINGTON
REVISION Nº 3
(a) REORIENTED STATION
(b) REARRANGED EXTERIOR PIPING
(c) ADDED STAIRWAY AND COVER
REVISION Nº 4
SITE PLAN
SCALE: 1" = 100'
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 19
P.S. Nº 18
P.S. Nº 19
SOIL BORING LOGS
SOIL NOTES:
GENERAL NOTES:
NOTE: THIS DRAWING ISSUED JUNE 15, 1965.
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE "H"
SITE PLAN — SOIL LOGS
PUMP STATIONS NO. 18 & 19
AS NOTED
6223-C 303.5

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE 1/31/66


SITE PLAN
SCALE: 1" = 100'


PLOT PLAN
SCALE: 1" = 10'

PUMP STATION Nº 20 (7/5)

## SOIL NOTES:

1. DATUM : USC & GS.
2. TEST DRILLING BY WASHBORING METHOD.
3. FOR ADDITIONAL SOILS INFORMATION REFER TO SPECIFICATIONS, PARA 302.3.
4. STANDARD PENETRATION TEST CONSISTS OF DROPPING A 140 POUND WEIGHT 30" TO DRIVE A 2" O.D. SPLIT TUBE SAMPLER 18" WITH NUMBER OF BLOWS RECORDED IN 6" INCREMENTS.
5. ● APPROXIMATE LOCATION OF TEST BORING.

## GENERAL NOTES:

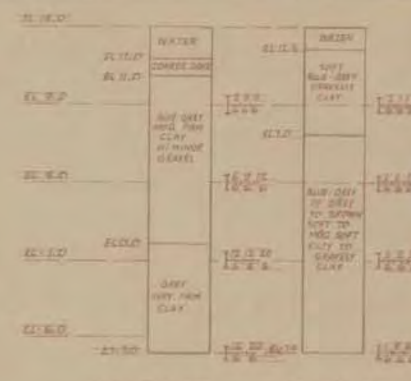
1. $\boxed{CL}$ DENOTES CONTRACT LIMIT-SCHEDULE H. REFER TO MECH. DWGS. FOR C.L. DIMENSIONS NOT SHOWN. ELECT. CONTRACT LIMIT DEFINED BY SPECS.

### SITE RESTORATION & GRADING (P.S.-20)

1. SITE RESTORATION SHALL INCLUDE BACKFILL TO ELEV 17.5 & A NEW ROCKERY TO ELEV 17.5 THAT TIES INTO THE EXISTING ROCKERY & SEAWALL EACH SIDE OF THE STATION. PROVIDE AN 18" BERM @ TOP SLAB LEVEL AROUND THE PERIMETER OF THE P.S. BEHIND THE ROCKERY LINE. EXCAVATION OR EMBANKMENT SLOPES BEGINNING AT BERM OUTER LIMIT SHALL BE SLOPED AT 1½ TO 1.

### SITE RESTORATION & GRADING (P.S.-21)

1. SITE WORK SHALL INCLUDE RESTORATION AND NEW WORK AS SHOWN ... [illegible]
2. EXISTING FENCE SHALL BE RELOCATED ON THE PROPERTY LINE AS REQUIRED.
3. PAVED AREAS INDICATED SHALL BE PAVED WITH ... OF CLASS "B" ... CONCRETE ... GRAVEL BASE AS SPECIFIED IN PARAGRAPHS ... OF THE SPECIFICATIONS.
4. EXISTING LOGS AND DEBRIS IN THE AREA OF WORK INVOLVED SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.




P.S. Nº 20 P.S. Nº 21
SOIL BORING LOGS
SCALE: 1" = 4' VERTICAL

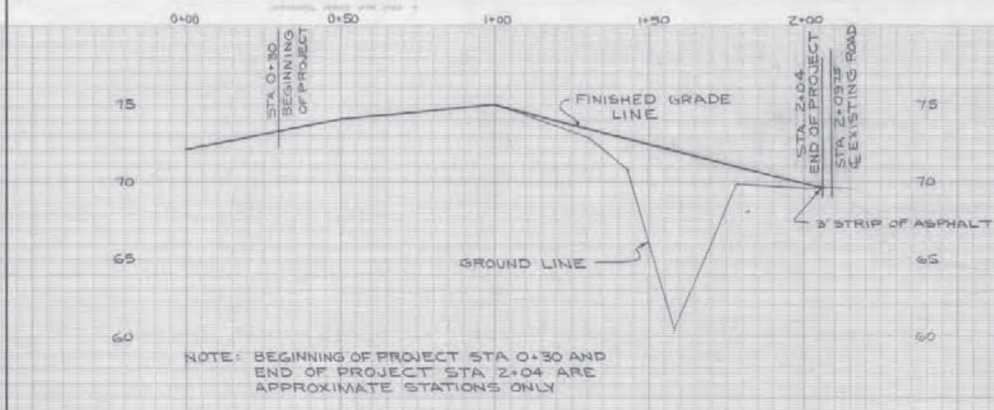

SITE PLAN
SCALE: 1" = 100'


PLOT PLAN
SCALE: 1" = 10'

PUMP STATION Nº 21 (8/5)

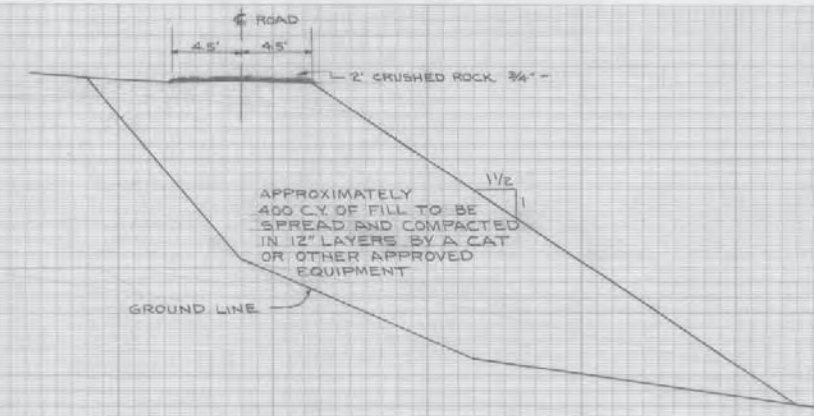
NOTE: THIS DRAWING SUPERSEDES DWG 6223-C304.
THIS DRAWING ISSUED WITH CO #12

| REVISIONS | DRAWN BY: FHE WG | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H" SITE PLAN — SOIL LOGS PUMP STATIONS NO. 20 & 21 | DRAWING NUMBER 6223-C304.1 SHEET NUMBER 5 OF 32 |
|---|---|---|---|---|---|---|
| | CKD BY: | SCALE: AS NOTED | | | | |



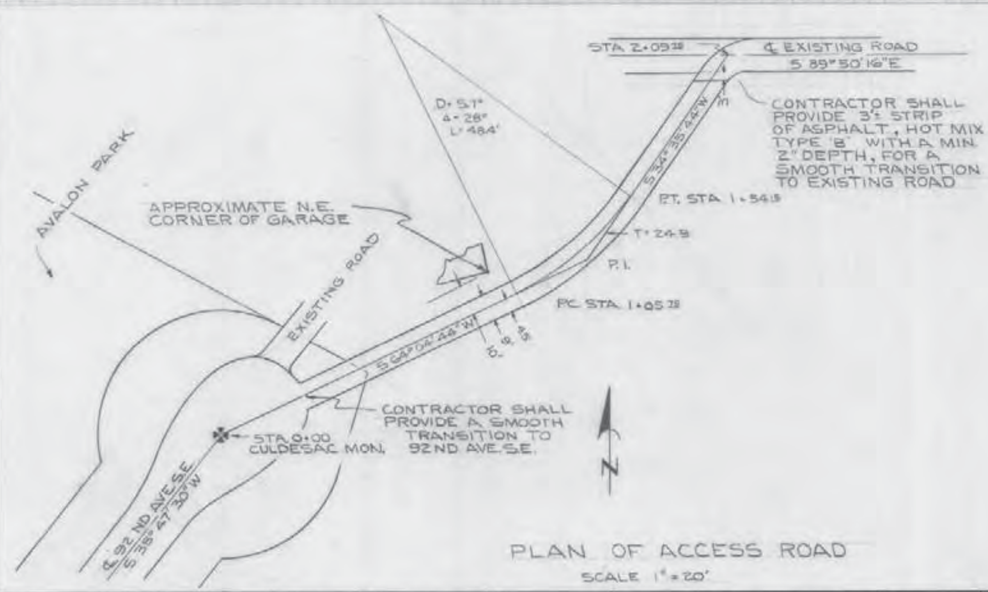

PROFILE OF ACCESS ROAD

SCALE
VERT. 1" = 4'
HORIZ. 1" = 20'




TYPICAL CROSS SECTION

SCALE 1" = 4'




PLAN OF ACCESS ROAD

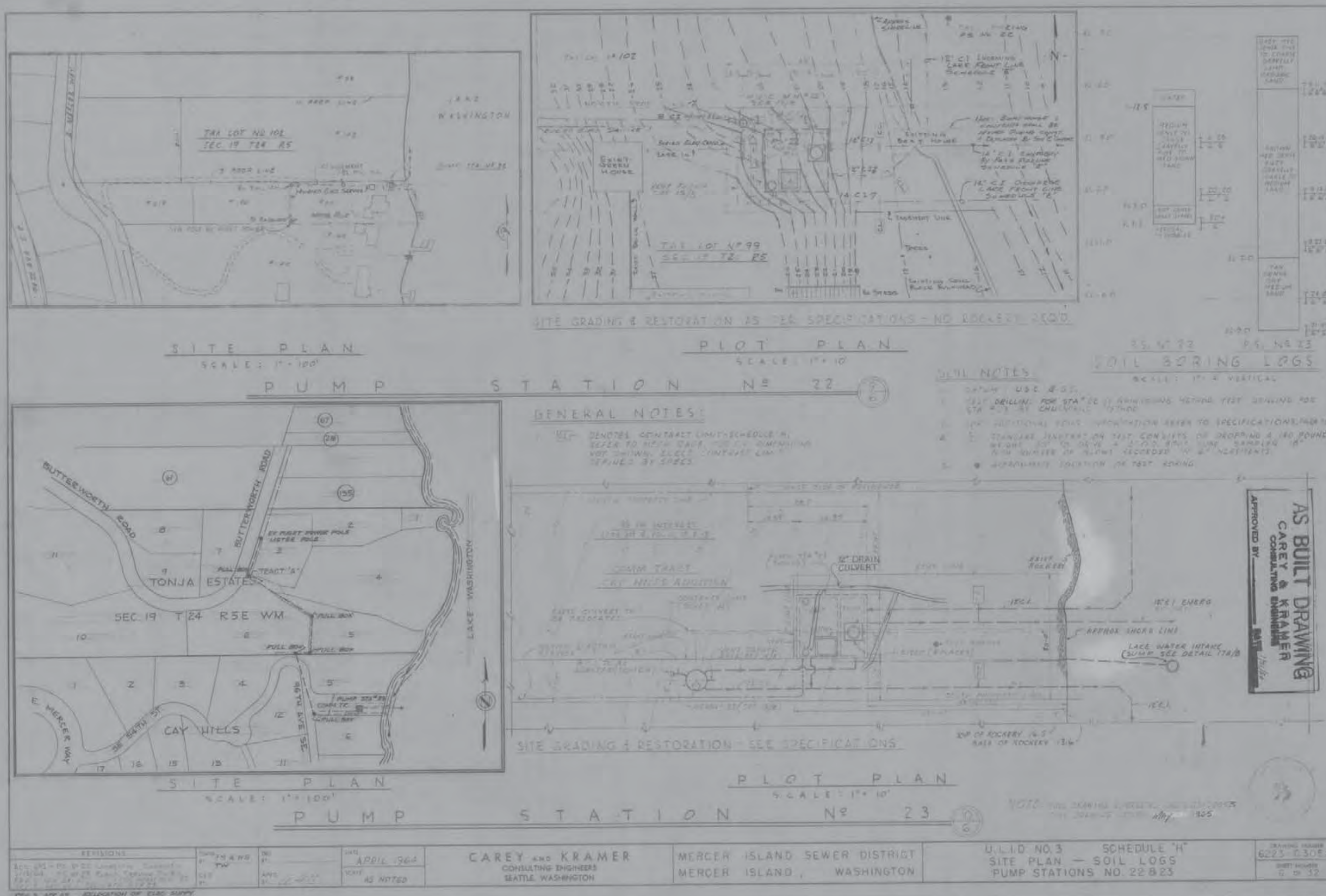
SCALE 1" = 20'

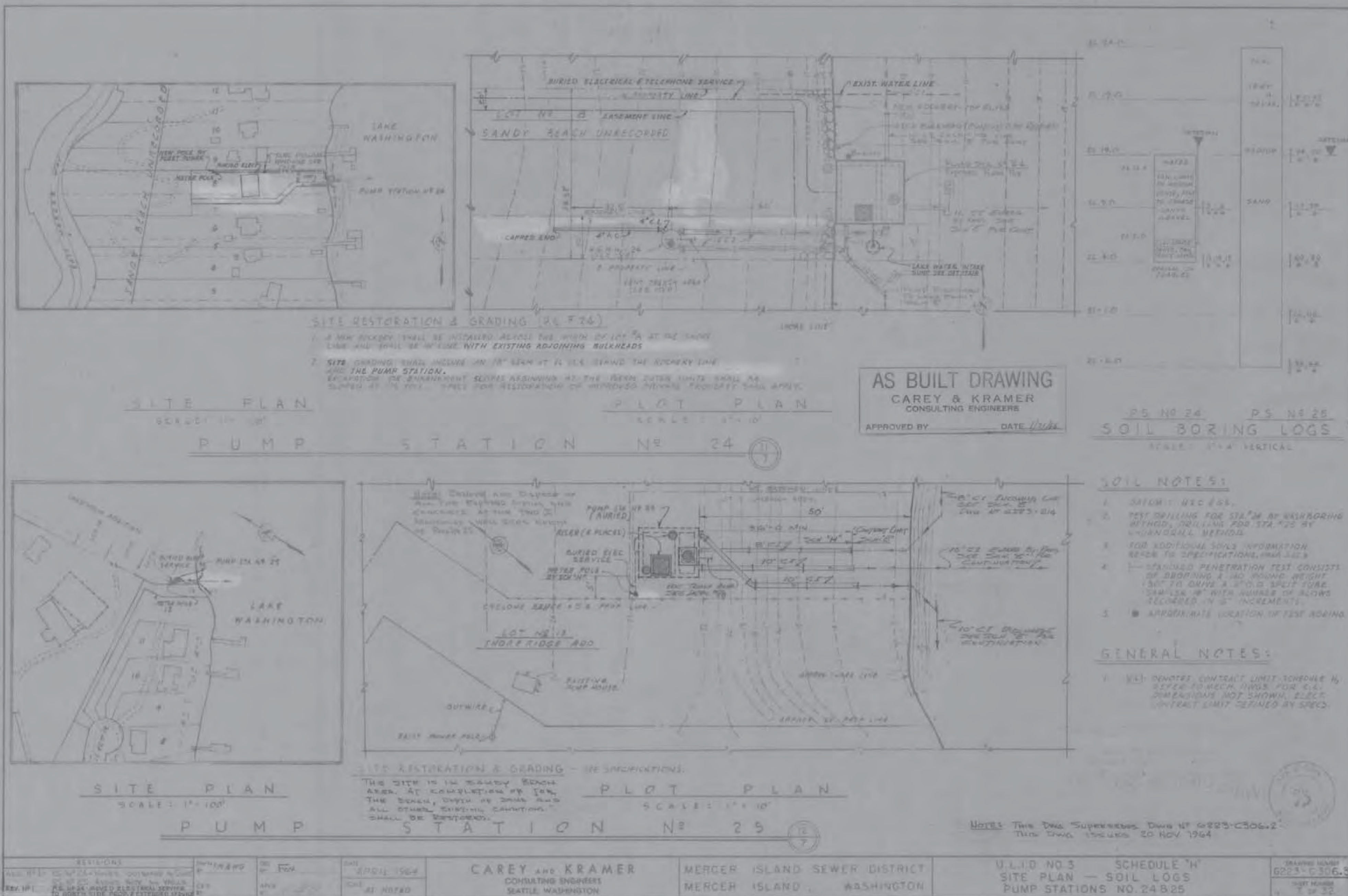
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE 5-4-67

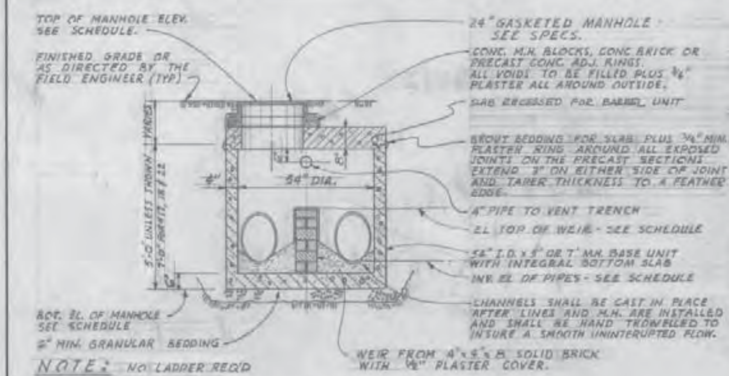
| | | | | | |
|---|---|---|---|---|---|
| REVISIONS 5/18/64 | DWN BY: J B / CK'D BY: | DES BY: J B / APP'D BY: K.G. | DATE: MAY, 1964 / SCALE: AS SHOWN | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT / MERCER ISLAND, WASHINGTON |

ULID NO. 3
ACCESS ROAD TO PUMP STATION NO. 21

DRAWING NUMBER 6223-304-A
SHEET NUMBER 5A OF 32


AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
SITE PLAN
SCALE: 1" = 100'
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 22
SITE GRADING & RESTORATION AS PER SPECIFICATIONS - NO ROCKERY REQ'D.
TAX LOT NO 102
SEC 19 T24 R5
TAX LOT Nº 99
SEC 19 T24 R5
EXIST. GREEN HOUSE
EXISTING BOAT HOUSE
LAKE WASHINGTON
SOIL NOTES:
SOIL BORING LOGS
P.S. Nº 22
P.S. Nº 23
GENERAL NOTES:
TONJA ESTATES
SEC 19 T24 R5E WM
BUTTERWORTH ROAD
CAY HILLS
E. MERCER WAY
SE 54TH ST
86TH AVE SE
TRACT "A"
12" DRAIN CULVERT
LAKE WATER INTAKE
APPROX SHORE LINE
SITE GRADING & RESTORATION - SEE SPECIFICATIONS
PUMP STATION Nº 23
REVISIONS
APRIL 1964
AS NOTED
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3
SCHEDULE "H"
SITE PLAN — SOIL LOGS
PUMP STATIONS NO. 22 & 23


AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE
SITE PLAN
PLOT PLAN
PUMP STATION Nº 24
SITE RESTORATION & GRADING
WITH EXISTING ADJOINING BULKHEADS
THE PUMP STATION.
LAKE WASHINGTON
PUMP STATION Nº 24
SANDY BEACH UNRECORDED
BURIED ELECTRICAL & TELEPHONE SERVICE
EASEMENT LINE
EXIST. WATER LINE
CAPPED END
LAKE WATER INTAKE
SHORE LINE
PS Nº 24
PS Nº 25
SOIL BORING LOGS
SCALE: 1" = 4' VERTICAL
SOIL NOTES:
GENERAL NOTES:
SITE PLAN
SCALE: 1" = 100'
PLOT PLAN
SCALE: 1" = 10'
PUMP STATION Nº 25
SITE RESTORATION & GRADING - SEE SPECIFICATIONS.
THE SITE IS IN SANDY BEACH AREA. AT COMPLETION OF JOB, THE BEACH, DITCH OF DRAIN AND ALL OTHER EXISTING CONDITIONS SHALL BE RESTORED.
PUMP STA. Nº 25 (BURIED)
RISER (4 PLACES)
BURIED ELEC. SERVICE
METER POLE
LOT Nº 13
SHORERIDGE ADD
EXISTING PUMP HOUSE
GUY WIRE
EXIST. POWER POLE
50'
LAKE WASHINGTON
NOTES: THIS DWG. SUPERSEDES DWG. Nº 6223-C306.2. THIS DWG. ISSUED 20 NOV 1964
REVISIONS
APRIL 1964
AS NOTED
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3
SCHEDULE "H"
SITE PLAN — SOIL LOGS
PUMP STATIONS NO. 24 & 25
6223-C306.3

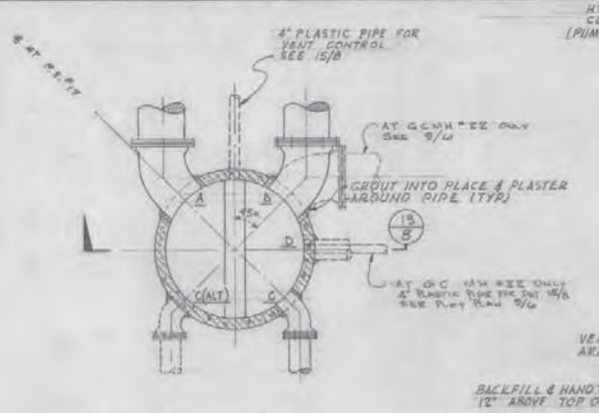



NOTE: NO LADDER REQ'D

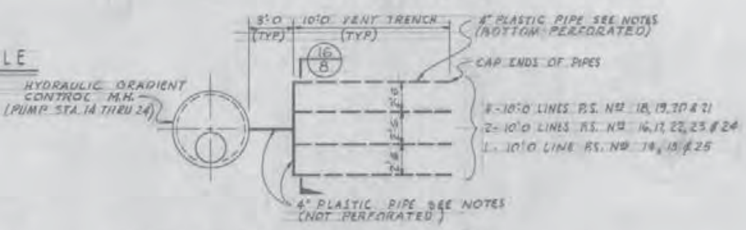
SECTION (13/VAR)
SCALE: ½" = 1'-0

## HYDRAULIC GRADIENT CONTROL MANHOLE

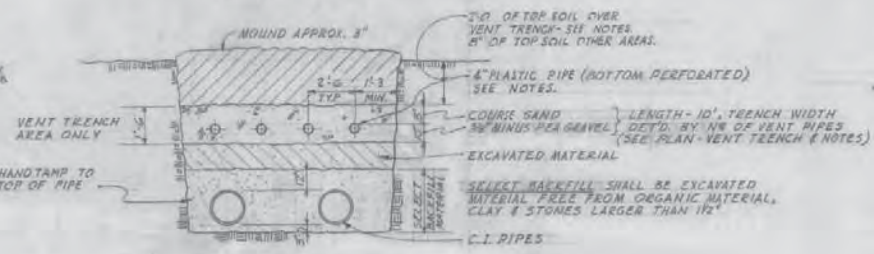
| HYDRAULIC GRADIENT MANHOLE SCHEDULE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M.H. AT P.S. Nº | LOCATION AND SIZE OF M.H. PIPING | | | | BOT. EL OF M.H | INV. EL OF PIPES | TOP EL OF WEIR | TOP EL OF M.H. |
| | TO WETWELL | FROM PUMPS | FROM UPLAND SUMP | TO LAKE FRONT | | | | |
| 14 | A × 6" | D × 6" | C × 8" | A × 8" | 15.0 | 17.67 | 18.5 | 21.5 |
| 15 | B × 10" | A × 10" | — | — | 16.0 | 17.0 | 18.08 | 23.0 |
| 16 | A × 12" | B × 12" | C-ALT × 12" | — | 15.0 | 16.0 | 17.05 | 21.5 |
| 17 | B × 14" | A × 8" | C × 8" | — | 14.0 | 15.0 | 16.37 | 22.5 |
| 18 | A × 16" | B × 10" | C-ALT × 8" | — | 16.0 | 16.9 | 18.4 | 22.0 |
| 19 | B × 16" | A × 16" | — | — | 17.5 | 18.5 | 20.9 | 24.0 |
| 20 | A × 18" | B × 18" | C-ALT × 8" | — | 16.0 | 17.0 | 18.7 | 22.0 |
| 21 | A × 18" | B × 18" | — | — | 17.0 | 18.0 | 19.8 | 23.5 |
| 22 | A × 14" | B × 14" | C-ALT × 8" | — | 16.0 | 17.0 | 18.75 | 24.5 |
| 23 | A × 12" | B × 12" | C-ALT × 8" | — | 18.5 | 17.5 | 19.8 | 23.0 |
| 24 | A × 12" | B × 12" | — | — | 14.5 | 15.5 | 17.4 | 21.0 |
| — | — | — | — | — | — | — | — | — |




MANHOLE BOTTOM PLAN (14/VAR)
SCALE: ½" = 1'-0

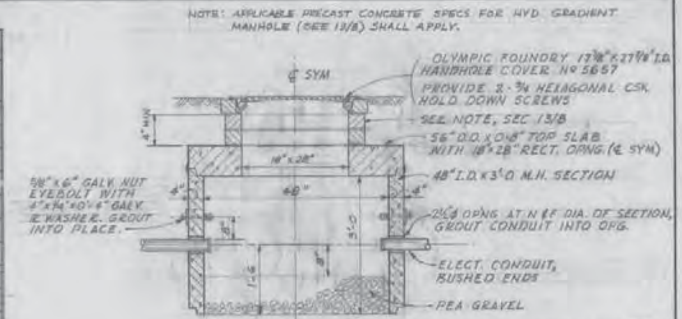



PLAN - VENT TRENCH (15/VAR)
SCALE: ¼" = 1'-0

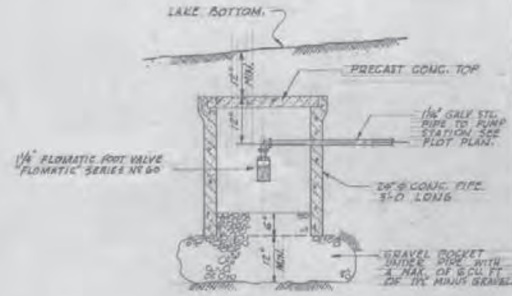



TYPICAL TRENCH SECTION (16/VAR)
NO SCALE

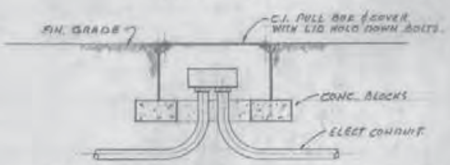
NOTE: APPLICABLE PRECAST CONCRETE SPECS FOR HYD. GRADIENT MANHOLE (SEE 13/8) SHALL APPLY.




ELECTRICAL PULLING HANDHOLE - DETAIL (17/VAR)
NO SCALE




LAKE WATER INTAKE SUMP - DETAIL (17A/VAR)
SCALE: ¾" = 1'-0




ELECTRICAL PULL BOX - DETAIL (17B/VAR)
NO SCALE

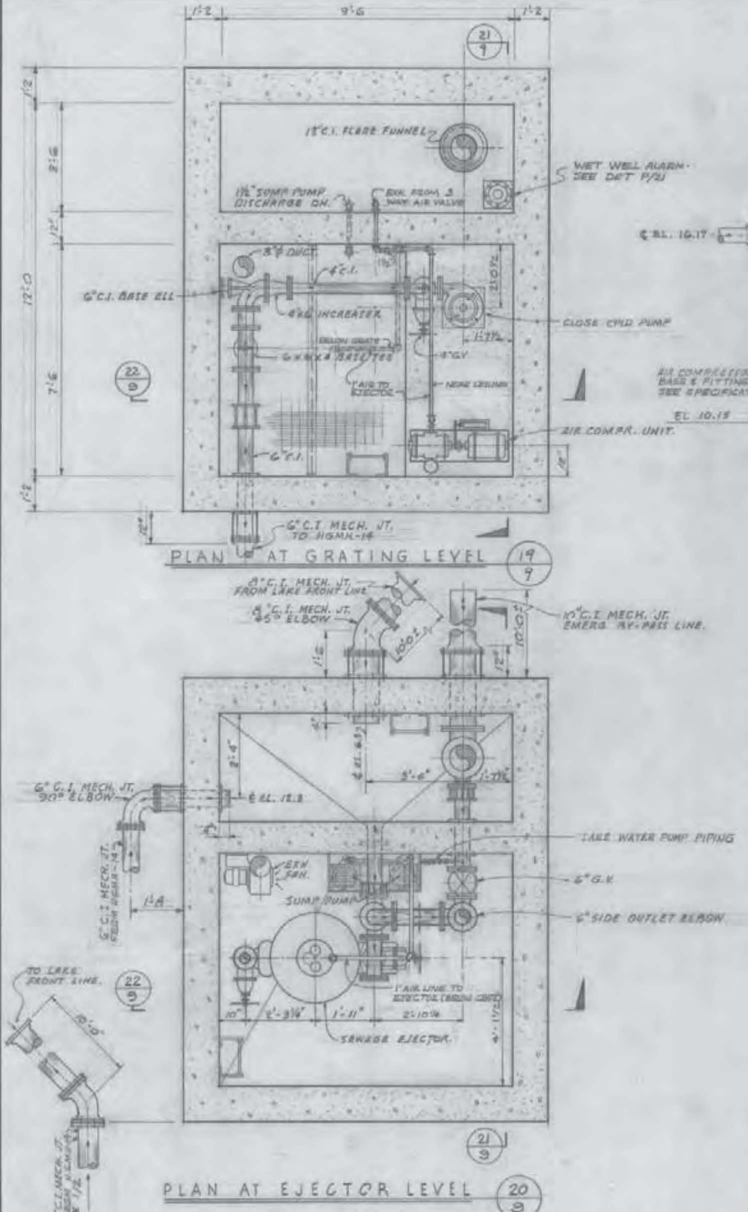
## NOTES - VENT TRENCHS

1. 4" PLASTIC PIPE SHALL BE WESTERN PLASTIC TYPE 800 CONFORMING TO US COMMERCIAL STANDARD CS-228-61. FITTINGS SHALL BE SUPPLIED BY PIPE MANUFACTURER.
2. BEDDING GRAVEL SHALL BE WASHED ⅜" MINUS PEA GRAVEL AS AVAILABLE AT LOCAL PITS.
3. TOP SOIL SHALL HAVE A POUROUS LOAMY APPEARANCE AND SHALL BE FREE OF EXCESS CLAY OR ROCKS. SOIL SHALL BE AS NORMALLY AVAILABLE LOCALLY FROM LANDSCAPE NURSERIES.
4. COURSE SAND SHALL BE A WASHED SAND SIMILIAR TO THAT USED AS PLASTER SAND.
5. VENT TRENCH BEDDING GRAVEL & SAND SHALL BE APPROVED BY THE FIELD ENGINEER.

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE ______

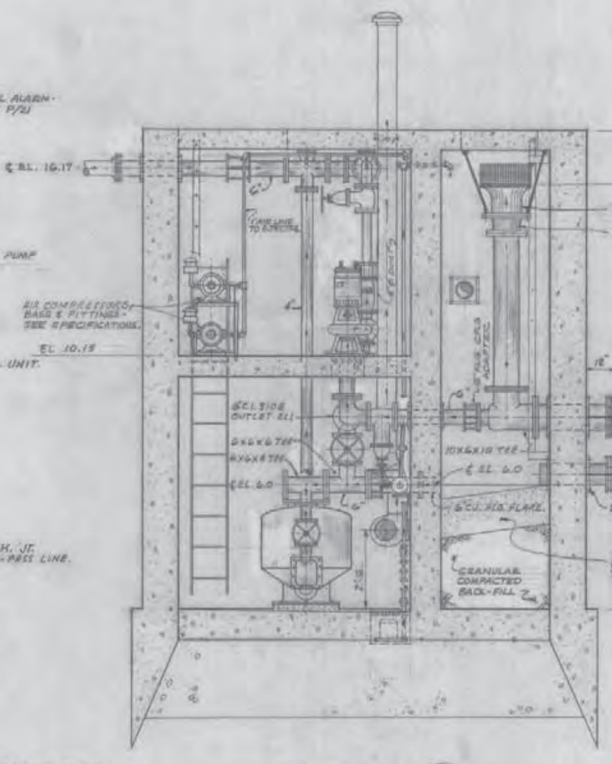
NOTE: THIS DRAWING SUPERSEDES DWG 6223-C 307.2
THIS DRAWING ISSUED 20 NOV 1964

| REVISIONS | DW'N BY: WG. RLM | DES BY: AG | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H SITE PLAN DETAILS PUMP STATIONS NO. 14 THRU 25 | DRAWING NUMBER 6223-C 307.3 |
|---|---|---|---|---|---|---|---|
| ADD Nº 1 L.S. #22 REVISIONS ADDED REV. #1 P.S. #17 REVISED - SEE C.O. #2 | CK'D BY: | APP'D BY: | SCALE: AS NOTED | | | | SHEET NUMBER 8 OF 32 |

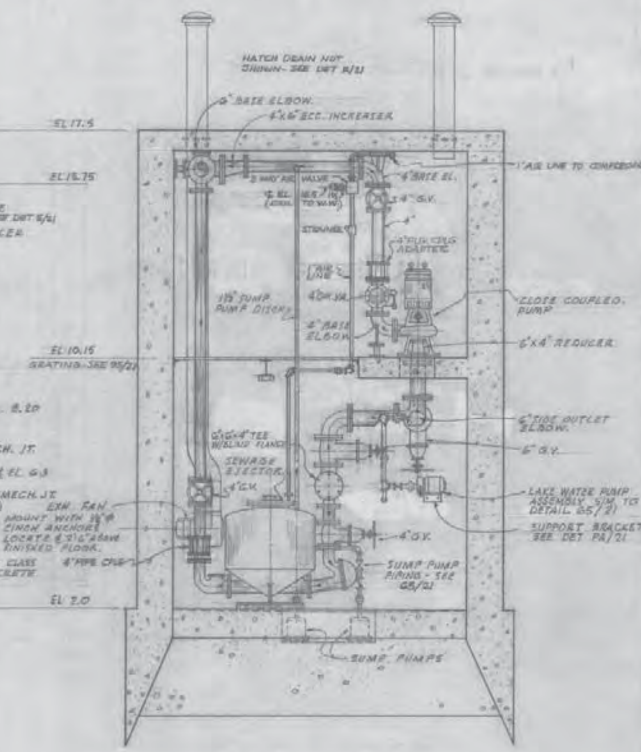



PLAN AT GRATING LEVEL (19/9)

PLAN AT EJECTOR LEVEL (20/9)




SECTION (21/9)




SECTION (22/9)

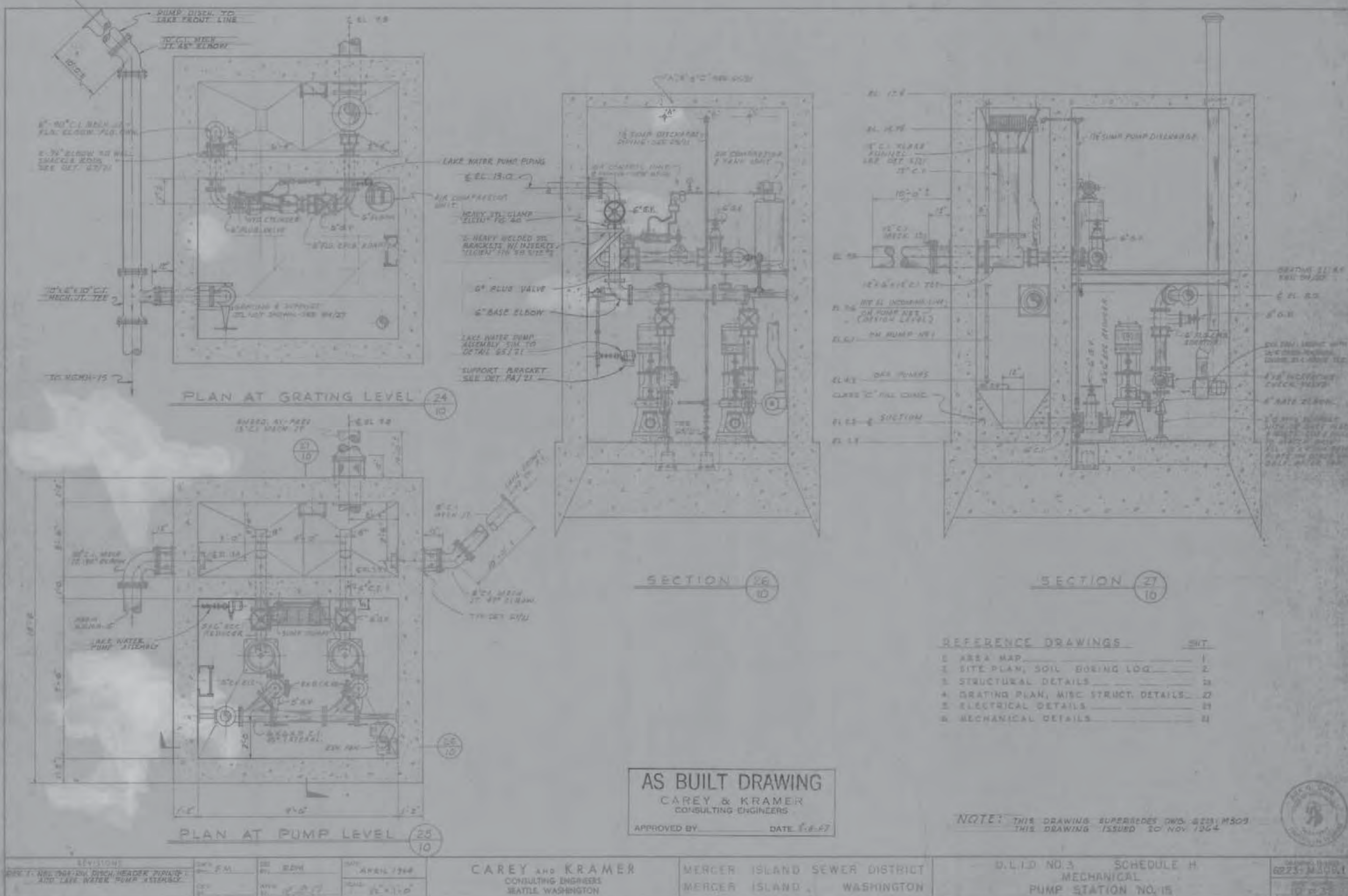
## REFERENCE DRAWINGS

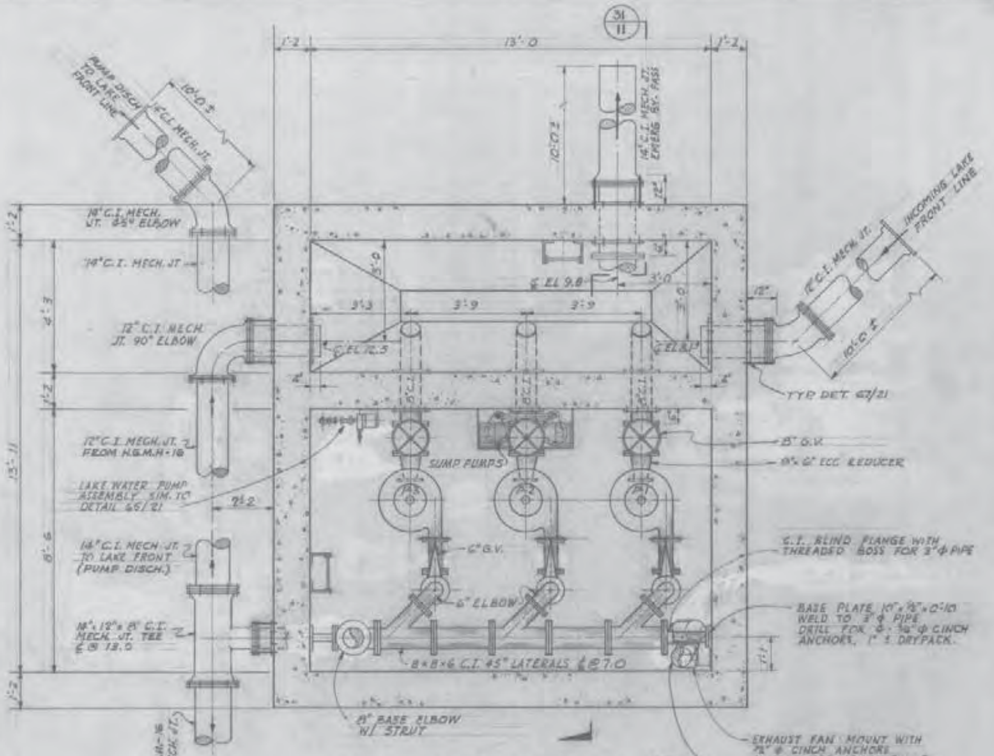
| | | SHT. |
|---|---|---|
| 1. | AREA MAP | 1 |
| 2. | SITE PLAN, SOIL BORING LOG | 2 |
| 3. | STRUCTURAL DETAILS | 23 |
| 4. | GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. | ELECTRICAL DETAILS | 28 |
| 6. | MECHANICAL DETAILS | 21 |

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

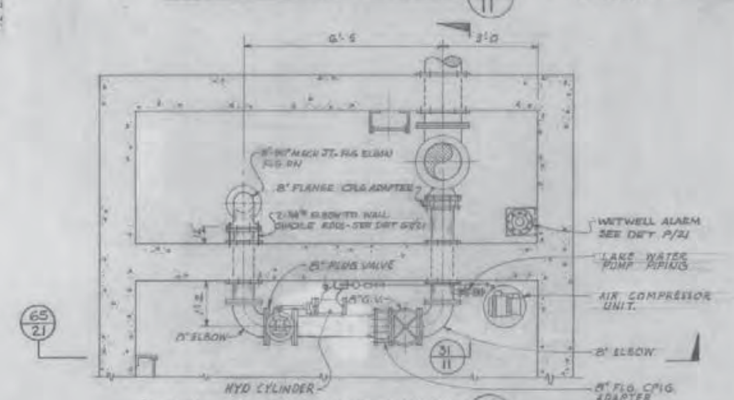
NOTE: THIS DRAWING SUPERSEDES DWG 6223-M308.
THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | DWN BY: FM & WG | DES BY: RDM | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT | U.L.I.D. NO. 3 SCHEDULE H | DRAWING NUMBER 6223-M308.1 |
|---|---|---|---|---|---|---|---|
| REV. 1 - NOV. 1964 - ADD. LAKE WATER ASS. | CK'D BY: | APV'D BY: | SCALE: ½" = 1'-0 | | MERCER ISLAND, WASHINGTON | MECHANICAL PUMP STATION NO. 14 | SHEET NUMBER 9 OF 32 |

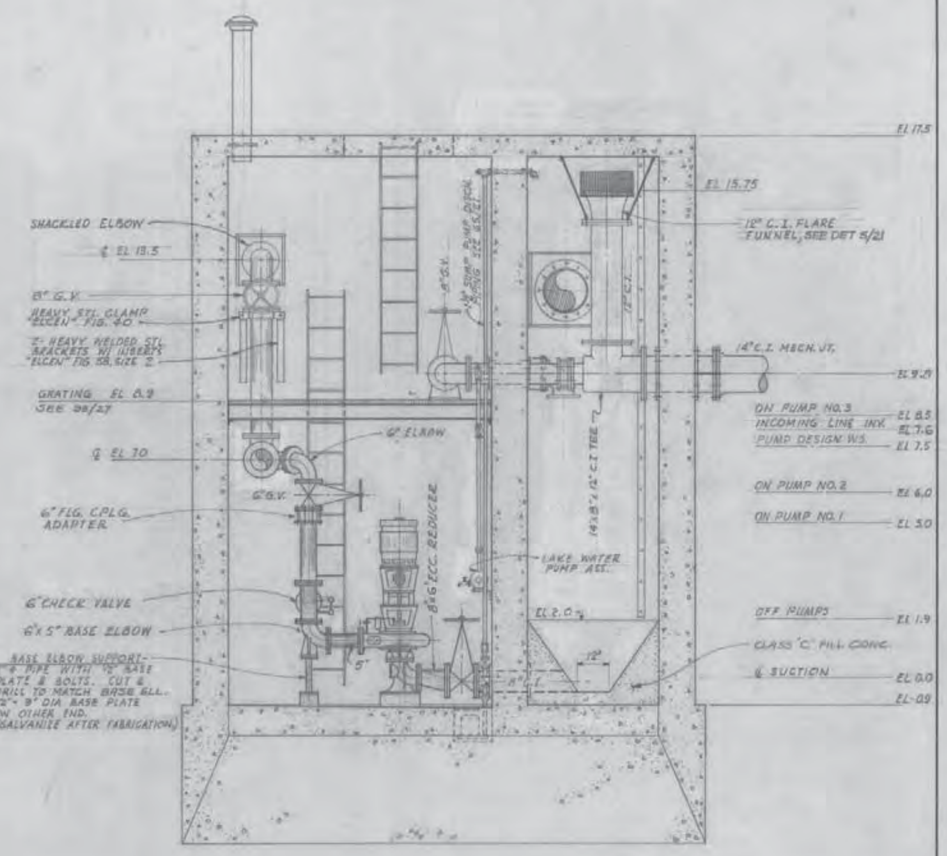

PLAN AT GRATING LEVEL 24/10
PLAN AT PUMP LEVEL 25/10
SECTION 26/10
SECTION 27/10
LAKE WATER PUMP PIPING
6" PLUG VALVE
6" BASE ELBOW
REFERENCE DRAWINGS SHT
1. AREA MAP 1
2. SITE PLAN, SOIL BORING LOG 2
3. STRUCTURAL DETAILS
4. GRATING PLAN, MISC STRUCT. DETAILS
5. ELECTRICAL DETAILS
6. MECHANICAL DETAILS
NOTE: THIS DRAWING SUPERSEDES DWG. 6231 M509
THIS DRAWING ISSUED 20 NOV 1964
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE
REVISIONS
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE H
MECHANICAL
PUMP STATION NO. 15




PLAN AT PUMP LEVEL (29/11)




PLAN AT GRATING LEVEL (30/11)




SECTION (31/11)

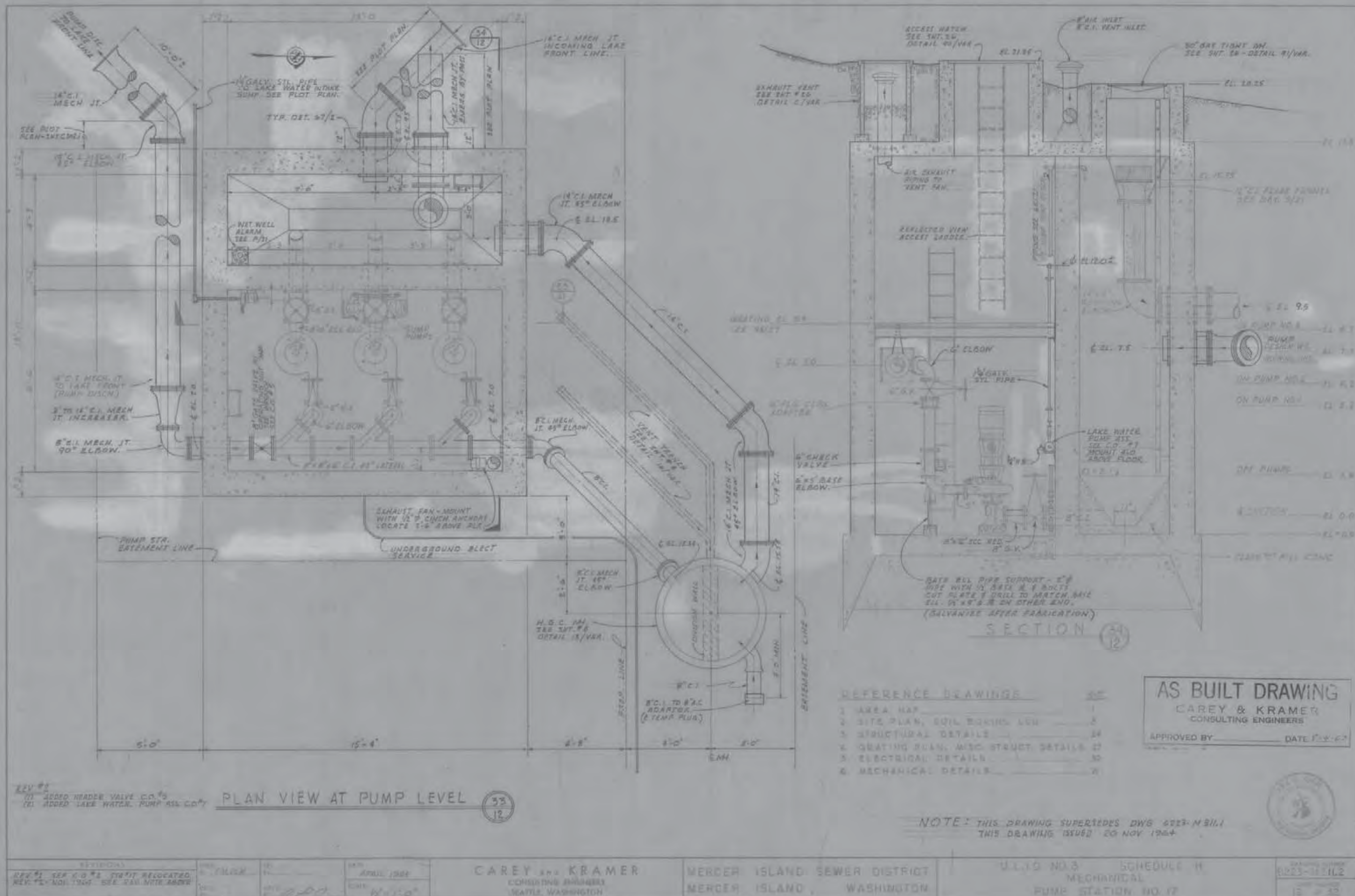
REFERENCE DRAWINGS

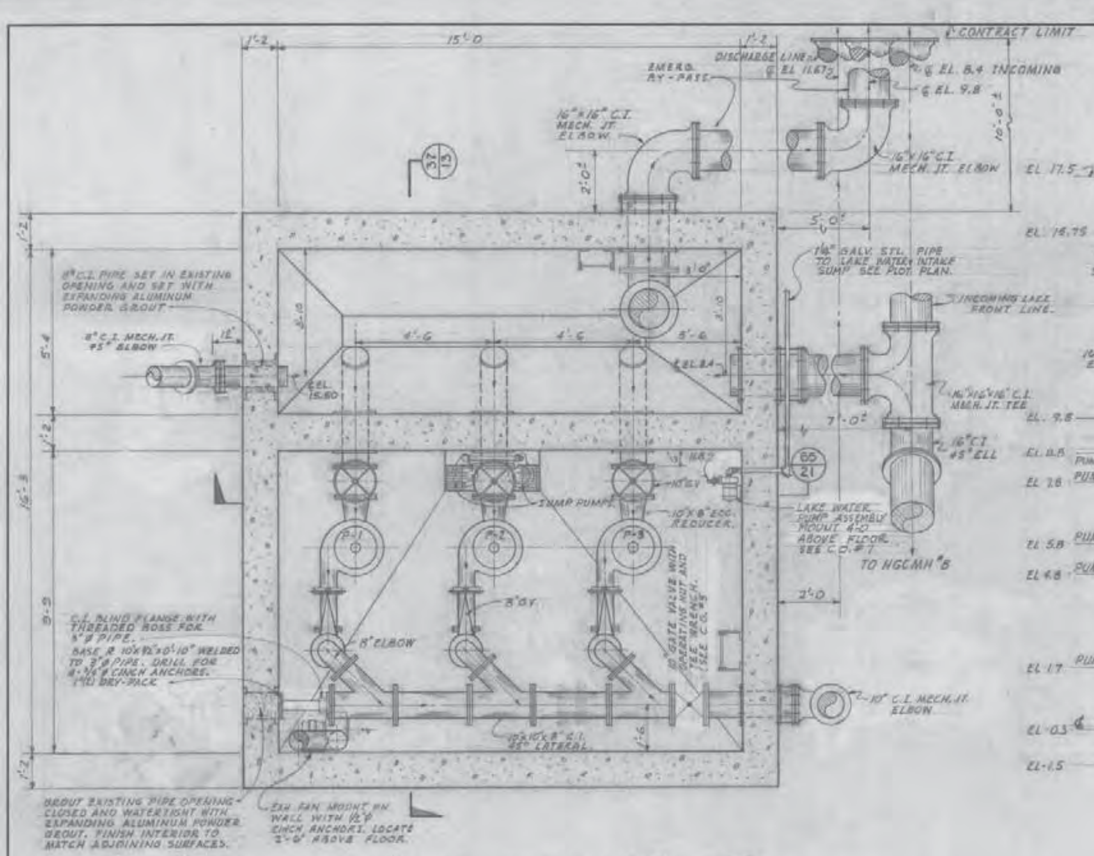
| | | SHT. |
|---|---|---|
| 1. | AREA MAP | 1 |
| 2. | SITE PLAN, SOIL BORING LOG | 2 |
| 3. | STRUCTURAL DETAILS | 24 |
| 4. | GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. | ELECTRICAL DETAILS | 30 |
| 6. | MECHANICAL DETAILS | 21 |

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M310
THIS DRAWING ISSUED 20 NOV 1964.

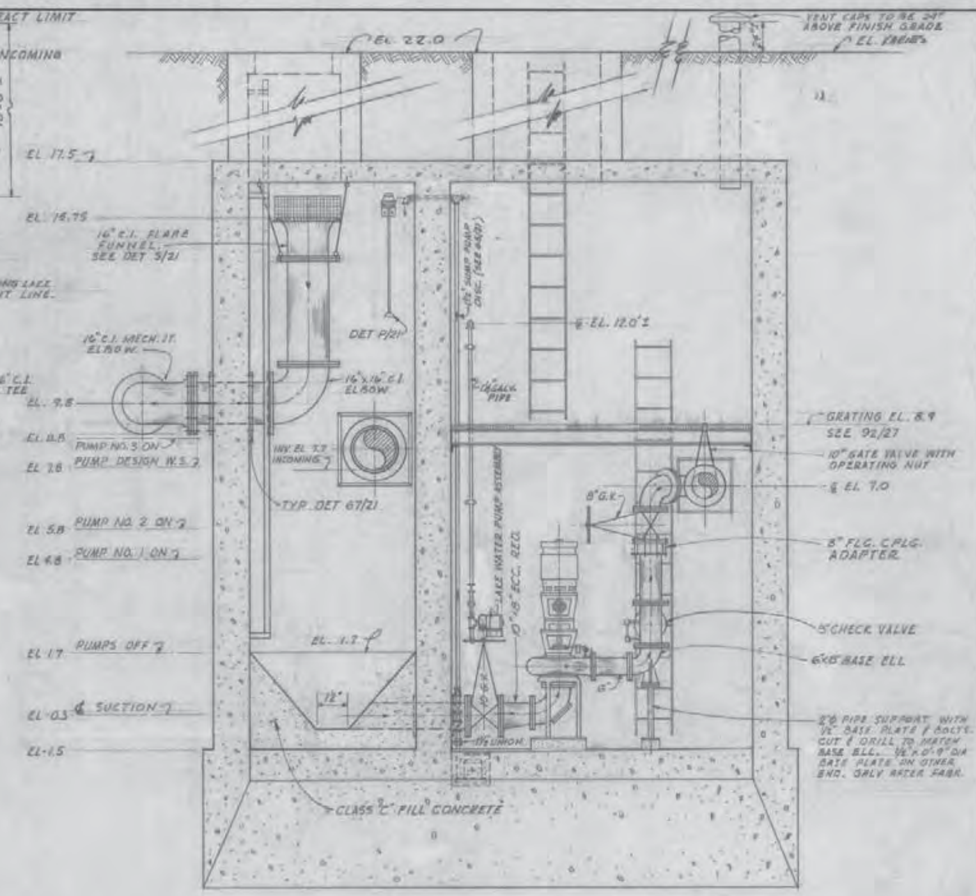
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

| REVISIONS | DW'N BY: FM & WG | DES BY: EDM | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H MECHANICAL PUMP STATION NO. 16 | DRAWING NUMBER 6223-M310.1 |
|---|---|---|---|---|---|---|---|
| REV. 1, NOV 64 CHANGE HEADER PIPING & LAKE WATER ASSEMBLY C.O. #7 | CK'D BY: | APP'D BY: | SCALE: ½" = 1'-0 | | | | SHEET NUMBER 11 OF 32 |


PLAN VIEW AT PUMP LEVEL
SECTION
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE
REFERENCE DRAWINGS
1. AREA MAP
2. SITE PLAN, SOIL BORING LOG
4. STRUCTURAL DETAILS
4. GRATING PLAN, MISC. STRUCT. DETAILS
5. ELECTRICAL DETAILS
6. MECHANICAL DETAILS
NOTE: THIS DRAWING SUPERSEDES DWG 6223-M311.1
THIS DRAWING ISSUED 20 NOV 1964
PUMP STR. EASEMENT LINE
UNDERGROUND ELECT SERVICE
EASEMENT LINE
GRATING EL 18.4
6" CHECK VALVE
6"x45° BASE ELBOW
LAKE WATER PUMP ASS.
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE H
MECHANICAL
PUMP STATION NO. 17




PLAN AT PUMP LEVEL (36/13)




SECTION (37/13)

REVISION Nº 1

(a) YARD PIPING REVISED - SEE DWG. 6223-C303.1
(b) EXTENDED HATCH OPENING & WET WELL MANHOLE TO ELEV. 22.0
(c) REVISED PUMP HEADER PIPING
(d) ADDED 8" C.I. GRAVITY SEWER LINE TO WET WELL THRU EXIST. OPENING
(e) ADDED LAKE WATER PUMP ASSEMBLY - SEE C.O. #7
(f) ESTABLISHED PIPELINE ELEVATIONS FOR LAKE FRONT LINES AT CONTRACT LIMITS.
(g) 8" VENT PIPES FOR MACHINERY SPACE CHANGED TO EXTEND 2'-0" ABOVE FINISH GRADE.

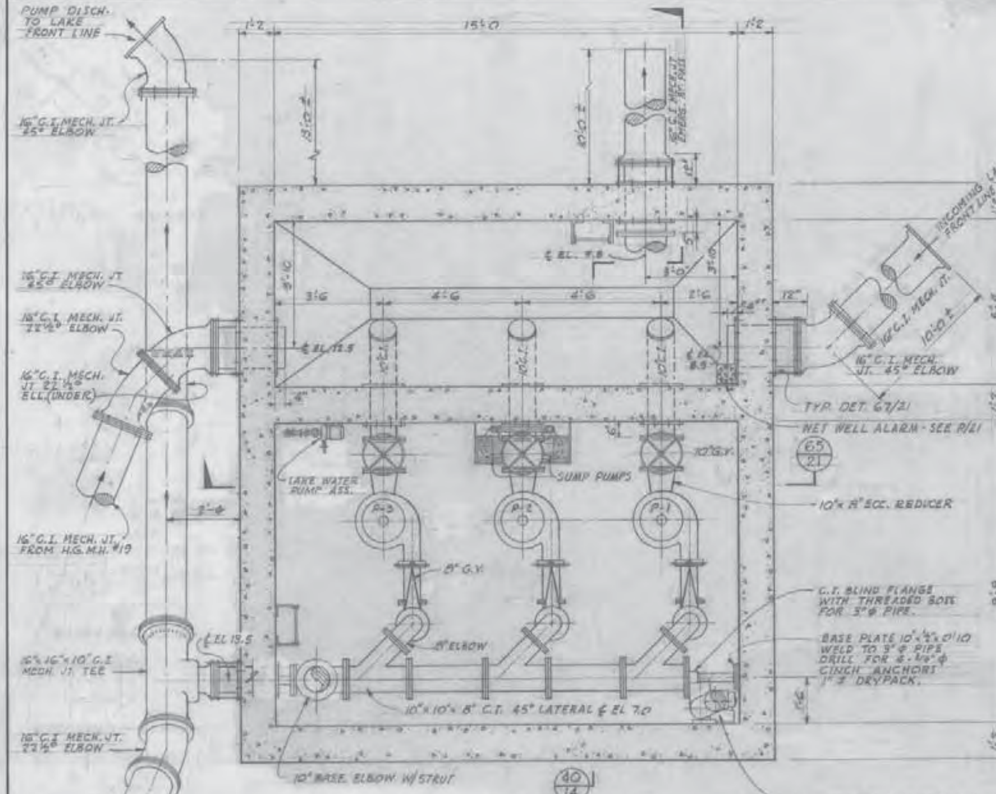
REFERENCE DRAWINGS

| | | SHT. |
|---|---|---|
| 1. | AREA MAP | 1 |
| 2. | SITE PLAN, SOIL BORING LOG | 3 |
| 3. | STRUCTURAL DETAILS | 25 |
| 4. | GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. | ELECTRICAL DETAILS | 31 |
| 6. | MECHANICAL DETAILS | 21 |

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-65

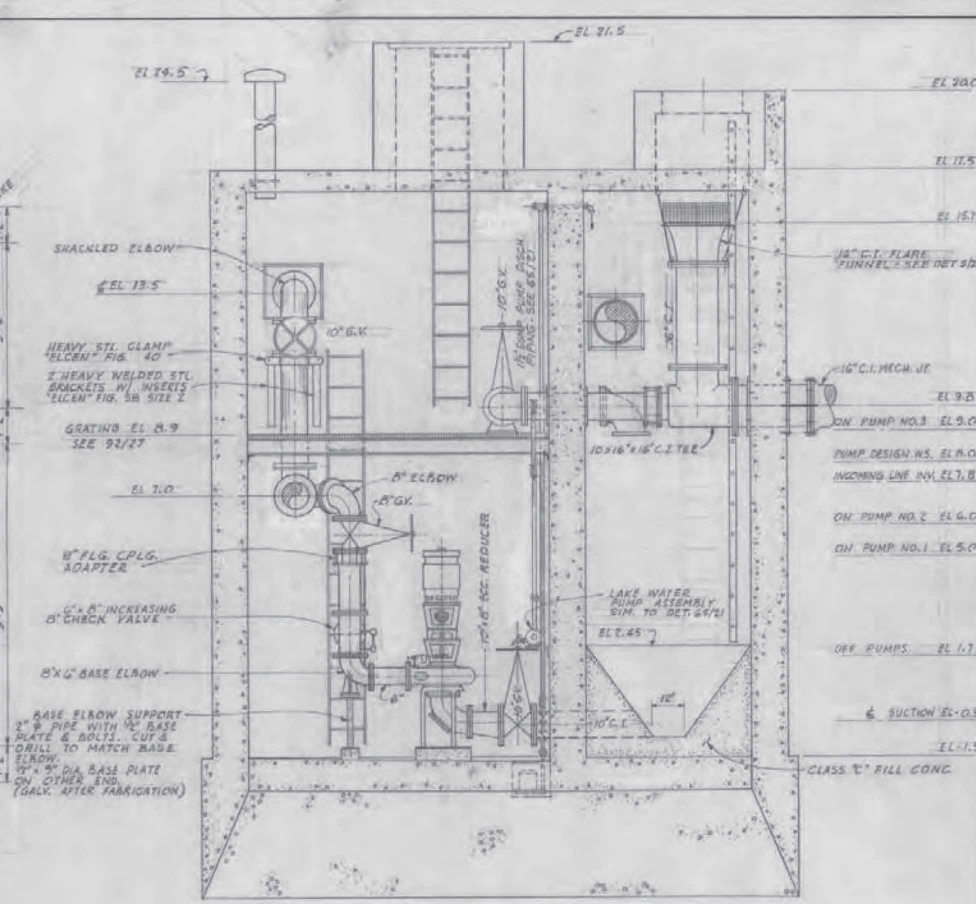
NOTE: THIS DRAWING SUPERSEDES DWG. 6223-M312.1
THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | DWN BY: FM & RLM | DES BY: RPM | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H MECHANICAL PUMP STATION NO. 18 | DRAWING NUMBER 6223-M312.2 |
|---|---|---|---|---|---|---|---|
| OCT. 12, 1964 - REV. #1 - SEE NOTE ABOVE; NOV. 1964 - REV #2 - REV. LAKE WATER SYST. | CK'D BY: | APP'D BY: | SCALE: ½" = 1'-0" | | | | SHEET NUMBER 13 OF 32 |




PLAN AT PUMP LEVEL (39/14)

PLAN AT GRATING LEVEL (63/21)




SECTION (40/14)

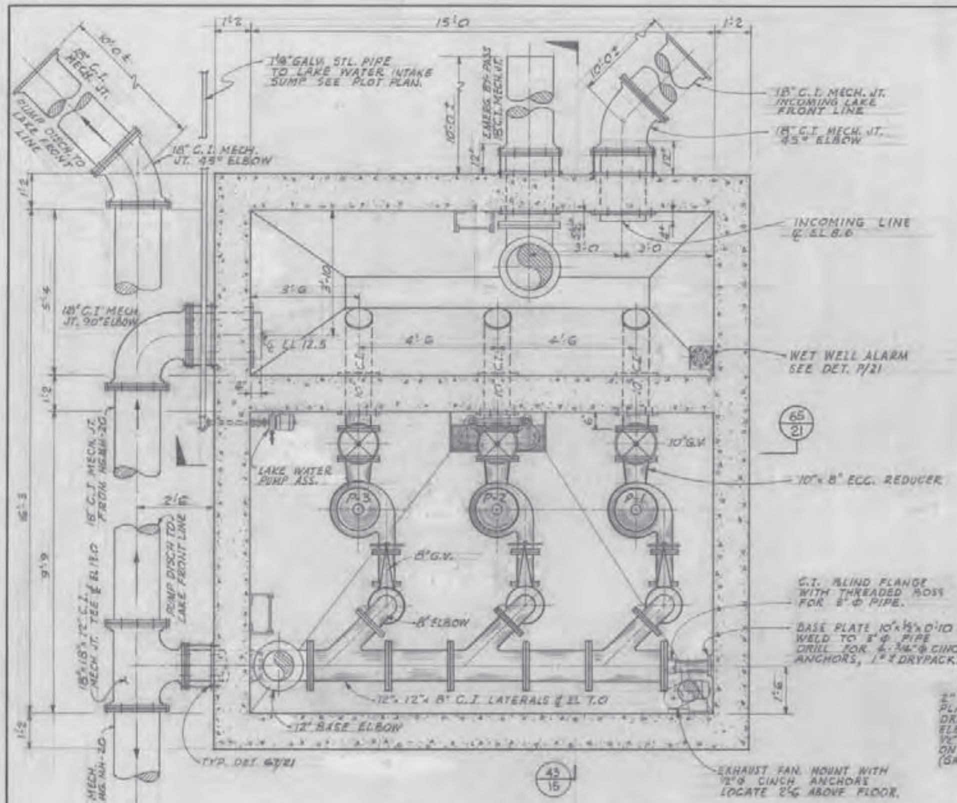
REFERENCE DRAWINGS

| | SHT. |
|---|---|
| 1. AREA MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 4 |
| 3. STRUCTURAL DETAILS | 25 |
| 4. GRATING PLAN, MISC. STRUCT DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 31 |
| 6. MECHANICAL DETAILS | 21 |

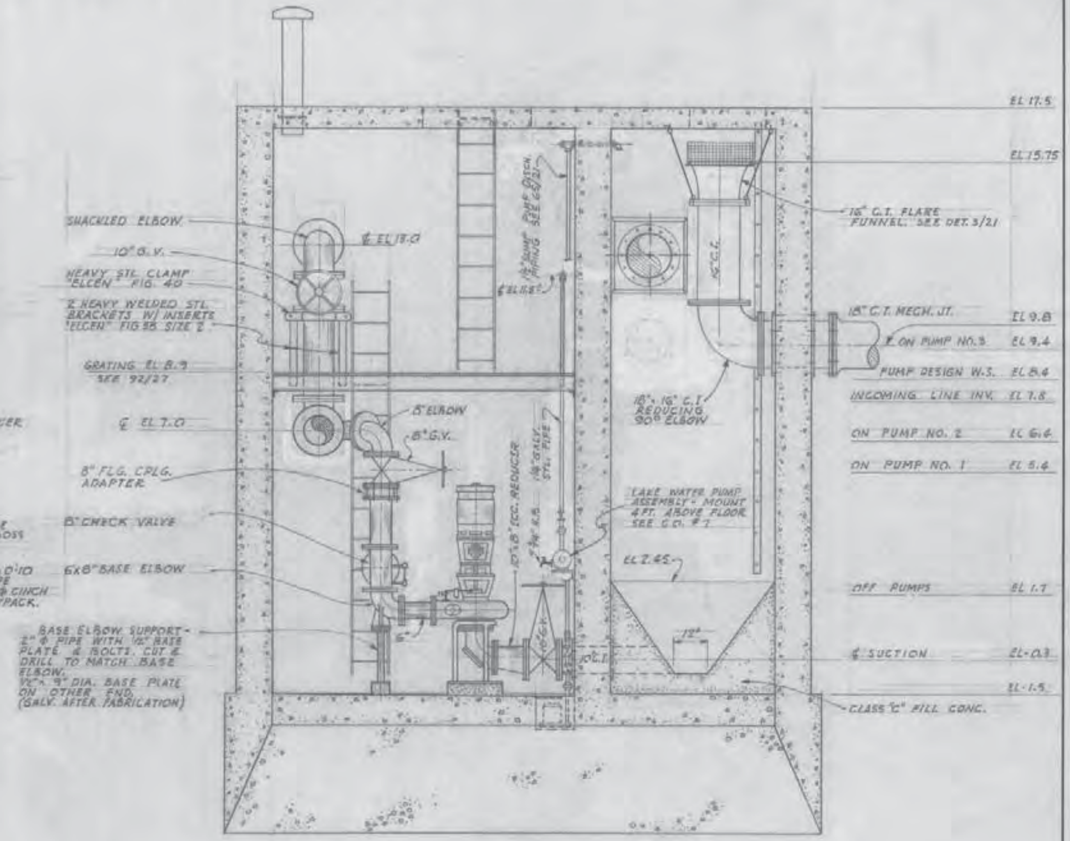
AS. BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 5-8-67

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M313
THIS DRAWING ISSUED 20 NOV 1964

| REVISIONS | DWN BY: FM & WG | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D NO.3 SCHEDULE H MECHANICAL PUMP STATION NO.19 | DRAWING NUMBER 6223-M313.1 |
|---|---|---|---|---|---|---|
| REV 1. NOV 1964 - ADD LAKE WATER ASS. CHANGED HEADER PIPING, OUTSIDE PIPING & COVERED TOP. | CK'D BY: / APP'D BY: | SCALE: ½"=1'-0 | | | | SHEET NUMBER 14 OF 32 |




PLAN AT PUMP LEVEL (42/15)




SECTION (43/15)

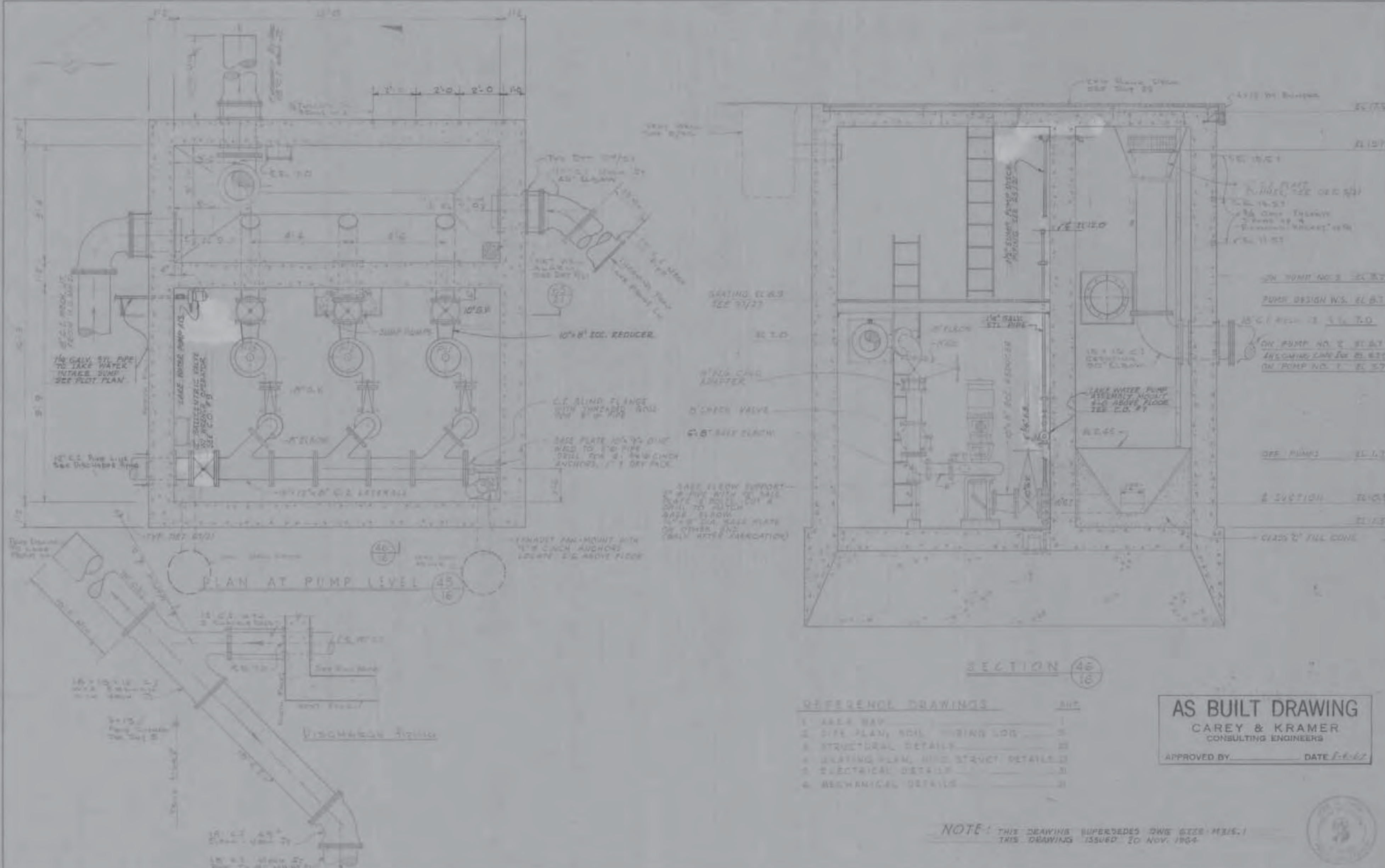
REFERENCE DRAWINGS

| | SHT. |
|---|---|
| 1. AREA MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 5 |
| 3. STRUCTURAL DETAILS | 25 |
| 4. GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 31 |
| 6. MECHANICAL DETAILS | 21 |

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE 8-4-67

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M314
THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | DWN BY: FMEWG | DES BY: | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H MECHANICAL PUMP STATION NO. 20 | DRAWING NUMBER 6223-M314.1 |
|---|---|---|---|---|---|---|---|
| REV. 1, NOV. 1964 - ADD LAKE WATER ASSEMBLY CHANGE HEADER PIPING. | CK'D BY: | APP'D BY: | SCALE: ½" = 1'-0 | | | | SHEET NUMBER 15 OF 32 |



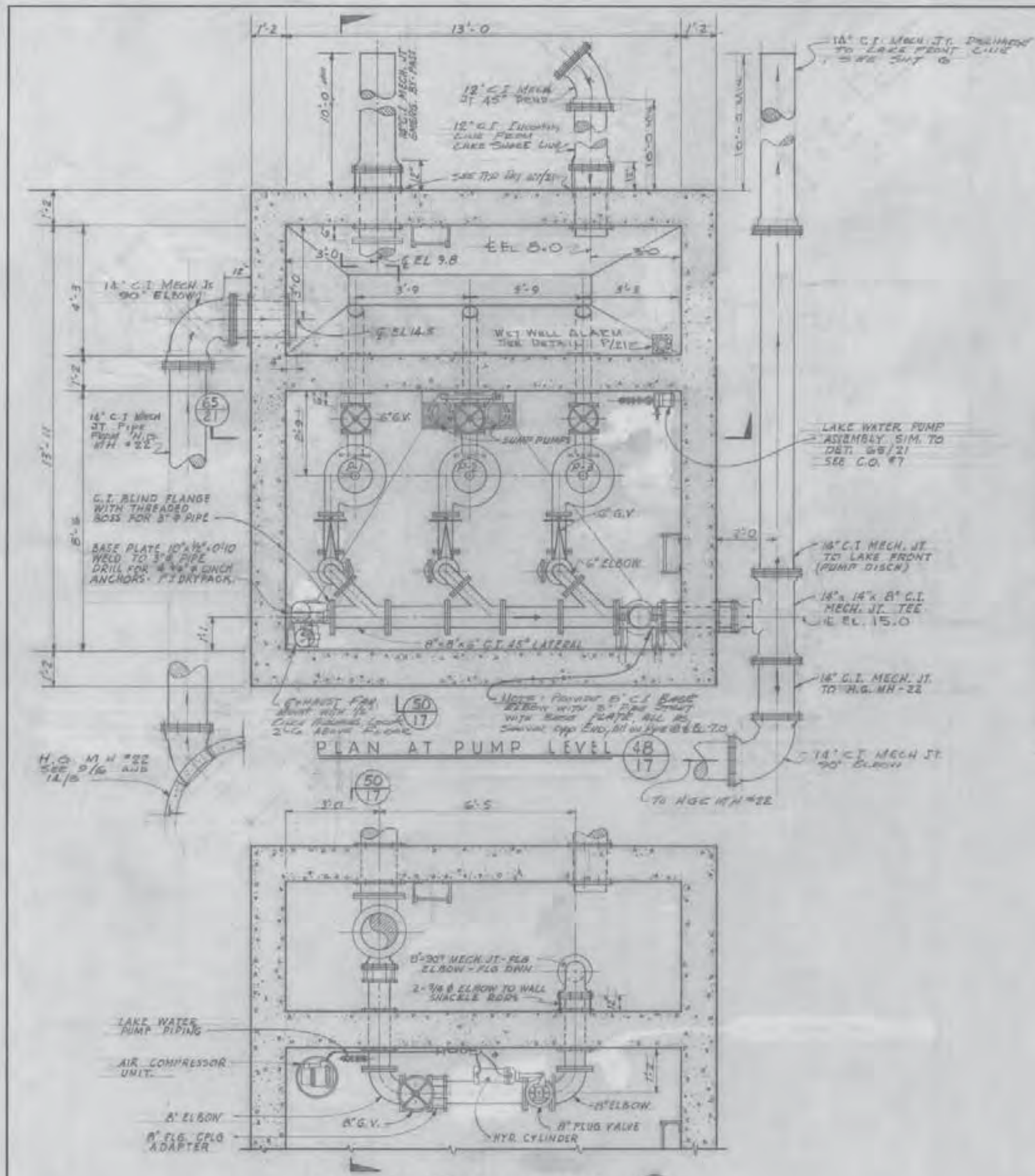

REFERENCE DRAWINGS — SHT.

1. AREA MAP — 1
2. SITE PLAN, SOIL BORING LOG — 15
3. STRUCTURAL DETAILS — 20
4. GRATING PLAN, MISC. STRUCT. DETAILS — 21
5. ELECTRICAL DETAILS — 31
6. MECHANICAL DETAILS — 31

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 5-6-65

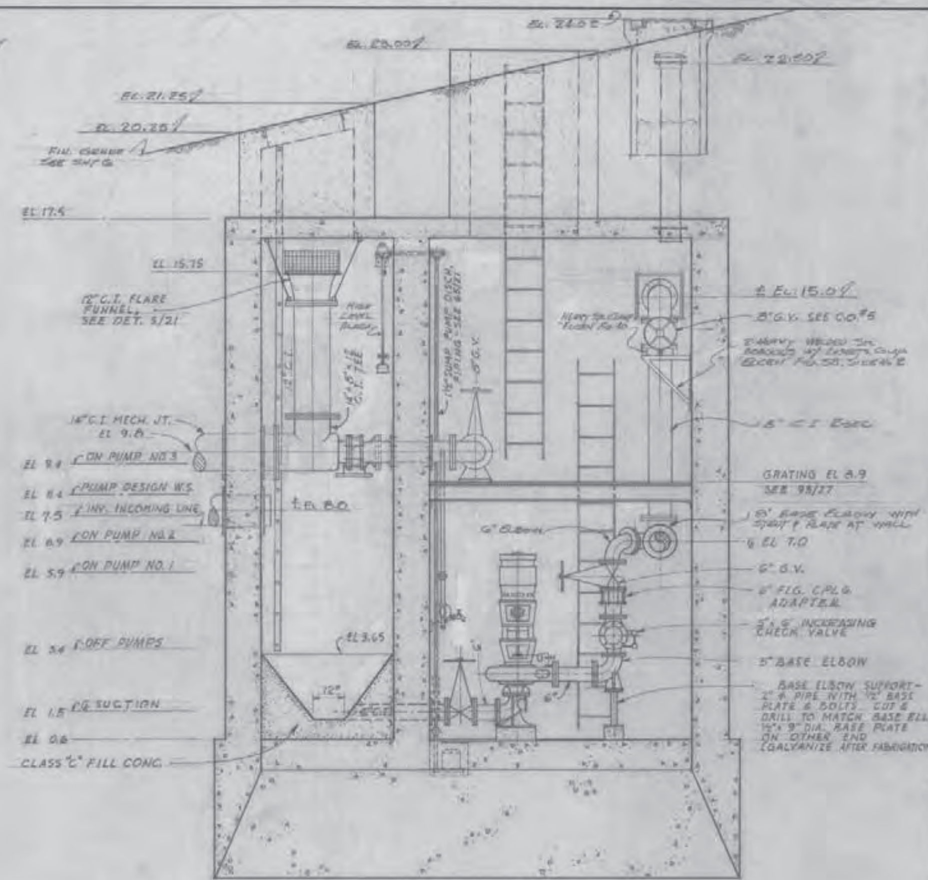
NOTE: THIS DRAWING SUPERSEDES DWG 6223-M316.1
THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ADD 1 - 8/18/64 - PIPING CHANGE, WR DECK ADDED<br>REV 2 - NOV 64 - ADD WASHER VALVE - C.O. #5<br>- ADD LAKE WATER REG. C.O. #7 | DES. FEB 1964<br>DR. RDM | APRIL 1964<br>SCALE 3/8"=1'-0" | CAREY and KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H<br>MECHANICAL<br>PUMP STATION NO. 21 | 6223-M316.2<br>16 OF 32 |




PLAN AT PUMP LEVEL (48/17)

PLAN AT GRATING LEVEL (49/17)



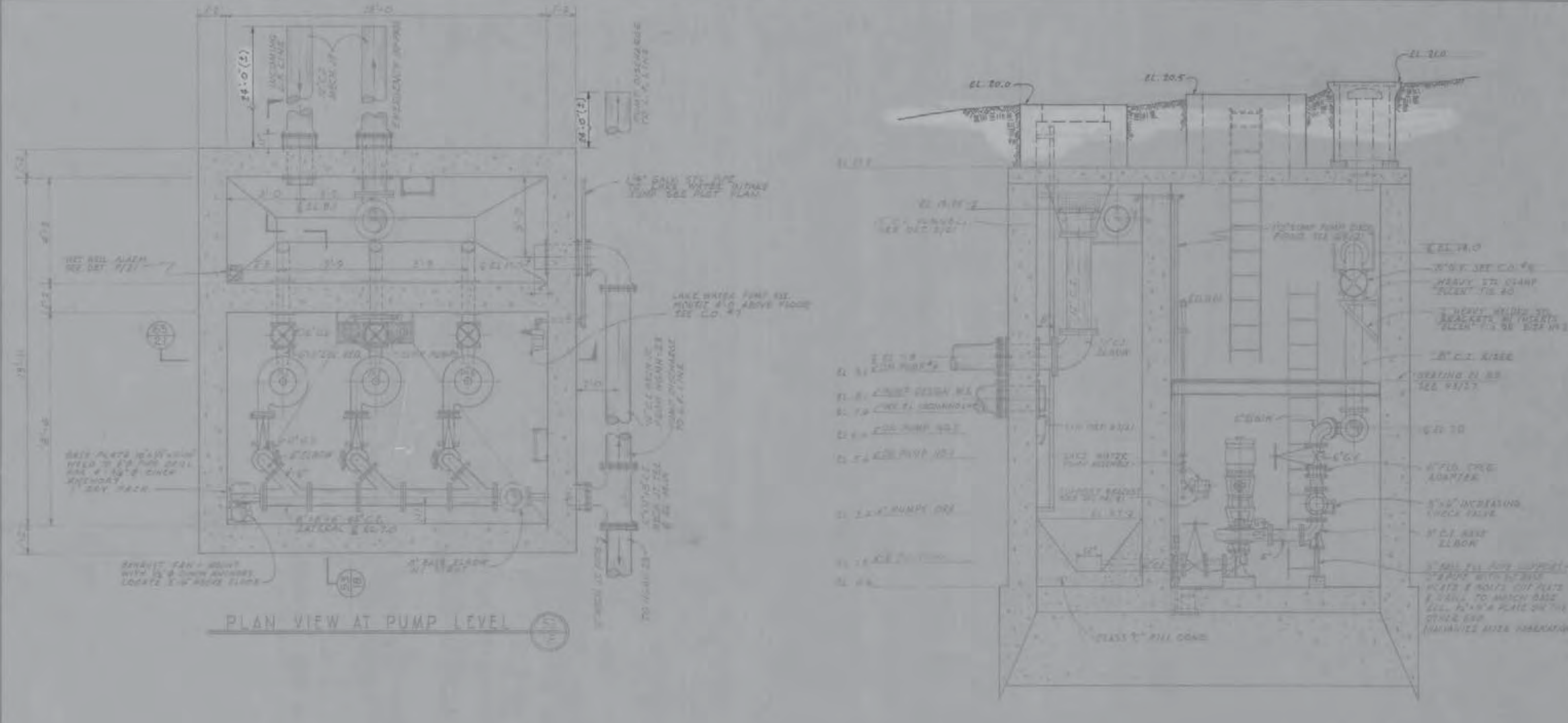

SECTION (50/17)

| REFERENCE DRAWINGS | SHT. |
|---|---|
| 1. AREA MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 6 |
| 3. STRUCTURAL DETAILS | 24 |
| 4. GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 30 |
| 6. MECHANICAL DETAILS | 21 |

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 2-5-67

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M316.1 THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | DWN. BY FM&WG / CK'D BY | DES. BY RDM / APPD BY ADC | DATE APRIL 1964 / SCALE 1/4" = 1'-0" | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT / MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H / MECHANICAL / PUMP STATION NO. 22 | DRAWING NUMBER 6223-M316.2 / SHEET NUMBER 17 OF 32 |
|---|---|---|---|---|---|---|---|
| ADD-1 - 5-18-64 - CHANGE PIPING AND TOP SLAB; REV 1 - NOV 64 - ADD HEADER VALVE C.O. #5, ADD LAKE WATER ASS. C.O. #7 | | | | | | | |



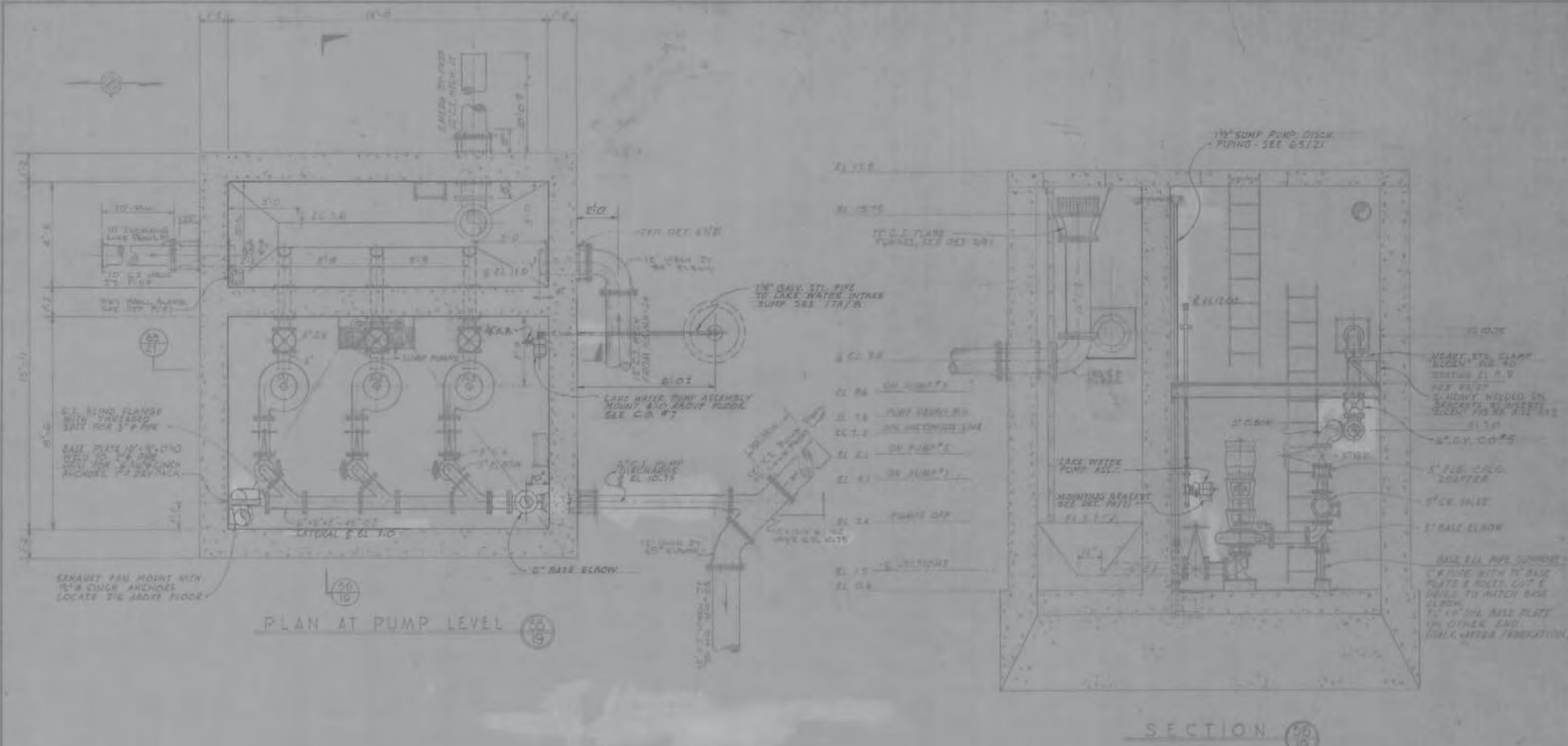

REFERENCE DRAWINGS — SHT.

1. AREA MAP — 1
2. SITE PLAN, SOIL BORING LOG — 3
3. STRUCTURAL DETAILS — 14
4. GRATING PLAN, MISC. STRUCT. DETAILS — 17
5. ELECTRICAL DETAILS — 30
6. MECHANICAL DETAILS — 31

NOTE: THIS DRAWING SUPERSEDES DWG. 6323-M31?
THIS DRAWING ISSUED 4 DEC. 1968

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE ________

| REVISIONS | DRAWN | CHECKED | DATE | | | | |
|---|---|---|---|---|---|---|---|
| REV 1 ... | ... | ... | APRIL 1964 | CAREY AND KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H<br>MECHANICAL<br>PUMP STATION NO. 23 | 6323-M317.2<br>... OF 32 |
| REV 2 DEC 68 - RELOCATED PS. # 23 | | | SCALE 1/2" = 1'-0" | | | | |




REFERENCE DRAWINGS — SHT.

1. AREA MAP — 1
2. SITE PLAN, SOIL BORING LOG — 7
3. STRUCTURAL DETAILS — 24
4. GRATING PLAN, MISC. STRUCT. DETAILS — 27
5. ELECTRICAL DETAILS — 11
6. MECHANICAL DETAILS — 21

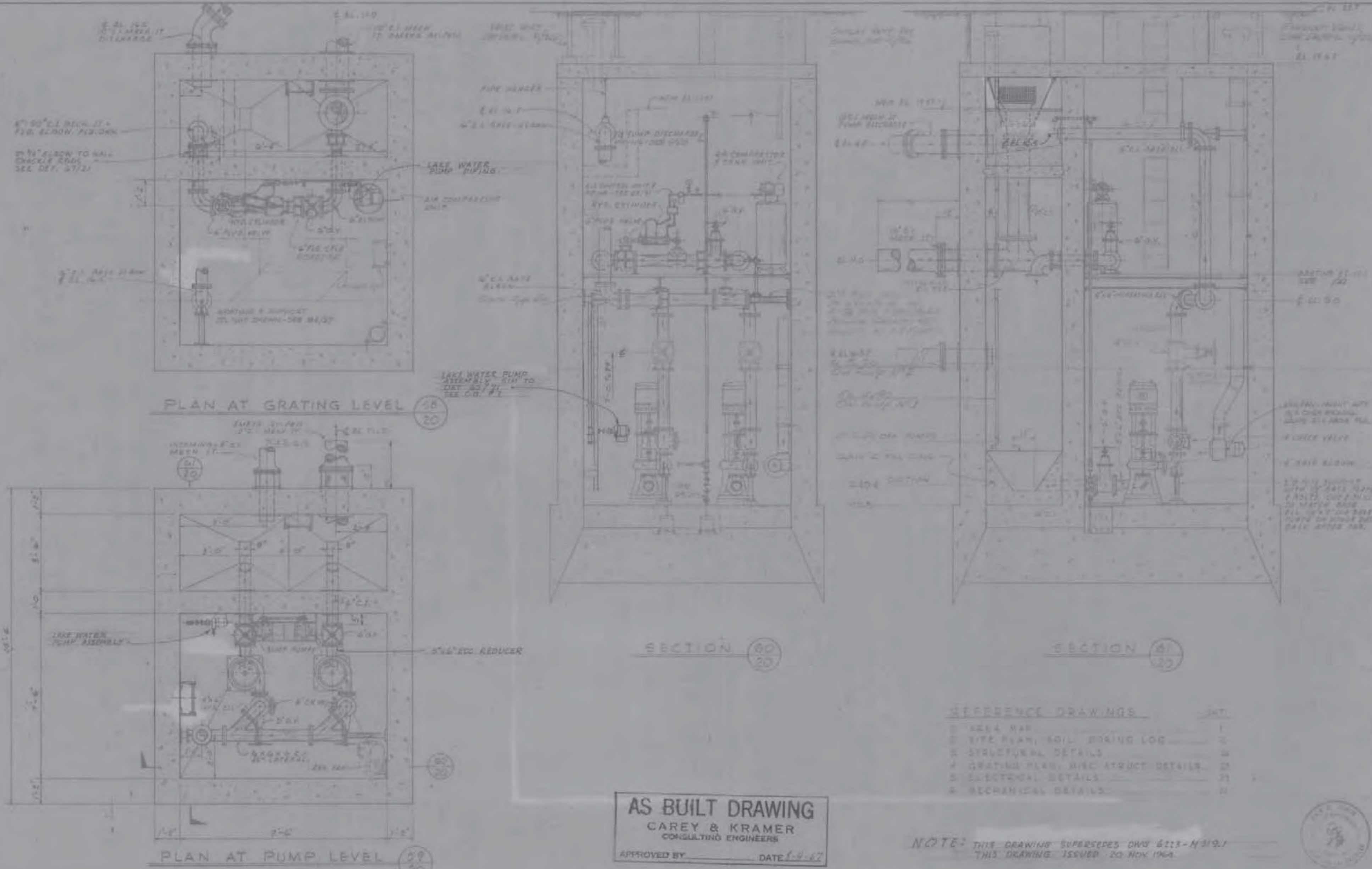
**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE ______

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M31M.1
THIS DRAWING ISSUED 20 NOV. 1964

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ADD 1 5-18-68 - PIPING CHANGED<br>REV. 2 NOV 68 - HEADER PIPING CHANGED LAKE WATER ASS'Y ADDED | DRN BY | DES BY RDH | DATE APRIL 1964 | CAREY AND KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON |
| | CKD BY | APPD BY | SCALE ½" = 1'-0 | | |

U.L.I.D. NO. 3 SCHEDULE H
MECHANICAL
PUMP STATION NO. 24

DRAWING NUMBER 6223-M3 6.2



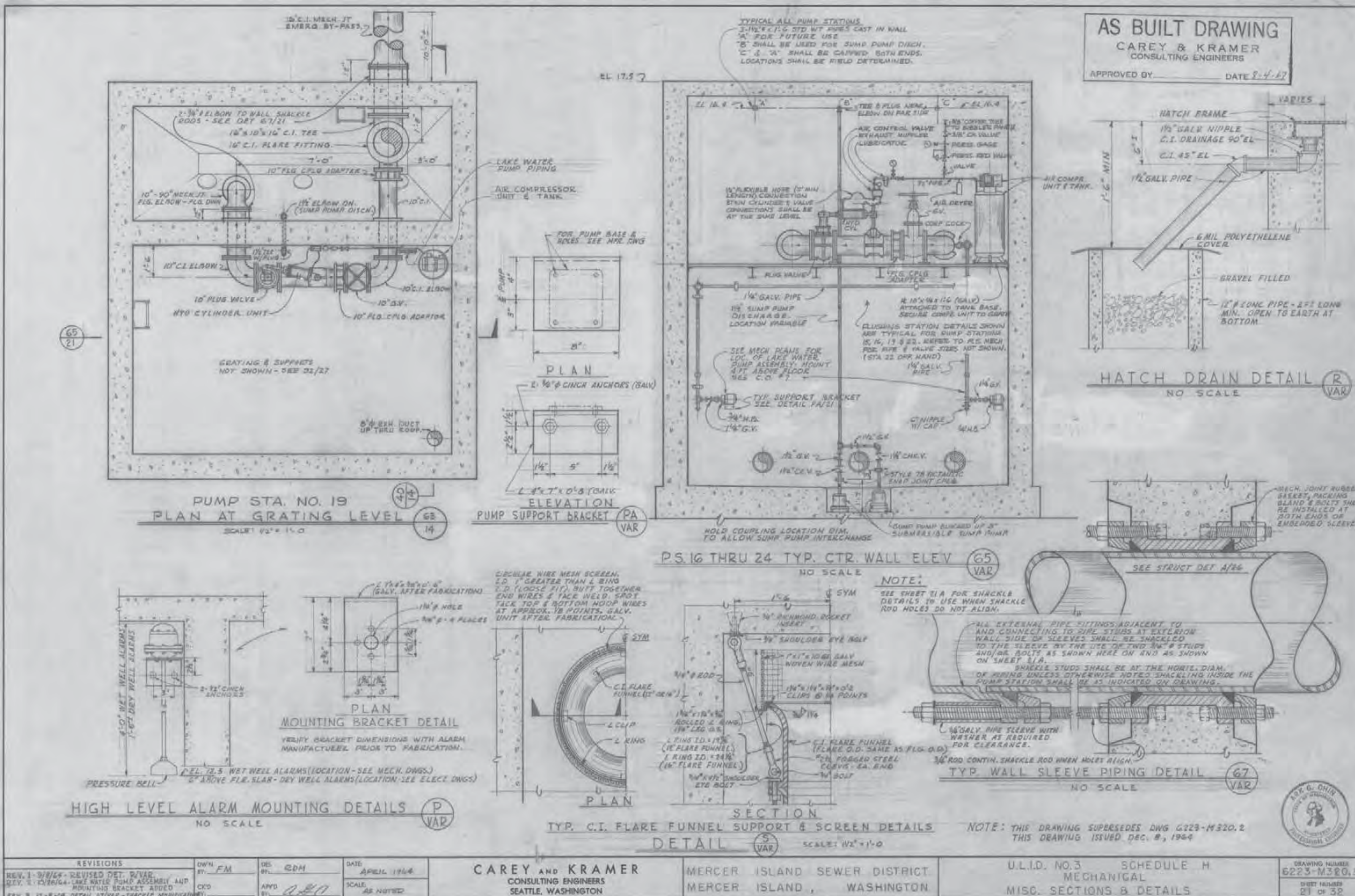

REFERENCE DRAWINGS — SHT.

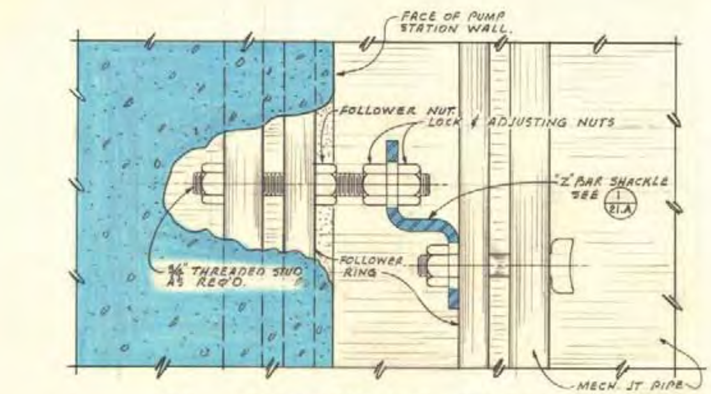
1 AREA MAP — 1
2 SITE PLAN, SOIL BORING LOG — 2
3 STRUCTURAL DETAILS — 18
4 GRATING PLAN, MISC STRUCT DETAILS — 27
5 ELECTRICAL DETAILS — 31
6 MECHANICAL DETAILS — 31

NOTE: THIS DRAWING SUPERSEDES DWG 6223-M319.1
THIS DRAWING ISSUED 20 NOV 1964

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE 6-8-67

| REVISIONS | | | | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H MECHANICAL PUMP STATION NO. 28 | 6223-M319.2 |
|---|---|---|---|---|---|---|---|
| REV 1, 8-18-64, P.S. 28 COMPLETELY REVISED<br>REV 2, NOV 64, LAKE WATER PUMP ASS. | DRN BY E.M. | DES BY RPM-ECE | DATE APRIL 1964<br>SCALE 1/2"=1'-0" | | | | SHEET NUMBER 20 OF 38 |

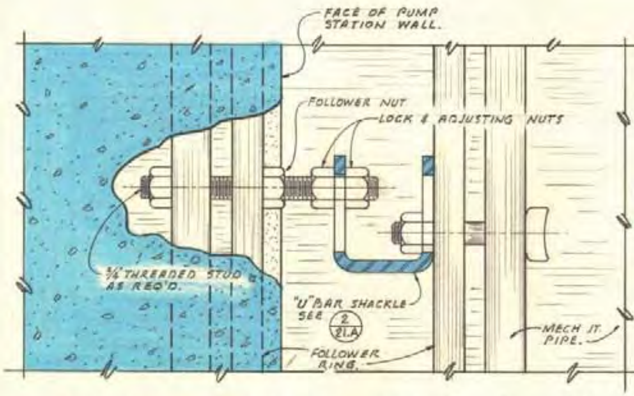

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE 8-4-67
PUMP STA. NO. 19
PLAN AT GRATING LEVEL
SCALE: 1/2" = 1'-0
ELEVATION
PUMP SUPPORT BRACKET
PLAN
P.S. 16 THRU 24 TYP. CTR. WALL ELEV
NO SCALE
HATCH DRAIN DETAIL
NO SCALE
HATCH FRAME
GRAVEL FILLED
6 MIL POLYETHELENE COVER
TYPICAL ALL PUMP STATIONS
NOTE:
SEE SHEET 7/A FOR SHACKLE DETAILS TO USE WHEN SHACKLE ROD HOLES DO NOT ALIGN.
SEE STRUCT DET A/26
TYP. WALL SLEEVE PIPING DETAIL
NO SCALE
HIGH LEVEL ALARM MOUNTING DETAILS
NO SCALE
MOUNTING BRACKET DETAIL
VERIFY BRACKET DIMENSIONS WITH ALARM MANUFACTURER PRIOR TO FABRICATION.
PRESSURE BELL
SECTION
TYP. C.I. FLARE FUNNEL SUPPORT & SCREEN DETAILS
DETAIL
SCALE: 1 1/2" = 1'-0
NOTE: THIS DRAWING SUPERSEDES DWG G223-M320.2
THIS DRAWING ISSUED DEC. 8, 1964
REVISIONS
REV. 1 - 9/8/64 - REVISED DET. R/VAR.
REV. 2 - 10/29/64 - LAKE WATER PUMP ASSEMBLY AND MOUNTING BRACKET ADDED
DWN BY FM
DES BY RDH
DATE APRIL 1964
SCALE AS NOTED
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE H
MECHANICAL
MISC. SECTIONS & DETAILS
DRAWING NUMBER 6223-M320.3
SHEET NUMBER 21 OF 32




FOR BOLT CENTERS OFFSET 1¾" TO 3¾"

"Z" BAR SHACKLE INSTALLED

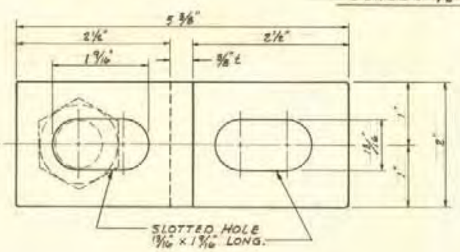
SCALE: ½" = 1"



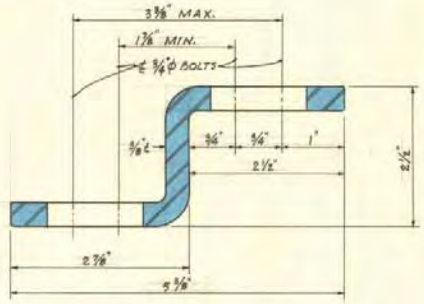

FOR BOLT CENTERS OFFSET 0" TO 1¾"

"U" BAR SHACKLE INSTALLED

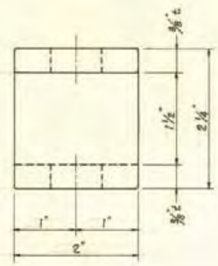
SCALE: ½" = 1"




PLAN



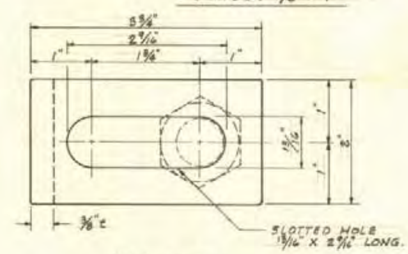

SIDE



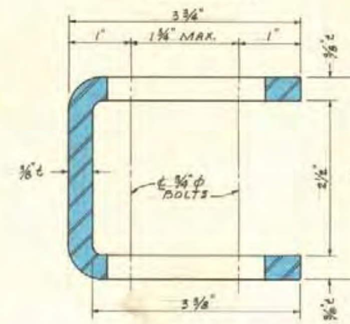

END

"Z" BAR DETAIL (1/21.A)

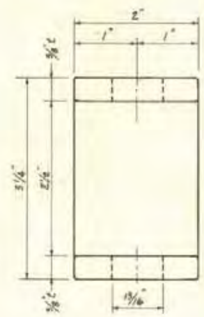
SCALE: FULL




PLAN




SIDE




END

"U" BAR DETAIL (2/21.A)

SCALE: FULL

## GENERAL NOTES

1. BOLT SHACKLES AND DETAILS SHOWN ON THIS SHEET ARE TO BE USED IN CONJUNCTION WITH DETAIL (A1) SHT 21. THE DETAILS SHOWN ON THIS SHEET ARE TO BE USED WHEN THE HOLES OF THE SHACKLED FITTING DO NOT ALIGN WITH THE HOLES OF THE CAST IN SLEEVE.
2. SHACKLES SHALL BE FABRICATED OF 3/8" FLAT BAR, OF ASTM A-7 STEEL.
3. ALL SHACKLE EXPOSED TO WATER SHALL BE GALVANIZED AFTER FABRICATION.
4. SHACKLES PLACED IN THE DRY MAY BE GALV. OR GIVEN TWO COATS OF "INERTOL" No. 49 THICK.

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY________ DATE 8-4-67

NOTE:

THIS DRAWING ADDED BY LETTER DATED DEC. 8, 1964.

| REVISIONS | DW'N BY: E.M / CK'D BY: C.L.F | DES BY: C.L.F / APV'D BY: | DATE: DEC. 1964 / SCALE: AS SHOWN | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H" MECHANICAL SHACKLE DETAILS | DRAWING NUMBER 6223-M320A SHEET NUMBER 21A OF 32 |
|---|---|---|---|---|---|---|---|

## GENERAL

G1 SCOPE. The notes and details on this sheet are general and apply to the entire project except where there are specific indications to the contrary.

G2 APPLICABLE SPECIFICATIONS AND CODES. Construction shall be in accordance with the latest edition of the Uniform Building Code. The above shall govern except where other applicable codes or the following notes are more restrictive.

G3 ALTERNATIVE DESIGNS. The structural systems and details on these plans are the priority design; however, alternative systems and details may be used if the Contractor submits plans with substantiating calculations and test data that are accepted by the Engineer.

G4 DIMENSIONS. Structural dimensions controlled by or related to mechanical or electrical equipment shall be verified by the Contractor prior to construction.

G5 PROVISIONS FOR EQUIPMENT. Mechanical and electrical equipment supports, anchorages openings, recesses and reveals not shown on the structural drawings but required by other contract drawings, shall be provided for prior to casting concrete.

G6 CONSTRUCTION LOADS. Structures have been designed for operational loads on the completed structures; during construction, the structures shall be protected by bracing and balancing wherever excessive construction loads may occur.

G7 DRAINAGE SURFACES. Slope drainage surfaces uniformly to drain. Slope shall be 1/4" per foot except where noted otherwise on the plans.

## STRUCTURAL

S1 DESIGN CODE. Design is in accordance with the latest edition of the Uniform Building Code except where other applicable codes or the following notes are more restrictive.

S2 DESIGN LIVE LOADS.

A. Floor Areas

(1) Operating floors (floors on which machinery may be disassembled) - 150 psf
(2) Unloading areas - 2-1/2 ton truck or 100 psf
(3) Other areas - 100 psf

B. Gratings, Checkered Plates, and Hatches - Same loading as adjacent floor areas

C. Seismic Loading - Zone III, Uniform Building Code

S3 CONSTRUCTION JOINTS. Location of all construction joints shall have the approval of the Engineer. In watertight structures, PVC waterstops shall be provided in the construction joints. Construction joints shall be as detailed on the drawings.

## STEEL

ST1 CODES AND SPECIFICATIONS. Steel construction shall conform to the specifications and standards as contained in the latest edition of the AISC Steel Construction Manual.

ST2 MATERIAL. All structural shapes, bars, plates and sheets indicated on the drawings shall be steel meeting ASTM A-7 specifications, except as noted.

ST3 WELDING. All welding shall conform to AWS Code for Arc and Gas Welding in Building. Welders shall be certified by the City of Seattle Building Department.

ST4 ENCASED STEEL. Steel completely encased in concrete shall not be galvanized or painted and shall have a clean surface for bonding with concrete when it is cast.

ST5 PAINTING. Structural steel shall be painted in accordance with specifications.

## ALUMINUM

A1 SPECIFICATIONS AND CODES. Aluminum construction shall be in accordance with ASCE's Specifications for Structures of Aluminum Alloy 6061-T6.

## CONCRETE

C1 APPLICABLE CODE. Concrete construction shall conform to ACI 318-63.

C2 REINFORCING STEEL DETAILS. All detailing, fabrication and erection of reinforcing bars, unless otherwise noted, shall be in accordance with Manual of Standard Practice for Detailing Reinforced Concrete Structures ACI-315 latest edition.

C3 DESIGN STRESSES

A. Concrete, f'c - 3000 psi ultimate compressive stress at 28 days, fc - 1350 psi.

B. Reinforcing Steel

(1) Tension due to flexure, intermediate grade - 20,000 psi
(2) Column reinforcing, intermediate grade - 16,000 psi
(3) Column reinforcing, hard grade - 20,000 psi (as noted)

C4 CONCRETE COVER. Concrete cover for reinforcing bars shall be as follows with minimum cover of one bar diameter.

A. Footings and foundation mats cast on ground - 3"

B. Concrete to be in contact with sewage - 2-1/2"

C. Concrete to be in contact with ground, weather, or clean water

(1) At bars greater than #5 - 2"
(2) At bars #5 or less - 1-1/2"

D. Concrete not to be exposed to ground, weather, or clean water

(1) Beams and columns - 1-1/2"
(2) Slabs and walls 1", joist 3/4"

C5 MINIMUM REINFORCEMENT. Concrete construction shall be reinforced concrete except where plain concrete (P/C) is called out on the drawings, in which case no reinforcement shall be used. Concrete that is not designated P/C and has no reinforcement indicated shall be reinforced per ACI-318 and the following schedules.

| WALL THICKNESS | SIZE | SPACING E.W. | POSITION |
|---|---|---|---|
| 6" | #4 | 12" | On ℄ |
| 8" | #4 | 10" | On ℄ |
| 10" | #4 | 16" | EF |
| 12" | #4 | 12" | EF |
| 14" | #5 | 18" | EF |
| 16" | #5 | 16" | EF |
| 18" and greater | #6 | 18" | EF |

Mass concrete shall be reinforced with #6 @ 18" EW minimum in all faces.

C6 SHRINKAGE AND TEMPERATURE STEEL. Unless otherwise noted, shrinkage and temperature reinforcing steel shall be provided for slabs in accordance with the following schedules.

| SLAB THICKNESS | SIZE | SPACING |
|---|---|---|
| 4" | #3 | 11" |
| 4-1/2" | #4 | 18" |
| 5" | #4 | 16" |
| 6" | #4 | 12" |
| 7" | #5 | 18" |
| 8" | #5 | 16" |
| 9" | #5 | 14" |
| 10" | #4 | 16" T & B |
| 11" | #4 | 14" T & B |
| 12" and greater | #5 | 18" T & B |

Slabs over 8" thick - place alternate bars top and bottom.

C7 ADDED TOP STEEL IN SLABS. Where beams or walls are parallel to main reinforcing in slab, provide #4 @ 18" in top of slab normal to beam or wall. Extend bars 2'-0 beyond face of beam or wall. When slab is on one side only, terminate bars with standard hook on other side of beam or wall.

C8 EXTRA ACCESSORY BARS. Aside from normal accessories used to hold reinforcing steel firmly in position the following shall be added:

A. In slabs #5 raiser bars at 36" o/c maximum to support top reinforcing steel.

B. In walls with two curtains #3 U or Z shape spacers at 6' o/c E.W.

C9 DOWELS. Dowels shall be the same size and spacing as bars with which they are lapped. The lap and embedment shall be 24 diameters minimum for each.

C10 BAR SPLICES. Vertical reinforcing bar splices in columns shall have at least 20 bar diameter lap; all other bar splices shall be lapped at least 24 bar diameters. The length of lap splice of bars of different diameter shall be based on the larger diameter. Bar splices may also be made by welding in accordance with the details for reinforcing steel splice and with AWS Spec. D12.1-61.

C11 RESTRICTED BAR ANCHORAGE. In cases where reinforcing bars cannot be extended as far as required due to the limited extent of the adjacent concrete structure, the bars shall extend as far as possible and end in standard hooks.

C12 STANDARD HOOKS. Bars ending in right angle bends or hooks shall conform to the requirements of paragraph 801, ACI 318-63.

C13 BENT UP TRUSS BARS. Bent up truss bars in reinforced concrete shall be bent through an angle of 45 degrees.

C14 SLOPING SLABS. Monolithic slabs with tops that are sloped shall have bottoms sloped the same amount, maintaining a uniform slab thickness.

C15 GROUND SUPPORTED SLABS. Concrete slabs supported by ground shall be 4" thick, reinforced with 6 x 6 - 10/10 wwf at mid-depth of slab and doweled along the edge of slab to all adjacent walls, columns, and foundations with #3 @ 15" that lap 1'-0" with wwf and extend into walls, columns, and foundations at least 9"; if slab is designated as "floating slab" on drawings, omit dowels and substitute 3/8" thick premolded joint filler to isolate the slab from contact with the structure along its perimeter.

C16 CHAMFERS. Except as otherwise required, exposed concrete corners and edges shall have 3/4" chamfers. Re-entrant corners shall not have fillets.

C17 ANCHOR BOLTS. Use of anchor bolts shall be governed by the following table:

| Bolt Diameter | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1-1/8" | 1-1/4" |
|---|---|---|---|---|---|---|---|
| Min. Embedment in Structural Concrete | 3" | 4" | 5" | 6" | 7" | 8" | 9" |
| Allowable Shear | 750# | 1000# | 1500# | 2000# | 2500# | 3000# | 3500# |

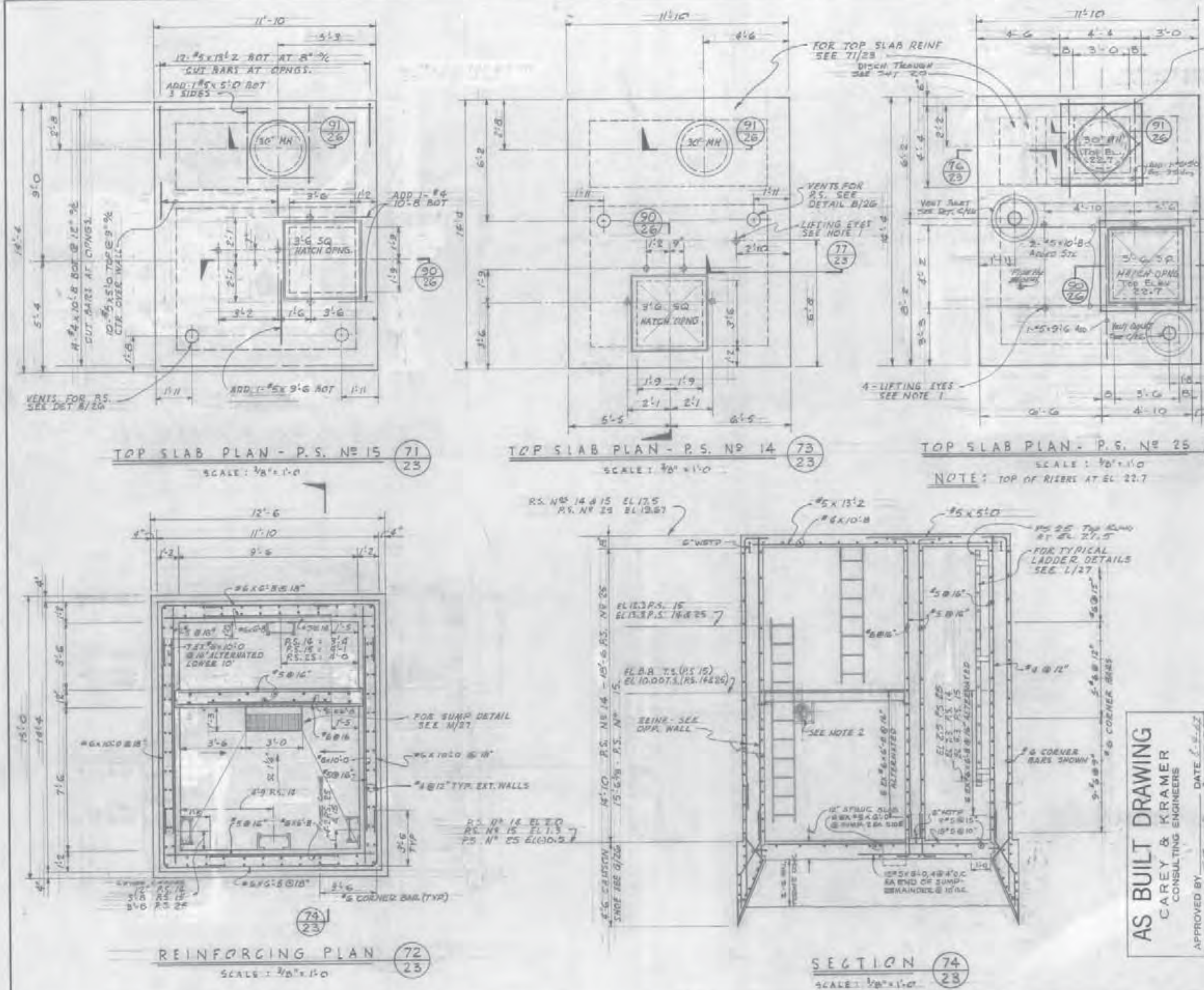
All bolts shall be hot dipped galvanized unless otherwise noted. Embedment length for bolts in tension shall be determined by the Engineer.

C18 INSERTS FOR LIFTING EYES. Locate two 3/4" galvanized Richmond Rockit inserts, straddling ℄ of equipment, over all pumps, motors, or other mechanical units of more than 100# for inserting lifting eyes.

## PUMP STATION CAISSON TOLERANCES

1. VERTICAL: Station shall be sunk to the specified elevation. Undersinking will not be permitted. Oversinking up to 6" is permissible.
2. OUT-OF-PLUMB: The maximum deviation from vertical plumb, based on the full wall height, shall not exceed 2" for any one side or a cumulative total of 3" for two adjacent sides.
3. CRITICAL ELEVATIONS: Elevations specified for overflow funnels, internal concrete weirs and the top slab shall be adhered to.

| REVISIONS | DRAWN BY | DES BY | DATE APRIL 1964 | CAREY AND KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H"<br>GENERAL STRUCTURAL NOTES | DRAWING NUMBER 6223-S321<br>SHEET NUMBER 22 OF 32 |
|---|---|---|---|---|---|---|---|
| | CHKD BY | APPD BY | SCALE | | | | |




## NOTES

1. LIFTING EYES AND INSERTS AT UNDERSIDE OF SLAB. 3/4" FIXED TYPE CAST IRON INSERTS WITH 1/2" GALV. SHOULDERS (RICHMOND ROCKET OR APPROVED EQUAL) EYEBOLTS - 1½" MIN. I.S. EYE DIA.
2. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR LOCATION OF WALL PENETRATIONS. EXCEPT WHERE OTHERWISE NOTED, PENETRATIONS SHALL BE AS PER DETAILS A/26 & 6T/21
3. TOP SLABS SHALL BE CROWNED 1" ABOUT THE NARROW AXIS, UNDERSIDE OF THE SLAB SHALL BE LEVEL.

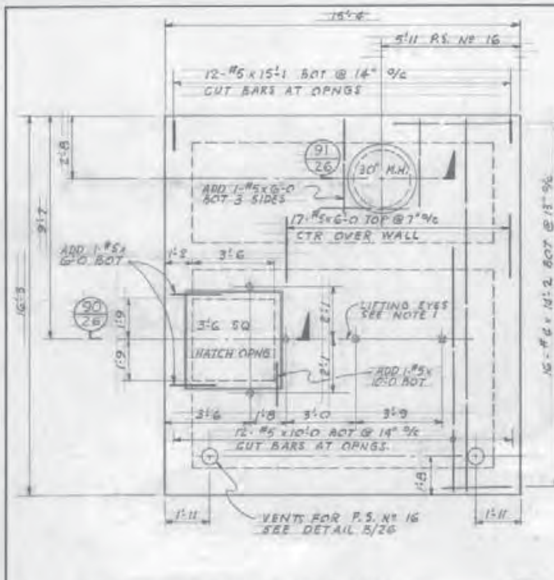
## REFERENCE DRAWINGS

| | SHT. |
|---|---|
| 1. VICINITY MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 2 & 7 |
| 3. STRUCTURAL DETAILS | 27 & 26 |
| 4. GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 28 & 29 |
| 6. MECHANICAL DETAILS | 9, 10 & 20 |

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ____ DATE 1-5-67

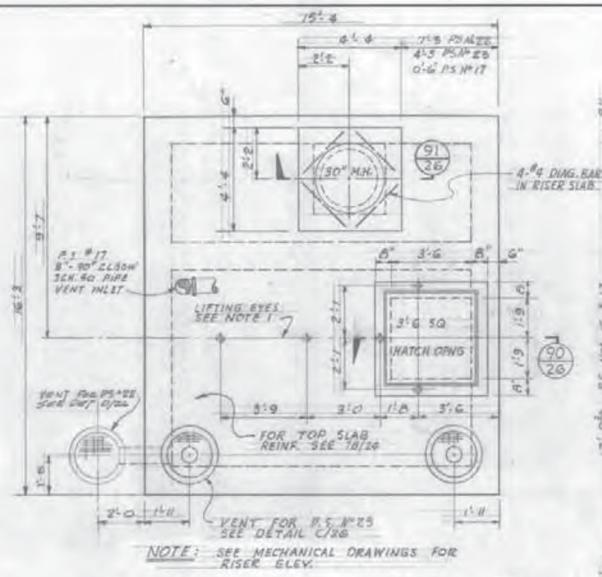
NOTE: THIS DWG SUPERSEDES DWG 6223-S322.1
THIS DWG ISSUED 20 NOV 64

| REVISIONS | DWN BY: AG & WG | DES BY: AG | DATE: APRIL 1964 | CAREY AND KRAMER, CONSULTING ENGINEERS, SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT, MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H, STRUCTURAL, PUMP STATIONS NO. 14, 15 & 25 | DRAWING NUMBER 6223-S322.2 |
|---|---|---|---|---|---|---|---|
| 8-18-64 - REV. #1 - REVISED P.S. #25 - SEE CO. #3; NOV. 64 - REV. #2 - REVISED TOP PLAN P.S. 15 & LADDER LOC. ON REINF. PLAN | CK'D BY: | APP'D BY: | SCALE: AS NOTED | | | | SHEET NUMBER 23 OF 32 |




TOP SLAB PLAN P.S. Nº 16 (78/24)

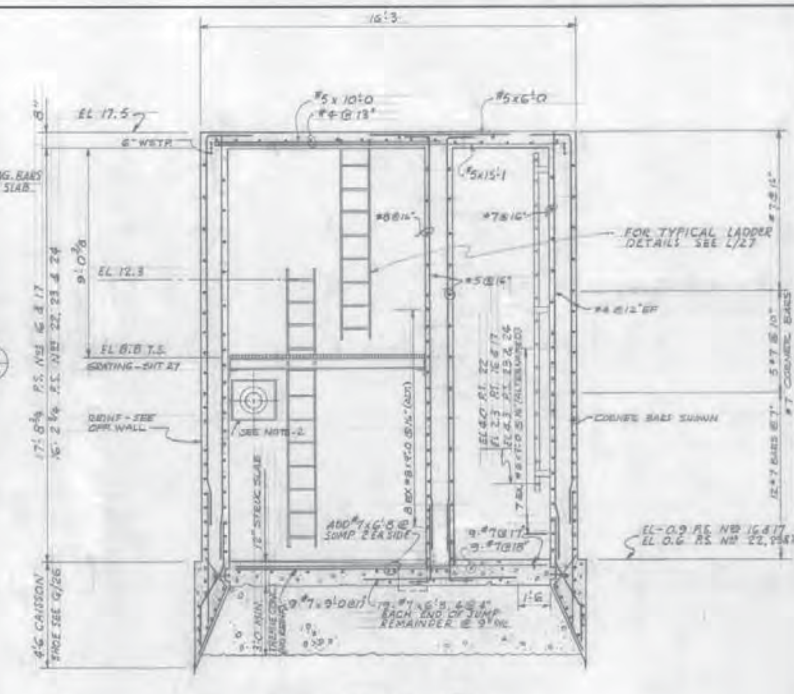
SCALE: 3/8" = 1'-0




NOTE: SEE MECHANICAL DRAWINGS FOR RISER ELEV.

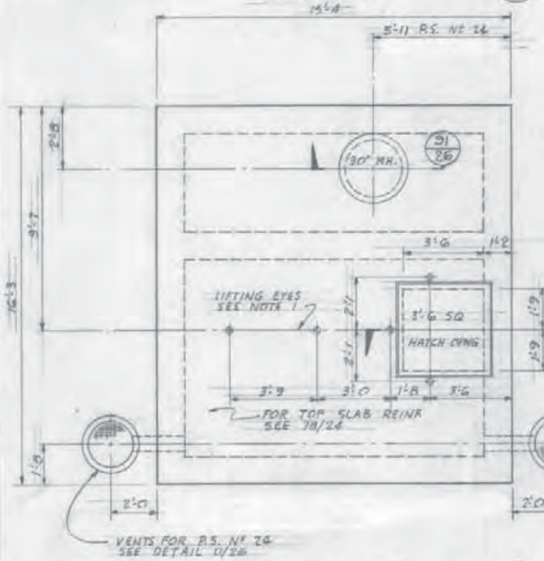
TOP SLAB PLAN P.S. Nºs 17, 22 & 23 (80/24)

SCALE: 3/8" = 1'-0



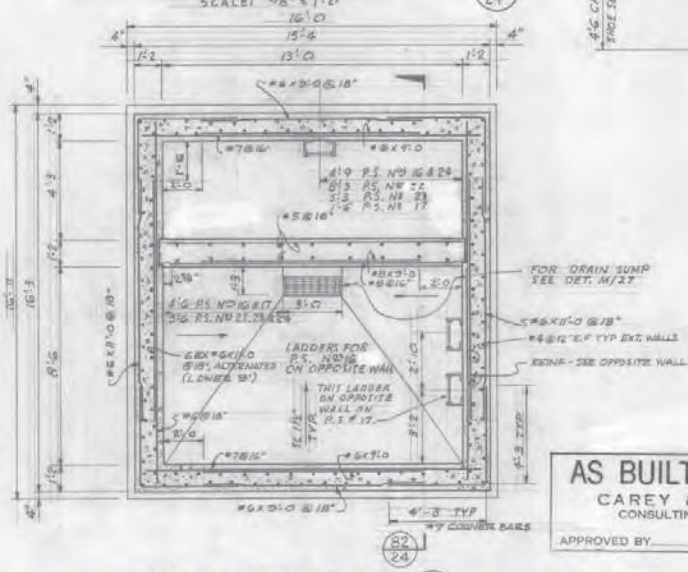

SECTION (82/24)

SCALE: 3/8" = 1'-0




TOP SLAB PLAN P.S. Nº 24 (79/24)

SCALE: 3/8" = 1'-0




REINFORCING PLAN (81/24)

SCALE: 3/8" = 1'-0

## NOTES

1. LIFTING EYES AND INSERTS (5 REQ'D) AT UNDERSIDE OF SLAB. 3/4" FIXED TYPE CAST IRON INSERTS WITH 3/4" GALV. SHOULDERS (RICHMOND ROCKET OR APPROVED EQUAL) EYEBOLTS - 1½" MIN. I.S. EYE DIA.
2. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR LOCATION OF WALL PENETRATIONS. EXCEPT WHERE OTHERWISE NOTED, PENETRATIONS SHALL BE AS PER DETAILS A/26 & 67/21.
3. TOP SLABS SHALL BE CROWNED 1" ABOUT THE NARROW AXIS, UNDERSIDE OF THE SLAB SHALL BE LEVEL.

## REFERENCE DRAWINGS

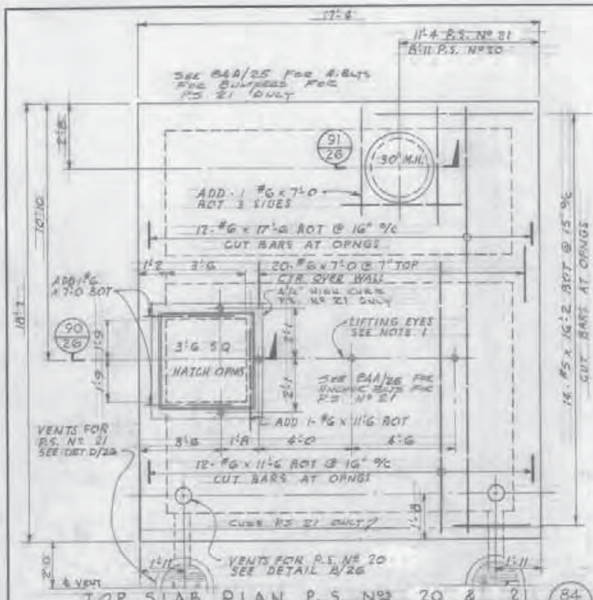
| | SHT |
|---|---|
| 1. VICINITY MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 5, 6 & 7 |
| 3. STRUCTURAL DETAILS | 22 & 26 |
| 4. GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 30 |
| 6. MECHANICAL DETAILS | 11, 12, 17, 18 & 19 |

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

NOTE: THIS DRAWING SUPERSEDES DWG 6223-S323.1
THIS DWG ISSUED 20 NOV. 1964

NOV. 64 REV. 1 - LADDER LENGTHS

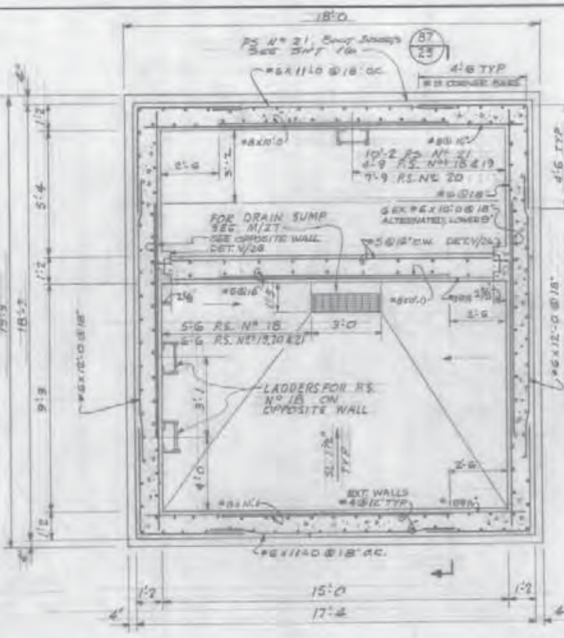
| REVISIONS | | | | | | |
|---|---|---|---|---|---|---|
| Revised P.S. Nº 22 Design - See Add. Nº 1. REVISED P.S. Nº 17 - ACCESS & MANHOLE SEE CHANGE ORDER Nº 1. | DWN BY: W.G. | DES BY: A.G. | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H STRUCTURAL PUMP STATIONS NO. 16, 17, 22, 23 & 24 |
| | CK'D BY: | APP'D BY: [signature] | SCALE: 3/8" = 1'-0 | | | DRAWING NUMBER 6223-S323.2 SHEET NUMBER 24 OF 32 |



TOP SLAB PLAN P.S. Nos 20 & 21 (84/25)

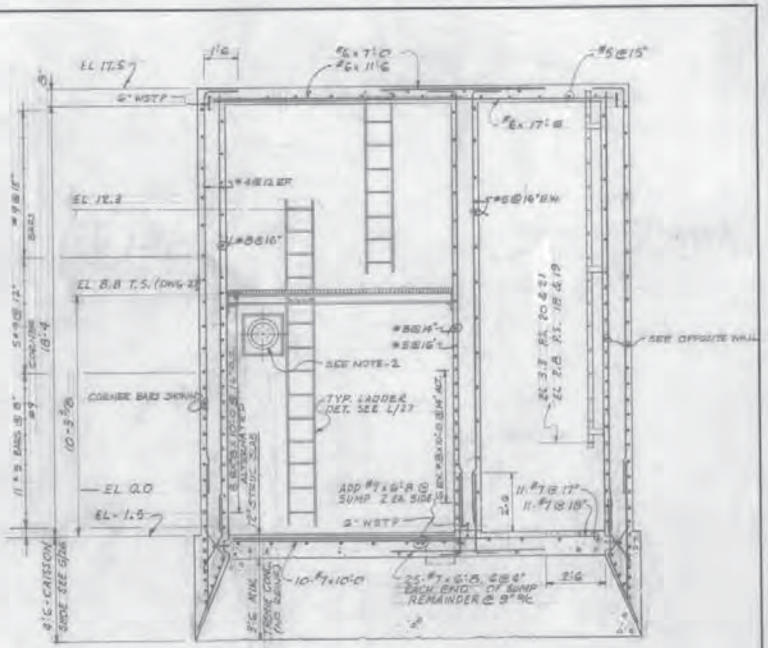
FOR TOP SLAB PLAN P.S. No 19 SEE DWG 25A

SCALE: 3/8" = 1'-0



REINFORCING PLAN (86/25)

SCALE: 3/8" × 1'-0



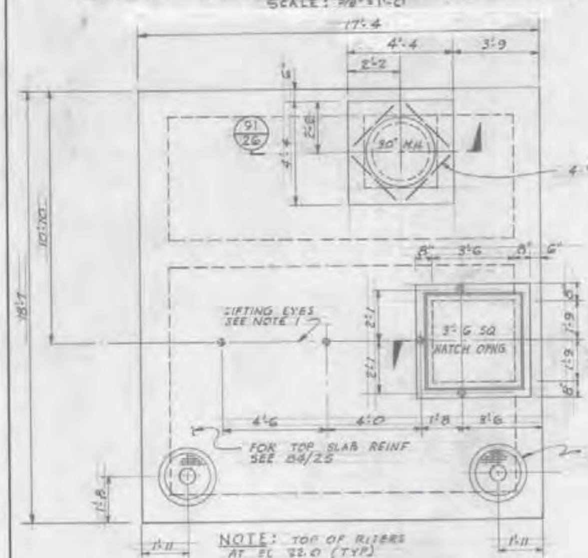
SECTION (87/25)

SCALE: 3/8" = 1'-0

AS BUILT DRAWING

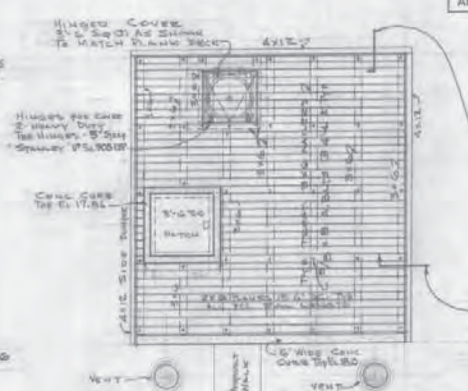
CAREY & KRAMER
CONSULTING ENGINEERS

APPROVED BY ______ DATE 8-4-67



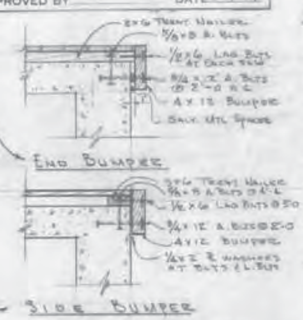
TOP SLAB PLAN P.S. No 18 (85/25)

SCALE: 3/8" = 1'-0



PUMP STATION No 21
TOP DECK PLAN (84A/25)

SCALE: 1/4" = 1'-0



END BUMPER

SIDE BUMPER

WOOD DECKING NOTES: PS No 21

1. ALL LUMBER AND TIMBER SHALL BE DOUGLAS FIR, CONSTRUCTION GRADE IN ACCORDANCE WITH RULE No 15, WCLA
2. ALL METAL PARTS (NAILS, BLTS, WASHERS, ETC) SHALL BE GALV OR NON-FERROUS MATL.
3. ALL 3×6 NAILERS SHALL BE PRESSURE TREATED WITH "PENTA" - 8 LB. RETENTION. PAINT FIELD CUTS WITH 5% SOLUTION.
4. PROVIDE FOR DRAINAGE TO LAKE SIDE. ALL AREAS UNDER DECK SHALL DRAIN COMPLETELY
5. 2×6 PLANKS TO BE NAILED AT EA NAILER WITH 2-16d GALV.

## NOTES

1. LIFTING EYES AND INSERTS (5 REQ'D) AT UNDERSIDE OF SLAB. 3/4" FIXED TYPE CAST IRON INSERTS WITH 3/8" GALV. SHOULDERS (RICHMOND ROCKET OR APPROVED EQUAL) EYEBOLTS - 1½" MIN. I.S. EYE DIA.
2. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR LOCATION OF WALL PENETRATIONS. EXCEPT WHERE OTHERWISE NOTED, PENETRATIONS SHALL BE AS PER DETAILS A/26 & 67/21
3. TOP SLABS SHALL BE CROWNED 1" ABOUT THE NARROW AXIS, UNDERSIDE OF THE SLAB SHALL BE LEVEL.

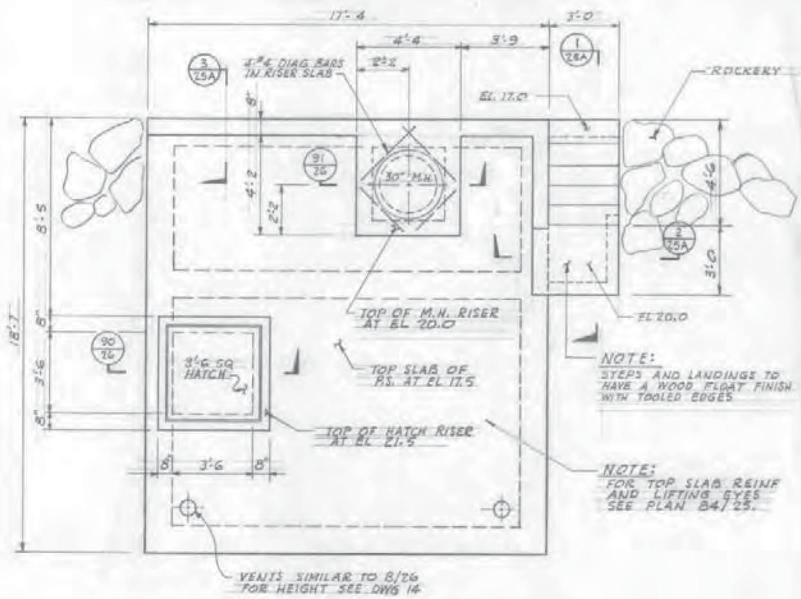
## REFERENCE DRAWINGS

| | SHT |
|---|---|
| 1. VICINITY MAP | 1 |
| 2. SITE PLAN, SOIL BORING LOG | 4 & 5 |
| 3. STRUCTURAL DETAILS | 22,26 |
| 4. GRATING PLAN, MISC. STRUCT. DETAILS | 27 |
| 5. ELECTRICAL DETAILS | 31 |
| 6. MECHANICAL DETAILS | 13, 14, 15 & 16 |

NOTE:
THIS DWG SUPERSEDES DWG 6223-S324.1
THIS DWG ISSUED 20 NOV 1964

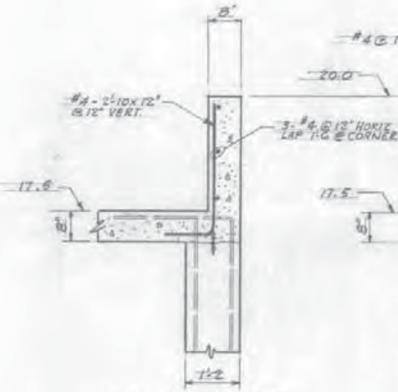
ARR G. CHIN — REGISTERED PROFESSIONAL ENGINEER

| REVISIONS | DWN BY: WG | DES BY: AG | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H STRUCTURAL PUMP STATIONS NO.18,19,20 & 21 | DRAWING NUMBER 6223-S324.2 |
|---|---|---|---|---|---|---|---|
| ADD. No 1 - PS 21 CHANGES, TOP DECK ADDED (5/18/64) NOV. 1964 - REV 1 - P.S. 18, TOP SLAB, P.S. 18, RISER ELEV, LADDER LENGTHS | CKD BY: | APP'D BY: | SCALE: AS NOTED | | | | SHEET NUMBER 25 OF 32 |



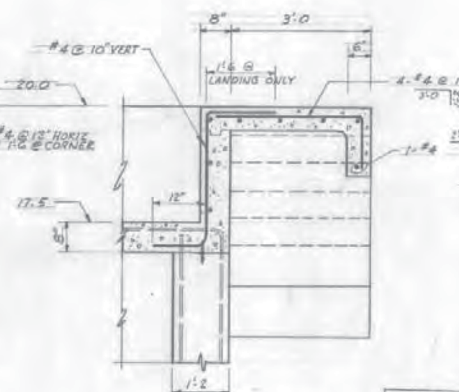

TOP SLAB PLAN - P.S. 19

SCALE: 3/8" = 1'-0



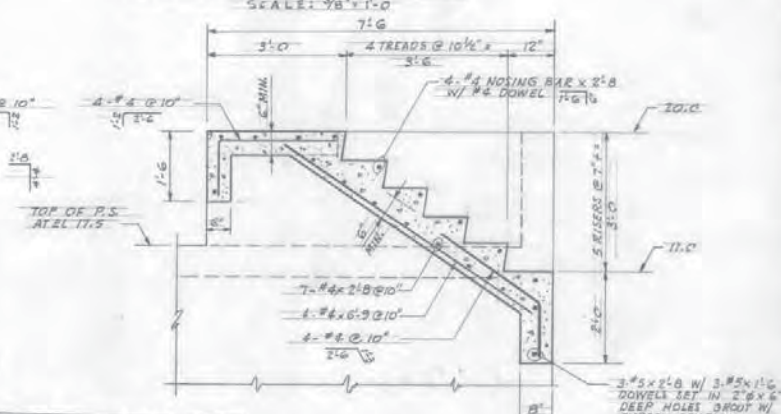

SECTION 3/25A

SCALE: 3/4" = 1'-0




SECTION 2/25A

SCALE: 3/4" = 1'-0



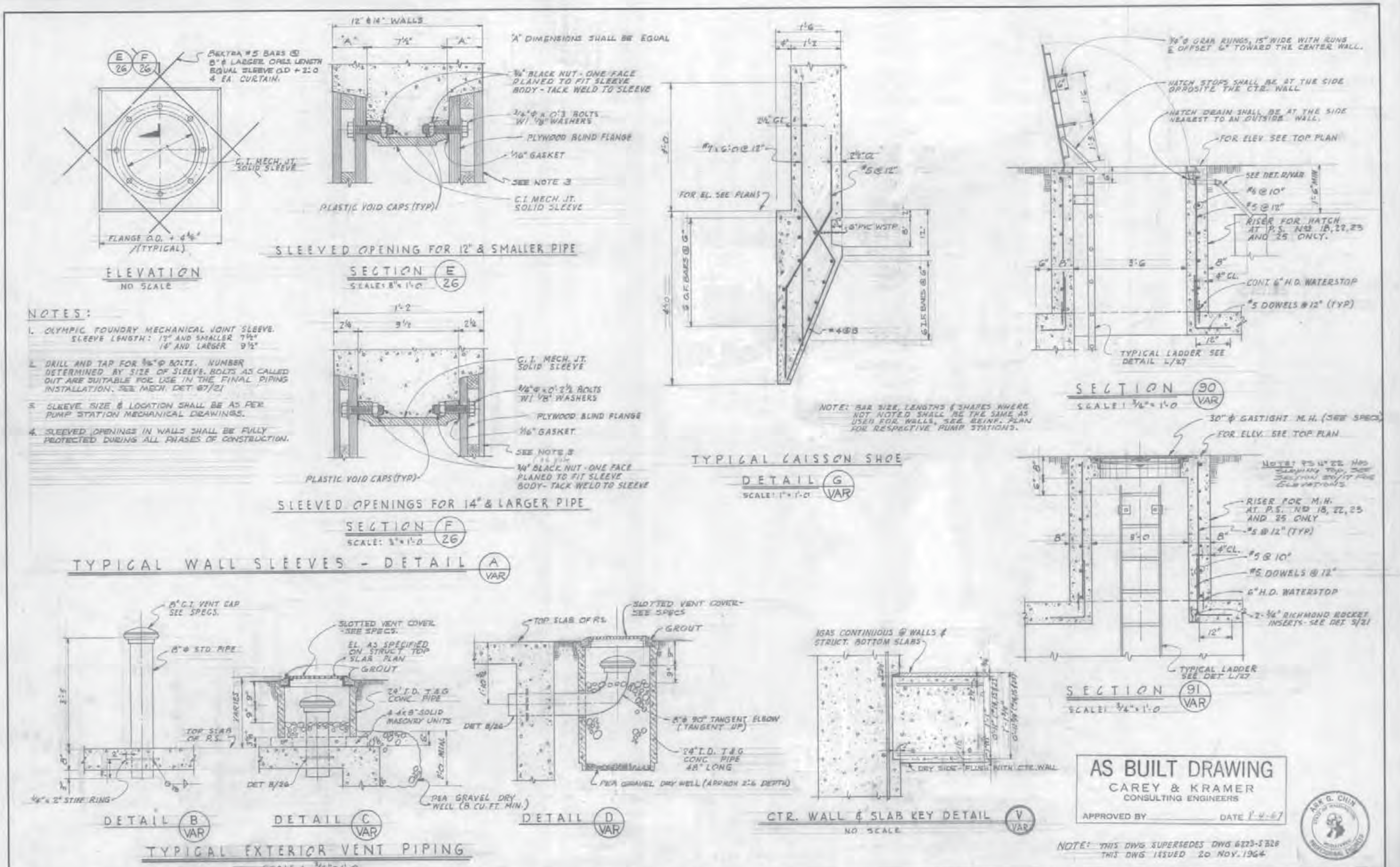

SECTION 1/25A

SCALE: 3/4" = 1'-0

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

THIS DWG ISSUED 20 NOV 1964

| REVISIONS | DWN BY: WG / CK'D BY: | DES BY: C.F. / APV'D BY: | DATE: NOV. 1964 / SCALE: AS NOTED | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H" STRUCTURAL MISCELLANEOUS DETAILS | DRAWING NUMBER 6223-S324A SHEET NUMBER 25A OF 32 |
|---|---|---|---|---|---|---|---|



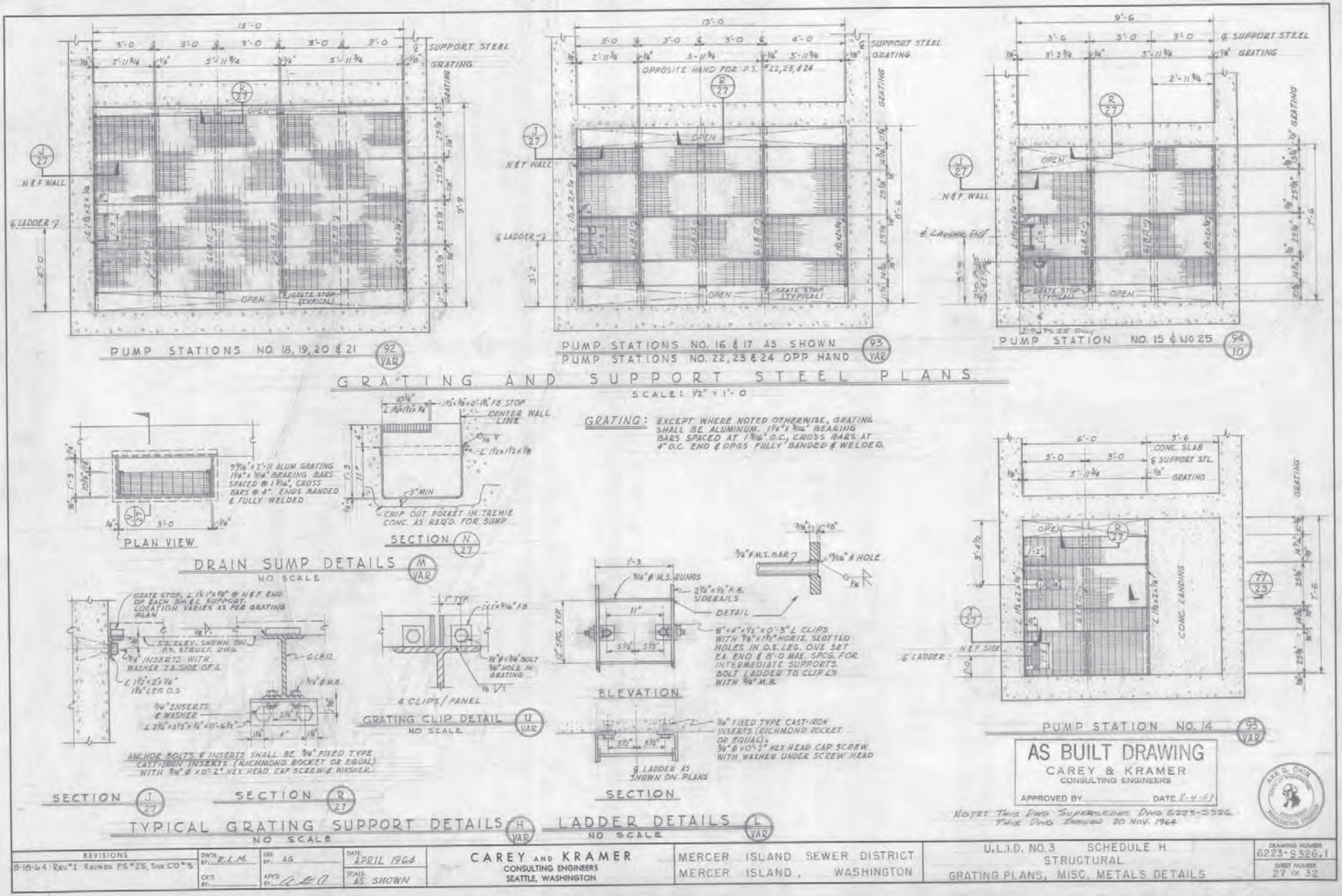

NOTES:

1. OLYMPIC FOUNDRY MECHANICAL JOINT SLEEVE. SLEEVE LENGTH: 12" AND SMALLER 7 1/2"; 14" AND LARGER 9 1/2"
2. DRILL AND TAP FOR 3/4" ϕ BOLTS. NUMBER DETERMINED BY SIZE OF SLEEVE. BOLTS AS CALLED OUT ARE SUITABLE FOR USE IN THE FINAL PIPING INSTALLATION. SEE MECH. DET 87/21
3. SLEEVE SIZE & LOCATION SHALL BE AS PER PUMP STATION MECHANICAL DRAWINGS.
4. SLEEVED OPENINGS IN WALLS SHALL BE FULLY PROTECTED DURING ALL PHASES OF CONSTRUCTION.

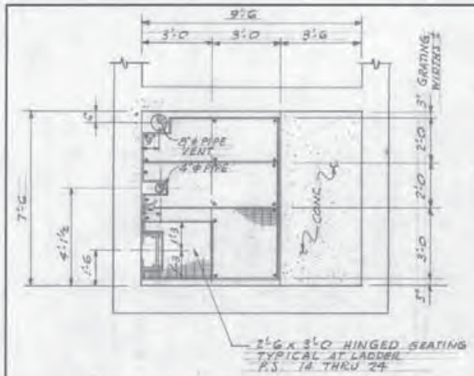
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ____ DATE 8-4-67

NOTE: THIS DWG SUPERSEDES DWG 6223-S326
THIS DWG ISSUED 20 NOV. 1964

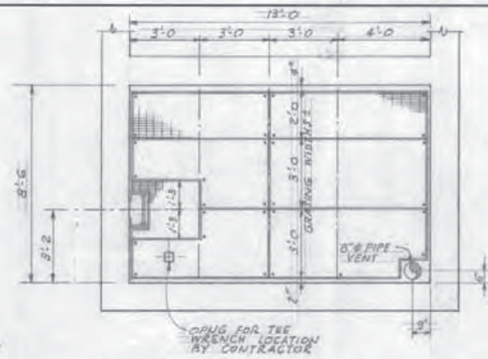
| REVISIONS | DWN BY: WG | DES BY: AG | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H STRUCTURAL DETAILS | DRAWING NUMBER 6223-S325.1 |
|---|---|---|---|---|---|---|---|
| 5/20/64 P.S. 14 & 23 Assign To Sect 90 & 91, See 4&5; 9/9/64 ADDED DOWELS & CONST. JOINT DETAIL 90 & 91, CHANGED DET. E, F, G & V AS APPR'D. BY LTR. | CK'D BY: | APPD BY: | SCALE: AS NOTED | | | | SHEET NUMBER 26 OF 32 |



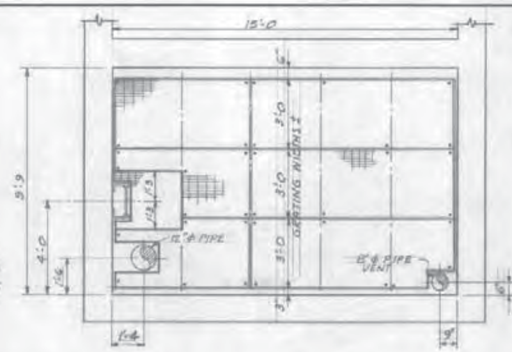
PUMP STATIONS NO. 18, 19, 20 & 21
PUMP STATIONS NO. 16 & 17 AS SHOWN
PUMP STATIONS NO. 22, 23 & 24 OPP HAND
PUMP STATION NO. 15 & LIO 25
GRATING AND SUPPORT STEEL PLANS
SCALE: 1/2" = 1'-0
OPPOSITE HAND FOR P.S. #22, 23 & 24
SUPPORT STEEL
GRATING
N & F WALL
℄ LADDER
OPEN
GRATE STOP (TYPICAL)
GRATING: EXCEPT WHERE NOTED OTHERWISE, GRATING SHALL BE ALUMINUM. 1 1/4" x 3/16" BEARING BARS SPACED AT 1 3/16" O.C., CROSS BARS AT 4" O.C. END & OPGS FULLY BANDED & WELDED.
CENTER WALL LINE
CHIP OUT POCKET IN TREMIE CONC. AS REQ'D. FOR SUMP
PLAN VIEW
SECTION
DRAIN SUMP DETAILS
NO SCALE
GRATING CLIP DETAIL
NO SCALE
ELEVATION
SECTION
PUMP STATION NO. 14
CONC. SLAB
CONC. LANDING
ANCHOR BOLTS & INSERTS SHALL BE 3/4" FIXED TYPE CAST-IRON INSERTS (RICHMOND ROCKET OR EQUAL) WITH 3/4" Ø x 0'-2" HEX HEAD CAP SCREW & WASHER.
TYPICAL GRATING SUPPORT DETAILS
NO SCALE
LADDER DETAILS
NO SCALE
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
DATE 8-4-65
NOTE: THIS DWG SUPERSEDES DWG 6223-S326. THIS DWG ISSUED 20 NOV. 1964
REVISIONS
8-18-64 Rev. #1 Revised PS #25, See CO #5
DWN BY R.L.M.
DES BY AG
DATE APRIL 1964
SCALE AS SHOWN
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE H
STRUCTURAL
GRATING PLANS, MISC. METALS DETAILS
DRAWING NUMBER 6223-S326.1
SHEET NUMBER 27 OF 32



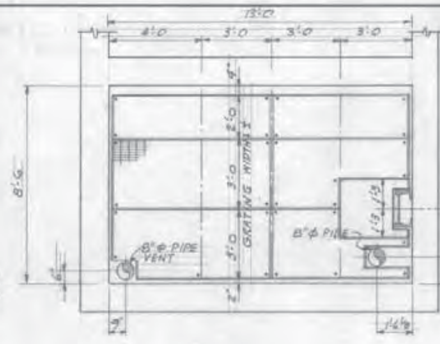

PLAN AT GRATING LEVEL P.S. - 14



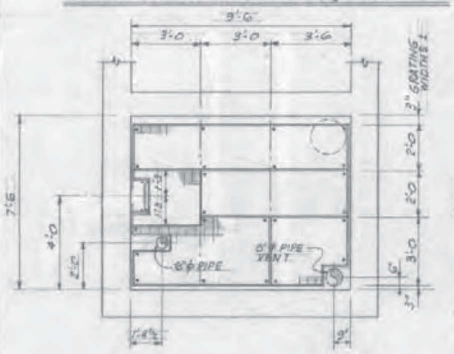

PLAN AT GRATING LEVEL P.S. - 17



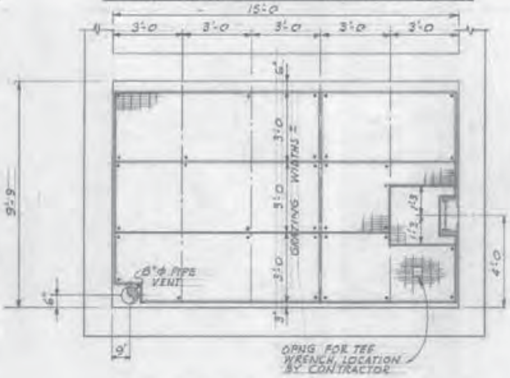

PLAN AT GRATING LEVEL P.S. - 20



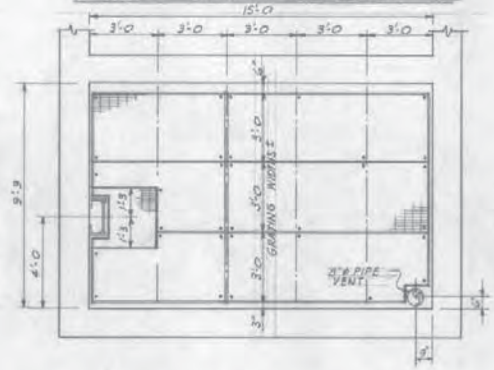

PLAN AT GRATING LEVEL P.S. - 23



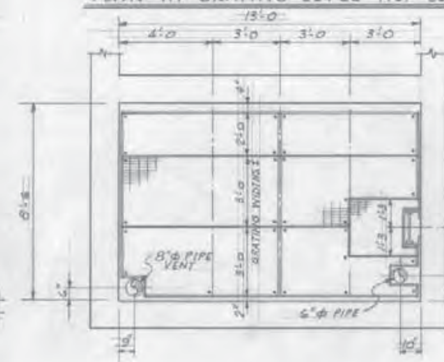

PLAN AT GRATING LEVEL P.S. - 15



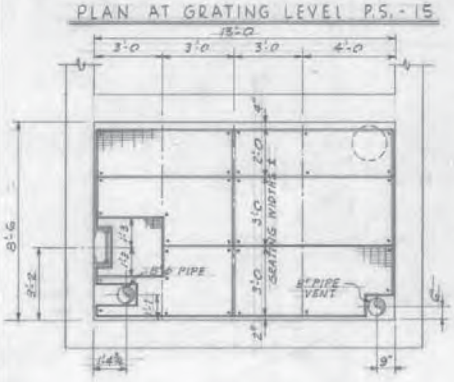

PLAN AT GRATING LEVEL P.S. - 18



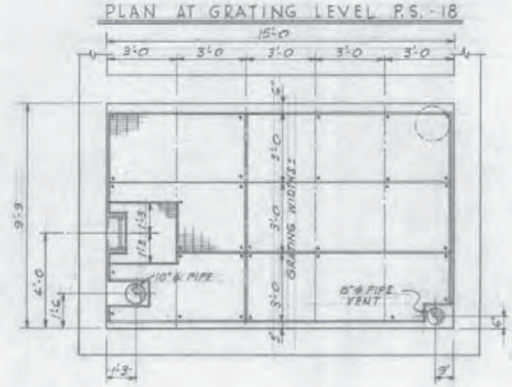

PLAN AT GRATING LEVEL P.S. - 21



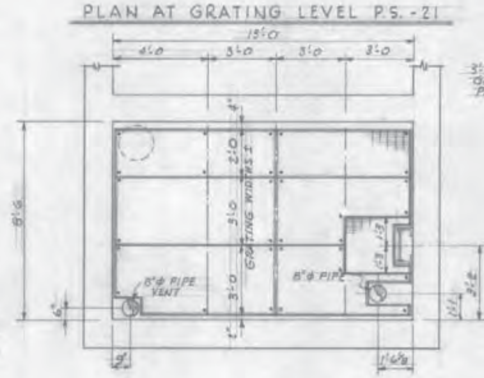

PLAN AT GRATING LEVEL P.S. - 24



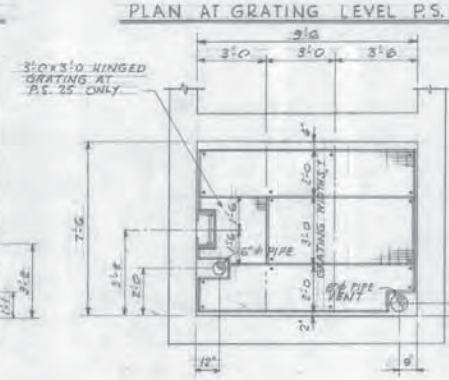

PLAN AT GRATING LEVEL P.S. 16




PLAN AT GRATING LEVEL P.S. - 19



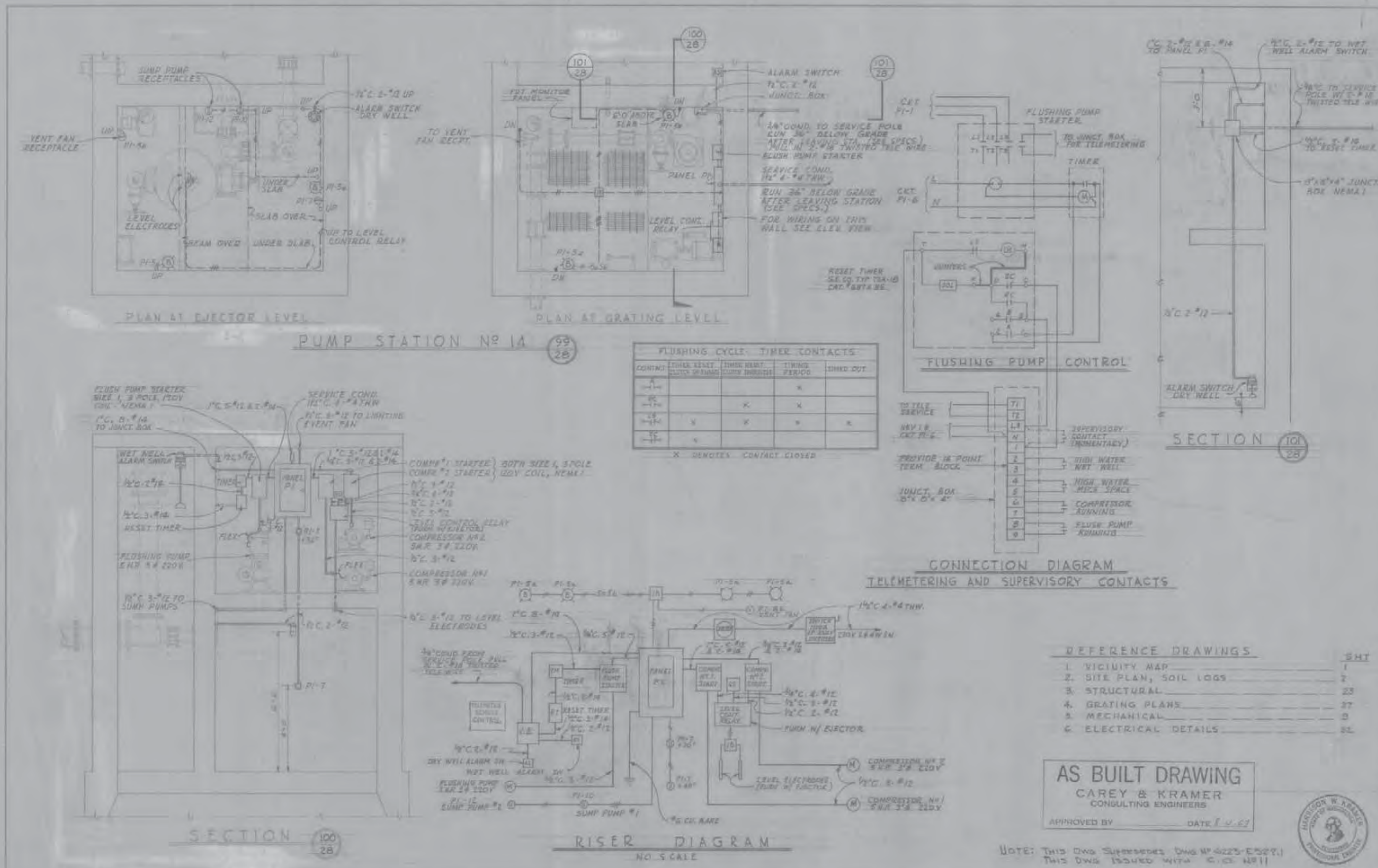

PLAN AT GRATING LEVEL P.S. 22




PLAN AT GRATING LEVEL P.S. - 25

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

| | | | | | |
|---|---|---|---|---|---|
| REVISIONS | DWN BY: WG / CK'D BY: | DES BY: CLF / APP'D BY: | DATE: NOV. 1964 / SCALE: 3/8" = 1'-0 | CAREY AND KRAMER<br>CONSULTING ENGINEERS<br>SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT<br>MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE "H"<br>STRUCTURAL<br>GRATING LEVEL PLANS | DRAWING NUMBER 6223-S326A<br>SHEET NUMBER 27A OF 32 |




| FLUSHING CYCLE TIMER CONTACTS | | | | |
|---|---|---|---|---|
| CONTACT | TIMER RESET CLUTCH OPENING | TIMER RESET CLUTCH ENERGIZED | TIMING PERIOD | TIMED OUT |
| A | | | X | |
| BC | | X | X | |
| LS | X | X | X | X |
| EC | X | | | |

X DENOTES CONTACT CLOSED

REFERENCE DRAWINGS

| | SHT |
|---|---|
| 1. VICINITY MAP | 1 |
| 2. SITE PLAN, SOIL LOGS | 2 |
| 3. STRUCTURAL | 23 |
| 4. GRATING PLANS | 27 |
| 5. MECHANICAL | 9 |
| 6. ELECTRICAL DETAILS | 32 |

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE 8-4-67

NOTE: THIS DWG SUPERSEDES DWG Nº 6223-E327.1
THIS DWG ISSUED WITH C.O. Nº11

REVISIONS
8-18-64 - REV.1 - DELETED PC#26 FROM DWG
FEB 1965 REV.2 - DELETED FACTORY... TELEMETERING MODIFICATIONS

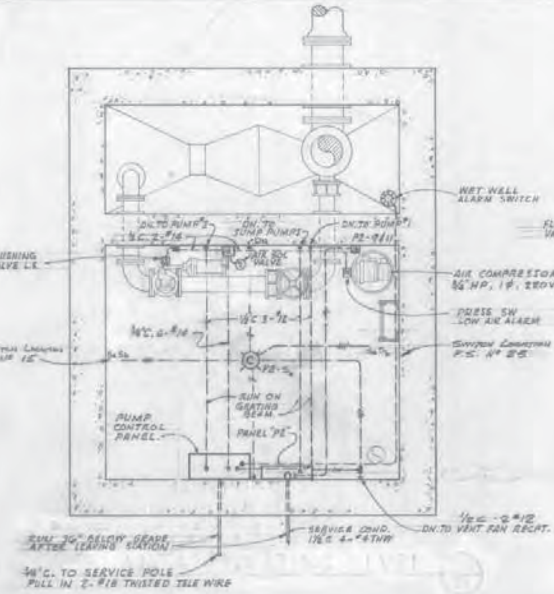
DATE APRIL 1964 · SCALE 1/2" = 1'-0"

CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE WASHINGTON

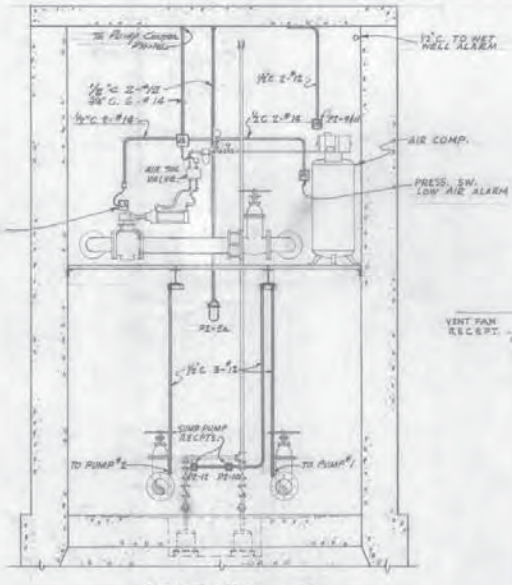
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON

U.L.I.D. NO. 3 SCHEDULE H
ELECTRICAL
PUMP STATIONS NO. 14

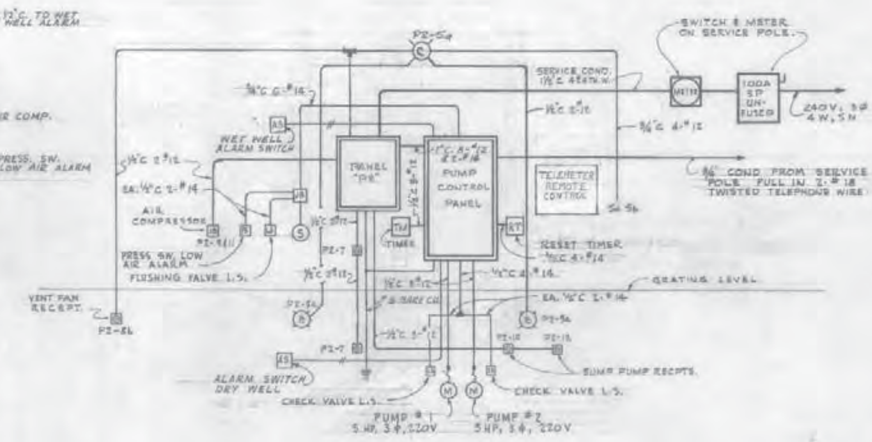
6223-E 327.2
28 OF 32



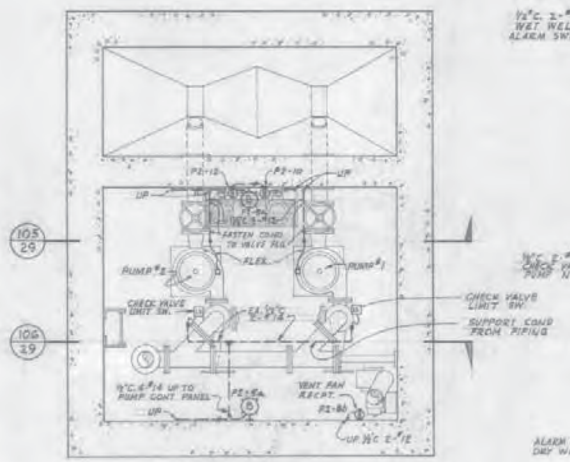

PLAN AT GRATING LEVEL (103/29)



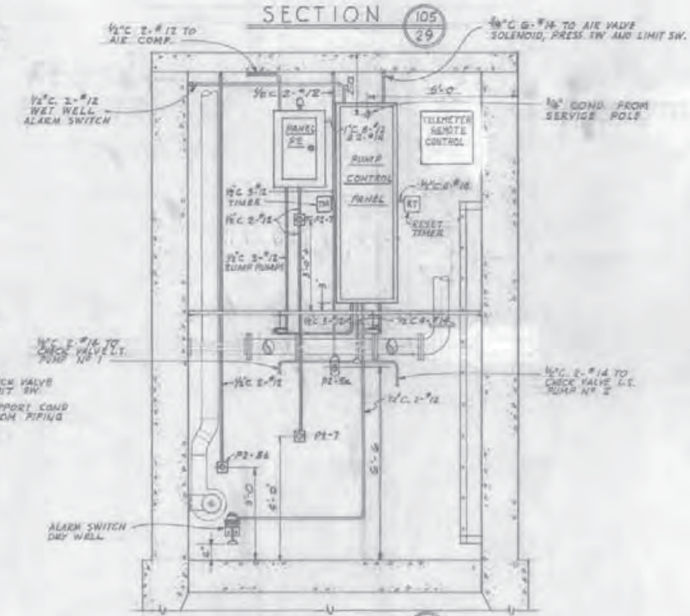

SECTION (105/29)



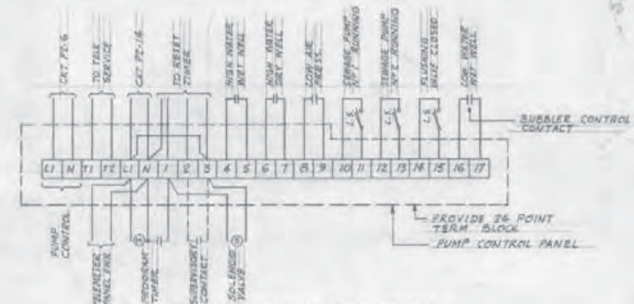

RISER DIAGRAM




PLAN AT PUMP LEVEL (104/29)




SECTION (106/29)




CONNECTION DIAGRAM

TELEMETERING AND SUPERVISORY CONTACTS

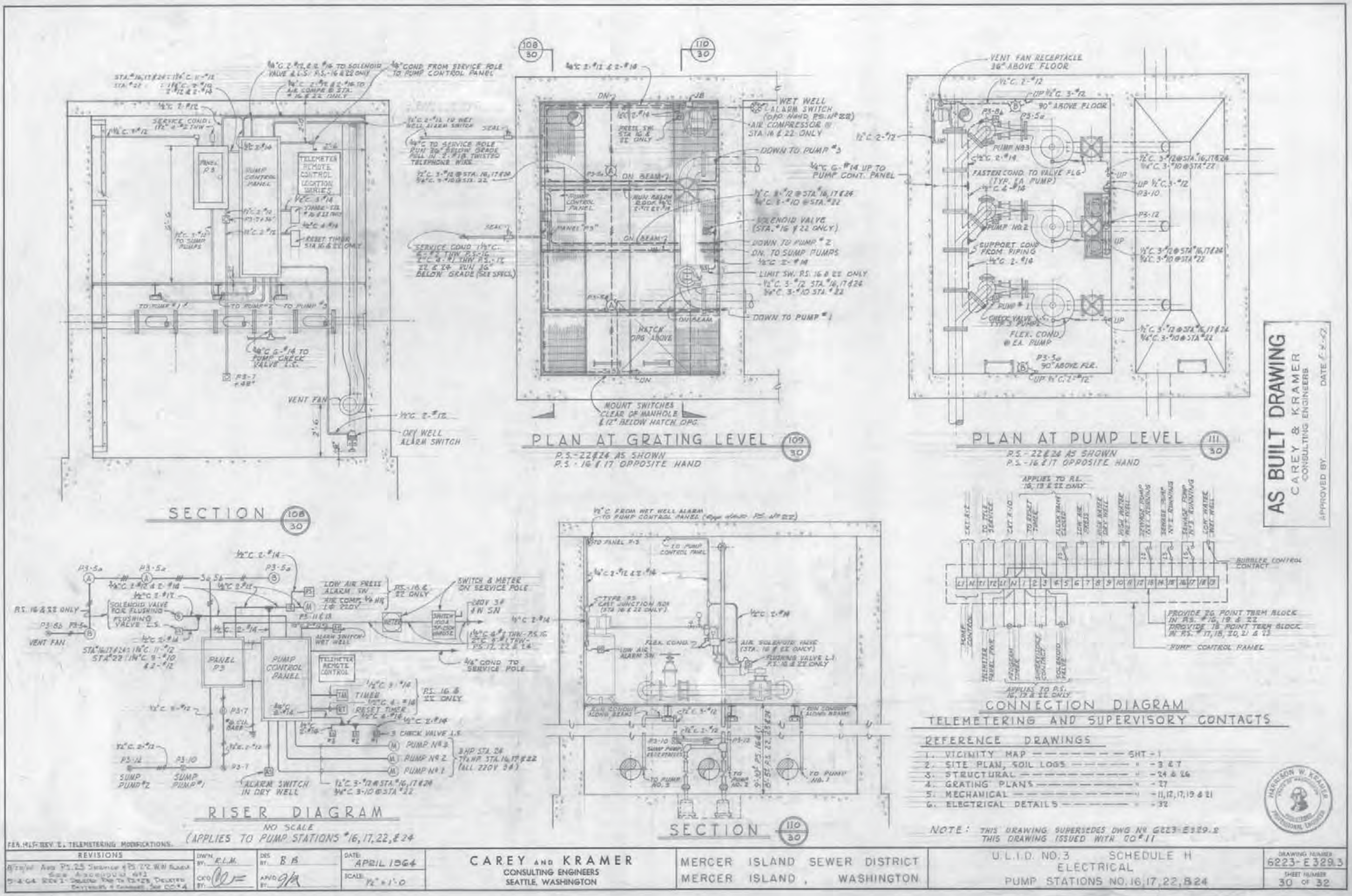
## REFERENCE DRAWINGS

| | SHT |
|---|---|
| 1. VICINITY MAP | 1 |
| 2. SITE PLAN, SOIL LOGS | 2 & 7 |
| 3. STRUCTURAL | 28 |
| 4. GRATING PLANS | 27 |
| 5. MECHANICAL | 10 & 20 |
| 6. ELECTRICAL DETAILS | 32 |

**AS BUILT DRAWING**
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-9-67

NOTE: THIS DWG SUPERSEDES DWG Nº 6223-E328.1
THIS DWG ISSUED WITH C.O. #11

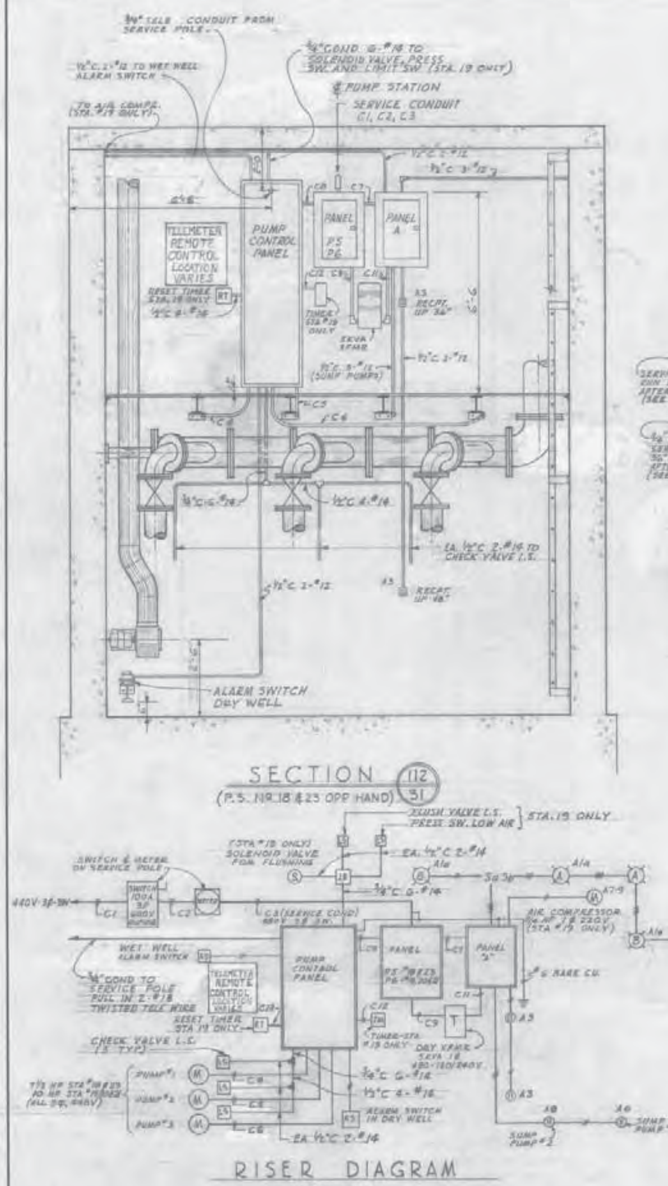
| REVISIONS | | | | | | |
|---|---|---|---|---|---|---|
| 8-18-64 REV 1 - ADDED PS #25 (See C.O. #8); FEB. 1965 REV 2 - TELEMETERING MODIFICATIONS | DWN BY R.C.M.; CK'D BY | DES. BY B.B.; APP'D BY | DATE APRIL 1964; SCALE ½" = 1'-0" | CAREY AND KRAMER, CONSULTING ENGINEERS, SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT, MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H, ELECTRICAL, PUMP STATION NO. 15 & NO. 25 | DRAWING NUMBER 6223-E328.2; SHEET NUMBER 29 OF 32 |


AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY
SECTION 108/30
PLAN AT GRATING LEVEL 109/30
P.S. - 22 & 24 AS SHOWN
P.S. - 16 & 17 OPPOSITE HAND
PLAN AT PUMP LEVEL 111/30
P.S. - 22 & 24 AS SHOWN
P.S. - 16 & 17 OPPOSITE HAND
RISER DIAGRAM
NO SCALE
(APPLIES TO PUMP STATIONS #16, 17, 22, & 24
SECTION 110/30
CONNECTION DIAGRAM
TELEMETERING AND SUPERVISORY CONTACTS
REFERENCE DRAWINGS
1. VICINITY MAP — SHT. 1
2. SITE PLAN, SOIL LOGS — 3 & 7
3. STRUCTURAL — 24 & 26
4. GRATING PLANS — 27
5. MECHANICAL — 11, 12, 17, 19 & 21
6. ELECTRICAL DETAILS — 32
NOTE: THIS DRAWING SUPERSEDES DWG Nº 6223-E329.2
THIS DRAWING ISSUED WITH CO #11
REVISIONS
DATE APRIL 1964
SCALE 1/2" = 1'-0
CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASHINGTON
U.L.I.D. NO. 3 SCHEDULE H
ELECTRICAL
PUMP STATIONS NO. 16, 17, 22, & 24
DRAWING NUMBER 6223-E329.3
SHEET NUMBER 30 OF 32

# AS BUILT DRAWING

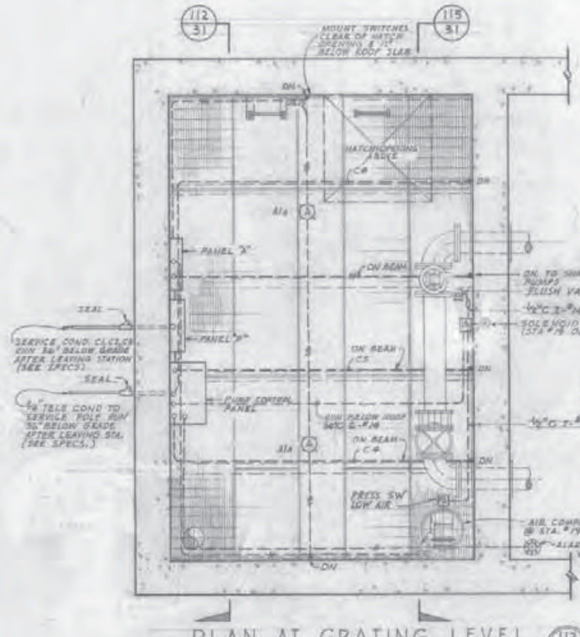
CAREY & KRAMER
CONSULTING ENGINEERS

APPROVED BY ______ DATE 8-4-67

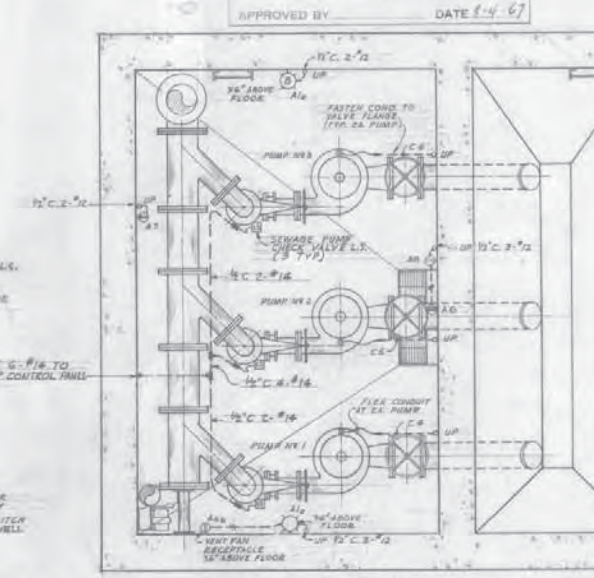



SECTION (112/31)
(P.S. NO. 18 & 23 OPP HAND)

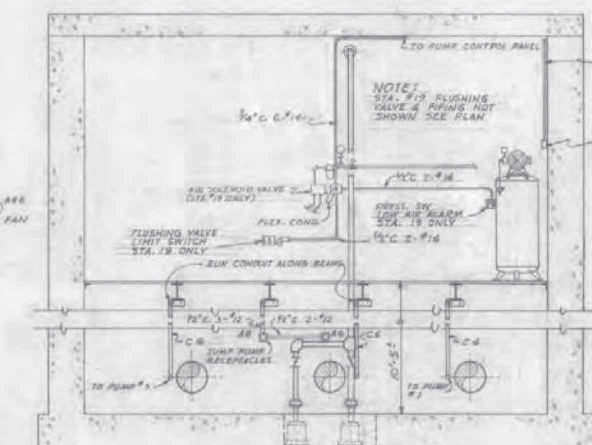
RISER DIAGRAM
NO SCALE




PLAN AT GRATING LEVEL (113/31)
(PUMP STATION NO. 18 & 23 OPP. HAND)




PLAN AT PUMP LEVEL (114/31)
(PUMP STATION NO. 18 & 23 OPP. HAND




SECTION (115/31)

CONDUIT & WIRE SCHEDULE

| CONDUIT NO. | STA. NO. 18 | | STA. NO. 19 | | STA. NO. 20 | | STA. NO. 21 | | STA. NO. 23 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | COND. | WIRE | COND. | WIRE | COND. | WIRE | COND. | WIRE | COND. | WIRE |
| C1,C2,C3 | 1¼" | 3-#4THW | 1¼" | 3-#4THW | 1¼" | 3-#4THW | 1¼" | 3-#4THW | 1½" | 3-#2TW |
| C4,C5,C6 | ½" | 3-#12TW | ½" | 3-#12TW | ½" | 3-#12TW | ¾" | 3-#10TW | ½" | 3-#10TW |
| C7 | ¾" | 4-#12TW | ¾" | 4-#12TW | ¾" | 4-#12TW | ¾" | 4-#12TW | ¾" | 4-#12TW |
| C8 | 1¼" | 9-#12TW 4-#12TW | 1¼" | 9-#12TW 4-#12TW | 1¼" | 9-#12TW 4-#12TW | 1¼" | 9-#10TW 4-#12TW | 1¼" | 9-#12TW 4-#12TW |
| C9 | ½" | 2-#12TW | ½" | 2-#12TW | ½" | 2-#12TW | ½" | 2-#12TW | ½" | 2-#12TW |
| C10 | ¾" | 2-#10TW | ¾" | 2-#10TW | ¾" | 2-#10TW | ¾" | 2-#10TW | | |
| C11 | ¾" | 3-#10TW | ¾" | 3-#10TW | ¾" | 3-#10TW | ¾" | 3-#10TW | ¾" | 3-#10TW |
| C12 | | | ½" | 3-#14TW | | | | | | |
| C13 | | | ½" | 4-#14TW | | | | | | |
| C14 | | | | | | | | | | |
| | | | | | | | | | | |

REFERENCE DRAWINGS — SHT

1. VICINITY MAP — 1
2. SITE PLAN, SOIL LOGS — 4,5 & 6
3. STRUCTURAL — 25
4. GRATING PLANS — 27
5. MECHANICAL — 13, 14, 15, 16 & 18
6. ELECTRICAL DETAILS — 32

NOTE: REFER TO DWG 6223-E329.3 FOR CONNECTION DIAGRAM - TELEMETERING AND SUPERVISORY CONTACTS.

NOTE: THIS DWG SUPERSEDES DWG NO 6223-E330.1 THIS DWG ISSUED WITH C.O. # 11

HARRISON W. KRAMER — REGISTERED PROFESSIONAL ENGINEER

| REVISIONS | DWN. BY: PHB RLH | DES. BY: B.P. | DATE: APRIL 1964 | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT MERCER ISLAND, WASHINGTON | U.L.I.D. NO. 3 SCHEDULE H ELECTRICAL PUMP STATIONS NO. 18, 19, 20, 21 & 23 | DRAWING NUMBER 6223-E330.2 |
|---|---|---|---|---|---|---|---|
| 9-4-64 - REV 1 ADDED "PS" 23, DELETED ... PER C.O. #4 | CKD. BY: | APVD. BY: | SCALE: ½" = 1'-0" | | | | SHEET NUMBER 31 OF 32 |
| FEB 65 - REV 2 - TELEMETERING MODIFICATIONS | | | | | | | |

## SCHEDULE PANEL "P1"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 15 | 50 | PUMP NO 1 | 1 | 2 | COMPRESSOR NO 1 | 50 | 40 | 3 |
| 3 | | | SPACE | 3 | 4 | COMPRESSOR NO 2 | | 40 | 3 |
| 1 | 20 | | LIGHTING | 5 | 6 | CONTROL & TIMER | | 15 | 1 |
| 1 | 20 | | RECEPTACLES | 7 | 8 | VENT FAN | | 15 | 1 |
| 1 | 20 | | SPARE | 9 | 10 | SUMP PUMP NO 1 | | 20 | 1 |
| 1 | 15 | | SPARE | 11 | 12 | SUMP PUMP NO 2 | | 20 | 1 |
| 1 | | | SPACE | 13 | 14 | SPACE | | | 1 |
| 1 | | 50 | SPACE | 15 | 16 | SPACE | 50 | | 1 |

100A MAIN — 70A

3Ø, 4W, 120/240V - TYPE NAB (APPLIES TO STATIONS NO 14)

## SCHEDULE PANEL "P2"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 15 | 50 | PUMP NO 1 | 1 | 2 | PUMP NO 2 | 50 | 15 | 3 |
| 3 | 15 | | SPARE | 3 | 4 | SPACE | | | 3 |
| 1 | 20 | | LIGHTING | 5 | 6 | PUMP CONTROL | | 15 | 1 |
| 1 | 20 | | RECEPTACLES | 7 | 8 | VENT FAN | | 15 | 1 |
| 2 | 15 | | AIR COMPRESSOR | 9, 11 | 10 | SUMP PUMP NO 1 | | 20 | 1 |
| | | | | | 12 | SUMP PUMP NO 2 | | 20 | 1 |
| 1 | 20 | | SPARE | 13 | 14 | TELEMETERING | | 15 | 1 |
| 1 | | 50 | SPACE | 15 | 16 | SPACE | 50 | | 1 |

100A MAIN — 70A

3Ø, 4W, 120/240V - TYPE NAB (APPLIES TO STATION NO 15 & [illegible])

## SCHEDULE PANEL "P5"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 30 | 50 | PUMP NO 1 | 1 | 2 | PUMP NO 2 | 50 | 30 | 3 |
| 3 | 30 | 50 | PUMP NO 3 | 3 | 4 | SPACE | 50 | | 3 |
| 2 | 20 | 50 | LIGHTING XFMR | 5 | 6 | SPACE | 50 | | 2 |

100A MAIN

3Ø, 3W, 480V - TYPE NHB (APPLIES TO STATION NO [illegible])

## SCHEDULE PANEL "P3"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 40 | 50 | PUMP NO 1 | 1 | 2 | PUMP NO 2 | 50 | 40 | 3 |
| 3 | 40 | | PUMP NO 3 | 3 | 4 | SPACE | | | 3 |
| 1 | 20 | | LIGHTING | 5 | 6 | PUMP CONTROL | | 15 | 1 |
| 1 | 20 | | RECEPTACLES | 7 | 8 | VENT FAN | | 15 | 1 |
| 1 | 20 | | SPARE | 9 | 10 | SUMP PUMP NO 1 | | 20 | 1 |
| * 2 | 15 | | AIR COMPRESSOR | 11, 13 | 12 | SUMP PUMP NO 2 | | 20 | 1 |
| | | | | | 14 | TELEMETERING | | 15 | 1 |
| 1 | | 50 | SPACE | 15 | 16 | SPACE | 50 | | 1 |

100A MAIN — 100A

3Ø, 4W, 120/240V - TYPE NAB (APPLIES TO STATIONS NO 16, 17, 22 & 24)
* THIS BREAKER POSITION IS A SPACE ON STATIONS NO 17 & 24

## SCHEDULE PANEL "P6"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 40 | 50 | PUMP NO 1 | 1 | 2 | PUMP NO 2 | 50 | 40 | 3 |
| 3 | 40 | 50 | PUMP NO 3 | 3 | 4 | SPACE | 50 | | 3 |
| 2 | 20 | 50 | LIGHTING XFMR | 5 | 6 | SPACE | 50 | | 2 |

100A MAIN

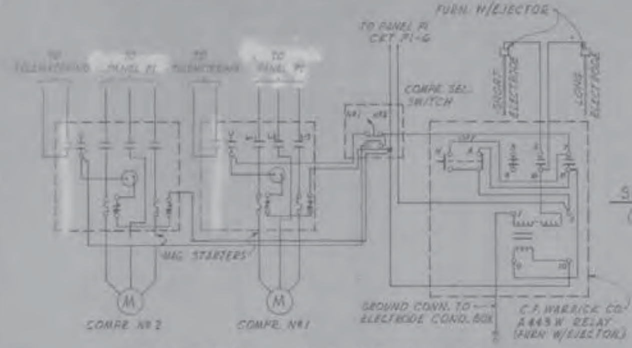
3Ø, 3W, 480V - TYPE NHB (APPLIES TO STATION NO 19, 20 & [illegible])

## SCEDULE PANEL "A"

| ACB POLES | ACB TRIP | ACB FRAME | DESIGNATION | CKT NO | CKT NO | DESIGNATION | ACB FRAME | ACB TRIP | ACB POLES |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 20 | 50 | LIGHTING | 1 | 2 | PUMP CONTROL | 50 | 15 | 1 |
| 1 | 20 | | RECEPTACLES | 3 | 4 | VENT FAN | | 15 | 1 |
| 1 | 20 | | SPARE | 5 | 6 | SUMP PUMP NO 1 | | 20 | 1 |
| * 2 | 15 | | AIR COMPRESSOR | 7, 9 | 8 | SUMP PUMP NO 2 | | 20 | 1 |
| | | | | | 10 | TELEMETERING | | 15 | 1 |
| 1 | | 50 | SPACE | 11 | 12 | SPACE | 50 | | 1 |

50A MAIN

1Ø, 3W, 120/240V - TYPE NAB (APPLIES TO STATIONS NO 18, 19, 20, 21 & 23)
* THIS BREAKER POSITION IS A SPACE ON STATIONS NO 18, 20, 21 & 23



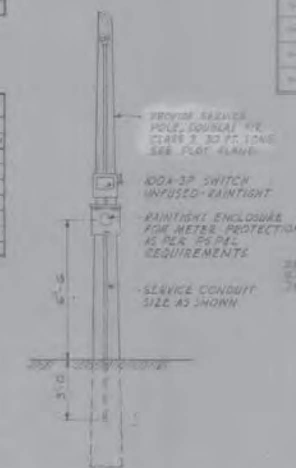

## EJECTOR WIRING DIAGRAM

NO SCALE
(APPLIES TO STATION NO 14)

## SYMBOLS

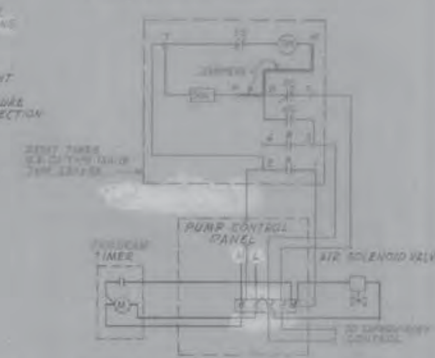
| | |
|---|---|
| —#— | EXPOSED CONDUIT - HASH MARKS INDICATE NUMBER OF WIRES. ALL WIRE SHALL BE #12 TYPE TW UNLESS OTHERWISE NOTED |
| S | SWITCH, SINGLE POLE, 20A @ 125V - BRYANT #2901 IN FS BOX W/C-H DS 128 SWITCH OPERATOR |
| | RECEPTACLE, SINGLE, GROUNDING, 15A @ 125V, C-H TYPE DS 82 IN FS BOX W/ PLATE & THREADED CAP. |
| | CONDUIT SEAL. C-H TYPE EYS - SIZE TO SUIT. |
| AS | ALARM SWITCH - (HIGH LEVEL) - SEE SPECS & DET. P, SHT #21 |
| TM | PROGRAM TIMER - SEE SPECS |
| (S) | SOLENOID VALVE, 4 WAY - SEE MECHANICAL SPECS |
| A | VAPORTITE FIXTURE, CEILING TYPE, 150W. C-H TYPE VS 12009 |
| B | VAPORTITE FIXTURE, BRACKET TYPE, 150W. C-H TYPE VDA 11009 OR VJ 12009 |
| JB | JUNCTION BOX, CAST FERALOY, C-H OR EQUAL - SIZE TO SUIT |
| SS | SELECTOR SWITCH, HOA - SEE SPECS. |
| RT | RESET TIMER - GE TYPE TSA-18 |
| C | VAPORTITE FIXTURE, CEILING TYPE, 200W, C-H TYPE VX 12009 |
| LS | LIMIT SWITCH - SEE SPECS |
| PS | PRESSURE SWITCH - SEE SPECS |

SEQUENCE CYCLE & TIMER CONTACTS




## SERVICE & METER POLE DETAIL

(APPLIES TO ALL STATIONS)




## WIRING DIAG. - AIR SOLENOID VALVE

APPLIES TO STATIONS NO 15, 16, 19, 22 & 25

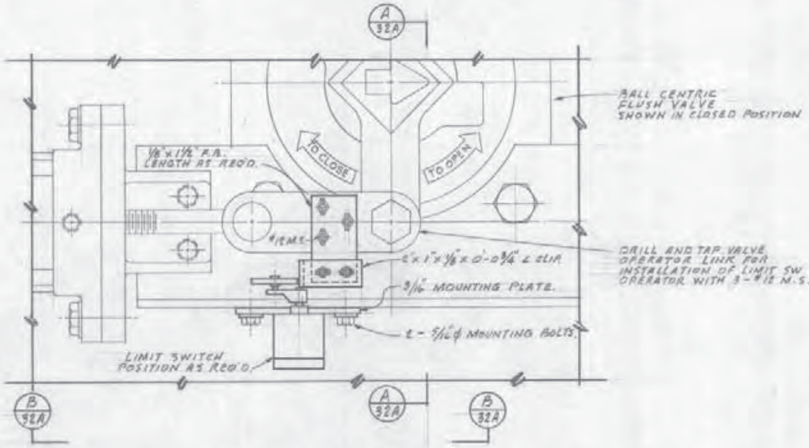
AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ________ DATE ________

| REVISIONS | DRAWN BY R.L.H. | DESIGNED BY B.H. | DATE APRIL 1964 |
|---|---|---|---|
| | CHECKED BY | APPROVED BY | SCALE |

CAREY AND KRAMER
CONSULTING ENGINEERS
SEATTLE, WASHINGTON

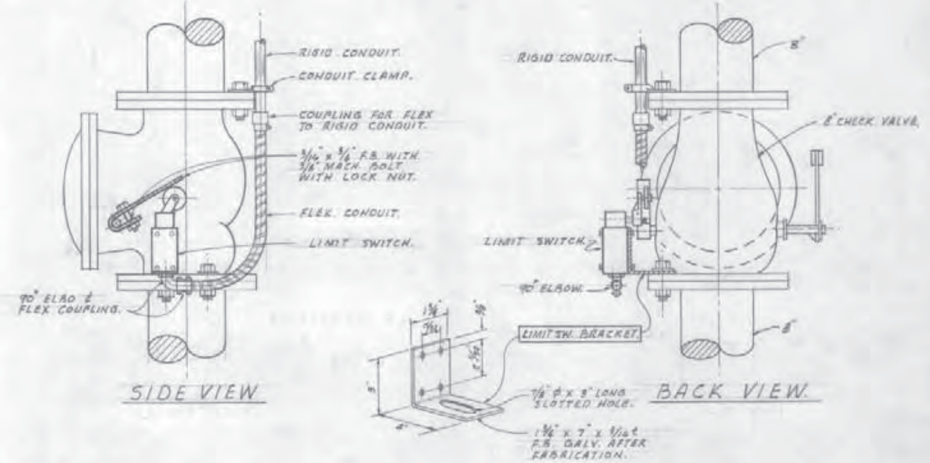
MERCER ISLAND SEWER DISTRICT
MERCER ISLAND, WASH

U.L.I.D. NO. 3 — SCHEDULE H
ELECTRICAL DETAILS
PUMP STATIONS NO. 14 THRU 25

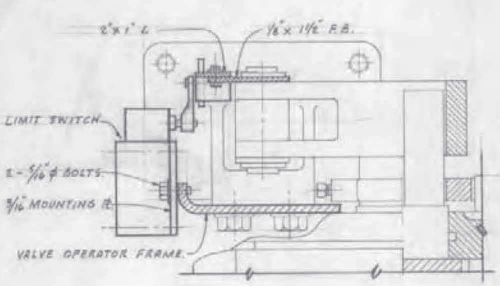



PLAN VIEW

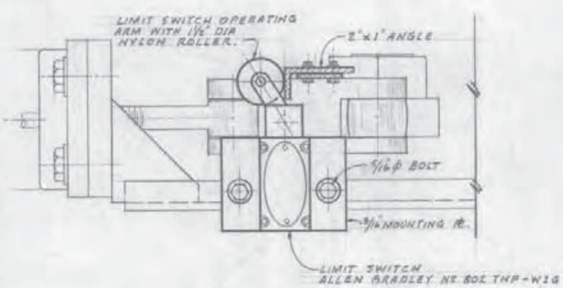
LIMIT SWITCH INSTALLATION
AIR OPERATED FLUSH VALVE
SCHEMATIC




LIMIT SWITCH INSTALLATION
CHECK VALVES
SCHEMATIC




END VIEW (A 32A)
SCHEMATIC




SIDE VIEW (B 32A)
SCHEMATIC

NOTES: LIMIT SWITCH INSTALLATION

1. VERIFY ALL DIMENSIONS IN THE FIELD FOR ALL CLIPS AND COMPONENTS FOR ALL LIMIT SWITCH BRACKETS AND OPERATORS BEFORE FABRICATION.
2. DETAILS AND ARRANGEMENTS SHOWN ARE SCHEMATIC AND ARE NOT TO BE SCALED.
3. ALL FASTENINGS AND ALL METAL ITEMS TO BE CUT IN THE FIELD SHALL BE NON-FERROUS.
4. ALL ADJUSTING BOLTS AND SCREWS SHALL BE INSTALLED IN SLOTTED HOLES AND BE PROVIDED WITH LOCK WASHERS.

AS BUILT DRAWING
CAREY & KRAMER
CONSULTING ENGINEERS
APPROVED BY ______ DATE 8-4-67

| REVISIONS | DWN BY: F.M. / CK'D BY: | DES BY: C.E.P. / APP'D BY: | DATE: FEB. 1965 / SCALE: | CAREY AND KRAMER CONSULTING ENGINEERS SEATTLE, WASHINGTON | MERCER ISLAND SEWER DISTRICT / MERCER ISLAND WASHINGTON | U.L.I.D. NO 3 SCHEDULE H / ELECTRICAL DETAILS / LIMIT SWITCH INSTALLATION | DRAWING NUMBER 6223-E 331 A / SHEET NUMBER 32A OF 32 |
|---|---|---|---|---|---|---|---|

# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## FLUSH STATION 12 CONTROL WIRING SCHEMATIC

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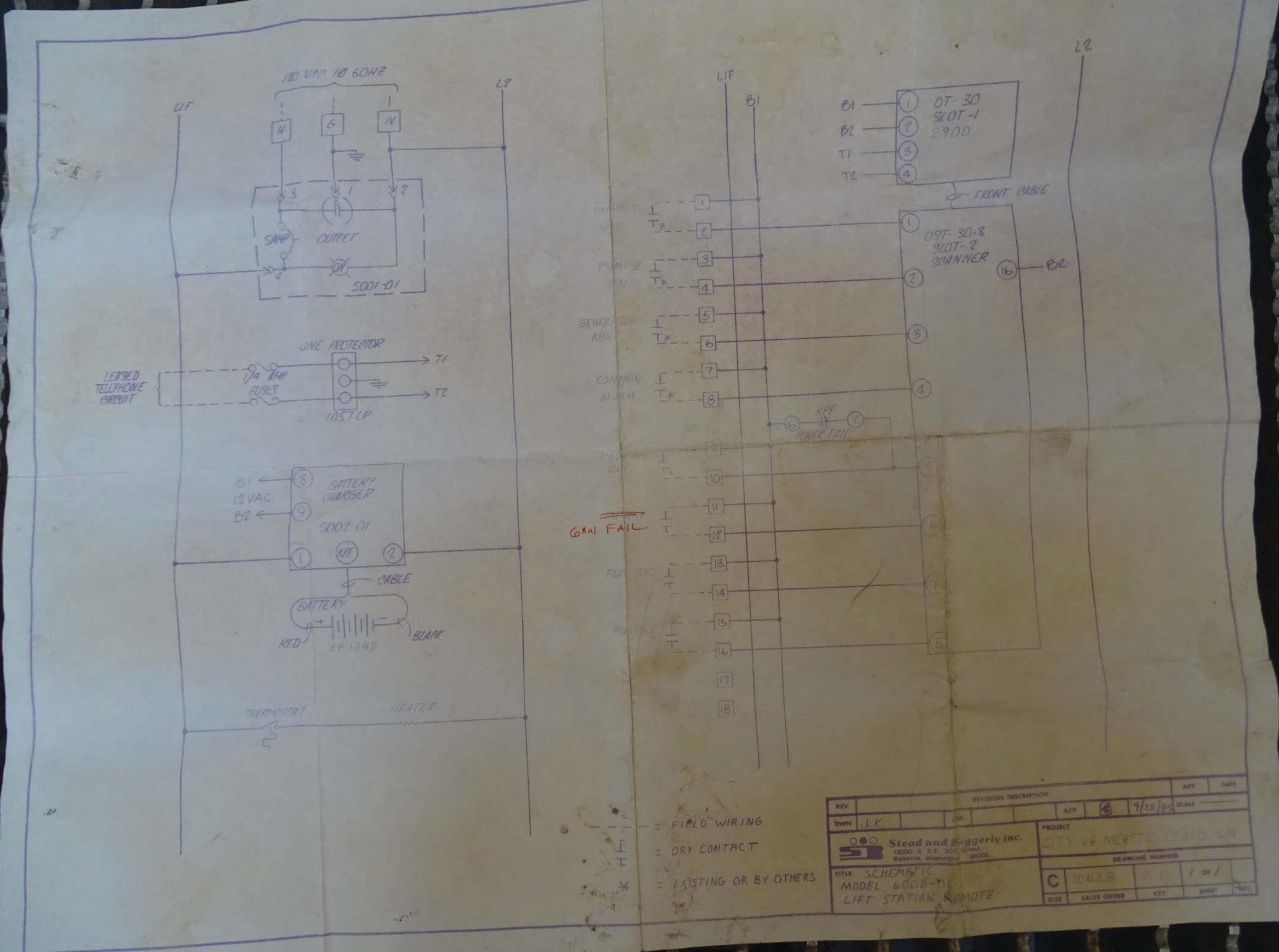

120 VAC 1Ø 60HZ
L1F
L2
H
G
N
3
1
2
4
SAMP
OUTLET
ON
5001-01
LINE PROTECTOR
LEASED TELEPHONE CIRCUIT
1/4 AMP FUSES
T1
T2
1057CP
B1
12 VAC
B2
BATTERY CHARGER
5002-01
KPF
CABLE
BATTERY
RED
BLACK
EP 1240
THERMOSTAT
HEATER
L1F
B1
DT-30
SLOT-1
2900
B1
B2
T1
T2
FRONT CABLE
DST-30-8
SLOT-2
SCANNER
B2
GENERATOR RUN
COMMON ALARM
POWER FAIL
GRN FAIL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
= FIELD WIRING
= DRY CONTACT
= EXISTING OR BY OTHERS
REV.
REVISION DESCRIPTION
APP
DATE
DWN J.K.
APP
9/25/89
SCALE
Stead and Baggerly inc.
PROJECT
CITY of MERCER ISLAND
DRAWING NUMBER
TITLE SCHEMATIC
MODEL 6008-
LIFT STATION REMOTE
C
SIZE
SALES ORDER
KEY
1 OF 1
SHEET
REV.
KESTREL BLUEPRINT INC./ 53360

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SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

PUMP STATION NO. 1, 12, & 13 PLAN AND SECTIONS

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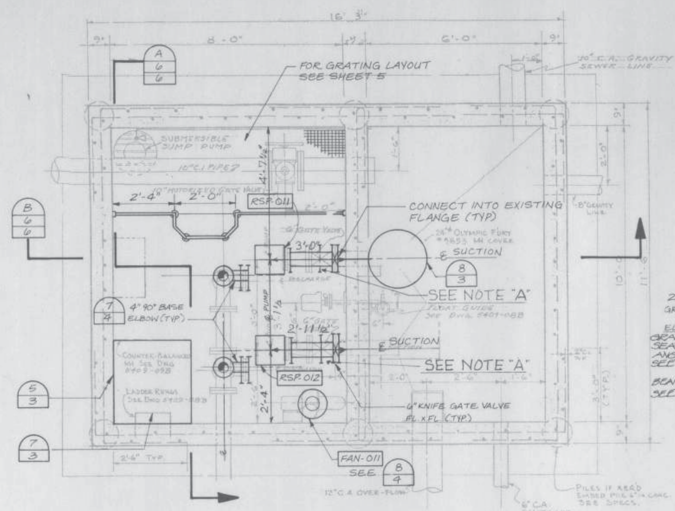
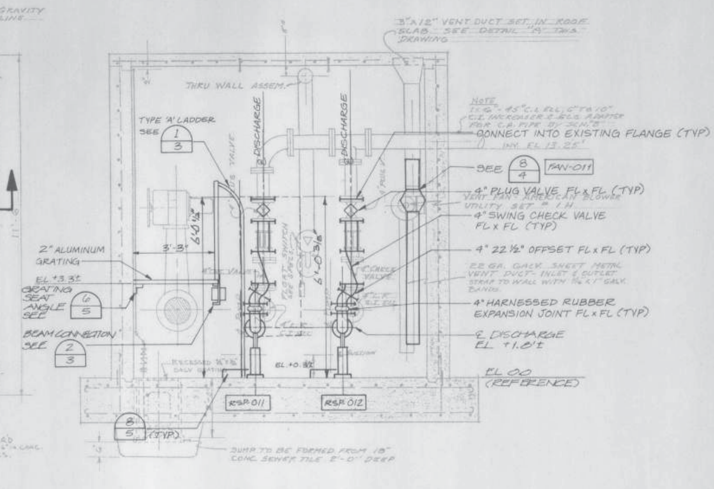
NOTE "A"

ADDED MATERIAL
(2) 6" FL x PE DI SPOOL
W/ QUICK FLANGE & GASKET.

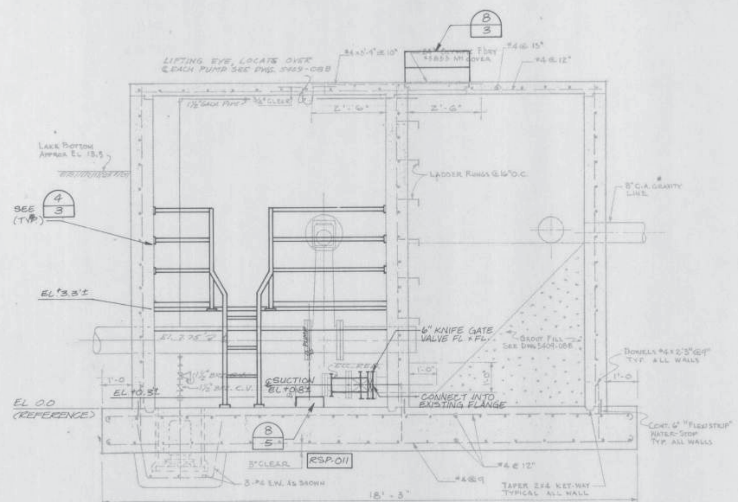



PLAN
SCALE: 1/2" = 1'-0"

NOTE:
MANIFOLD PIPING TO BE SUPPORTED BY PIPE HANGERS GRINNELL FIG. 101 OR EQUAL.




SECTION
SCALE: 1/2" = 1'-0"




SECTION
SCALE: 1/2" = 1'-0"

NOTES:

1. DEMOLISH PIPING AND VALVES FROM FLANGE ON 6" GATE VALVE (SUCTION) TO FLANGE ON 4" PLUG VALVE (DISCHARGE), 6" GATE VALVE AND 4" PLUG VALVE INCLUSIVE. DEMOLISH PUMP AND BUILT-UP CONCRETE PADS.
2. SEE GENERAL NOTES, SHEET 2.
3. SCALED DIMENSIONS ARE NOT ACCURATE OF ACTUAL FIELD CONDITIONS.

HDR

HDR Engineering, Inc.

| Issue No | Description | Proj Mgr | Des Engr | Drwn | Chkd | Date |
|---|---|---|---|---|---|---|
| 1 | REVISED PER DRAWINGS OF RECORD | | | L.T. | | 7.91 |

ROBERT DONALD KING — PROFESSIONAL ENGINEER — STATE OF WASHINGTON — REGISTERED

Project Manager: RDK
Designed: DKT
Drawn: MGJ
Checked: RAV

CITY OF MERCER ISLAND
SEWER PUMP STATION REHABILITATION
PROJECT NO. 561.600
MERCER ISLAND, WASHINGTON

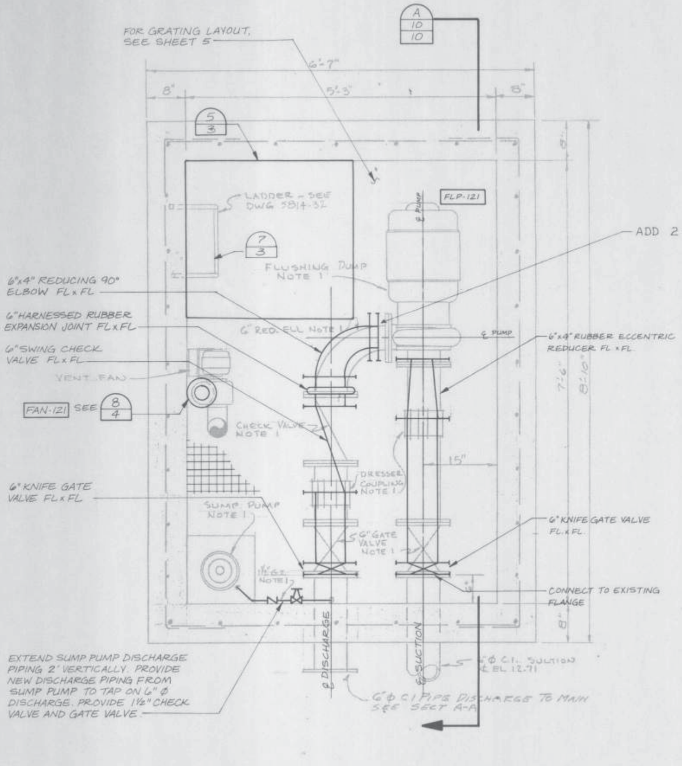
THIS LINE IS ONE INCH WHEN DRAWING IS FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY.

Date: JULY 1990

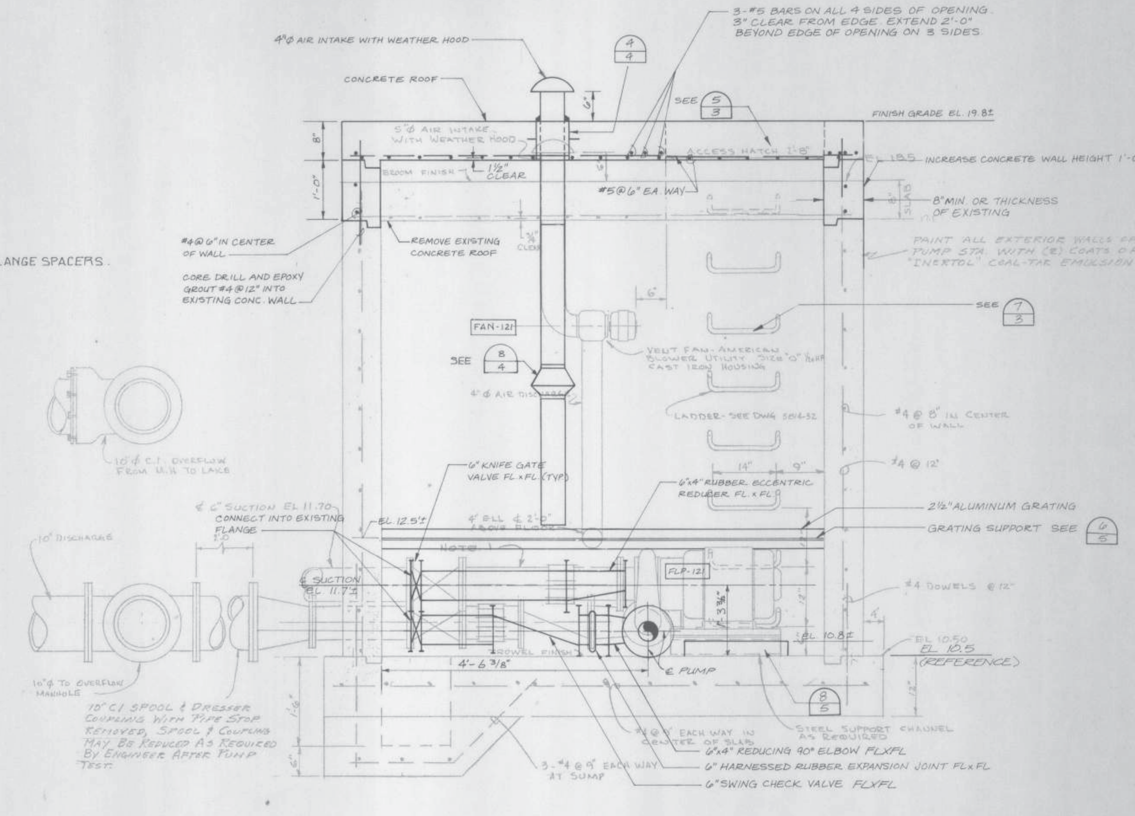
PUMP STATION NO. 1
PLAN AND SECTIONS

Project Number: 00035-004-002
Sheet Number: 6

SCREEN
COMPOSITE
OVERLAY




PLAN
SCALE: 1"=1'-0"




SECTION
SCALE: 1"=1'-0"
A 10/10

NOTES:

1. DEMOLISH PIPING AND VALVING FROM FLANGE ON 6" GATE VALVE (SUCTION) TO FLANGE ON 6" GATE VALVE (DISCHARGE), BOTH 6" GATE VALVES INCLUSIVE. DEMOLISH PUMPS AND BUILT-UP CONCRETE PADS.
2. SEE GENERAL NOTES, SHEET 2.

HDR Engineering, Inc.

| Issue No | Description | Proj Mgr | Des Engr | Drwn | Chkd | Date |
|---|---|---|---|---|---|---|
| 1 | REVISED PER DRAWINGS OF RECORD | | | L.T. | | 7.91 |

ROBERT DONALD KING · STATE OF WASHINGTON · REGISTERED PROFESSIONAL ENGINEER

Project Manager: RDK
Designed: DKT
Drawn: MGJ
Checked: RAV

CITY OF MERCER ISLAND
SEWER PUMP STATION REHABILITATION
PROJECT NO. 561.600
MERCER ISLAND, WASHINGTON

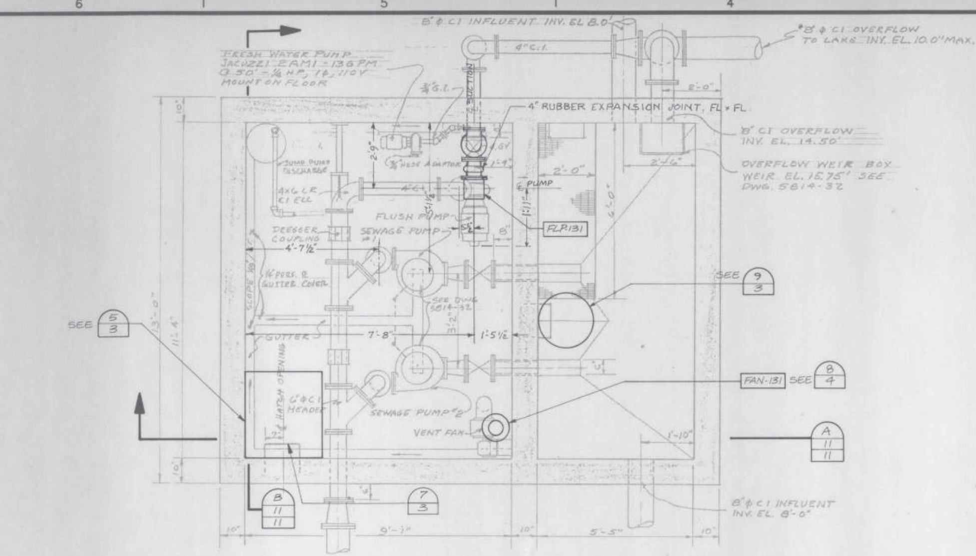
THIS LINE IS ONE INCH WHEN DRAWING IS FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY.

Date: JULY 1990

PUMP STATION NO. 12
PLAN AND SECTION

Project Number: 00035-004-002
Sheet Number: 10

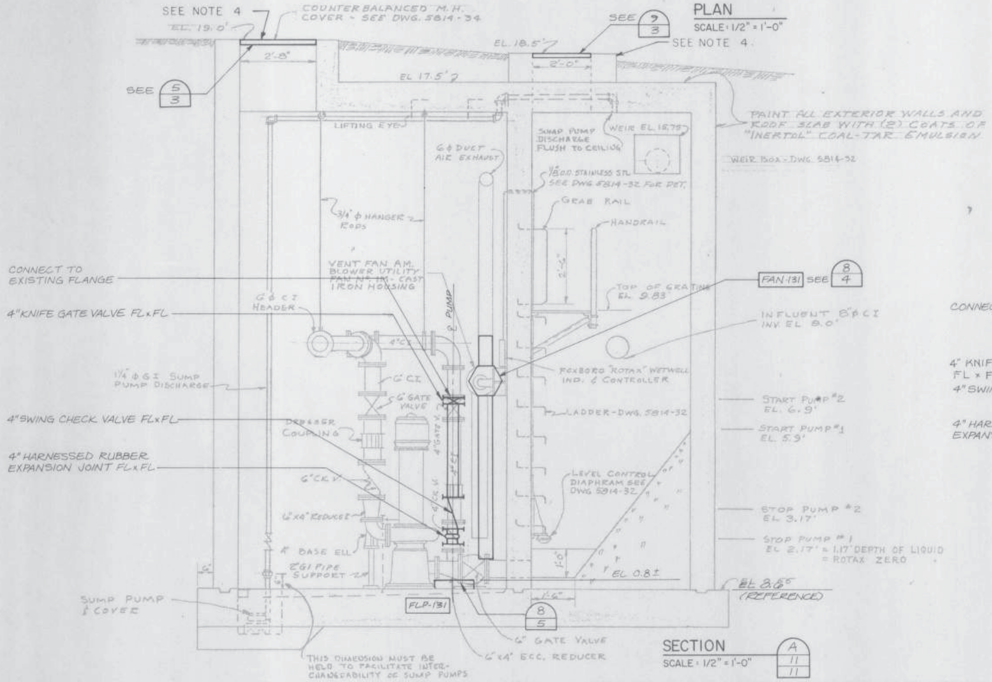
SCREEN / COMPOSITE / OVERLAY




PLAN

SCALE: 1/2" = 1'-0"

SEE NOTE 4.

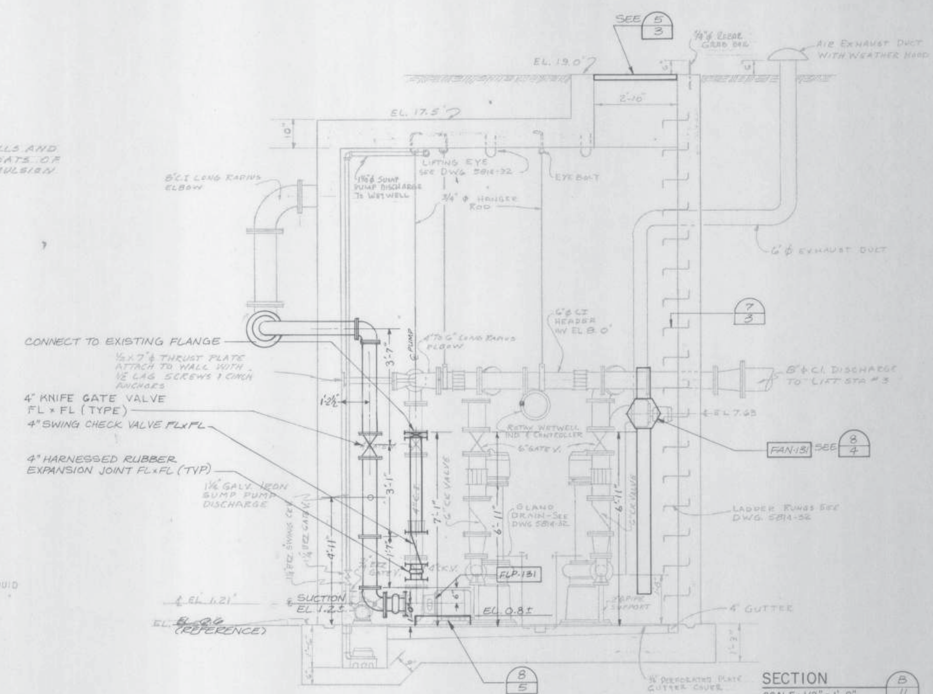



SECTION

SCALE: 1/2" = 1'-0"

**NOTES:**

1. DEMOLISH PIPING AND VALVING FROM FLANGE OF 4" GATE VALVE (SUCTION) TO FLANGE OF 4" GATE VALVE (DISCHARGE), BOTH 4" GATE VALVES INCLUSIVE. DEMOLISH PUMP AND BUILT-UP CONCRETE PADS.
2. SEE GENERAL NOTES, SHEET 2.
3. FOR SEWAGE PUMPING LAYOUT, SEE SHEET 8.
4. SEE CPR NO.5, SHEET 17 FOR ACCESS HATCH RAISING DETAIL




SECTION

SCALE: 1/2" = 1'-0"

| Issue No | Description | Proj Mgr | Des Engr | Drwn | Chkd | Date |
|---|---|---|---|---|---|---|
| 1 | REVISED PER DRAWINGS OF RECORD | | | L.T. | | 7.91 |

HDR

HDR Engineering, Inc.

ROBERT DONALD KING — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

Project Manager: RDK
Designed: DKT
Drawn: MGJ
Checked: RAV

CITY OF MERCER ISLAND
SEWER PUMP STATION REHABILITATION
PROJECT NO. 561.600
MERCER ISLAND, WASHINGTON

THIS LINE IS ONE INCH WHEN DRAWING IS FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY.

Date: JULY 1990

PUMP STATION NO. 13
PLAN AND SECTIONS

Project Number: 00035-004-002
Sheet Number: 11

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## PUMP STATION MOTOR CONTROL PANEL AS-BUILT DRAWINGS

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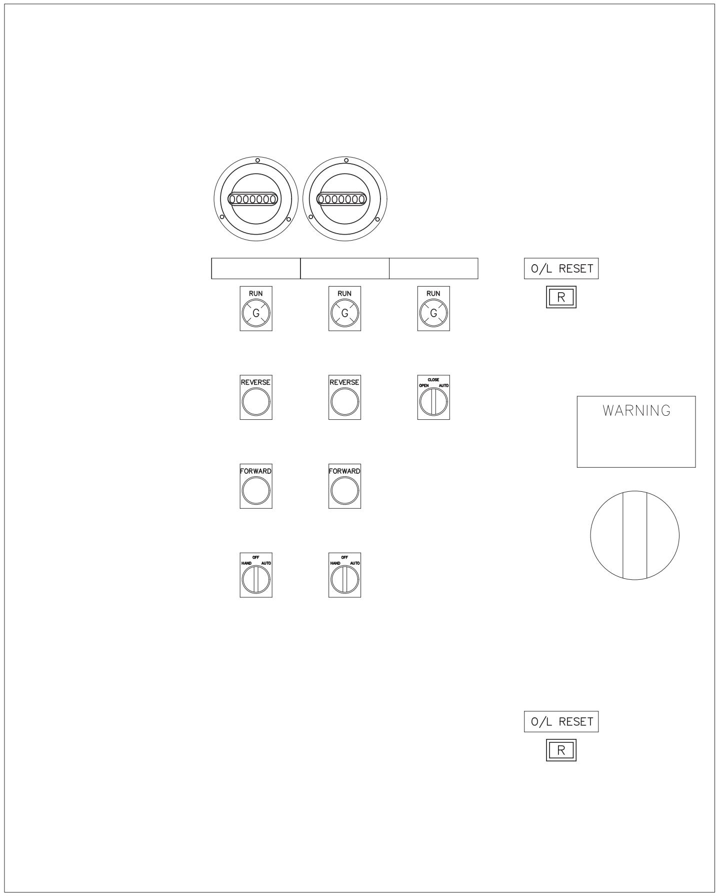
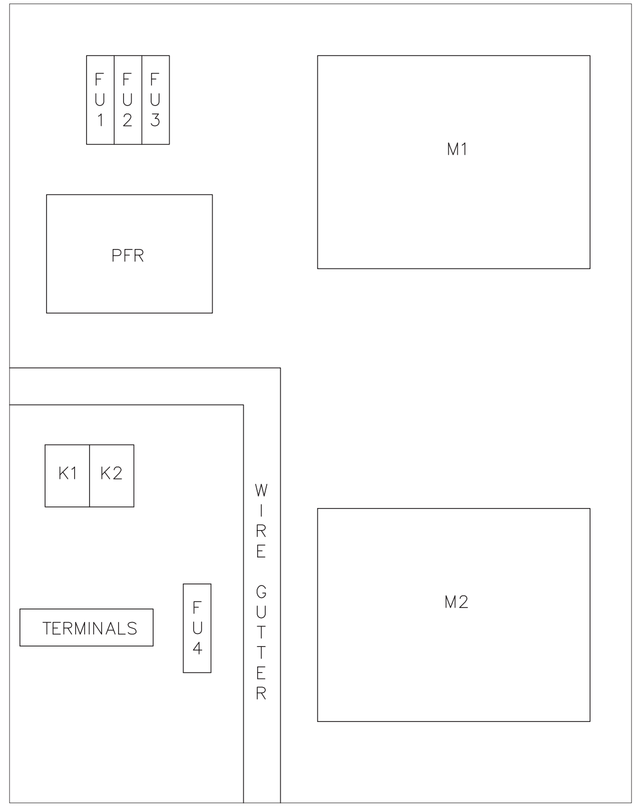



DOOR LAYOUT




DUPLEX PAN LAYOUT

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| A | REVISED | SHERRY | RUSS | 9/21/93 |
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/12/93 |
| C | REMOVED PUMP STATION 4 FROM TITLE | SHERRY | RUSS | 12/21/93 |

CUSTOMER: GRAYBAR PRIME ELECTRIC

ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204

DO NOT SCALE

CAD FILE: 1287D101

TOL. UNLESS NOTED .XX .05 .XXX .020

SCALE: 1 = 2

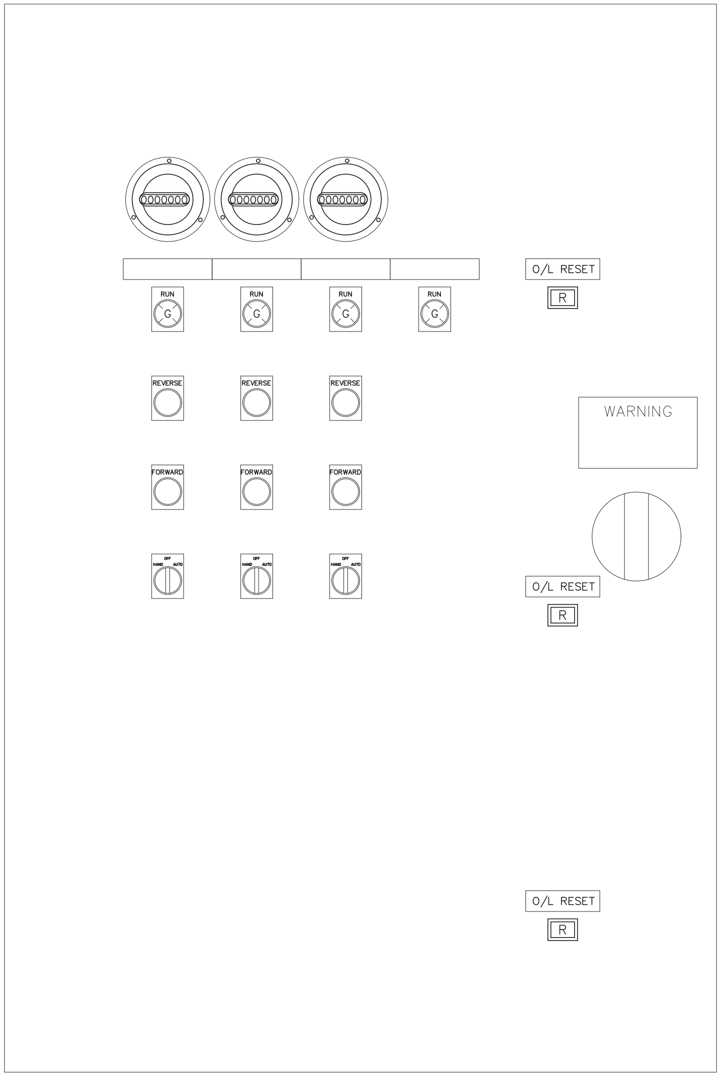
DWN BY: SLM DATE: 8/30/93

CHKD BY: DATE:

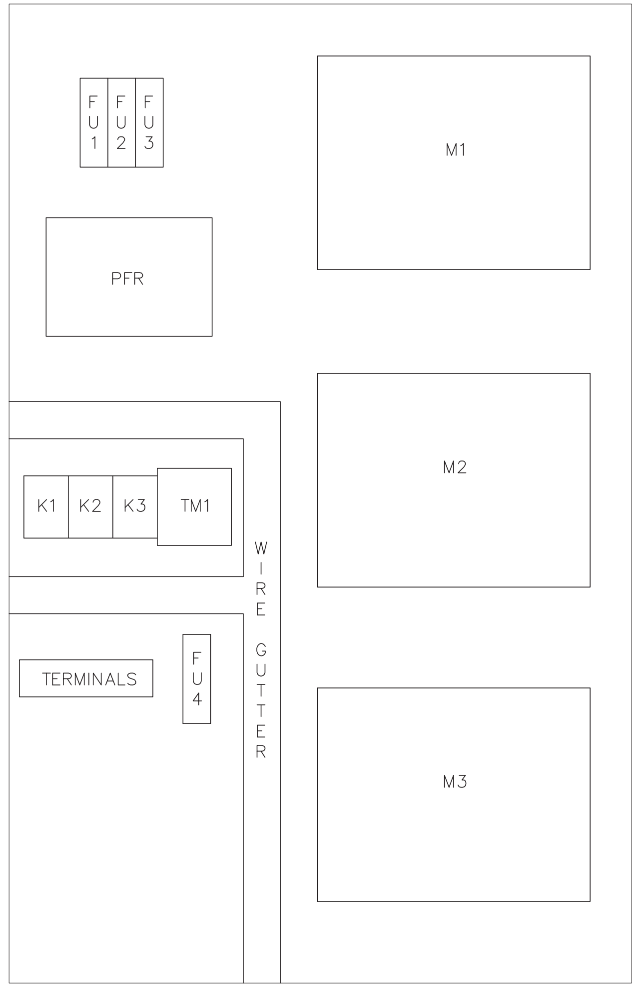
TITLE: PANEL LAYOUT DUPLEX BACKPAN PUMP STATIONS 5,10,11,15 & 25

DWG. NO. 9308-1287-D101

REV C




TRIPLEX DOOR LAYOUT




TRIPLEX PAN LAYOUT

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| A | REVISED | SHERRY | RUSS | 9/21/93 |
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/12/93 |
| C | REMOVED PUMP STATION 1 FROM TITLE | SHERRY | RUSS | 12/21/93 |

CUSTOMER: GRAYBAR PRIME ELECTRIC

ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204

DO NOT SCALE

CAD FILE: 1287D102

TOL. UNLESS NOTED .XX .05 .XXX .020

SCALE: 1 = 2

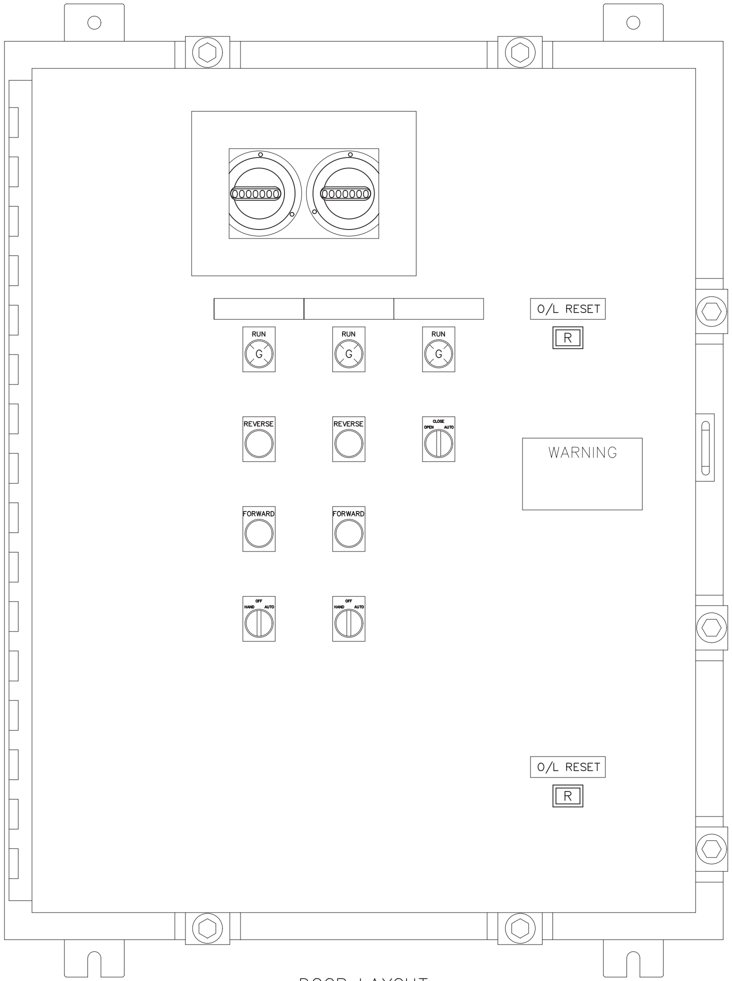
DWN BY: SLM DATE: 8/30/93

CHKD BY: DATE:

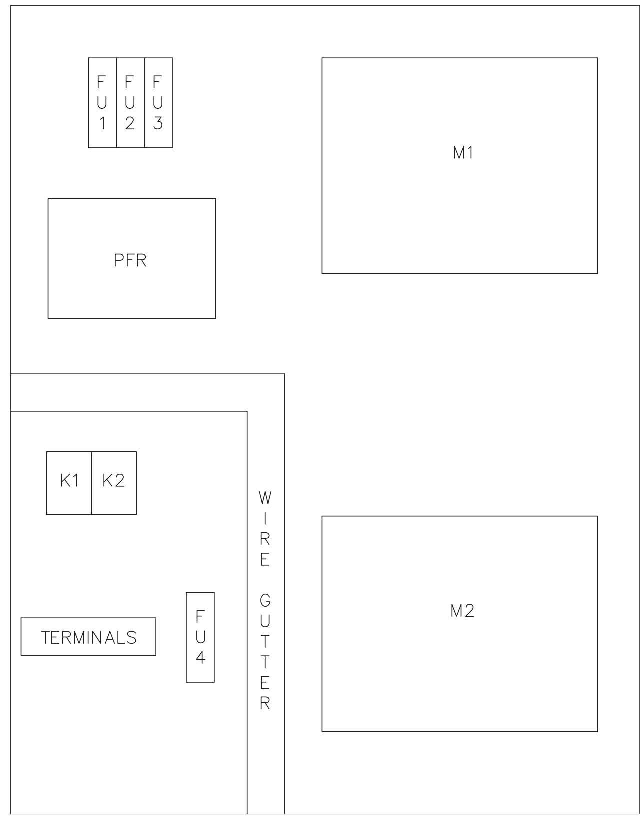
TITLE: PANEL LAYOUT TRIPLEX PANEL WITH FLUSH VALVE PUMP STATIONS 13 & 16 THRU 24

DWG. NO. 9308-1287-D102

REV C




DOOR LAYOUT

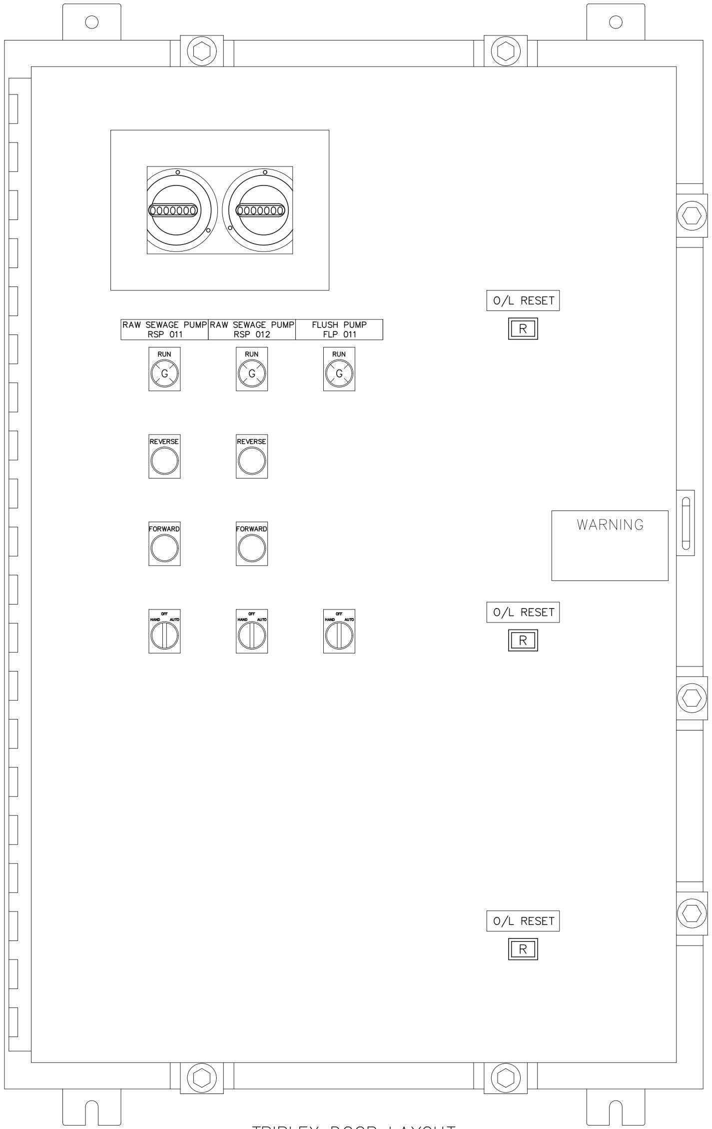



DUPLEX PAN LAYOUT

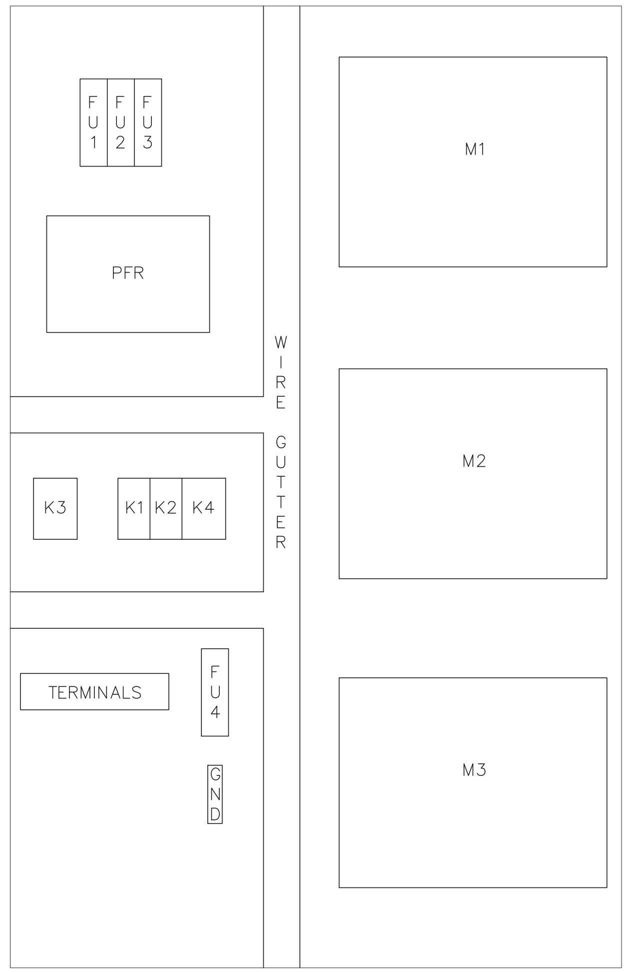
NOTE:
NEMA 4 ENCLOSURE HOFFMAN A-30H24BLP
WITH A-30P24 BACK PANEL AND WINDOW KIT
A-PWK53NF.

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| A | NEMA 4 REVISION | SHERRY | RUSS | 1/4/94 |

| | | |
|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 |
| DO NOT SCALE | | TITLE: PANEL LAYOUT DUPLEX BACKPAN PUMP STATION 4 |
| CAD FILE: 1287D103 | TOL. UNLESS NOTED | |
| SCALE: 1 = 2 | .XX .05 / .XXX .020 | |
| DWN BY: SLM | DATE: 12/21/93 | DWG. NO. 9308-1287-D103 — REV A |
| CHKD BY: | DATE: | |




TRIPLEX DOOR LAYOUT




TRIPLEX PAN LAYOUT

NOTE:
NEMA 4 ENCLOSURE HOFFMAN A-36H24BLP
WITH A-36P24 BACK PANEL AND WINDOW KIT
A-PWK95NF.

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| A | NEMA 4 REVISION | SHERRY | RUSS | 1/4/94 |
| C | AS BUILT | SHERRY | TOM | 2/4/94 |

CUSTOMER: GRAYBAR PRIME ELECTRIC

DO NOT SCALE

CAD FILE: 1287D104

SCALE: 1 = 2

TOL. UNLESS NOTED: .XX .05; .XXX .020

DWN BY: SLM DATE: 12/21/93

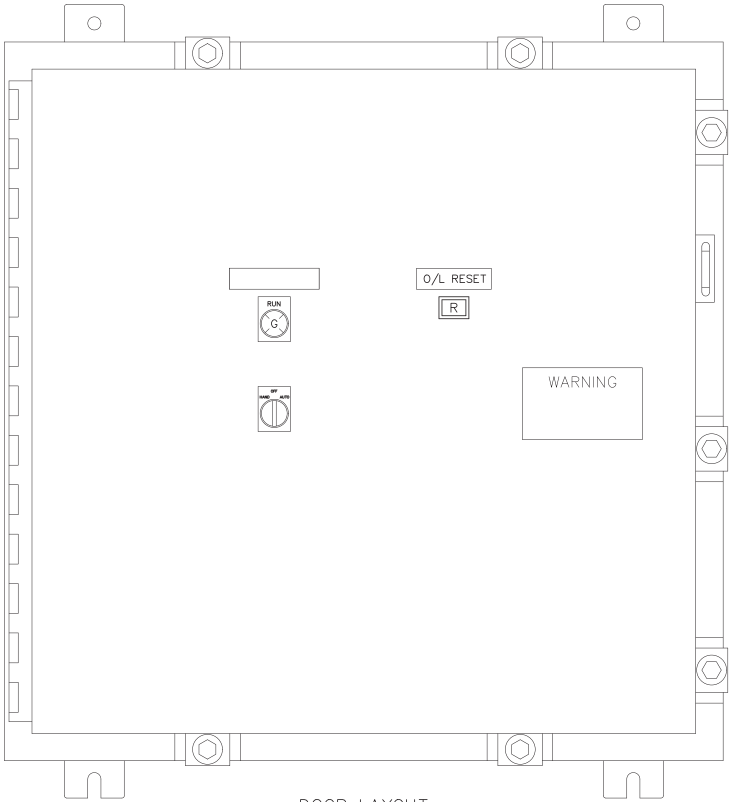
CHKD BY: DATE:

ELPAC ELECTRICAL PACKAGING CO. INC.
13010 HIWAY 99 SOUTH
EVERETT, WASHINGTON 98204

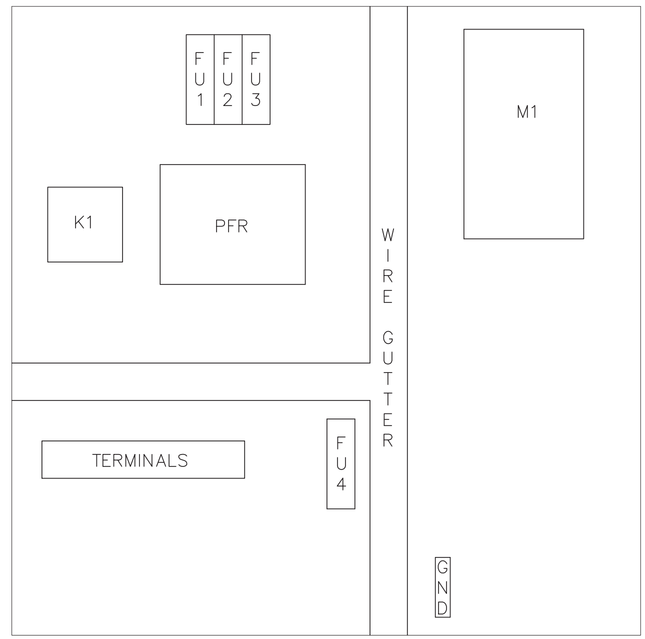
TITLE: PANEL LAYOUT
TRIPLEX PANEL WITH FLUSH VALVE
PUMP STATION 1

DWG. NO. 9308-1287-D104

REV C




DOOR LAYOUT

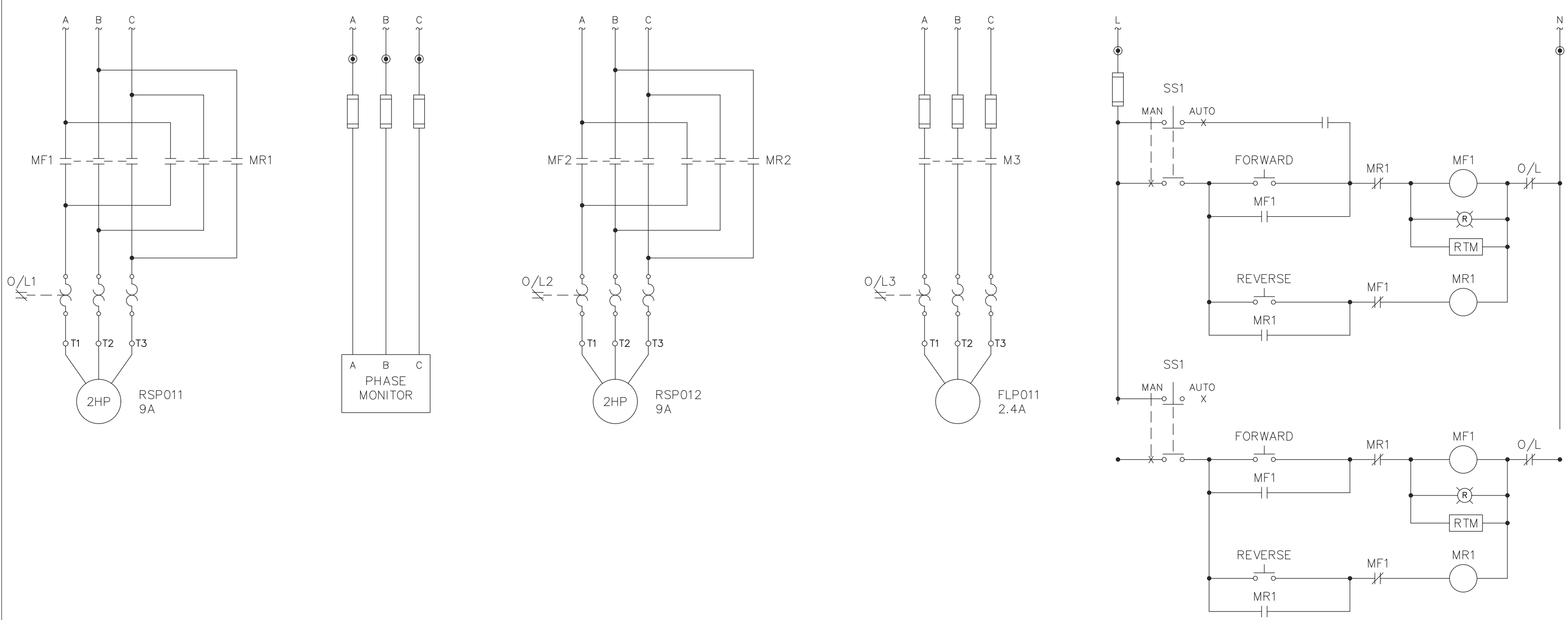



PAN LAYOUT

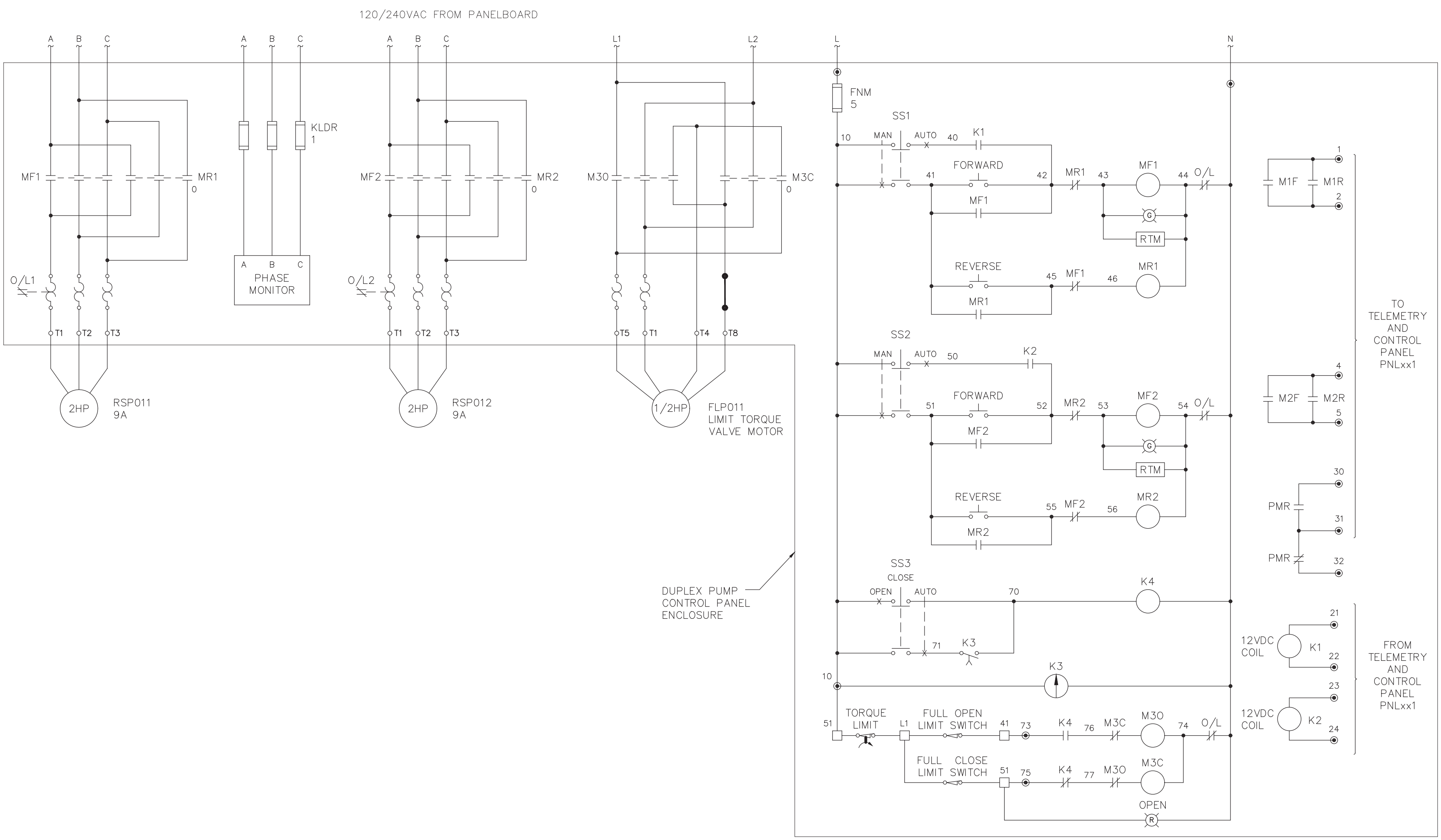
NOTE:
NEMA 4 ENCLOSURE HOFFMAN A-24H24BLP
WITH A-24P24 BACK PANEL.

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| A | NEMA 4 REVISION | SHERRY | RUSS | 1/4/94 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: PANEL LAYOUT PUMP STATION 9 AND 12 STARTER PANEL | |
| CAD FILE: 1287D105 | TOL. UNLESS NOTED | | |
| SCALE: 1 = 2 | .XX .05 / .XXX .020 | | |
| DWN BY: SLM | DATE: 12/22/93 | DWG. NO. 9308-1287-D105 | REV A |
| CHKD BY: | DATE: | | |




| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 1 | |
| CAD FILE: 1287D300 | TOL. UNLESS NOTED | | |
| SCALE: NONE | .XX .05 / .XXX .020 | | |
| DWN BY: SLM | DATE: 8/24/93 | DWG. NO. 9308-1287-D300 | REV 0 |
| CHKD BY: | DATE: | | |




LEGEND:

◉ CONTROL PANEL TERMINAL

☐ TERMINAL ON LIMIT TORQUE MOTORIZED VALVE.

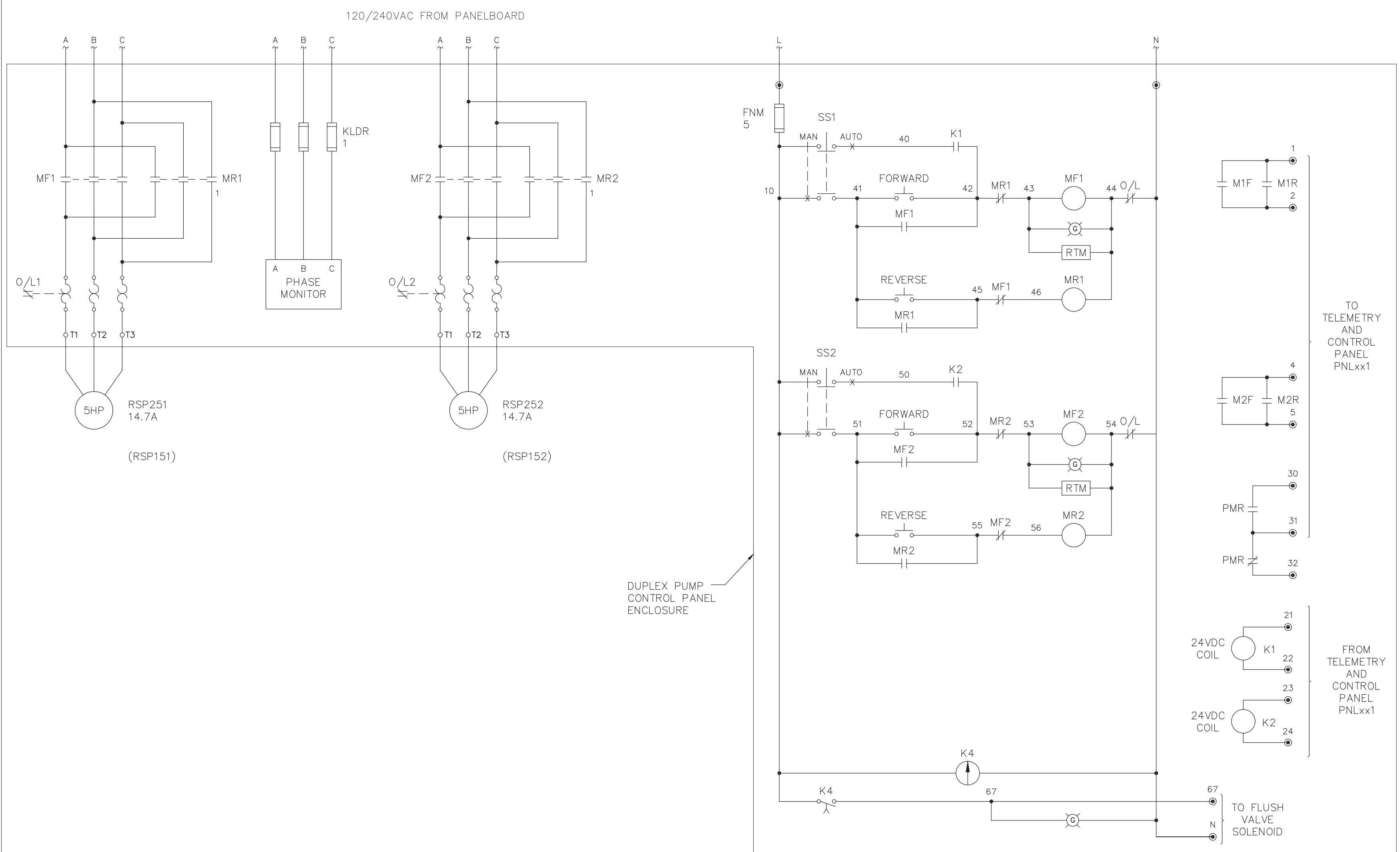
| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | AS BUILT | SHERRY | TOM | 2/4/94 |

| | |
|---|---|
| CUSTOMER: | GRAYBAR PRIME ELECTRIC |
| DO NOT SCALE | |
| CAD FILE: 1287D301 | TOL. UNLESS NOTED: .XX .05; .XXX .020 |
| SCALE: NONE | |
| DWN BY: SLM | DATE: 8/24/93 |
| CHKD BY: | DATE: |

ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204

TITLE: SCHEMATIC PUMP STATION NO. 1

DWG. NO. 9308-1287-D301 REV C

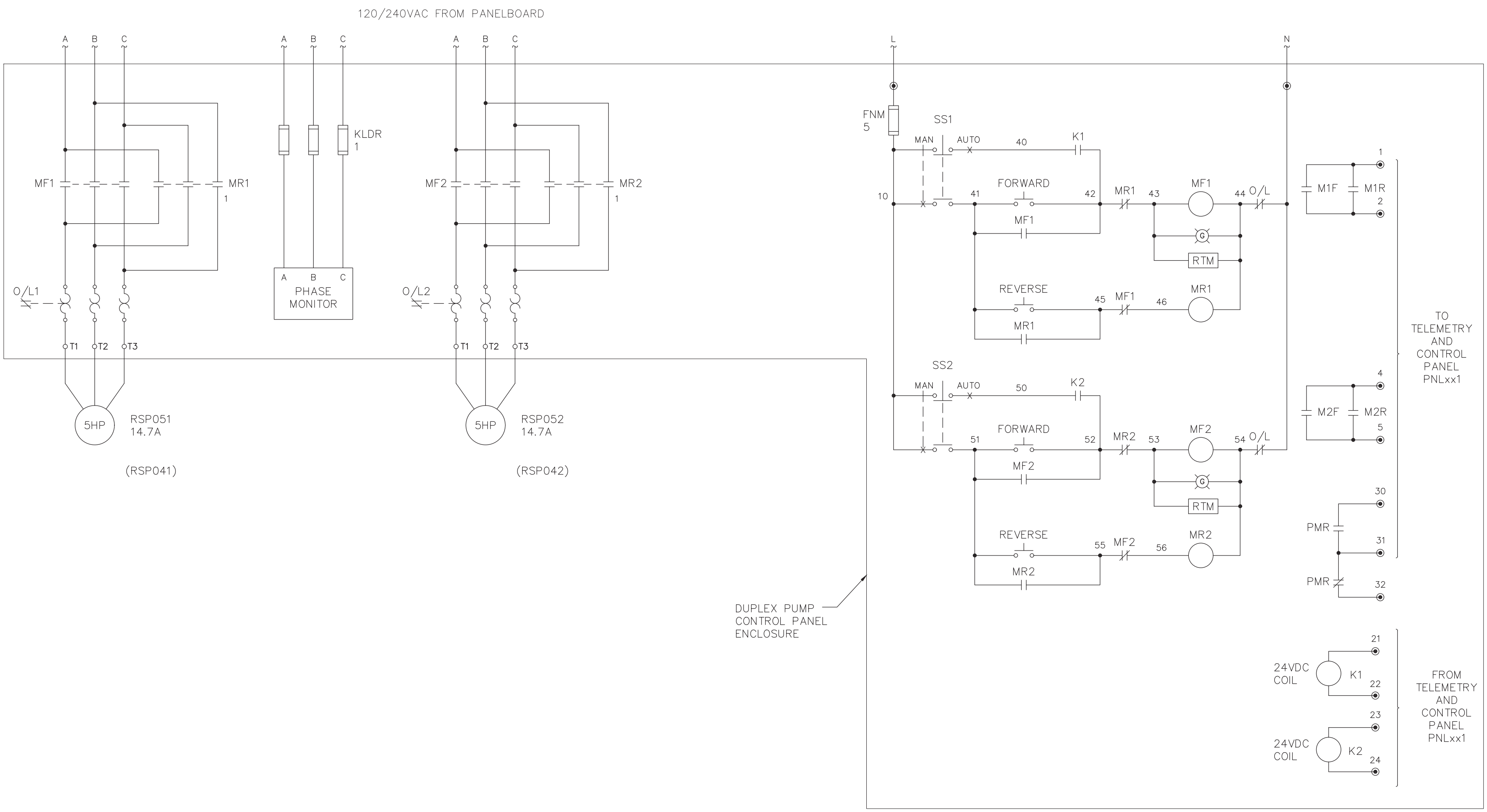



LEGEND:

⊙ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/12/93 |
| C | AS BUILT | SHERRY | TOM | 11/2/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATIONS NO. 15 AND NO. 25 | |
| CAD FILE: 1287D302 | TOL. UNLESS NOTED .XX .05 .XXX .020 | | |
| SCALE: NONE | | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308-1287-D302 | REV C |
| CHKD BY: | DATE: | | |




LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | AS BUILT | SHERRY | TOM | 11/2/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 4 AND NO. 5 | |
| CAD FILE: 1287D303 | TOL. UNLESS NOTED .XX .05 .XXX .020 | | |
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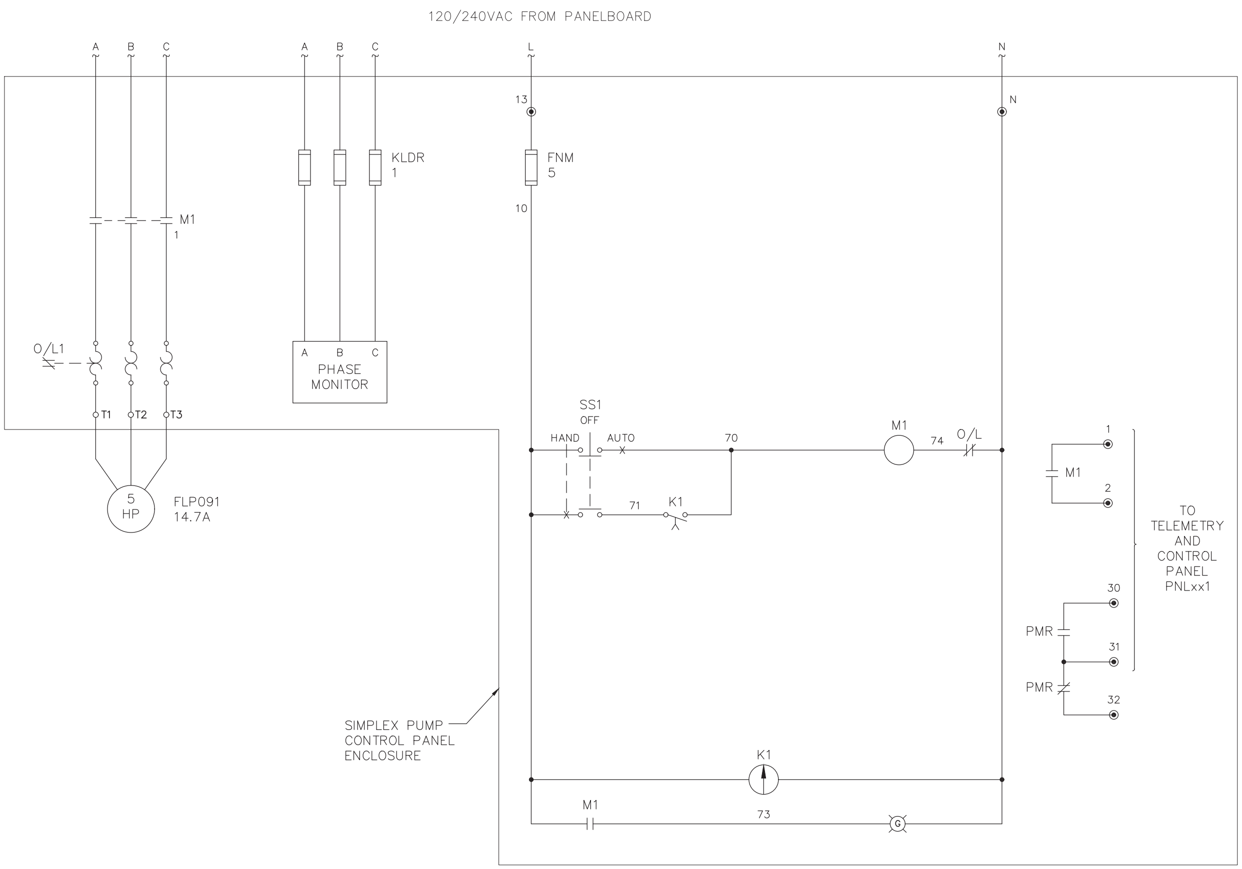
| CHKD BY: | DATE: | | |




LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 9 | |
| CAD FILE: 1287D304 | TOL. UNLESS NOTED .XX .05 .XXX .020 | | |
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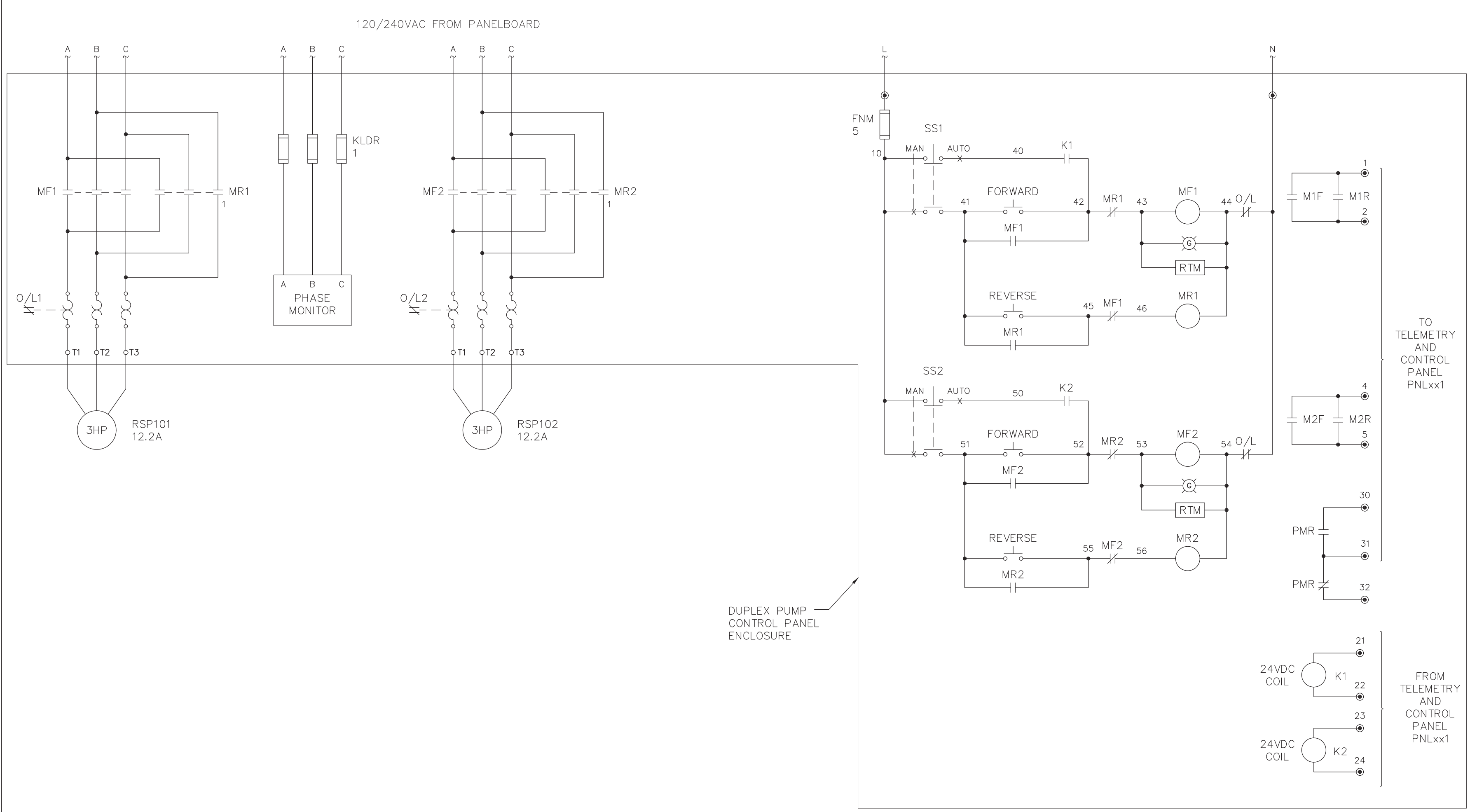
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308–1287–D304 | REV B |
| CHKD BY: | DATE: | | |




LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | AS BUILT | SHERRY | TOM | 11/2/93 |

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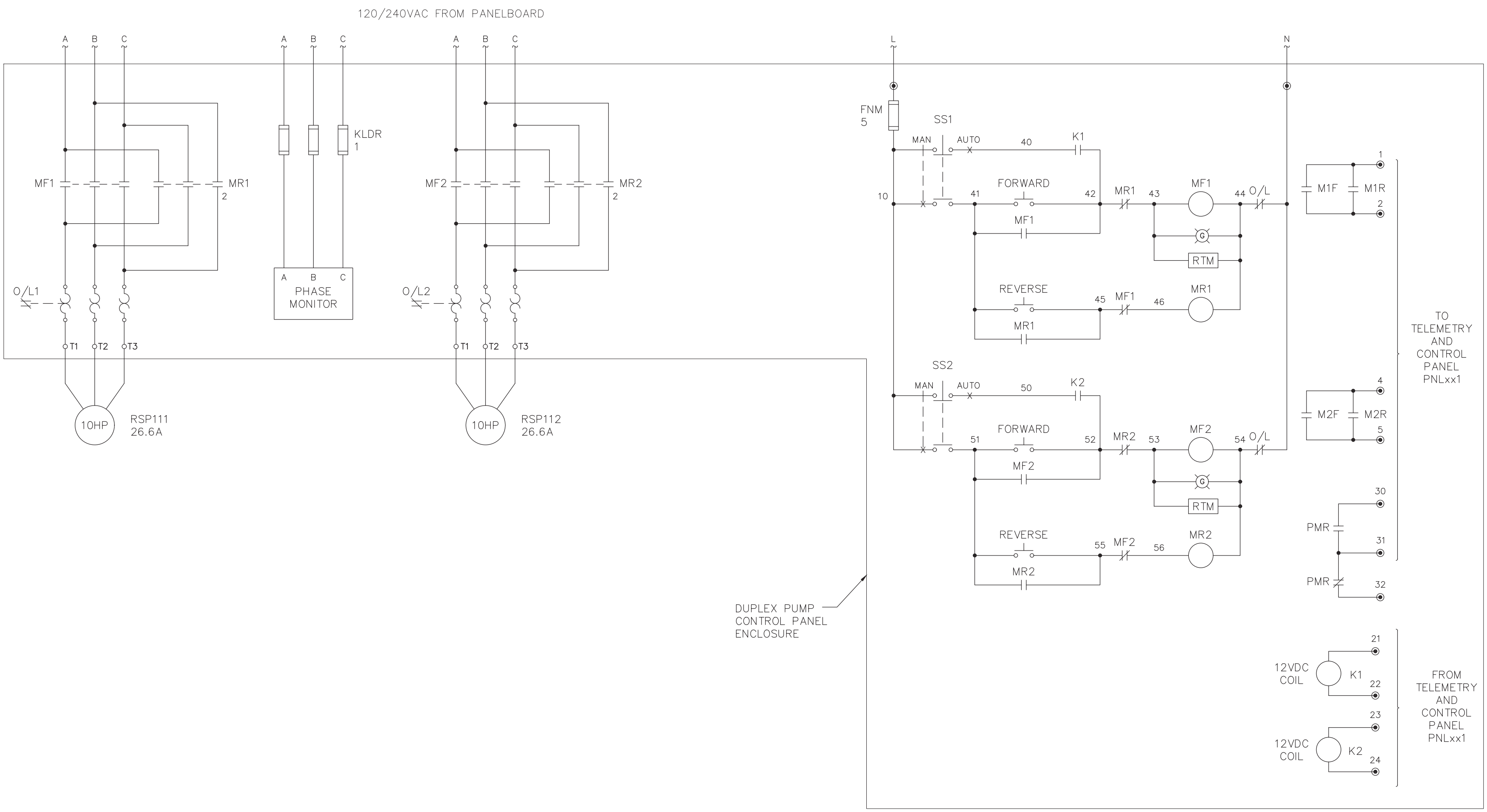
|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 |
| DO NOT SCALE | TITLE: SCHEMATIC PUMP STATION NO. 10 |
| CAD FILE: 1287D305 | TOL. UNLESS NOTED: .XX .05; .XXX .020 |
| SCALE: NONE | |
| DWN BY: SLM | DATE: 8/25/93 |
| CHKD BY: | DATE: |
| DWG. NO. 9308-1287-D305 | REV C |

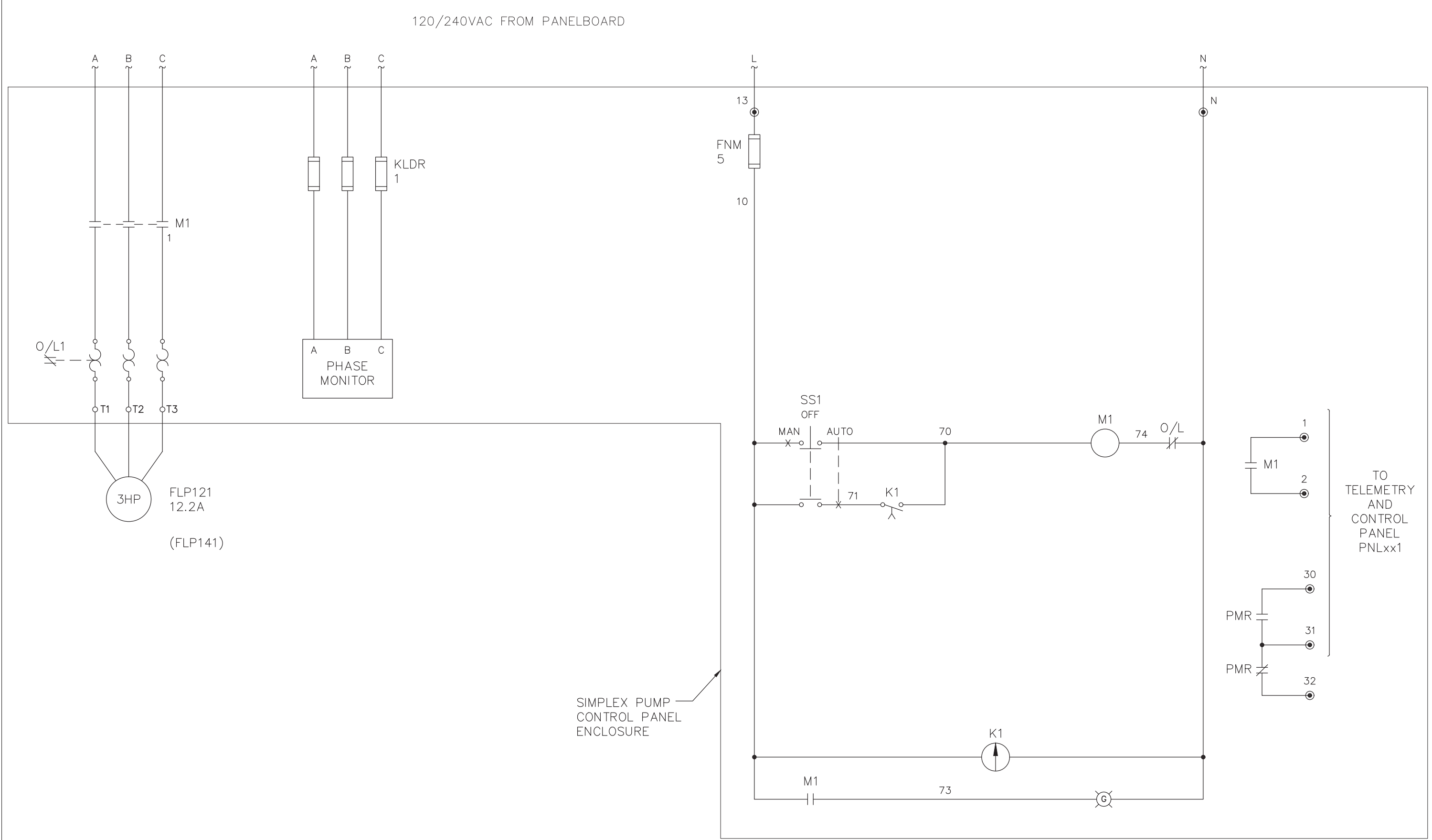



| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | ADD 12VDC RELAYS | SHERRY | TOM | 1/21/94 |

| | | |
|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | TITLE: SCHEMATIC PUMP STATION NO. 11 | |
| CAD FILE: 1287D306 | TOL. UNLESS NOTED .XX .05 .XXX .020 | |
| SCALE: NONE | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308-1287-D306 | REV C |
| CHKD BY: | DATE: | |

LEGEND:

⊙ CONTROL PANEL TERMINAL

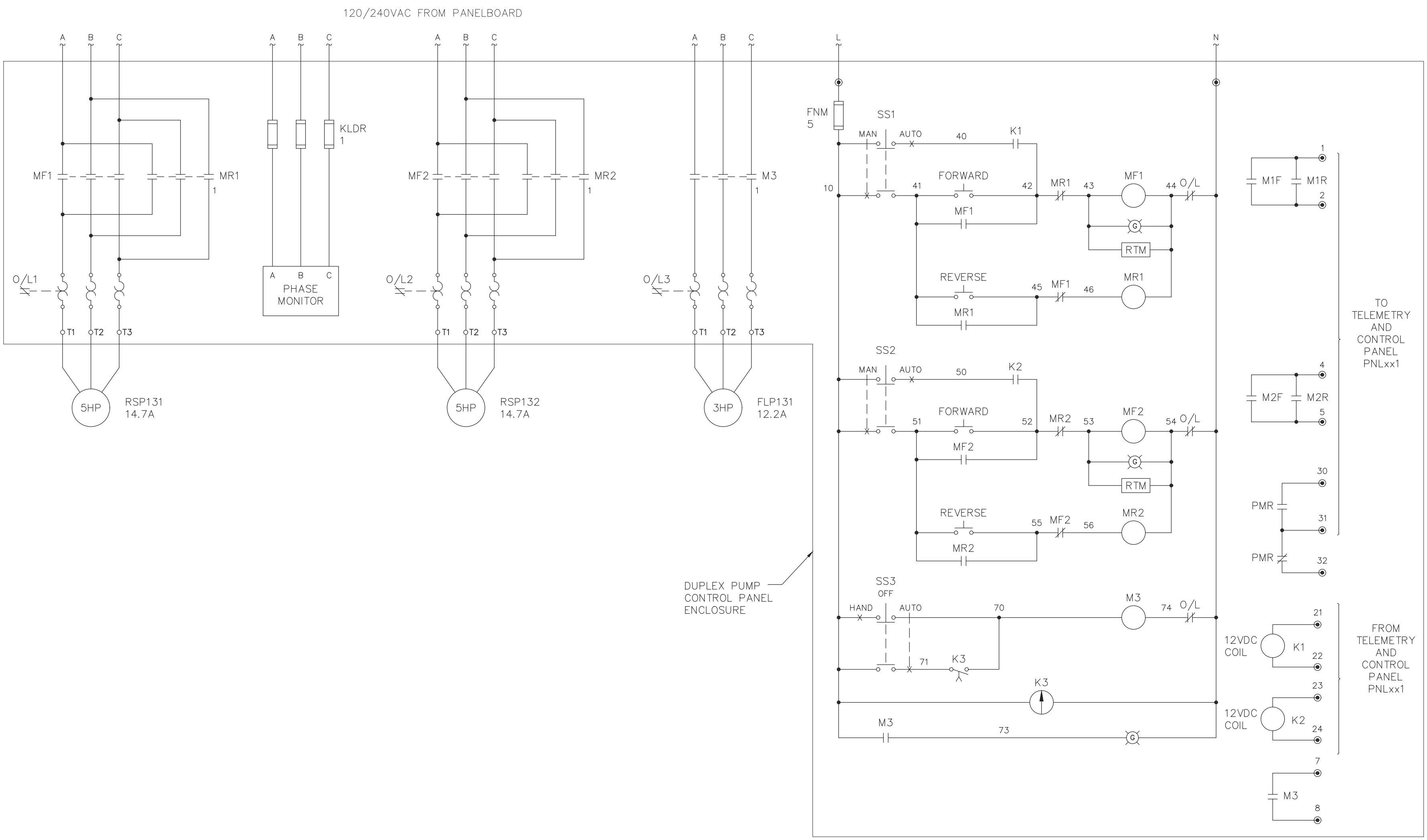



LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | AS BUILT | SHERRY | TOM | 11/2/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATIONS NO. 12 AND NO. 14 | |
| CAD FILE: 1287D307 | TOL. UNLESS NOTED | | |
| SCALE: NONE | .XX .05 / .XXX .020 | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308–1287–D307 | REV C |
| CHKD BY: | DATE: | | |




LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAY COILS | SHERRY | TOM | 11/30/93 |

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|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 13 | |
| CAD FILE: 1287D308 | TOL. UNLESS NOTED | | |
| SCALE: NONE | .XX .05 / .XXX .020 | | |
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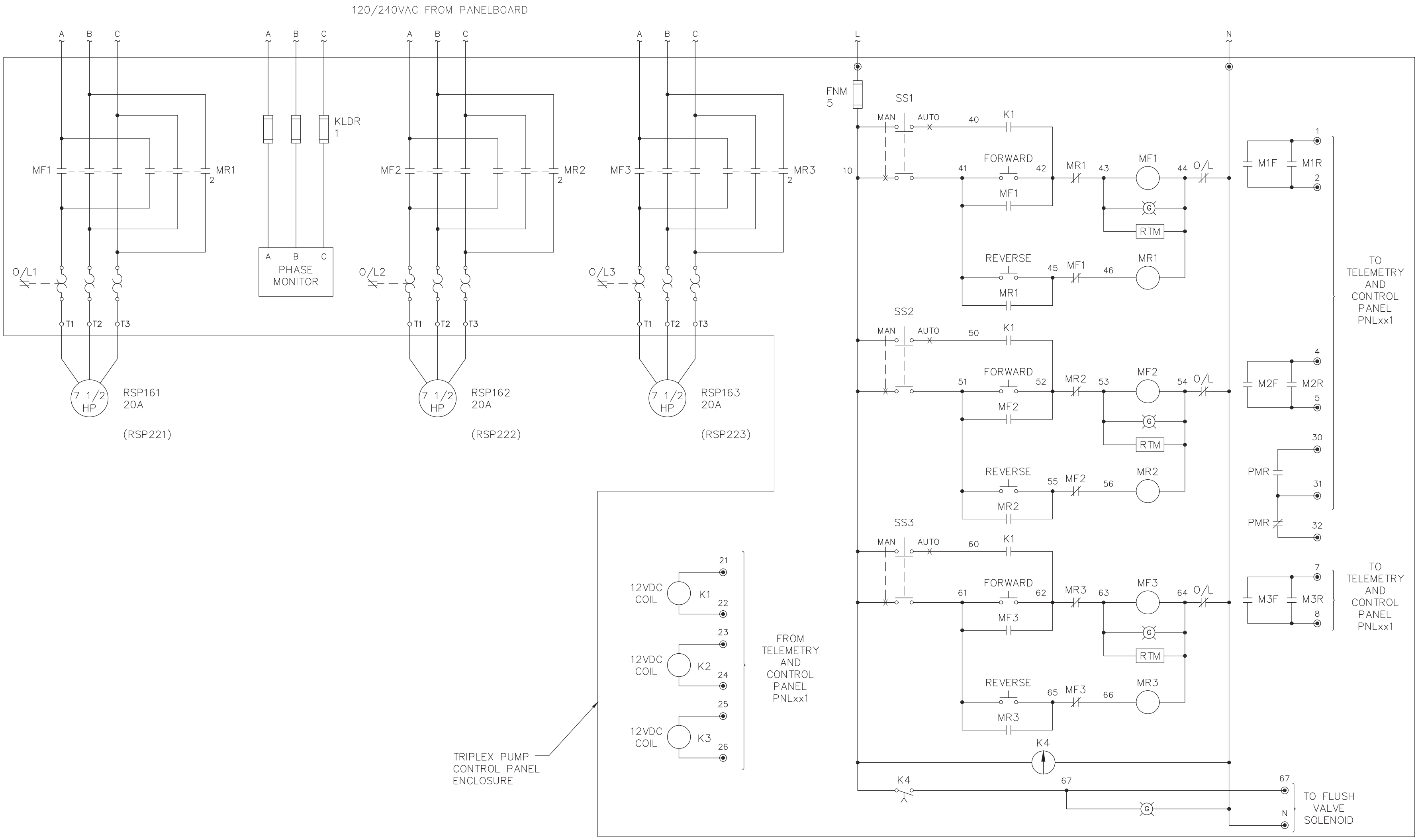
| CHKD BY: | DATE: | | |

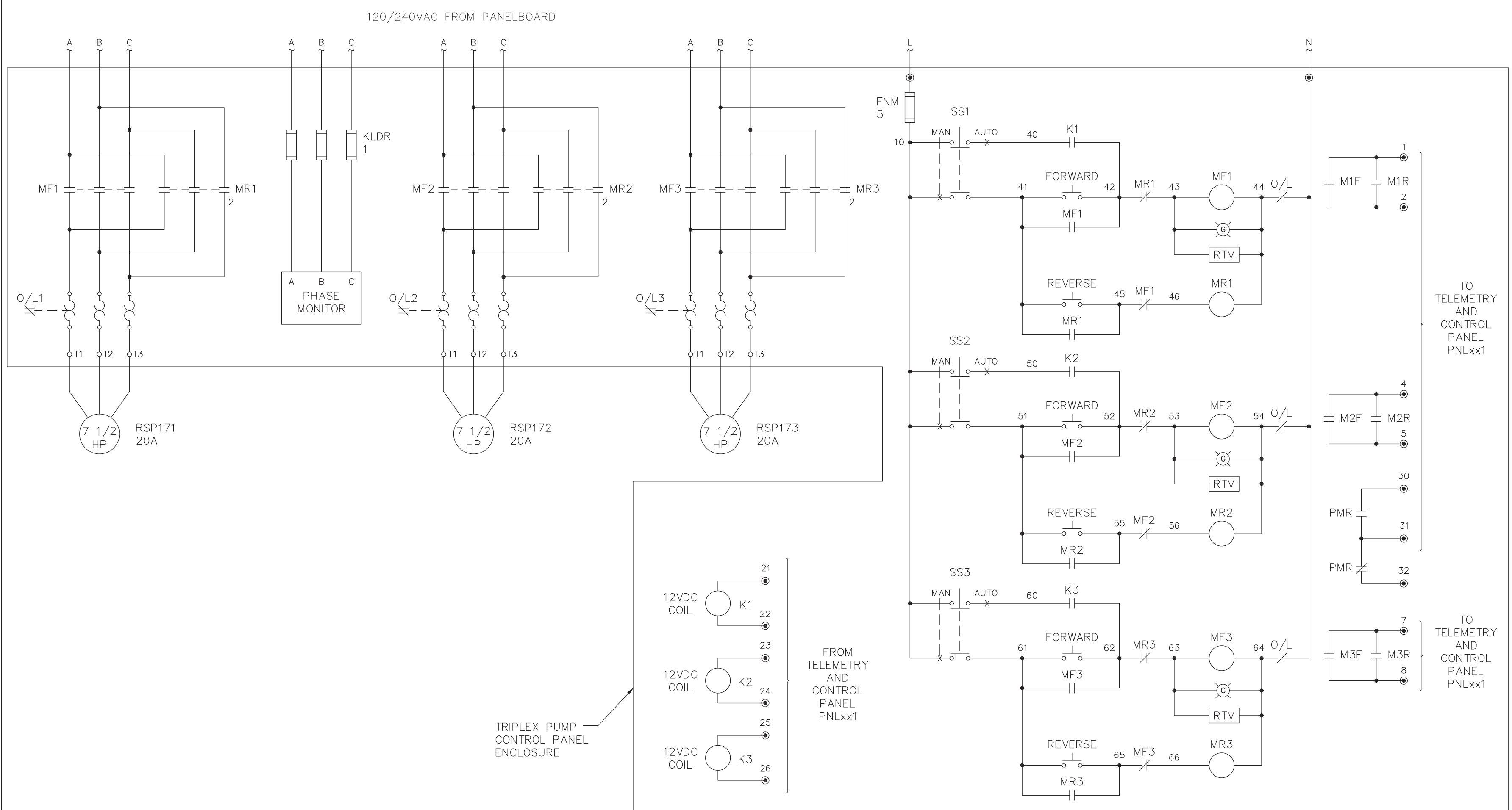



LEGEND:

⦿ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/14/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 16 AND NO. 22 | |
| CAD FILE: 1287D309 | TOL. UNLESS NOTED | | |
| SCALE: NONE | .XX .05 / .XXX .020 | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308–1287–D309 | REV C |
| CHKD BY: | DATE: | | |

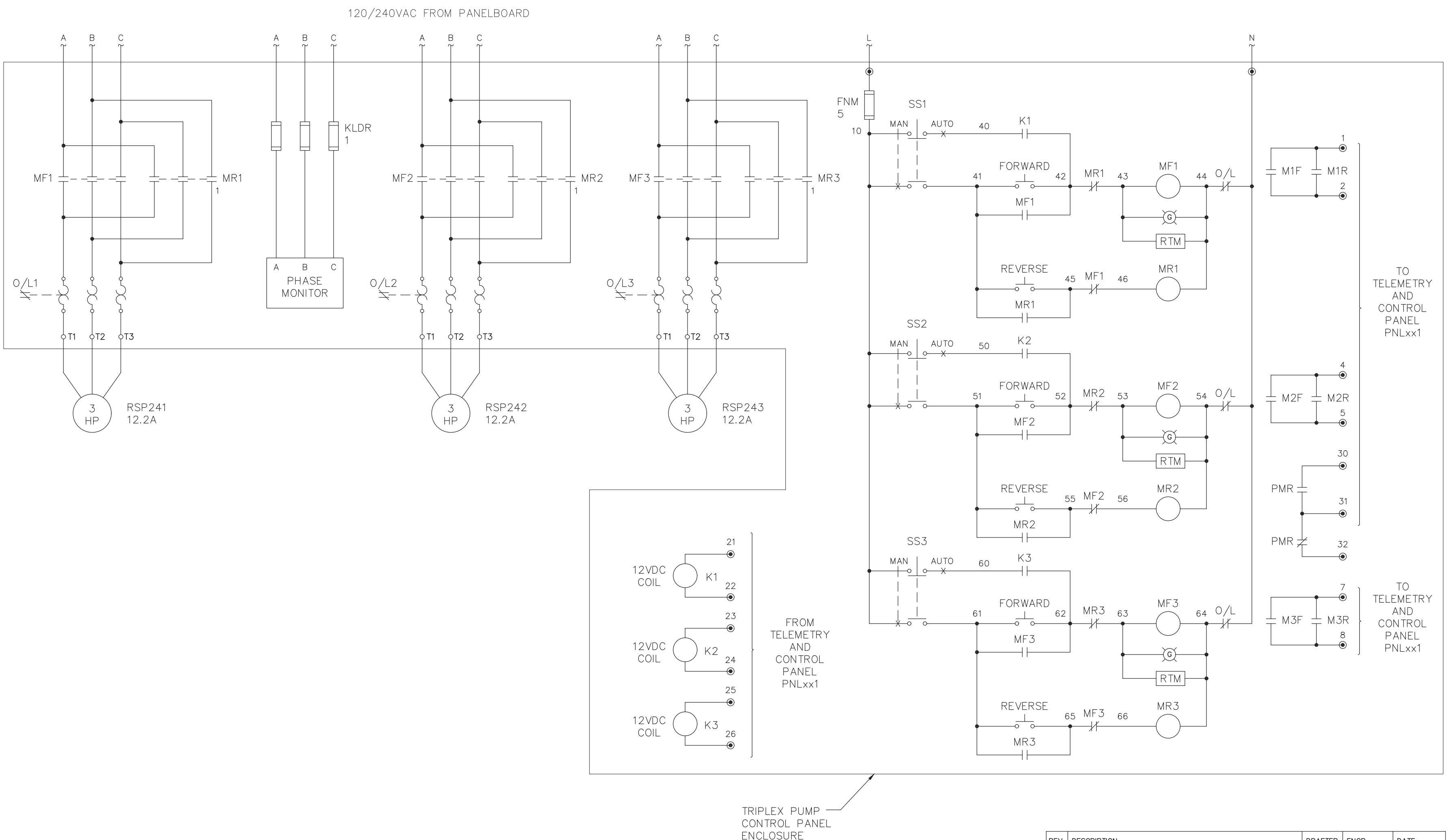



LEGEND:

⊙ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/16/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 17 | |
| CAD FILE: 1287D310 | TOL. UNLESS NOTED .XX .05 .XXX .020 | | |
| SCALE: NONE | | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308–1287–D310 | REV C |
| CHKD BY: | DATE: | | |




LEGEND:

⊙ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/16/93 |

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|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 |
| DO NOT SCALE | TITLE: SCHEMATIC PUMP STATION NO. 24 |
| CAD FILE: 1287D311 | TOL. UNLESS NOTED: .XX .05; .XXX .020 |
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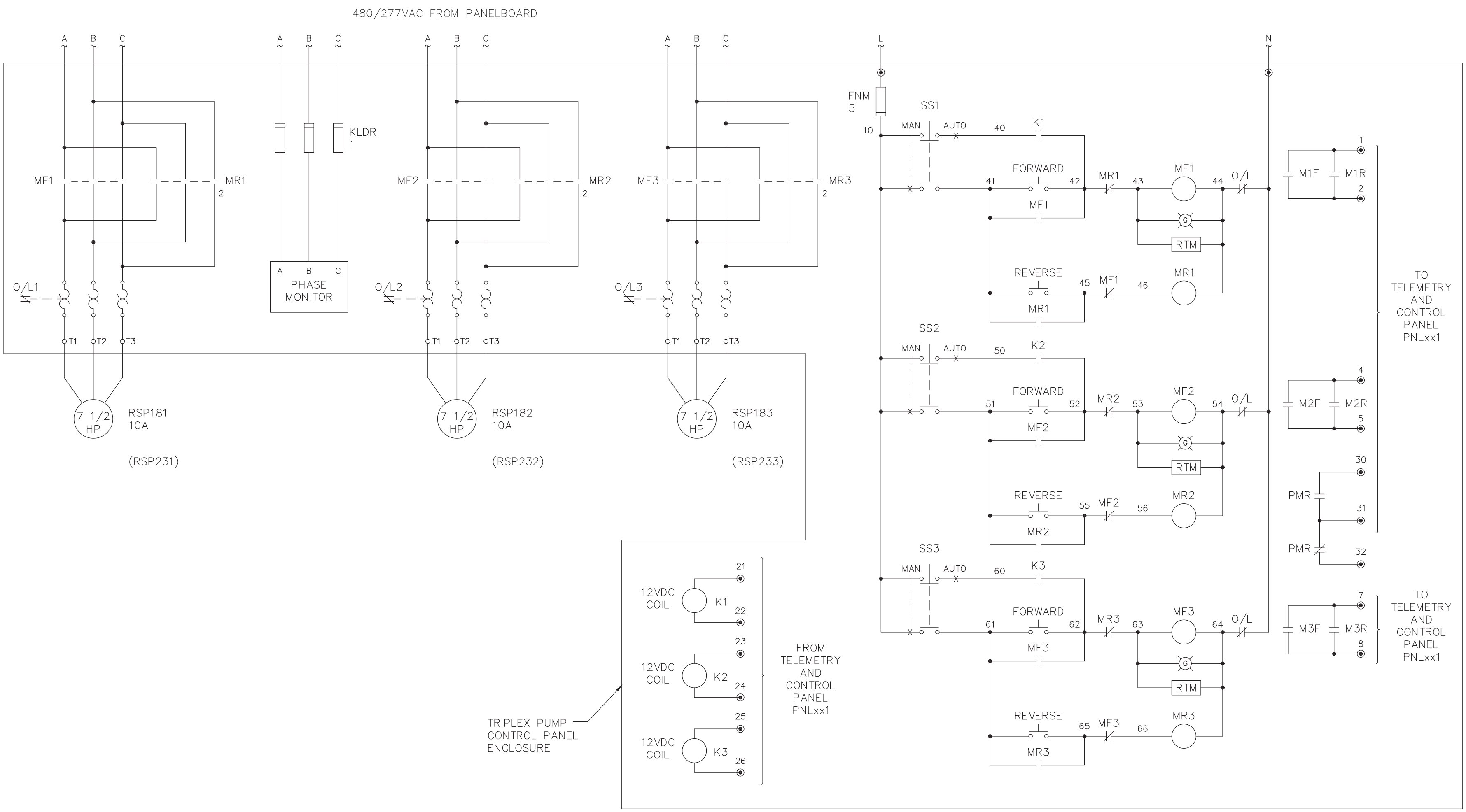
| DWN BY: SLM | DATE: 8/25/93 |
| CHKD BY: | DATE: |
| DWG. NO. 9308-1287-D311 | REV C |

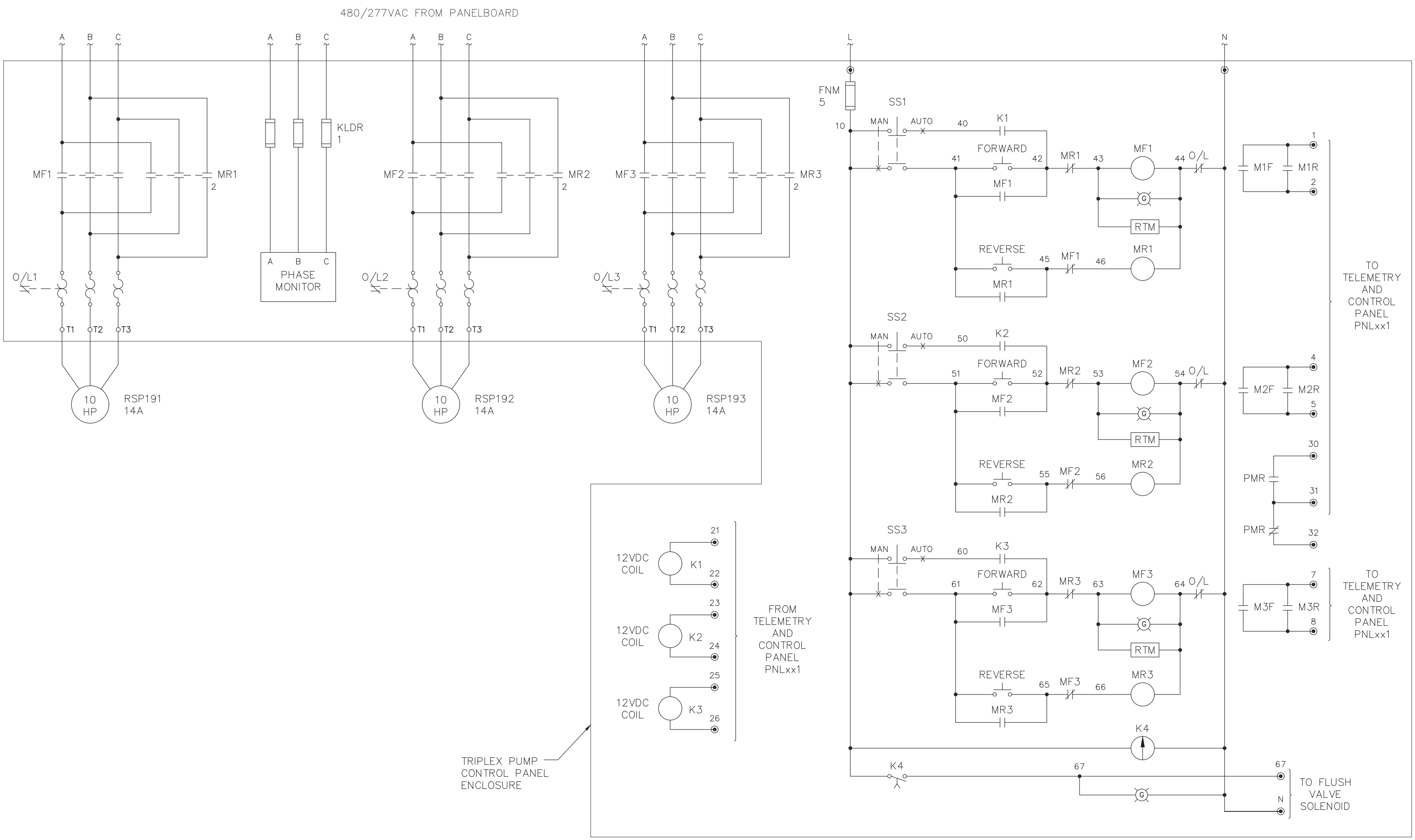



LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/14/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 18, AND 23 | |
| CAD FILE: 1287D312 | TOL. UNLESS NOTED .XX .05 .XXX .020 | | |
| SCALE: NONE | | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308-1287-D312 | REV C |
| CHKD BY: | DATE: | | |

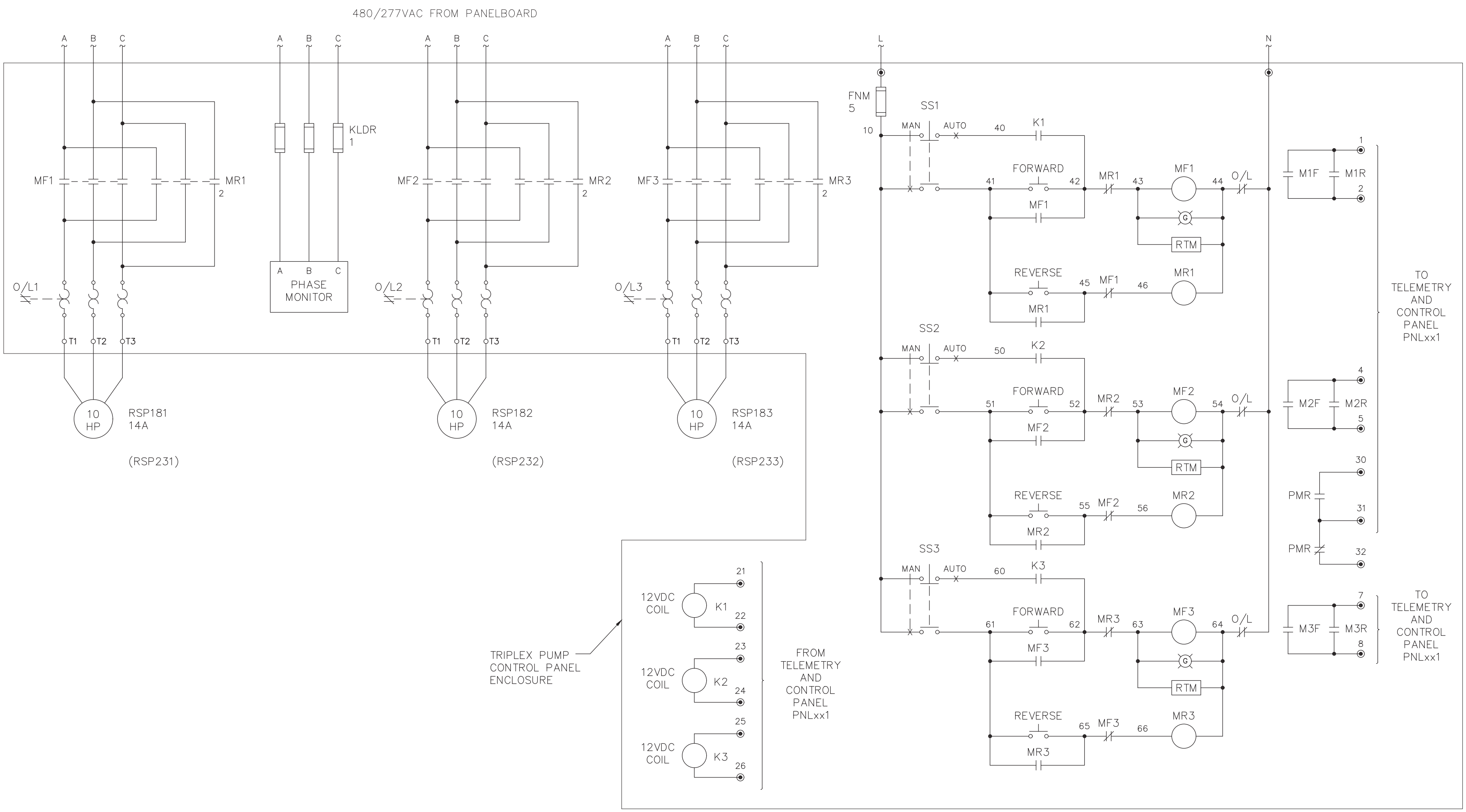



LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/16/93 |

| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATION NO. 19 | |
| CAD FILE: 1287D313 | TOL. UNLESS NOTED | | |
| SCALE: NONE | .XX .05 / .XXX .020 | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308-1287-D313 | REV C |
| CHKD BY: | DATE: | | |

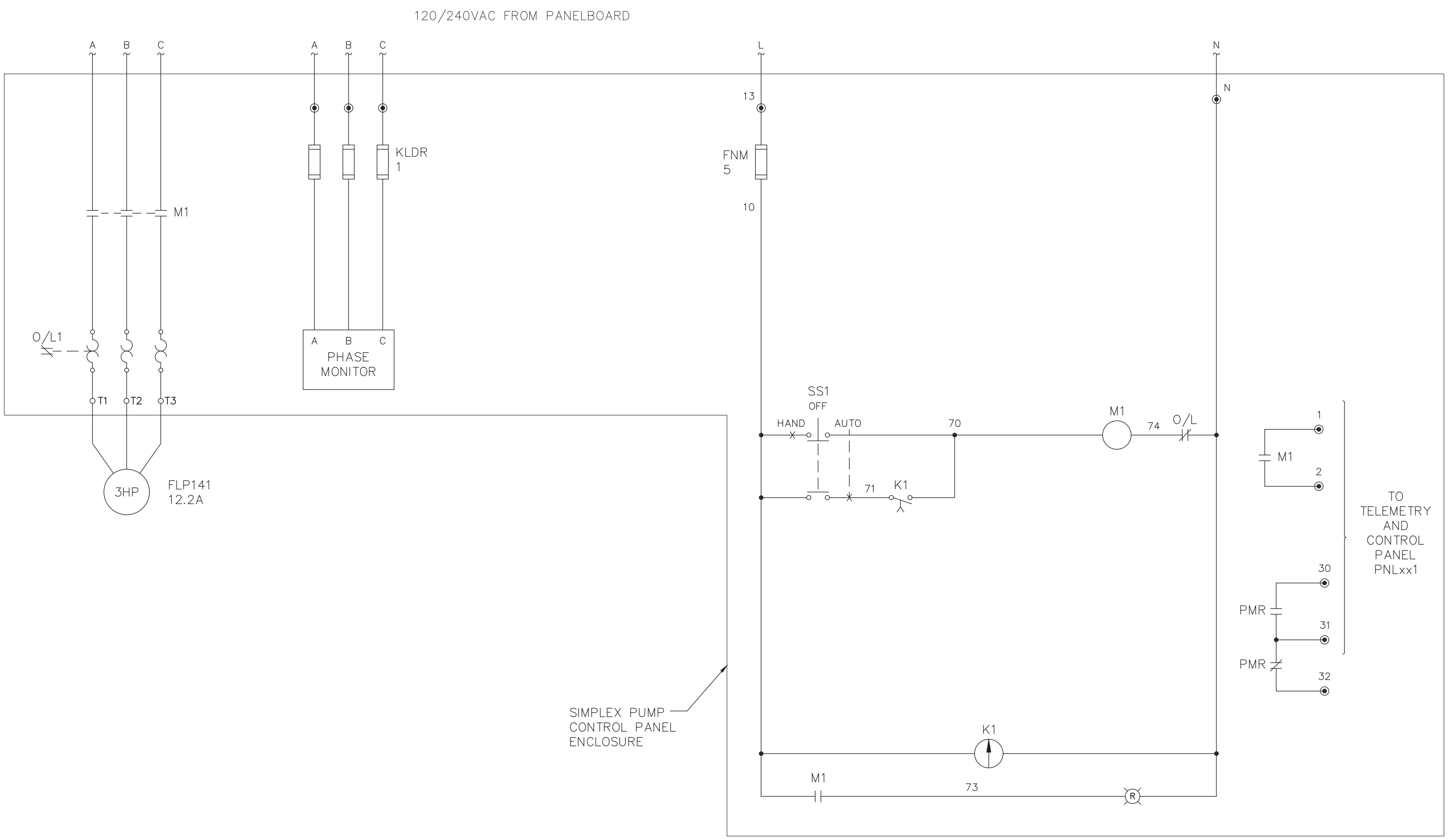



LEGEND:

◉ CONTROL PANEL TERMINAL

| REV | DESCRIPTION | DRAFTER | ENGR. | DATE |
|---|---|---|---|---|
| B | FOR RESUBMITTAL | SHERRY | RUSS | 10/13/93 |
| C | 12VDC RELAYS | SHERRY | TOM | 12/14/93 |

| | | |
|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | ELPAC | ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 |
| DO NOT SCALE | TITLE: SCHEMATIC PUMP STATION NO. 20 AND NO. 21 | |
| CAD FILE: 1287D314 | TOL. UNLESS NOTED .XX .05 .XXX .020 | |
| SCALE: NONE | | |
| DWN BY: SLM | DATE: 9/17/93 | DWG. NO. 9308–1287–D314 REV C |
| CHKD BY: | DATE: | |




| | | | |
|---|---|---|---|
| CUSTOMER: GRAYBAR PRIME ELECTRIC | | ELPAC ELECTRICAL PACKAGING CO. INC. 13010 HIWAY 99 SOUTH EVERETT, WASHINGTON 98204 | |
| DO NOT SCALE | | TITLE: SCHEMATIC PUMP STATIONS NO. 14 | |
| CAD FILE: 1287D315 | TOL. UNLESS NOTED .XX .05 | | |
| SCALE: NONE | .XXX .020 | | |
| DWN BY: SLM | DATE: 8/25/93 | DWG. NO. 9308-1287-D315 | REV 1 |
| CHKD BY: | DATE: | | |

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# SECTION 01 11 00_SUMMARY OF WORK

# ATTACHMENT A

# MAINTENANCE DEPARTMENT TELEMETRY SYSTEM PHASE 1 INSTALLATION

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# Mercer Island

## Maintenance Department
## Telemetry System
## Phase 1 Installation

| TELEMETRY DRAWING LIST | |
|---|---|
| NO. | DESCRIPTION |
| E1 | TITLE SHEET |
| E2 | SYMBOLS AND ABBREVIATIONS |
| E3 | SITE PLANS |
| E4 | STATION PLANS |
| E5 | TELEMETRY SYSTEM BLOCK DIAGRAM PHASE 1 |
| E6 | LIFT STATION PUMP 1 CONTROL WIRING – TYPICAL PUMP STATION 1,4,5,13 |
| E7 | LIFT STATION PUMP 2 CONTROL WIRING – TYPICAL PUMP STATION 1,4,5,13 |
| E8 | GENERAL STATION I/O CONTROL WIRING – TYPICAL PUMP STATION 1,4,5 |
| E9 | GENERAL STATION I/O CONTROL WIRING – TYPICAL PUMP STATION 13 |
| E10 | ELECTRICAL DETAILS |
| E11 | 8AI MODULE WIRING – 170AAI03000 – "FOR REFERENCE ONLY" |
| E12 | 16DI/8DO MODULE WIRING – 170ADM37010 – "FOR REFERENCE ONLY" |
| E13 | 16DI MODULE WIRING – 170ADM34000 – "FOR REFERENCE ONLY" |

| No. | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010
SCALE: NONE

Designed R.HELLER
Drawn by R.FARLEY
Checked by K.ALBINGER

Proj. Engr.
Approved by
Date

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS
355 118TH AVE. SE, SUITE 100 BELLEVUE, WA 98005 (425) 454-3585
609 N. ARGONNE RD., SUITE B SPOKANE, WA 99212 (509) 922-7597

City of Mercer Island
Telemetry System
Configuration

TITLE SHEET

SHEET 1 / 13

EXPIRES 8/31/05

h:\02\03\0321-010 Mercer Island Telemetry_Drawings\0321-010E01.dwg
4/26/04 14:50:26 rnf

## SYMBOL / DESCRIPTION

SCHEMATIC | PLAN

- GROUND ROD IN GROUND ROD BOX
- BATTERY.
- TRANSFORMER, PLAN VIEW SHOWN TO SCALE
- CURRENT TRANSFORMER, NUMBER INDICATES NUMBER OF C.T.'S.
- MOTOR, NUMBER INDICATES HORSEPOWER
- GENERATOR WITH EXHAUST DUCTING
- MOTOR STARTER W/DISCONNECT
- PACKAGED POWER AND CONTROL PANEL
- DISCONNECT SWITCH, NON FUSED (60A) INDICATES AMPERAGE RATING
- DISCONNECT SWITCH, FUSED 200=SWITCH RATING, 100=FUSE RATING
- UTILITY METERING
- INDICATING LIGHT: A = AMBER G = GREEN W = WHITE B = BLUE R = RED
- LIGHTED PUSHBUTTON WITH LENS COLOR ABOVE
- SELECTOR SWITCH: HOR = HAND/OFF/REMOTE HOA = HAND/OFF/AUTO RO = RUN/OFF
- HAND STATION
- LOCAL CONTROL PANEL
- PUSHBUTTON SWITCH. MOMENTARY ON.
- PRESSURE SWITCH. NORMALLY CLOSED.
- FLOW SWITCH. NORMALLY CLOSED.
- LIMIT SWITCH, NORMALLY OPEN.
- LEVEL SWITCH, CLOSES ON RISING LEVEL
- TS, TEMP. SWITCH, CLOSES ON FALLING TEMP. T, THERMOSTAT
- CONTROL RELAY
- POTENTIOMETER
- LEVEL TRANSMITTER
- PRESSURE TRANSMITTER
- SPEED INDICATOR
- FLOW TRANSMITTER
- SMOKE DETECTOR
- HEAT DETECTOR
- SOLENOID VALVE.
- ELECTRIC HEATER
- THERMOSTAT
- TIME DELAY RELAY TDOE = TIME DELAY ON ENERGIZATION TDOD = TIME DELAY ON DE-ENERGIZATION
- DOOR SECURITY SWITCH
- VIBRATION SENSOR
- LEAK DETECTION FOR SUBMERSIBLE PUMPS
- RESISTANCE TEMPERATURE DEVICE
- OVER TEMPERATURE CUTOUT
- HORN
- UNIT HEATER – SHOWING BLOWER DIRECTION
- LIGHT
- DIODE

## SYMBOL / DESCRIPTION

- FLUORESCENT LIGHTING FIXTURE, SURFACE. "F1" INDICATES TYPE PER FIXTURE SCHEDULE. "2" INDICATES CIRCUITING. "a" INDICATES SWITCHING.
- FLUORESCENT LIGHTING FIXTURE, RECESSED. ● INDICATES FIXTURE ON EMERGENCY CIRCUIT.
- FLUORESCENT WRAPAROUND FIXTURE. SURFACE SURFACE OR PENDANT AS INDICATED IN FIXTURE SCHEDULE.
- FLUORESCENT LIGHTING FIXTURE FOR HAZARDOUS AREAS. CLASS. AND DIV. AS INDICATED IN FIXTURE SCHEDULE
- FLUORESCENT STRIP, SURFACE OR PENDANT AS INDICATED IN FIXTURE SCHEDULE.
- INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE, CEILING MOUNTED.
- INCANDESCENT,COMPACT FLUORESCENT OR H.I.D. LIGHTING FIXTURE, WALL MOUNTED.
- INCANDESCENT, COMPACT FLUORESCENT, OR H.I.C. LIGHTING FIXTURE ON EMERGENCY CIRCUIT.
- EXIT LIGHT, INDICATES DIRECTION OF ARROW
- EMERGENCY WALL PACK.
- H.I.D. LIGHTING FIXTURE, POLE MOUNTED.
- SINGLE POLE SWITCH
- DOUBLE POLE SWITCH
- THREE WAY SWITCH
- FOUR WAY SWITCH
- OTHER SWITCHES: P – WITH PILOT LIGHT K – KEY OPERATED N – MOTOR RATED SWITCH WP – WEATHER PROOF T – TIMER
- PHOTO ELECTRIC RELAY
- TIME CLOCK. VERIFY TYPE FROM PLANS.
- LIGHTING CONTACTOR.
- CONDUIT JUNCTION BOX
- EXHAUST OR SUPPLY FAN, NUMBER INDICATES H.P.
- SURFACE METAL RACEWAY WITH RECEPTACLE AT X" O.C.
- DUPLEX RECEPTACLE, 2 INDICATES CIRCUITING, GFI INDICATES GROUND FAULT PROTECTION
- FOURLEX RECEPTACLES
- SINGLE RECEPTACLE
- SPECIAL PURPOSE RECEPTACLE, AS NOTED
- DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTER BACKSPLASH.
- DATA OUTLET
- INTERCOM
- SPLIT TELEPHONE DATA OUTLET
- TELEPHONE OUTLET
- PANELBOARD – CONCEALED
- PANELBOARD SURFACE MOUNTED
- HANDHOLE WITH DESIGNATION P – POWER C – CONTROL S – SIGNAL MH – MAN HOLE V – VAULT
- ELECTRIC HEATER WALL OR BASEBOARD
- PHASE FAIL RELAY & FUSE
- RUN TIME METER
- START COUNT METER
- BLOWN FUSE INDICATOR
- NORMALLY OPEN CONTACT. (WHEN DE-ENERGIZED)
- NORMALLY CLOSED CONTACT. (WHEN DE-ENERGIZED)

## SYMBOL / DESCRIPTION

- CONDUIT CONCEALED
- CONDUIT EXPOSED.
- CONDUIT REMOVED
- EXISTING CONDUIT ROUTED UNDERGROUND.
- CORD
- CONDUIT WITH FLEX CONNECTION
- HEAT TAPE ON PIPING.
- CONDUIT TURNED UP OR TOWARD.
- CONDUIT TURNED DOWN OR AWAY.
- CONDUIT CAPPED.
- CONDUIT SEALS. CLASS 1. DIV.1 EXPLOSION PROOF. PROVIDE CONDUIT SEALS PER NEC
- CONDUIT HOME RUN 0"C, 2#12 & 1#12 GND. TO PANEL L, CKT. 7 UNLESS SHOWN OTHERWISE.
- CONDUIT RUN – SEE CONDUIT SCHEDULE.
- THERMAL MAGNETIC CIRCUIT BREAKER, RATING/NO. POLES MO – MAGNETIC ONLY
- SURGE ARRESTOR
- ATS – AUTOMATIC TRANSFER SWITCH MTS – MANUAL TRANSFER SWITCH
- POWER CAPACITOR WITH KVAR RATING
- FULL VOLTAGE STARTER, NEMA SIZE 1 MS=MOTOR STARTER CONTACT BP=BYPASS CONTACTOR IC=ISOLATION CONTACTOR
- THERMAL OVERLOAD RELAY
- VARIABLE FREQUENCY DRIVE
- REDUCED VOLTAGE AUTO-TRANSFORMER STARTER NEMA SIZE 1
- SOLID STATE STARTER, REDUCED VOLTAGE WITH ISOLATION & BYPASS CONTRACTORS
- FUSE WITH AMPERE RATING
- AM – AMMETER VM – VOLT METER AVM – AMMETER AND VOLT METER AS – AMMETER SWITCH VS – VOLTMETER SWITCH
- CONDUCTORS NOT CONNECTED.
- CONDUCTORS CONNECTED.
- PULL OUT SWITCH/PLUG-RECEPTACLE CONNECTION
- TERMINAL IN MCC
- TERMINAL IN MCP
- TERMINAL IN REMOTE DEVICE OR PANEL
- TERMINAL BLOCK

## ABBREVIATIONS

| | |
|---|---|
| A,AMP | AMPERE |
| AC | AIR COMPRESSOR, ALTERNATING CURRENT |
| AF | AMPERE FRAME |
| AFF | ABOVE FINISHED FLOOR |
| AI | ANALOG INPUT POINT (PLC) |
| AIC | AMPERES INTERRUPTING CAPACITY |
| AIL | AMBER INDICATING LIGHT |
| AL | ALARM |
| ALT | ALTERNATOR |
| AM | AMMETER |
| AO | ANALOG OUTPUT POINT (PLC) |
| AOR | HANDS OFF REMOTE |
| AS | AMPERE SWITCH |
| AT | AMPERE TRIP |
| ATS | AUTOMATIC TRANSFER SWITCH |
| ATS | AUTOMATIC TRANSFER SWITCH |
| BAT | BATTERY |
| BC | BATTERY CHARGER |
| BH | BLOCK HEATER |
| BIL | BLUE INDICATING LIGHT |
| BP | BYPASS CONTRACTOR |
| C | CONDUIT, CONTROL |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CKT | CIRCUIT |
| CNT | START COUNTER |
| CONT | CONTINUED |
| CP | CONTROL PANEL |
| CPT | CONTROL POWER TRANSFORMER |
| CR | CONTROL RELAY |
| CT | CURRENT TRANSFORMER |
| CV | CHECK VALVE |
| DB | DIRECT BURIED |
| DEM | DEMAND |
| DF | DEMAND FACTOR |
| DI | AC DIGITAL INPUT POINT (PLC) |
| DO | AC DIGITAL OUTPUT POINT (PLC) |
| DWG | DRAWING |
| E,EXIST | EXISTING |
| EF | EXHAUST FAN |
| F | FUSED |
| FACP | FIRE ALARM CONTROL PANEL |
| FS | FLOW SWITCH |
| FT | FLOW TRANSMITTER |
| FVNR | FULL VOLTAGE NON-REVERSING |
| FVR | FULL VOLTAGE REVERSING |
| G,GND | GROUND |
| GEN | GENERATOR |
| GFI | GROUND FAULT INTERRUPTER |
| GIL | GREEN INDICATING LIGHT |
| GRS | GALVANIZED RIGID STEEL (CONDUIT) |
| H | HOT, HIGH, HAND |
| HH | HAND HOLE |
| HID | HIGH INTENSITY DISCHARGE |
| HDA | HAND OFF AUTO |
| HTR | HEATER |
| I | INTRUSION SWITCH |
| IC | ISOLATION CONTRACTOR |
| ISR | INTRINSICALLY SAFE RELAY |
| KI | KEY INTERLOCK |
| kVA | KILO VOLT AMPS |
| kVAR | KILO VOLT AMP REACTIVE |
| kVARH | KILOVAR HOUR |
| kW | KILOWATT |
| kWH | KILOWATT HOUR |
| L | LOW |
| LC | LIGHTING CONTACTOR |
| LCP | LOCAL CONTROL PANEL |
| LCP | LOCAL CONTROL PANEL |
| LE | LEVEL ELEMENT |
| LS | LEVEL SWITCH |
| LT | LEVEL TRANSMITTER |
| LTG | LIGHTING |
| M | METER |
| MCC | MOTOR CONTROL CENTER |
| MCP | MAIN CONTROL PANEL |
| MFGR | MANUFACTURER |
| MH | MANHOLE |
| MOV | MOTOR OPERATED VALVE |
| MS | MOTOR STARTER |
| MTS | MANUAL TRANSFER SWITCH |
| N | NEUTRAL |
| NC | NORMALLY CLOSED |
| NF | NON FUSED |
| NO | NORMALLY OPEN |
| OI | OPERATOR INTERFACE |
| OIT | OPERATOR IN TROUBLE |
| OL | OVERLOAD RELAY |
| OT | OVER TEMP |
| P | POWER |
| P.S. | PUMP STATION |
| PB | PUSH BUTTON – LIGHTED |
| PBL | PUSH BUTTON – LIGHTED |
| PE | PHOTO ELECTRIC RELAY |
| PFR | PHASE FAILURE RELAY |
| PLC | PROGRAMMABLE LOGIC CONTROLLER |
| PMD | POWER MONITORING DEVICE |
| PNL | PANEL |
| POT | POTENTIOMETER |
| PS | PRESSURE SWITCH |
| PT | POTENTIAL TRANSFORMER |
| PVC | POLY VINYL CHLORIDE (CONDUIT) |
| RCP | REMOTE CONTROL PANEL |
| RHP | RADIANT HEAT PANEL |
| RIL | RED INDICATING LIGHT |
| RO | RUN – OFF |
| RTD | RESISTANCE TEMPERATURE DEVICE |
| RTM | RUN TIME METER |
| RV | REDUCED VOLTAGE |
| RVAT | REDUCED VOLTAGE AUTO TRANSFORMER STARTER |
| S | SIGNAL |
| SA | SURGE ARRESTOR |
| SE | SERVICE ENTRANCE |
| SHT | SHEET |
| SS | STAINLESS STEEL |
| SSS | SOLID STATE STARTER |
| SV | SOLENOID VALVE |
| T | THERMOSTAT |
| TC | TIME CLOCK |
| TDOD | TIME DELAY ON DE-ENERGIZATION |
| TDOE | TIME DELAY ON ENERGIZATION |
| TDR | TIME DELAY RELAY |
| TEL | TELEPHONE |
| TNI | TELEPHONE NETWORK INTERFACE |
| TS | TEMPERATURE SWITCH |
| TSP | TWISTED SHIELDED PAIR |
| TSP | TWISTED SHIELDED PAIR |
| TST | TWISTED SHIELDED THREE CONDUCTOR (TRIAD) |
| TYP | TYPICAL |
| UH | UNIT HEATER |
| UPS | UNINTERRUPTIBLE POWER SUPPLY |
| V | VAULT |
| VB | VIBRATION RELAY |
| VFD | VARIABLE FREQUENCY DRIVE |
| W | WATT |
| WFP | WATER FILTRATION PLANT |
| WFR | WATER FILTER PLANT |
| WHM | WATT HOUR METER |
| WIL | WHITE INDICATING LIGHT |
| WP | WEATHER PROOF |
| XFMR | TRANSFORMER |
| XP | EXPLOSION PROOF |
| ZS | LIMIT SWITCH |

## REFERENCE SYMBOLS

- F1 POWER FEEDER CONDUIT
- P1 POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE
- C1 CONTROL CONDUIT & WIRE TAG SEE SCHEDULE
- S1 SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE
- T1 TELEPHONE CONDUIT & WIRE TAG
- R1 SPARE CONDUIT
- 1 SHEET NOTE
- P-01 MECHANICAL EQUIP. DESIGNATION
- PSL-101 INSTRUMENT DESIGNATION

1 DETAIL / XX — DETAIL NUMBER; SCALE; SHEET WHERE DETAIL IS TAKEN FROM.

1 / XX — DETAIL NUMBER; DETAIL AREA; SHEET ON WHICH DETAIL APPEARS

SECTION A / XX — SECTION LETTER; SCALE; SHEET WHERE SECTION IS TAKEN FROM

A / XX — SECTION LETTER; SHEET ON WHICH SECTION APPEARS.

| No. | DATE | BY | REVISION |
|---|---|---|---|
| | | | |

Job No. 0321-010 SCALE: NONE

Designed R.HELLER Drawn by R.FARLEY Checked by K.ALBINGER Proj. Engr. Approved by Date

CASNE ENGINEERING, INC. ELECTRICAL AND TECHNOLOGY CONSULTANTS

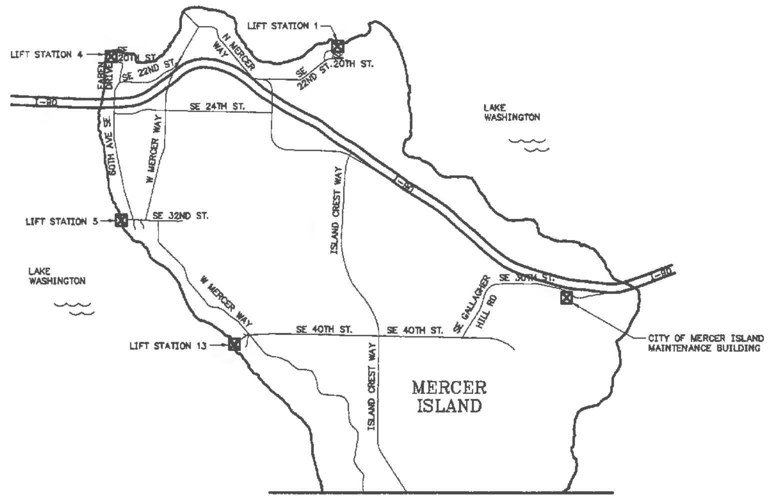
# City of Mercer Island

Telemetry System Configuration

SYMBOLS AND ABBREVIATIONS

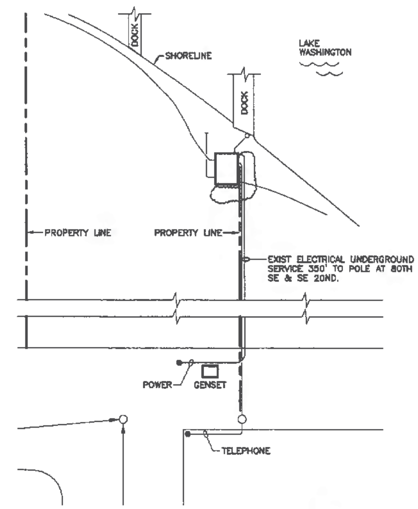
SHEET 2 / 19

KENNETH L. ALBINGER, STATE OF WASHINGTON, PROFESSIONAL ENGINEER — EXPIRES 8/31/05



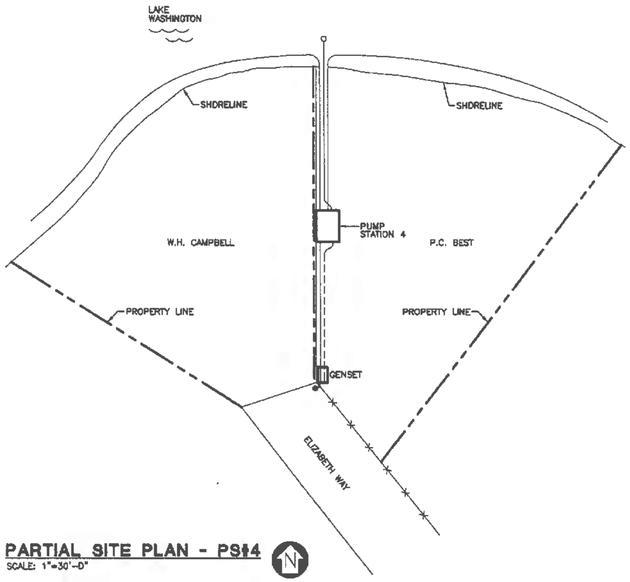

PARTIAL SITE PLAN

SCALE: 1"=NONE



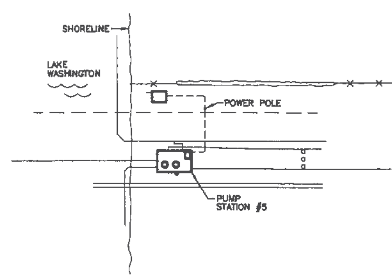

PARTIAL SITE PLAN - PS#1

SCALE: 1"=30'-0"




PARTIAL SITE PLAN - PS#4

SCALE: 1"=30'-0"




PARTIAL SITE PLAN - PS#5

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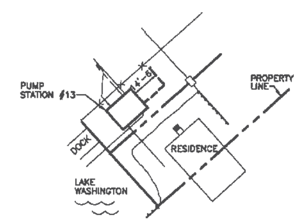



PARTIAL SITE PLAN - PS#13

SCALE: 1"=30'-0"

GRAPHIC SCALE:

SCALE: 1"=30'-0"

0 15' 30' 60' 120'

KENNETH L. ALBINGER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER

EXPIRES 8/31/05

| No. | DATE | BY | REVISION |
|---|---|---|---|

Job No. D321-010

SCALE: NONE

Designed R.HELLER
Drawn by R.FARLEY
Checked by K.ALBINGER

Proj. Engr. ______
Approved by ______
Date ______

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS

City of Mercer Island
Telemetry System
Configuration

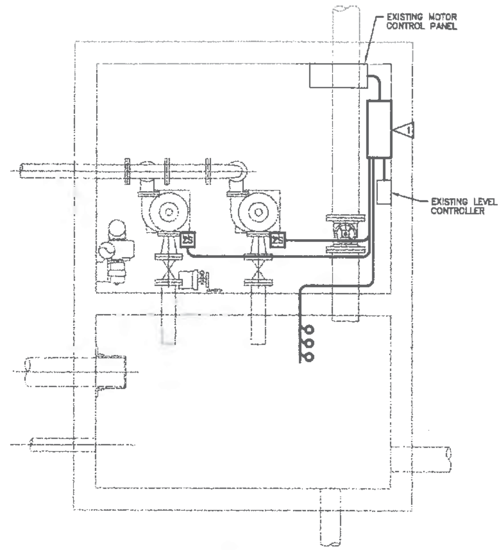
SITE PLANS

SHEET 3 / 13

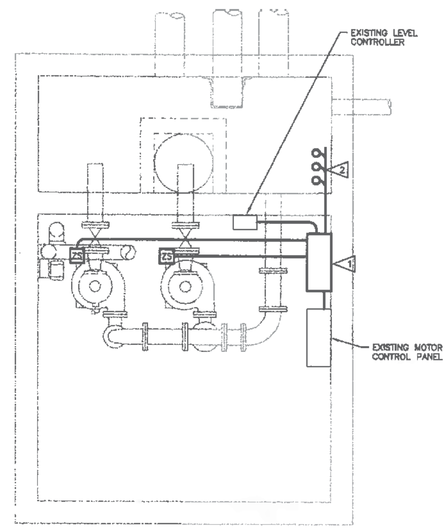
4/27/04 150804 raf E:\D2\03\D321-010 Mercer Island Telemetry_Drawings\D321-010E03.dwg

## NOTES

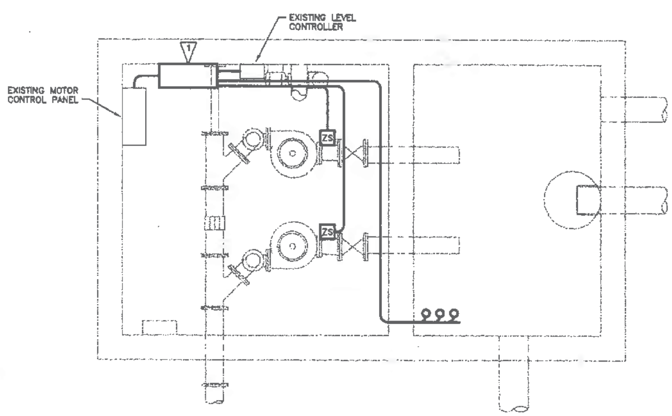
1. REMOVE O/O TELEMETRY PANEL AND BUBBLER. REPLACE WITH NEW TELEMETRY PANEL.
2. INSTALL NEW FLOATS NEXT TO THE EDGE OF WET WELL HATCH BY THE LADDER PER DETAIL SHOWN ON SHEET 10.



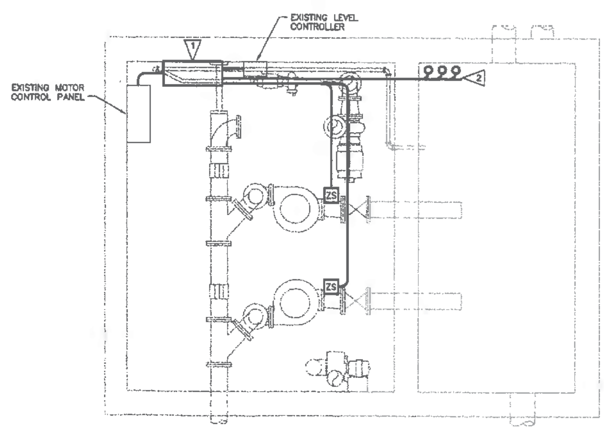

**PLAN LS1**
SCALE: 1/2"=1'-0"




**PLAN LS4**
SCALE: 1/2"=1'-0"




**PLAN LS5**
SCALE: 1/2"=1'-0"




**PLAN LS13**
SCALE: 1/2"=1'-0"

GRAPHIC SCALE:
SCALE: 1/2"=1'-0"
0 6" 1' 2' 4' 6' 8'

SF:24

| No. | DATE | BY | REVISION |
|---|---|---|---|
| | | | |

Job No. 0321-010 SCALE: NONE
Designed R.HELLER Drawn by R.FARLEY Checked by K.ALBINGER
Proj. Engr. ____ Approved by ____ Date ____


CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS

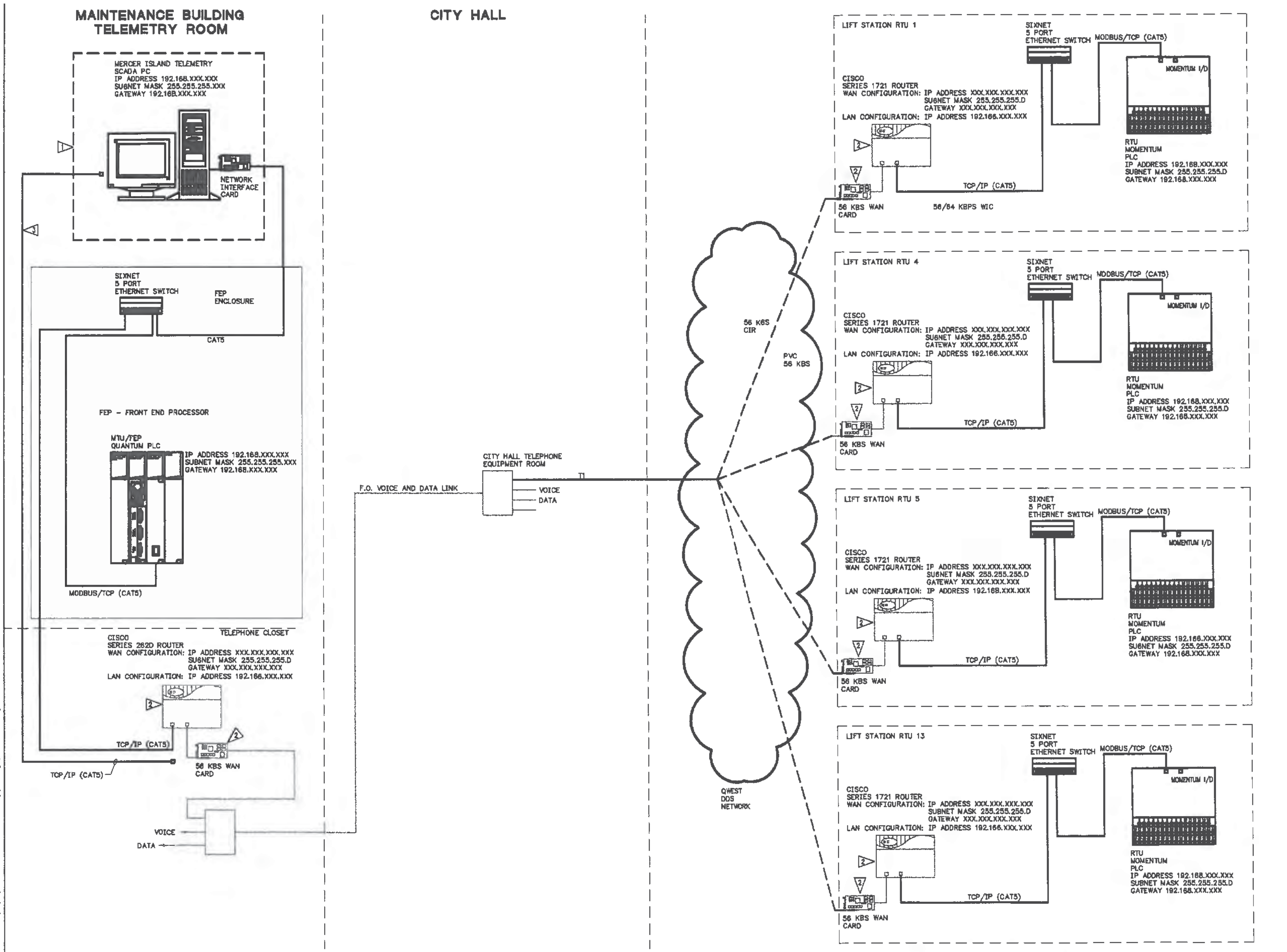

**City of Mercer Island**
Telemetry System Configuration

STATION PLANS

SHEET 4 / 13

EXPIRES 8/31/05

5/13/04 11:20:36 boa t:\02\03\0321-010 Mercer Island Telemetry_Drawings\0321-010E04.dwg




## GENERAL NOTES:

1. ALL ETHERNET SWITCHES SHALL HAVE AT LEAST ONE SPARE PORT AFTER ALL LOCAL DEVICES ARE CONNECTED.

## CONSTRUCTION NOTES:

1. EXISTING.
2. NEW PROVIDED BY OTHERS.
3. INSTALL TWO CAT5 CABLES FROM THE TELEPHONE CLOSET TO THE TEMETRY ROOM.

| No. | DATE | BY | REVISION |
|---|---|---|---|

Job No. D321-01D  SCALE: NONE

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**CASNE ENGINEERING, INC.**
ELECTRICAL AND TECHNOLOGY CONSULTANTS

**City of Mercer Island**
Telemetry System Configuration

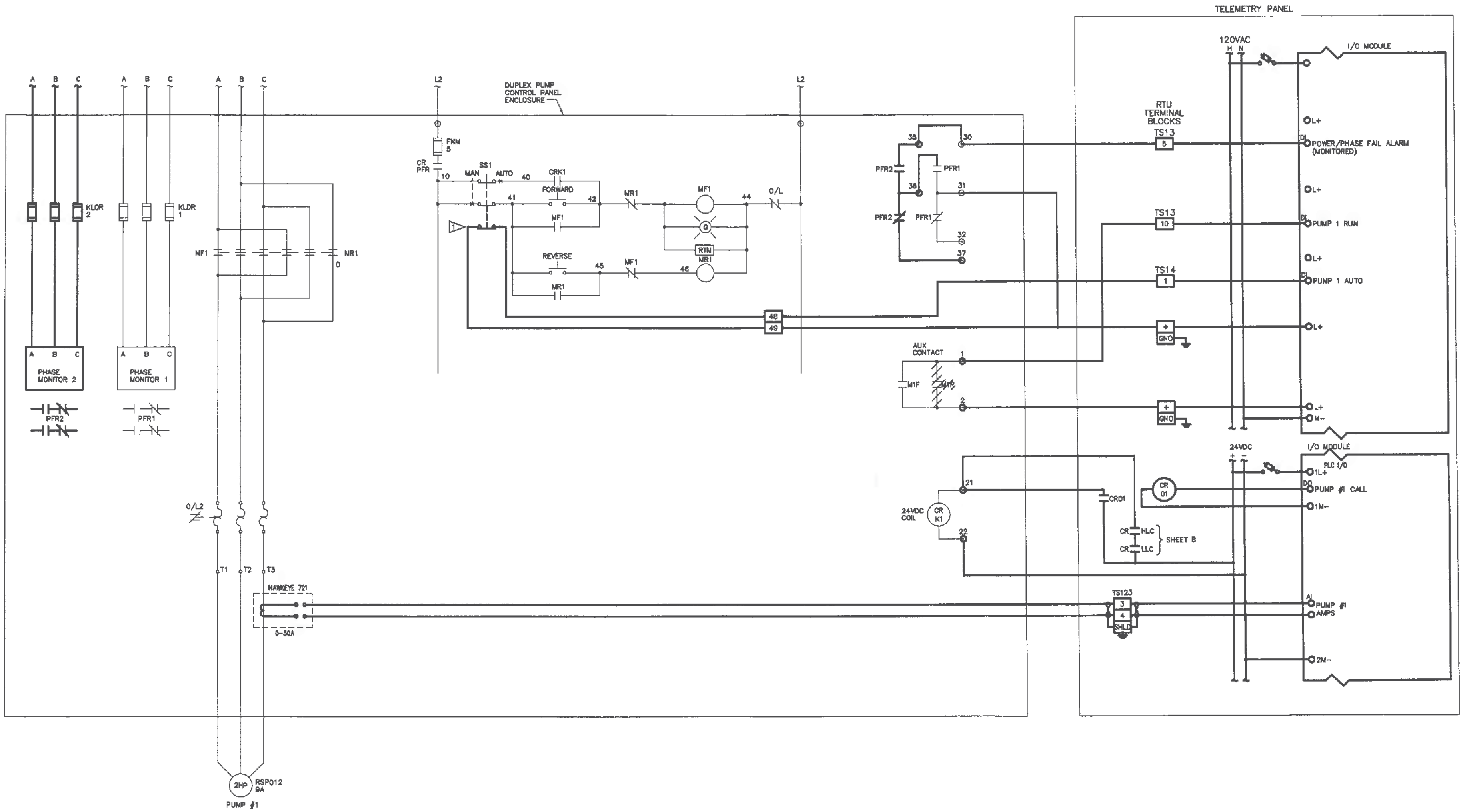
TELEMETRY SYSTEM
BLOCK DIAGRAM PHASE 1

SHEET 5 / 13

EXPIRES 8/31/05

**NOTE:**

ADD AUTO CONTACT BLOCK TO HOA WIRE TO RTU.




| | | | | | |
|---|---|---|---|---|---|
| No / DATE / BY / REVISION | Job No. 0321-010<br>SCALE: NONE | Designed R.HELLER<br>Drawn by R.FARLEY<br>Checked by K.ALBINGER | Proj. Engr. ____<br>Approved by ____<br>Date ____ | CASNE ENGINEERING, INC.<br>ELECTRICAL AND TECHNOLOGY CONSULTANTS<br>355 118TH AVE. SE, SUITE 100 BELLEVUE, WA 98005 (425) 454-3855<br>909 N. ARGONNE RD., SUITE B SPOKANE, WA 99212 (509) 922-7887 | **City of Mercer Island**<br>Telemetry System<br>Configuration |

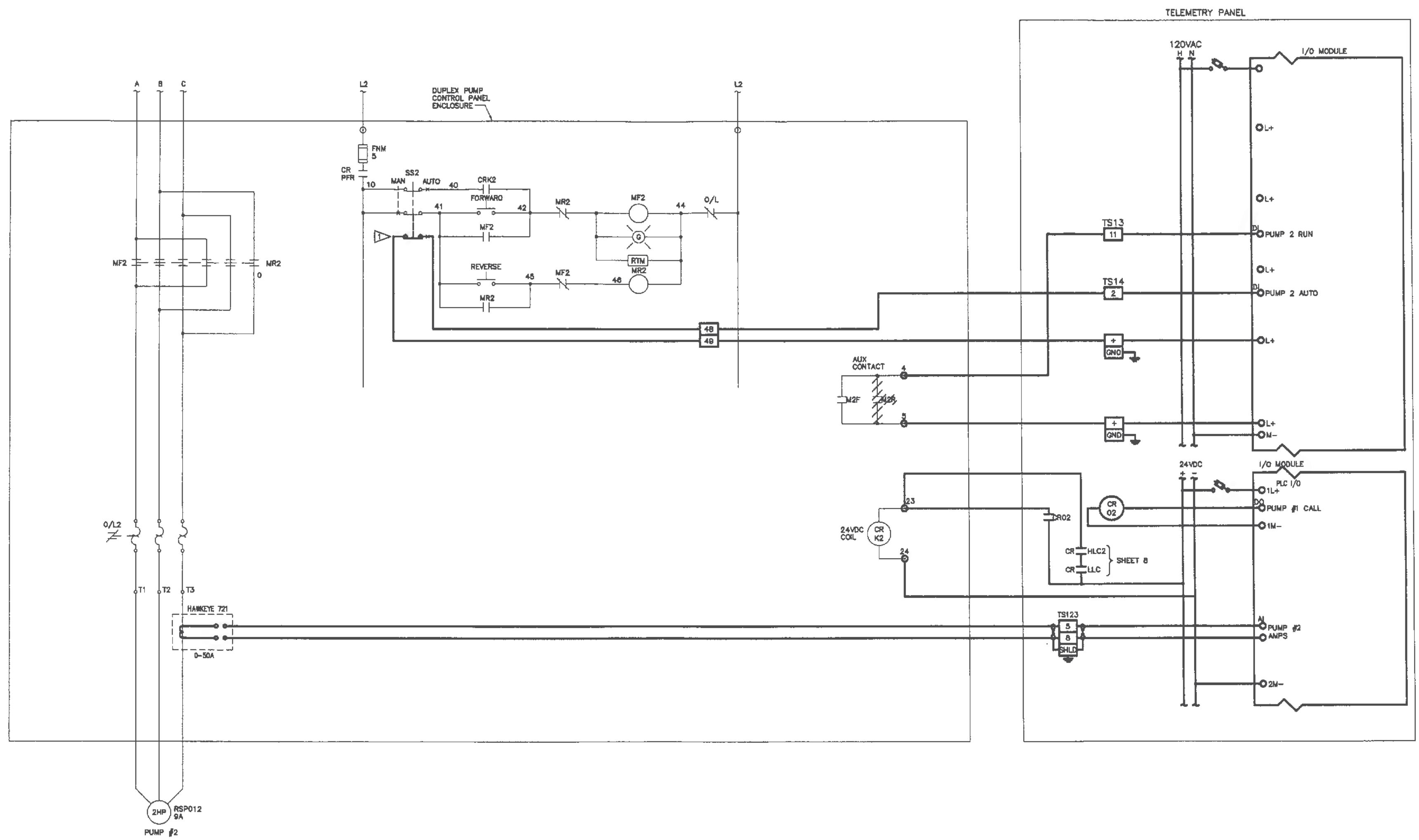
LIFT STATION
PUMP 1 CONTROL WIRING
TYPICAL PUMP STATION 1,4,5,13

SHEET 6 / 13

EXPIRES 8/31/05

**NOTE:**

1 ADD AUTO CONTACT BLOCK TO HOA WIRE TO RTU.




| No | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010

SCALE: NONE

Designed R.HELLER

Drawn by R.FARLEY

Checked by K.ALBINGER

Proj. Engr.

Approved by

Date

**CASNE ENGINEERING, INC.**
ELECTRICAL AND TECHNOLOGY CONSULTANTS

**City of Mercer Island**

Telemetry System Configuration

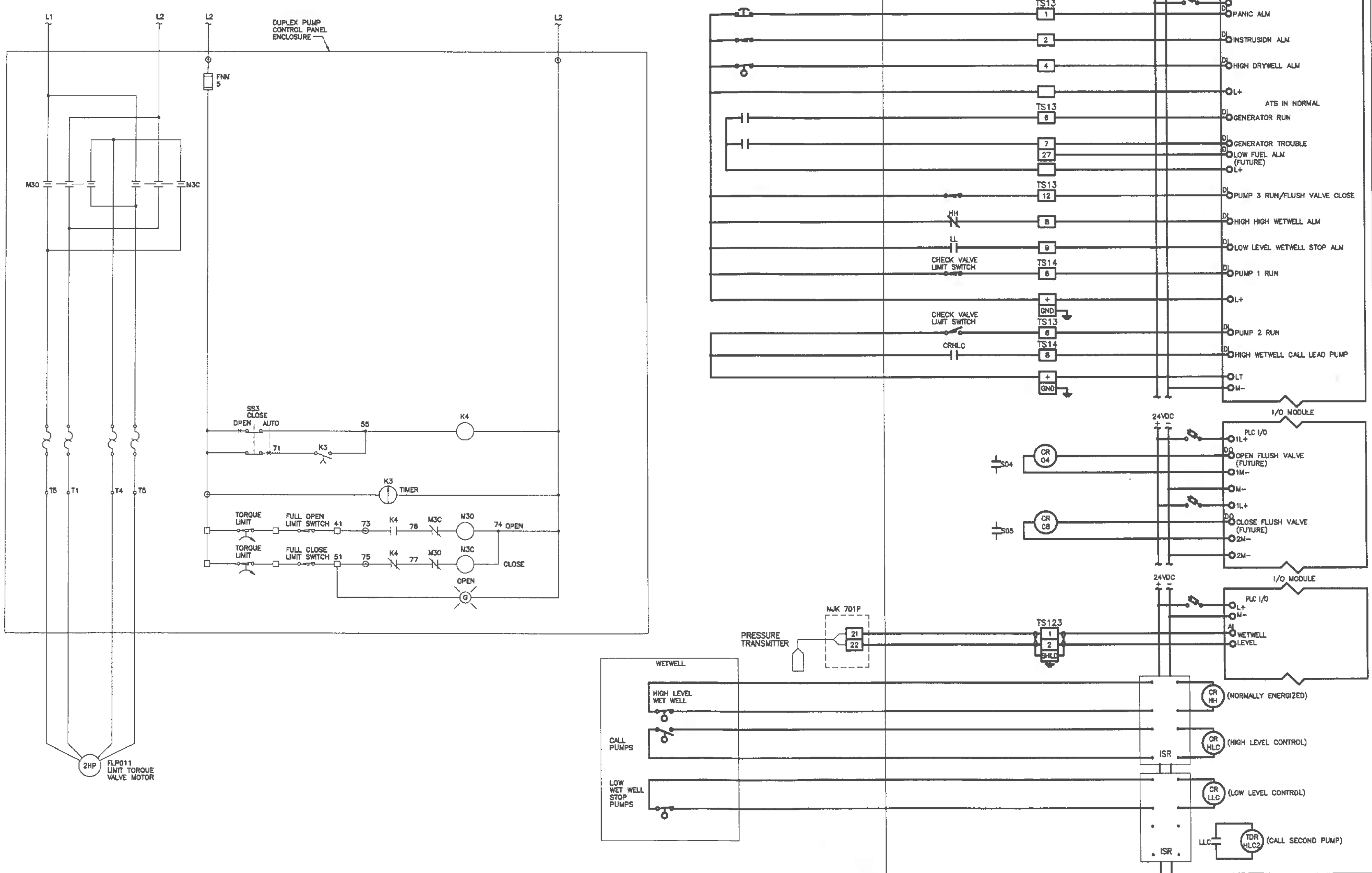
LIFT STATION
PUMP 2 CONTROL WIRING
TYPICAL PUMP STATION 1,4,6,13

SHEET 7 / 13

EXPIRES 8/31/05

6/3/04

**NOTE:**




| No | DATE | BY | REVISION |
|---|---|---|---|

Job No. D321-D10
SCALE: NONE

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Drawn by R.FARLEY
Checked by K.ALBINGER

Proj. Engr. ______
Approved by ______
Date ______

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS

# City of Mercer Island

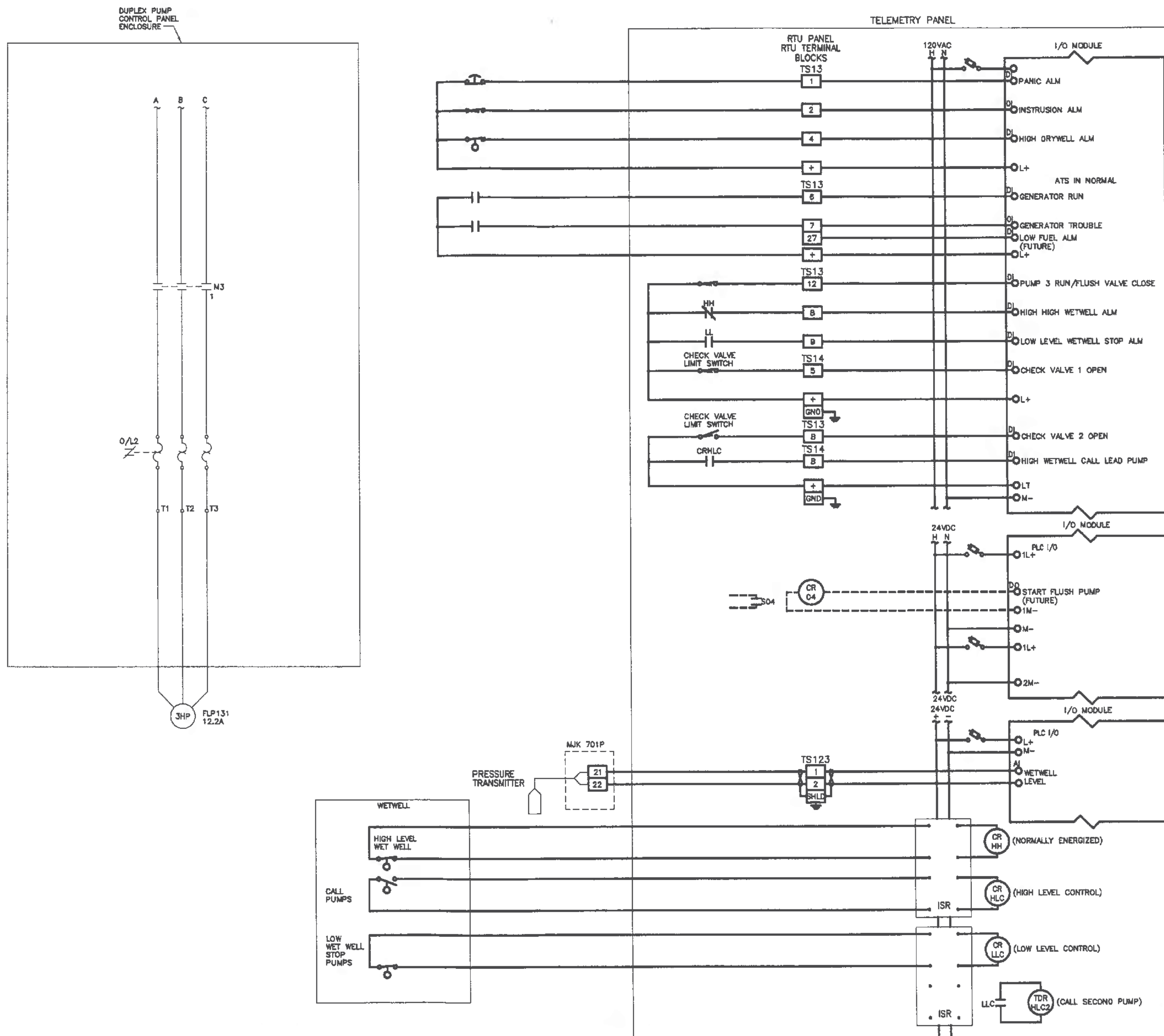
Telemetry System Configuration

GENERAL STATION
I/O CONTROL WIRING
TYPICAL PUMP STATION 1,4,5

SHEET 8 / 13

EXPIRES 6/31/05

4/28/04 15:12:50 ref




| No. | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010
SCALE: NONE
Designed R.HELLER
Drawn by R.FARLEY
Checked by K.ALBINGER
Proj. Engr.
Approved by
Date

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS

**City of Mercer Island**
Telemetry System
Configuration

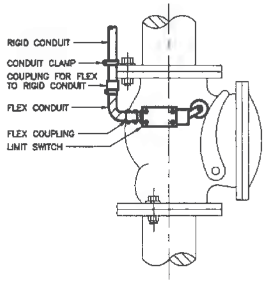
**GENERAL STATION**
**I/O CONTROL WIRING**
**TYPICAL PUMP STATION 13**

SHEET 9 / 13

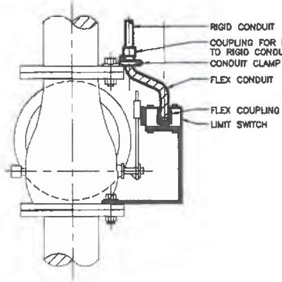
KENNETH L. ALBINGER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER
6/3/04
EXPIRES 8/31/05

4/28/04 14:32:35 rsf

| | LS1 | LS4 | LS5 | LS13 |
|---|---|---|---|---|
| PUMP STATION CONTROL/ALARM LEVELS (FEET) | | | | |
| HIGH HIGH ALARM FLOAT ALARM | 9.00 | 8.00 | 8.00 | 9.00 |
| HIGH HIGH ALARM CONTROLLER ALARM | 8.50 | 7.00 | 7.00 | 8.00 |
| START FLOAT (HLC) (BACKUP CONTROL) | 5.50 | 6.50 | 8.50 | 7.50 |
| START LEVEL CONTROLLER (ON) | 5.35 PUMP 1 5.85 PUMP 2 | 4.50 PUMP 1 4.75 PUMP 2 | 5.75 PUMP 1 8.25 PUMP 2 | 7.00 PUMP 1 7.25 PUMP 2 |
| STOP LEVEL CONTROLLER (OFF) | 2.50 PUMP 1 2.50 PUMP 2 | 2.00 PUMP 1 2.00 PUMP 2 | 2.25 PUMP 1 3.00 PUMP 2 | 3.25 PUMP 1 3.25 PUMP 2 |
| STOP FLOAT (LLC) (BACKUP CONTROL/ALARM) | 2.00 | 1.75 | 2.00 | 3.00 |

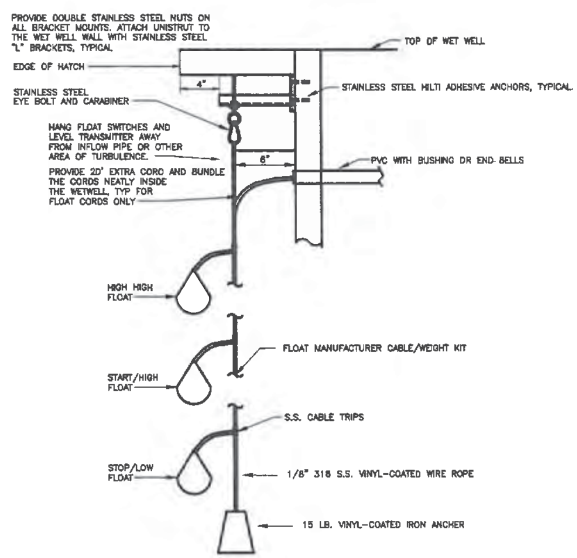



SIDE VIEW

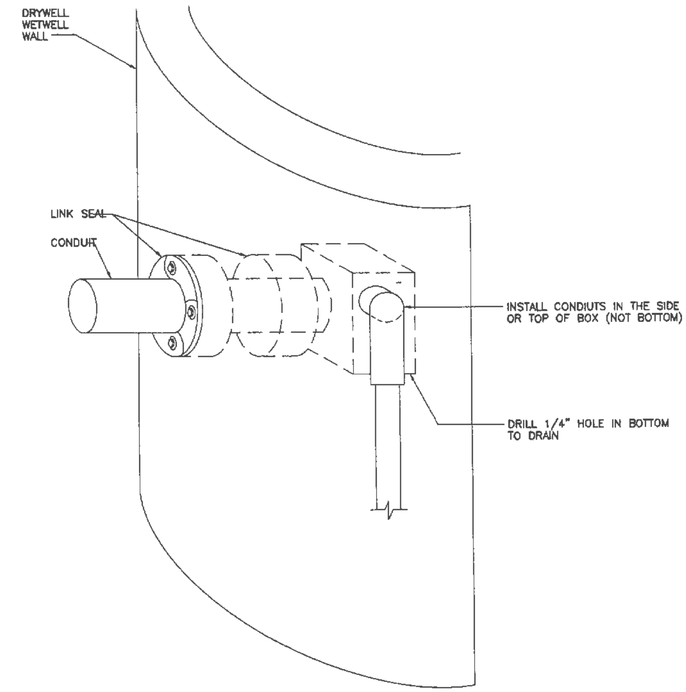



BACK VIEW

(1/VAR) TYPICAL ARRANGEMENT DETAIL
LIMIT SWITCH INSTALLATION
SCALE: NONE




(2/VAR) WET WELL FLOAT CORD MOUNTING DETAIL
SCALE: NONE




(3/VAR) DRYWELL PENETRATION DETAIL (WHERE NEEDED)
SCALE: NONE

KENNETH L. ALBINGER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER
EXPIRES 6/31/05

| No. | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010
SCALE: NONE
Designed R.HELLER
Drawn by R.FARLEY
Checked by K.ALBINGER
Proj. Engr.
Approved by
Date

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS
355 118TH AVE. SE, SUITE 100 BELLEVUE, WA 98005 (425) 454-3305
909 N. ARGONNE RD., SUITE B SPOKANE, WA 99212 (509) 822-7237

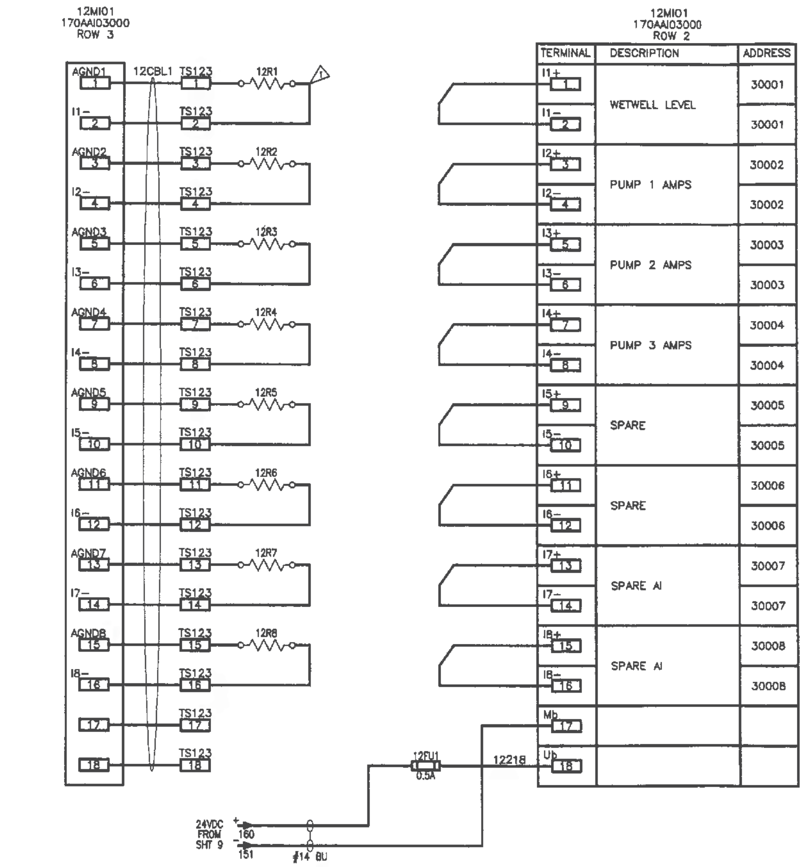
CITY OF MERCER ISLAND WASHINGTON

**City of Mercer Island**
Telemetry System
Configuration

ELECTRICAL DETAILS

SHEET 10 / 13

# 12




NOTE: ALL WIRING ON THIS SHEET TO BE #14 BLUE UNLESS OTHERWISE SPECIFIED.

**NOTE:**

1. TYPICAL WIRING FOR MODULES 12 & 12A.

**FLAG NOTES:**

1 WIRE ALL ANALOG INPUTS AS CURRENT 4–20mA. SUPPLY .1% 250 OHM PRECISION RESISTOR FOR ALL POINTS.

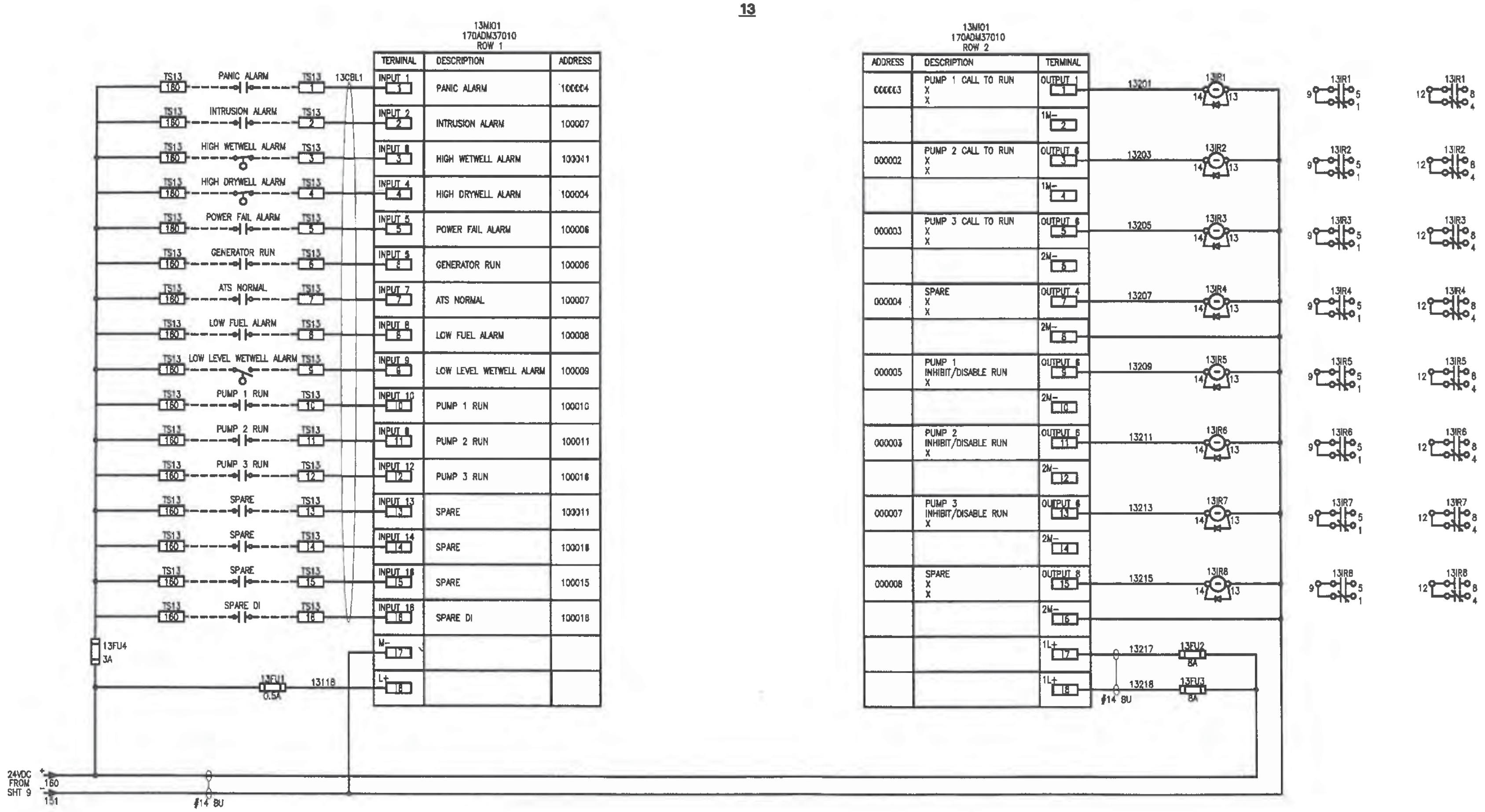
RTU'S PROVIDED BY CITY

FOR REFERENCE ONLY

EXPIRES 8/31/05

| No | DATE | BY | REVISION | Job No. 0321-010 SCALE: NONE | Designed R.HELLER Drawn by R.FARLEY Checked by K.ALBINGER | Proj. Engr. Approved by Date | CASNE ENGINEERING, INC. ELECTRICAL AND TECHNOLOGY CONSULTANTS | City of Mercer Island Telemetry System Configuration | 8AI MODULE WIRING 170AAIO3000 | SHEET 11 / 13 |
|---|---|---|---|---|---|---|---|---|---|---|

**13**




13MI01 170ADM37010 ROW 1

| TERMINAL | DESCRIPTION | ADDRESS |
|---|---|---|
| INPUT 1 / 1 | PANIC ALARM | 100004 |
| INPUT 2 / 2 | INTRUSION ALARM | 100007 |
| INPUT 3 / 3 | HIGH WETWELL ALARM | 100011 |
| INPUT 4 / 4 | HIGH DRYWELL ALARM | 100004 |
| INPUT 5 / 5 | POWER FAIL ALARM | 100006 |
| INPUT 6 / 6 | GENERATOR RUN | 100006 |
| INPUT 7 / 7 | ATS NORMAL | 100007 |
| INPUT 8 / 8 | LOW FUEL ALARM | 100008 |
| INPUT 9 / 9 | LOW LEVEL WETWELL ALARM | 100009 |
| INPUT 10 / 10 | PUMP 1 RUN | 100010 |
| INPUT 11 / 11 | PUMP 2 RUN | 100011 |
| INPUT 12 / 12 | PUMP 3 RUN | 100016 |
| INPUT 13 / 13 | SPARE | 100011 |
| INPUT 14 / 14 | SPARE | 100018 |
| INPUT 15 / 15 | SPARE | 100015 |
| INPUT 16 / 16 | SPARE DI | 100018 |
| M- / 17 | | |
| L+ / 18 | | |

13MI01 170ADM37010 ROW 2

| ADDRESS | DESCRIPTION | TERMINAL |
|---|---|---|
| 000003 | PUMP 1 CALL TO RUN X X | OUTPUT 1 / 1 |
| | | 1M- / 2 |
| 000002 | PUMP 2 CALL TO RUN X X | OUTPUT 2 / 3 |
| | | 1M- / 4 |
| 000003 | PUMP 3 CALL TO RUN X X | OUTPUT 3 / 5 |
| | | 2M- / 6 |
| 000004 | SPARE X X | OUTPUT 4 / 7 |
| | | 2M- / 8 |
| 000005 | PUMP 1 INHIBIT/DISABLE RUN X | OUTPUT 5 / 9 |
| | | 2M- / 10 |
| 000003 | PUMP 2 INHIBIT/DISABLE RUN X | OUTPUT 6 / 11 |
| | | 2M- / 12 |
| 000007 | PUMP 3 INHIBIT/DISABLE RUN X | OUTPUT 6 / 13 |
| | | 2M- / 14 |
| 000008 | SPARE X X | OUTPUT 8 / 15 |
| | | 2M- / 16 |
| | | 1L+ / 17 |
| | | 1L+ / 18 |

RTU'S PROVIDED BY CITY

**FOR REFERENCE ONLY**

KENNETH L. ALBINGER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
6/3/04
EXPIRES 8/31/05

| No | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010
SCALE: NONE
Designed R.HELLER
Drawn by R.FARLEY
Checked by K.ALBINGER
Proj. Engr.
Approved by
Date

**CASNE ENGINEERING, INC.**
ELECTRICAL AND TECHNOLOGY CONSULTANTS
355 118TH AVE. SE, SUITE 100 BELLEVUE, WA 98005 (425) 454-3355
508 N. ARGONNE RD., SUITE B SPOKANE, WA 99212 (509) 922-7397

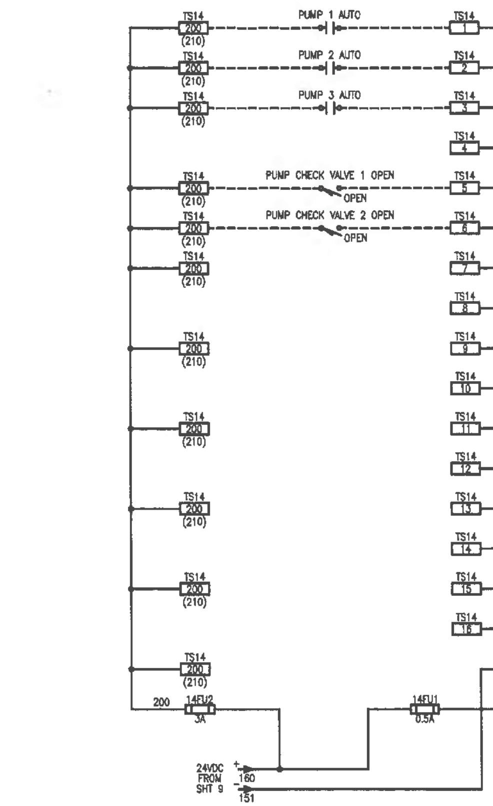
CITY OF MERCER ISLAND WASHINGTON

**City of Mercer Island**
Telemetry System
Configuration

16DI/8DO MODULE WIRING
170ADM37010

SHEET 12 / 13

14




12MI01
170ADI34000
ROW 1

| TERMINAL | DESCRIPTION | ADDRESS |
|---|---|---|
| INPUT 1 / 1 | PUMP 1 AUTO<br>X<br>X | 100017 |
| INPUT 2 / 2 | PUMP 2 AUTO<br>X<br>X | 100018 |
| INPUT 3 / 3 | PUMP 3 AUTO<br>X<br>X | 100019 |
| INPUT 4 / 4 | SPARE<br>X<br>X | 100020 |
| INPUT 5 / 5 | PUMP CHECK<br>VALVE 1 OPEN<br>X | 100021 |
| INPUT 6 / 6 | PUMP CHECK<br>VALVE 2 OPEN<br>X | 100022 |
| INPUT 7 / 7 | PUMP CHECK<br>VALVE 3 OPEN<br>X | 100023 |
| INPUT 8 / 8 | SPARE<br>X<br>X | 100024 |
| INPUT 9 / 9 | SPARE<br>X<br>X | 100025 |
| INPUT 10 / 10 | SPARE<br>X<br>X | 100026 |
| INPUT 11 / 11 | SPARE<br>X<br>X | 100027 |
| INPUT 12 / 12 | SPARE<br>X<br>X | 100026 |
| INPUT 13 / 13 | X<br>X<br>X | 100029 |
| INPUT 14 / 14 | X<br>X<br>X | 100030 |
| INPUT 15 / 15 | X<br>X<br>X | 100031 |
| INPUT 16 / 16 | X<br>X<br>X | 100032 |
| M- / 17 | | |
| L+ / 18 | | |

**NOTE:**
1. TYPICAL WIRING FOR MODULES 14 & (14A).

NOTE: ALL WIRING ON THIS SHEET TO BE #18 BU UNLESS OTHERWISE SPECIFIED.

RTU'S PROVIDED BY CITY

FOR REFERENCE ONLY

EXPIRES 8/31/05

| No | DATE | BY | REVISION |
|---|---|---|---|

Job No. 0321-010 SCALE: NONE
Designed R.HELLER Drawn by R.FARLEY Checked by K.ALBINGER
Proj. Engr. Approved by Date

CASNE ENGINEERING, INC.
ELECTRICAL AND TECHNOLOGY CONSULTANTS

City of Mercer Island
Telemetry System
Configuration

16DI MODULE WIRING
170ADM34000

SHEET 13 / 13

4/28/04 14:33:33 ref E:\0Z\03\0321-010 Mercer Island Telemetry_Drawings\0321-010E13.dwg

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT

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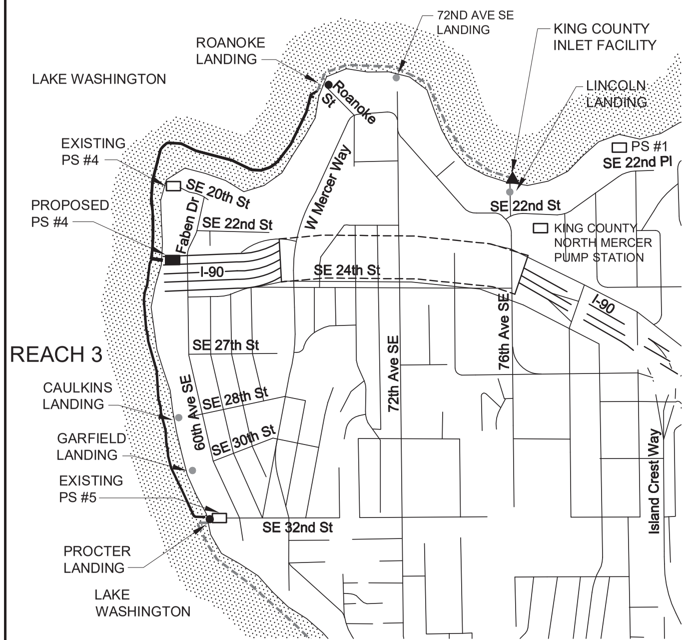
# CITY OF MERCER ISLAND

## KING COUNTY WASHINGTON

## VOLUME 3 OF 3

# SEWER LAKE LINE AND PUMP STATION NO. 4 REPLACEMENT PROJECT




LOCATION MAP NORTH


VICINITY MAP NORTH

## DRAWING INDEX

| SHEET NO. | DWG NO. | |
|---|---|---|
| | | **GENERAL** |
| 1 | G1 | LOCATION MAP, VICINITY MAP, AND DRAWING INDEX |
| 2 | G2 | CIVIL ABBREVIATIONS AND DRAWING REFERENCING |
| 3 | G3 | LAKE LINE KEY MAP, CIVIL LEGEND, AND SURVEY CONTROL |
| 4 | G4-A | LAKE LINE DETAILS DUCTILE IRON PIPE |
| 5 | G4-B | LAKE LINE DETAILS HDPE PIPE |
| 6 | G5-A | LAKE LINE DETAILS DUCTILE IRON PIPE |
| 7 | G5-B | LAKE LINE DETAILS HDPE PIPE |
| 8 | G6-A | LAKE LINE DETAILS DUCTILE IRON PIPE |
| 9 | G6-B | LAKE LINE DETAILS HDPE PIPE |
| - | G7 | NOT USED |
| 10 | G8 | LAKE LINE DETAILS |
| - | G9 | NOT USED |
| - | G10 | NOT USED |
| 11 | G11 | LAKE LINE DETAILS |
| | | **SCHEDULE A - REACH 3 LAKE LINE IMPROVEMENTS** |
| | | **CIVIL** |
| 12 | C100 | PLAN AND PROFILE STA 0+00 TO STA 13+20 |
| 13 | C101 | PLAN AND PROFILE STA 13+20 TO STA 23+60 |
| 14 | C102 | PLAN AND PROFILE STA 23+60 TO STA 35+60 |
| 15 | C103 | PLAN AND PROFILE STA 50+00 TO STA 58+80 |
| 16 | C104 | PLAN AND PROFILE STA 58+80 TO STA 68+80 |
| 17 | C105 | PLAN AND PROFILE STA 68+80 TO STA 78+30 |
| 18 | C106 | PLAN AND PROFILE STA 78+30 TO STA 85+60 |
| 19 | C107 | PLAN AND PROFILE STA 85+60 TO STA 92+00 |
| 20 | C108 | PLAN AND PROFILE PROCTOR LANDING |
| 21 | C109 | PLAN AND PROFILE PUMP STATION NO. 4 |
| | | **SCHEDULE B - PUMP STATION NO. 4** |
| | | **DEMOLITION** |
| 22 | D300 | PUMP STATION NO. 5 DEMOLITION |
| 23 | D301 | PUMP STATION NO. 5 DEMOLITION DETAILS |
| | | **CIVIL** |
| 24 | C300 | SITE PLAN EXISTING CONDITIONS |
| 25 | C301 | EROSION CONTROL AND SITE DEMOLITION PLAN |
| 26 | C302 | SITE PLAN |
| 27 | C303 | PUMP STATION AND CONTROL BUILDING SITE UTILITY PLAN |
| 28 | C304 | PUMP STATION AND CONTROL BUILDING SITE GRADING PLAN |
| 29 | C305 | CIVIL SECTION AT CONTROL BUILDING |
| 30 | C306 | CIVIL DETAILS |
| 31 | C307 | CIVIL DETAILS |
| | | **ARCHITECTURAL** |
| 32 | A300 | ARCHITECTURAL SYMBOLS, ABBREVIATIONS AND LEGEND |
| 33 | A301 | CONTROL BUILDING PLANS, ELEVATIONS AND SCHEDULES |
| 34 | A302 | CONTROL BUILDING SECTIONS |
| 35 | A303 | CONTROL BUILDING DETAILS |

| SHEET NO. | DWG NO. | |
|---|---|---|
| | | **SCHEDULE B - PUMP STATION NO. 4 (CONT)** |
| | | **LANDSCAPING** |
| 36 | L300 | DEMOLITION/TESC |
| 37 | L301 | LANDSCAPE PLAN |
| 38 | L302 | GRADING PLAN & LAYOUT |
| 39 | L303 | IRRIGATION PLAN |
| 40 | L304 | LANDSCAPE DETAILS |
| 41 | L305 | IRRIGATION DETAILS |
| | | **STRUCTURAL** |
| 42 | S300 | STRUCTURAL GENERAL NOTES |
| 43 | S301 | TYPICAL CONCRETE DETAILS 1 |
| 44 | S302 | TYPICAL CONCRETE DETAILS 2 |
| 45 | S303 | TYPICAL EQUIPMENT PAD DETAILS |
| 46 | S304 | TYPICAL MASONRY DETAILS |
| 47 | S305 | TYPICAL FIBERGLASS AND METAL DETAILS |
| 48 | S306 | PUMP STATION PLANS |
| 49 | S307 | PUMP STATION SECTIONS |
| 50 | S308 | PUMP STATION DETAILS |
| 51 | S309 | CONTROL BUILDING FOUNDATION AND ROOF FRAMING PLANS |
| 52 | S310 | CONTROL BUILDING DETAILS |
| | | **MECHANICAL** |
| 53 | M300 | MECHANICAL ABBREVIATIONS AND SYMBOLS |
| 54 | M301 | MECHANICAL STANDARD DETAILS |
| 55 | M302 | SCHEDULES AND PIPE PENETRATIONS |
| 56 | M303 | PUMP STATION PLANS |
| 57 | M304 | PUMP STATION SECTIONS |
| 58 | M305 | PROCESS PIPING PLAN AND SECTIONS |
| 59 | M306 | PUMP STATION AND VALVE VAULT DETAILS |
| 60 | M307 | CONTROL BUILDING AND VENTILATION VAULT PLANS |
| 61 | M308 | CONTROL BUILDING AND VENTILATION VAULT SECTIONS & DETAILS |
| 62 | M309 | CONTROL BUILDING DETAILS |
| | | **ELECTRICAL** |
| 63 | E300 | SYMBOLS AND ABBREVIATIONS |
| 64 | E301 | ELECTRICAL DETAILS |
| 65 | E302 | ELECTRICAL DETAILS |
| 66 | E303 | ONE-LINE, LOAD CALCS, AND PANEL SCHEDULE |
| 67 | E304 | ELECTRICAL SITE PLAN |
| 68 | E305 | ELECTRICAL PLANS |
| 69 | E306 | CONTROL PANEL ELEVATIONS |
| 70 | E307 | CONTROL PANEL SCHEMATICS-1 |
| 71 | E308 | CONTROL PANEL SCHEMATICS-2 |
| 72 | E309 | CONTROL PANEL SCHEMATICS-3 |
| 73 | E310 | CONTROL PANEL SCHEMATICS-4 |
| 74 | E311 | CONTROL PANEL SCHEMATICS-5 |
| 75 | E312 | CONTROL PANEL SCHEMATICS-6 |
| 76 | E313 | CONTROL PANEL SCHEMATICS-7 |
| 77 | E314 | CONTROL PANEL SCHEMATICS-8 |

10/10/08

CONFORMED SET
December 2008

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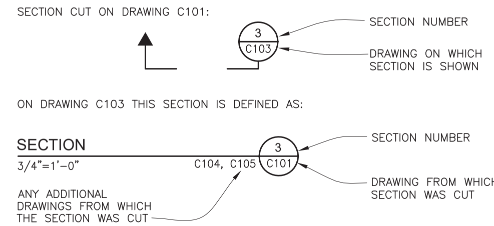
## ABBREVIATIONS

| Abbreviation | Description |
|---|---|
| @ | AT |
| ABAN | ABANDONED |
| AC | ASBESTOS CEMENT OR ASPHALT CONCRETE |
| ACP | ASPHALT CONCRETE PAVEMENT |
| ADMIN | ADMINISTRATION |
| AHD | AHEAD |
| AIR | AIR RELIEF |
| AL | ALUMINUM |
| AP | ANGLE POINT |
| APPROX | APPROXIMATELY |
| ARCH | ARCHITECTURAL |
| ASPH | ASPHALT |
| AT | AERIAL TELEPHONE |
| ATB | ASPHALT TREATED BASE |
| AV | AIR VALVE |
| AVE | AVENUE |
| B/C | BACK OF CURB |
| BE | BOTTOM OF EXCAVATION |
| BF | BUTTERFLY VALVE |
| BK | BACK |
| BLDG | BUILDING |
| BLVD | BOULEVARD |
| BM | BENCH MARK |
| BO | BLOW-OFF |
| BOT | BOTTOM |
| BR | BRICK |
| BTU | BRITISH THERMAL UNITS |
| BV | BALL VALVE |
| BVC | BEGIN VERTICAL CURVE |
| BW | BOTTOM OF WALL |
| C | CONDUIT |
| CAP | CAPACITY |
| CB | CATCH BASIN |
| CDF | CONTROLLED DENSITY FILL |
| CF | CUBIC FEET |
| CI | CAST IRON |
| CIP | CAST IN PLACE |
| CK | CHECK |
| CL | CENTERLINE |
| CLF | CHAIN LINK FENCE |
| CLR | CLEARANCE |
| CMP | CORRUGATED METAL PIPE |
| CO | CLEAN OUT |
| CONC | CONCRETE |
| CONN | CONNECTION |
| CONT | CONTINUOUS |
| CP | CONCRETE PIPE |
| CPL | COUPLING |
| CPP | CORRUGATED POLYETHYLENE PIPE |
| CSBC | CRUSHED SURFACING BASE COURSE |
| CSTC | CRUSHED SURFACING TOP COURSE |
| CU | COPPER |
| CULV | CULVERT |
| CW | COLD WATER (POTABLE) |
| CY | CUBIC YARD |
| D | STORM DRAIN (EXST) |
| D/W | DRIVEWAY |
| DEG, ° | DEGREE |
| DEMO | DEMOLISH |
| DEPT | DEPARTMENT |
| DI | DUCTILE IRON (PIPE) |
| DIA | DIAMETER |
| DIM | DIMENSION |
| DISCH | DISCHARGE |
| DIV | DIVERSION |
| DN | DOWN |
| DR | DRIVE |
| DS | DOWNSPOUT |
| DW | DEWATERING |
| DWV | DRAIN, WASTE & VENT |
| DWG | DRAWING |
| E | EAST |
| EF | EXHAUST FAN |
| EFFL | EFFLUENT |
| EG | EMERGENCY GENERATOR |
| EL, ELEV | ELEVATION |
| ELB | ELBOW |
| ELEC | ELECTRICAL |
| EOP | EDGE OF PAVEMENT |
| EQ | EQUATION |
| ESMT | EASEMENT |
| ETC | ET CETERA |
| EVC | END VERTICAL CURVE |
| EXH | EXHAUST |
| EXST | EXISTING |
| EXT | EXTRUDED |
| FA | FOUL AIR |
| F/C | FACE OF CURB |
| FF | FINISHED FLOOR |
| FG | FINISHED GRADE |
| FH | FIRE HYDRANT |
| FL | FLANGE |
| FLEX | FLEXIBLE |
| FM | FORCE MAIN |
| FNC | FENCE |
| FND | FOUNDATION |
| FO | FIBER OPTIC |
| FPM | FEET PER MINUTE |
| FRP | FIBERGLASS REINFORCED PIPE |
| FO | FIBER OPTIC |
| FT OR ' | FOOT |
| FTG | FOOTING |
| G | GAS |
| GA | GAUGE, GAGE |
| GAL | GALLON |
| GALV | GALVANIZED |
| GB | GRADE BREAK |
| GL | GUTTER LINE |
| GM | GAS METER |
| GP | GUARD POST |
| GPM | GALLONS PER MINUTE |
| GV | GATE VALVE |
| GWT | GROUND WATER TABLE |
| HB | HOSE BIBB |
| HDPE | HIGH DENSITY POLYETHYLENE (PIPE) |
| HGL | HYDRAULIC GRADE LINE |
| HH | HAND HOLE |
| HMA | HOT MIX ASPHALT |
| HORIZ | HORIZONTAL |
| HP | HIGH PRESSURE OR HIGH POINT OR HORSE POWER |
| HR | HOUR |
| HT | HEIGHT |
| HTG | HEATING |
| HVP | HIGH VOLTAGE POWER |
| HVAC | HEATING, VENTILATION AND AIR CONDITIONING |
| HW | HIGH WATER |
| HYD | HYDRANT |
| IAW | IN ACCORDANCE WITH |
| IC | INSTRUMENT CONTROL |
| ID | INSIDE DIAMETER |
| IE | INVERT ELEVATION |
| IFL | INFLUENT |
| IHL | INNER HARBOR LINE |
| IL | INTAKE LOUVER |
| IN OR " | INCH |
| INT | INTERSECTION |
| INV | INVERT |
| IP | IRON PIPE |
| IRR | IRRIGATION |
| JB | JUNCTION BOX |
| JT | JOINT |
| K | KIP |
| KV | KILOVOLT |
| KVA | KILOVOLT AMP |
| KW | KILOWATT |
| L | LENGTH |
| LBS | POUNDS |
| LF | LINEAR FEET |
| LP | LOW POINT |
| LPG | LOW PRESSURE GAS |
| LT | LEFT |
| LT STD | LIGHT STANDARD |
| LTG | LIGHTING |
| LVP | LOW VOLTAGE POWER |
| M | METER |
| MAINT | MAINTENANCE |
| MAX | MAXIMUM |
| MB | MAIL BOX |
| MECH | MECHANICAL |
| MFR | MANUFACTURER |
| MH | MANHOLE |
| MHW | MEAN HIGH WATER |
| MIC | MONUMENT (IN CASE) |
| MIN | MINIMUM |
| MISC | MISCELLANEOUS |
| MJ | MECHANICAL JOINT |
| MON | MONUMENT (SURFACE) |
| MTD | MOUNTED |
| N | NORTH |
| N/A | NOT APPLICABLE |
| NIC | NOT IN CONTRACT |
| NO OR # | NUMBER |
| NPT | NATIONAL PIPE THREAD |
| NTS | NOT TO SCALE |
| NW | NORTHWEST |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| OE | OVERHEAD ELECTRICAL |
| OF | OPTIC FIBER |
| OH | OVERHEAD |
| OHLE | ORDINARY HIGH LAKE ELEVATION |
| OLLE | ORDINARY LOW LAKE ELEVATION |
| P | POWER |
| P/T | POWER/TELEPHONE |
| PAV | PAVEMENT |
| PC | POINT OF CURVATURE |
| PCC | POINT OF COMPOUND CURVATURE, PORTLAND CEMENT CONCRETE |
| PCCP | PRECAST CONCRETE CYLINDER PIPE |
| PD | PRESSURE DROP |
| PERF | PERFORATED |
| PH | PHASE |
| PI | POINT OF INTERSECTION |
| PIVC | POINT OF INTERSECTION OF VERTICAL CURVE |
| PK | MASONRY NAIL |
| PL | PROPERTY LINE |
| PM | PAD MOUNTED |
| PN | POINT NUMBER |
| PNL | PANEL |
| POC | POINT OF CONNECTION |
| POW | POWER VAULT |
| PP | POWER POLE |
| PRC | POINT OF REVERSE CURVATURE |
| PREP | PREPARATION |
| PRESS | PRESSURE |
| PRG | PROPANE GAS |
| PRV | PRESSURE REDUCING VALVE |
| PSD | PIPE STORM DRAIN |
| PSF | POUNDS PER SQUARE FOOT |
| PSI | POUNDS PER SQUARE INCH |
| PT | POINT OF TANGENCY |
| PV | PLUG VALVE |
| PVC | POLYVINYL CHLORIDE, POINT OF VERTICAL CURVE |
| PVI | POINT OF VERTICAL INTERSECTION |
| PVMT | PAVEMENT |
| PW | POTABLE WATER |
| PWRMH | POWER MANHOLE |
| R | RADIUS |
| R/W | RIGHT-OF-WAY |
| RCP | REINFORCED CONCRETE PIPE |
| RD | ROOF DRAIN |
| RED | REDUCER |
| REF | REFERENCE |
| REV | REVISED(ION) |
| RGS | RIGID GALVANIZED STEEL |
| RIM | MANHOLE RIM |
| RJ | RESTRAINED JOINT |
| RND | ROUND |
| ROW | RIGHT-OF-WAY |
| RPBP | REDUCED PRESSURE BACKFLOW PREVENTOR |
| RPM | REVOLUTIONS PER MINUTE |
| RR | RAILROAD |
| RS | RAW SEWAGE |
| RT | RIGHT |
| S | SOUTH, SLOPE, SANITARY SEWER (EXST) |
| SB | SOIL BORING |
| SC | STEEL CABLE |
| SD | STORM DRAIN |
| SDCB | STORM DRAIN CATCH BASIN |
| SDMH | STORM DRAIN MANHOLE |
| SE | SPOT ELEVATION |
| SF | SQUARE FEET |
| SHT | SHEET |
| SIM | SIMILAR |
| SL | SLOPE |
| SOL | SOLID/SOLUTION |
| SPEC | SPECIFICATIONS |
| SQ | SQUARE |
| SS | SANITARY SEWER |
| SSFM | SANITARY SEWER FORCE MAIN |
| SSMH | SANITARY SEWER MANHOLE |
| SST | STAINLESS STEEL |
| ST | STREET |
| STA | STATION |
| STD | STANDARD |
| STL | STEEL |
| STRUCT | STRUCTURAL |
| SW | SERVICE WATER (NON POTABLE) |
| T | TELEPHONE |
| TAN | TANGENT |
| TB | THRUST BLOCK |
| TC | TOP OF CONCRETE/ CURB |
| TD | TANK DRAIN |
| TE | TOP ELEVATION |
| TEL R | TELEPHONE RISER |
| TEL V | TELEPHONE VAULT |
| TELCO | TELEPHONE COMPANY |
| TEMP | TEMPORARY |
| TESC | TEMPORARY EROSION AND SEDIMENTATION CONTROL |
| THD | THREAD |
| TLM | TEMPORARY |
| TOG | TOP OF GRATE |
| TP | TELEPHONE POLE |
| TRANS | TRANSFORMER |
| TRANS TWR | TRANSMISSION TOWER |
| TV | TELEVISION CABLE |
| TW | TOP OF WALL |
| TYP | TYPICAL |
| UD | UNDERDRAIN |
| UG | UNDERGROUND |
| UGP | UNDERGROUND POWER |
| UGT | UNDERGROUND TELECOM |
| UTIL | UTILITIES |
| V | VALVE, VENT, VOLT |
| VB | VALVE BOX |
| VC | VERTICAL CURVE |
| VERT | VERTICAL |
| VP | VACUUM PUMP |
| VPC | VERTICAL POINT OF CURVATURE |
| VPI | VERTICAL POINT OF INTERSECTION |
| VPT | VERTICAL POINT OF TANGENCY |
| VTR | VENT THRU ROOF |
| W | WASTE, WATER, WEST OR WIDTH |
| WG | WATER GAGE |
| WM | WATER METER |
| WN | WATER - NON POTABLE |
| WNH | WATER - NON POTABLE HOT |
| WP | WATER - POTABLE |
| WPH | WATER - POTABLE HOT |
| WWF | WELDED WIRE FABRIC |
| W/ | WITH |
| W/O | WITHOUT |

## DRAWING REFERENCING

SECTIONS ARE CROSS REFERENCED IN THE FOLLOWING MANNER:




SECTION OR DETAIL CUT AND SHOWN ON THE SAME DRAWING: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JEFFREY W. LYMAN, STATE OF WASHINGTON, 29088, REGISTERED PROFESSIONAL ENGINEER, 10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE:
DESIGN JWL
DATE OCT 2008
CHECKED DW

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
CIVIL ABBREVIATIONS AND DRAWING REFERENCING

DRAWING NO. G2
SHEET 2 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAED1G02.dwg Plot date: Oct 13, 2008-08:36:43am CAD User: jeff.wicke.
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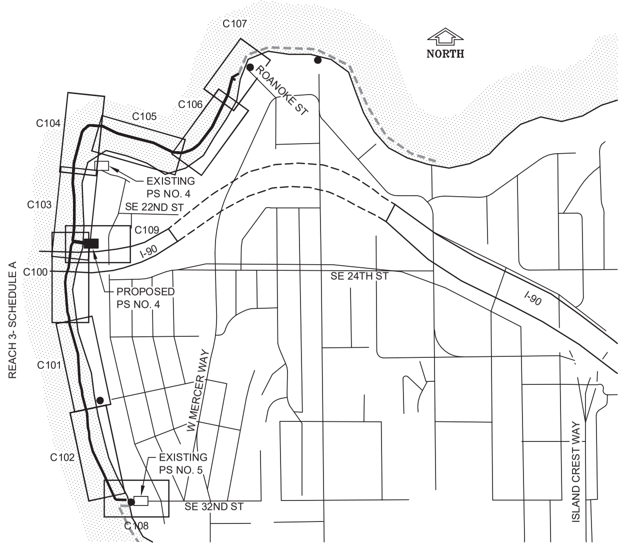


KEY MAP FOR
SCHEDULE A LAKE LINE PLAN AND PROFILE DRAWINGS

NO SCALE

## CIVIL LEGEND

- CENTERLINE (EXST)
- CENTERLINE RIGHT-OF-WAY (STATION LINE)
- BUILDING LINE (EXST)
- BUILDING LINE (PROP)
- CREEK/DITCH ℄ (EXST)
- OR — CURB/PAVEMENT /SIDEWALK (EXST)
- CURB/PAVEMENT /SIDEWALK (PROP)
- P — POWER (BURIED)
- SD — STORM DRAINAGE (EXST)
- T — TELEPHONE (BURIED)
- W — WATER (EXST, BURIED)
- FO — FIBER OPTIC CABLE (BURIED)
- SC — STEEL COMMUNICATIONS CABLE

AERIAL POWER AND TELEPHONE NOT SHOWN FOR CLARITY

EXST PROP

- ANGLE POINT
- IRON PIPE
- SPOT ELEVATION
- CB PROTECTION
- WV — WATER VALVE
- WATER METER
- VAULT
- GV — GAS VALVE
- DECIDUOUS TREE
- CONIFER TREE
- 433 — CONTOUR
- BUILDING OUTLINE
- BLOW-OFF VALVE
- FIRE HYDRANT
- GAS METER
- P — POWER VAULT
- T — TELEPHONE VAULT
- SIGN
- 67.13 — BOTTOM OF BRIDGE ELEVATION

- PROPERTY LINE (EXST)
- RIGHT-OF-WAY (EXST)
- FENCE (EXST)
- FENCE (PROP)
- GUARDRAIL (EXST)
- RIVERBANK/SHORELINE
- UTILITY SERVICE LINE (EXST)
- W — WATER
- G — GAS
- OE — OVERHEAD ELECTRICAL
- OHLE — ORDINARY HIGH LAKE ELEVATION
- OLLE — ORDINARY LOW LAKE ELEVATION

PROPOSED UTILITIES

- MAIN LINE (PIPE TYPE AND SIZE LISTED)
- SERVICE LINE (PIPE TYPE AND SIZE LISTED)
- FORCE MAIN (PIPE TYPE AND SIZE LISTED)

EXST PROP

- SANITARY SEWER CLEAN OUT
- SANITARY SEWER MANHOLE
- STORM DRAIN CATCH BASIN
- STORM DRAIN CULVERT
- PAD MOUNTED TRANSFORMER
- UTILITY POLE
- UTILITY POLE ANCHOR
- TELEPHONE RISER
- SURVEY CONTROL POINT
- SOIL BORING LOCATION
- S-1 — VIBRACORE LOCATION
- SPRINKLER HEAD

## BASIS OF BEARING

WASHINGTON COORDINATE SYSTEM, NORTH ZONE, NAD 1983/91. DETERMINED BY STATIC GPS OBSERVATIONS FROM WSDOT CONTROL STATION GP17090-230 AND CITY OF MERCER ISLAND 4011.

## VERTICAL DATUM

NAVD 1988, DETERMINED BY STATIC GPS OBSERVATIONS FROM WSDOT CONTROL STATIONS GP17090-230 AND GP17090-71. THIS CONTROL HAS ALSO BEEN TIED TO MACANDREWS INC PHOTO CONTROL FOR CITY OF MERCER ISLAND AND DAVID EVANS AND ASSOCIATES SURVEY CONTROL THE CITY'S G.I.S. PROGRAM.

## CONTROL DESCRIPTION

MERCER ISLAND GIS POINT NO. 4011
N=215,463.11 FT., E=1,290,590.51 FT., ELEV.: 44.36 FT.
FOUND MON. IN CASE (1-3/4" IRON PIPE W/PLUG IN TACK), APPROX. 4.8' SOUTH OF INTERSECTION OF SE 32ND STREET AND 60TH AVENUE SE.

LOCAL PROJECT CONTROL
WSI-4311
N=215,466.91 FT., E=1,290,331.36 FT., ELEV: 25.37 FT.
SET PK NAIL IN ASPHALT AT SOUTHWEST CORNER OF PARKING LOT AT PROCTOR LANDING.

WSI-4308
N=215,840.81 FT., E=1,290,455.29 FT., ELEV=44.98 FT.
SET PK NAIL IN ASPHALT. SOUTHEASTERLY 5.4' OF SANITARY SEWER MANHOLE AT PROCTOR LANDING. ESTABLISHED BY STATIC GPS AS AN AZIMUTH MARK TO MI-4011.

## CONTROL DESCRIPTION

LOCAL PROJECT CONTROL
WSI-4255
N=218,475.67 FT., E=1,290,116.20 FT., ELEV: 49.72 FT.
SET PK NAIL IN ASPHALT NEAR CENTERLINE OF 60TH AVENUE SE NEAR THE NORTHEAST CORNER OF THE NEW PUMP STATION NO. 4 PROJECT SITE.

WSI-4307
N=218,449.43 FT., E=1,289,869.89 FT., ELEV: 29.96 FT.
SET 5/8" REBAR AND CAP INSIDE THE ASPHALT ROAD LOOP NEAR THE WEST SIDE OF THE NEW PUMP STATION NO. 4 PROJECT SITE.

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JEFFREY W. LYMAN, STATE OF WASHINGTON, 29088 REGISTERED PROFESSIONAL ENGINEER 10/10/08

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| DESIGN | JWL |
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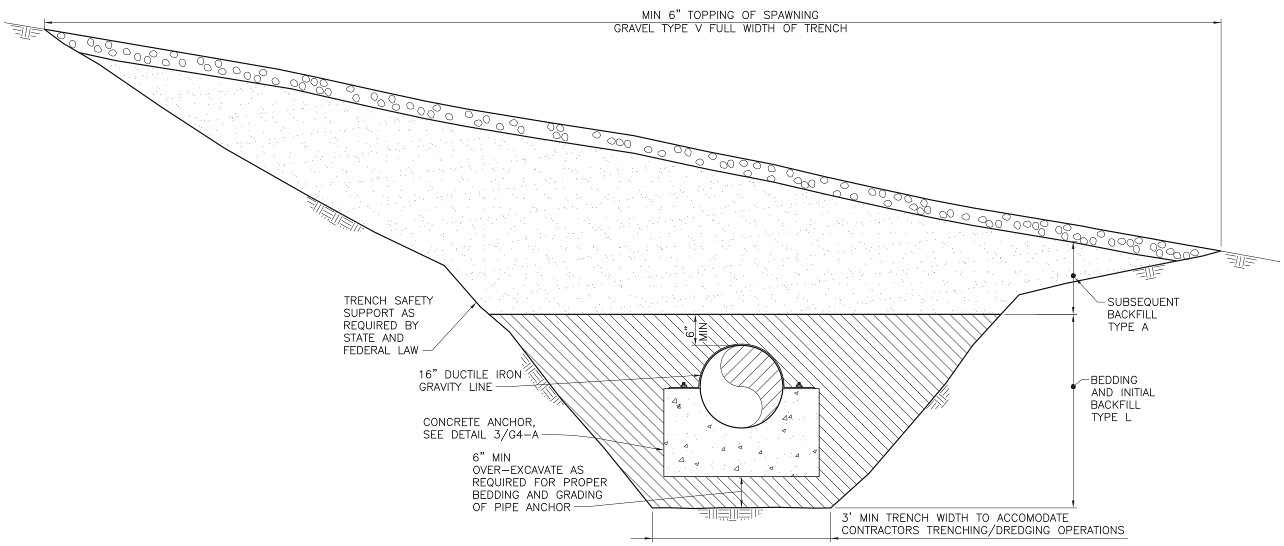
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT

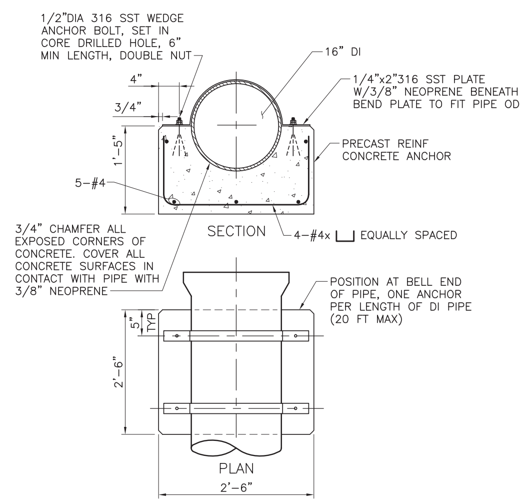
LAKE LINE KEY MAP, CIVIL LEGEND AND SURVEY CONTROL

DRAWING NO. G3




SINGLE PIPE OFFSHORE TRENCH
SECTION SCHEDULE A (1/C100)

NO SCALE C101 C102




CONCRETE ANCHOR
FOR DI PIPE (3/–)

NO SCALE

**SIDE SEWER TABLE**

| ADDRESS/ LOCATION | HORIZONTAL BENDS | DRAWING NO. |
|---|---|---|
| SCHEDULE A | | |
| 2237 60TH SE | 45 | C100 |
| 2401 60TH SE | 11-1/4, 45 | C100 |
| 2411 60TH SE | 45 | C100 |
| 2425 60TH SE | 45 | C100 |
| 2451 60TH SE | 11-1/4, 45 | C100 |
| 2669 60TH SE | 45 | C101 |
| 2701 60TH SE | 45 | C101 |
| 2721 60TH SE | 11-1/4, 45 | C101 |
| 2727 60TH SE | 45 | C101 |
| 2749 60TH SE | 11-1/4<br>(3) 45 | C101 |
| 2755 60TH SE | 45 | C101 |
| 2801 60TH SE | 45 | C101 |
| 2815 60TH SE | 45 | C101 |
| 5980 SE 30TH | (2)11-1/4, 45 | C102 |
| 3019 60TH SE | 45 | C102 |
| 3031 60TH SE | 45 | C102 |
| 3041 60TH SE | 45 | C102 |
| 2217 60TH SE | 45 | C103 |
| 2205 60TH SE | 45 | C103 |
| 2021 60TH SE | 45 | C103 |
| 2005 60TH SE | 45 | C104 |
| 6000 SE 20TH | 45 | C104 |
| 5904 SE 20TH | 22-1/2 | C104 |
| 5916 SE 20TH | 22-1/2 | C105 |
| 1900 FABEN DR | 11-1/4, 22-1/2 | C105 |
| 6024 SE 22ND | 45<br>(2) 22-1/2<br>11-1/4 | C105 |
| 6210 SE 22ND | 22-1/2 | C105 |
| 6308 SE 22ND | 22-1/2<br>11-1/4 | C105 |
| 6330 SE 22ND | 45 | C106 |
| 2029 WEST MERCER WAY | 22-1/2 | C106 |
| 2025 WEST MERCER WAY | 22-1/2, 11-1/4 | C106 |
| 20TH STREET LANDING | 45 | C106 |
| 1895 WEST MERCER WAY | 11-1/4, 22-1/2 | C106 |
| 1845 WEST MERCER WAY | 45 | C106 |
| 1829 WEST MERCER WAY | 45 | C107 |
| 1631 WEST MERCER WAY | 22-1/2 | C107 |
| 1619 WEST MERCER WAY | 22-1/2 | C107 |

NOTE:

HORIZONTAL REALIGNMENT OF SIDE SEWER LOCATION BY CONTRACTOR ACCEPTABLE PROVIDED THE REALIGNMENT DOES NOT SHIFT THE SEWER LOCATION TO AN ADJACENT PROPERTY. SEE SPECIFICATION SECTION 02530 FOR FURTHER REQUIREMENTS.

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JEFFREY W. LYMAN
STATE OF WASHINGTON
29088
REGISTERED PROFESSIONAL ENGINEER
10/10/08

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DATE OCT 2008
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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT

LAKE LINE DETAILS
DUCTILE IRON PIPE

DRAWING NO. G4-A

SHEET 4 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAED1G04A.dwg Plot date: Oct 13, 2008-08:38:02am CAD User: jeff.wicke.
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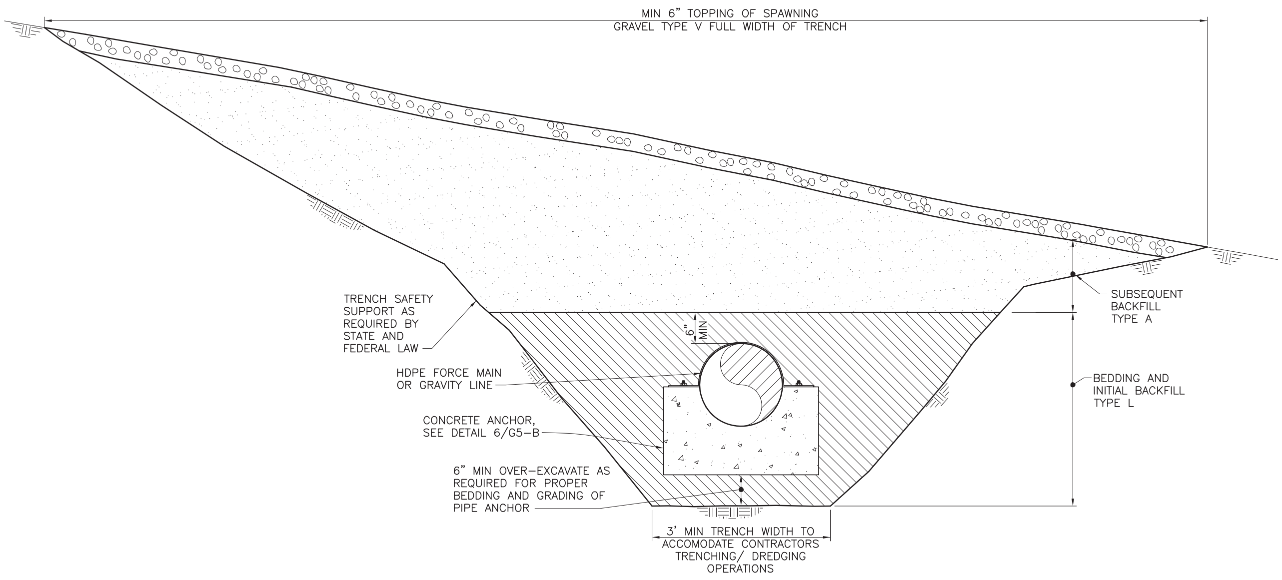


SINGLE PIPE OFFSHORE TRENCH SECTION
NO SCALE — C101, C102 — 1/C100

| SIDE SEWER TABLE | | |
|---|---|---|
| ADDRESS/ LOCATION | HORIZONTAL BENDS | DRAWING NO. |
| SCHEDULE A | | |
| 2237 60TH SE | 45 | C100 |
| 2401 60TH SE | 11-1/4, 45 | C100 |
| 2411 60TH SE | 45 | C100 |
| 2425 60TH SE | 45 | C100 |
| 2451 60TH SE | 11-1/4, 45 | C100 |
| 2669 60TH SE | 45 | C101 |
| 2701 60TH SE | 45 | C101 |
| 2721 60TH SE | 11-1/4, 45 | C101 |
| 2727 60TH SE | 45 | C101 |
| 2749 60TH SE | 11-1/4<br>(3) 45 | C101 |
| 2755 60TH SE | 45 | C101 |
| 2801 60TH SE | 45 | C101 |
| 2815 60TH SE | 45 | C101 |
| 5980 SE 30TH | (2)11-1/4, 45 | C102 |
| 3019 60TH SE | 45 | C102 |
| 3031 60TH SE | 45 | C102 |
| 3041 60TH SE | 45 | C102 |
| 2217 60TH SE | 45 | C103 |
| 2205 60TH SE | 45 | C103 |
| 2021 60TH SE | 45 | C103 |
| 2005 60TH SE | 45 | C104 |
| 6000 SE 20TH | 45 | C104 |
| 5904 SE 20TH | 22-1/2 | C104 |
| 5916 SE 20TH | 22-1/2 | C105 |
| 1900 FABEN DR | 11-1/4, 22-1/2 | C105 |
| 6024 SE 22ND | 45<br>(2) 22-1/2<br>11-1/4 | C105 |
| 6210 SE 22ND | 22-1/2 | C105 |
| 6308 SE 22ND | 22-1/2<br>11-1/4 | C105 |
| 6330 SE 22ND | 45 | C106 |
| 2029 WEST MERCER WAY | 22-1/2 | C106 |
| 2025 WEST MERCER WAY | 22-1/2, 11-1/4 | C106 |
| 20TH STREET LANDING | 45 | C106 |
| 1895 WEST MERCER WAY | 11-1/4, 22-1/2 | C106 |
| 1845 WEST MERCER WAY | 45 | C106 |
| 1829 WEST MERCER WAY | 45 | C107 |
| 1631 WEST MERCER WAY | 22-1/2 | C107 |
| 1619 WEST MERCER WAY | 22-1/2 | C107 |

NOTE:
1. CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11 1/4" BENDS. DO NOT EXCEED MANUFACTURERS MIN BEND RADIUS.
2. HORIZONTAL REALIGNMENT OF SIDE SEWER LOCATION BY CONTRACTOR ACCEPTABLE PROVIDED THE REALIGNMENT DOES NOT SHIFT THE SEWER LOCATION TO AN ADJACENT PROPERTY. SEE SPECIFICATION SECTION 02530 FOR FURTHER REQUIREMENTS.

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS
HDPE PIPE

DRAWING NO. G4-B


Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAED1G04B.dwg Plot date: Oct 13, 2008-08:38:27am CAD User: jeff.wicke.
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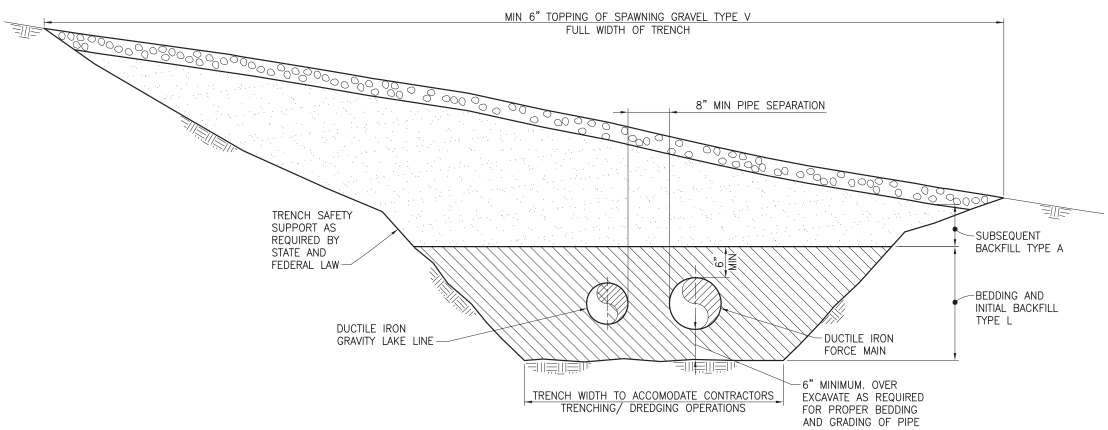
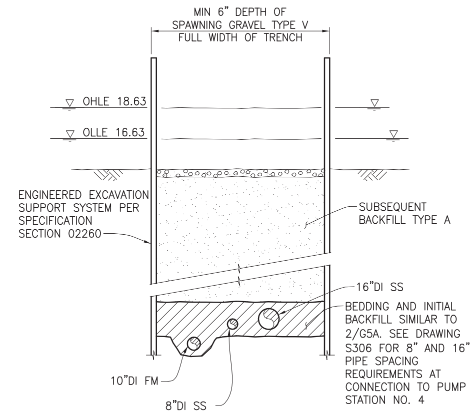


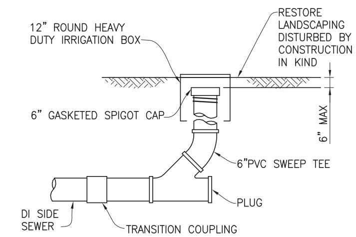

DOUBLE PIPE OFFSHORE TRENCH SECTION (1 / C103)

NO SCALE C104–C107




PIPE SECTION (3 / C109)

NO SCALE

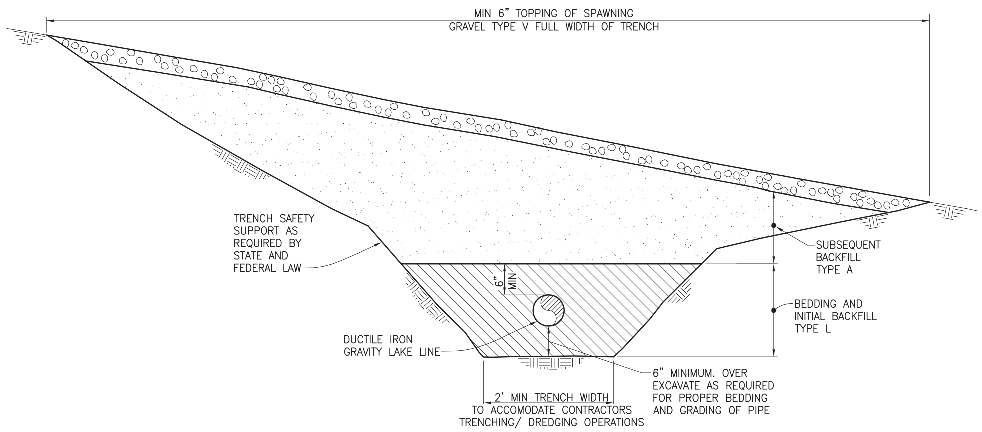



NOTES:

1. CLEAN-OUT PIPE AND FITTINGS SHALL BE PVC, UNLESS OTHERWISE SHOWN.
2. EXACT LOCATION AS DIRECTED BY ENGINEER.

SIDE SEWER CLEANOUT (5 / C106)

NO SCALE




SINGLE PIPE OFFSHORE TRENCH SECTION (2 / G6–A)

NO SCALE

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| DESIGN | JWL |
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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS DUCTILE IRON PIPE

DRAWING NO. G5-A

SHEET 6 OF 77


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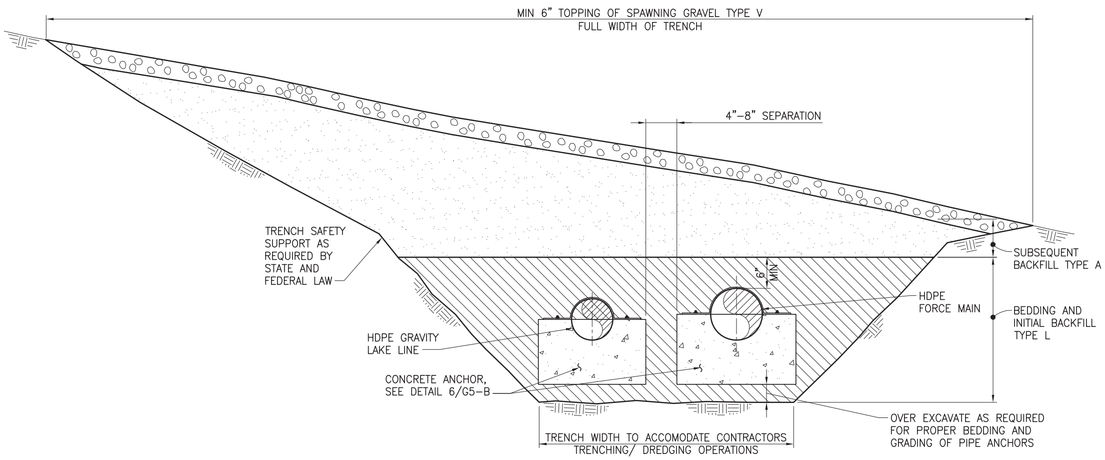
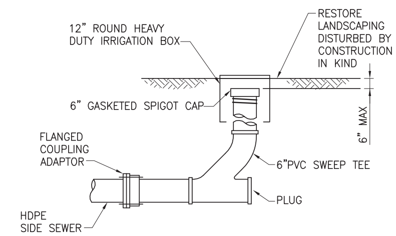
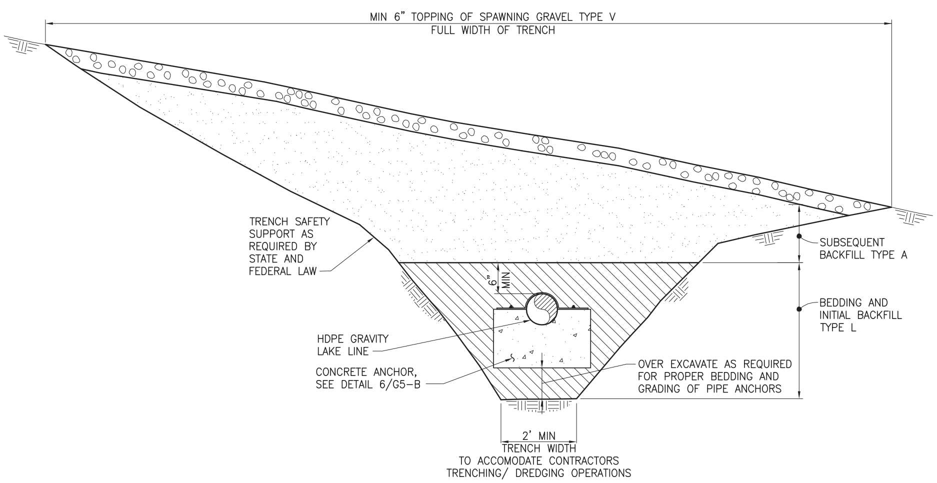



DOUBLE PIPE OFFSHORE TRENCH SECTION
NO SCALE — 1 / C104–C107 C103

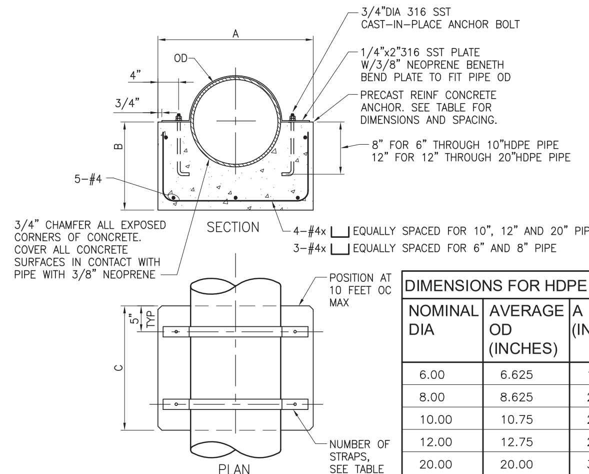



NOTES:
1. CLEAN-OUT PIPE AND FITTINGS SHALL BE PVC, UNLESS OTHERWISE SHOWN.
2. EXACT LOCATION AS DIRECTED BY ENGINEER.

SIDE SEWER CLEANOUT
NO SCALE — 5 / C106




SINGLE PIPE OFFSHORE TRENCH SECTION
NO SCALE — 2 / G6-B




CONCRETE ANCHOR FOR HDPE PIPE
NO SCALE — 6 / G4-B –

DIMENSIONS FOR HDPE PIPE ANCHORS

| NOMINAL DIA | AVERAGE OD (INCHES) | A (INCHES) | B (INCHES) | C (INCHES) | NUMBER OF STRAPS |
|---|---|---|---|---|---|
| 6.00 | 6.625 | 19 | 12 | 14 | SINGLE – CENTERED |
| 8.00 | 8.625 | 21 | 13 | 18 | SINGLE – CENTERED |
| 10.00 | 10.75 | 23 | 14 | 22 | DOUBLE – AS SHOWN |
| 12.00 | 12.75 | 25 | 15 | 28 | DOUBLE – AS SHOWN |
| 20.00 | 20.00 | 32 | 20 | 42 | DOUBLE – AS SHOWN |

* ANCHORS TO BE INSTALLED A MAX OF 10 FEET ON-CENTER

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DESIGN: JWL
DATE: OCT 2008
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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS HDPE PIPE

DRAWING NO. G5-B
SHEET 7 OF 77

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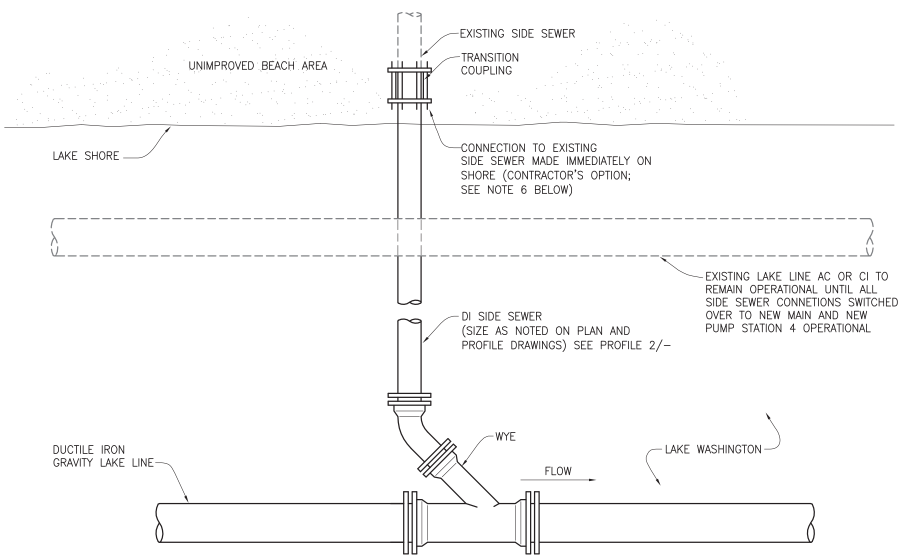
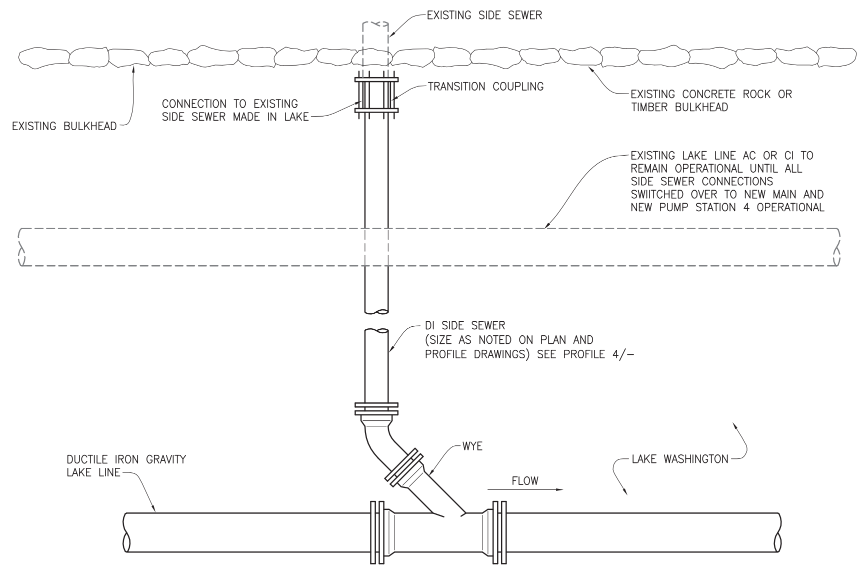
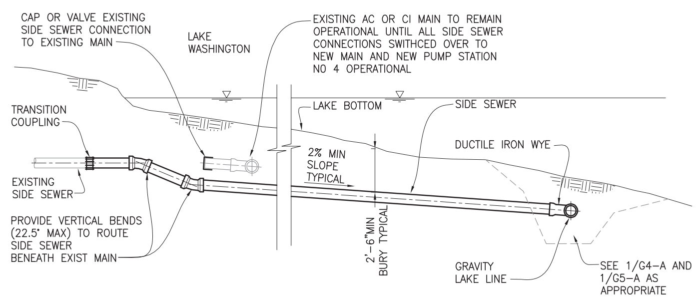



TYPE 1 SIDE SEWER CONNECTION PLAN
NO SCALE — C101–C107 — 1/C100



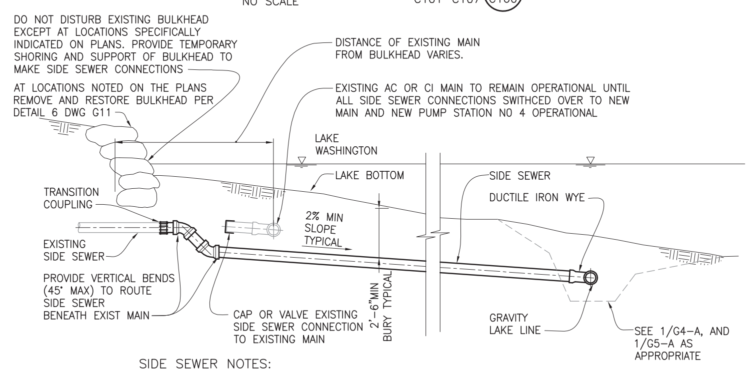

TYPE 2 SIDE SEWER CONNECTION PLAN
NO SCALE — C101–C107 — 3/C100




SIDE SEWER NOTES:

1. MAXIMUM DEFLECTION PER JOINT SHALL NOT EXCEED 3 DEGREES.
2. ON ALL SHORE CONNECTIONS, RESTORATION OF BEACH SHALL CONSIST OF BEACH GRAVEL OR BEACH SAND 9" DEEP TO MATCH EXISTING BEACH SURFACE.
3. SIDE SEWER BEDDING, BACKFILL AND TRENCH RESTORATION REQUIREMENTS PER DETAIL 2/G5–A.
4. CONTRACTOR TO VERIFY SIDE SEWER LOCATION, PIPE MATERIAL AND OD OF EXISTING SIDE SEWER IN ADVANCE OF BEGINNING CONNECTION WORK.
5. PROVIDE BENDS FOR HORIZONTAL ALIGNMENT AS REQUIRED. SEE SIDE SEWER TABLE ON DRAWING G4–A.
6. CONNECTION TO EXISTING SIDE SEWER MAY BE MADE IN LAKE RATHER THAN UPLAND UNIMPROVED BEACH AREA AT CONTRACTOR'S OPTION.

TYPE 1 SIDE SEWER CONNECTION -PROFILE
NO SCALE — C101–C107 — 2/C100




SIDE SEWER NOTES:

1. MAXIMUM DEFLECTION PER JOINT SHALL NOT EXCEED 3 DEGREES.
2. SIDE SEWER BEDDING, BACKFILL AND TRENCH RESTORATION REQUIREMENTS PER DETAIL 2/G5–A.
3. CONTRACTOR TO VERIFY SIDE SEWER LOCATION, PIPE MATERIAL AND OD OF EXISTING SIDE SEWER IN ADVANCE OF BEGINNING CONNECTION WORK.
4. PROVIDE BENDS FOR HORIZONTAL ALIGNMENT AS REQUIRED. SEE SIDE SEWER TABLE ON DRAWING G4–A.

TYPE 2 SIDE SEWER CONNECTION -PROFILE
NO SCALE — C101–C107 — 4/C100

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS
DUCTILE IRON PIPE

DRAWING NO. G6-A
SHEET 8 OF 77


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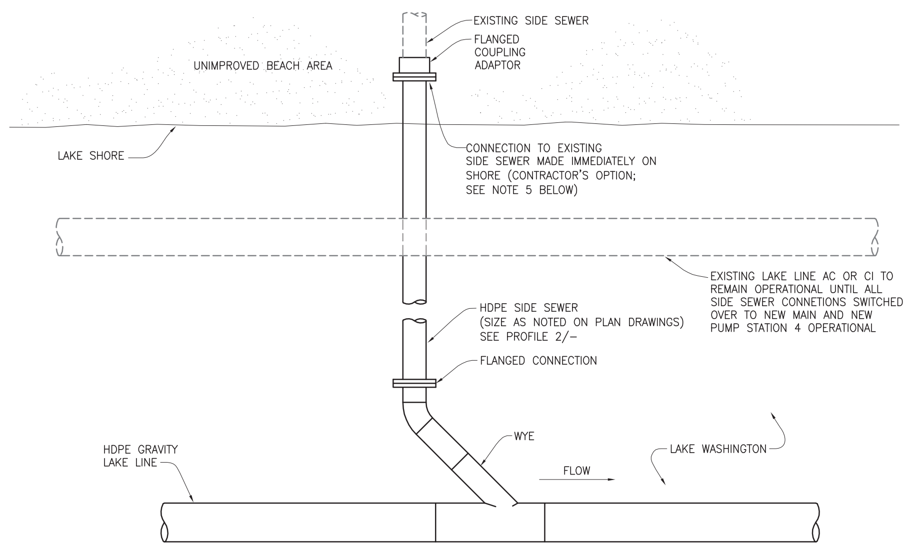
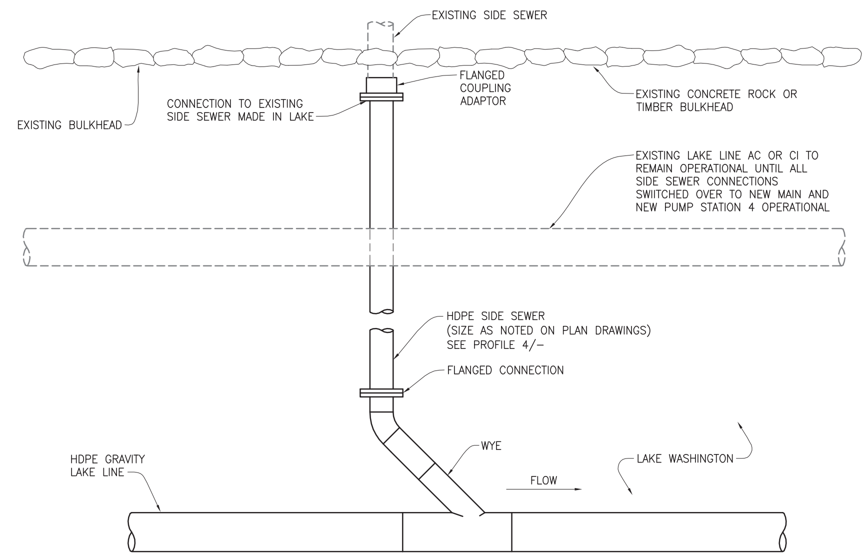
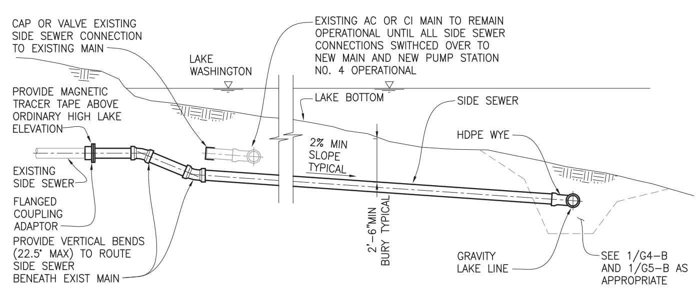



TYPE 1 SIDE SEWER
CONNECTION PLAN
NO SCALE C101–C107, 1/C100



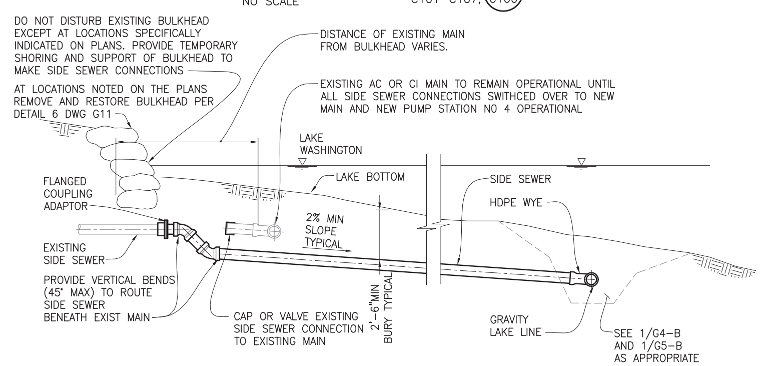

TYPE 2 SIDE SEWER
CONNECTION PLAN
NO SCALE C101–C107, 3/C100




SIDE SEWER NOTES:

1. ON ALL SHORE CONNECTIONS, RESTORATION OF BEACH SHALL CONSIST OF BEACH GRAVEL OR BEACH SAND 9" DEEP TO MATCH EXISTING BEACH SURFACE.
2. SIDE SEWER BEDDING, BACKFILL AND TRENCH RESTORATION REQUIREMENTS PER DETAIL 2/G5–B.
3. CONTRACTOR TO VERIFY SIDE SEWER LOCATION, PIPE MATERIAL AND OD OF EXISTING SIDE SEWER IN ADVANCE OF BEGINNING CONNECTION WORK PER SPECIFICATIONS.
4. PROVIDE BENDS FOR HORIZONTAL ALIGNMENT AS REQUIRED. SEE SIDE SEWER TABLE ON DRAWING G4–B.
5. CONNECTION TO EXISTING SIDE SEWER MAY BE MADE IN LAKE RATHER THAN UPLAND UNIMPROVED BEACH AREA AT CONTRACTOR'S OPTION.

TYPE 1 SIDE SEWER
CONNECTION -PROFILE
NO SCALE C101–C107, 2/C100




SIDE SEWER NOTES:

1. SIDE SEWER BEDDING, BACKFILL AND TRENCH RESTORATION REQUIREMENTS PER DETAIL 2/G5–B.
2. CONTRACTOR TO VERIFY SIDE SEWER LOCATION, PIPE MATERIAL AND OD OF EXISTING SIDE SEWER IN ADVANCE OF BEGINNING CONNECTION WORK.
3. PROVIDE BENDS FOR HORIZONTAL ALIGNMENT AS REQUIRED. SEE SIDE SEWER TABLE ON DRAWING G4–B.

TYPE 2 SIDE SEWER
CONNECTION -PROFILE
NO SCALE C101–C107, 4/C100

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| DESIGN | JWL |
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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
LAKE LINE DETAILS
HDPE PIPE

DRAWING NO.
G6-B
SHEET 9 OF 77

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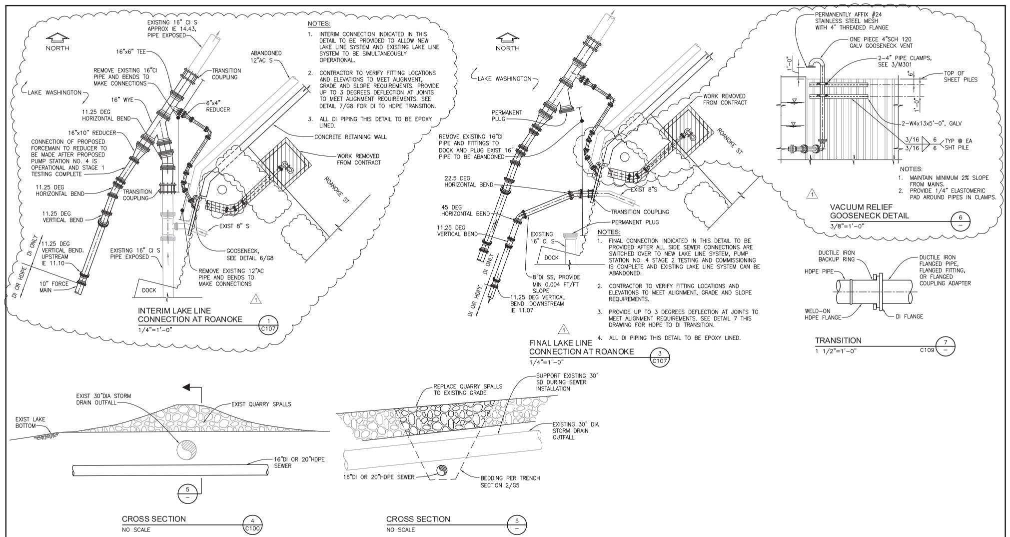


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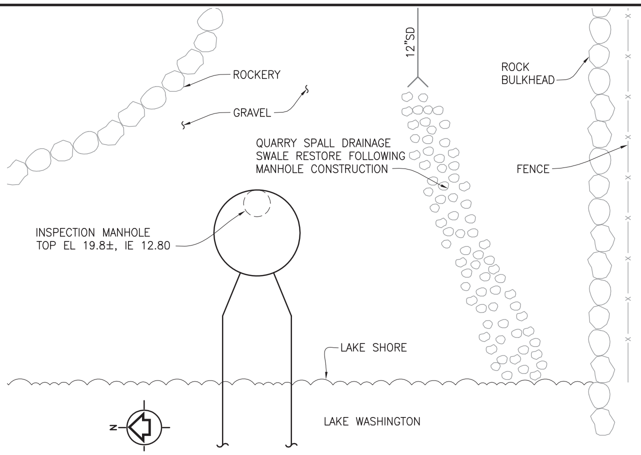
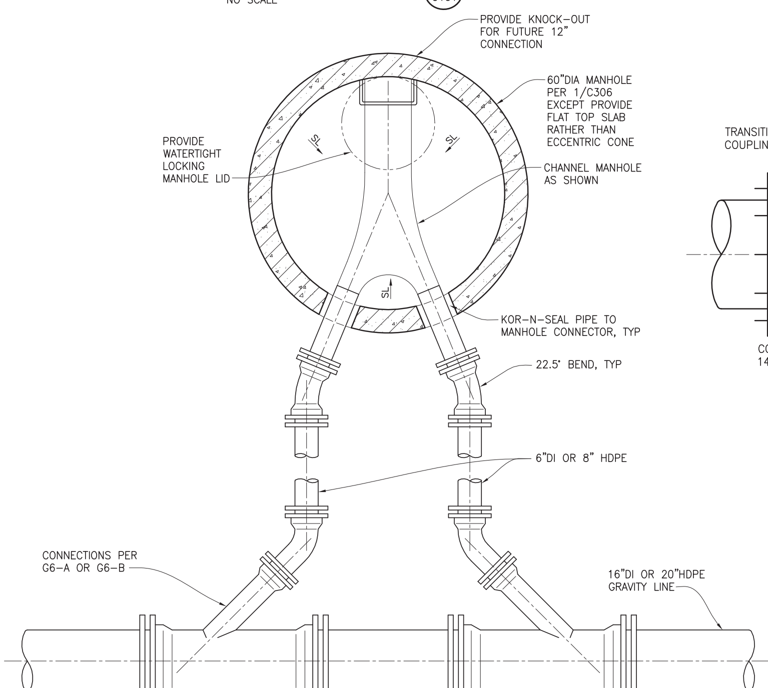
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS

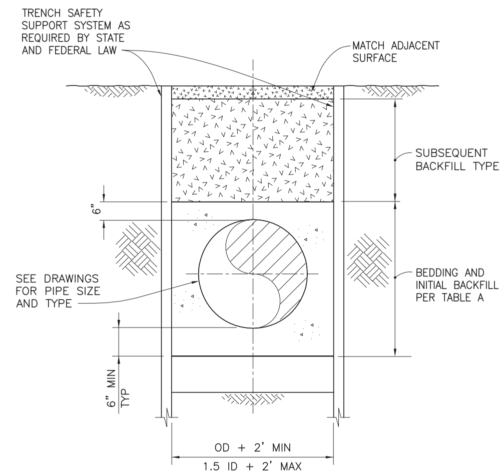
DRAWING NO. G8
SHEET 10 OF 77




SCHEMATIC PLAN AT CAULKINS LANDING (3 / C101)
NO SCALE

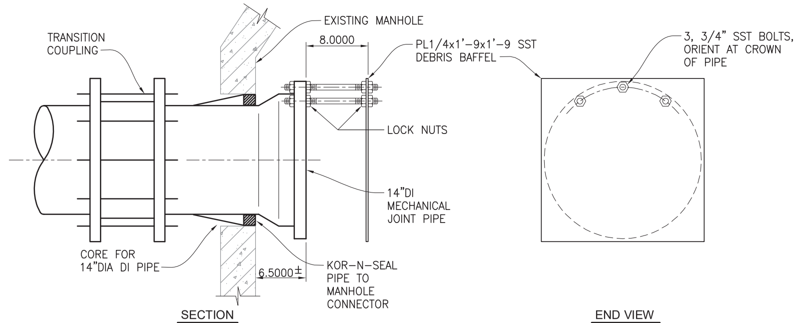



INSPECTION MANHOLE (2 / C101)
NO SCALE

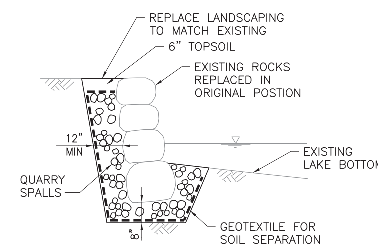



TYPICAL ONSHORE UTILITY TRENCH SECTION (5 / –)
NO SCALE

| TABLE A | |
|---|---|
| UTILITY | BEDDING AND INITIAL BACKFILL PER SECTION 02300 |
| SANITARY SEWER (SS) DUCTILE IRON | TYPE S |
| SANITARY SEWER (SS) PVC | TYPE D |
| STORM DRAINAGE (SD) | TYPE D |
| FOUL AIR (FA) | TYPE D |
| WASH WATER (WW) | TYPE L |
| RAW PUMPED SEWAGE (RS) | TYPE S |
| DRAIN (D) | TYPE D |
| AIR-VAC (AV) | TYPE L |
| POTABLE WATER (PW) | TYPE L |




DEBRIS BAFFLE (4 / C108)
NO SCALE




BULKHEAD RESTORATION (6 / C100)
NO SCALE
C106, C107, G6-A, G6-B

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| DESIGN | JWL |
| DATE | OCT 2008 |
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CITY OF MERCER ISLAND
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SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
LAKE LINE DETAILS

DRAWING NO. G11
SHEET 11 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAED1G11.dwg Plot date: Oct 13, 2008-08:41:51am CAD User: jeff.wicke.
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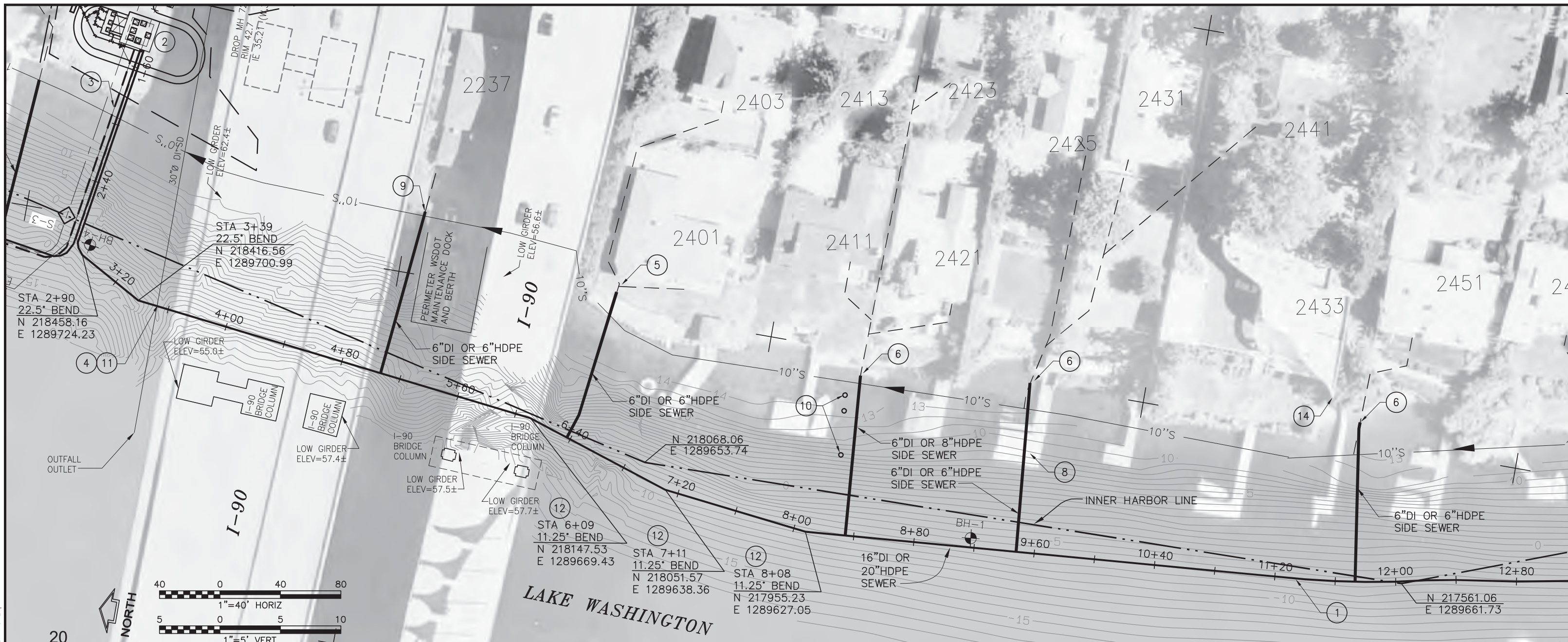


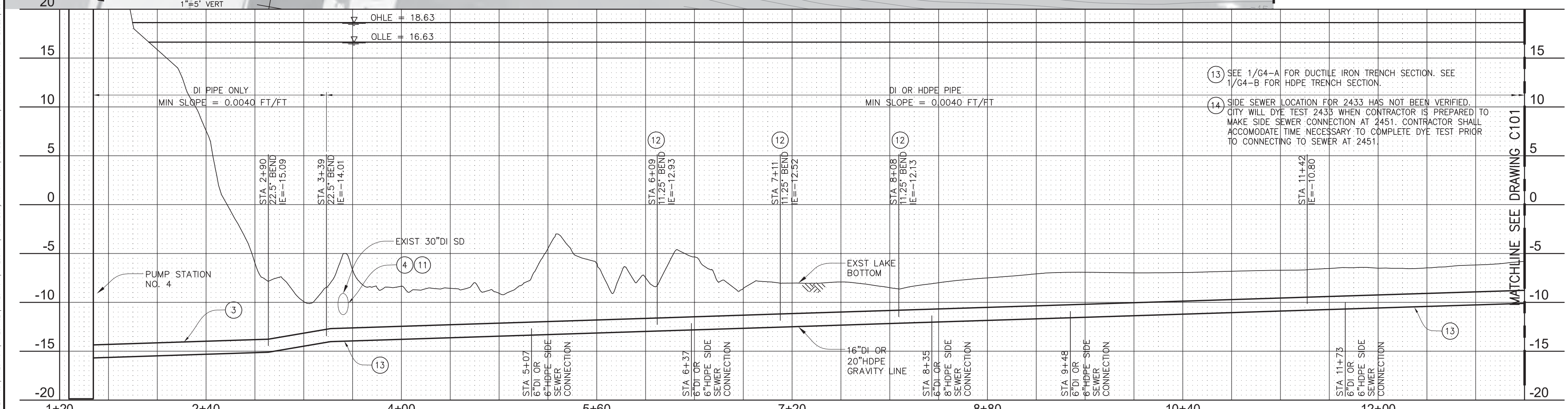


## CONSTRUCTION NOTES

1. FOR DI LAY PIPE USING 1° TO 3° DEFLECTION AT JOINTS FROM STA 11+42 TO 13+62. FOR HDPE PIPE, BEND PIPE. SEE MIN BEND RADIUS IN SPECS.
2. SEE SCHEDULE B DRAWINGS FOR PUMP STATION NO. 4 CONSTRUCTION.
3. SEE DRAWING C109 FOR PIPELINE PLAN AND PROFILE AT PUMP STATION NO. 4.
4. SUPPORT EXISTING 30"SD DURING SEWER INSTALLATION. RESTORE RIP-RAP TOPPING OVER TOP OF SD PIPE TO MATCH EXISTING CONDITIONS. SEE 4/G8.
5. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
6. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
7. NOT USED
8. DO NOT DISTURB EXISTING DOCK STRUCTURE DURING PIPE INSTALLATION. DEPTH OF EXISTING PILE PENETRATION TYPICALLY VARIES BETWEEN 3 FEET AND 10 FEET BELOW LAKE BOTTOM. SUPPORT DOCK AS NECESSARY. HAND DIG OR JET PIPE IN PLACE AS REQUIRED. DEPTH OF BURY OVER THE CROWN OF THE SIDE SEWER PIPE MAY BE REDUCED FROM 2'-6" MIN AS SHOWN ON THE SIDE SEWER PROFILES ON DWG G6-A AND G6-B TO 1' MIN UNDER THE DOCK STRUCTURE PROVIDED A MIN 2% PIPE SLOPE CAN BE MAINTAINED. THE REQUIRED 2'-6" MIN BURY SHALL BE MAINTAINED ONCE CLEAR OF THE DOCK STRUCTURE.
9. EXISTING SEWER MAIN ALIGNED DIRECTLY ADJACENT, OR UNDER EXISTING ROCK BULKHEAD. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B. REMOVE AND RESTORE ROCK BULKHEAD PER 6/G11 TO MAKE CONNECTION.
10. PROTECT EXISTING PILINGS.
11. CONFIRM BOTTOM OF PIPE ELEVATION OF EXISTING 30"SD AT CROSSING WITH NEW GRAVITY LINE PRIOR TO BEGINNING ANY PIPE LAYING OPERATIONS. REPORT ELEVATION TO THE ENGINEER, SEE 4/G8 AND SPECIFICATION SECTION 01014.
12. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BENDS. DO NOT EXCEED MANUFACTURER'S MIN BEND RADIUS.
13. SEE 1/G4-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G4-B FOR HDPE TRENCH SECTION.
14. SIDE SEWER LOCATION FOR 2433 HAS NOT BEEN VERIFIED. CITY WILL DYE TEST 2433 WHEN CONTRACTOR IS PREPARED TO MAKE SIDE SEWER CONNECTION AT 2451. CONTRACTOR SHALL ACCOMODATE TIME NECESSARY TO COMPLETE DYE TEST PRIOR TO CONNECTING TO SEWER AT 2451.


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| DESIGN | JWL |
| DATE | OCT 2008 |
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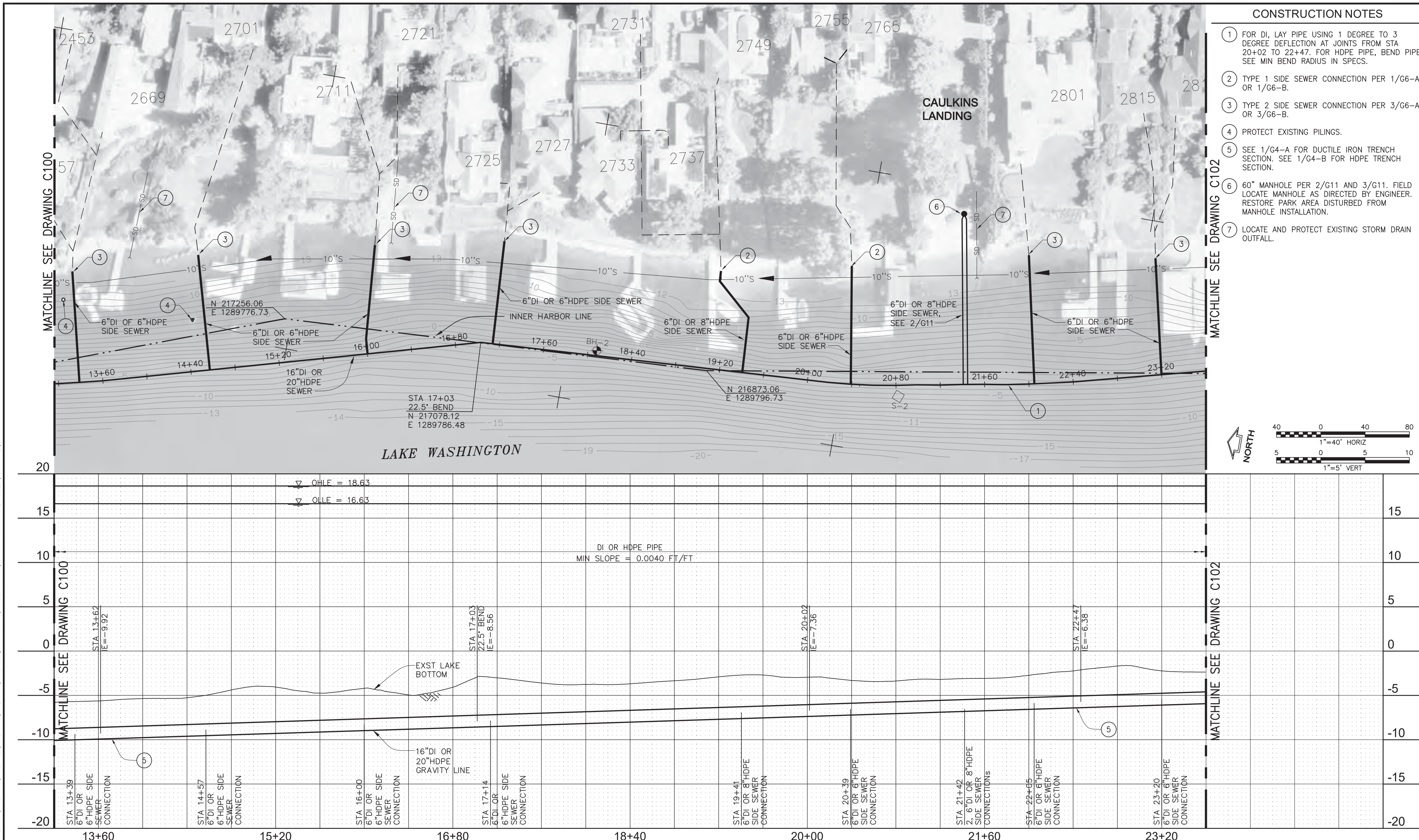
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 0+00 TO STA 13+20

DRAWING NO. C100




## CONSTRUCTION NOTES

1. FOR DI, LAY PIPE USING 1 DEGREE TO 3 DEGREE DEFLECTION AT JOINTS FROM STA 20+02 TO 22+47. FOR HDPE PIPE, BEND PIPE. SEE MIN BEND RADIUS IN SPECS.
2. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
3. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
4. PROTECT EXISTING PILINGS.
5. SEE 1/G4-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G4-B FOR HDPE TRENCH SECTION.
6. 60" MANHOLE PER 2/G11 AND 3/G11. FIELD LOCATE MANHOLE AS DIRECTED BY ENGINEER. RESTORE PARK AREA DISTURBED FROM MANHOLE INSTALLATION.
7. LOCATE AND PROTECT EXISTING STORM DRAIN OUTFALL.

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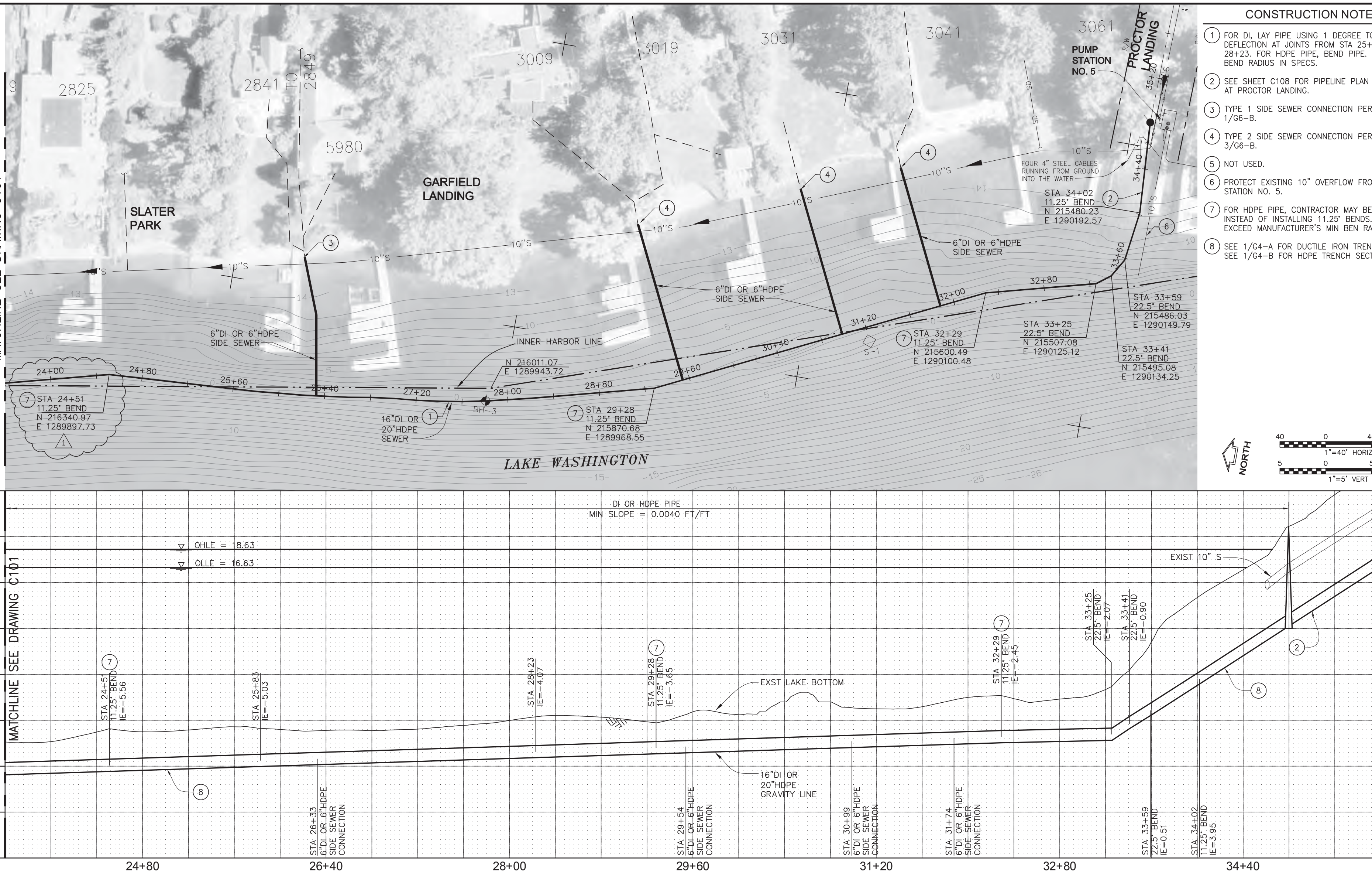
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 13+20 TO STA 23+60

DRAWING NO. C101




## CONSTRUCTION NOTES

1. FOR DI, LAY PIPE USING 1 DEGREE TO 3 DEGREE DEFLECTION AT JOINTS FROM STA 25+83 TO 28+23. FOR HDPE PIPE, BEND PIPE. SEE MIN BEND RADIUS IN SPECS.
2. SEE SHEET C108 FOR PIPELINE PLAN AND PROFILE AT PROCTOR LANDING.
3. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
4. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
5. NOT USED.
6. PROTECT EXISTING 10" OVERFLOW FROM PUMP STATION NO. 5.
7. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BENDS. DO NOT EXCEED MANUFACTURER'S MIN BEN RADIUS.
8. SEE 1/G4-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G4-B FOR HDPE TRENCH SECTION.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SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 23+60 TO STA 35+60

DRAWING NO. C102



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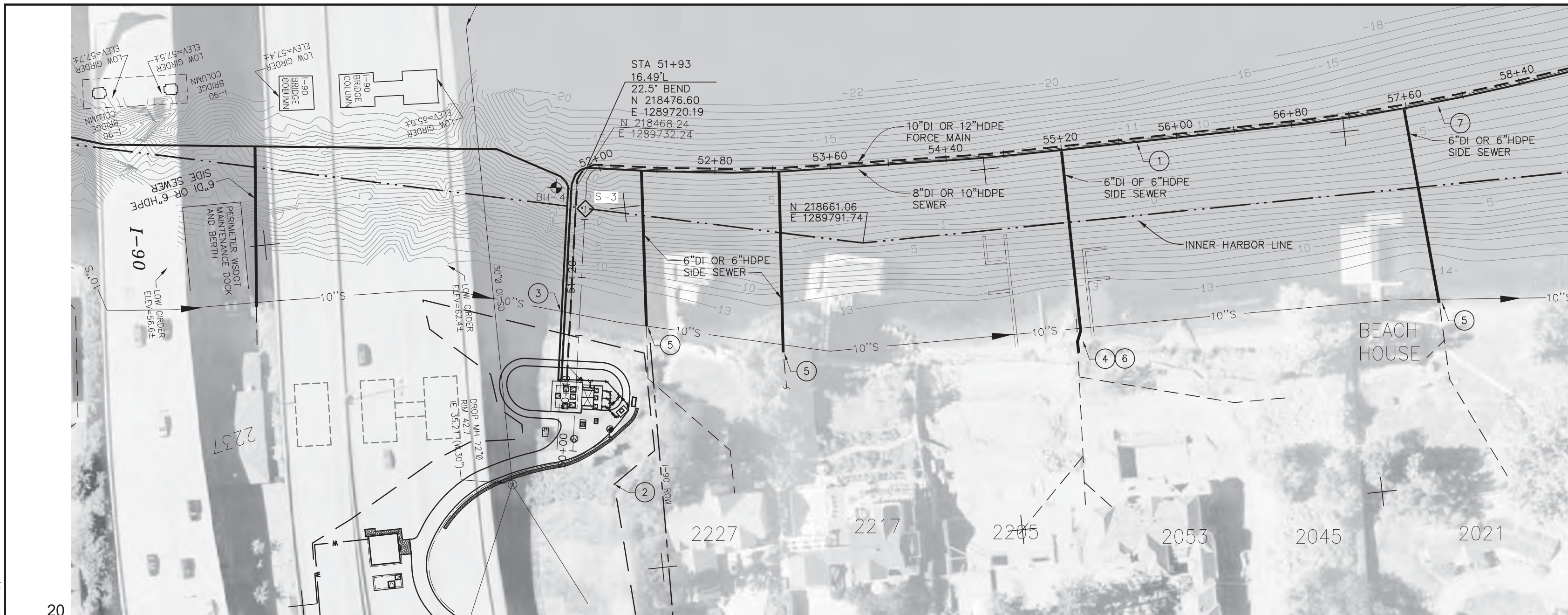
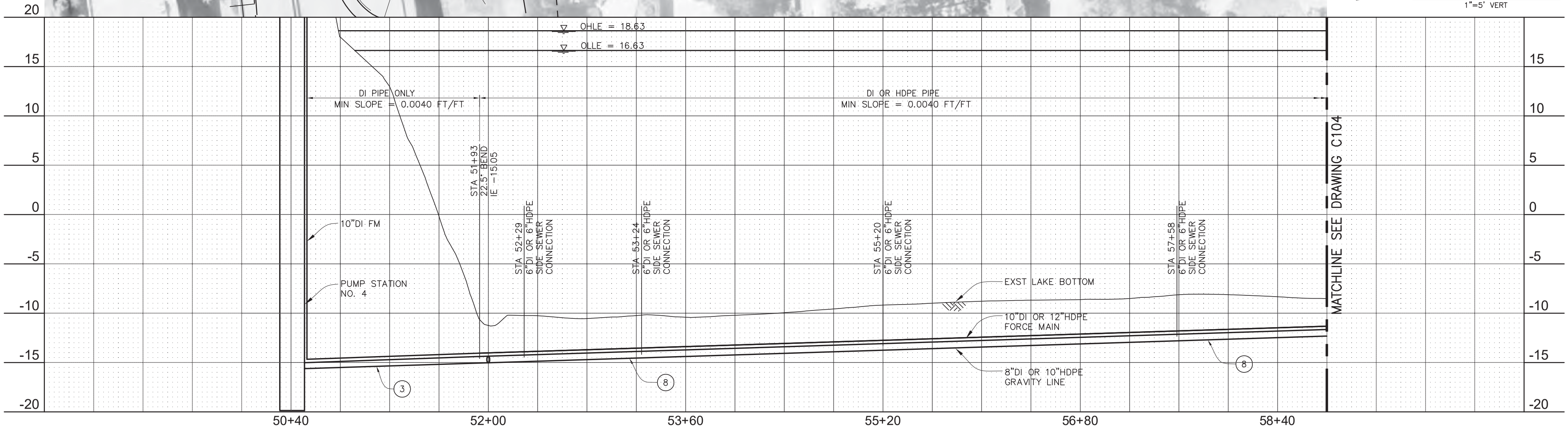



## CONSTRUCTION NOTES

1. FOR DI LAY PIPE USING 1 DEGREE TO 3 DEGREE DEFLECTION AT JOINTS FROM STA 51+93 TO 59+04. FOR HDPE PIPE, BEND PIPE. SEE MIN BEND RADIUS IN SPECS.
2. SEE SCHEDULE B DRAWINGS FOR PUMP STATION NO. 4 CONSTRUCTION.
3. SEE DRAWING C109 FOR PIPELINE PLAN AND PROFILE AT PUMP STATION NO. 4.
4. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
5. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
6. EXISTING CHECK VALVE INSTALLED 3 FEET EAST OF EXISTING LAKELINE. REPLACE CHECK VALVE AND LOCATE IMMEDIATELY UPSTREAM OF NEW SIDE SEWER CONNECTION LOCATION.
7. HORIZONTAL BEND LOCATIONS SHOWN FOR 8"SS ONLY. PROVIDE SIMILAR BENDS FOR 10"FM TO MAINTAIN HORIZONTAL ALIGNMENT PER 1/G5.
8. SEE 1/G5-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G5-B FOR HDPE TRENCH SECTION.

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SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 50+00 TO STA 58+80

DRAWING NO. C103
SHEET 15 OF 77

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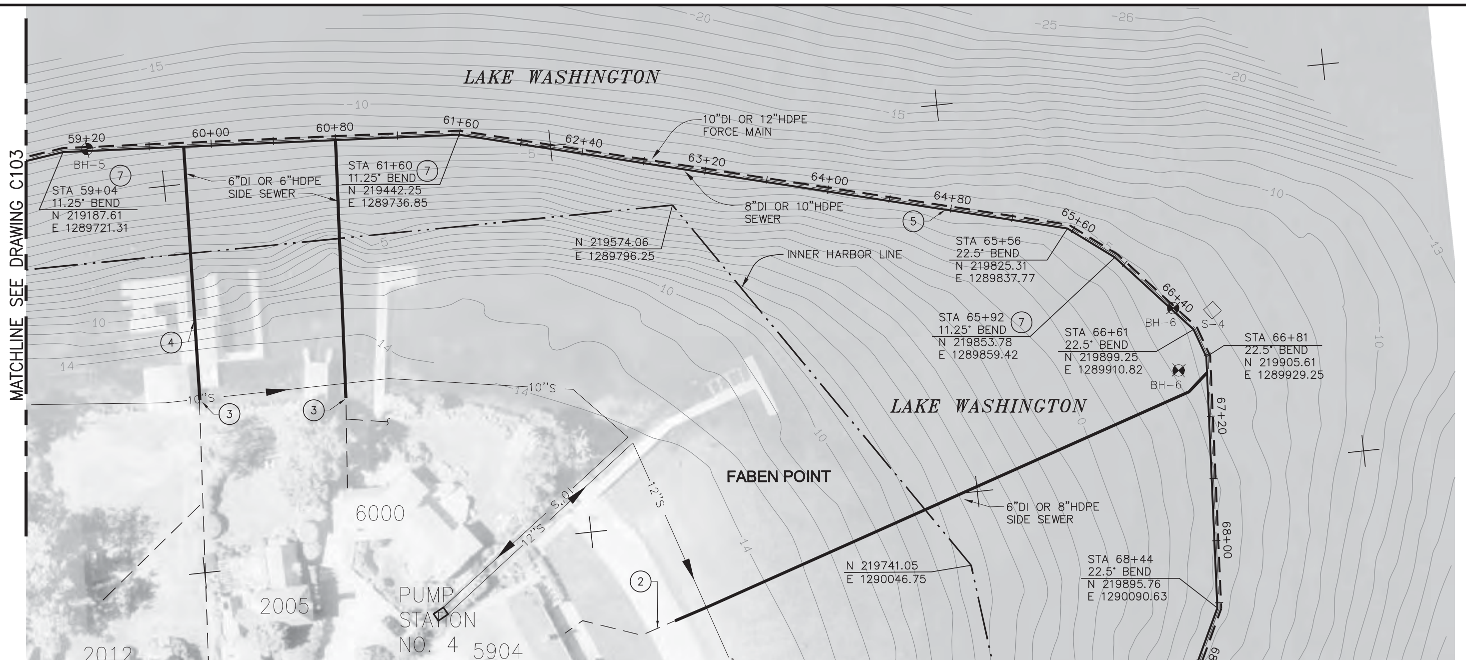


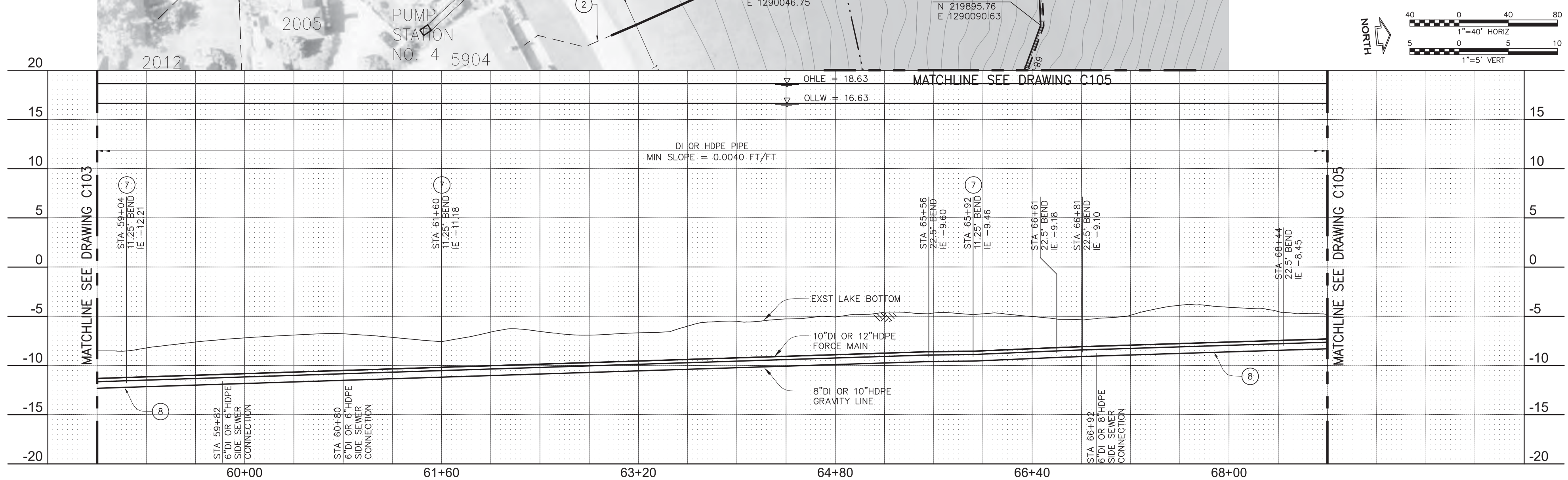


## CONSTRUCTION NOTES

1. NOT USED
2. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
3. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
4. DO NOT DISTURB EXISTING DOCK STRUCTURE DURING PIPE INSTALLATION. DEPTH OF EXISTING PILE PENETRATION TYPICALLY VARIES BETWEEN 3 FEET AND 10 FEET BELOW LAKE BOTTOM. SUPPORT DOCK AS NECESSARY. HAND DIG OR JET PIPE IN PLACE AS REQUIRED. DEPTH OF BURY OVER THE CROWN OF THE SIDE SEWER PIPE MAY BE REDUCED FROM 2'-6" MIN AS SHOWN ON THE SIDE SEWER PROFILES ON DWG G6-A AND G6-B TO 1' MIN UNDER THE DOCK STRUCTURE PROVIDED A MIN 2% PIPE SLOPE CAN BE MAINTAINED. THE REQUIRED 2'-6" MIN BURY SHALL BE MAINTAINED ONCE CLEAR OF THE DOCK STRUCTURE.
5. HORIZONTAL BEND LOCATIONS SHOWN FOR 8"DI OR 10"HDPE GRAVITY ONLY. PROVIDE SIMILAR BENDS FOR 10"DI OR 12"HDPE FORCE MAIN TO MAINTAIN HORIZONTAL ALIGNMENT PER 1/G5-A OR 1/G5-B.
6. NOT USED
7. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BENDS. DO NOT EXCEED MANUFACTURER'S MINIMUM BEND RADIUS.
8. SEE 1/G5-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G5-B FOR HDPE TRENCH SECTION.


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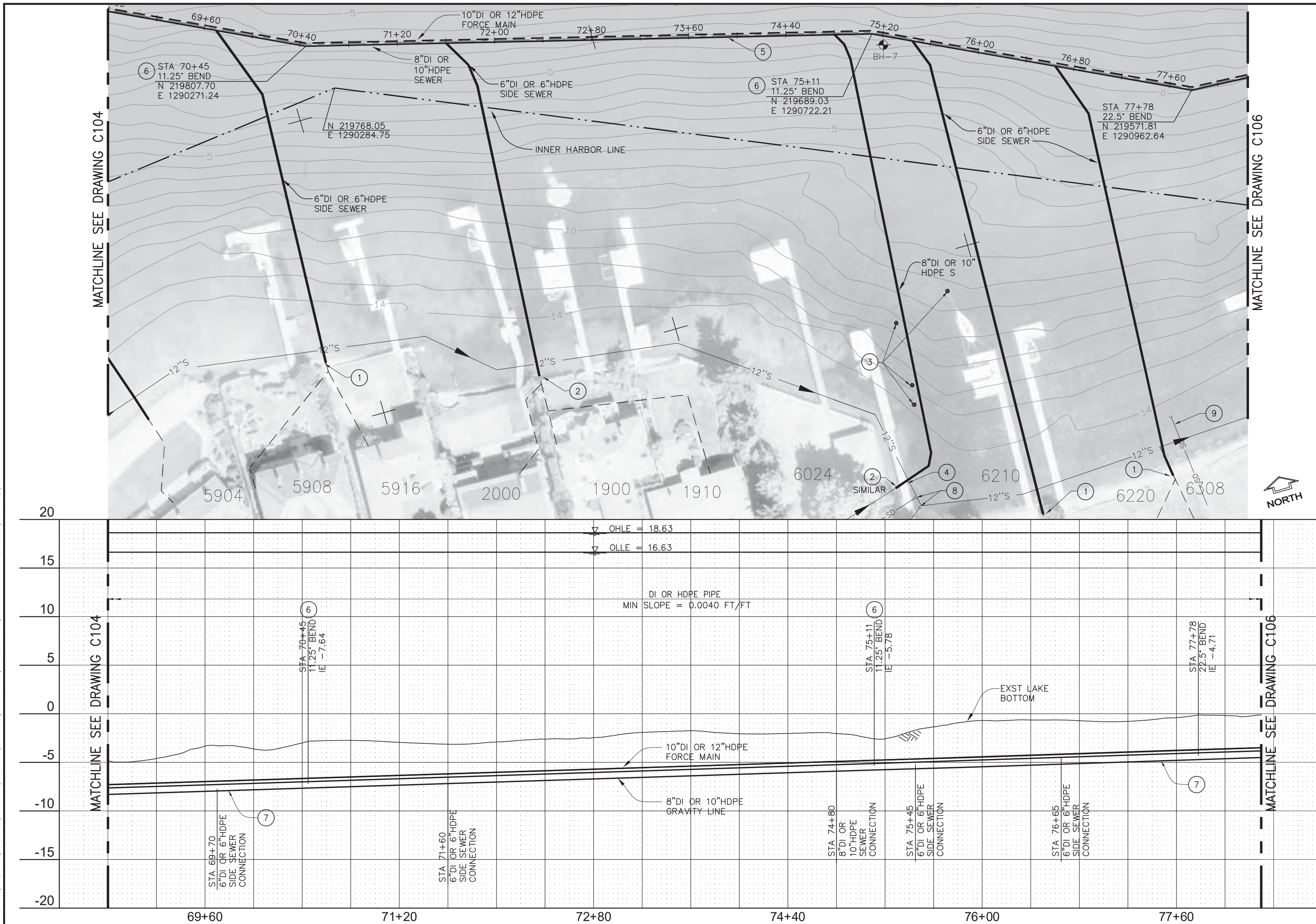
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 58+80 TO STA 68+80

DRAWING NO.
C104




## CONSTRUCTION NOTES

1. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
2. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
3. PROTECT EXISTING PILING.
4. DO NOT DISTURB EXISTING DOCK STRUCTURE DURING PIPE INSTALLATION. DEPTH OF EXISTING PILE PENETRATION TYPICALLY VARIES BETWEEN 3 FEET AND 10 FEET BELOW LAKE BOTTOM. SUPPORT DOCK AS NECESSARY. HAND DIG OR JET PIPE IN PLACE AS REQUIRED. DEPTH OF BURY OVER THE CROWN OF THE SIDE SEWER PIPE MAY BE REDUCED FROM 2'-6" MIN AS SHOWN ON THE SIDE SEWER PROFILES ON DWG G6-A AND G6-B TO 1' MIN UNDER THE DOCK STRUCTURE PROVIDED A MIN 2% PIPE SLOPE CAN BE MAINTAINED. THE REQUIRED 2'-6" MIN BURY SHALL BE MAINTAINED ONCE CLEAR OF THE DOCK STRUCTURE.
5. HORIZONTAL BEND LOCATIONS SHOWN FOR 8"DI OR 10"HDPE GRAVITY ONLY. PROVIDE SIMILAR BENDS FOR 10"DI OR 12"HDPE FORCE MAIN TO MAINTAIN HORIZONTAL ALIGNMENT PER 1/G5-A OR 1/G5-B.
6. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BENDS. DO NOT EXCEED MANUFACTURER'S MINIMUM BEND RADIUS.
7. SEE 1/G5-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G5-B FOR HDPE TRENCH SECTION.
8. LOCATE AND PROTECT EXISTING 12" AND 18" STORM DRAINAGE OUTFALLS.
9. LOCATE AND PROTECT EXISTING 8" STORM DRAINAGE OUTFALL.

40 0 40 80
1"=40' HORIZ
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1"=5' VERT


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SCHEDULE A
PLAN AND PROFILE
STA 68+80 TO STA 78+30

DRAWING NO.
C105

SHEET 17 OF 77

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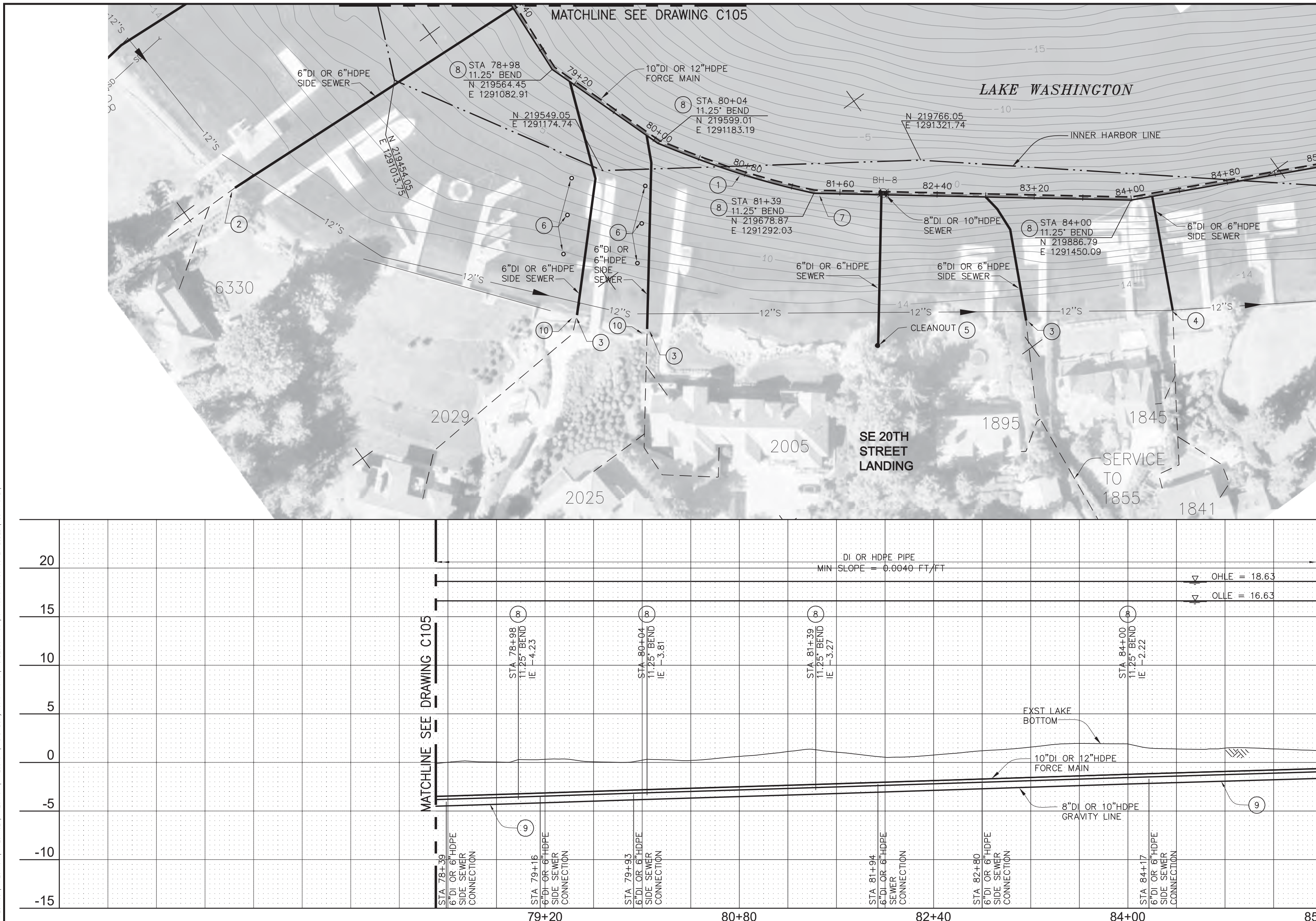


## CONSTRUCTION NOTES

1. FOR DI, LAY PIPE USING 1 DEGREE TO 3 DEGREE DEFLECTION AT JOINTS FROM STA 80+04 TO 81+39. FOR HDPE PIPE, BEND PIPE. SEE MIN BEND RADIUS IN SPECS.
2. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
3. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
4. EXISTING SEWER MAIN ALIGNED DIRECTLY ADJACENT, OR UNDER EXISTING ROCK BULKHEAD. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B. REMOVE AND RESTORE ROCK BULKHEAD PER 6/G11 TO MAKE CONNECTION.
5. PROVIDE CLEANOUT PER TO 5/G5-A OR 5/G5-B. FIELD LOCATE AS DIRECTED BY ENGINEER.
6. PROTECT EXISTING PILINGS.
7. HORIZONTAL BEND LOCATIONS SHOWN FOR 8"DI OR 10"HDPE GRAVITY ONLY. PROVIDE SIMILAR BENDS FOR 10"DI OR 12"HDPE FORCE MAIN TO MAINTAIN HORIZONTAL ALIGNMENT PER 1/G5-A OR 1/G5-B.
8. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BENDS. DO NOT EXCEED MANUFACTURER'S MIN BEND RADIUS.
9. SEE 1/G5-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G5-B FOR HDPE TRENCH SECTION.
10. INVISIBLE DOG FENCE BURIED AT SHORELINE. LOCATE AND PROTECT WHEN MAKING SIDE SEWER CONNECTION.


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CITY OF MERCER ISLAND
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SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 78+30 TO STA 85+60

DRAWING NO. C106

SHEET 18 OF 77


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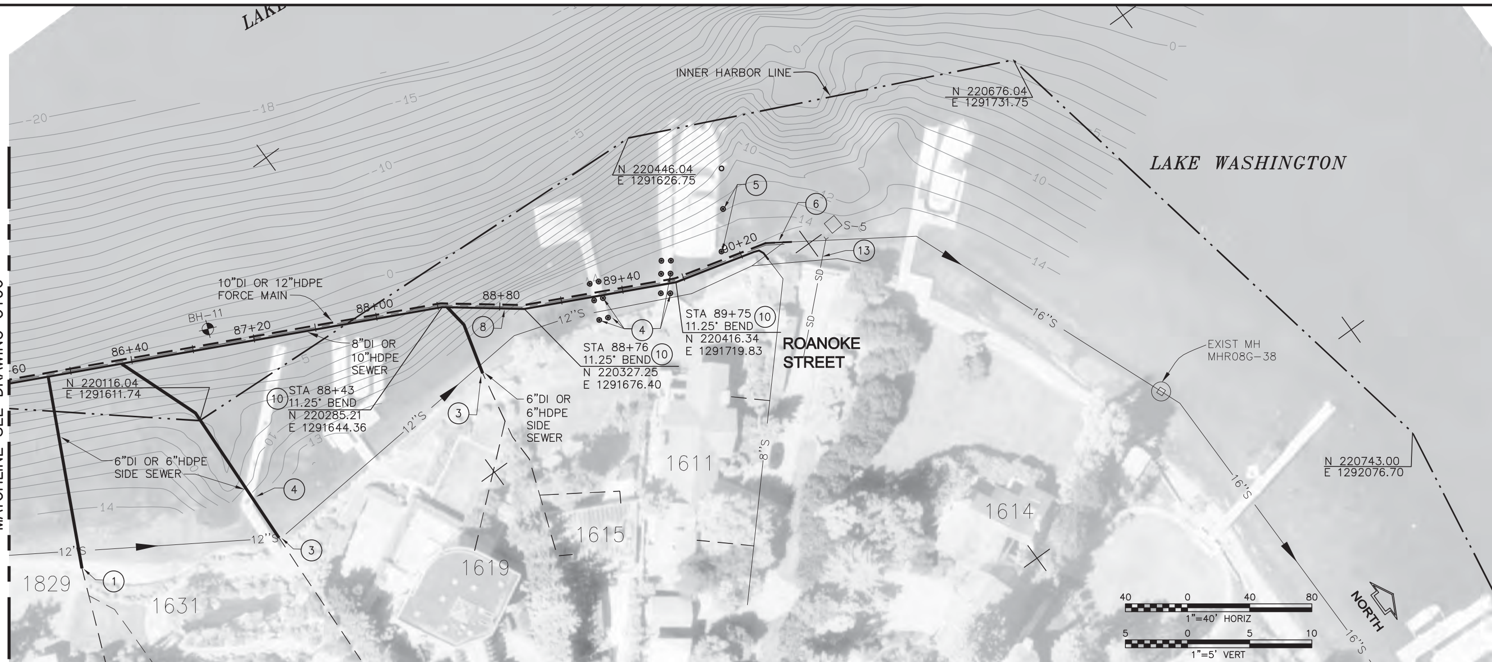


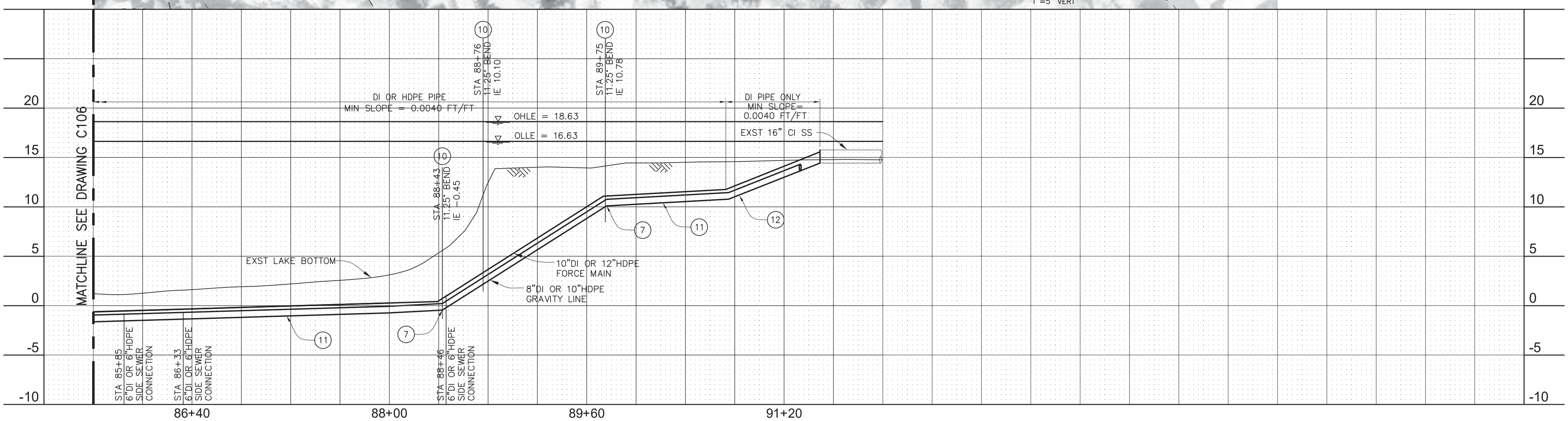


## CONSTRUCTION NOTES

1. TYPE 1 SIDE SEWER CONNECTION PER 1/G6-A OR 1/G6-B.
2. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B.
3. EXISTING SEWER MAIN ALIGNED DIRECTLY ADJACENT TO, OR UNDER EXISTING ROCK BULKHEAD. TYPE 2 SIDE SEWER CONNECTION PER 3/G6-A OR 3/G6-B. REMOVE AND RESTORE ROCK BULKHEAD PER 6/G11 TO MAKE CONNECTION.
4. DO NOT DISTURB EXISTING DOCK STRUCTURE DURING PIPE INSTALLATION. DEPTH OF EXISTING PILE PENETRATION TYPICALLY VARIES BETWEEN 3 FEET AND 10 FEET BELOW LAKE BOTTOM. SUPPORT DOCK AS NECESSARY. HAND DIG OR JET PIPE IN PLACE AS REQUIRED.
5. PROTECT EXISTING PILINGS.
6. INTERIM AND FINAL 10"DI FORCE MAIN AND 8"DI GRAVITY CONNECTIONS PER 1/G8 AND 3/G8.
7. FOR DI, PROVIDE 11.25° VERTICAL BEND TO MAINTAIN VERTICAL ALIGNMENT AS REQUIRED.
8. HORIZONTAL BEND LOCATIONS SHOWN FOR 8"DI OR 10"HDPE GRAVITY UP TO CONNECTION POINT WITH EXISTING LINES. PROVIDE SIMILAR BENDS FOR 10"DI OR 12"HDPE FORCE MAIN TO MAINTAIN HORIZONTAL ALIGNMENT PER 1/G5-A OR 1/G5-B.
9. NOT USED.
10. FOR HDPE PIPE, CONTRACTOR MAY BEND PIPE INSTEAD OF INSTALLING 11.25° BEND, DO NOT EXCEED MANUFACTURER'S MIN BEND RADIUS.
11. SEE 1/G5-A FOR DUCTILE IRON TRENCH SECTION. SEE 1/G5-B FOR HDPE TRENCH SECTION.
12. DI PIPE AND FITTINGS ABOVE ELEVATION 10.0 SHALL BE EPOXY LINED.
13. LOCATE AND PROTECT EXISTING 12" STORM DRAINAGE OUTFALL.


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**CITY OF MERCER ISLAND**
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
STA 85+60 TO STA 92+00

DRAWING NO. C107

SHEET 19 OF 77


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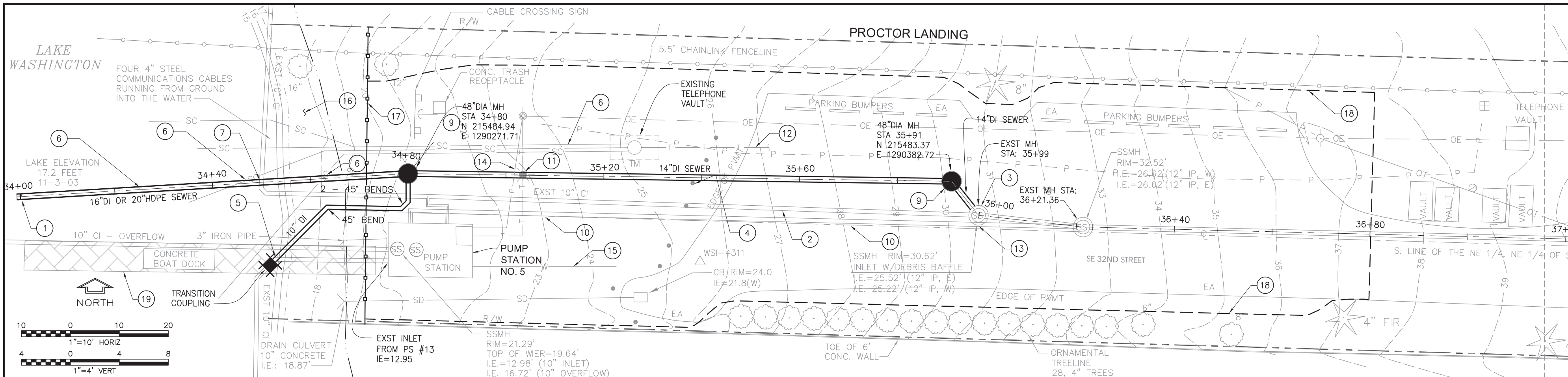
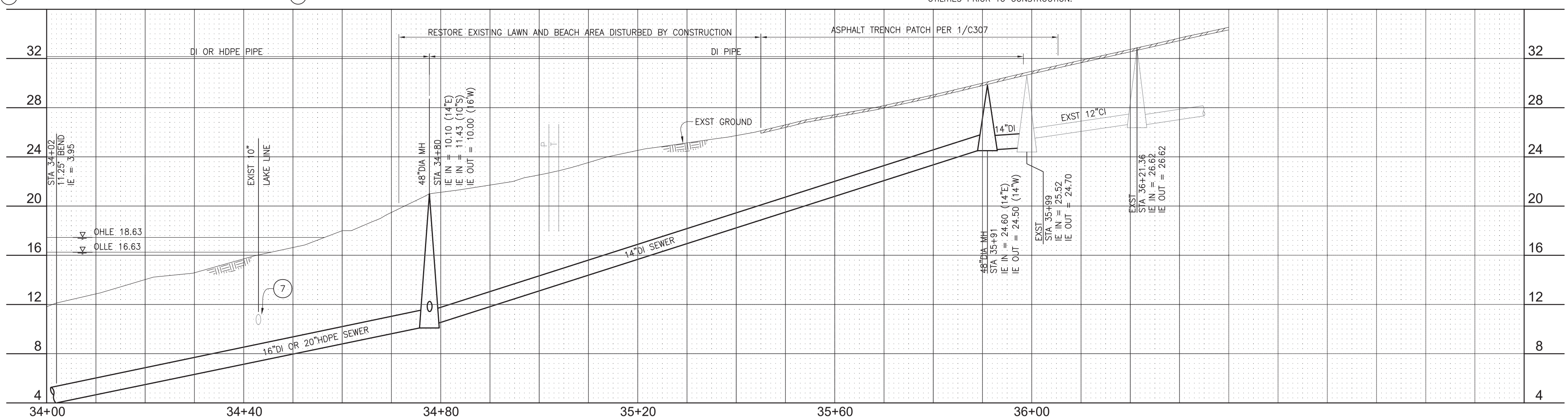



## CONSTRUCTION NOTES

1. SEE DRAWING C102 FOR CONTINUATION OF PIPELINE PLAN AND PROFILE.
2. EXISTING 10"SS TO REMAIN IN SERVICE UNTIL ALL SIDE SEWER CONNECTIONS ARE SWITCHED OVER TO NEW MAIN AND STAGE 2 TESTING COMPLETE FOR PUMP STATION NO. 4.
3. CORE EXISTING MANHOLE FOR 14"DI SEWER CONNECTION. PROVIDE DEBRIS BAFFLE ON INLET PIPE PER 4/G11.
4. REMOVE AND REPLACE EXISTING BOLLARDS.
5. REMOVE EXISTING ELBOW AND CONNECT TO EXISTING 10"CI PIPE FROM PUMP STATION NO. 13.
6. EXISTING STEEL COMMUNICATIONS CABLES ARE ABANDONED, DO NOT REMOVE.
7. HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING 10" LAKE LINE SHOWN ARE APPROXIMATE. POTHOLE EXISTING 10" CAST IRON LAKE LINE AT CROSSING WITH NEW GRAVITY LINE PRIOR TO BEGINNING ANY PIPE LAYING OPERATIONS. REPORT ELEVATION TO ENGINEER.
8. NOT USED.
9. SEE DETAIL 1/C306 FOR MANHOLE DETAIL.
10. EXISTING BYPASS PIPE TO PUMP STATION NO. 5 TO REMAIN.
11. PROTECT EXISTING STREET LIGHT.
12. EXISTING UNDERGROUND TELEPHONE DUCT NOT LOCATED BUT KNOWN TO EXIST. CONTRACTOR TO VERIFY LOCATION WITH UTILITY.
13. REMOVE EXISTING DEBRIS BAFFLE AND PLUG END OF EXISTING 10"SS WITH GROUT A MINIMUM OF FIVE FEET, FULL PIPE SECTION. AFTER ALL SIDE SEWER CONNECTIONS SWITCHED OVER TO NEW MAIN AND NEW PUMP STATION NO. 4 OPERATIONAL.
14. EXISTING UNDERGROUND TELEPHONE AND POWER NOT LOCATED BUT KNOWN TO EXIST. CONTRACTOR TO VERIFY LOCATION WITH UTILITIES PRIOR TO CONSTRUCTION.
15. EXISTING UNDERGROUND WATER SERVICE NOT LOCATED BUT KNOWN TO EXIST. CONTRACTOR TO VERIFY LOCATION WITH UTILITIES PRIOR TO CONSTRUCTION.
16. PROVIDE TESC PER SPECIFICATION SECTION 02250.
17. SILT FENCE.
18. WORK LIMITS AND AVAILABLE STAGING AREA. RESTORE ALL DISTURBED LANDSCAPING, PAVEMENT, SURFACE FEATURES, UTILITIES, ETC. DISTURBED WITHIN WORK LIMITS.
19. EXISTING BOAT DOCK AVAILABLE TO CONTRACTOR FOR TRANSPORTATION OF PERSONNEL. BOAT DOCK TO REMAIN ACCESSIBLE TO CITY STAFF.

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
PROCTOR LANDING

DRAWING NO. C108
SHEET 20 OF 77

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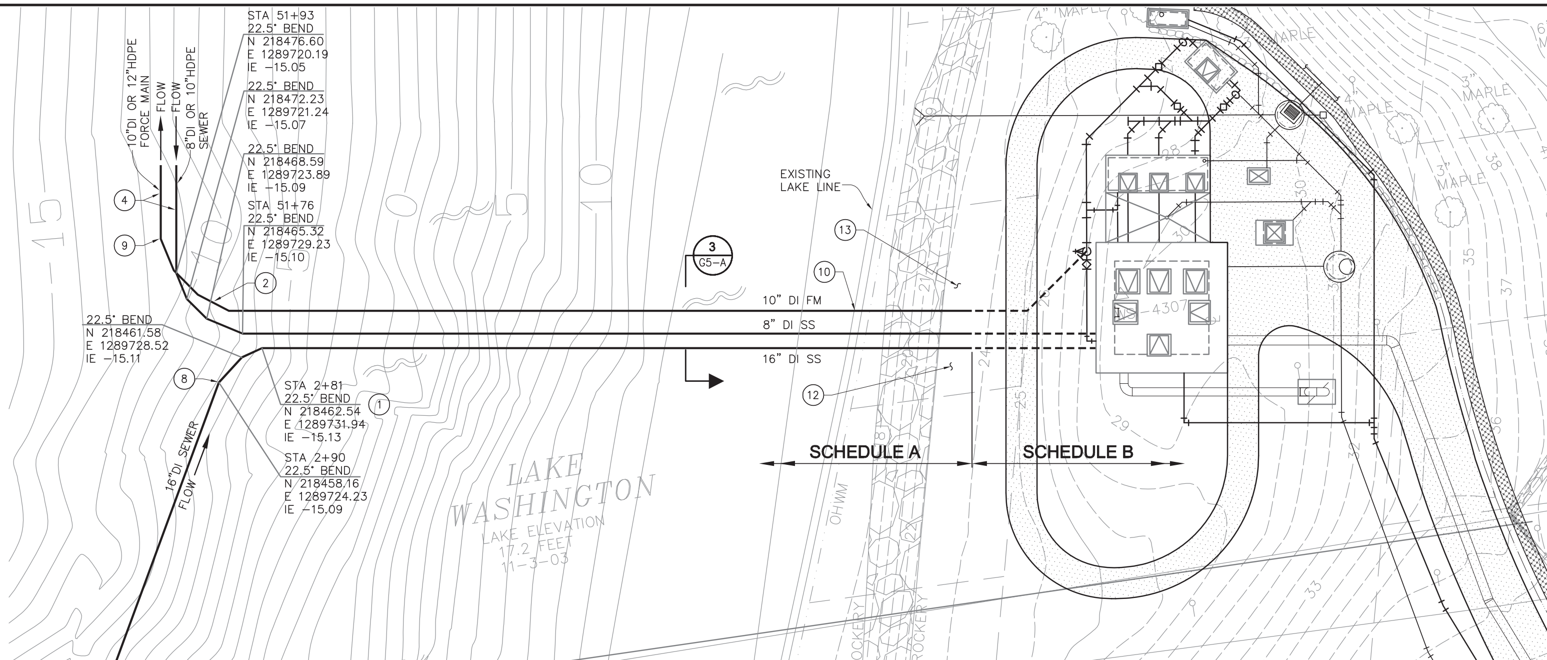


## CONSTRUCTION NOTES

1. DEFLECT JOINT AT BEND APPROXIMATELY 2' TO MAINTAIN REQUIRED HORIZONTAL ALIGNMENT TO PUMP STATION NO. 4.
2. PROVIDE HORIZONTAL BENDS AS REQUIRED ON 10"FM TO MAINTAIN ALIGNMENT.
3. CONNECT TO 16" SS, 8" SS AND 10" FM INSTALLED BY SCHEDULE B CONTRACTOR. SEE SPECIFICATION SECTION 01014 FOR CONSTRAINTS AND MILESTONES
4. SEE 7/G8 FOR DI TO HDPE TRANSITION AS NECESSARY.
5. 16" SS SHALL BE EPOXY LINED DI CLASS 55 BETWEEN PUMP STATION NO. 4 AND STA 2+81.
6. 8" SS SHALL BE EPOXY LINED DI CLASS 55 BETWEEN PUMP STATION NO. 4 AND STA 51+76.
7. REMOVE AND REPLACE EXISTING ROCK BULKHEAD.
8. SEE DRAWING C100 FOR CONTINUATION OF PLAN AND PROFILE.
9. SEE DRAWING C103 FOR CONTINUATION OF PLAN AND PROFILE.
10. BYPASS FLOW IN EXISTING 10"AC LAKELINE AS NECESSARY.
11. 10" FM SHALL BE EPOXY LINED DI CLASS 55 BETWEEN PUMP STATION NO. 4 AND STA 51+93. MAINTAIN CONSTANT PIPE GRADIENT TO PREVENT HIGH POINT IN FORCE MAIN.
12. SCHEDULE A CONTRACTOR TO RESTORE DISTURBED ONSHORE WORK AREA TO ORIGINAL CONDITIONS AND GRADES.
13. PROVIDE TESC PER SPECIFICATION SECTION 02250. COORDINATE WITH SCHEDULE B CONTRACTORS TESC PLAN.

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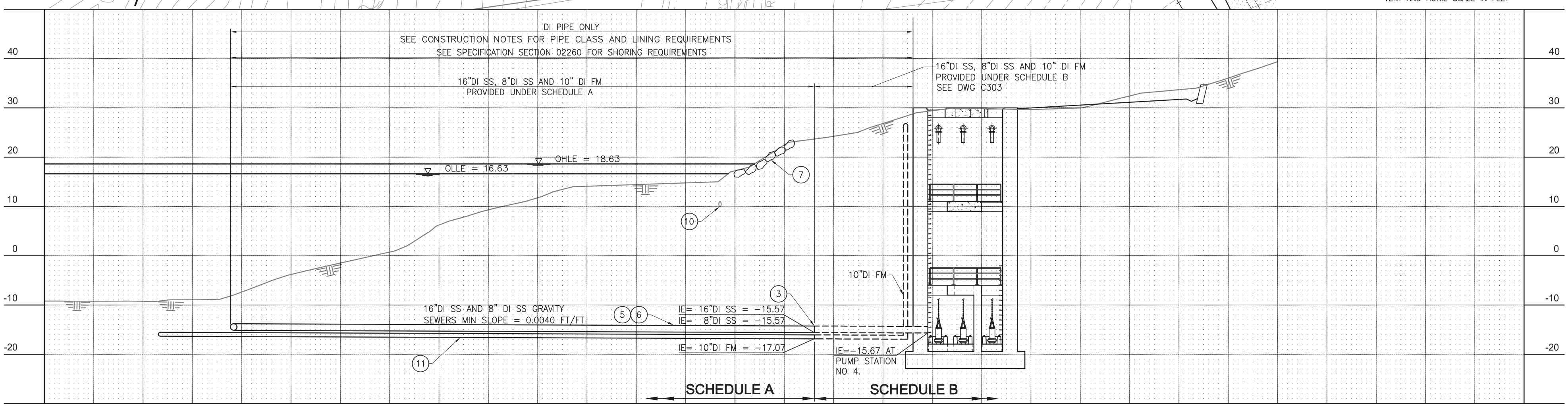


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CITY OF MERCER ISLAND
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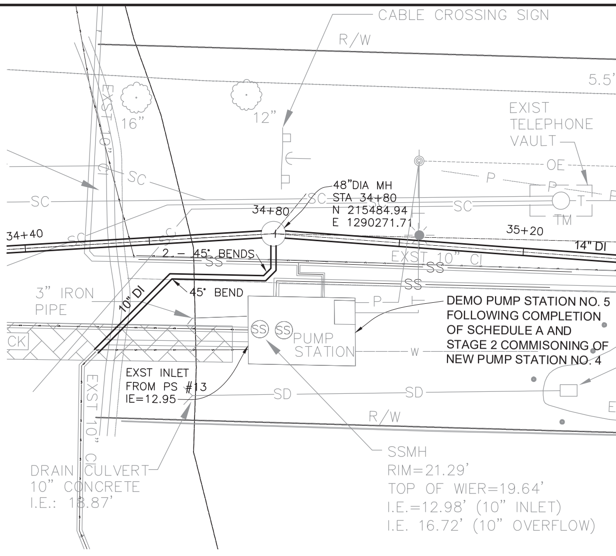
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE A
PLAN AND PROFILE
PUMP STATION NO. 4

DRAWING NO.
C109
SHEET 21 OF 77




EXISTING PUMP STATION NO. 5
SITE PLAN
1"=10'
1
–

EXISTING PUMP STATION NO. 5
DEMOLITION NOTES:

1. COORDINATE DEMOLITION SCHEDULE WITH ENGINEER.
2. COORDINATE ELECTRICAL SERVICE DISCONNECTION WITH UTILITY AND REMOVE ALL SERVICE EQUIPMENT NOT REMOVED BY UTILITY TO A POINT ONE FOOT BELOW GRADE. RESTORE DISTURBED SURFACES TO MATCH ADJACENT.
3. SALVAGE EQUIPMENT PER SPEC SECTION 02110.
4. PRESSURE WASH AND DEGREASE TOP 6 FEET OF WET WELL AND PUMP WET WELL COMPLETELY DRY.
5. REMOVE FRAMES AND HATCHES AND PROVIDE CHANNELING IN WET WELL PER DETAIL 1, DRAWING D301.
6. EXCEPT FOR THOSE PIPES IDENTIFIED TO REMAIN ON D301, PLUG ALL PIPE, DUCT, AND CONDUIT CONNECTIONS TO BOTH WET WELL AND DRY WELL WITH GROUT A MINIMUM OF FOUR FEET BEYOND STRUCTURE WALL, FULL PIPE SECTION. REMOVE VENT PIPE TO 1 FT BELOW GRADE.
7. BACKFILL DRY WELL STRUCTURE AS SHOWN IN DETAIL 2 DRAWING D301.
8. PROVIDE SECURITY FENCE. PROVIDE SHEETING FOR ALL EXCAVATIONS OPEN OVERNIGHT.
9. EXISTING UNDERGROUND POWER, TELEPHONE AND WATER SERVICE'S NOT LOCATED BUT KNOWN TO EXIST. CONTRACTOR TO VERIFY LOCATION WITH CITY/UTILITIES PRIOR TO CONSTRUCTION.

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SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION NO. 5
DEMOLITION

DRAWING NO.
D300
SHEET 22 OF 77


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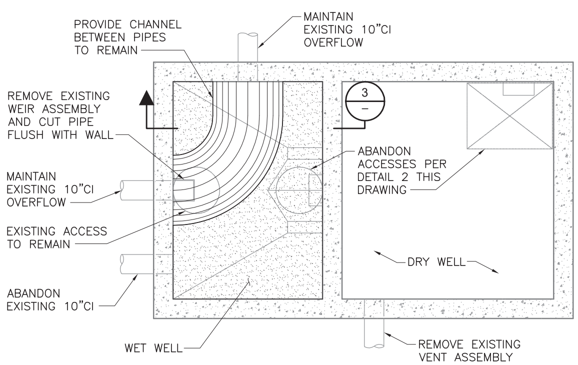
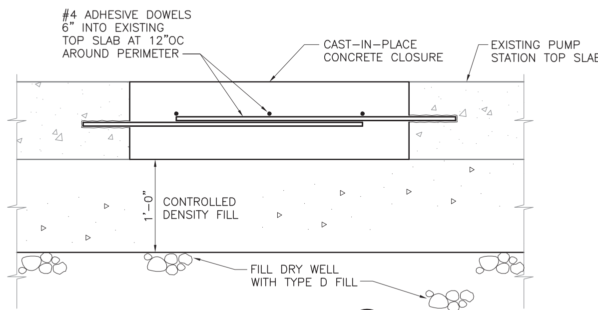



PLAN
3/8"=1'-0"
1
D300




DETAIL
1 1/2"=1'-0"
2
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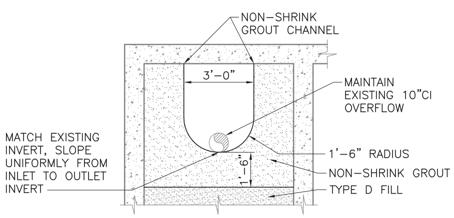


SECTION
3/8"=1'-0"
3
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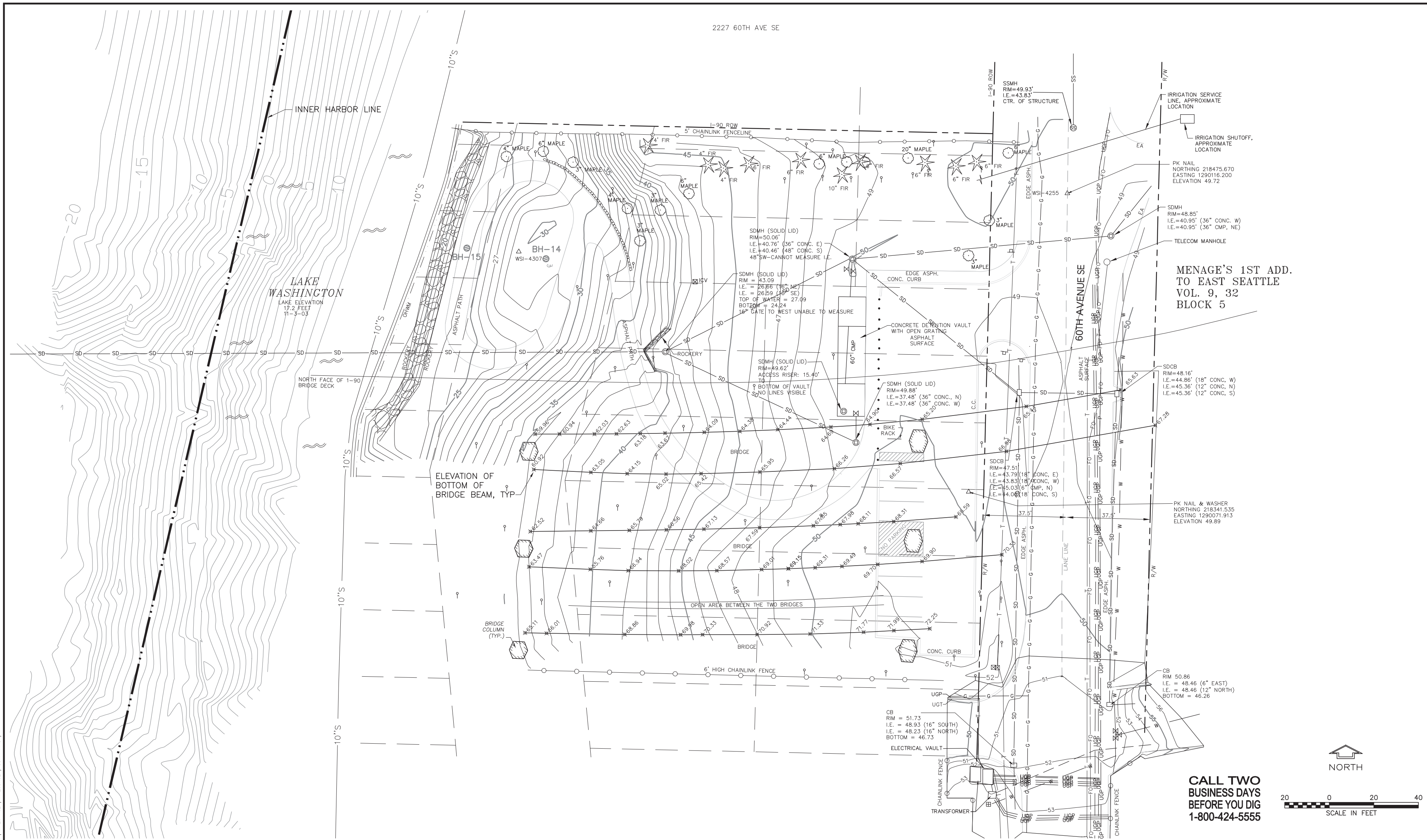
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION NO. 5
DEMOLITION DETAILS

DRAWING NO.
D301
SHEET 23 OF 77

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CITY OF MERCER ISLAND
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SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
SITE PLAN
EXISTING CONDITIONS

DRAWING NO. C300

SHEET 24 OF 77

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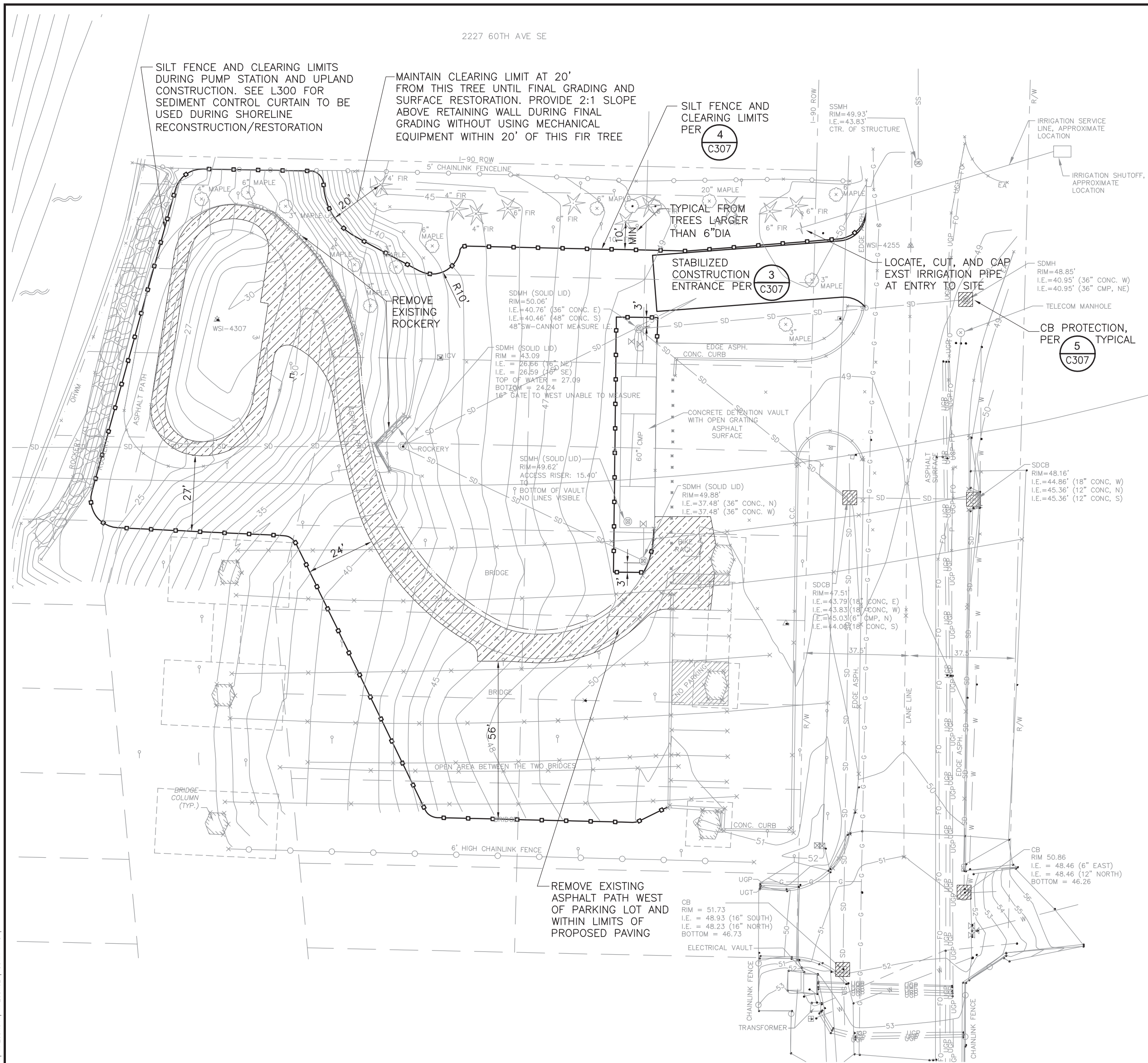


## TEMPORARY EROSION AND SEDIMENTATION CONTROL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR SIZING, IMPLEMENTING, MONITORING, AND MAINTAINING ALL EROSION AND SEDIMENT CONTROL MEASURES NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT, ALL ASSOCIATED PERMITS, AND APPLICABLE PROVISIONS OF THE RCW AND WAC THROUGHOUT THE CONTRACT PERIOD.
2. TESC FACILITIES SHOWN ON THESE PLANS ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL ADJUST THESE MEASURES AND ADD OTHER MEASURES AS NEEDED TO CONTROL EROSION AND SEDIMENTATION.
3. SEE ADDITIONAL REQUIREMENTS IN SECTION 02250 OF THE SPECIFICATIONS.
4. EXISTING TREES GREATER THAN 6" DIAMETER AT 4.5' ABOVE GRADE ARE TO BE PRESERVED, EXCEPT AS SPECIFICALLY NOTED. EXISTING TREES SMALLER THAT THIS ARE TO BE REMOVED UNLESS THEY ARE OUTSIDE CLEARING LIMITS.
5. CONTRACTOR SHALL STAKE CLEARING LIMITS AND RECEIVE APPROVAL OF ENGINEER PRIOR TO INSTALLING SILT FENCE.
6. CLEARING LIMITS SHOWN ON THIS DRAWING ARE FOR UPLAND CONSTRUCTION. ADDITIONAL DEMOLITION AND TESC MEASURES ARE REQUIRED FOR PIPE CROSSINGS OF SHORELINE AND FOR SHORELINE RESTORATION WORK SHOWN IN THE LANDSCAPING PLANS. SEE ALSO SECTION 01014 OF THE SPECIFICATIONS.
7. CONTRACTOR MAY UTILIZE AREAS WITHIN THE DESIGNATED CLEARING LIMITS AND WITHIN THE PAVED PARKING LOT FOR STAGING. NO STAGING OR PARKING ALLOWED IN 60TH AVE RIGHT-OF-WAY. CONTRACTOR SHALL IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES AT ANY OFFSITE STAGING AREA IN ACCORDANCE WITH CITY GUIDELINES. SEE ALSO SECTION 01014 OF THE SPECIFICATIONS.
8. ALL DISCHARGES OF WATER FROM THE PROJECT LIMITS SHALL BE PH NEUTRAL.
9. ALL PAVED PARKING AREAS AND ADJACENT STREETS SHALL BE KEPT CLEAN AT ALL TIMES.
10. CONTRACTOR SHALL PRESERVE FUNCTION OF EXISTING DRAINAGE FACILITIES ON SITE THROUGHOUT CONSTRUCTION AND REPAIR DAMAGE THERETO TO THE SATISFACTION OF ENGINEER AND WSDOT STAFF BOTH DURING AND AT THE COMPLETION OF CONSTRUCTION.
11. ALL SPOIL PILES, EXPOSED SOILS, AND STOCKPILED MATERIALS SHALL BE PROTECTED FROM RAINFALL AND RUNOFF BOTH TO PREVENT SEPARATION AND TO CONTROL EROSION.
12. CONTRACTOR SHALL REMOVE ACCUMULATED SEDIMENT IN EROSION CONTROL FACILITIES WHEN IT REACHES 6 INCHES IN DEPTH OR OTHERWISE REDUCES EFFECTIVENESS OF EROSION CONTROL MEASURES.
13. TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE PER MONTH OR WITHIN 48 HOURS FOLLOWING A STORM EVENT.
14. CONTRACTOR TO PROVIDE TEMPORARY EQUIPMENT ACCESS DRIVEWAY FROM 60TH AVE SE TO PUMP STATION SITE.
15. ALL EXPOSED AND UNWORKED SOILS SHALL BE STABILIZED ACCORDING TO THE FOLLOWING CRITERIA: FROM OCTOBER 1ST TO APRIL 30TH, NO EXPOSED AND UNWORKED SOILS SHALL REMAIN UNSTABILIZED (EXPOSED) FOR MORE THAN TWO DAYS. NON-ERODIBLE, CLEAN, GRANULAR BASE MATERIALS SHALL BE APPLIED TO STABILIZED ALL TRAFFICKED AREAS. FROM MAY 1ST TO SEPTEMBER 30TH, NO EXPOSED AND UNWORKED SOILS ON SLOPES SHALL REMAIN UNSTABILIZED (EXPOSED) FOR MORE THAN SEVEN DAYS.
16. OWNER MAY REQUIRE SUSPENSION OF WORK ACTIVITIES UNTIL CONTRACTOR UPGRADES EROSION CONTROL MEASURES TO CONTROL EROSION AND/OR SEDIMENT TRANSPORT.
17. CONTRACTOR SHALL INSTALL ROCK-LINED CHANNELS OR PIPES TO CONVEY RUNOFF DOWN SLOPES TO PREVENT EROSION OF CHANNELS.
18. CONTRACTOR SHALL INSTALL SEDIMENT TRAPS AND/OR BAKER TANKS FOR SURFACE RUNOFF AND DEWATERING ACTIVITIES TO REMOVE SEDIMENT FROM DISCHARGED WATER.

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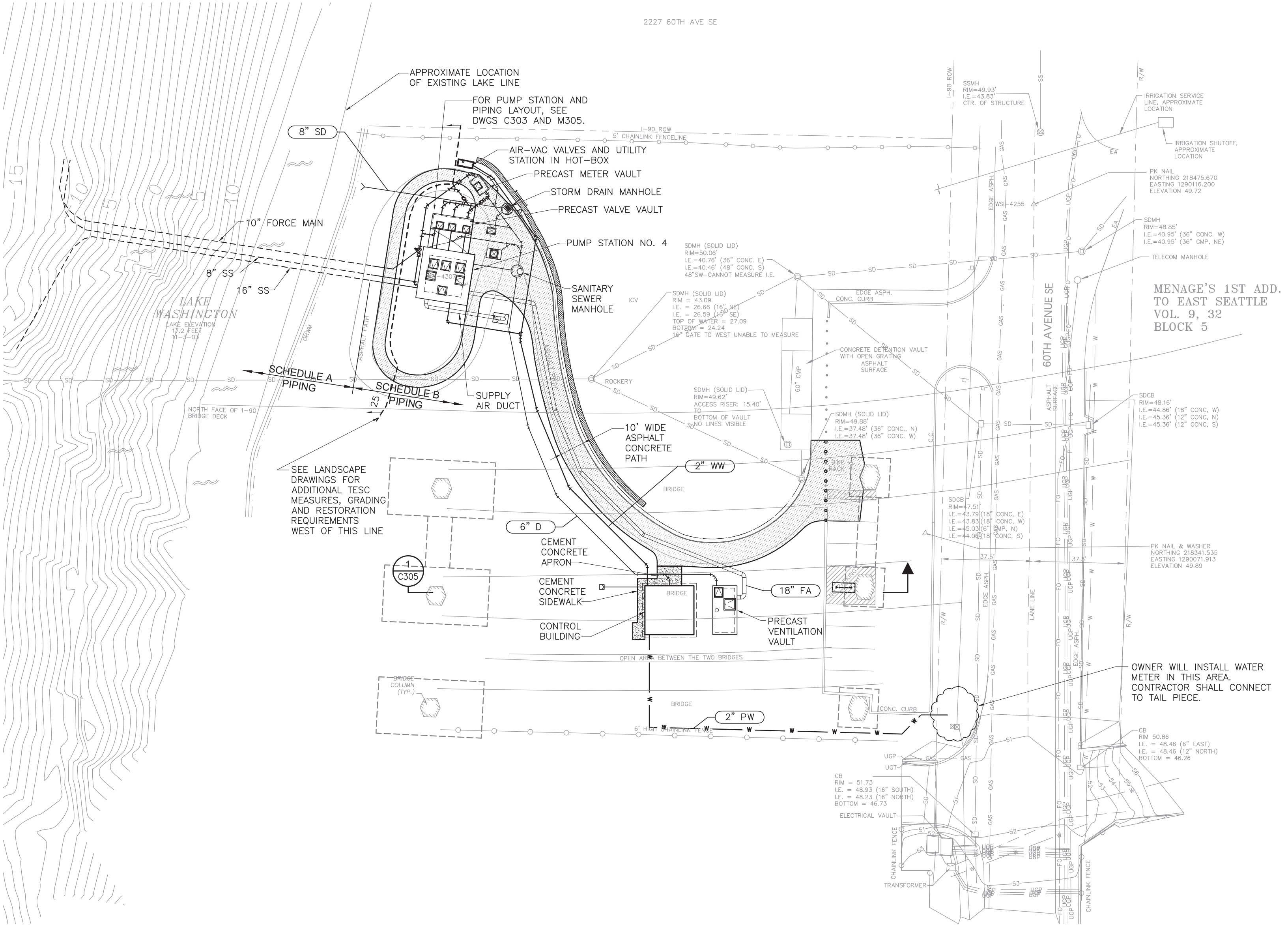
SCHEDULE B

EROSION CONTROL AND SITE DEMOLITION PLAN

DRAWING NO. C301




NOTES:

PROVIDE PAVED PATH PER GRADES SHOWN ON DRAWING C304 SECTION 2/C305.

1. CONTRACTOR'S DAMAGE TO EXISTING PARKING LOT SHALL BE REPAIRED WITH A PAVING SECTION EQUIVALENT TO SECTION 2/C305. SLOPE SURFACE AND RESTRIPE TO MATCH EXISTING PARKING LOT.
2. SEE SPECIFICATIONS SECTION 01014 REGARDING CONSTRUCTION TIMING AND MILESTONES.

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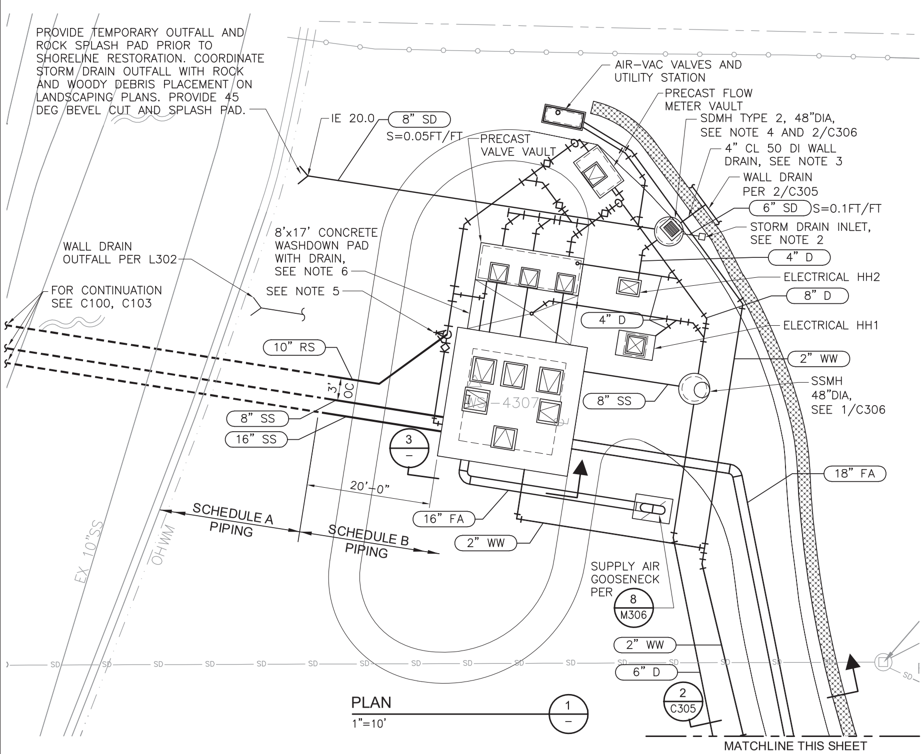
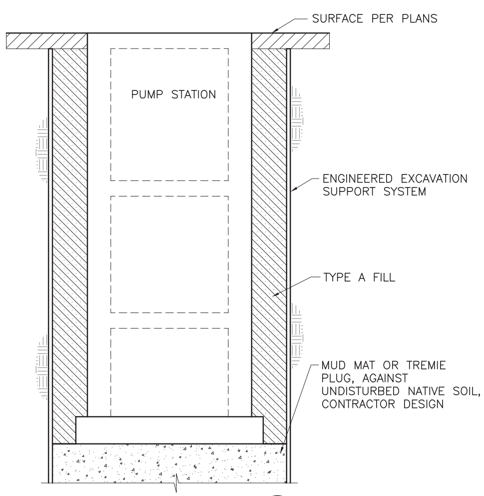
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
SITE PLAN

DRAWING NO. C302




PLAN 1
1"=10'




SECTION 3
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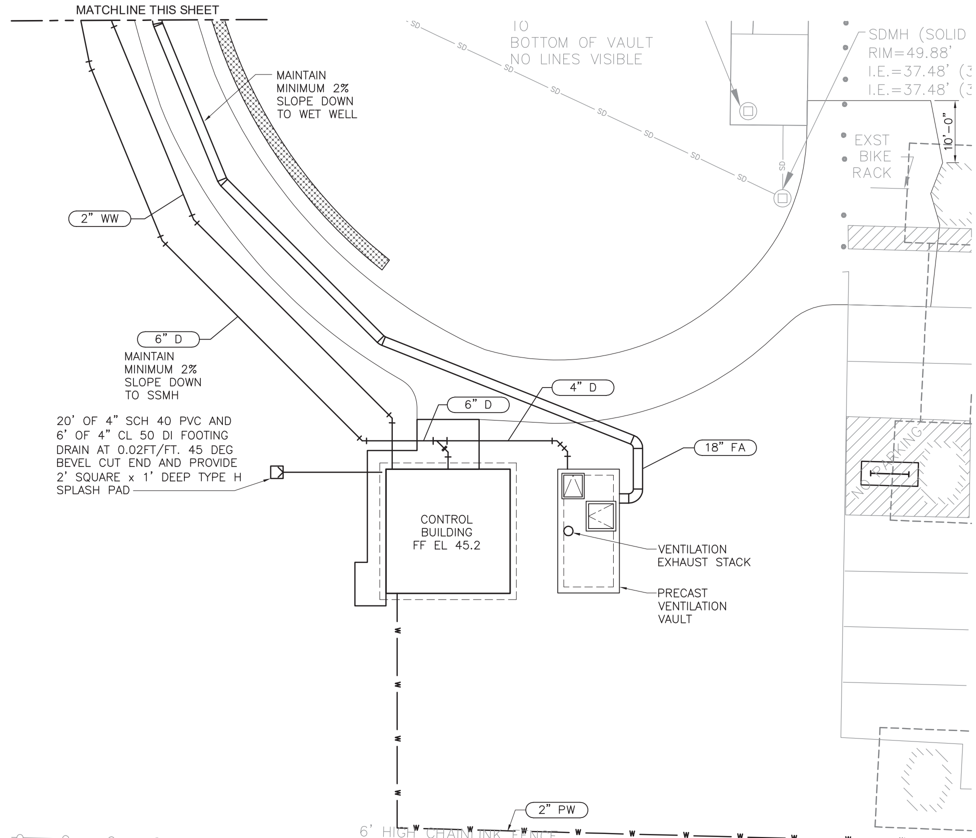


PLAN 2
1"=10'

NOTES:

1. SEE DRAWING M305 FOR ADDITIONAL PIPING DETAIL NEAR PUMP STATION.
2. PROVIDE STORM DRAIN INLET. HANSON "TYPE 50 CATCH BASIN" WITH CAST IRON FRAME AND GRATE, OR APPROVED EQUAL. RIM EL 28.78, 6" WEST IE 27.28.
3. PROVIDE 4" CL 50 DI PIPE BENEATH WALL FOR WALL DRAINAGE.
4. STORM DRAIN MANHOLE
   RIM=29.18
   IE 8" W=22.80
   IE 4" NE=26.00
   IE 6" E=26.98
   IE 4" SW=24.10
5. 10" PLUG VALVE FOR STAGE 1 TESTING/COMMISSIONING ONLY. MAINTAIN ACCESS TO VALVE UNITL STAGE 2 COMMISSIONING THEN REMOVE ANY OPERATORS AND BACKFILL VALVE.
6. 12" THICK TYPE A CONCRETE WASH PAD WITH #5@12 EW, T&B WITH ISOLATION JOINTS, SIMILAR TO JOINTS AT WALLS, 5/S302. SLOPE TOWARD FLOOR DRAIN.

NORTH

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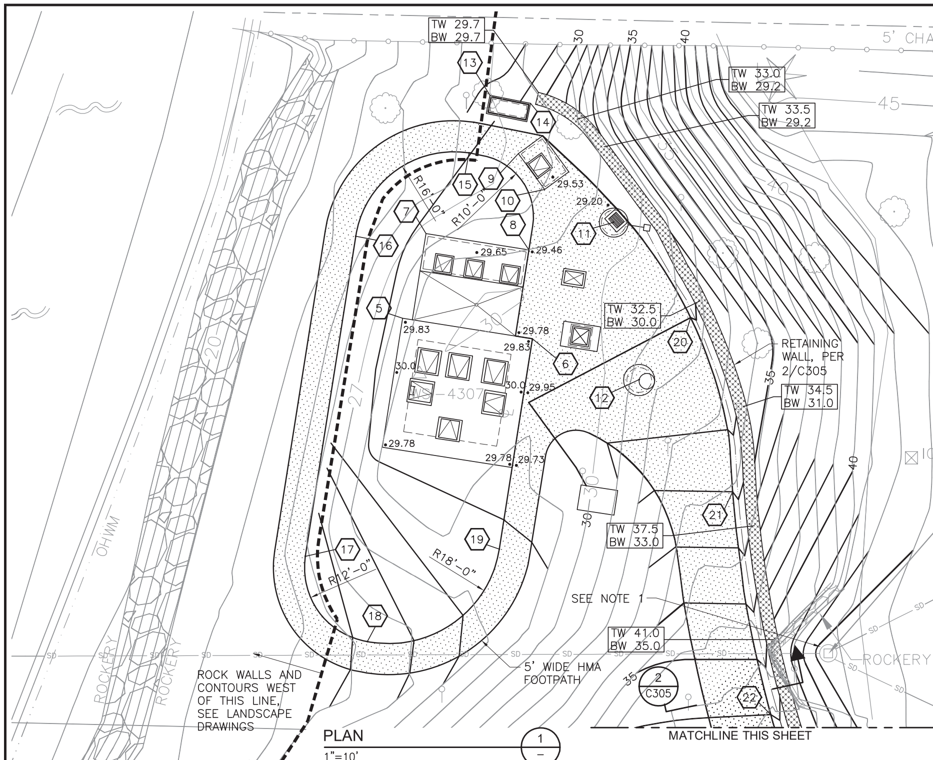
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION AND CONTROL BUILDING
SITE UTILITY PLAN

DRAWING NO. C303

SHEET 27 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03C303.dwg Plot date: Oct 13, 2008-09:15:38am CAD User: jeff.wicke.
Xref Filename: | MAE01X01 | MAE03FRM | MAE03X04 | MAE03X02 | GSWA-KRG |



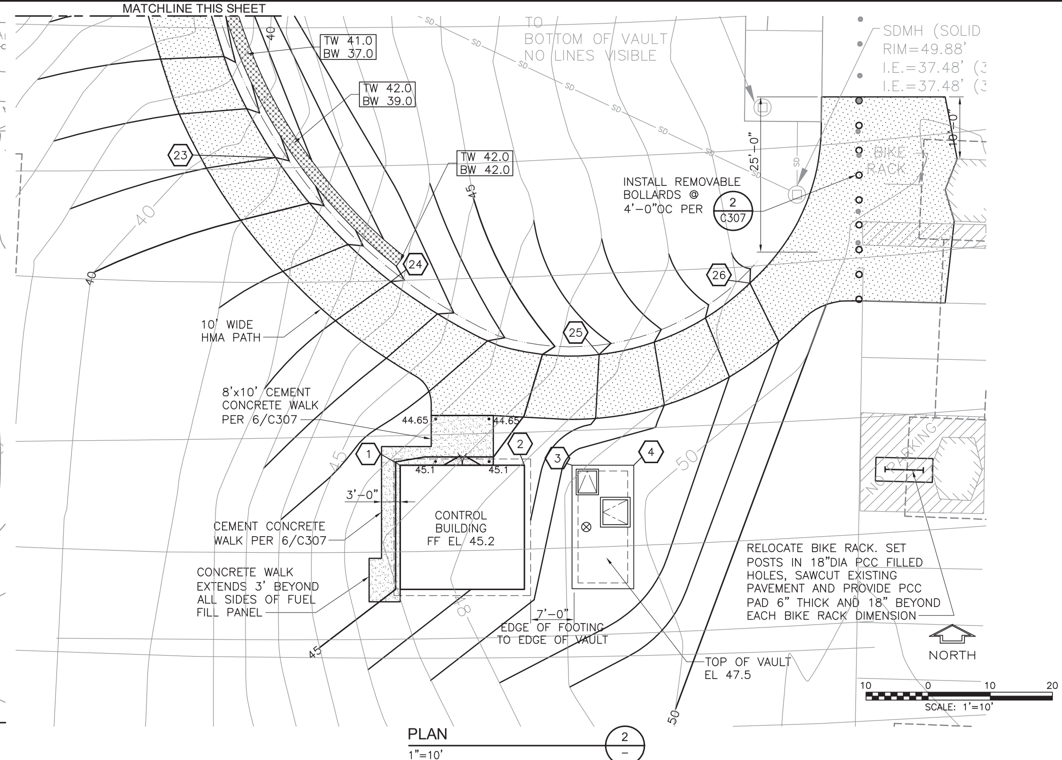




**TABLE OF SITE COORDINATES ***

| POINT | DRAWING | DESCRIPTION | NORTHING | EASTING |
|---|---|---|---|---|
| 1 | C304 | NW CORNER CONTROL BLDG | 218320.15 | 1289957.46 |
| 2 | C304 | NE CORNER CONTROL BLDG | 218320.15 | 1289977.46 |
| 3 | C304 | NW CORNER VENTILATION VAULT | 218320.15 | 1289985.13 |
| 4 | C304 | NE CORNER VENTILATION VAULT | 218320.15 | 1289995.04 |
| 5 | C304 | NW CORNER PUMP STATION | 218458.45 | 1289867.22 |
| 6 | C304 | NE CORNER PUMP STATION | 218455.16 | 1289888.13 |
| 7 | C304 | NW CORNER VALVE VAULT | 218472.07 | 1289870.98 |
| 8 | C304 | NE CORNER VALVE VAULT | 218469.46 | 1289887.56 |
| 9 | C304 | NW CORNER METER VAULT | 218484.95 | 1289885.86 |
| 10 | C304 | SW CORNER METER VAULT | 218479.17 | 1289890.10 |
| 11 | C304 | CENTER STORM DRAIN MANHOLE | 218473.85 | 1289901.22 |
| 12 | C304 | CENTER SANITARY MANHOLE | 218448.51 | 1289905.30 |

* COORDINATES SHOWN ARE FOR GENERAL ALIGNMENT. DIMENSIONS SHOWN ON PLANS SUPERCEDE THESE COORDINATES. ELEVATIONS PER PLANS.

**TABLE OF SITE COORDINATES ***

| POINT | DRAWING | DESCRIPTION | NORTHING | EASTING |
|---|---|---|---|---|
| 13 | C300 | NW CORNER AIR-VAC STATION | 218494.36 | 1289881.30 |
| 14 | C300 | NE CORNER AIR-VAC STATION | 218493.04 | 1289887.83 |
| 15 | C300 | 5' WIDE FOOTPATH TANGENT PT | 218485.07 | 1289877.91 |
| 16 | C304 | 5' WIDE FOOTPATH TANGENT PT | 218471.67 | 1289859.69 |
| 17 | C304 | 5' WIDE FOOTPATH TANGENT PT | 218420.13 | 1289851.57 |
| 18 | C304 | 5' WIDE FOOTPATH TANGENT PT | 218406.41 | 1289861.56 |
| 19 | C304 | 5' WIDE FOOTPATH TANGENT PT | 218421.29 | 1289882.80 |
| 20 | C304 | 10' WIDE PATH | 218458.54 | 1289913.57 |
| 21 | C304 | 10' WIDE PATH | 218430.52 | 1289920.34 |
| 22 | C304 | 10' WIDE PATH | 218394.66 | 1289926.49 |
| 23 | C304 | 10' WIDE PATH | 218369.71 | 1289937.39 |
| 24 | C304 | 10' WIDE PATH | 218349.70 | 1289955.97 |
| 25 | C304 | 10' WIDE PATH | 218337.98 | 1289989.48 |
| 26 | C304 | 10' WIDE PATH | 218349.48 | 1290013.74 |

NOTES:

1. CONTRACTOR SHALL PROTECT EXISTING WSDOT SDMH ADJACENT TO CONTROL POINT 22 DURING CONSTRUCTION ACTIVITIES, INCLUDING EXCAVATING BACK SIDE OF SDMH IF GRADING ACTIVITIES MIGHT LEAD TO UNBALANCED SOIL LOADS.
2. ADJUST TOP OF RETAINING WALL ELEVATIONS BASED ON BLOCK HEIGHT.
3. SEE SECTION 01014 OF THE SPECIFICATIONS. AFTER CONSTRUCTION OF PUMP STATION STRUCTURE, CONTRACTOR SHALL ROUGH GRADE TO EXISTING CONTOURS FROM 10' WEST OF PUMP STATION TO SHORELINE PRIOR TO APPLICABLE MILESTONE DATE.

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555

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KEVIN R. GOSS, STATE OF WASHINGTON, 37442, REGISTERED PROFESSIONAL ENGINEER, 10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE: 1"=10'
DESIGN KG
DATE OCT 2008
CHECKED DW

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION AND CONTROL BUILDING SITE GRADING PLAN

DRAWING NO. C304
SHEET 28 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03C304.dwg Plot date: Oct 13, 2008-09:16:33am CAD User: jeff.wicke.
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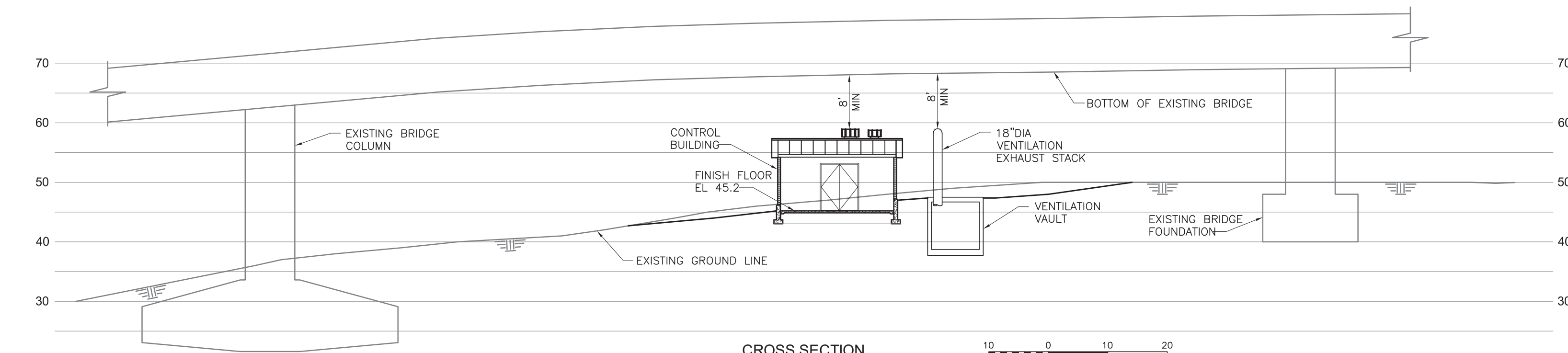
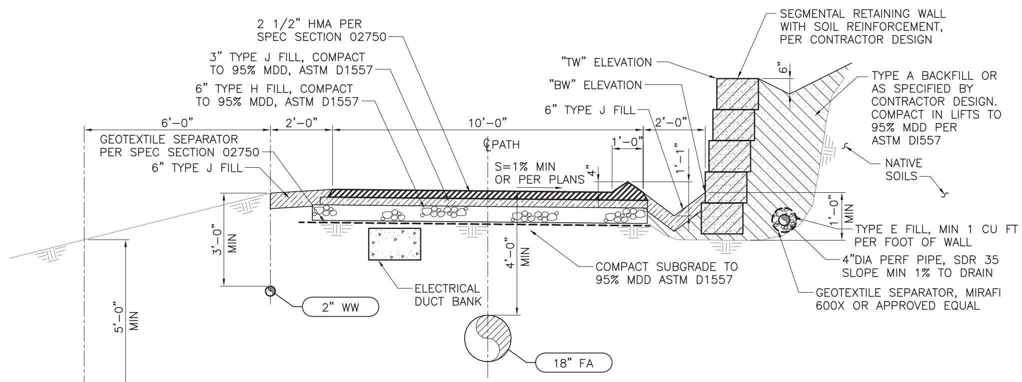



CROSS SECTION
AT CONTROL BUILDING (1/C302)
1"=10'

10 0 10 20 SCALE IN FEET




SECTION (2/C303)
1"=2' C304

2 0 2 4 SCALE IN FEET

NOTES:

1. THIS IS A TYPICAL SECTION. SPECIFIC HORIZONTAL AND VERTICAL CALLOUTS ON THE RESPECTIVE DRAWINGS SUPERCEDE IT.
2. SEE 5/G11 FOR TYPICAL UTILITY TRENCH SECTIONS.
3. SEE ELECTRICAL DRAWINGS FOR CONDUIT TRENCH SECTIONS.

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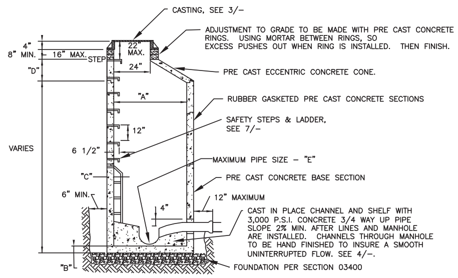
| | |
|---|---|
| SCALE: | 1"=20' |
| DESIGN | KG |
| DATE | OCT 2008 |
| CHECKED | DW |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CIVIL SECTION AT
CONTROL BUILDING

DRAWING NO.
C305

SHEET 29 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03C305.dwg Plot date: Oct 13, 2008-09:17:02am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | GSWA-KRG |

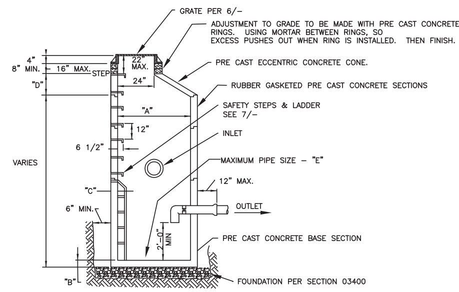



| | "A" | "B" | "C" | "D" | "E" |
|---|---|---|---|---|---|
| 48" MH | 48" | 6" MIN. | 5" MIN. | 24" MIN. | 21" I.D. |
| 54" MH | 54" | 8" MIN. | 5.5" MIN. | 24" MIN. | 24" I.D |
| 60" MH | 60" | 8" MIN. | 6" MIN. | 42" MIN. | 30" I.D. |

*NOTES*

1. PRE CAST SECTIONS SHALL BE REINFORCED PER ASTM SPECS FOR CORRESPONDING SEWER PIPE.
2. SAFETY STEPS, 1" MINIMUM, SEE 7/–. STEPS IN PRE CAST BASE SECTION MAY BE CAST IN PLACE OR MOVABLE SAFETY LADDER GROUTED IN PLACE.
3. ALL HOLES FOR PIPE SHALL BE BLOCKED OUT AT THE TIME OF CASTING THE SECTION.
4. MINIMUM 2% SLOPE ACROSS MANHOLE.
5. CONNECTION TO MANHOLE WITH PVC PIPE REQUIRES A PVC x CONCRETE ADAPTER.
6. ALL PIPE THROUGH MANHOLE WALL SHALL HAVE A "KOR–N–SEAL" WITH "WEDGE KORBAND" MANUFACTURED BY NPC. INC. OR APPROVED EQUAL.
7. BEDDING AND FOUNDATION MATERIAL REQUIRED AS SHOWN ON DETAIL AND AS NOTED IN THE SPECIFICATIONS.
8. LOCATION OF MANHOLE STEPS SHALL NOT BE OVER FLOW LINES AND SHALL BE INCLUDED IN SUBMITTAL.

## SANITARY SEWER MANHOLE
NO SCALE — 1 — C108 C303




| | "A" | "B" | "C" | "D" | "E" |
|---|---|---|---|---|---|
| 48" MH | 48" | 6" MIN. | 5" MIN. | 24" MIN. | 21" I.D. |
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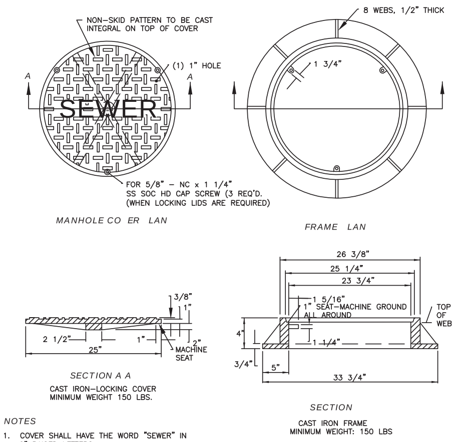
| 60" MH | 60" | 8" MIN. | 6" MIN. | 42" MIN. | 30" I.D. |

*NOTES*

1. PRE CAST SECTIONS SHALL BE REINFORCED PER ASTM SPECS FOR CORRESPONDING PIPE.
2. SAFETY STEPS, 1" MINIMUM, SEE 7/–. STEPS IN PRE CAST BASE SECTION MAY BE CAST IN PLACE OR MOVABLE SAFETY LADDER GROUTED IN PLACE.
3. ALL HOLES FOR PIPE SHALL BE BLOCKED OUT AT THE TIME OF CASTING THE SECTION.
4. MINIMUM 2' SUMP.
5. BEDDING AND FOUNDATION MATERIAL REQUIRED AS NOTED IN THE SPECIFICATIONS.
6. LOCATION OF STEPS SHALL BE INCLUDED IN SUBMITTAL.

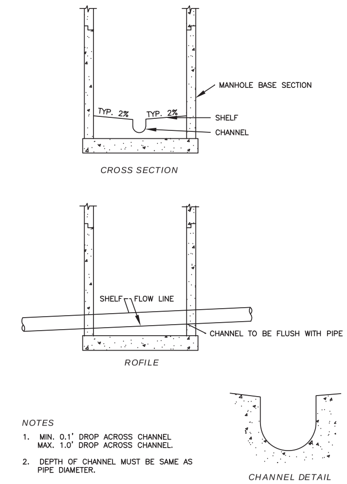
## CATCH BASIN, TYPE 2 WITH SPILL CONTROL
NO SCALE — 2 — C303




*NOTES*

1. COVER SHALL HAVE THE WORD "SEWER" IN 2" RAISED LETTERS.
2. LIFT HOLE SHALL BE FITTED WITH A 3/4"x3 1/2" GALVANIZED CARRIAGE BOLT WITH BURRED END TO RETRAIN NUT.
3. MANHOLE FRAME AND COVE 24" ROUND SHALL BE OLYMPIC FOUNDRY #MH30D/T.
4. WHEN LOCKING LIDS ARE REQUIRED, PROVIDE WRENCH FOR CAP SCREW TO CITY AS REQUIRED.

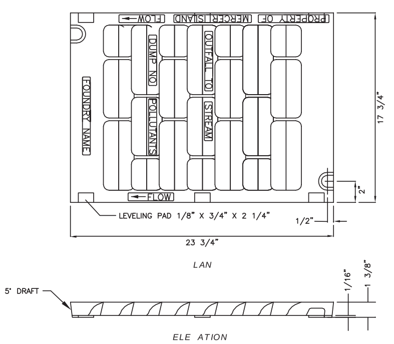
## SEWER FRAME AND COVER
NO SCALE — 3 — –




*NOTES*

1. MIN. 0.1' DROP ACROSS CHANNEL MAX. 1.0' DROP ACROSS CHANNEL.
2. DEPTH OF CHANNEL MUST BE SAME AS PIPE DIAMETER.

## SANITARY SEWER CHANNEL
NO SCALE — 4 — –



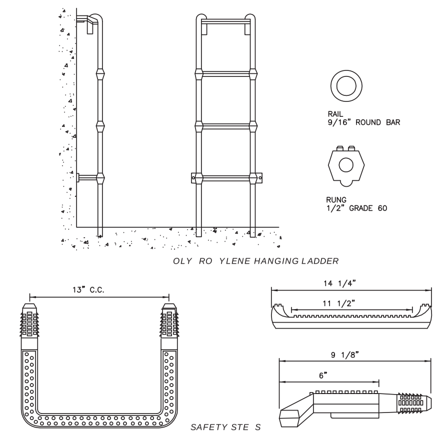

*NOTES*

1. SELF–LOCK VANED GRATE MANUFACTURER SUBJECT TO APPROVAL BY ENGINEER.
2. USE WITH TWO LOCKING BOLTS 5/8"–11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD ALLEN HEAD) CAP SCREWS 2" LONG.
3. MATERIAL IS DUCTILE IRON ASTM A536 GRADE 80–55–06.
4. "OUTFALL TO STREAM DUMP NO POLLUTANTS" MAY BE LOCATED ON BORDER AREA.

## STORM DRAIN GRATE
NO SCALE — 6 — –

*NOTES*

1. ALL STEPS SHALL MEET THE REQUIREMENTS OF ASTM C–478, AASHTO M–199, WISHA AND ALL OSHA SPECIFICATIONS. THE POLYPROPYLENE CONFORM TO ASTM D–4101. THE 1/2" GRADE 60 DEFORMED REINFORCING BAR MEETS ASTM–A–615. 9/16" COLD DRAWN BAR MEET ASTM C–1018.
2. THE STEPS MAY BE INSTALLED IN THE FOLLOWING MANNER.
   A. CAST IN PLACE.
   B. DRIVEN INTO PREFORMED HOLES WITH CONCRETE CURED TO 3,000 P.S.I. MINIMUM.
   C. DRIVEN INTO PARALLEL 1" DIAMETER HOLES DRILLED 13" ON CENTER, 3 1/2" DEEP.
   D. DRILL TWO 1 1/8" OR 1 1/4" HOLES 3 1/2" DEEP. APPLY EPOXY IN THE HOLE AND AROUND THE BARDS OF THE STEP. PUSH THE STEP INTO THE HOLES ALLOWING THE EPOXY TO FLOW OUT TO THE SQUARE SHOULDER OF THE STEP. ANY OF THE ABOVE METHODS WILL RESIST A PULLOUT FORCE OF OVER 1,000 LBS.




## SSMH AND SDMH LADDERS
NO SCALE — 7 — –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DATE OCT 2008
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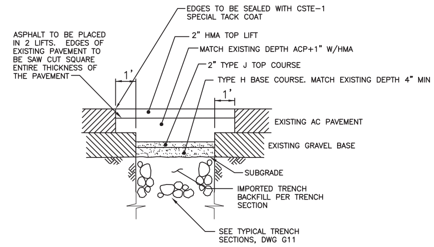
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CIVIL DETAILS

DRAWING NO. C306
SHEET 30 OF 77



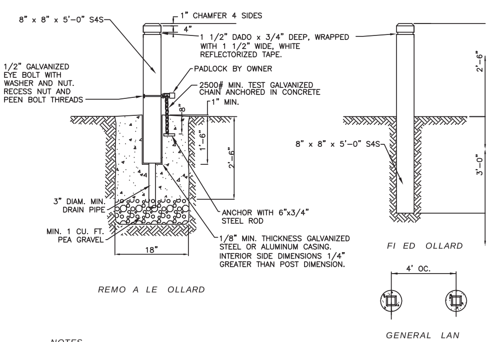

*NOTES*

1. HOT MIX ASPHALT PER SPECS.
2. TOP SEAL–USE AR4000W AND PROVIDE A SAND BLANKET TO ALLEVIATE TRAILING.

TRENCH

## TRENCH PATCH (1 / –)

NO SCALE

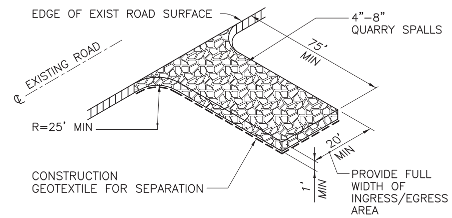



*NOTES*

1. TIMBER SHALL BE DOUGLAS FIR, DENSE CONSTRUCTION GRADE, AND SHALL BE PRESSURE TREATED WITH A WATERBORNE PRESERVATIVE (ACA, CCA, ACZA)
2. THE BOLLARD SHALL BE STAINED WITH TWO COATS OF "OLYMPIC NEW BARK" STAIN, WITH TOP 5" PAINTED WHITE.
3. STEEL TUBE SHALL CONFORM TO ASTM A53 GRADE A.
4. NUTS, BOLTS, & WASHERS SHALL CONFORM TO ASTM A307.
5. ALL STEEL PARTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
6. CONCRETE SHALL BE CLASS A.
7. A HASP MAY BE SUBSTITUTED FOR THE CHAIN UPON APPROVAL BY THE ENGINEER.
8. PITCH GRADE ON BOTH FIXED AND REMOVABLE BOLLARD TO DRAIN AWAY FROM POST.
9. FIXED BOLLARDS NOT SPECIFIED, BUT SHOWN IN CASE CONTRACTOR MUST REPLACE DUE TO DAMAGE TO EXISTING BOLLARDS.

## REMOVABLE BOLLARD (2 / C304)

NO SCALE

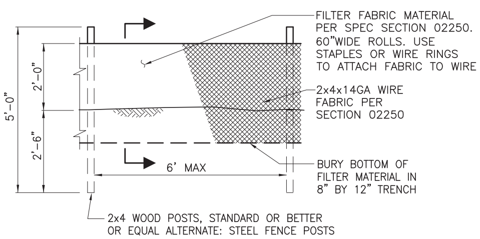



NOTES:

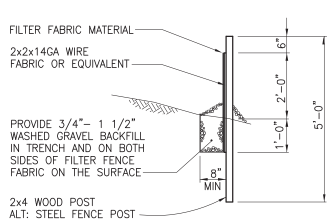
1. PROVIDE AT EACH CONSTRUCTION ACCESS LOCATION FROM ROADWAY R/W'S.
2. IF THE ENTRANCE IS NOT PREVENTING SEDIMENT FROM BEING TRACKED OFFSITE, THEN CONTRACTOR SHALL REMOVE ACCUMULATED SEDIMENT FROM QUARRY SPALLS AND RECONSTRUCT ENTRANCE AND/OR IMPLEMENT ADDITIONAL MEASURES TO CONTAIN SEDIMENT ONSITE.

## STABILIZED CONSTRUCTION ENTRANCE (3 / C301)

NO SCALE



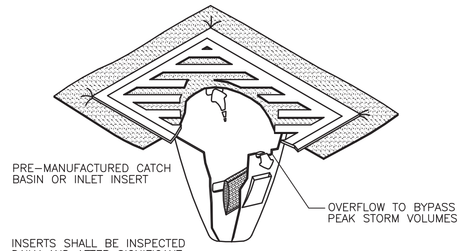

ELEVATION




SECTION

## SILT FENCE (4 / C301)

NO SCALE

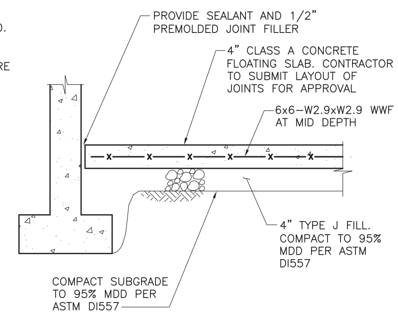



INSERTS SHALL BE INSPECTED DAILY AND AFTER SIGNIFICANT RAINFALL CLEAN OR REPLACE INSERTS WHEN HALF OF THE TRAP IS FILLED WITH SEDIMENT.

SYMBOL:

## CATCH BASIN INSERT (5 / C301)

NO SCALE




## CONCRETE WALK (6 / C304)

NO SCALE

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KEVIN R. GOSS — STATE OF WASHINGTON — 37442 — REGISTERED PROFESSIONAL ENGINEER — 10/10/08

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CIVIL DETAILS

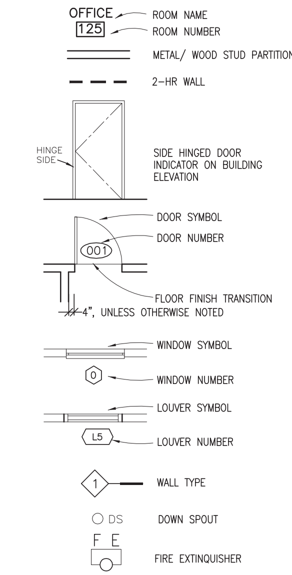
DRAWING NO. C307

## ABBREVIATIONS

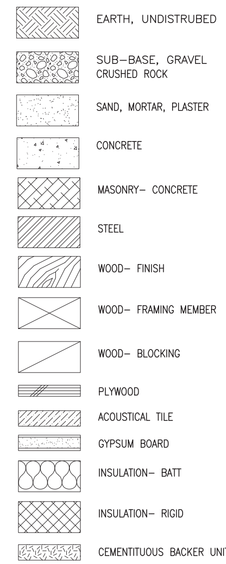
| | |
|---|---|
| ABAN | ABANDONED |
| AC | AIR CONDITIONING |
| ACP | ASPHALT CONCRETE PAVEMENT |
| ADMIN | ADMINISTRATION |
| AFF | ABOVE FINISHED FLOOR |
| AIR | AIR RELIEF |
| AL | ALUMINUM |
| ANSI | AMERICAN NATIONAL STANDARD INSTITUTE |
| AP | ANGLE POINT |
| APPROX | APPROXIMATELY |
| APWA | AMERICAN PUBLIC WORKS ASSOCIATION |
| ARCH | ARCHITECTURAL |
| ASPH | ASPHALT |
| AVE | AVENUE |
| B/C | BACK OF CURB |
| BE | BOTTOM OF EXCAVATION |
| BK | BACK |
| BLDG | BUILDING |
| BLVD | BOULEVARD |
| BM | BENCH MARK |
| BOD | BOTTOM OF DUCT |
| BOT | BOTTOM |
| BR | BRICK |
| BTU | BRITISH THERMAL UNITS |
| BVC | BEGIN VERTICAL CURVE |
| BW | BOTTOM OF WALL |
| C | CONDUIT |
| CAP | CAPACITY |
| CB | CATCH BASIN |
| CC | CURVE CENTER |
| | CENTER TO CENTER |
| CD | CUTOFF DRAIN |
| CDF | CONTROLLED DENSITY FILL |
| CF | CUBIC FEET |
| CI | CAST IRON |
| CIP | CAST IN PLACE |
| CJ | CONTROL JOINT |
| CK | CHECK |
| CL | CENTERLINE |
| CLG | CELING |
| CLR | CLEARANCE |
| CMP | CORRUGATED METAL PIPE |
| CMU | CONCRETE MASONRY UNIT |
| CO | CLEAN OUT |
| CONC | CONCRETE |
| CONN | CONNECTION |
| CONT | CONTINUOUS |
| CP | CONCRETE PIPE |
| CU | COPPER |
| CULV | CULVERT |
| CW | COLD WATER (POTABLE) |
| CY | CUBIC YARD |
| D/W | DRIVEWAY |
| DB | DUCT BANK |
| DEG & ° | DEGREE |
| DEMO | DEMOLISH |
| DEPT | DEPARTMENT |
| DG | DOOR GRILLE |
| DI | DUCTILE IRON |
| DIA | DIAMETER |
| DIM | DIMENSION |
| DISP | DISPENSER |
| DN | DOWN |
| DR | DRIVE |
| DS | DOWNSPOUT |
| DWV | DRAIN, WASTE & VENT |
| DWG | DRAWING |
| E | EAST |
| EF | EXHAUST FAN |
| EFFL | EFFLUENT |
| EG | EMERGENCY GENERATOR |
| EL | ELEVATION |
| ELEC | ELECTRICAL |
| EOP | EDGE OF PAVEMENT |
| EQ | EQUAL |
| ER | EXHAUST REGISTER |
| ESMT | EASEMENT |
| ETC | ET CETERA |
| EVC | END VERTICAL CURVE |
| EWB | ENTERING WET BULB TEMPERATURE |
| EXH | EXHAUST |
| EXIST | EXISTING |
| EXT | EXTERIOR |
| FD | FLOOR DRAIN |
| FF | FINISHED FLOOR |
| FG | FINISHED GRADE |
| FH | FIRE HYDRANT |
| FIN | FINISH |
| FLEX | FLEXIBLE |
| FNC | FENCE |
| FND | FOUNDATION |
| FO | FACE OF |
| FOC | FACE OF CONCRETE |
| FOS | FACE OF STUD |
| FRP | FIBERGLASS REINFORCED PLASTIC |
| FTG | FOOTING |
| FT OR ' | FOOT |
| G | GAS |
| GA | GAUGE |
| GAL | GALLON |
| GALV | GALVANIZED |
| GB | GRADE BREAK |
| GL | GUTTER LINE |
| GM | GAS METER |
| GP | GUARD POST |
| GPM | GALLONS PER MINUTE |
| GWB | GYPSUM WALL BOARD |
| GWT | GROUND WATER TABLE |
| HB | HOSE BIBB |
| HDWR | HARDWARE |
| HH | HAND HOLE |
| HM | HOLLOW METAL |
| HORIZ | HORIZONTAL |
| HR | HOUR |
| HT | HEIGHT |
| HTG | HEATING |
| HVAC | HEATING, VENTILATION AND AIR CONDITIONING |
| HOL | HOLLOW |
| HW | HIGH WATER |
| HYD | HYDRANT |
| IC | INTEGRAL COVE |
| ID | INSIDE DIAMETER |
| IE | INVERT ELEVATION |
| IL | INTAKE LOUVER |
| IN OR " | INCH |
| INSUL | INSULATION |
| IP | IRON PIPE |
| JB | JUNCTION BOX |
| JT | JOINT |
| K | KIP |
| L | LENGTH |
| LBS | POUNDS |
| LF | LINEAR FEET |
| LIN | LINOLEUM |
| LP | LOW POINT |
| LT STD | LIGHT STANDARD |
| LTG | LIGHTING |
| M | METER |
| MAINT | MAINTENANCE |
| MAT | MATERIAL |
| MH | MANHOLE |
| MAX | MAXIMUM |
| MB | MAIL BOX |
| MECH | MECHANICAL |
| MFR | MANUFACTURER |
| MIN | MINIMUM |
| MISC | MISCELLANEOUS |
| MO | MASONRY OPENING |
| MNT | MINUTE |
| MTD | MOUNTED |
| N | NORTH |
| N/A | NOT APPLICABLE |
| NFA | NET FREE AREA |
| NIC | NOT IN CONTRACT |
| NO. OR # | NUMBER |
| NPT | NATIONAL PIPE THREAD |
| NR | NOT RATED |
| NTS | NOT TO SCALE |
| NW | NORTHWEST |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| OH | OVERHEAD |
| P/T | POWER/TELEPHONE |
| PAV | PAVEMENT |
| PERF | PERFORATED |
| PF | PLUMBING FIXTURES |
| PH | PHASE |
| PJF | PREMOLDED JOINT FILLER |
| PK | MASONRY NAIL |
| PL | PROPERTY LINE |
| PN | POINT NUMBER |
| PNL | PANEL |
| PNT | PAINT |
| PRESS | PRESSURE |
| PT | PRESSURE TREATED |
| PP | POWER POLE |
| PREP | PREPARATION |
| PRG | PROPANE GAS |
| PSD | PIPE STORM DRAIN |
| PSF | POUNDS PER SQUARE FOOT |
| PSI | POUNDS PER SQUARE INCH |
| PV | PLUG VALVE |
| PVC | POLYVINYL CHLORIDE |
| PVMT | PAVEMENT |
| R | RADIUS |
| RO | ROUGH OPENING |
| REF | REFERENCE |
| REQ'D | REQUIRED |
| REST | RESTROOM |
| REV | REVISED(ION) |
| RG | RETURN GRILLE |
| RGS | RIGID GALVANIZED STEEL |
| RND | ROUND |
| RR | RAILROAD |
| RT | RIGHT |
| S | SOUTH |
| SCFM | STANDARD CUBIC FEET PER MINUTE |
| SD | STORM DRAIN |
| SE | SPOT ELEVATION |
| SEAL | SEALANT |
| SF | SQUARE FEET |
| SG | SAFETY GLASS |
| SHWR | SHOWER |
| SHT | SHEET |
| SIM | SIMILAR |
| SL | SLOPE |
| SPEC | SPECIFICATIONS |
| SQ | SQUARE |
| SR | SUPPLY REGISTER |
| SS | STAINLESS STEEL |
| SSD | SEE STRUCTURAL DRAWINGS |
| STA | STATION |
| STD | STANDARD |
| STE | STEAM |
| STL | STEEL |
| STRUCT | STRUCTURAL |
| SV | SHEET VINYL |
| SW | SWITCH |
| T | TELEPHONE |
| T&B | TOP AND BOTTOM |
| TE | TOP ELEVATION |
| TEMP | TEMPORARY |
| THICK | THICKNESS |
| TOG | TOP OF GRATE |
| TV | TELEVISION CABLE |
| TW | TOP OF WALL |
| TYP | TYPICAL |
| UD | UNDERDRAIN |
| UG | UNDERGROUND |
| UH | UNIT HEATER |
| UTIL | UTILITIES |
| V | VENT |
| VB | VALVE BOX |
| VC | VERTICAL CURVE |
| VCT | VINYL COMPOSITION TILE |
| VERT | VERTICAL |
| VIF | VERIFY IN FIELD |
| VTR | VENT THRU ROOF |
| W | WEST |
| WD | WOOD |
| WE | WELD EXHAUST |
| WH | WATER HEATER |
| WL | WATER LINE |
| W/ | WITH |
| W/O | WITHOUT |
| WM | WATER METER |
| WWF | WELDED WIRE FABRIC |
| W | WASTE |
| WC | WATER CLOSET |
| WG | WATER GAGE |
| WH | WATER HEATER |
| WM | WATER MAIN |

## ARCHITECTURAL SYMBOLS

NOTE:
ITEMS SHOWN SCREENED (HALF TONE) ARE EITHER EXISTING OR SHOWN UNDER A DIFFERENT DISCIPLINE.




## MATERIALS




## BUILDING CODE DATA

| | |
|---|---|
| BUILDING CODE: | IBC 2003 |
| ZONING: | P – (PUBLIC) |
| CONSTRUCTION TYPE: | II-B |
| PROPOSED AREA: | 400 SF |
| OCCUPANCY: | H-3 (173 GAL DIESEL FUEL TANK IN CLOSED SYSTEM WITH REMOTE FILL & SPILL PROTECTION) |
| FIRE PROTECTION: | BUILDING NOT SPRINKLED 40BC FIRE EXTINGUISHER WILL BE PROVIDED |
| NOISE REDUCTION: | LOUVERS SERVING CONTROL BUILDING GENERATOR WILL BE ACOUSTICALLY BAFFLED |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3201 REGISTERED ARCHITECT
THOMAS HENRY ROTH
STATE OF WASHINGTON
10/10/08

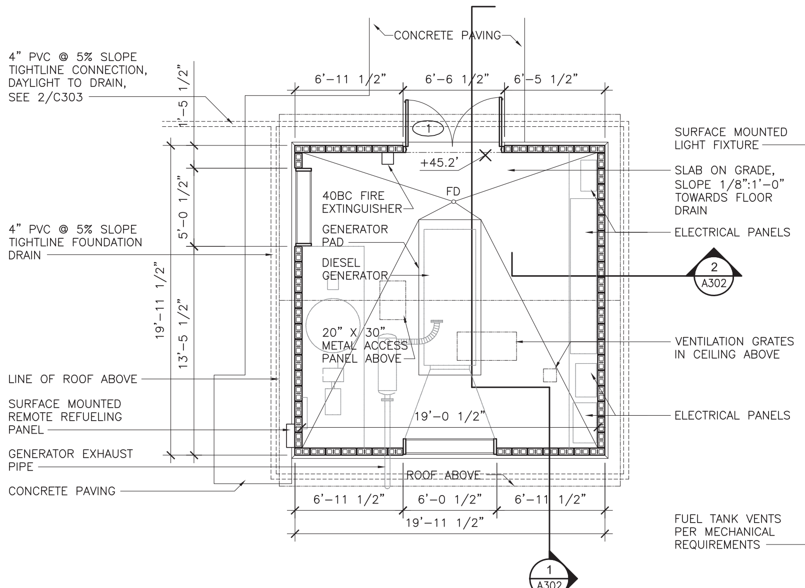
| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE: AS SHOWN
DESIGN SO
DATE OCT 2008
CHECKED TR

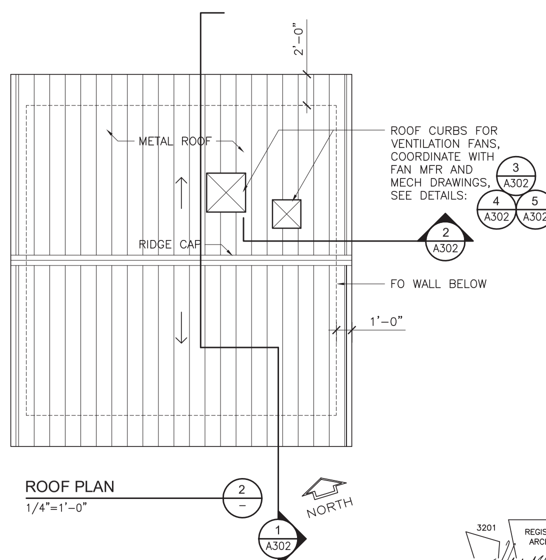
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
ARCHITECTURAL SYMBOLS, ABBREVIATIONS, AND LEGEND

DRAWING NO.
A300

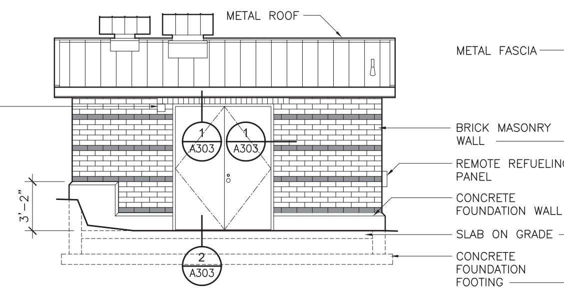
SHEET 32 OF 77



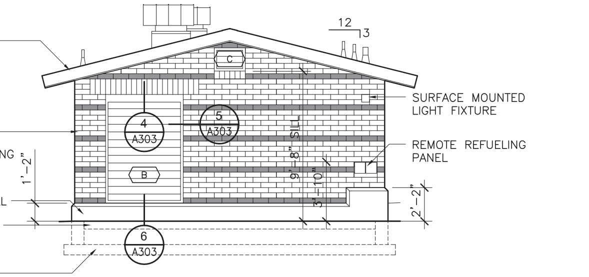

FLOOR PLAN 1
1/4"=1'-0"




ROOF PLAN 2
1/4"=1'-0"

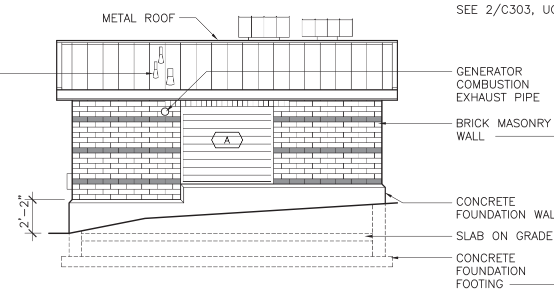



NORTH ELEVATION 3
1/4"=1'-0"

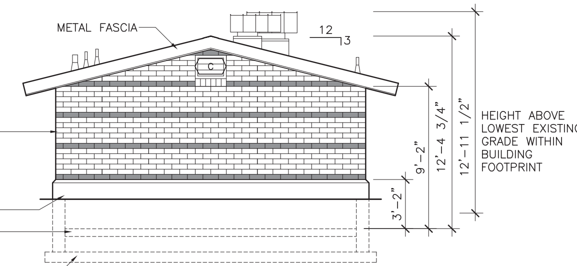



WEST ELEVATION 4
1/4"=1'-0"

NOTE:
ALL ELEVATION DIMENSIONS RELATIVE TO CONCRETE SLAB FINISH FLOOR AT DOOR THRESHOLD EL = +45.2'. SEE 2/C303, UON.




SOUTH ELEVATION 5
1/4"=1'-0"




EAST ELEVATION 6
1/4"=1'-0"

## DOOR SCHEDULE

| NO. | DOOR TYPE | DOOR MAT'L | DOOR W | DOOR H | DOOR T | FRAME TYPE | FRAME JAMB | FRAME HEAD | FRAME SILL | HDWR | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FLUSH | HM | * | 96" | 1 3/4" | HM INSUL | 1/A303 | 1/A303 | 2/A303 | HW1 | * ACTIVE DOOR: 36", PASSIVE DOOR: 38" |

## LOUVER SCHEDULE

| NO. | TYPE | EQUIPMENT | DIMENSIONS | JAMB | HEAD | SILL | NOTES |
|---|---|---|---|---|---|---|---|
| A | NA | GEN. COOLING EXHAUST | 72"x60" | 5/A303 | 4/A303 | 6/A303 | ACOUSTIC LOUVER |
| B | NA | GEN. INTAKE | 60"x84" | 5/A303 | 4/A303 | 6/A303 | ACOUSTIC LOUVER W/ MOTORIZED DAMPER |
| C | NA | ATTIC VENT | 24"x18" | 8/A303 | 8/A303 | 8/A303 | |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3201 REGISTERED ARCHITECT THOMAS HENRY ROTH STATE OF WASHINGTON
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

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DESIGN SO
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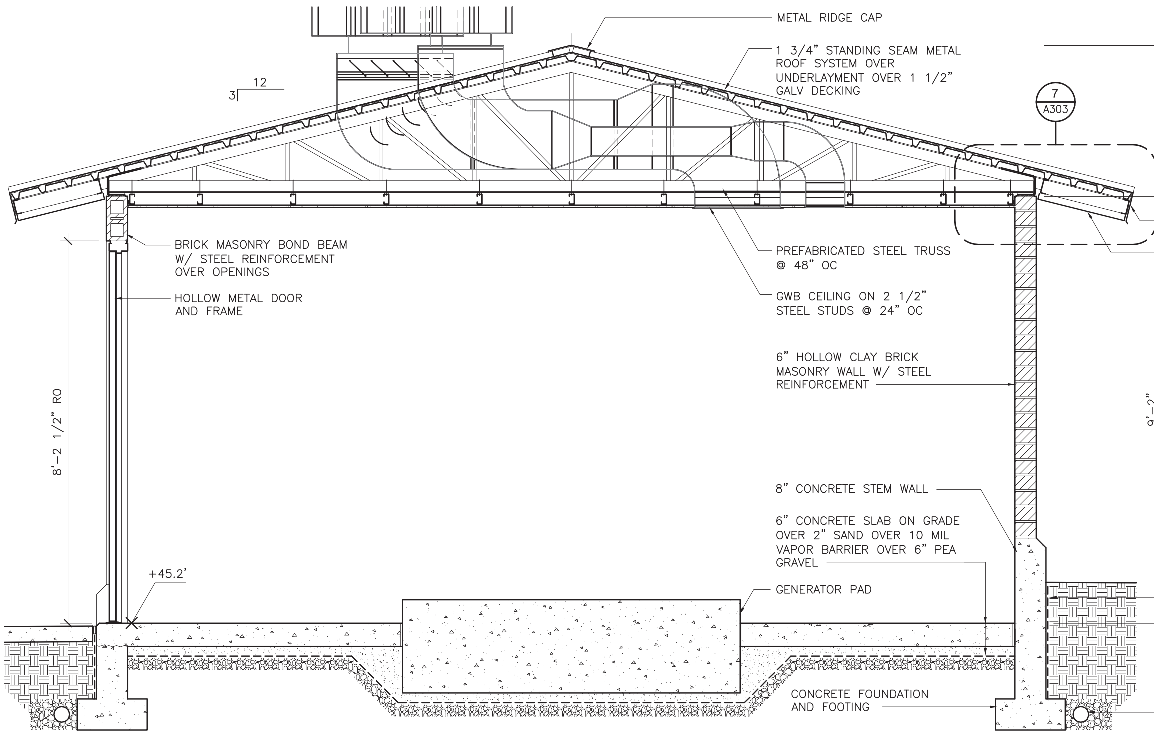
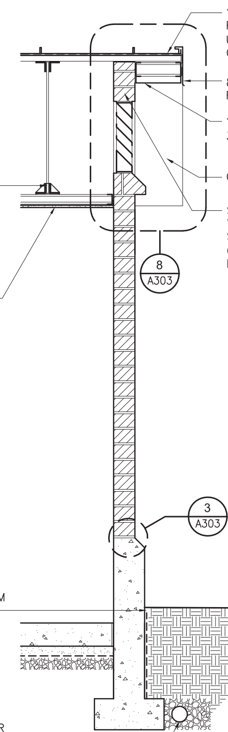
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING PLANS ELEVATIONS, AND SCHEDULES

DRAWING NO. A301
SHEET 33 OF 77

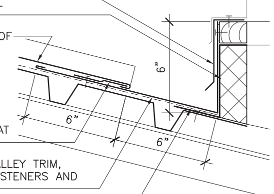

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE01A301.dwg Plot date: Oct 13, 2008-08:47:01am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | SUBMITTAL | MAE01A302 | GSMA-THR |



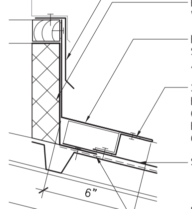

BUILDING SECTION (1 / A301)
3/4"=1'-0"



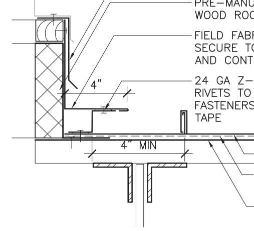

WALL SECTION @ GABLE (2 / A301)
3/4"=1'-0"




ROOF CURB DETAIL (3 / A301)
3"=1'-0"




ROOF CURB PITCHBREAK (4 / A301)
3"=1'-0"




ROOF CURB RAKE (5 / A301)
3"=1'-0"

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3201 REGISTERED ARCHITECT
THOMAS HENRY ROTH
STATE OF WASHINGTON
10/10/08

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| DESIGN | SO |
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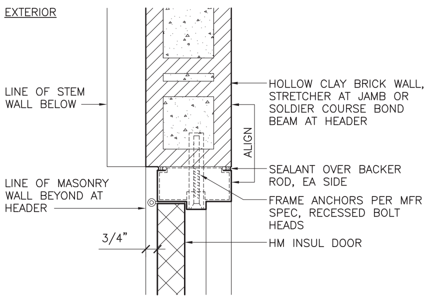
| CHECKED | TR |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

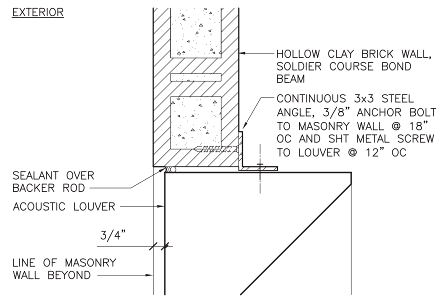
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING SECTIONS

DRAWING NO. A302

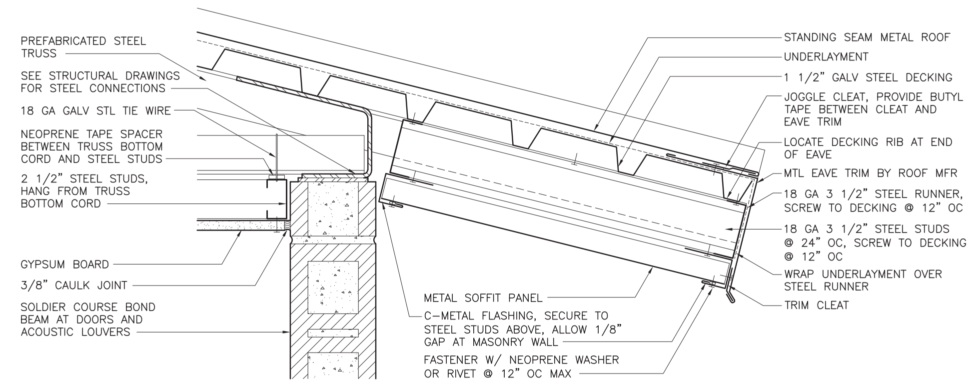
SHEET 34 OF 77



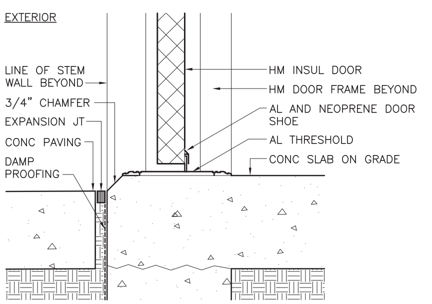

DOOR HEAD/JAMB DETAIL 1 A301
3"=1'-0"



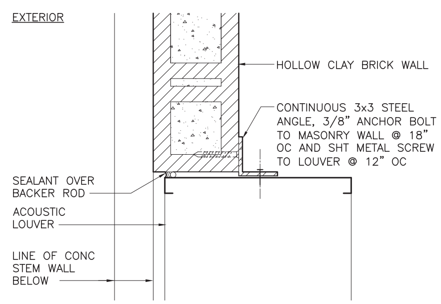

LOUVER HEAD 4 A301
3"=1'-0"



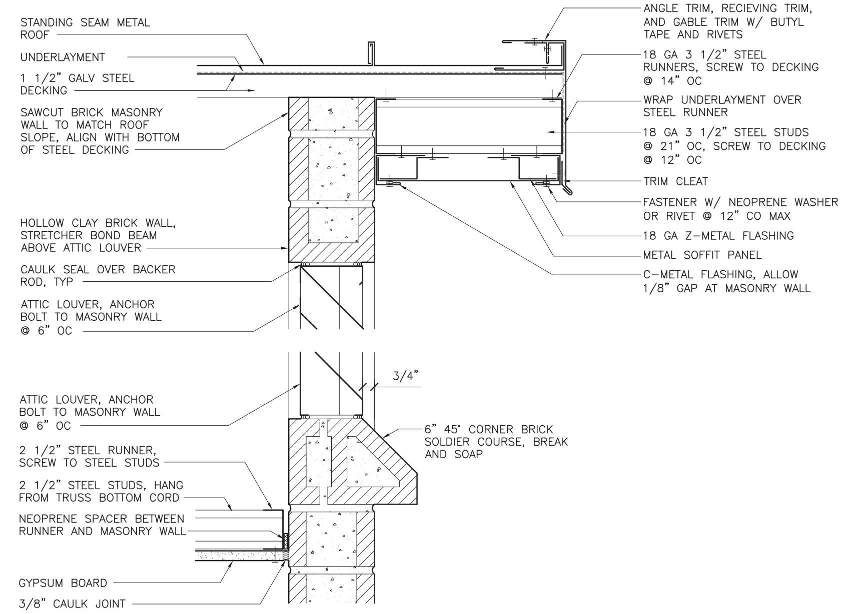

EAVE DETAIL 7 A302
3"=1'-0"



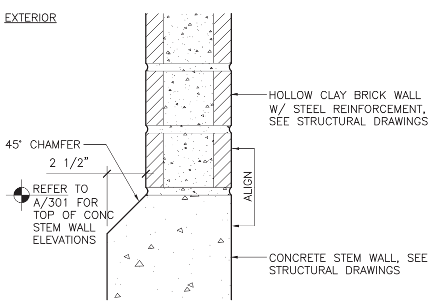

DOOR SILL DETAIL 2 A301
3"=1'-0"



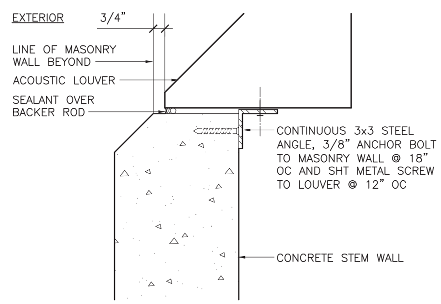

LOUVER JAMB 5 A301
3"=1'-0"




GABLE DETAIL 8 A302
3"=1'-0"




STEM WALL DETAIL 3 A302
3"=1'-0"




LOUVER SILL 6 A301
3"=1'-0"

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3201 REGISTERED ARCHITECT
THOMAS HENRY ROTH
STATE OF WASHINGTON
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|
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SCALE: AS SHOWN
DESIGN SO
DATE OCT 2008
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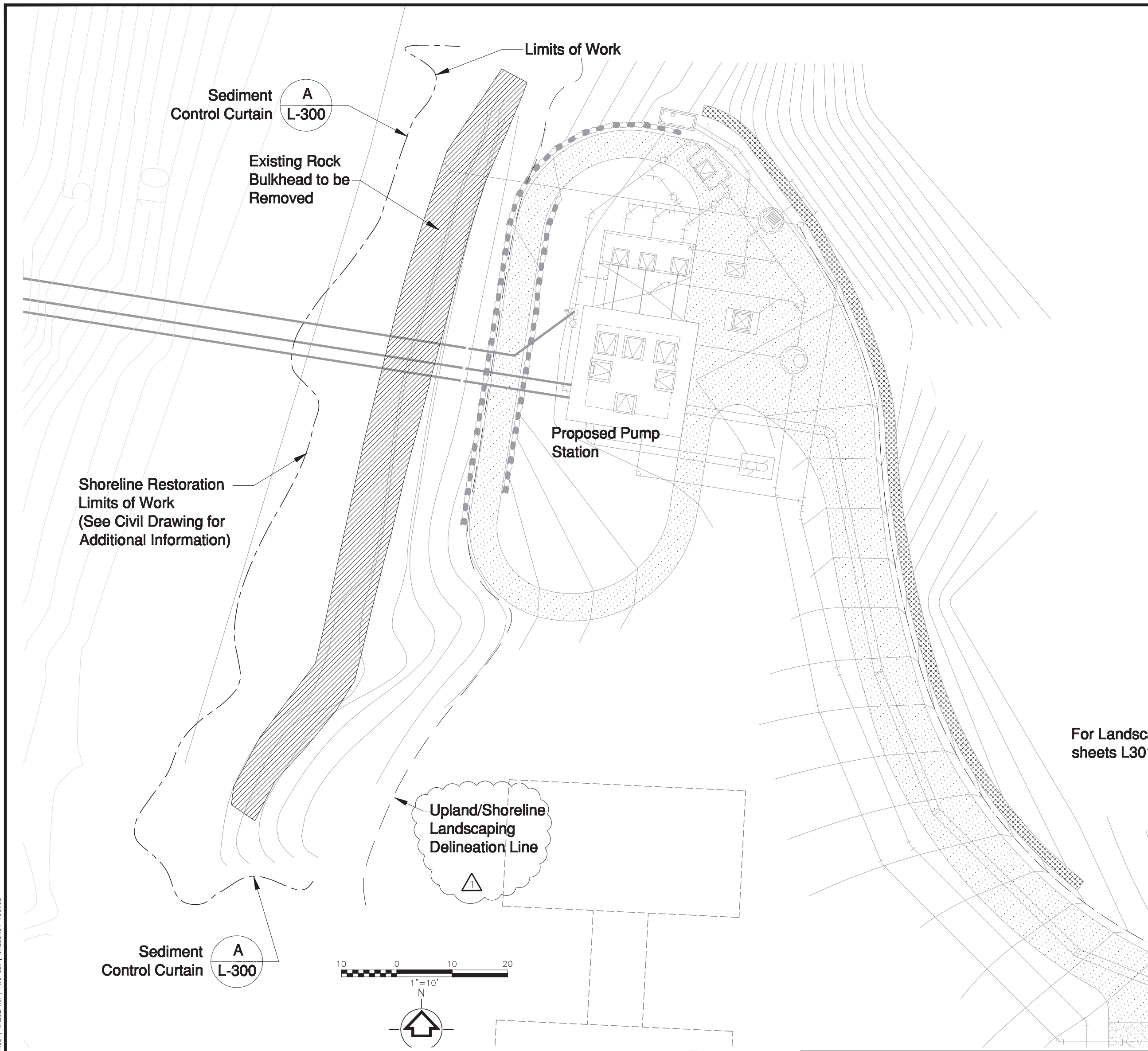
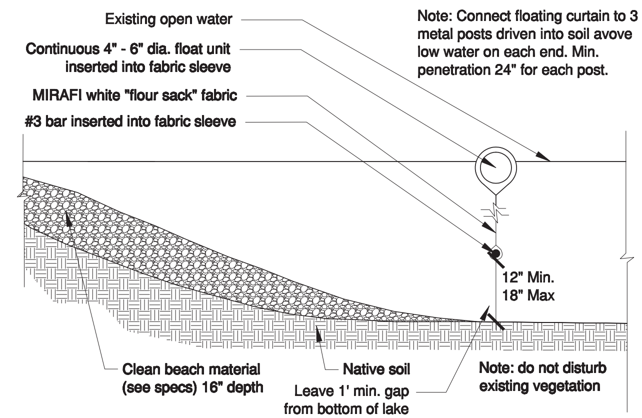
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING DETAILS

DRAWING NO.
A303
SHEET 35 OF 77




A — **Sediment Control Curtain**
1" = 1'

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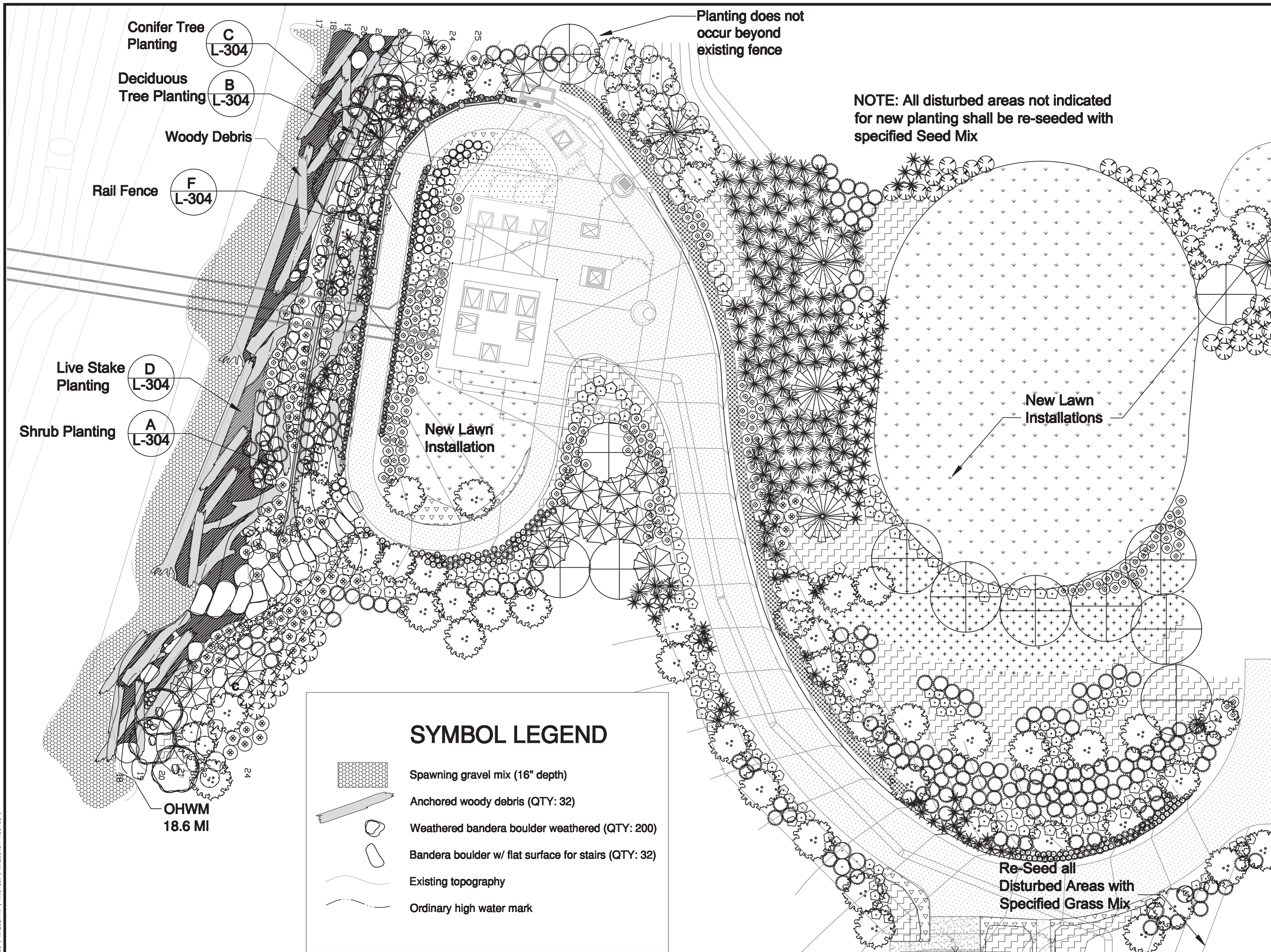
| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|
| 1 | DEC 2008 | JAW | ADDED ADDENDUM NO. 4 | |

| | |
|---|---|
| SCALE: | 1"-20' |
| DESIGN | JJM |
| DATE | OCT 2008 |
| CHECKED | JFB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
**SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT**
**SCHEDULE B**
**DEMOLITION / TESC**

DRAWING NO.
L-300




## SYMBOL LEGEND

- Spawning gravel mix (16" depth)
- Anchored woody debris (QTY: 32)
- Weathered bandera boulder weathered (QTY: 200)
- Bandera boulder w/ flat surface for stairs (QTY: 32)
- Existing topography
- Ordinary high water mark

## PLANTING SCHEDULE

| TREES | Qty. | COMMON NAME | BOTANICAL NAME | SIZE | SPACING |
|---|---|---|---|---|---|
| | 14 | Western Red Cedar | Thuja plicata | 5-6' | 12' o.c. |
| | 13 | Dogwood | Cornus 'Eddies White Wonder' | 5-6' | 12' o.c. |
| | 6 | Sitka Willow | Salix sitchensis | 5-6' | 6' o.c. |
| | 69 | Vine Maple | Acer circinatum Multi-Stem | 4-5' | 5' o.c. |
| | 15 | Flowering Pear | Pyrus calleryana, callery X chanticleer | 4-5' | 5' o.c. |
| SHRUBS | | | | | |
| | 83 | Serviceberry | Amelanchier alnifolia | 5 gal. | 5' o.c. |
| | 75 | Red Flowering Currant | Ribes sanguineum | 2 gal. | 3' o.c. |
| | 195 | Snowberry | Symphocarpus alba | 2 gal. | 2' o.c. |
| | 328 | Oregon Grape | Mahonia nervosa | 1 gal. | 2' o.c. |
| | 113 | Sword Fern | Polystichum munitum | 1 gal. | 12" o.c. |
| | 105 | Rugosa rose | Rosa rugosa | 1 gal. | 12" o.c. |
| | 33 | Salmonberry | Rubus spectabilis | 1 gal. | 12" o.c. |
| | 223 | Evergreen Huckleberry | Vaccinium ovata | 1 gal. | 12" o.c. |
| | 76 | Dicentra formosa | Common Bleeding Heart | 1 gal. | 12" o.c. |
| | 52 | Tolmiea Menziessi | Piggyback plant | 1 gal. | 12" o.c. |
| | 11 | Tolmiea Menziessi | Pacific Wax Murtle | 1 gal. | 2' o.c. |
| | | Salal | Gaultheria shallon | 1 gal. | 12" o.c. |
| | | Red Osier Dogwood | Cornus stolonifera | Live stakes | 6" o.c. |
| | | Geyer Willow | Salix geyeriana | Live stakes | 6" o.c. |
| | | Lawn | Hydroseed per spec. | | |
| | | Tall Oregon Grape | Mahonia aquifolium | 1 gal. | 36" o.c. |
| | | Fragaria chiloensis | Wild Strawberry | 4" cont. | 12" o.c. |
| No Symbol | | Re-seed Mix for Disturbed Areas Below Bridge | Envirolawn - 5lbs per sq.ft. Agrivestment Ph: 235.383.5014 | | |

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BARKER LANDSCAPE ARCHITECTS

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|
| | | | | |

SCALE: 1"-10'
DESIGN
DATE OCT 2008
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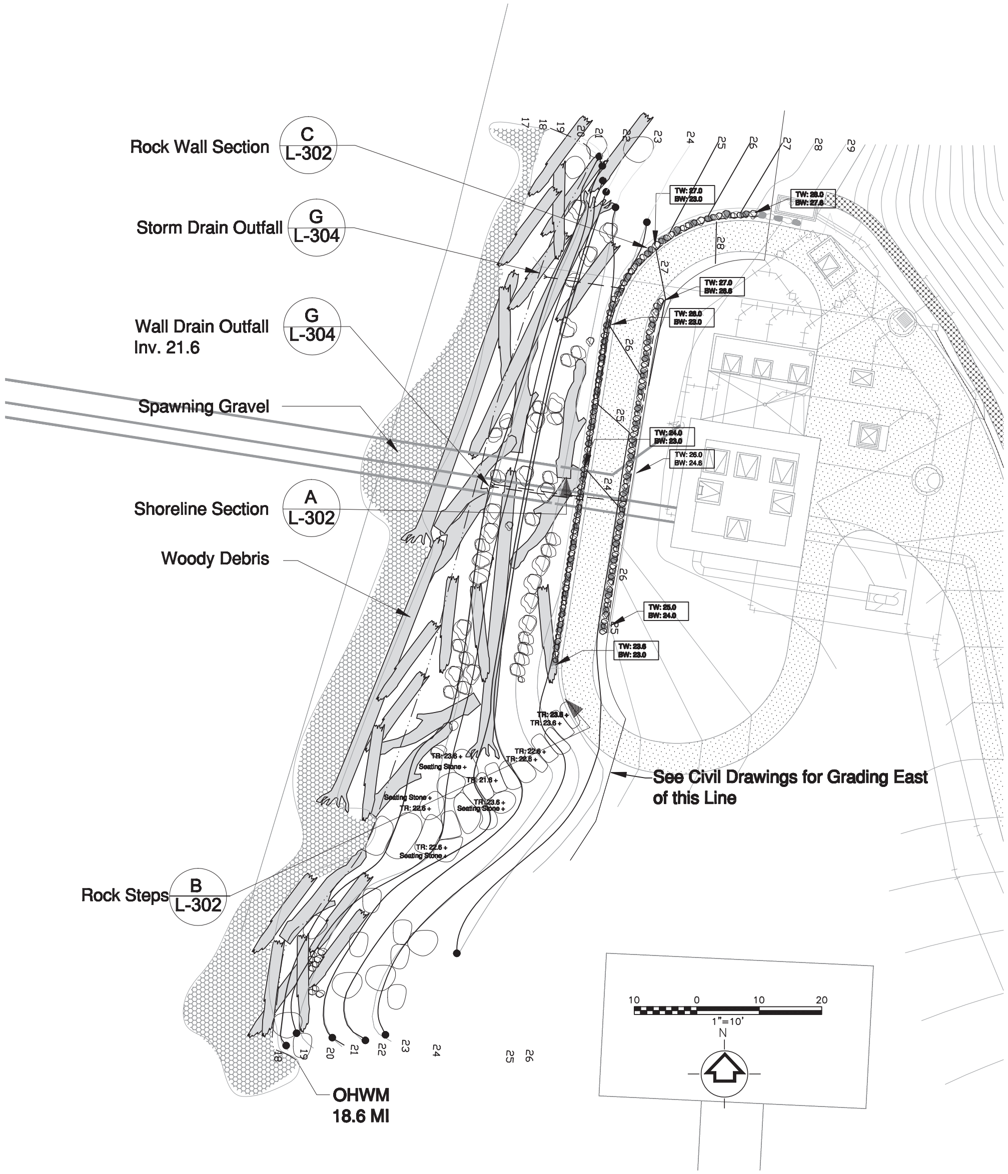
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

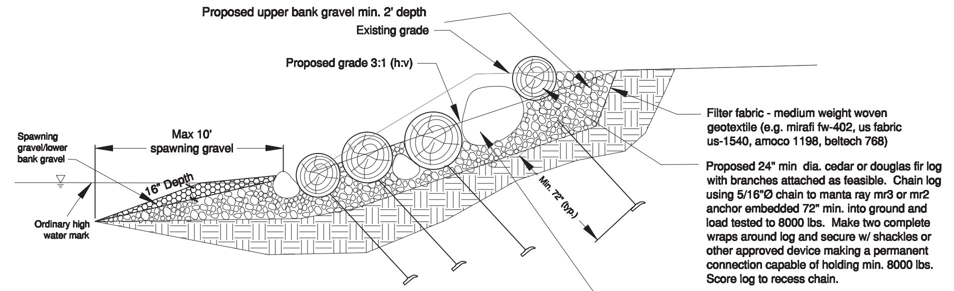
**SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT**
**SCHEDULE B**
**LANDSCAPE PLAN**

DRAWING NO. L-301

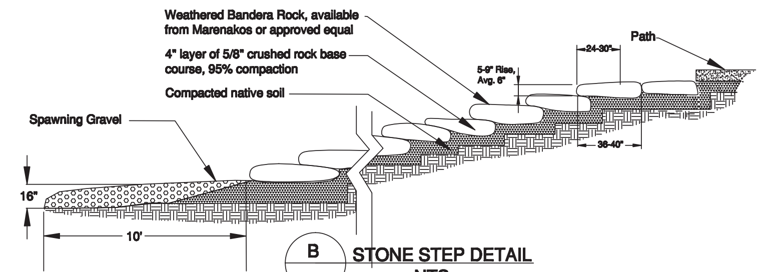
SHEET 37 OF 77

Path: R:\PROJECTS\Mercer Island\THCM Restoration\ACAD\Pump Station\CADD\CADD Update 100608\PS Update 100608\PUMPSTA 300,301,303.dwg Plot date: Oct 10, 2008-10:16:06pm CAD User: Matthew.
Xref Filename: | MAE01X01 | MAE01X03 | MAE02FRM | TWC set | MAE03X04 100708 |

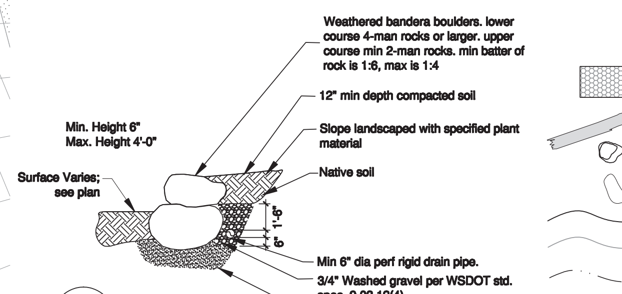



A SHORELINE SECTION
NTS




B STONE STEP DETAIL
NTS




C ROCK WALL
NTS

## SYMBOL LEGEND

- SPAWNING GRAVEL MIX (16" Depth))
- ANCHORED WOODY DEBRIS (QTY: 32)
- WEATHERED BANDERA BOULDER (QTY: 200)
- WEATHERED BANDERA BOULDER (QTY: 32) W/ FLAT SURFACE FOR STAIRS
- PROPOSED TOPOGRAPHY
- EXISTING TOPOGRAPHY
- ORDINARY HIGH WATER MARK
- 6" DIA. PERFERATED RIGID DRAIN PIPE Located Behind All Rock Walls

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BARKER LANDSCAPE ARCHITECTS

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE: 1"-10'
DESIGN
DATE OCT 2008
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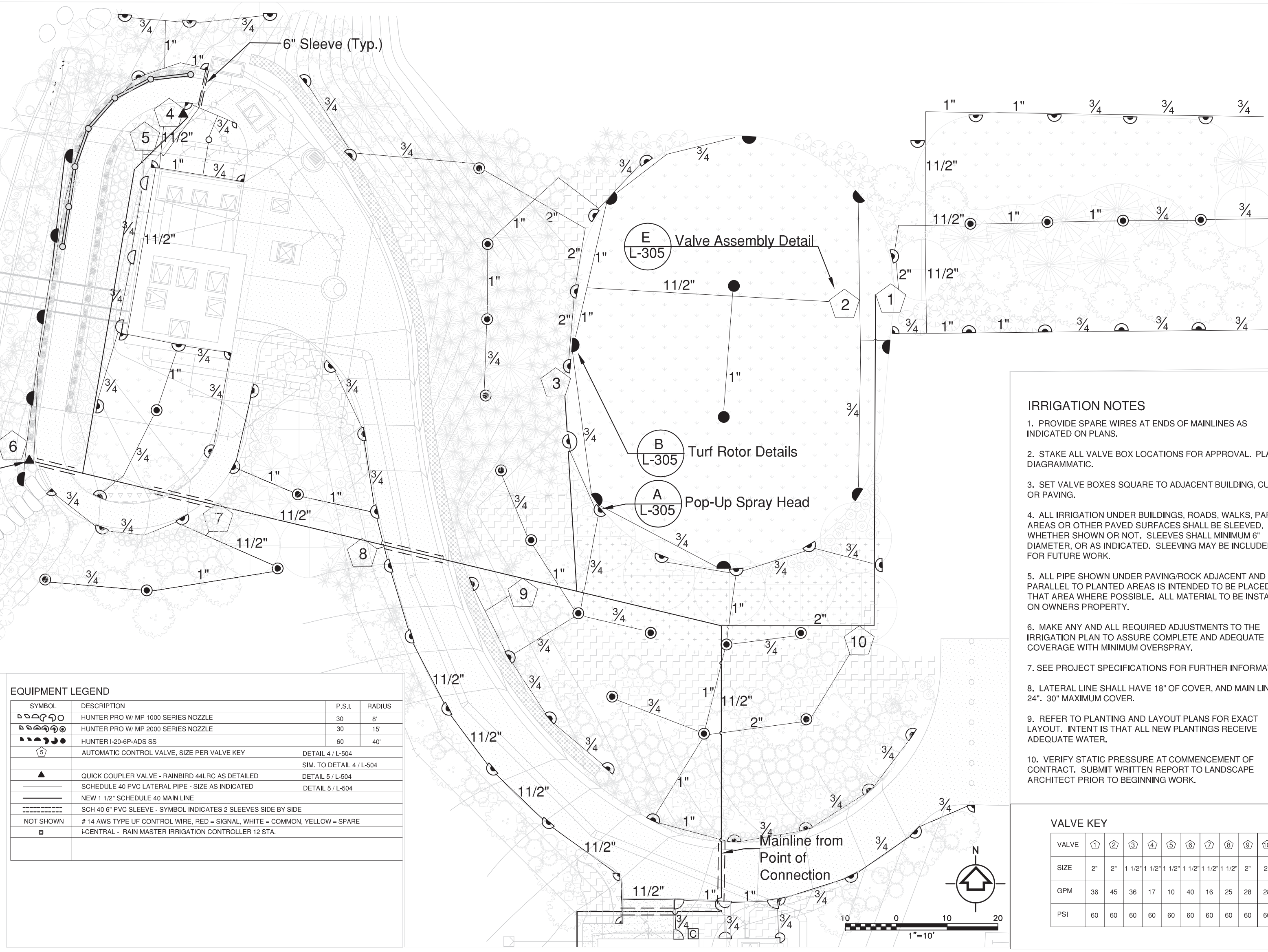
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

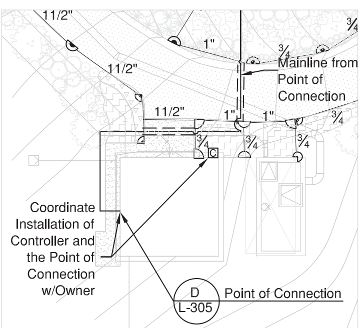
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
GRADING PLAN & LAYOUT

DRAWING NO.
L-302

SHEET 38 OF 77

Path: R:\PROJECTS\Mercer Island\TKCM Restoration\ACAD\Pump Station\CADD\CADD Update 100608\PS Update 100608\PUMPSTA 302.dwg Plot date: Oct 10, 2008-10:29:32pm CAD User: Matthew
Xref Filename: | MAE03FRM | MAE01X03 | MAE03X04 | MAE03X04 100708 |




## IRRIGATION NOTES

1. PROVIDE SPARE WIRES AT ENDS OF MAINLINES AS INDICATED ON PLANS.

2. STAKE ALL VALVE BOX LOCATIONS FOR APPROVAL. PLAN IS DIAGRAMMATIC.

3. SET VALVE BOXES SQUARE TO ADJACENT BUILDING, CURB, OR PAVING.

4. ALL IRRIGATION UNDER BUILDINGS, ROADS, WALKS, PARKING AREAS OR OTHER PAVED SURFACES SHALL BE SLEEVED, WHETHER SHOWN OR NOT. SLEEVES SHALL MINIMUM 6" DIAMETER, OR AS INDICATED. SLEEVING MAY BE INCLUDED FOR FUTURE WORK.

5. ALL PIPE SHOWN UNDER PAVING/ROCK ADJACENT AND PARALLEL TO PLANTED AREAS IS INTENDED TO BE PLACED IN THAT AREA WHERE POSSIBLE. ALL MATERIAL TO BE INSTALLED ON OWNERS PROPERTY.

6. MAKE ANY AND ALL REQUIRED ADJUSTMENTS TO THE IRRIGATION PLAN TO ASSURE COMPLETE AND ADEQUATE COVERAGE WITH MINIMUM OVERSPRAY.

7. SEE PROJECT SPECIFICATIONS FOR FURTHER INFORMATION.

8. LATERAL LINE SHALL HAVE 18" OF COVER, AND MAIN LINES 24". 30" MAXIMUM COVER.

9. REFER TO PLANTING AND LAYOUT PLANS FOR EXACT LAYOUT. INTENT IS THAT ALL NEW PLANTINGS RECEIVE ADEQUATE WATER.

10. VERIFY STATIC PRESSURE AT COMMENCEMENT OF CONTRACT. SUBMIT WRITTEN REPORT TO LANDSCAPE ARCHITECT PRIOR TO BEGINNING WORK.

## EQUIPMENT LEGEND

| SYMBOL | DESCRIPTION | | P.S.I. | RADIUS |
|---|---|---|---|---|
| | HUNTER PRO W/ MP 1000 SERIES NOZZLE | | 30 | 8' |
| | HUNTER PRO W/ MP 2000 SERIES NOZZLE | | 30 | 15' |
| | HUNTER I-20-6P-ADS SS | | 60 | 40' |
| 5 | AUTOMATIC CONTROL VALVE, SIZE PER VALVE KEY | DETAIL 4 / L-504 | | |
| | | SIM. TO DETAIL 4 / L-504 | | |
| ▲ | QUICK COUPLER VALVE - RAINBIRD 44LRC AS DETAILED | DETAIL 5 / L-504 | | |
| | SCHEDULE 40 PVC LATERAL PIPE - SIZE AS INDICATED | DETAIL 5 / L-504 | | |
| | NEW 1 1/2" SCHEDULE 40 MAIN LINE | | | |
| | SCH 40 6" PVC SLEEVE - SYMBOL INDICATES 2 SLEEVES SIDE BY SIDE | | | |
| NOT SHOWN | # 14 AWS TYPE UF CONTROL WIRE, RED = SIGNAL, WHITE = COMMON, YELLOW = SPARE | | | |
| ▫ | I-CENTRAL - RAIN MASTER IRRIGATION CONTROLLER 12 STA. | | | |

## VALVE KEY

| VALVE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | 2" | 2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 2" | 2" |
| GPM | 36 | 45 | 36 | 17 | 10 | 40 | 16 | 25 | 28 | 28 |
| PSI | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |

TETRA TECH/KCM

SCALE: 1"-10'

DESIGN

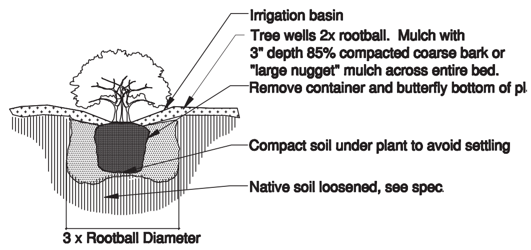
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4

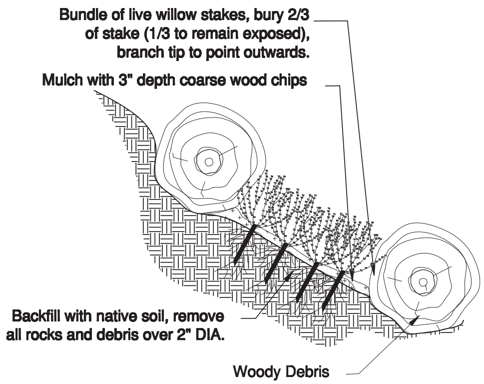
DRAWING NO.

L-303

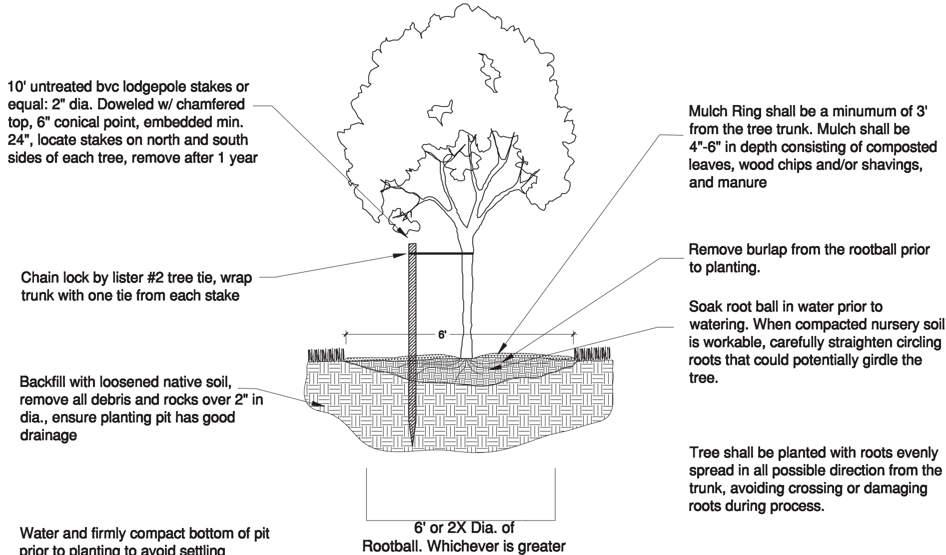
TS:\Mercer Island\Pump Station #4\CADD\PUMPSTATION, 300,301,303.dwg Plot date: Nov 05, 2009-02:57:41pm CAD User: jeff.
MAE01X01 | MAE01X03 | MAE02FRM | TWC set | MAE03X04 |



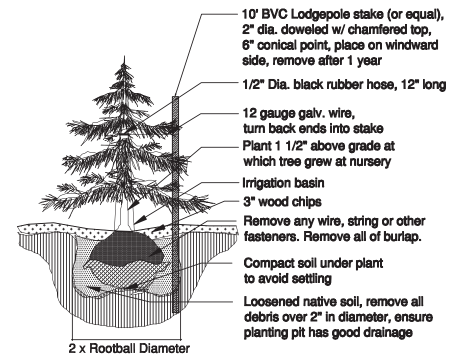

A / L-301 SHRUB PLANTING
NTS



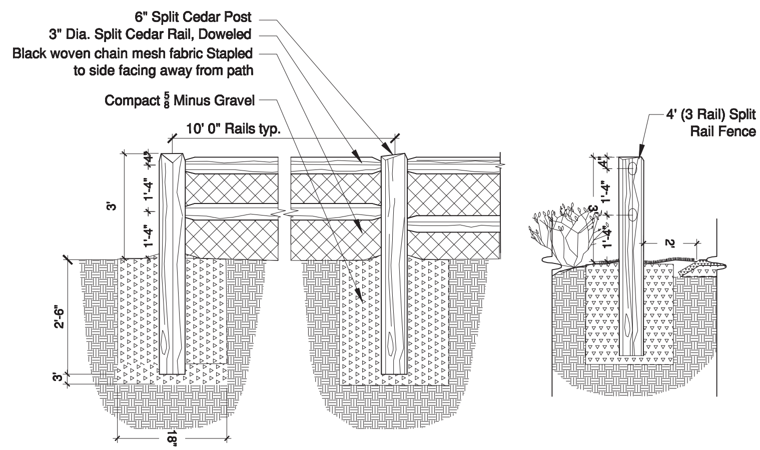

D / L-301 LIVE STAKE PLANTING
NTS



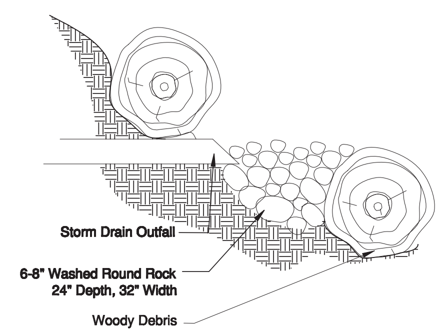

B / L-301 DECIDUOUS TREE PLANTING
NTS




C / L-301 CONIFER TREE PLANTING
NTS




F / L-301 RAIL FENCE DETAIL
NTS




G / L-302 DRAIN OUTFALL
NTS

TETRA TECH
www.tetratech.com
1420 Fifth Avenue, Suite 600
Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

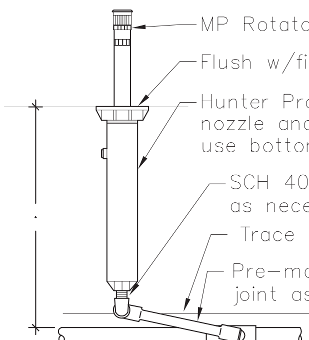
BARKER LANDSCAPE ARCHITECTS

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

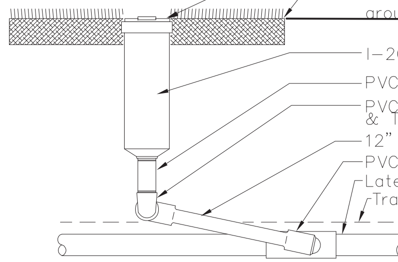
SCALE:
DESIGN
DATE OCT 2008
CHECKED

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
LANDSCAPE DETAILS

DRAWING NO. L-304
SHEET 40 OF 77

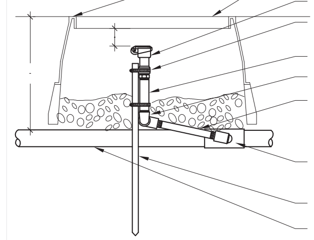



A
L-303
POP-UP SPRAY HEAD DETAIL
NTS

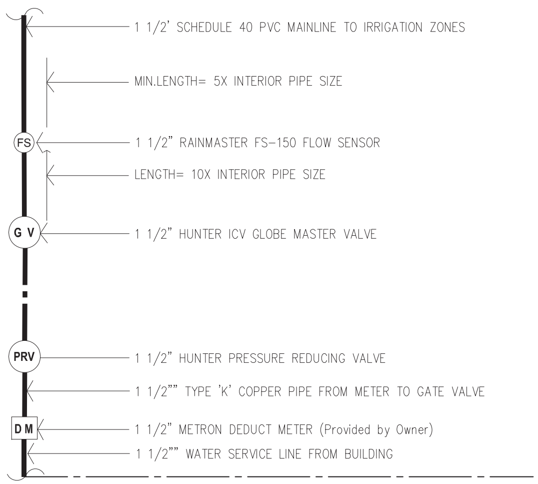



B
L-303
TURF ROTOR DETAIL
NTS

NOTES:
1. Do not allow vault to rest on pipe. Use extensions as necessary.
2. Valve to be set plumb and centered in valve box
3. Contractor to provide (2) each QCV keys and swivel hose ells.
4. Provide 6" depth drain rock.

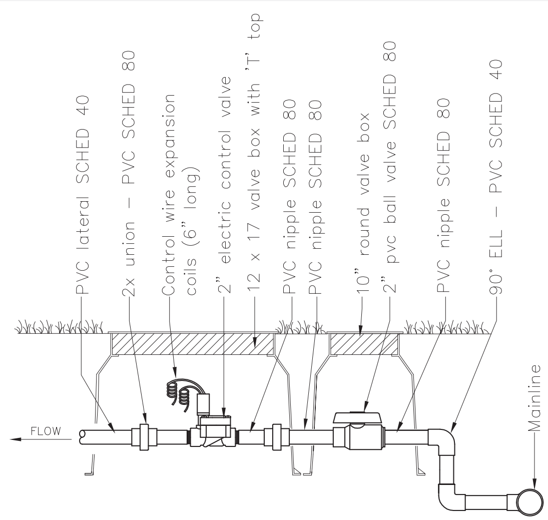



C
L-303
QUICK COUPLER DETAIL
NTS




NOTES:
1. ALL COMPONENTS OF SCHEMATIC POINT OF CONNECTION SHALL BE INSTALLED PER OWNER STANDARD DETAILS.

D
L-303
POINT OF CONNECTION DIAGRAM
NTS




E
L-303
VALVE ASSEMBLY DETAIL
NTS

TETRA TECH/KCM

| SCALE: NTS | CITY OF MERCER ISLAND<br>KING COUNTY, WASHINGTON | DRAWING NO. |
|---|---|---|
| DESIGN | SEWER LAKE LINE AND P.S. NO. 4<br>REPLACEMENT PROJECT | L-305 |

## G. STRUCTURAL - GENERAL

G1 SCOPE

THE NOTES AND DETAILS ON THIS SHEET ARE GENERAL AND APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY.

G2 APPLICABLE SPECIFICATIONS AND CODES

CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE 2003 EDITION OF THE INTERNATIONAL BUILDING CODE (IBC) WITH LOCAL AMENDMENTS. THE ABOVE SHALL GOVERN EXCEPT WHERE OTHER APPLICABLE CODES OR THE CONTRACT DOCUMENTS ARE MORE RESTRICTIVE.

G3 ALTERNATIVE DESIGNS

THE STRUCTURAL SYSTEMS AND DETAILS ON THESE PLANS ARE THE PRIORITY DESIGN; HOWEVER, ALTERNATIVE SYSTEMS AND DETAILS MAY BE USED IF THE CONTRACTOR SUBMITS PLANS WITH SUBSTANTIATING CALCULATIONS AND TEST DATA WHICH BEAR A WASHINGTON STATE LICENSED ENGINEERS SEAL AND SIGNATURES FOR PERMIT.

G4 DIMENSIONS

STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL AND ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

G5 PROVISIONS FOR EQUIPMENT

MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, PIPE SLEEVES, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS, BUT REQUIRED BY OTHER CONTRACT DRAWINGS SHALL BE PROVIDED FOR, PRIOR TO CASTING CONCRETE.

G6 CONSTRUCTION LOADS

STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON THE COMPLETED STRUCTURES; DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND SUPPORTS WHEREVER EXCESSIVE CONSTRUCTION LOADS MAY OCCUR.

G7 DRAINAGE SURFACES

SLOPE DRAINAGE SURFACES UNIFORMLY TO DRAIN. SLOPE SHALL BE 1/4" PER FOOT EXCEPT WHERE NOTED OTHERWISE ON THE PLANS.

G8 FLOOR DRAINS

SEE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR LOCATION AND SIZES.

G9 FLOOR ELEVATIONS

SEE ARCHITECTURAL DRAWINGS FOR FLOOR ELEVATIONS NOT CALLED OUT.

## F. STRUCTURAL DESIGN

F1 DESIGN CODE

DESIGN IS IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE (IBC) EXCEPT WHERE OTHER APPLICABLE CODES OR THE FOLLOWING NOTES ARE MORE RESTRICTIVE.

F2 DESIGN SOIL PRESSURE FOR FOUNDATIONS

A. DESIGN IS BASED ON GOTECHNICAL REPORT BY HWA GEOSCIENCES INC, DATED JANUARY 2007.

B. ALLOWABLE BEARING PRESSURE – PUMP STATION 4000 PSF.

C. ALLOWABLE BEARING PRESSURE – CONTROL BUILDING 1500 PSF.

## L. DESIGN LIVE LOADS

A. FLOOR
- (1) SLAB ON GRADE = 400 PSF
- (2) ELEVATED STRUCTURAL SLAB = 300 PSF
- (3) GRATINGS = 100 PSF
- (4) HATCHES = HS–20 UNO
- (5) STAIRS = 100 PSF
- (6) PRECAST VAULTS = HS–20

B. ROOF
- (1) LIVE AND EQUIPMENT = 20 PSF

C. SNOW
- (1) GROUND Pg = 20 PSF
- (2) TERRAIN CATEGORY C
  ROOF EXPOSURE – FULLY EXPOSED
  Ce = 0.9
- (3) Ct = 1.0
- (4) Is = 1.1
- (5) ROOF Pf = 25 PSF

D. WIND
- (1) BASIC WIND SPEED = 85 MPH
- (2) OCCUPANCY CATEGORY III, Iw = 1.15
- (3) WIND EXPOSURE C
- (4) BUILDING IS ENCLOSED
- (5) Kzt = 1

E. SEISMIC LOADING
- (1) OCCUPANCY CATEGORY III, SEISMIC USE GROUP II
- (2) Ie = 1.25
- (3) Ss = 1.504, $S_1$ = 0.497
- (4) SITE CLASS = C
- (5) Sds = 1.003, $S_{d1}$ = 0.431
- (6) SEISMIC DESIGN CATEGORY = D
- (7) LATERAL FORCE RESISTING SYSTEM (BUILDING)
  SPECIAL REINFORCED MASONRY, R =5.0
- (8) ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE
- (9) Cs = 0.251

F. DESIGN BASE SHEAR (BUILDING)
- (1) SEISMIC: Vb =6.2 KIPS

## C. CONCRETE

C1 APPLICABLE CODE

CONCRETE CONSTRUCTION SHALL CONFORM TO THE 2002 EDITION OF THE ACI BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI–318; AND THE ACI CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES, ACI–350.

C2 REINFORCING STEEL DETAILS

DETAILING, FABRICATION AND ERECTION OF REINFORCING STEEL, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH DETAILS AND DETAILING OF CONCRETE REINFORCEMENT ACI 315.

C3 DESIGN STRENGTHS

A. CAST–IN–PLACE CONCRETE
- (1) GENERAL USE – f'c = 4000 PSI @ 28 DAYS
- (2) PRECAST – f'c = 5000 PSI @28 DAYS
- (3) PIPE ENCASEMENT AND FILL CONC – f'c = 2000 PSI @ 28 DAYS

B. REINFORCING STEEL SHALL BE ASTM A 615, GRADE 60. WELDED WIRE FABRIC SHALL BE ASTM A 185 SMOOTH WIRE – fy = 60 KSI MINIMUM. REBAR USED IN SHEAR WALLS AND CONCRETE FRAME MEMBERS SHALL BE ASTM A706.

C4 CONCRETE COVER

CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS WITH MINIMUM COVER OF ONE BAR DIAMETER.

A. FOOTINGS AND FOUNDATION MATS CAST ON GROUND – 3"

B. FORMED OR FINISHED SURFACES TO BE IN CONTACT WITH GROUND, WEATHER, OR CLEAN WATER.
- (1) AT BARS GREATER THAN NO. 5 – 2"
- (2) AT BARS NO. 5 OR SMALLER – 1 1/2"

C. FORMED OR FINISHED SURFACES NOT TO BE EXPOSED TO GROUND, WEATHER OR CLEAN WATER.
- (1) BEAMS AND COLUMNS – 1 1/2"
- (2) SLABS AND WALLS – 1"
- (3) JOIST – 3/4"

D. FORMED OR FINISHED SURFACES EXPOSED TO SEWAGE – 2"

C5 MINIMUM REINFORCEMENT

CONCRETE CONSTRUCTION SHALL BE REINFORCED CONCRETE EXCEPT WHERE PLAIN CONCRETE IS CALLED OUT ON THE DRAWINGS, IN WHICH CASE NO REINFORCEMENT SHALL BE USED. CONCRETE THAT IS NOT DESIGNATED AS PLAIN CONCRETE AND HAS NO REINFORCEMENT INDICATED SHALL BE REINFORCED PER ACI 318 AND THE FOLLOWING SCHEDULES:

| WALL THICKNESS | SIZE | SPACING, EW | POSITION |
|---|---|---|---|
| 6" | #4 | 12" | OC |
| 8" | #5 | 12" | OC |
| 12"OR GREATER | #5 | 12" | EF |

MASS CONCRETE SHALL BE REINFORCED WITH #5@150C EW MINIMUM IN ALL FACES.

C6 SHRINKAGE AND TEMPERATURE STEEL

UNLESS OTHERWISE NOTED, SHRINKAGE AND TEMPERATURE REINFORCING STEEL SHALL BE PROVIDED FOR SLABS IN ACCORDANCE WITH THE FOLLOWING SCHEDULES:

| SLAB THICKNESS | SIZE | SPACING |
|---|---|---|
| 4" | #3 | 12" |
| 6" | #4 | 12" |
| 8" | #5 | 12" |
| 12" | #4 | 12" T&B |

C7 EXTRA ACCESSORY BARS

ASIDE FROM NORMAL ACCESSORIES USED TO HOLD REINFORCING STEEL IN POSITION THE FOLLOWING SHALL BE ADDED:

A. IN SLABS NO. 4 RAISER BARS @ 48"MAXIMUM TO SUPPORT TOP REINFORCING STEEL.

B. IN WALLS WITH TWO CURTAINS, NO. 3 U OR Z SHAPE SPACERS @6'–0"OC EW.

C8 DOWELS

DOWELS SHALL BE AT LEAST THE SAME SIZE AND SPACING AS BARS WITH WHICH THEY ARE LAPPED. THE LAP EMBEDMENT SHALL BE AS RECOMMENDED BY ACI 318 OR AS NOTED.

C9 BAR SPLICES

SPLICES OF REINFORCING STEEL BAR SHALL BE IN ACCORDANCE WITH SCHEDULE SHOWN ON CONCRETE DETAILS AND ACI 318 AND SHALL BE CLASS B UNLESS OTHERWISE NOTED. THE LENGTH OF LAP SPLICE OF BARS OF DIFFERENT DIAMETER SHALL BE BASED ON THE SMALLER DIAMETER. BAR SPLICES MAY ALSO BE MADE BY WELDING IN ACCORDANCE WITH AWS SPEC D 1.4 IF APPROVED BY THE ENGINEER.

C10 RESTRICTED BAR ANCHORAGE

IN CASES WHERE REINFORCING BARS CANNOT BE EXTENDED AS FAR AS REQUIRED DUE TO THE LIMITED EXTENT OF THE ADJACENT CONCRETE STRUCTURE, THE BARS SHALL EXTEND AS FAR AS POSSIBLE AND END IN STANDARD HOOKS.

C11 STANDARD HOOKS

BARS ENDING IN RIGHT ANGLE BENDS OR HOOKS SHALL CONFORM TO THE REQUIREMENTS OF ACI 318.

C12 SLOPING SLABS

MONOLITHIC SLABS WITH TOPS THAT ARE SLOPED SHALL HAVE BOTTOMS SLOPED THE SAME AMOUNT, MAINTAINING A UNIFORM SLAB THICKNESS, UNLESS OTHERWISE NOTED.

C13 SLAB ON GRADE

CONCRETE SLABS ON GRADE, UNLESS OTHERWISE NOTED, SHALL BE 6"MINIMUM THICKNESS REINFORCED WITH #4@12 OC AT SLAB MID–DEPTH.

C14 CHAMFERS

EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS AND EDGES SHALL HAVE 3/4" CHAMFERS. RE–ENTRANT CORNERS SHALL NOT HAVE FILLETS.

C15 ANCHOR BOLTS

USE OF ANCHOR BOLTS SHALL BE GOVERNED BY IBC TABLE NO. 1912.2. ANCHOR BOLTS SHALL BE A307 MATERIAL.

C16 CONCRETE ANCHORS

CONCRETE ANCHORS SHALL BE DRILLED IN STAINLESS STEEL EXPANSION OR ADHESIVE ANCHORS. EXPANSION ANCHORS SHALL BE HILTI KBII, POWERS RAWL POWERSTUD, SIMPSON WEDGE–ALL, OR ITW RAMSET TRUBOLT. ADHESIVE ANCHORS SHALL BE HILTI HY150, COVERT CIA GEL7000, SIMPSON SET ADHESIVE, OR USANCHOR HS200.

| EXPANSION ANCHORS | | | ADHESIVE ANCHORS | | |
|---|---|---|---|---|---|
| DIA (IN) | MIN EMBED (IN) | MIN SPACING (IN) | DIA (IN) | MIN EMBED (IN) | MIN SPACING (IN) |
| 3/8 | 3 | 4 1/2 | 3/8 | 3 1/2 | 4 1/2 |
| 1/2 | 4 1/8 | 6 | 1/2 | 4 1/2 | 6 |
| 5/8 | 5 1/8 | 7 1/2 | 5/8 | 5 5/8 | 7 1/2 |
| 3/4 | 6 5/8 | 9 | 3/4 | 6 3/4 | 9 |
| 1 | 8 | 12 | 1 | 9 | 12 |

ADHESIVE ANCHORS SHALL HAVE SPECIAL INSPECTION. EXPANSION BOLT VALUES SHALL NOT BE INCREASED FOR SHORT DURATION LOADS. EXPANSION BOLT ANCHORS SHALL NOT BE SUBJECT TO VIBRATORY OR SHOCK LOADS. INSTALL ANCHORS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS UNLESS NOTED OTHERWISE.

C17 CONSTRUCTION JOINTS

LOCATION OF CONSTRUCTION JOINTS SHALL HAVE THE APPROVAL OF THE ENGINEER. CONSTRUCTION JOINTS SHALL BE DETAILED AS SHOWN ON THE DRAWINGS.

C18 WATERSTOPS

PROVIDE WATERSTOPS AT JOINTS IN LOCATIONS OF STRUCTURES EXPOSED TO GROUND WATER OR LIQUID ON ONE SIDE AND OCCUPIED BY NON–SUBMERGED EQUIPMENT OR BY PERSONNEL ON THE OTHER SIDE. PROVIDE WATERSTOPS AT WALL AND SLAB JOINTS OF TANKS AND CHANNELS SUBJECT TO LIQUID PRESSURE. WATERSTOPS SHALL BE PROVIDED UP TO 6" ABOVE HIGH WATER/LIQUID LEVEL.

## S. STEEL

S1 CODES AND SPECIFICATIONS

STEEL CONSTRUCTION SHALL CONFORM TO THE SPECIFICATIONS AND STANDARDS AS CONTAINED IN THE 13TH EDITION OF THE AISC MANUAL OF STEEL CONSTRUCTION.

S2 MATERIAL

STRUCTURAL BARS, PLATES, ANGLES, AND CHANNELS INDICATED ON THE DRAWINGS SHALL BE STEEL MEETING ASTM A36 SPECIFICATIONS. ROLLED W SECTIONS SHALL BE STEEL MEETING ASTM A992 GR50. BOLTS SHALL CONFORM TO ASTM 325N.

S3 WELDING

WELDING SHALL CONFORM TO AWS D1.1 STRUCTURAL WELDING CODE – STEEL. ELECTRODE SHALL BE E70XX GROUP. WELDING SHALL BE CONDUCTED BY WELDERS CERTIFIED BY THE AWS.

S4 HOT–DIP GALVANIZING

UNLESS OTHERWISE NOTED, ALL STEEL FABRICATIONS SHALL BE HOT–DIPPED GALVANIZED AFTER FABRICATION.

## A. ALUMINUM

A1 SPECIFICATIONS AND CODES

ALUMINUM CONSTRUCTION SHALL BE IN ACCORDANCE WITH IBC CHAPTER 20.

A2 MATERIAL

STRUCTURAL SHAPES, BARS, PLATES, AND SHEETS INDICATED ON THE DRAWINGS SHALL BE ALUMINUM MEETING THE ALUMINUM ASSOCIATION, ALLOY 6061–T6 UNLESS OTHERWISE NOTED.

A3 ALUMINUM IN CONTACT WITH CONCRETE

WHERE ALUMINUM IS IN CONTACT WITH CONCRETE OR MASONRY SURFACES, CONTACT SURFACES SHALL BE COATED.

A4 WELDING

MATERIAL AND PROCEDURES FOR WELDING ALUMINUM SHALL BE IN ACCORDANCE WITH AWS D1.2.

## B. OPEN WEB STEEL JOISTS

B1 OPEN WEB STEEL JOISTS

OPEN WEB STEEL JOISTS (INCLUDING BRIDGING) SHALL CONFORM TO THE SPECIFICATIONS OF THE STEEL JOIST INSTITUTE, LATEST EDITION, FOR THE JOIST SERIES DESIGNATED ON THE PLANS. ENDS OF BRIDGING ROWS SHALL BE FIELD WELDED TO STRUCTURAL STEEL MEMBERS OR TO PLATES EMBEDDED IN CONCRETE OR MASONRY UNLESS DETAILED OTHERWISE. JOIST MANUFACTURER SHALL CHECK ROOF JOIST AND PROVIDE UPLIFT BRIDGING AS REQUIRED TO ADEQUATELY BRACE THE BOTTOM CHORD AGAINST LATERAL MOVEMENT UNDER WIND UPLIFT PRESSURES (SEE DESIGN CRITERIA NOTE FOR WIND CRITERIA).

## D. METAL ROOF DECKING

D1 METAL FLOOR AND ROOF DECKING

PROVIDE SIZE, TYPE, GAUGE, AND ATTACHMENT TO THE SUPPORTING STRUCTURE AS SHOWN ON THE PLANS. ALTERNATES MUST BE CONNECTED ACCORDING TO PUBLISHED ICC–ES CRITERIA FOR DIAPHRAGM SHEARS SHOWN. PROVIDE SHORING WHERE REQUIRED PER MANUFACTURE'S PUBLISHED CRITERIA. ALL DECKING SHALL CONFORM TO THE REQUIREMENTS OF THE STEEL DECK INSTITUTE.

## M. REINFORCED MASONRY

M1 MASONRY UNITS

A. STRUCTURAL HOLLOW CLAY MASONRY UNITS SHALL CONFORM TO ASTM C90, GRADE I.

B. DESIGN STRENGTH: F'm = 2000 PSI.

M2 MORTAR AND GROUT

MORTAR SHALL CONFORM TO THE REQUIREMENTS OF ASTM C270, TYPE S.

A. MORTAR SHALL DEVELOP A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 1,800 PSI AT 28 DAYS.

B. GROUT SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI AT 28 DAYS. MAXIMUM AGGREGATE SIZE SHALL BE 3/8" PEA GRAVEL WITH SLUMP BETWEEN 6 AND 9 INCHES.

M3 HORIZONTAL REINFORCING

A. HORIZONTAL JOINT REINFORCING SHALL BE PROVIDED IN EVERY 2ND MORTAR JOINT. JOINT REINFORCING SHALL BE CONTINUOUS NO. 9 GAGE TRUSS TYPE.

B. PROVIDE STRUCTURAL BOND BEAMS AT EVERY 4'–0" OR AS INDICATED ON THE DRAWINGS. BOND BEAM SHALL CONTAIN TWO NO. 4 BARS CONTINUOUS AS SHOWN IN TYPICAL DETAILS, UNLESS NOTED OTHERWISE.

M4 REINFORCING AT CORNERS AND INTERSECTIONS

HORIZONTAL JOINT REINFORCING SHALL BE CONTINUOUS AROUND ALL CORNERS AND INTERSECTIONS AND SHALL LAP 6 INCHES MINIMUM AT SPLICES. DETAILS SHALL CONFORM WITH MANUFACTURERS RECOMMENDATIONS AND AS SHOWN IN TYPICAL DETAILS. REFER TO TYPICAL DETAILS FOR ADDITIONAL REINFORCING AT OPENINGS, CORNERS AND INTERSECTIONS.

M5 LAPPED REINFORCING

REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 24" OR 48 BAR DIAMETERS (db) WHICH EVER IS GREATER. AT SHEAR WALLS, WALL ENDS, INTERSECTIONS, AND OPENINGS GREATER THAN 3'–0" WIDE, USE 72db.

M6 VERTICAL WALL REINFORCING

VERTICAL WALL REINFORCING SHALL BE AS SHOWN ON THE TYPICAL DETAILS UNLESS OTHERWISE NOTED. VERTICAL CELLS CONTAINING REINFORCING SHALL BE FILLED SOLIDLY WITH GROUT. GROUT SHALL BE POURED IN LIFTS OF 4 FEET MAXIMUM.

M7 ANCHOR BOLTS

USE OF ANCHOR BOLTS SHALL BE GOVERNED BY ACI 530–02, 2.1.4. BOLTS SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.

## I. SPECIAL INSPECTION

THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION PER IBC CHAPTER 17. THESE INSPECTIONS SHALL BE PERFORMED BY A SPECIAL INSPECTOR CERTIFIED BY THE APPROPRIATE JURISDICTION TO PERFORM THE TYPES OF INSPECTIONS SPECIFIED. SEE THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR SPECIAL INSPECTION AND TESTING.

| ITEM | DESCRIPTION |
|---|---|
| CONCRETE | ALL STRUCTURAL CONCRETE. |
| BOLTS INSTALLED IN CONCRETE | ANCHOR BOLTS, HEADED STUDS (EXCEPT AT BEAM–TO– DECK) INSTALLATION |
| REINFORCING STEEL | A. PLACEMENT OF REINFORCING STEEL B. SPLICING OF REINFORCING BY BUTT WELDING, EXOTHERMIC WELDING PROCESS OR THREADED COUPLERS. |
| WELDING, SEE IBC CHAPTER 17 FOR ADDITIONAL INFO | ALL FIELD WELDING, INCLUDING WELDING OF REINFORCING STEEL |
| HIGH STRENGTH BOLTING | ALL CONNECTIONS WITH ASTM A325 BOLTS |
| STRUCTURAL MASONRY | ALL MASONRY SHOWN ON STRUCTURAL DRAWINGS. MASONRY SHALL BE INSPECTED IN ACCORDANCE WITH IBC CHAPTER 17 LEVEL 1. COMPRESSIVE STRENGTH SHALL BE VERIFIED BY UNIT STRENGTH METHOD PER IBC 2105.2.2.1. |
| ADHESIVE ANCHORAGE | INCLUDES ADHESIVE DOWELS OR ANCHORS. PERIODIC SPECIAL INSPECTION SHALL INCLUDE VISUAL OBSERVATION OF DRILLED HOLES AFTER CLEANING, SPACING, EDGE DISTANCE, AND THE INSTALLATION OF DOWEL OR ANCHOR, AND OTHER ITEMS AS REQUIRED BY MANUFACTURER. |


TETRA TECH
www.tetratech.com
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Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301


GARY C. BANSEMER, STATE OF WASHINGTON, 29628, REGISTERED PROFESSIONAL ENGINEER
10-10-08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

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|---|---|
| SCALE: | NONE |
| DESIGN | GB |
| DATE | OCT 2008 |
| CHECKED | HN |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
STRUCTURAL GENERAL NOTES

DRAWING NO. S300

SHEET 42 OF 77


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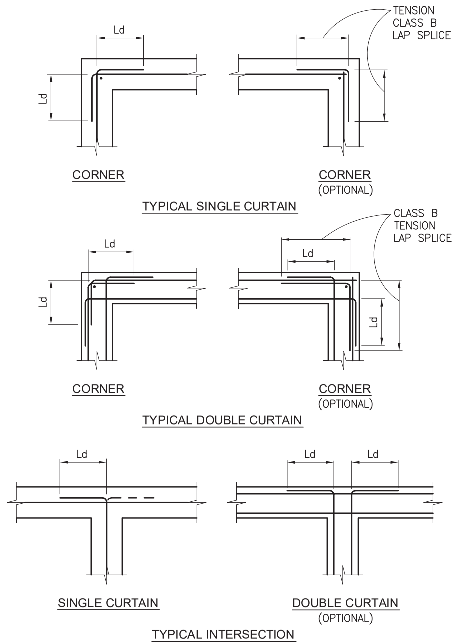
Xref Filename: | MAE03FRM | GSWA-CCB |




REINFORCING AT WALL INTERSECTIONS (1/–)

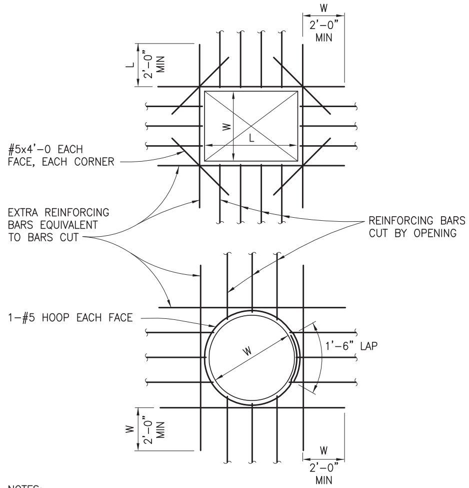
NO SCALE

| BAR SIZE | Ld: TOP BARS (NOTE 2) | Ld: OTHER BARS | CLASS B TENSION LAP: TOP BARS (NOTE 2) | CLASS B TENSION LAP: OTHER BARS |
|---|---|---|---|---|
| #3 | 12 | 12 | 16 | 16 |
| #4 | 12 | 12 | 16 | 16 |
| #5 | 19 | 15 | 25 | 19 |
| #6 | 28 | 21 | 36 | 28 |
| #7 | 47 | 36 | 61 | 47 |
| #8 | 62 | 48 | 80 | 62 |
| #9 | 70 | 54 | 90 | 70 |
| #10 | 78 | 61 | 102 | 78 |
| #11 | 87 | 67 | 113 | 87 |

WALLS, SLABS, AND FOOTINGS — F'c = 4000, SEE NOTES 1 AND 2

REINF DEVELOPMENT AND LAP SPLICE LENGTHS (2/–)

NO SCALE



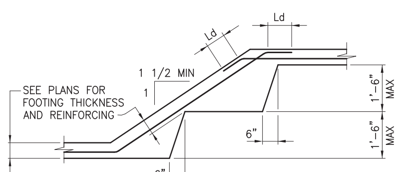

NOTES:
1. REINFORCEMENT IN OTHER DIRECTION SHALL BE TREATED IN A SIMILAR MANNER.
2. "W" AND "L" = DIMENSION OF OPENING. FOR CIRCULAR OPENINGS, "W"= DIAMETER.
3. ALL OPENINGS IN WALLS AND SLABS LARGER THAN OR EQUAL TO 10" IN ANY ONE DIRECTION SHALL CONFORM TO DETAILS.
4. SEE MECHANICAL AND ARCHITECTURAL DRAWINGS FOR SLAB AND WALL OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS.
5. SUPPLEMENTARY BARS MAY BE OMITTED WHERE OPENING IS FRAMED BY BEAMS.
6. OPENING DETAILS SHOWN ARE TYPICAL UNLESS NOTED OTHERWISE.

REINFORCING AT WALL AND SLAB OPENINGS (3/–)

NO SCALE

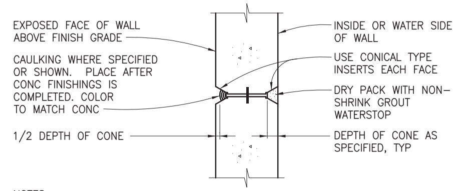
## WALLS, SLABS AND FOOTINGS REINF NOTES

1. FOR GRADE 60 UNCOATED BARS AND NORMAL WEIGHT CONCRETE.
2. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" DEPTH OF FRESH CONCRETE CAST BELOW THEM.




STEPPED WALL FOOTING (4/–)

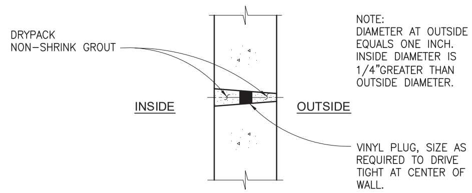
NO SCALE




NOTES:
1. FOR FORM TIE HOLES ON OUTSIDE FACE OF WALL BELOW GRADE, DRY PACK WITH NON-SHRINK GROUT.
2. SPACE FORM TIES ON EXPOSED PORTIONS OF WALLS APPROXIMATELY EQUAL HORIZONTALLY AND VERTICALLY AND UNIFORMLY IN EACH DIRECTION.
3. WHERE CAULKING IS NOT SPECIFIED OR SHOWN, DRY PACK EXTERIOR TIE HOLES WITH NON-SHRINK GROUT. GROUT COLOR TO MATCH COLOR OF CONCRETE.
4. DRY PACK USING STEEL TOOLS.

FORM SNAP TIE HOLE (5/–)

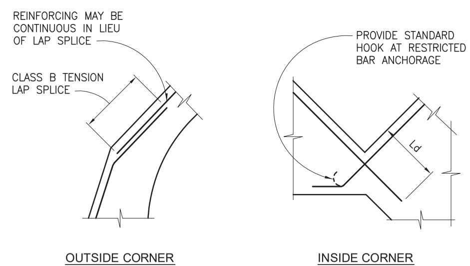
NO SCALE




CONSTRUCTION STEPS:
1. SANDBLAST OR MECHANICALLY ROUGHEN TAPERED TIE-HOLE SURFACES.
2. DRIVE IN VINYL PLUG.
3. PROVIDE BONDING AGENT INSIDE AND DRYPACK WITH NON-SHRINK GROUT WHILE STILL TACKY.
4. PROVIDE BONDING AGENT OUTSIDE AND DRYPACK WITH NON-SHRINK GROUT WHILE STILL TACKY.

ALTERNATIVE TIE THROUGH-BOLT (6/–)

NO SCALE




REINFORCING AT CORNERS (7/–)

NO SCALE

| BAR SIZE | Ld: TOP BARS (NOTE 2) | Ld: OTHER BARS | CLASS B TENSION LAP: TOP BARS | CLASS B TENSION LAP: OTHER BARS |
|---|---|---|---|---|
| #3 | 12 | 12 | 16 | 16 |
| #4 | 18 | 14 | 24 | 18 |
| #5 | 29 | 22 | 38 | 29 |
| #6 | 37 | 28 | 48 | 37 |
| #7 | 54 | 42 | 70 | 54 |
| #8 | 62 | 47 | 80 | 62 |
| #9 | 104 | 80 | 136 | 104 |
| #10 | 117 | 90 | 153 | 117 |
| #11 | 130 | 100 | 170 | 130 |

BEAMS, JOISTS, AND COLUMNS — F'c = 4000, SEE NOTES 1 AND 2

REINF DEVELOPMENT AND LAP SPLICE LENGTHS (8/–)

NO SCALE

## BEAMS, JOISTS, AND COLUMNS NOTES

1. FOR GRADE 60 UNCOATED BARS AND NORMAL WEIGHT CONCRETE.
2. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" DEPTH OF FRESH CONCRETE CAST BELOW THEM.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GARY C. BANSEMER, STATE OF WASHINGTON, 29626, REGISTERED PROFESSIONAL ENGINEER — 10-10-08

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| SCALE: | AS SHOWN |
| DESIGN | GB |
| DATE | OCT 2008 |
| CHECKED | HN |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
TYPICAL CONCRETE DETAILS 1

DRAWING NO. S301



Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03S02.dwg Plot date: Oct 13, 2008-09:30:27am CAD User: jeff.wicke.
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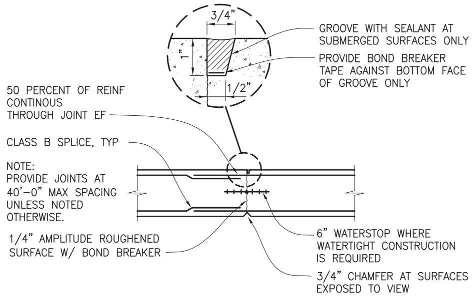
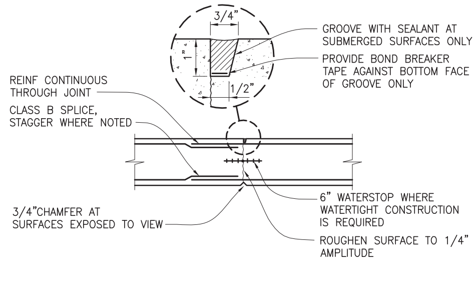


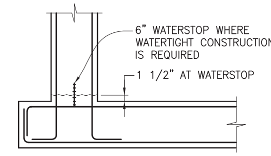

TYPICAL VERTICAL WALL CONTROL JOINT
HYDRAULIC STRUCTURES

DETAIL 1/–
NO SCALE



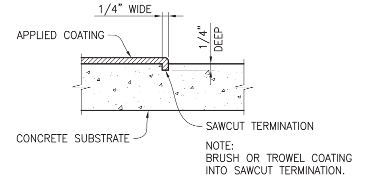

TYPICAL CONSTRUCTION JOINT
AT VERTICAL WALL OR STRUCTURAL SLAB
HYDRAULIC STRUCTURES

DETAIL 4/–
NO SCALE



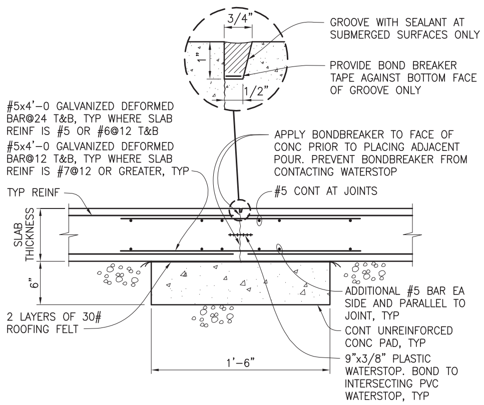

WALL BASE CONSTRUCTION JOINT

DETAIL 6/–
NO SCALE



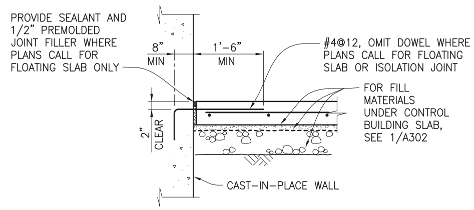

TYPICAL LEADING EDGE TERMINATION

COATING DETAIL 8/–
NO SCALE

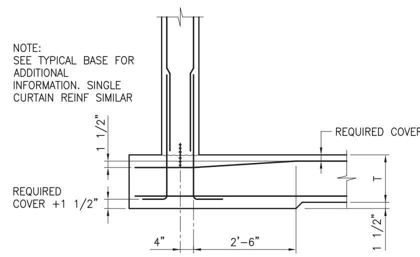



DOUBLE MAT BASE SLAB CONTROL JOINT
HYDRAULIC STRUCTURES

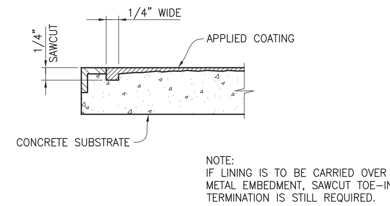
DETAIL 2/–
NO SCALE




JOINTS AT WALLS
NON-HYDRAULIC STRUCTURES

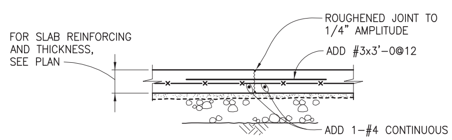



ALTERNATIVE BASE 7/–
NO SCALE

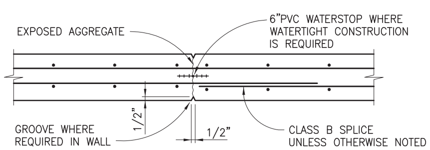



TYPICAL TERMINATION AT
METAL EMBEDMENT IN CONCRETE

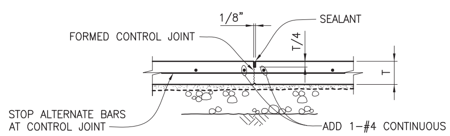
COATING DETAIL 9/–
NO SCALE




CONSTRUCTION JOINT
NON-HYDRAULIC STRUCTURES




VERTICAL WALL OR
SLAB CONSTRUCTION JOINT 3/–
NO SCALE




CONTROL JOINT
NON-HYDRAULIC STRUCTURES

SLAB ON GRADE 5/–
NO SCALE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10-10-08

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| DATE | OCT 2008 |
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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
TYPICAL CONCRETE DETAILS 2

DRAWING NO.
S302



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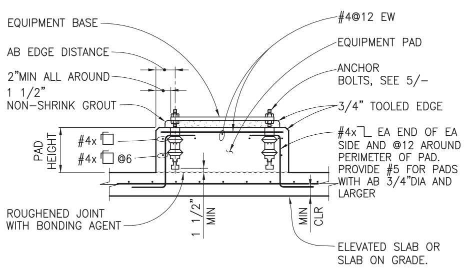
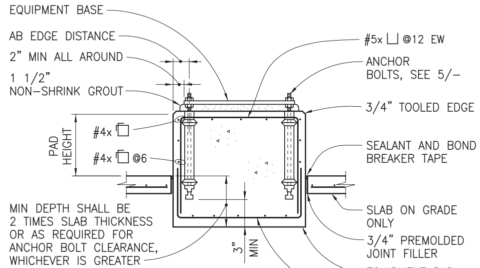



NOTE:
SEE EQUIPMENT PAD NOTES

TYPE A

EQUIPMENT PAD (1/–)
NO SCALE




NOTE:
SEE EQUIPMENT PAD NOTES

TYPE D

EQUIPMENT PAD (4/–)
NO SCALE

## EQUIPMENT PAD NOTES

1. PROVIDE EQUIPMENT PADS FOR ALL EQUIPMENT UNLESS NOTED OTHERWISE. PROVIDE TYPE A EQUIPMENT PAD, UNLESS NOTED OTHERWISE.

2. PROVIDE EQUIPMENT PAD DIMENSIONS, HEIGHT, AND LOCATION AS REQUIRED BY THE EQUIPMENT MANUFACTURER AND APPROVED BY THE ENGINEER. VERIFY EQUIPMENT PAD DIMENSIONS, HEIGHT, AND LOCATION WITH THE EQUIPMENT MANUFACTURER'S REVIEWED SHOP DRAWINGS BEFORE THE PAD IS INSTALLED.

3. PROVIDE ANCHOR BOLT SIZE, TYPE, QUANTITY, LOCATION, AND THREAD PROJECTION AS REQUIRED BY THE EQUIPMENT MANUFACTURER AND APPROVED BY THE ENGINEER. PROVIDE MINIMUM DIAMETER ANCHOR BOLTS. VERIFY LOADS ON ANCHOR BOLTS DO NOT EXCEED ALLOWABLE WORKING LOADS SHOWN IN GENERAL STRUCTURAL NOTES. IF LOADS EXCEED THE TABULATED VALUES, PROVIDE SPECIAL ANCHORAGE DETAILS APPROVED BY THE EQUIPMENT MANUFACTURER.

4. PROVIDE ANCHOR BOLT EDGE DISTANCE NOT LESS THAN THE MINIMUM TABULATED BELOW. INSTALL ANCHOR BOLTS TO PROVIDE A MINIMUM OF HORIZONTAL MOVEMENT IN ALL DIRECTIONS.

5. INSTALL EQUIPMENT PADS LEVEL UNLESS NOTED OTHERWISE.

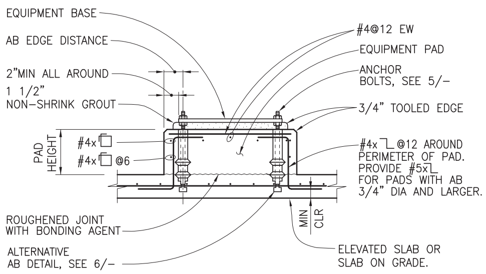
6. WHERE INSTALLATION REQUIRES A PAD HEIGHT LESS THAN THE MINIMUM TYPE A PAD TABULATED BELOW, PROVIDE TYPE B EQUIPMENT PAD, UNLESS NOTED OTHERWISE.

7. SUPPORT THE EQUIPMENT BASE WITH WEDGES OR SHIMS DURING GROUTING. REMOVE TEMPORARY LEVELING NUTS BEFORE FINAL EQUIPMENT INSTALLATION. WEDGES OR SHIMS LEFT IN PLACE SHALL NOT BE EXPOSED TO VIEW.

## EQUIPMENT PAD DIMENSIONS

| | | | | | | |
|---|---|---|---|---|---|---|
| ANCHOR BOLT (AB) DIAMETER | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1 1/4 |
| MINIMUM TYPE A PAD HEIGHT | 7 | 8 1/2 | 10 | 11 | 12 1/2 | 15 |
| MINIMUM ANCHOR BOLT EDGE DISTANCE | 3 | 3 3/4 | 4 1/2 | 5 1/4 | 6 | 7 1/2 |

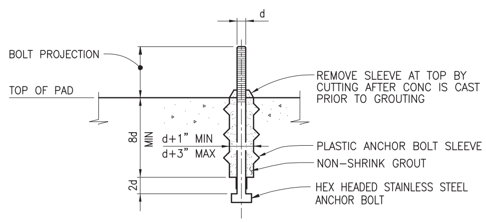
DETAIL (7/–)
NO SCALE




NOTE:
SEE EQUIPMENT PAD NOTES.

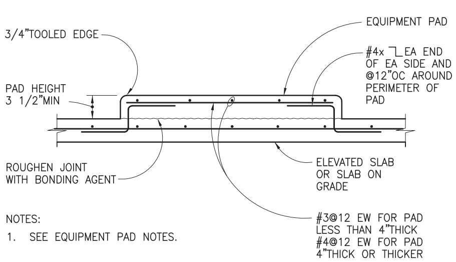
TYPE B

EQUIPMENT PAD (2/–)
NO SCALE




NOTE:
SEE EQUIPMENT PAD NOTES.

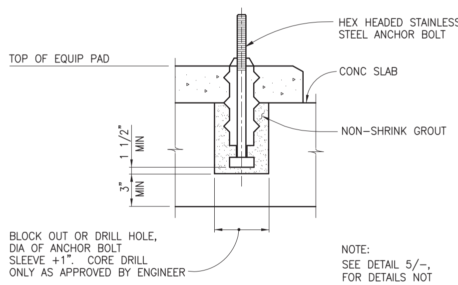
EQUIPMENT ANCHOR BOLT (5/–)
NO SCALE




NOTES:
1. SEE EQUIPMENT PAD NOTES.

TYPE C

EQUIPMENT PAD (3/–)
NO SCALE




NOTE:
SEE DETAIL 5/–, FOR DETAILS NOT CALLED OUT HERE.

ALTERNATIVE ANCHOR BOLT (6/–)
NO SCALE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10-10-08

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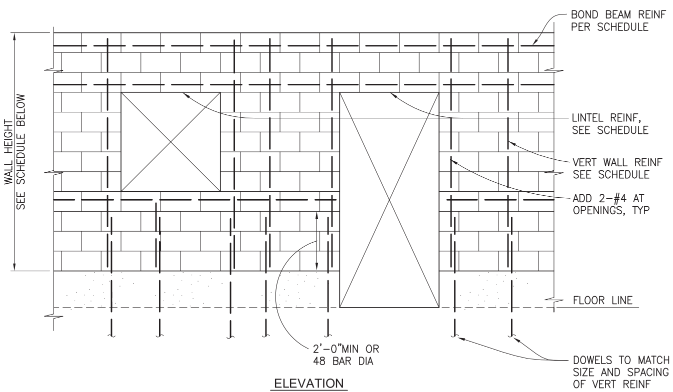
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
TYPICAL EQUIPMENT PAD DETAILS

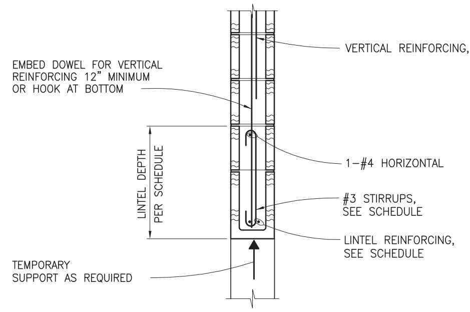
DRAWING NO.
S303




| MASONRY SHEAR WALL REINFORCEMENT SCHEDULE | | | | |
|---|---|---|---|---|
| WALL THICKNESS | WALL HEIGHT | VERTICAL REINFORCING, SEE NOTE 2 | BOND BEAM REINFORCING, SEE NOTE 6 | JOINT REINFORCING, SEE NOTE 5 |
| 6" | ≤12'-0" | #4@24 | 2-#4 CONT@48 | 16"OC |

NOTES:
1. SPECIAL INSPECTION REQUIRED ON ALL MASONRY WORK.
2. SCHEDULE APPLIES FOR MASONRY WALL REINFORCING NOT SPECIFIED ELSEWHERE.
3. ALL MASONRY SHEAR WALLS ARE IDENTIFIED ON PLANS.
4. LAY MASONRY IN 48" MAXIMUM LIFTS. FILL ALL CELLS AND BOND BEAMS CONTAINING REINFORCING WITH GROUT.
5. JOINT REINFORCING, SEE 4/–
6. TYP BOND BEAM REINFORCING DETAILS, SEE 3/–

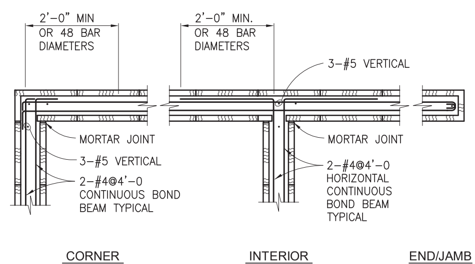
TYPICAL MASONRY WALL REINFORCEMENT 1/–
NO SCALE



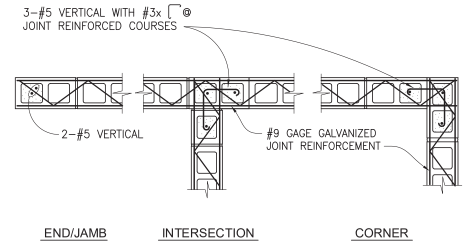

| LINTEL REINFORCING SCHEDULE | | | | |
|---|---|---|---|---|
| WALL | CLEAR SPAN | DEPTH | HORIZONTAL REINFORCING | STIRRUP |
| 6" | 4'-0" MAX | 11.5" | 2-#4 BOT | – |
| 6" | LESS THAN 6'-7" | 11.5" | 2-#4 BOT | #3@4 |

NOTES:
1. SCHEDULE APPLIES FOR LINTEL REINFORCING NOT SPECIFIED ELSEWHERE.
2. EXTEND HORIZONTAL REINFORCING A MINIMUM OF 2'-0" BEYOND BEARING.

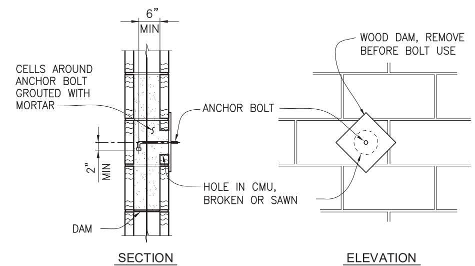
LINTEL REINFORCING 2/–
NO SCALE




TYPICAL BOND BEAM REINFORCING DETAILS 3/–
NO SCALE




TYPICAL VERTICAL AND JOINT REINFORCING 4/–
NO SCALE




ANCHOR BOLT IN CMU WALL 7/–
NO SCALE

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GARY C. BANSEMER, STATE OF WASHINGTON, 29626, REGISTERED PROFESSIONAL ENGINEER, 10-10-08

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
TYPICAL MASONRY DETAILS

DRAWING NO. S304


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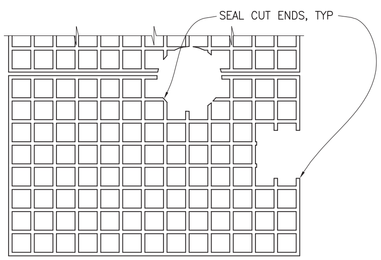
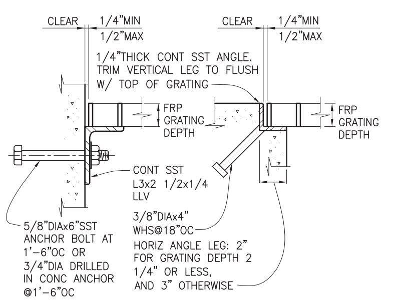


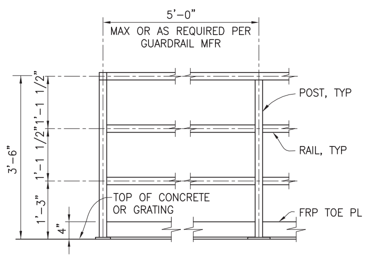

| FIBER REINFORCED PLASTIC (FRP) GRATING (100 PSF ALLOWABLE LOAD) | | |
|---|---|---|
| MAXIMUM SPAN | DEPTH | MESH |
| 2'-0" | 1" | 1 1/2"x1 1/2" |
| 3'-0" | 1 1/2" | 1 1/2"x1 1/2" |
| 4'-0" | 2" | 2"x2" |

NOTE:
1. PROVIDE MOLDED GRATING WITH NON-SLIP CONCAVE OR GRIT SURFACE.
2. ALL CUT OR ABRADED SURFACES SHALL BE SEALED WITH RESIN PRIOR TO INSTALLATION.
3. PROVIDE 4 SST HOLDOWN CLIPS, ONE AT EACH CORNER, TYPICAL EACH PIECE.
4. PROVIDE SST GRATING SUPPORTS AT ALL EDGES.
5. MAXIMUM WEIGHT OF ANY ONE PANEL SHALL BE 60 LB.

FRP GRATING SCHEDULE (1/–)
NO SCALE

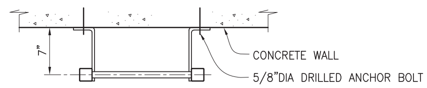



GRATING SUPPORT (2/–)
NO SCALE

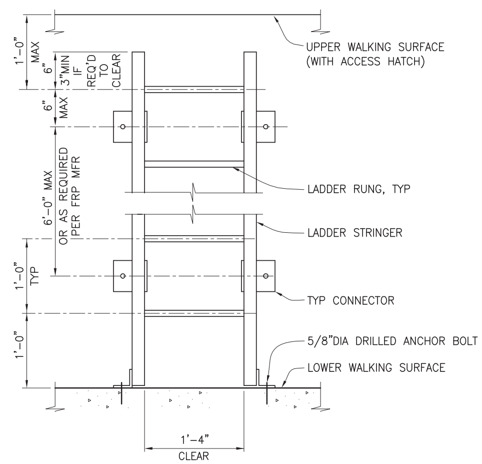



NOTES:
1. FRP GUARDRAILS, POSTS AND POST BASE CONNECTION SHALL BE A COMPLETE SYSTEM OF COMPONENTS CAPABLE OF WITHSTANDING A 200 LB LOAD AT ANY POINT HORIZONTAL OR VERTICAL ON THE RAILING SYSTEM OR 50 LB PER FOOT HORIZONTAL FORCE TOP RAIL.

TYPICAL FRP GUARDRAIL (3/–)
NO SCALE

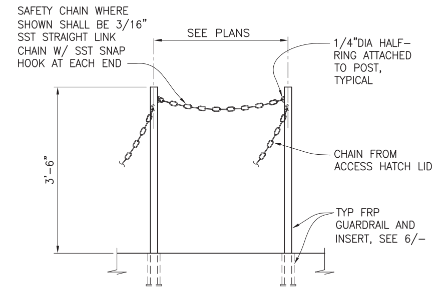



PLAN

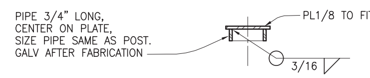



ELEVATION

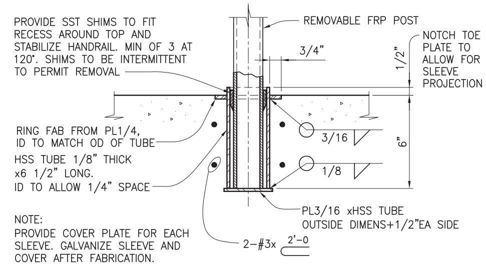
FRP LADDER (4/–)
NO SCALE




FRP GUARDRAIL SAFETY CHAIN (5/–)
NO SCALE




COVER PLATE




NOTE:
PROVIDE COVER PLATE FOR EACH SLEEVE. GALVANIZE SLEEVE AND COVER AFTER FABRICATION.

REMOVABLE FRP GUARDRAIL (6/–)
NO SCALE

TETRA TECH
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Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

GARY C. BANSEMER, STATE OF WASHINGTON, 29628, REGISTERED PROFESSIONAL ENGINEER
10-10-08

| REV | DATE | BY | DESCRIPTION | APPR. |
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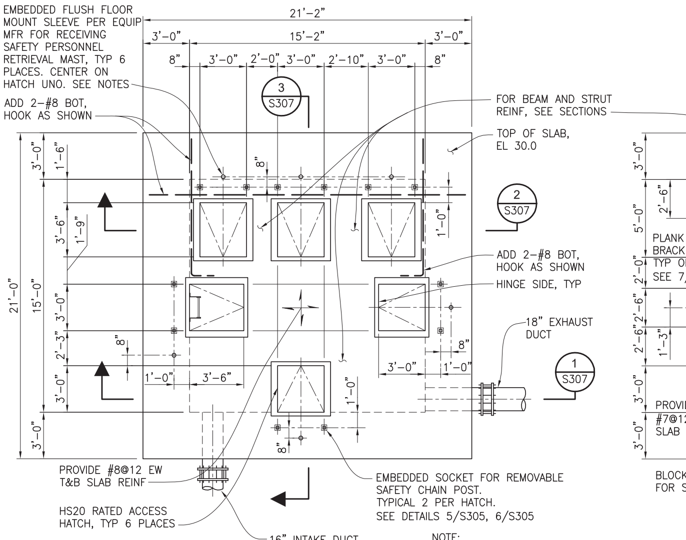
SCALE: AS SHOWN
DESIGN: GB
DATE: OCT 2008
CHECKED: HN

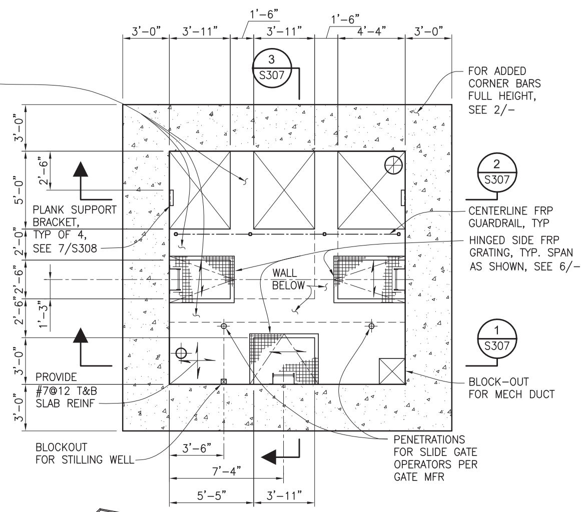
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
TYPICAL FIBERGLASS AND METAL DETAILS

DRAWING NO. S305
SHEET 47 OF 77

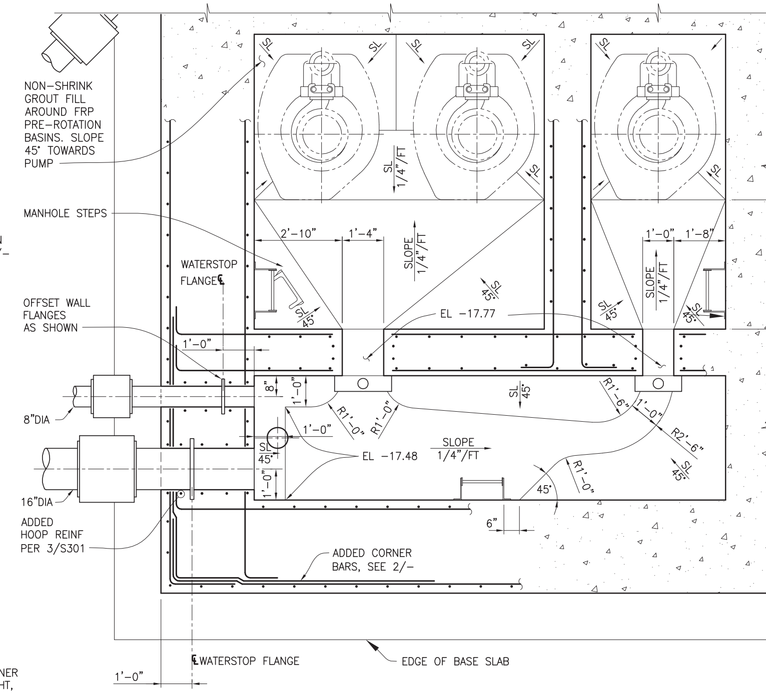



TOP PLAN 1/–
1/4"=1'-0"

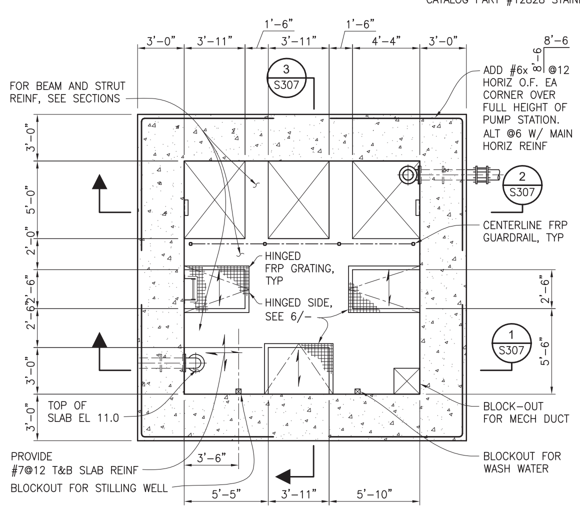
NOTE:
1. PER CITY OF MERCER ISLAND, FLUSH FLOOR MOUNT SLEEVE FOR USE IN FRESH CONCRETE SHALL BE "DBI-SALA-UCL-SAFETY SYSTEMS" CATALOG PART #12828 STAINLESS STEEL.



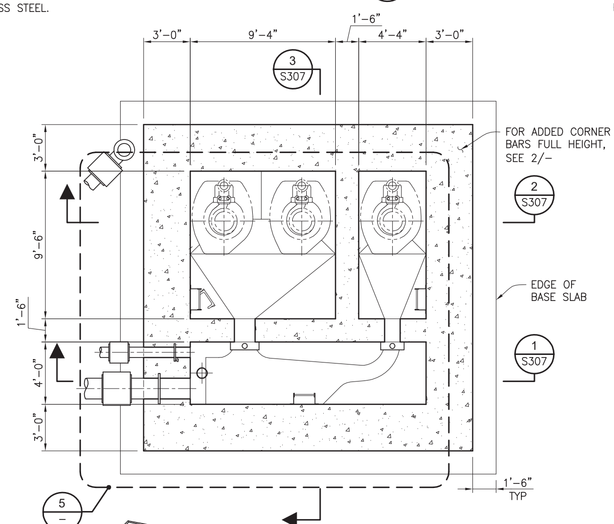

PLAN AT EL -6.0 3/–
1/4"=1'-0"



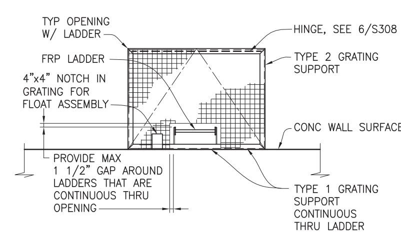

PARTIAL PLAN 5/–
1/2"=1'-0"




PLAN AT EL 11.0 2/–
1/4"=1'-0"




BOTTOM PLAN 4/–
1/4"=1'-0"




DETAIL 6/–
NO SCALE

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GARY C. BANSEMER, STATE OF WASHINGTON, 29628, REGISTERED PROFESSIONAL ENGINEER, 10-10-08

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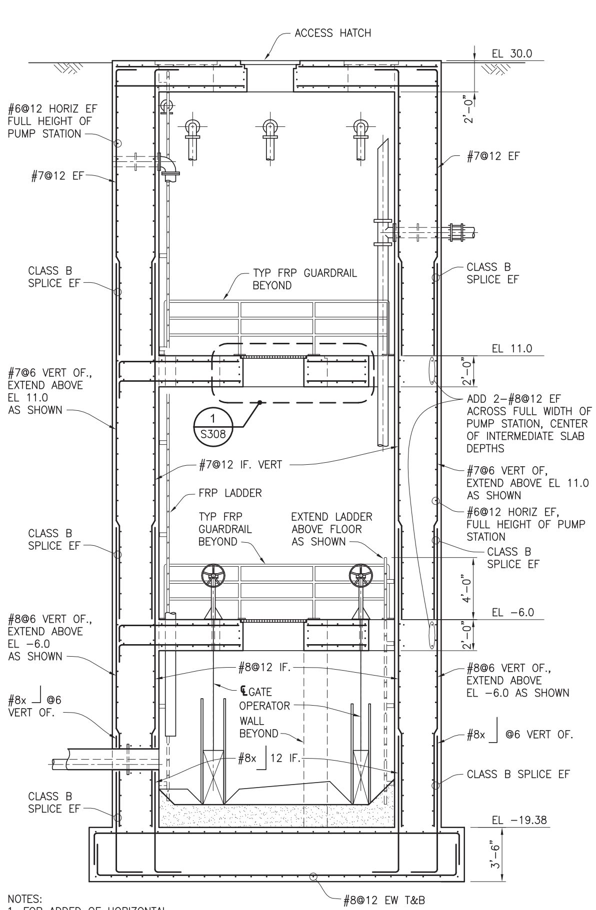
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION
PLANS

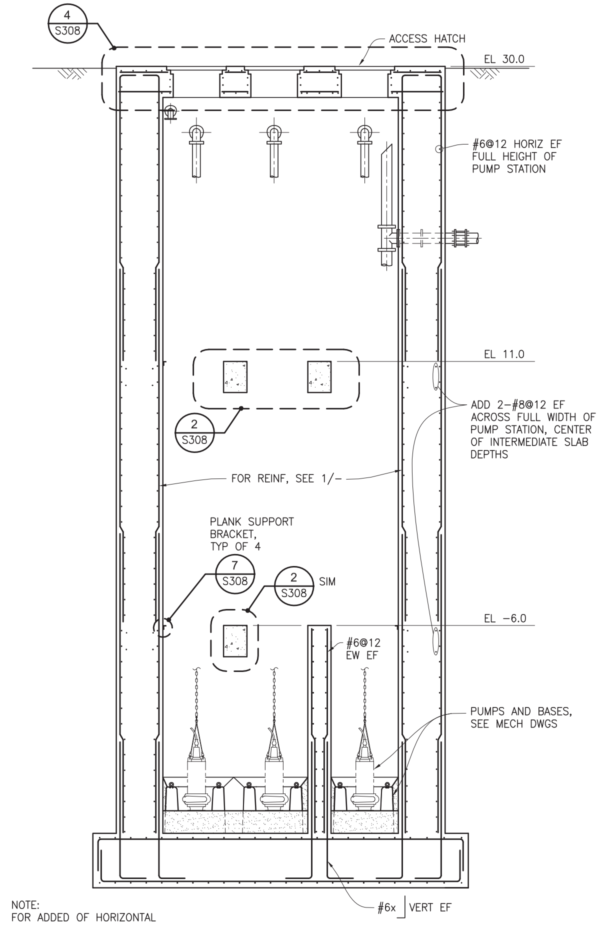
DRAWING NO. S306
SHEET 48 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03S08.dwg Plot date: Oct 13, 2008-09:32:43am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03X01 | MAE03M303 | GSWA-GCB |



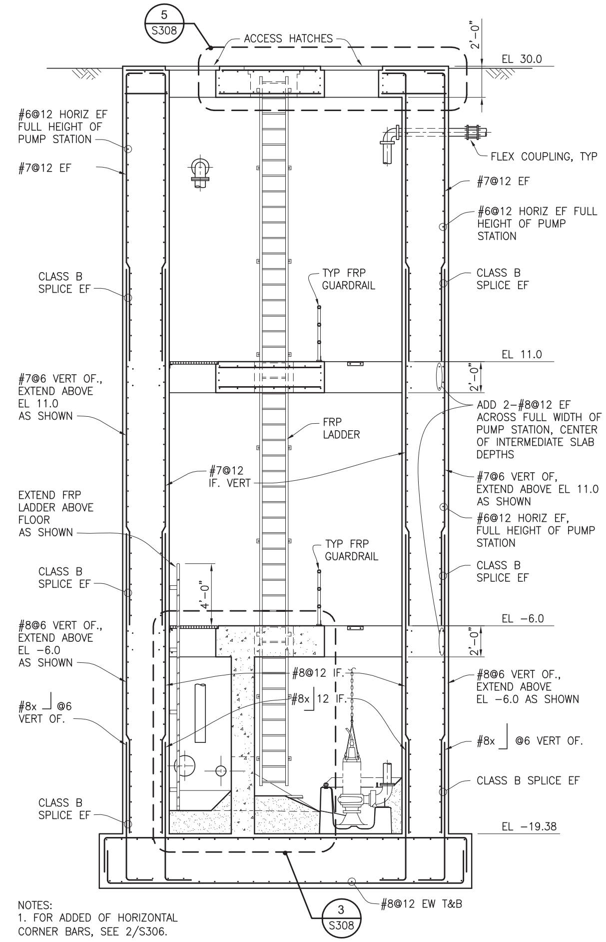

NOTES:
1. FOR ADDED OF HORIZONTAL CORNER BARS, SEE 2/S306.
2. EXHAUST AND INTAKE DUCTS NOT SHOWN FOR CLARITY, SEE M303.
3. ALL CONCRETE SURFACES INSIDE THE PUMP STATION SHALL BE COATED PER SPECIFICATION 09900 AND 8/S302, 9/S302.

SECTION 1 S306
1/4"=1'-0"




NOTE:
FOR ADDED OF HORIZONTAL CORNER BARS, SEE 2/S306

SECTION 2 S306
1/4"=1'-0"




NOTES:
1. FOR ADDED OF HORIZONTAL CORNER BARS, SEE 2/S306.
2. EXHAUST AND INTAKE DUCTS NOT SHOWN FOR CLARITY, SEE M303.
3. ALL CONCRETE SURFACES INSIDE THE PUMP STATION SHALL BE COATED PER SPECIFICATION 09900 AND 8/S302, 9/S302.

SECTION 3 S306
1/4"=1'-0"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GARY C. BANSEMER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 29626
10-10-08

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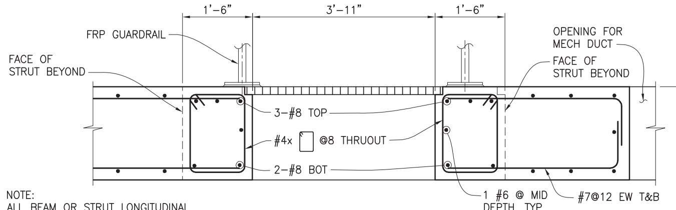
| | | | | | SCALE: | AS SHOWN |
| | | | | | DESIGN | GB |
| | | | | | DATE | OCT 2008 |
| | | | | | CHECKED | HN |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION
SECTIONS

DRAWING NO.
S307

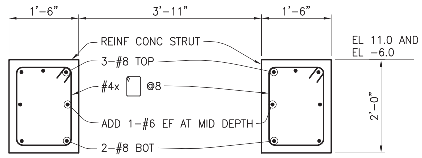
SHEET 49 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03509.dwg Plot date: Oct 13, 2008-09:33:22am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03X01 | GSWA-GCB |



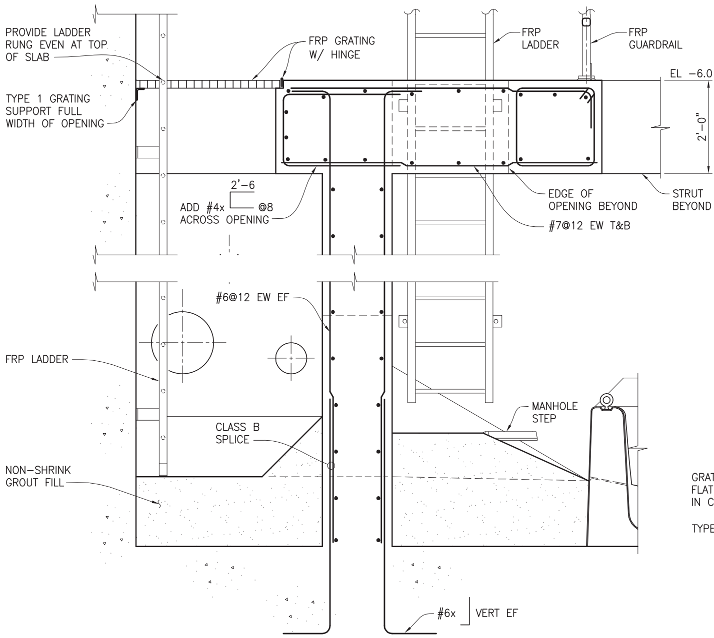

NOTE:
ALL BEAM OR STRUT LONGITUDINAL AND STIRRUP REINF SHALL BE CONTINUOUS ACROSS WIDTH OR LENGTH OF PUMP STATION.

DETAIL 1 / S307
3/4"=1'-0"

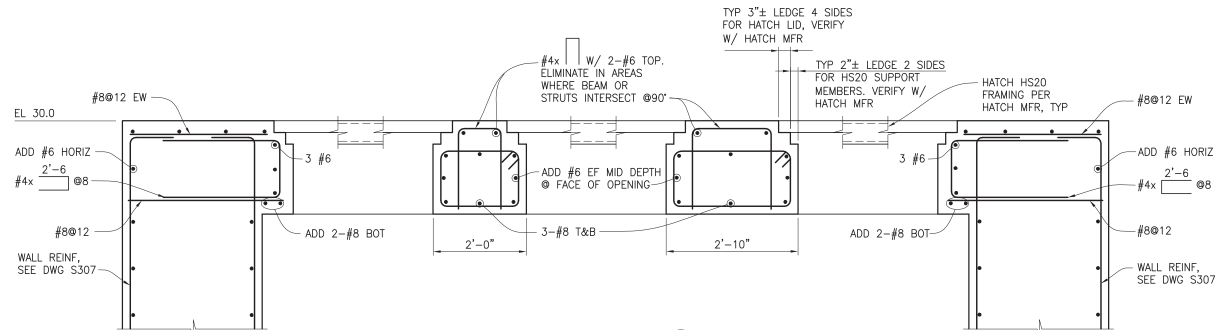



NOTE:
ALL BEAM OR STRUT LONGITUDINAL AND STIRRUP REINF SHALL BE CONTINUOUS ACROSS WIDTH OR LENGTH OF PUMP STATION.

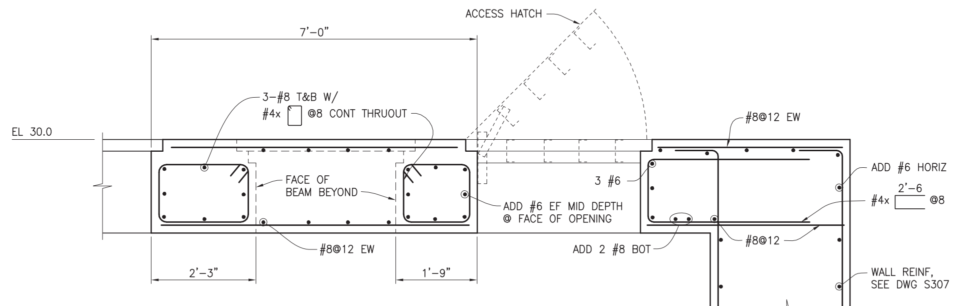
DETAIL 2 / S307
3/4"=1'-0"



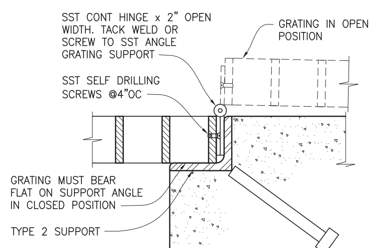

DETAIL 3 / S307
3/4"=1'-0" S306




DETAIL 4 / S307
3/4"=1'-0"

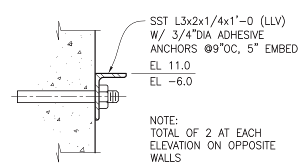



DETAIL 5 / S307
3/4"=1'-0"




HINGED GRATING

DETAIL 6 / S306
3/4"=1'-0"




NOTE:
TOTAL OF 2 AT EACH ELEVATION ON OPPOSITE WALLS

PLANK SUPPORT BRACKET

DETAIL 7 / S306
3/4"=1'-0" S307

TETRA TECH
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Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

GARY C. BANSEMER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 29626
10-10-08

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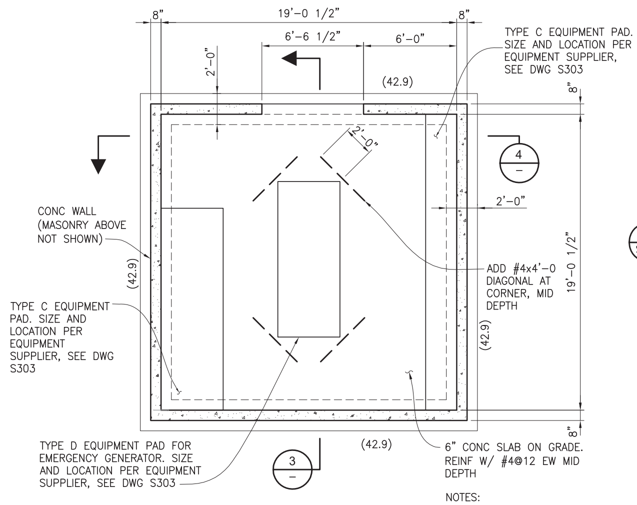
| SCALE: | AS SHOWN |
| DESIGN | GB |
| DATE | OCT 2008 |
| CHECKED | HN |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION
DETAILS

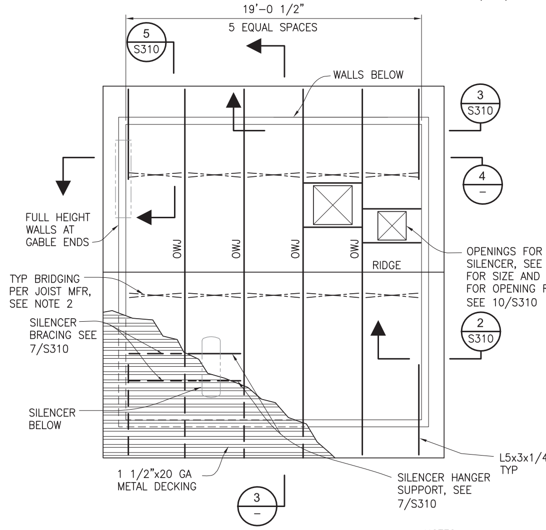
DRAWING NO. S308

SHEET 50 OF 77



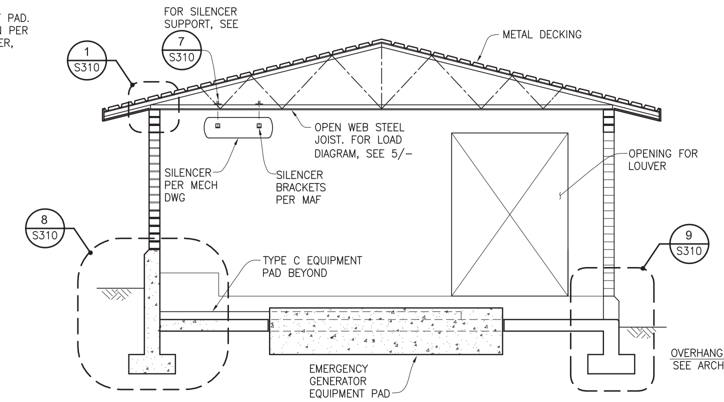

NOTES:
1. FOR DIMENSIONS AND FLOOR SLOPE NOT SHOWN, SEE ARCH DWGS.
2. BOTTOM OF FOOTING ELEVATION NOTED THUS (XX.X).

FOUNDATION PLAN 1/–
1/4"=1'-0"

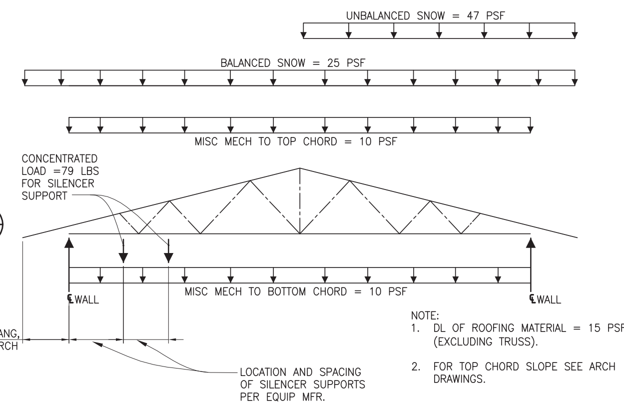



NOTES:
1. FOR SIZE AND WELDING OF METAL DECK, SEE 6/–.
2. CONTRACTOR SHALL COORDINATE SIZE AND LOCATION OF HVAC DUCTWORK WITH ROOF TRUSS BRIDGING LOCATION.

ROOF PLAN 2/–
1/4"=1'-0"

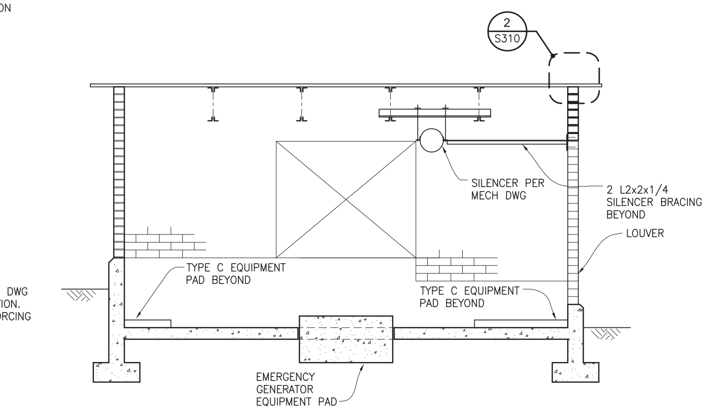



SECTION 3/–
3/8"=1'-0"

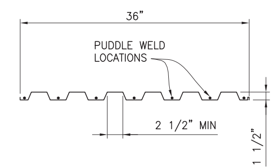



NOTE:
1. DL OF ROOFING MATERIAL = 15 PSF (EXCLUDING TRUSS).
2. FOR TOP CHORD SLOPE SEE ARCH DRAWINGS.

TRUSS LOAD DIAGRAM 5/–
NO SCALE




SECTION 4/–
3/8"=1'-0"




1 1/2" METAL DECK WITH THE FOLLOWING MINIMUM PROPERTIES

20 GA.
I = 0.216 $in^4$
+S = 0.235 $in^3$
−S = 0.248 $in^3$

NOTES
1. MAXIMUM UNSHORED CLEAR SPAN = 5'-0".
2. PROVIDE 7-1/2"DIA PUDDLE WELDS PER SHEET TO ALL SUPPORTS PERPENDICULAR TO DECK FLUTES.
3. CONNECT DECK SEAMS WITH BUTTON PUNCHES @24"OC.

DETAIL 6/S309 S310
NO SCALE

TETRA TECH
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GARY C. BANSEMER STATE OF WASHINGTON 29626 REGISTERED PROFESSIONAL ENGINEER 10-10-08

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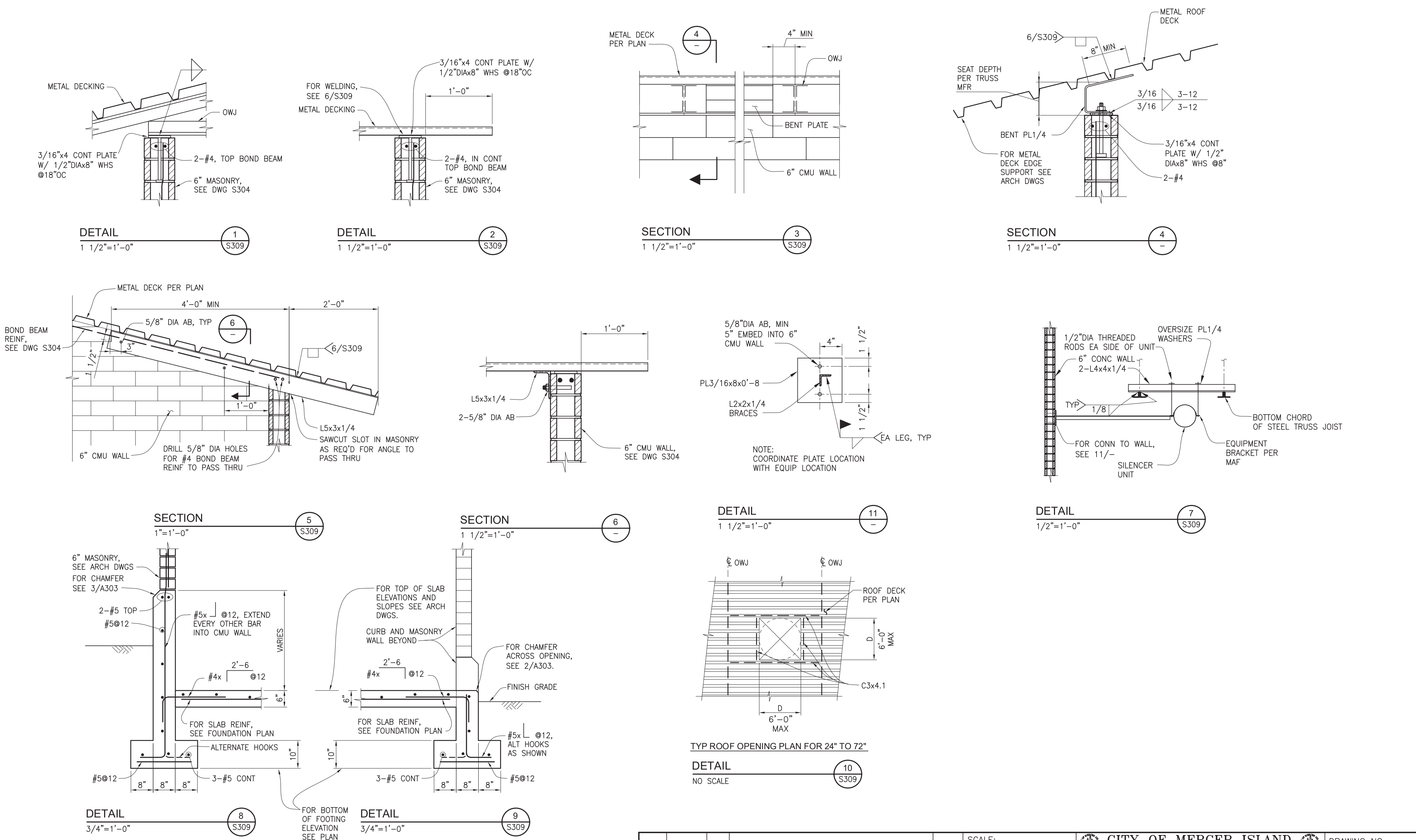
DATE OCT 2008
CHECKED HN

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING
FOUNDATION AND ROOF FRAMING PLANS

DRAWING NO. S309

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10-10-08

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| SCALE: | NONE |
| DESIGN | GB |
| DATE | OCT 2008 |
| CHECKED | HN |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING
DETAILS

DRAWING NO.
S310

SHEET 52 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03S12.dwg Plot date: Oct 13, 2008-09:36:36am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03X03 | SUBMITTAL | MAE01A301 | MAE03M306 | GSWA-CCB |

| | |
|---|---|
| & | AND |
| @ | AT |
| ℄ | CENTERLINE |
| ⊡ | SQUARE |
| # | NUMBER |
| °C | DEGREE CENTIGRADE |
| °F | DEGREE FAHRENHEIT |
| % | PERCENT |

A

| | |
|---|---|
| A | COMPRESSED AIR |
| AC | AIR CONDITIONER |
| AD | AIR DRYER |
| AFF | ABOVE FINISHED FLOOR |
| AHU | AIR HANDLING UNIT |
| AL | ALUMINUM |
| ALT | ALTERNATE |
| AR | AIR RECEIVER |
| ASHRAE | AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS, INC. |
| ASME | AMERICAN SOCIETY OF MECHANICAL ENGINEERS |
| ATF | AUTOMATIC TRANSMISSION FLUID |
| AV | AIR/VACUUM |

B

| | |
|---|---|
| B | BOILER |
| BDD | BACKDRAFT DAMPER |
| BFF | BELOW FINISHED FLOOR |
| BH | BASEBOARD HEATER |
| BOD | BOTTOM OF DUCT |
| BTUH | BRITISH THERMAL UNITS PER HOUR |
| BV | BALANCING VALVE |

C

| | |
|---|---|
| C | COMPRESSOR (AIR) |
| CB | CATCH BASIN |
| CD | CONDENSER |
| CDWR | CONDENSER WATER RETURN |
| CDWS | CONDENSER WATER SUPPLY |
| CFM | CUBIC FEET PER MINUTE |
| CG | CHASSIS GREASE |
| CH | CABINET HEATER |
| CHLR | CHILLER |
| CI | CAST IRON |
| CHWR | CHILLED WATER RETURN |
| CHWS | CHILLED WATER SUPPLY |
| CLG | CEILING |
| CO | CLEANOUT |
| CR | CONDENSATE RETURN |
| CRV | CHEMICAL RESISTANT VENT |
| CRW | CHEMICAL RESISTANT WASTE |
| CT | COOLING TOWER |
| CV | CONTROL VALVE |
| CW | COLD WATER (DOMESTIC) |

D

| | |
|---|---|
| D | DRAIN |
| DF | DIESEL FUEL |
| DG | DOOR GRILLE |
| DH | DEHUMIDIFIER |
| DI | DUCTILE IRON |
| DIA | DIAMETER |
| DN | DOWN |
| DWV | DRAIN, WASTE AND VENT |

E

| | |
|---|---|
| EA | EXHAUST AIR |
| EAD | EXHAUST AIR DAMPER |
| EC | ENGINE COOLANT |
| EDB | ENTERING DRY BULB TEMP |
| EE | ENGINE EXHAUST |
| EF | EXHAUST FAN |
| EFF | EFFICIENCY |
| EG | EXHAUST GRILLE |
| EO | ENGINE OIL |
| EMER | EMERGENCY |
| ER | EXHAUST REGISTER |
| ESP | EXTERNAL STATIC PRESSURE |
| ET | EXPANSION TANK |
| EWB | ENTERING WET BULB TEMP |
| EWT | ENTERING WATER TEMP |
| EXH | EXHAUST |
| EXST | EXISTING |

F

| | |
|---|---|
| F | FILTER |
| FA | FOUL AIR |
| FCO | FLOOR CLEANOUT |
| FCA | FLANGED COUPLING ADAPTOR |
| FD | FLOOR DRAIN |
| FF | FINISHED FLOOR |
| FO | FUEL OIL |
| FOR | FUEL OIL RETURN |
| FOS | FUEL OIL SUPPLY |
| FOV | FUEL OIL VENT |
| FRD | FIRE DAMPER |
| FLR | FLOOR |
| FRP | FIBERGLASS REINFORCED PLASTIC |
| FS | FIRE SPRINKLER |
| FT | FOOT, FEET |
| FTU | FIN TUBE UNIT |

G

| | |
|---|---|
| GALV | GALVANIZED |
| GO | GEAR OIL |
| GPM | GALLONS PER MINUTE |
| GR | GREASE |
| GHWR | GLYCOL HOT WATER RETURN |
| GHWS | GLYCOL HOT WATER SUPPLY |

H

| | |
|---|---|
| HB | HOSE BIBB |
| HC | HANDICAP or HEATING COIL |
| HDPE | HIGH DENSITY POLYETHYLENE |
| HHWR | HEATING HOT WATER RETURN |
| HHWS | HEATING HOT WATER SUPPLY |
| HO | HYDRAULIC OIL |
| HOR | HYDRAULIC OIL RETURN |
| HOS | HYDRAULIC OIL SUPPLY |
| HP | HORSEPOWER |
| HP/CHLR | HEAT PUMP/CHILLER |
| HPW | HIGH PRESSURE WASH |
| HR | HOSE REEL or HOUR |
| HRU | HEAT RECOVERY UNIT |
| HT | HEIGHT |
| HVAC | HEATING, VENTILATION AND AIR CONDITIONING |
| HW | HOT WATER (DOMESTIC) |
| HWC | HOT WATER CIRCULATION |
| HWT | HOT WATER TANK |
| HX | HEAT EXCHANGER |
| HZ | HERTZ |

I

| | |
|---|---|
| ID | INSIDE DIAMETER |
| IE | INVERT ELEVATION |
| IN | INCHES |
| IRH | INFRARED RADIANT HEATER |
| IW | INDUSTRIAL WASTE |

K

| | |
|---|---|
| KW | KILOWATT |

L

| | |
|---|---|
| LBS | POUNDS |
| LVR | LOUVER |
| LO | LUBE OIL |
| LWT | LEAVING WATER TEMPERATURE |

M

| | |
|---|---|
| MAX | MAXIMUM |
| MECH | MECHANICAL |
| MFR | MANUFACTURER |
| MH | MOTORIZED HOIST |
| MIN | MINIMUM |
| MJ | MECHANICAL JOINT |
| MTD | MOUNTED |

N

| | |
|---|---|
| NG | NATURAL GAS |
| NIC | NOT IN CONTRACT |
| NO | NUMBER |
| NOM | NOMINAL |
| NTS | NOT TO SCALE |

O

| | |
|---|---|
| OAD | OUTSIDE AIR DAMPER |
| OD | OUTSIDE DIAMETER |
| OPNG | OPENING |
| OSA | OUTSIDE AIR |
| OXY | OXYGEN |

P

| | |
|---|---|
| P | PUMP |
| PF | PLUMBING FIXTURE |
| PH | PHASE |
| PLS | PLACES |
| PRV | PRESSURE REDUCING VALVE |
| PSF | POWER STEERING FLUID |
| PSI | POUNDS PER SQUARE INCH |
| PSIG | POUNDS PER SQ INCH GAUGE |
| PVC | POLYVINYL CHLORIDE |
| PW | POTABLE WATER |

R

| | |
|---|---|
| R | RADIUS |
| RA | RETURN AIR |
| RAD | RETURN AIR DAMPER |
| RD | ROOF DRAIN |
| RDO | ROOF DRAIN OVERFLOW |
| RH | RADIANT HEATER |
| RPBP | REDUCED PRESSURE BACKFLOW PREVENTOR |
| RPM | REVOLUTIONS PER MINUTE |
| RR | RADIANT REGISTER |
| RS | RAW SEWAGE |

S

| | |
|---|---|
| SA | SUPPLY AIR |
| SAD | SUPPLY AIR DAMPER |
| SD | SUPPLY DIFFUSER, STORM DRAIN |
| SG | SUPPLY GRILLE |
| SF | SUPPLY FAN OR SQUARE FT |
| SM | SMOKE DETECTOR |
| SMACNA | SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC |
| SP | STATIC PRESSURE |
| SR | SUPPLY REGISTER |
| SS OR S | SANITARY SEWER |
| SW | SERVICE WATER (NONPOTABLE) |
| SCU | STAND ALONE CONTROL UNIT |
| SHT | SHEET |
| SIM | SIMILAR |
| SST | STAINLESS STEEL |
| STM | STEAM |
| SYM | SYMMETRICAL |

T

| | |
|---|---|
| TD | TRENCH DRAIN |
| TG | TRANSFER GRILLE |
| TSP | TOTAL STATIC PRESSURE |
| TV | TANK VENT |
| TYP | TYPICAL |

U

| | |
|---|---|
| UH | UNIT HEATER |
| UC | UNDERCUT (DOOR) |
| UG | UNLEADED GASOLINE |

V

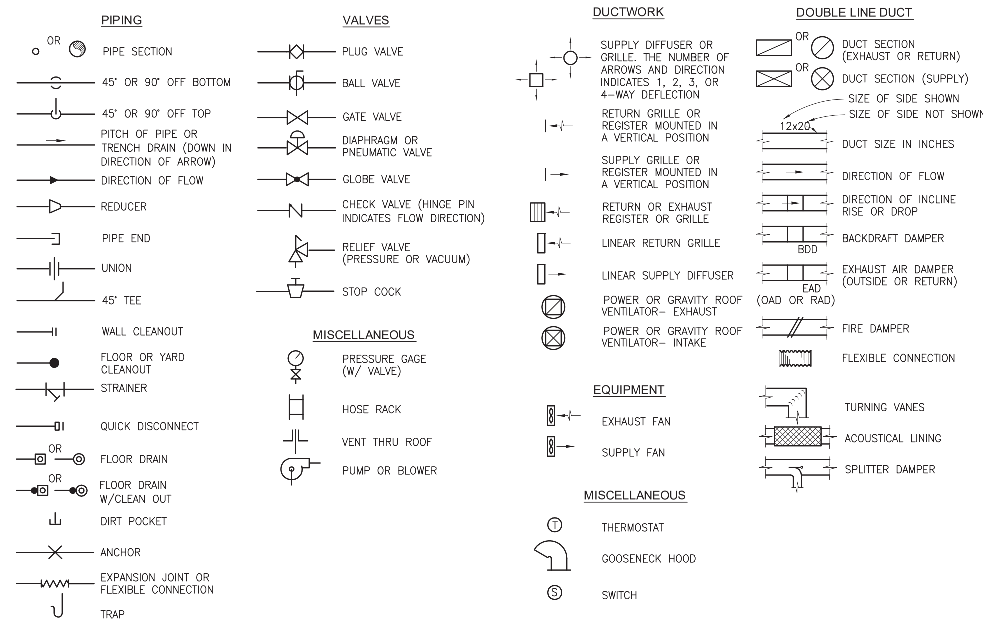
| | |
|---|---|
| V | VENT |
| VAC | VACUUM |
| VD | VOLUME DAMPER |
| VE | VEHICLE EXHAUST |
| VEF | VEHICLE EXHAUST FAN |
| VER | VEHICLE EXHAUST REEL |
| VTR | VENT THROUGH ROOF |
| VU | VENTILATION UNIT |

W

| | |
|---|---|
| W | WASTE |
| WEC | WASTE ENGINE COOLANT |
| WC | WATER COLUMN |
| WCO | WALL CLEANOUT |
| WG | WATER GAGE |
| WH | WALL HEATER |
| WN | NON POTABLE WATER |
| WO | WASTE OIL |
| WW | WASH WATER |

Y

| | |
|---|---|
| YCO | YARD CLEANOUT |




NOTES:

1. ADDITIONAL ABBREVIATIONS AND SYMBOLS TO THOSE INDICATED HEREON MAY APPEAR ON THE MECHANICAL DRAWINGS. REFER TO GENERAL DRAWING G2 FOR IDENTIFICATION AND CLARIFICATION.
2. NOT ALL ABBREVIATIONS AND SYMBOLS INDICATED HEREON WILL APPEAR ON THE MECHANICAL DRAWINGS.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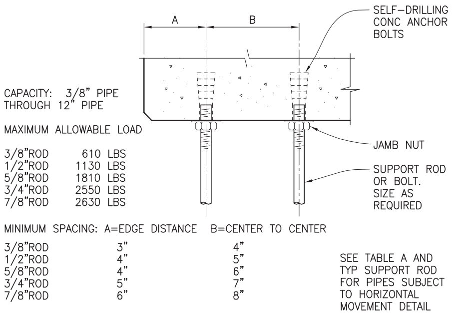
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
MECHANICAL
ABBREVIATIONS AND SYMBOLS

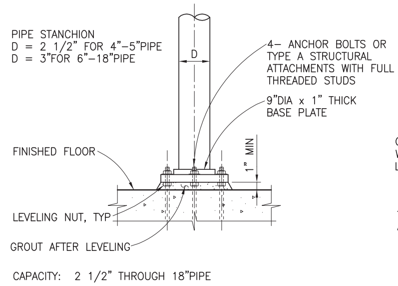
DRAWING NO. M300

SHEET 53 OF 77

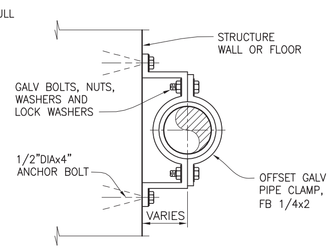

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03M300.dwg Plot date: Oct 13, 2008-09:23:03am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | GSWA-KRG |




TYPE A (1)
NO SCALE

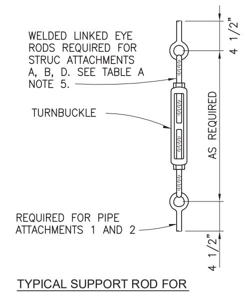



TYPE H (2)
NO SCALE



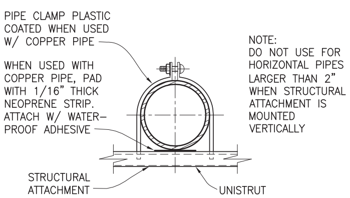

4" THROUGH 12" PIPE

TYPE 15 (3)
NO SCALE



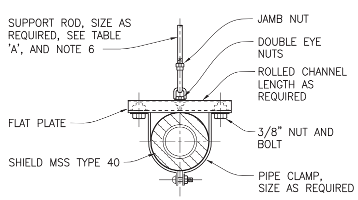

TYPICAL SUPPORT ROD FOR PIPES SUBJECT TO MOVEMENT

DETAIL (4)
NO SCALE



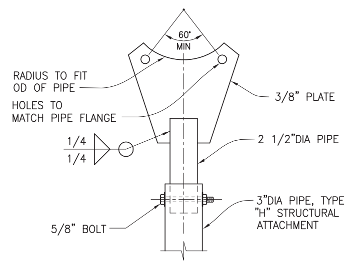

3/8" THROUGH 8" PIPE

TYPE 9 (5)
NO SCALE




3/8" THROUGH 3" PIPE

TYPE 6 (6)
NO SCALE




4" THROUGH 18" PIPE

TYPE 14 (7)
NO SCALE

| PIPE SIZE | DESIGN WEIGHT (LBS) | ROD SIZE BASE ON SINGLE ROD SEE NOTE 1 | MAXIMUM SPAN, IN FEET, FOR PIPES NOT IN RACKS SEE NOTE 2 | | | |
|---|---|---|---|---|---|---|
| | | | STEEL | COPPER | PLASTIC SEE NOTE 3 | CAST IRON |
| 1"TO 0" | 275 | 3/8" | 5 | 6 | 3 | – |
| 1" | 275 | 3/8" | 7 | 6 | 4 | – |
| 1 1/4" | 300 | 3/8" | 7 | 6 | 4 | – |
| 1 1/2" | 300 | 3/8" | 9 | 6 | 5 | – |
| 2" | 325 | 3/8" | 10 | 10 | 5 | SEE NOTE 4 |
| 2 1/2" | 375 | 1/2" | 10 | 10 | 5 | SEE NOTE 4 |
| 3" | 575 | 1/2" | 10 | 10 | 7 | SEE NOTE 4 |
| 4" | 600 | 5/8" | 10 | 10 | 10 | SEE NOTE 4 |
| 6" | 750 | 3/4" | 10 | 10 | 10.25 | SEE NOTE 4 |
| 8" | 950 | 7/8" | 10 | 10 | 12 | SEE NOTE 4 |
| 10" | 1,200 | 7/8" | 10 | – | 12 | SEE NOTE 4 |
| 12" | 1,450 | 7/8" | 10 | – | 15 | SEE NOTE 4 |

## TABLE A NOTES

1. ROD SIZE IS BASED ON CARRYING SINGLE PIPE. WHEN MORE THAN ONE PIPE IS TO BE SUPPORTED, RODS SHALL BE SIZED USING DESIGN WEIGHTS TO DETERMINE TOTAL LOAD. RUNNING THREAD NOT ACCEPTABLE.

2. WHERE MODULARLY SPACED INSERTS ARE REQUIRED SUPPORT PIPES AT INSERT MODULE. NO SPECIAL INSERTS WILL BE ALLOWED FOR INDIVIDUAL PIPE SUPPORTS UNLESS SPECIFICALLY DETAILED OR AUTHORIZED BY THE ENGINEER.

3. SPACING BASED ON SCHEDULE 40 PIPE AT 80° F. HIGHER TEMPERATURES REQUIRE SHORTER SPANS. SEE MANUFACTURER'S RECOMMENDATIONS.

4. 12 FT FOR PRESSURE PIPE AND 10 FT FOR SOIL PIPE. OTHERWISE, INSTALL AT LEAST ONE HANGER PER PIPE LENGTH AS NEAR THE BELL AS POSSIBLE.

5. SEE TYPICAL SUPPORT ROD FOR PIPES SUBJECT TO HORIZONTAL MOVEMENT. (SERVICE TEMPERATURES 33°-59° AND 120°-450° F.)

6. USE TURNBUCKLE, MSS TYPE 13, FOR PIPE ATTACHMENTS 3 AND 6.

7. DESIGN WEIGHTS REFER TO THE PIPE SIZE SHOWN SUPPORTED AT THE SPACING LISTED AND SHALL BE USED FOR DESIGN OF ALL SPECIAL HANGER SYSTEMS.

8. AT LEAST ONE PIPE HANGER OR SUPPORT SHALL BE LOCATED IMMEDIATELY ADJACENT TO THE JOINT OF ANY CONCENTRATED LOAD OR BEND IN THE PIPE SUCH AS VALVES, FITTINGS, ETC., IN ADDITION TO THE MAXIMUM SPANS LISTED ABOVE.

## TABLE B

| SERVICE CONDITIONS (SEE NOTE 2.) | PIPE ATTACHMENTS X INDICATES PIPE ATTACHMENTS SUITABLE FOR CONDITIONS IN SERVICE CONDITIONS COLUMN | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SERVICE TEMPERATURE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 33°-59° F } INSULATED | | | | X | X | X | X | | | X | X | X | X | X | X |
| 120°-450° F } UNINSULATED | X | X | X | X | | | X | X | X | X | X | X | | X | X |
| 60°-119° F UNINSULATED | X | X | X | X | | | | X | X | | X | X | X | X | X |
| PIPING MATERIALS | | | | | | | | | | | | | | | |
| STEEL | X | X | X | X | X | X | X | X | X | X | X | | X | X | X |
| COPPER (*SEE NOTE 1) | X | X | | | | X | X | X | X | X | X | | | | |
| PLASTIC (*SEE NOTE 1) | X | X | | | | | | X | X | | X | | X | | |
| CAST IRON | X | X | X | | | | X | X | X | X | X | X | X | X | X |

## TABLE B NOTES

1. PIPE ATTACHMENTS REQUIRE SPECIAL TREATMENT WHEN USED WITH COPPER OR PLASTIC PIPE. REFER TO INDIVIDUAL DETAILS.

2. FOR SERVICE OTHER THAN THOSE SHOWN IN TABLE B, PIPE ATTACHMENTS SHALL BE AS SELECTED BY THE ENGINEER.

## PIPE SUPPORT SYSTEMS NOTES

1. MSS REFERS TO MANUFACTURER'S STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY, STANDARD PRACTICE SP 58 AND SP 69.

2. FITTINGS SHALL NOT BE LESS THAN MSS CL. B.

3. ALL STRUCTURAL AND PIPE ATTACHMENTS, PIPE SUPPORT RACK AND TRAPEZE PIPE HANGER COMPONENTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

4. WHERE NO REFERENCE TO PIPE SUPPORT SYSTEMS IS GIVEN ON THE DRAWINGS, THE CONTRACTOR SHALL USE AN APPROPRIATE SYSTEM AS DIRECTED BY THE ENGINEER. SEE TABLE B.

5. SOME DETAILS ON THIS DRAWING MAY NOT APPLY TO THIS PROJECT.

## DRAINAGE NOTES

1. HORIZONTAL DRAINAGE SHALL HAVE A SLOPE OF 1/4 INCH PER FOOT OR AS SPECIFIED.

2. CLEANOUTS AND VENTS FOR HORIZONTAL DRAINAGE PIPES SHALL BE PROVIDED IN ACCORDANCE WITH APPLICABLE PLUMBING CODE.

3. THIS DRAWING IS GENERAL IN NATURE. SOME DRAINS AND CLEANOUTS SHOWN HEREON MAY NOT BE USED ON THE CONTRACT DRAWINGS.

4. WHERE SHOWN ON THE CONTRACT DRAWINGS, PROVIDE A FORMED 2' DIAMETER DISH FOR FLOOR DRAIN TYPES I, IV, V, AND VI AS ILLUSTRATED ON TYPE II AND III FLOOR DRAINS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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
MECHANICAL
STANDARD DETAILS

DRAWING NO. M301

SHEET 54 OF 77

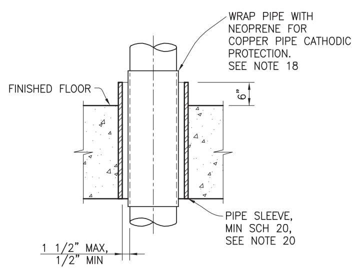
## GATE SCHEDULE

| EQUIPMENT NUMBER | NAME | GATE TYPE | SIZE WxH (IN) | MOUNTING | SIDE SEAL TYPE | BOTTOM SEAL TYPE | OPENING DIRECTION | SEATING HEAD (FT) | UNSEATING HEAD (FT) | FRAME TYPE | OPERATOR TYPE | OPERATOR MOUNT | STEM TYPE | SPECIFICATION SECTION | DRAWING REFERENCE | CHANNEL INVERT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SG01 | 1-PUMP BAY ISOLATION | SLIDE | 12x42 | SURFACE | P-BULB | P-BULB | UP | 12' | – | GUIDES | MANUAL | H. WHEEL | RISING | 15100 | M303 | -17.77 |
| SG02 | 2-PUMP BAY ISOLATION | SLIDE | 16x42 | SURFACE | P-BULB | P-BULB | UP | 12' | – | GUIDES | MANUAL | H. WHEEL | RISING | 15100 | M303 | -17.77 |

## VAULT SCHEDULE

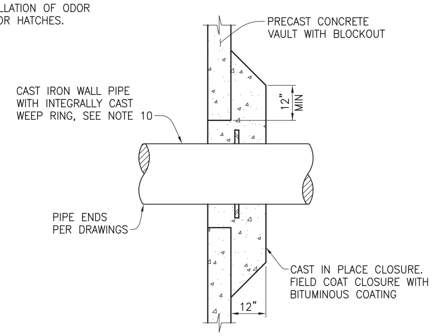
| NAME | MIN SIZE, WxLxD (FT) (INNER DIMENSIONS) | TYPE | HATCH TYPE | HATCH SIZE (MIN) | NO OF HATCHES | DRAWING REFERENCE | COMMENTS |
|---|---|---|---|---|---|---|---|
| VALVE VAULT | 5'-3"x16'-0"x7'-0" | 5076 TRENCH | JAL-H20 | 36x36 | 3 | | |
| METER VAULT | 4'-2"x6'-6"x7'-0" | 577 LA | JAL-H20 | 30x36 | 1 | | |
| VENT VAULT | 8'-0"x18'-0"x7'-0" | 818 LA | JAL-H20 | 36x42 | 1 | | * |
| VENT VAULT | – | – | JAL-H20 | 48x48 | 1 | | |
| PUMP STATION | PER S DWGS | – | JAL-H20 | 42x36 | 4 | | |
| PUMP STATION | PER S DWGS | – | JAL-H20 | 36x36 | 2 | | |

* PROVIDE TWO-PIECE LID FOR VENT VAULT TO ALLOW FUTURE INSTALLATION OF ODOR CONTROL EQUIPMENT WITHOUT DISTURBING EXISTING EXHAUST STACK OR HATCHES.

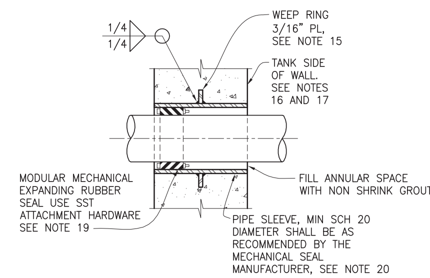



PIPE PENETRATION FOR FLOORS

TYPE A 1/–
NO SCALE

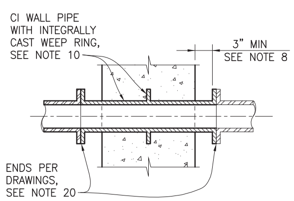



PRECAST VAULT PENETRATION 4/–
NO SCALE




PIPE PENETRATION FOR WALLS

TYPE D 2/–
NO SCALE




PIPE PENETRATION FOR WALLS

TYPE F 3/–
NO SCALE

## TABLE OF PIPE PENETRATION TYPES

| | CONDITION | | PIPE MATERIAL TYPE | | | |
|---|---|---|---|---|---|---|
| | FROM | TO | STEEL | CAST IRON | COPPER | PLASTIC |
| 1 | TANK WET | TANK WET | D,F OR H | F OR G | – | D OR F |
| 2 | TANK WET | TANK DRY | D,F OR H | F OR G | – | D OR F |
| 3 | TANK DRY | TANK DRY | B,D,E,F OR H | B,D,E,F OR H | D OR E | D,E,F OR H |
| 4 | PASSAGE | TANK WET | D,F OR H | F OR G | – | D OR F |
| 5 | PASSAGE | TANK DRY | A,B,C,D,E,F OR H | (ALL) | D OR E | A,B,C,D,E,F OR H |
| 6 | PASSAGE | PASSAGE SEE NOTE 6 | (ALL) | (ALL) | A,B,C,D OR E | A,B,C,D,E,F OR H |
| 7 | PASSAGE | OUTSIDE | D,E,F OR H | D,E,F,G OR H | D OR E | D,E,F OR G |
| 8 | PASSAGE | ROOF | AS SHOWN ON ARCHITECTURAL DETAIL DRAWINGS OR IN SPECIFICATIONS. | | | |
| 9 | TANK WET | OUTSIDE | D,F OR H | D,F,G OR H | – | D OR F |

## GENERAL NOTE

1. THE MATERIAL PRESENTED ON THIS DRAWING IS FOR REFERENCE USE. SOME OF THE DETAILS OR INFORMATION PRESENTED MAY NOT BE REQUIRED AS PART OF THIS CONTRACT.

2. PIPE SPOOLS CAST INTO OR FIT THROUGH WALLS AFTER CASTING SHALL MATCH SPECIFICATIONS FOR ADJACENT/CONNECTED PIPELINES. CONTRACTOR SHALL CONFIRM PIPE THICKNESS, COATING AND LINING REQUIREMENTS.

## PIPE PENETRATION NOTES

1. WHERE PIPES PASS THROUGH WALLS, FLOORS, OR CEILINGS, PENETRATIONS SHALL CONFORM TO TABLE AT LEFT, EXCEPT AS OTHERWISE SPECIFIED.

2. IN TABLE AT LEFT, "TANK" SHALL MEAN ANY PART OF A STRUCTURE CONTAINING LIQUID, OR IN CONTACT WITH THE EARTH.

3. IN TABLE AT LEFT, "PASSAGE" SHALL MEAN ANY ROOM, GALLERY, TUNNEL, OR SIMILAR ENCLOSURE.

4. IN TABLE AT LEFT, "DRY" SHALL MEAN AN ELEVATION 9-INCHES OR GREATER ABOVE MAXIMUM WATER SURFACE OF THE TANK.

5. ALL STEEL SLEEVES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

6. IN CONDITION 6, TYPE E OR H SHALL BE USED WHERE ONE SIDE CONTAINS EXPLOSION PROOF EQUIPMENT, WHERE FLOODING IS POSSIBLE, OR WHERE SPECIFIED (TYPE E ONLY FOR COPPER).

7. SEAL FLANGES SHALL BE FACED AND DRILLED TO 150 POUND STANDARD UNLESS SPECIFIED OTHERWISE. EACH JOINT SHALL BE FULL FACE GASKETED.

8. WHERE SPECIFIED, CAST IRON FLANGES MAY BE INSTALLED FLUSH WITH WALL AND TAPPED FOR STUDS.

9. PROVIDE CURB WHERE PENETRATING FLOOR, EXCEPT FOR PENETRATION TYPES A, AND C. CURB SHALL BE 4" HIGH BY 3" WIDE.

10. PROVIDE A MINIMUM OF 3" CLEARANCE BETWEEN REINFORCING STEEL AND FERROUS METAL PENETRATIONS.

11. WHEN MSS TYPE 8 PIPE CLAMP IS USED FOR COPPER PIPE, CLAMP SHALL BE PLASTIC COATED BY MFR.

12. (NOT USED)

13. INSULATION SHALL NOT EXTEND THROUGH SLEEVES, UNLESS OTHERWISE SPECIFIED.

14. (NOT USED)

15. WEEP RINGS SHALL HAVE A MINIMUM DIAMETER 3 INCHES GREATER THAN THE OUTSIDE PIPE OR SLEEVE DIAMETER .

16. "TANK SIDE OF WALL" SHALL MEAN SIDE OF WALL NORMALLY EXPOSED TO LIQUID, EARTH, OR OUTSIDE ATMOSPHERE.

17. SEAL WITH MASTIC SEALANT WHERE WALL IS EXPOSED TO LIQUID, EARTH OR AN EXPLOSION HAZARD AREA.

18. FOR COPPER PIPE IN A "PASSAGE" TO "PASSAGE" CONDITION (SEE TABLE AT LEFT), PROVIDE A FULL 360 DEGREE WRAP OF 1/16 INCH THICK NEOPRENE. BOND NEOPRENE TO PIPE WITH A COMPATIBLE WATERPROOF ADHESIVE. EXTEND NEOPRENE 1 INCH MINIMUM BEYOND LIMITS OF PENETRATION SLEEVE.

19. COPPER PIPE, PROVIDE GLASS REINFORCED NYLON PRESSURE PLATES IN PLACE OF STANDARD STEEL UNITS. FLANGE BOLT HOLES SHALL EQUALLY STRADDLE THE VERTICAL CENTER.

20. LINE OF THE PIPE TO ASSURE PROPER CONNECTION TO ADJOINING PIPE, VALVES AND FITTINGS.

21. STAINLESS STEEL PIPES THAT TRANSITION FROM A BURIED CONDITION INTO A TUNNEL OR STRUCTURE. SEE DIVISION 15 AND OUTSIDE PIPING DRAWINGS. FOR INSTALLATION OF PIPES THROUGH EXISTING WALLS, USE TYPE X DETAIL.

22. OR CORE DRILL AS APPROPRIATE. SEAL AROUND NEW PIPE AS REQUIRED.

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CITY OF MERCER ISLAND
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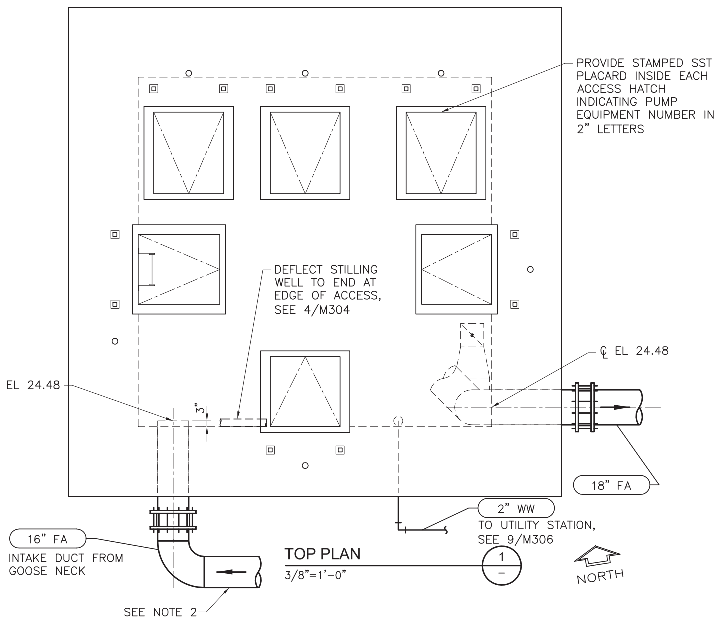
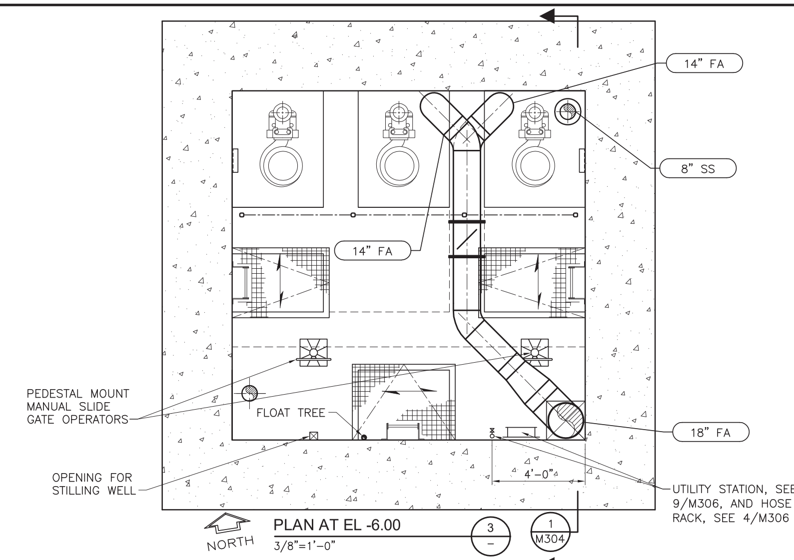
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
SCHEDULES AND
PIPE PENETRATIONS

DRAWING NO. M302

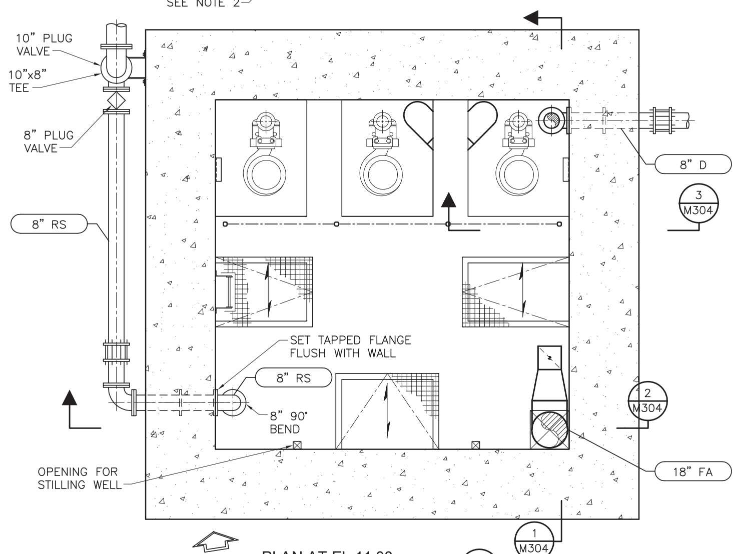
SHEET 55 OF 77



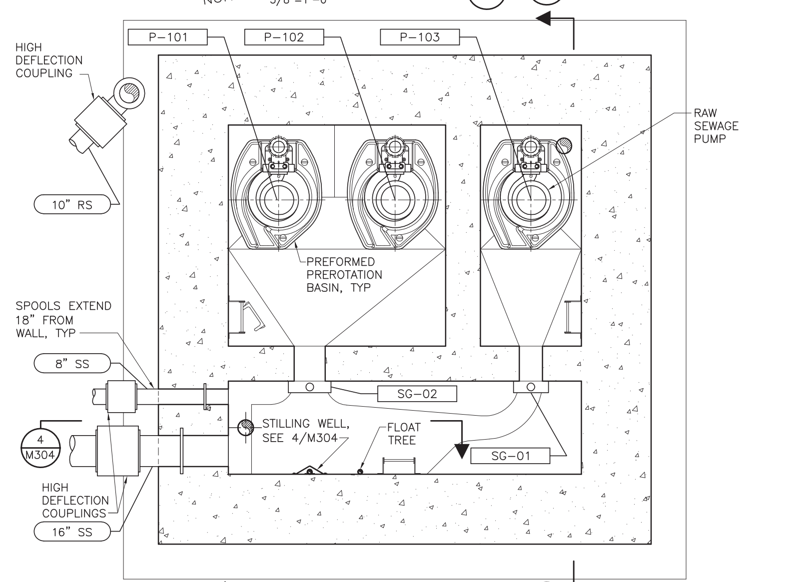

TOP PLAN
3/8"=1'-0"




PLAN AT EL -6.00
3/8"=1'-0"




PLAN AT EL 11.00
3/8"=1'-0"




BOTTOM PLAN
3/8"=1'-0"

NOTES:

1. SLOPE AIR INTAKE FA DUCT AT 2% TO DRAIN TOWARDS WETWELL.
2. FOR CONTINUATION OF PIPES AND DUCTS, SEE DWG'S C303 AND M305.
3. PROVIDE TYPE 15 PIPE ATTACHMENT. SST BASE, CLAMP AND ALL HARDWARE.
4. FA WALL PENETRATIONS TYPE D.
5. WW WALL PENETRATION TYPE D.
6. INFLUENT SEWER PENETRATIONS TYPE F.
7. RS WALL PENETRATIONS TYPE F.
8. STILLING WELL, RS, AND WW FLOOR PENETRATIONS TYPE A.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10/10/08

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| DESIGN | KG |
| DATE | OCT 2008 |
| CHECKED | AB |

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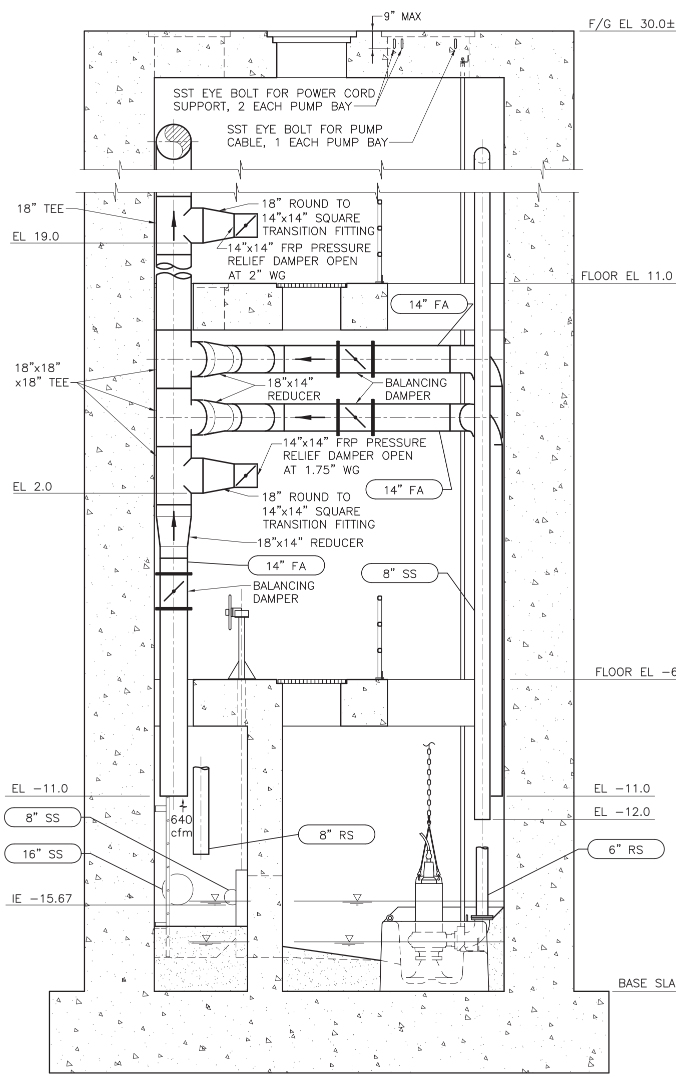
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION PLANS

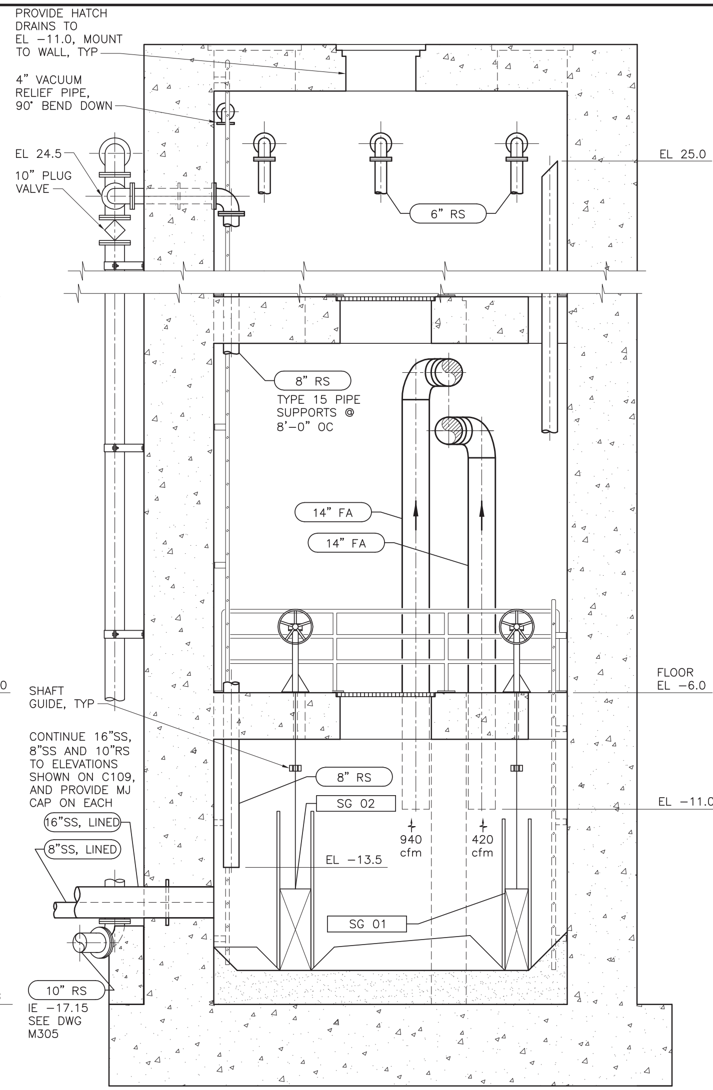
DRAWING NO.
M303

SHEET 56 OF 77


Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03M303.dwg Plot date: Oct 13, 2008-09:25:09am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03X01 | GSWA-KRG |




SECTION 1/M303
3/8"=1'-0"




SECTION 2/M303
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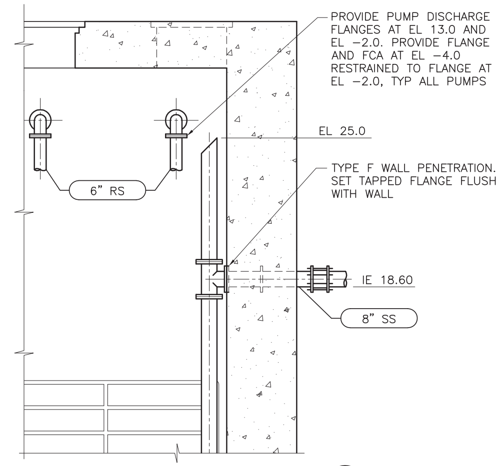
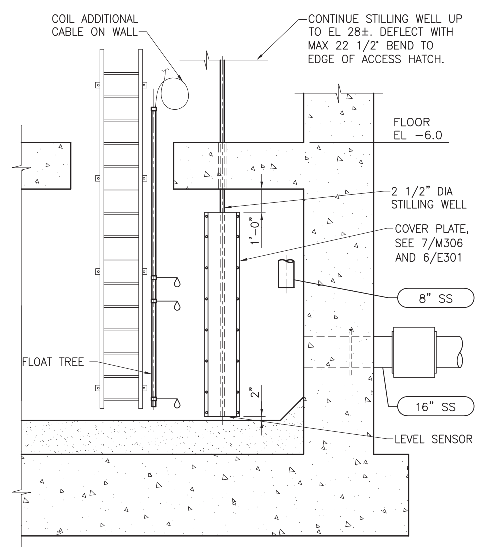



SECTION 3/M303
3/8"=1'-0"




SECTION 4/M303
3/8"=1'-0"

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

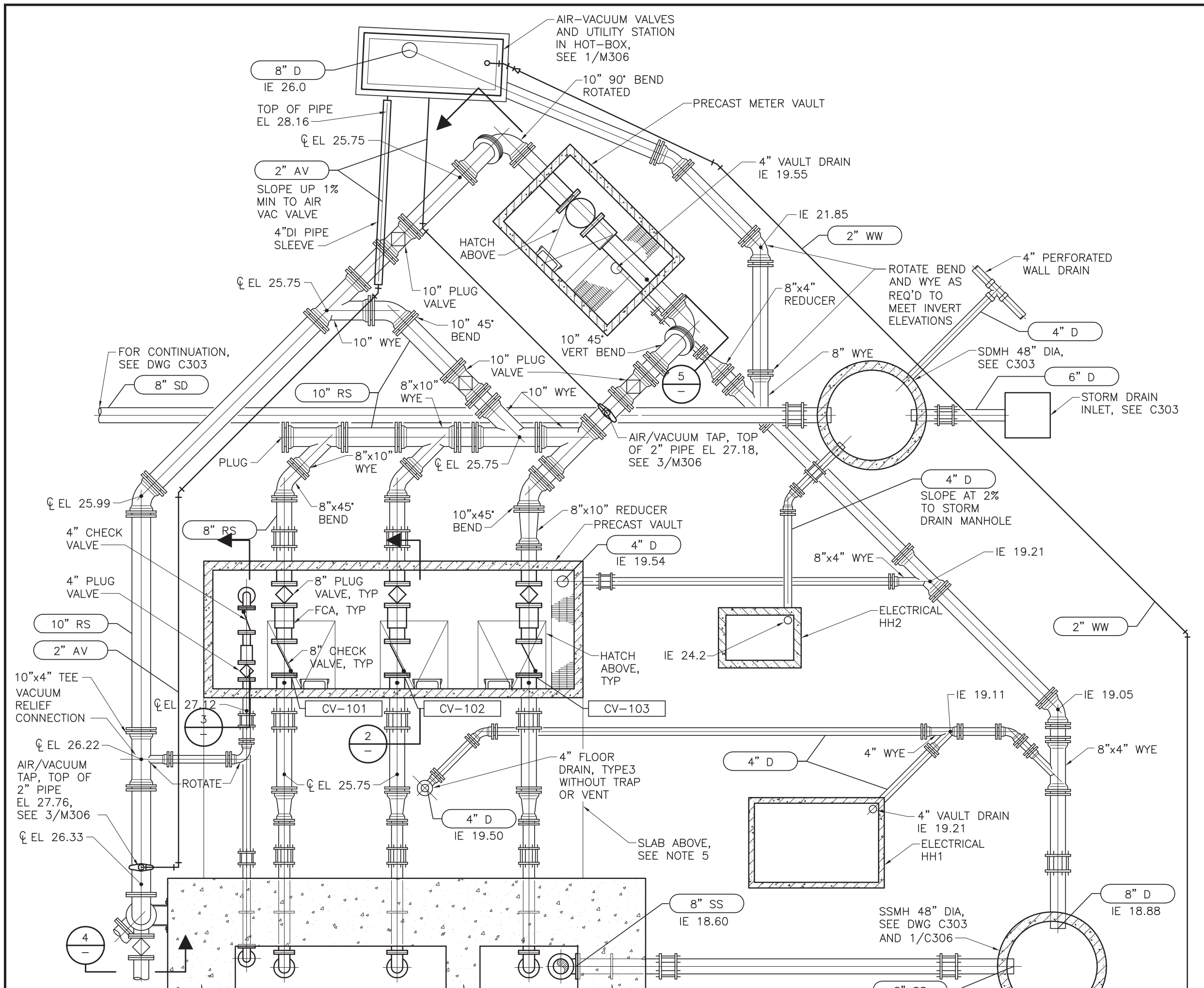
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B

PUMP STATION SECTIONS

DRAWING NO. M304

SHEET 57 OF 77

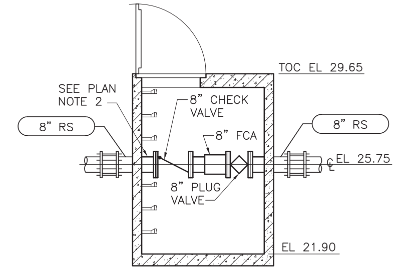
Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03M304.dwg Plot date: Oct 13, 2008-09:25:40am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03XO1 | GSWA-KRG |



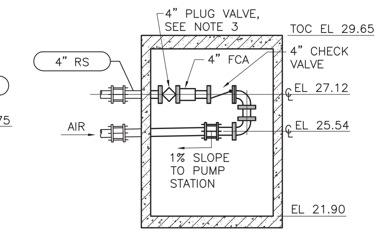

PLAN NOTES:

1. ALL PIPING BETWEEN PUMP DISCHARGE CONNECTION, THROUGH VAULTS AND ABOVE ELEVATION 24.0 ON VERTICAL PORTION OF FORCE MAIN SHALL BE CLASS 53 DUCTILE IRON FLANGED OR RESTRAINED MECHANICAL JOINT WITH EPOXY LINING. ALL FORCE MAIN PIPING BELOW ELEVATION 24.0 ON VERTICAL PORTION OF FORCE MAIN SHALL BE CLASS 55 DUCTILE IRON FLANGED OR RESTRAINED MECHANICAL JOINT WITH EPOXY LINING.
2. ALL PRECAST VAULT WALL PIPING PENETRATIONS SHALL BE PER 4/M302.
3. PIPE HATCH DRAINS TO VAULT DRAIN, TYP ALL HATCHES IN PRECAST VAULTS AND HAND HOLES.
4. SEE DRAWING C303 FOR CONTINUATION OF PIPING AND DUCTS.
5. FOR WASH PAD, SEE DRAWING C303.

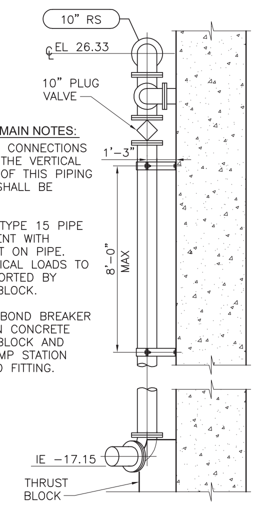
PIPING PLAN 1/–
3/8"=1'-0"




SECTION 2/–
3/8"=1'-0"



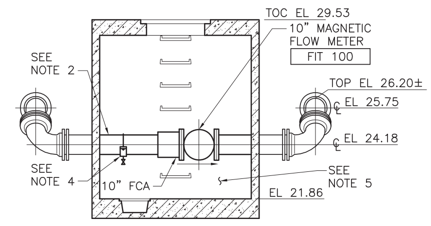

SECTION 3/–
3/8"=1'-0"




SECTION 4/–
3/8"=1'-0"

10" FORCE MAIN NOTES:

1. ANY PIPE CONNECTIONS MADE IN THE VERTICAL PORTION OF THIS PIPING SYSTEM SHALL BE FLANGED.
2. PROVIDE TYPE 15 PIPE ATTACHMENT WITH LOOSE FIT ON PIPE. ALL VERTICAL LOADS TO BE SUPPORTED BY THRUST BLOCK.
3. PROVIDE BOND BREAKER BETWEEN CONCRETE THRUST BLOCK AND BOTH PUMP STATION WALL AND FITTING.




SECTION 5/–
3/8"=1'-0"

VALVE AND METER VAULT NOTES:

1. PROVIDE A MINIMUM OF 60" FROM FACE OF UPSTREAM 90° BEND AND MINIMUM 36" FROM FACE OF DOWNSTREAM 90° BEND TO CENTERLINE OF FLOW METER.
2. PROVIDE DIRECT TAP AND CORPORATION STOP FOR GAGE ASSEMBLY PER SPEC SECTION 15130.
3. INSTALL STAMPED SST PLACARD ON VAULT WALL READING "PLUG VALVE MUST BE OPEN DURING PUMP OPERATION".
4. PROVIDE 1 1/2" SADDLE AND CORP STOP FOR FORCE MAIN DRAIN.
5. PROVIDE 10" EPOXY LINED DI SPOOL MATCHING LENGTH OF FLOW METER. PLACE IN FLOW METER VAULT.

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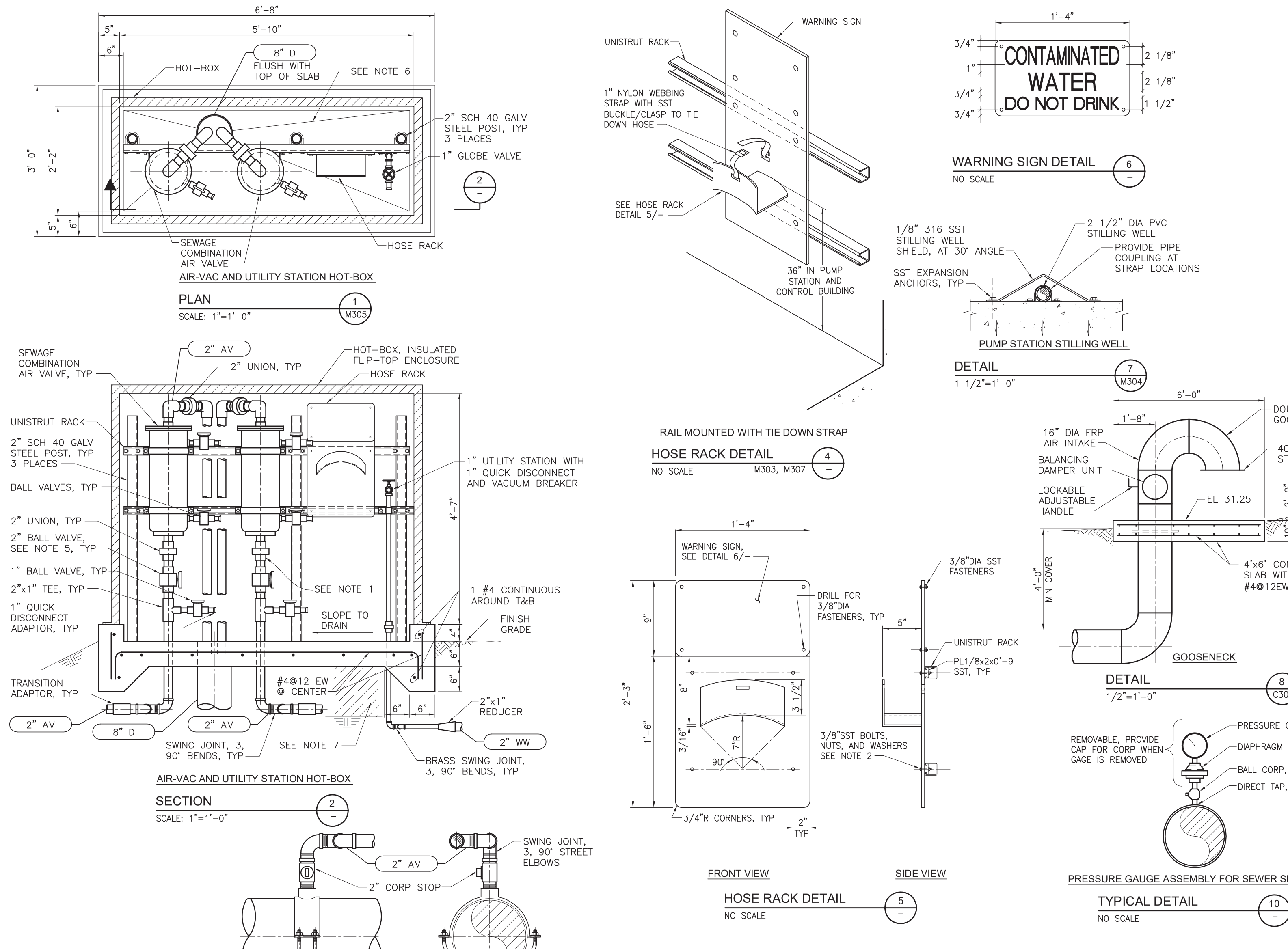
| DESIGN | KG |
| DATE | OCT 2008 |
| CHECKED | AB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
PROCESS PIPING PLAN
AND SECTIONS

DRAWING NO. M305
SHEET 58 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\MAE03M305.dwg Plot date: Oct 13, 2008-09:26:15am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | GSWA-KRG |

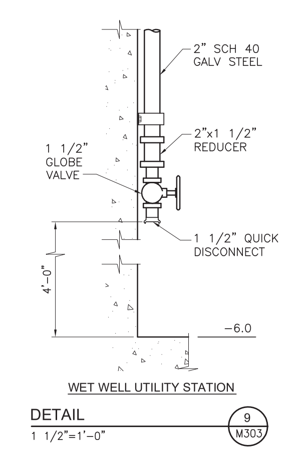



## NOTES FOR AIR-VAC AND UTILITY STATIONS

1. PROVIDE HEAT TRACE FOR ALL VALVES AND PIPING IN HOT BOX.
2. AT AIR-VAC AND WASH STATION, PROVIDE 2 HOSE SEGMENTS: ONE AT 1"x10' WITH 2, 1 INCH QUICK DISCONNECTS: ONE AT 1"x50' WITH 1, 1 INCH QUICK DISCONNECT AND ONE BRASS NOZZLE WITH 1/4 TURN BALL VALVE.
3. IN WET WELL, PROVIDE 1 1/2"x25' HOSE WITH 1 1/2" QUICK DISCONNECT, ONE BRASS NOZZLE AND 1/4-TURN BALL VALVE.
4. AV AND WW PENETRATIONS TYPE A.
5. PROVIDE STAMPED SST PLACARD STRAPPED TO PIPE ABOVE THIS VALVE READING "THIS VALVE MUST BE OPEN DURING PUMP OPERATION".
6. SLOPE SLAB TOWARD 8" DRAIN.
7. COMPACT SUBGRADE TO 95% MDD PER ASTM D1557. PROVIDE 6" MIN TYPE J FILL COMPACTED TO 95% MDD PER ASTM D1557.

## NOTES FOR HOSE RACKS

1. HOSE RACK SHALL BE WELDED CONSTRUCTION. MATERIAL SHALL BE 3/16 INCH THICK MINIMUM STEEL, HOT DIP GALVANIZED AFTER FABRICATION. FASTENERS SHALL BE STAINLESS STEEL.
2. WARNING SIGN SHALL BE BAKED ENAMEL ON STEEL PLATE WITH WHITE LETTERING ON A RED BACKGROUND.

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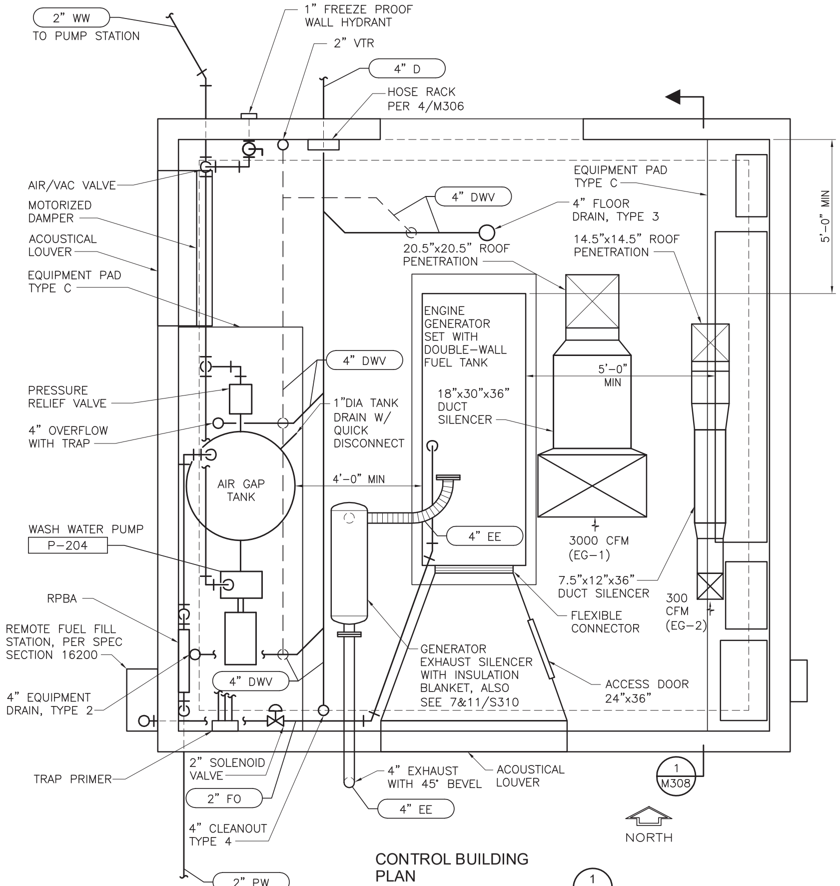
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

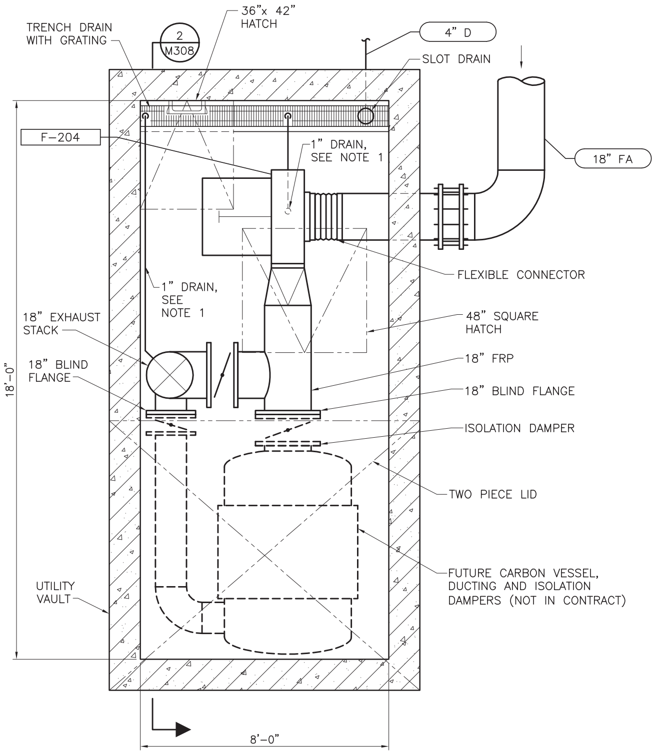
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
PUMP STATION AND VALVE VAULT DETAILS

DRAWING NO. M306

SHEET 59 OF 77




CONTROL BUILDING PLAN
1/2"=1'-0"
1
–




VENTILATION VAULT PLAN
1/2"=1'-0"
2
–

## VENTILATION VAULT NOTES:

1. FAN AND DRAIN DUCT DRAIN SLOPED TO TRENCH DRAIN.
2. PROVIDE HATCH DRAINS TO VAULT SLOT DRAIN.
3. FOR CONTINUATION OF PIPING AND DUCTS, SEE DRAWING C303.
4. FA WALL PENETRATION PER 4/M302.

## CONTROL BUILDING NOTES:

1. ALSO SEE DRAWING M309 FOR ADDITIONAL DETAILS OF WASH WATER SYSTEM.
2. PROVIDE 1"x50' HOSE WITH 1" QUICK DISCONNECT , ONE BRASS NOZZLE, AND 1/4-TURN BALL VALVE.
3. FOR CONTINUATION OF PIPING, SEE DRAWING C303.
4. PW AND WW FLOOR PENETARATIONS TYPE A.
5. HEAT TRACE AND INSULATE ALL PRESSURE PIPING.
6. COORDINATE ROOF PENETRATIONS WITH FAN MANUFACTURER, WITH 1/M308 AND WITH 1/A301.

## FAN SCHEDULE

| | FAN | | | | | | MOTOR | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. | TYPE | CFM | EXT SP (IN WC) | FAN SPEED (RPM) | OUTLET VELOCITY | HP | VOLT | PH | HZ | SPEED (RPM) | NOTES |
| F-201 | EXHAUST | 3000 | 0.5 | 963 | 1,336 | 1 | 480 | 3 | 60 | 1750 | SET TO 120V, WALL MOUNTED THERMOSTAT |
| F-202 | EXHAUST | 300 | 0.5 | 1,158 | 312 | 1/4 | 120 | 1 | 60 | 1750 | CONTINUOUS OPERATION |
| F-204 | SEE SPEC 15837 | | | | | | | | | | |

## EXHAUST GRILLE SCHEDULE

| NO. | TYPE | AREA SERVED | DIMENSIONS | NOTES |
|---|---|---|---|---|
| EG-1 | EXHAUST | CONTROL BUILDING | 42"x24" | ALUMINUM EXHAUST GRILLE TO F-201 |
| EG-2 | EXHAUST | CONTROL BUILDING | 10"x10" | ALUMINUM EXHAUST GRILLE TO F-202 |

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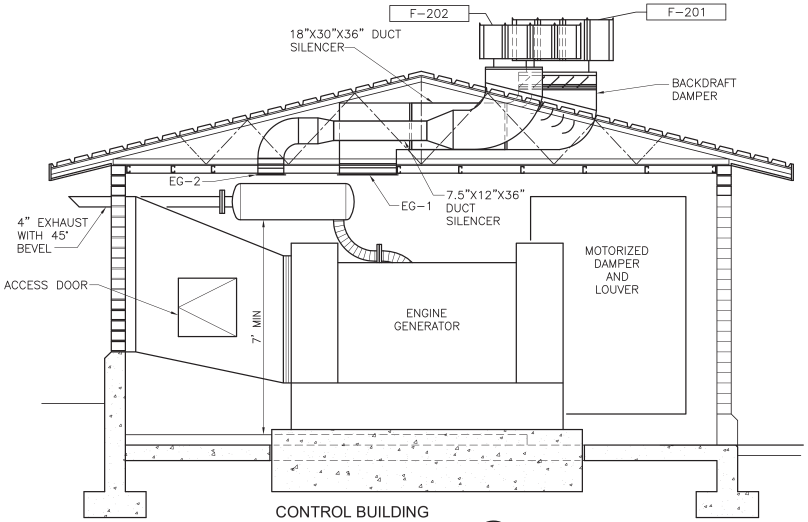
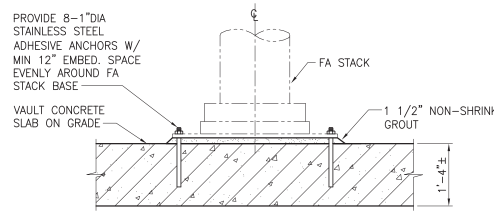
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING AND
VENTILATION VAULT PLANS

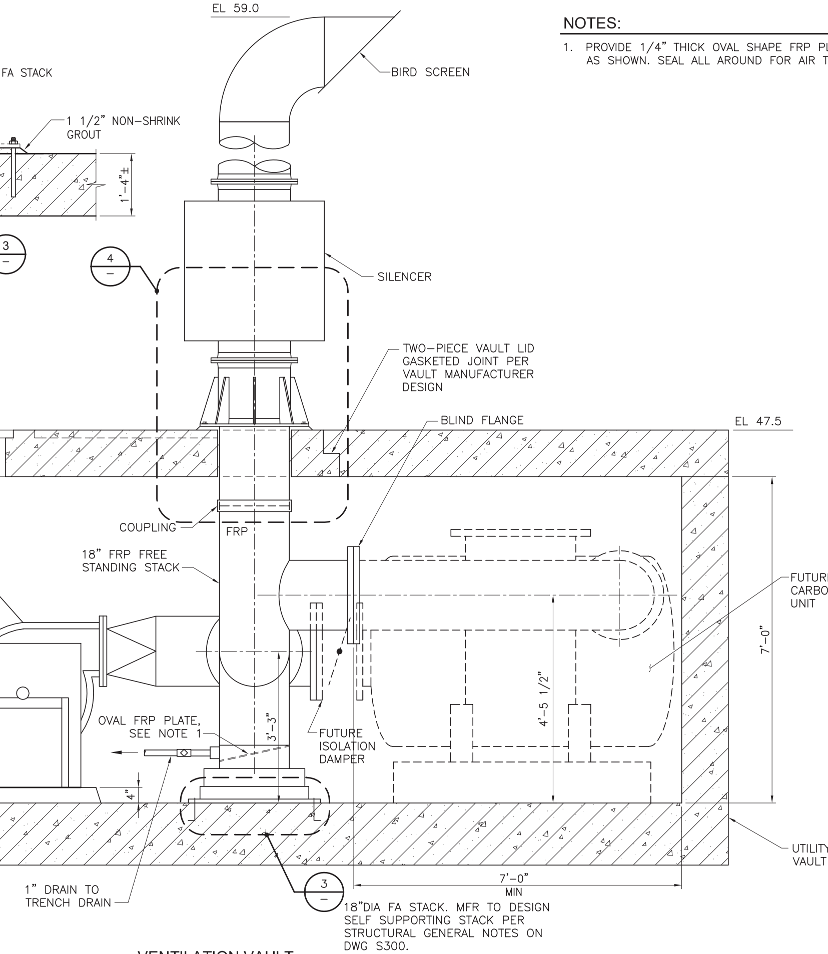
DRAWING NO.
M307




CONTROL BUILDING SECTION (1/M307)
1/2"=1'-0"



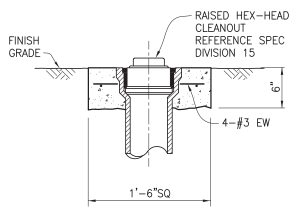

DETAIL (3/–)
3/4"=1'-0"



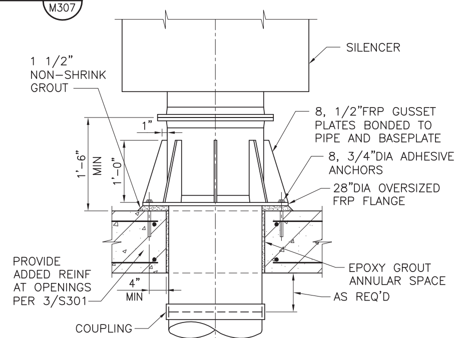

VENTILATION VAULT SECTION (2/M307)
3/4"=1'-0"

## NOTES:

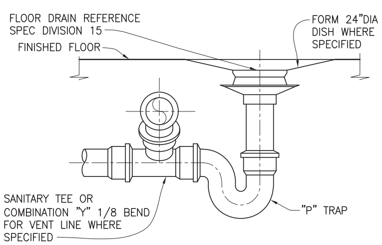
1. PROVIDE 1/4" THICK OVAL SHAPE FRP PLATE AS SHOWN. SEAL ALL AROUND FOR AIR TIGHT.



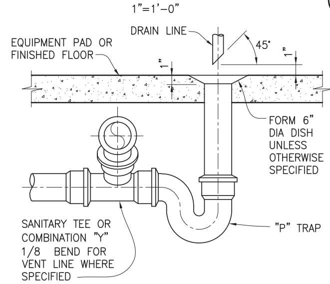

CLEANOUT TYPE 4 (5/–)
NO SCALE




DETAIL (4/–)
1"=1'-0"




FLOOR DRAIN TYPE 3 (6/–)
NO SCALE




EQUIPMENT PAD TYPE 2 (7/–)
NO SCALE

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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING AND VENTILATION VAULT SECTIONS & DETAILS

DRAWING NO. M308


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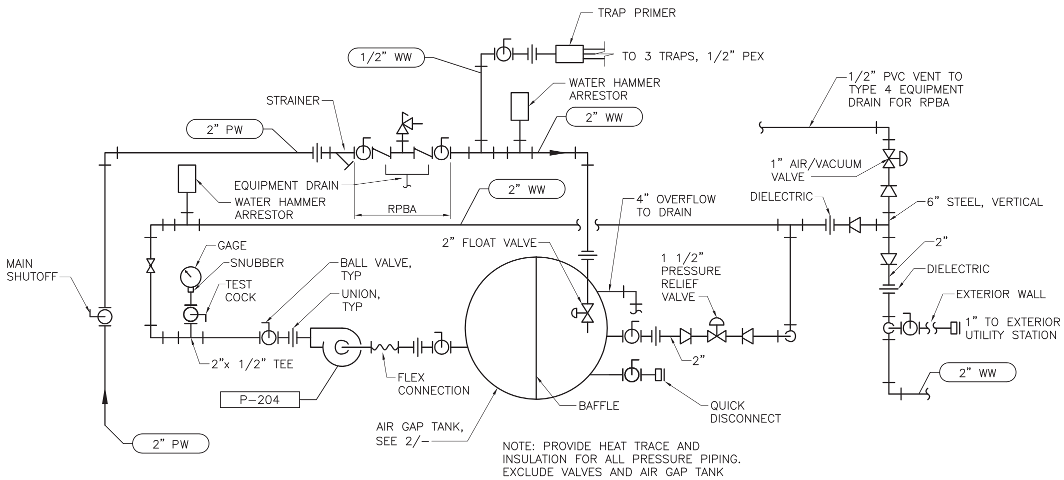
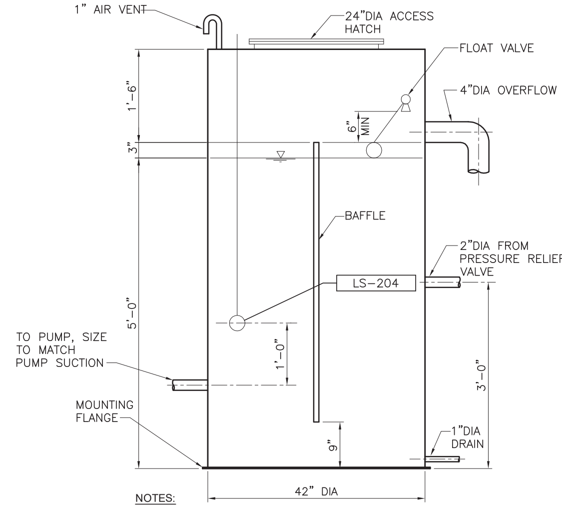



NOTE: PROVIDE HEAT TRACE AND INSULATION FOR ALL PRESSURE PIPING. EXCLUDE VALVES AND AIR GAP TANK

WASH WATER SCHEMATIC
NO SCALE
1 / –




NOTES:
1. FLOAT VALVE AND PRESSURE RELIEF VALVE TO DISCHARGE ON OPPOSITE SIDE OF BAFFLE FROM PUMP SUCTION.
2. LOW FLOAT PER SPEC SECTION 17210. PROVIDE FLEXIBLE GROMMET AT TANK PENETRATION. CONTRACTOR TO ADJUST LEVEL AS DIRECTED BY ENGINEER DURING TESTING AND STARTUP.

TANK DETAIL
NO SCALE
2 / –



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CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL BUILDING DETAILS

DRAWING NO. M309
SHEET 62 OF 77

| PLAN | ONE-LINE DIAGRAM | CONTROL DIAGRAM | DESCRIPTION |
|---|---|---|---|
| | | ST | PUSHBUTTON, N.O. SHOWN, LETTERS INDICATE: A-AUTO, DN-DOWN, FWD-FORWARD, H-HAND, LOS-LOCK OUT STOP, O-OFF, REV-REVERSE, ST-START, SP-STOP, T-TEST |
| | | OPEN AUTO CLOSE | SELECTOR SWITCH, "A" POSITION SHOWN. ARROW, WHEN USED, INDICATES SPRING RETURN, X'S AND O'S TO RIGHT OF CONTACTS, WHEN USED, INDICATE CONTACT DEVELOPMENT. |
| | | | SPEED SWITCH, N.C. SHOWN. CONTACT CLOSES AT PRESET SPEED. |
| | | | FLOAT SWITCH, N.C. SHOWN. CONTACT OPENS ON RISING LEVEL AT PRESET VALUE. |
| | | | PRESSURE SWITCH, N.O. SHOWN. CONTACT CLOSES ON RISING PRESSURE AT PRESET VALUE. |
| | | | TEMPERATURE SWITCH OR THERMOSTAT N.C. SHOWN. CONTACT OPENS ON RISING TEMPERATURE AT PRESET VALUE |
| | | | LIMIT SWITCH, N.O. SHOWN. CONTACT CLOSES WHEN DEFLECTED |
| | | | FLOW SWITCH, N.O. SHOWN. CONTACT CLOSES ON INCREASING FLOW AT PRESET VALUE. |
| | | | TORQUE SWITCH, N.O. SHOWN. CONTACT CLOSES ON INCREASING TORQUE AT PRESET VALUE. |
| | | | RELAY AND DEVICE CONTACTS<br>LETTERS & NUMBERS DESIGNATE DEVICE |
| | | 2 CR | CONTROL DEVICE, LETTER INDICATES: CR-CONTROL RELAY, TR-TIME DELAY RELAY, CC-CLOSING COIL, TM-TIMER, TC-TRIP COIL. NUMBER IDENTIFIES RELAY |
| | | | NORMALLY OPEN WHICH CLOSES ON COIL ENERGIZATION |
| | | | NORMALLY CLOSED WHICH OPENS ON COIL ENERGIZATION |
| | 2 | M | M-MAGNETIC MOTOR STARTER, C-GENERAL USE CONTACTOR (NUMBER INDICATED NEMA SIZE) |
| | | | SV-SOLENOID VALVE |
| | | | TIME DELAY CONTACTS<br>LETTERS & NUMBERS DESIGNATE DEVICE |
| | | 1TR | NORMALLY OPEN WITH TIME DELAY CLOSING (ON DELAY) |
| | | 1TR | NORMALLY CLOSED WITH TIME DELAY OPENING (ON DELAY) |
| | | 1TR | NORMALLY OPEN WITH TIME DELAY OPENING (OFF DELAY) |
| | | 1TR | NORMALLY CLOSED WITH TIME DELAY CLOSING (OFF DELAY) |
| | | | CONTROL PANEL D.C. SIGNALS |
| | | | CONTROL PANEL A.C. SIGNALS |
| | | | MCC D.C. SIGNALS |
| | | | MCC A.C. SIGNALS |
| | | | DEVICE D.C. SIGNALS |
| | | | DEVICE A.C. SIGNALS |
| | | | FIELD WIRING |
| | | | ENCLOSURE WIRING |
| | | | POWER FACTOR CORRECTION CAPACITOR |
| | | | VOICE JACK |
| | | | DATA JACK |
| | | | VOICE/DATA JACK |
| | | | DC FUSE WITH BLOWN FUSE INDICATOR |
| MD | MD | MD | MOTION DETECTOR |
| | | | DATA NETWORK INTERCONNECTION |
| | | H | ALARM HORN |

| PLAN | ONE-LINE DIAGRAM | CONTROL DIAGRAM | DESCRIPTION |
|---|---|---|---|
| M | 25 | 25 | MOTOR, NUMBER INSIDE CIRCLE INDICATES HORSEPOWER. MOTOR NUMBER SHOWN EXTERNAL |
| | | | GENERATOR |
| HTR | 75KW | 75KW | HEATER, NUMBER INDICATES KW |
| | | | MATING CONTACTS (DRAWOUT EQUIPMENT) |
| | | | THERMAL OVERLOAD HEATER |
| | | | DISCONNECT SWITCH (NON-FUSED) |
| | | | DISCONNECT SWITCH (FUSED) |
| | | | COMBINATION MOTOR STARTER (NUMBER INDICATES NEMA STARTER SIZE) |
| | | | AUTOMATIC TRANSFER SWITCH |
| | G | | BUS CONNECTION (N=NEUTRAL, G=GROUND) |
| | | | CARTRIDGE FUSE AND FUSEHOLDER |
| | | | CARTRIDGE FUSE AND FUSEHOLDER W/BLOWN (AC) FUSE INDICATOR |
| | 200/3 | 200 | CIRCUIT BREAKER: 200A CURRENT SENSOR OR TRIP SETTING, 3 POLE SHOWN |
| | ST | | SHUNT TRIP CIRCUIT BREAKER |
| | GF | | GROUND FAULT CIRCUIT BREAKER |
| | K | | KEY INTERLOCK |
| | | R | INDICATING LIGHT, LETTER INDICATES: R-RED, G-GREEN, A-AMBER, W-WHITE, B-BLUE |
| | | | REDUCED VOLTAGE SOLID STATE STARTER |
| | | | VARIABLE FREQUENCY DEVICE |
| T | | | TRANSFORMER |
| | | 400:5 | CURRENT TRANSFORMER (NUMBERS INDICATE TRANSFORMER RATIO) |
| | | 480:120 | POTENTIAL TRANSFORMER (NUMBERS INDICATE TRANSFORMER VOLTAGES) |
| | | ⊕12vdc⊖ | BATTERY, NUMBER INDICATES POTENTIAL |
| | | | RECTIFIER OR DIODE |
| | | | GROUND CONNECTION |
| | | | CONDUCTORS NOT CONNECTED |
| | | | CONDUCTORS CONNECTED |
| | | | MECHANICAL CONNECTION, INTERLOCKS |
| | | | EQUIPMENT ENCLOSURE/ BOUNDARY |
| | RES | RES | RESISTOR |
| | | | POTENTIOMETER |
| OR | | | SPECIAL PURPOSE RECEPTACLE, AS NOTED |
| KWH DEM | KWH | KWH | METER OR SWITCH, LETTER INDICATES: F-FREQUENCY METER, A-AMMETER, H-HOURMETER, PF-POWER FACTOR, T-TACHOMETER, V-VOLTMETER, VR-VARMETER, W-WATTMETER, VS-VOLTMETER SWITCH, AS-AMMETER SWITCH, DEM-DEMAND METER, KWH-WATTHOUR METER, (CIRCLE USED WITH METERS, SQUARE USED WITH SWITCHES) |
| | VS | VS | |
| | | | COIL SURGE SUPPRESSER |
| | PMD | | POWER MONITORING DEVICE |

| PLAN | DESCRIPTION |
|---|---|
| A | CONDUIT CALLOUT. IF USED, SEE CONDUIT SCHEDULE |
| D122DF | EQUIPMENT CALLOUT. SEE SCHEDULE |
| 1 | DETAIL NUMBER |
| | DETAIL IDENTIFIER |
| E2 | REFERENCE DRAWING NUMBER |
| LE | INSTRUMENT TYPE PER ISA |
| | INSTRUMENT IDENTIFIER |
| 101 | INSTRUMENT NUMBER |
| | LIGHT LINE INDICATED EXISTING ELECTRICAL OR EXISTING EQUIPMENT. LIGHT LINE MAY ALSO BE USED FOR DETAIL DRAWING CLARITY. |
| | HEAVY LINE INDICATED NEW WORK |
| | EXISTING WORK TO BE REMOVED |
| | GROUND ROD AND WELL |
| | ARROW WITH ANY FIXTURE DENOTES ORIENTATION OF REFLECTOR OR DIRECTION OF MOUNTING |
| 8'-6" A | LIGHTING FIXTURE IDENTIFIER. "A"-LIGHTING FIXTURE TYPE. SEE LIGHTING FIXTURE SCHEDULE. 8'6 MOUNTING HEIGHT TO BOTTOM OF FIXTURE. SURFACE MOUNTED IF NOT SPECIFIED. |
| $D | DIMMING SWITCH, LETTER REFERS TO CONTROLLED FIXTURES, 3-3 WAY |
| $ | TOGGLE SWITCH, LETTER REFERS TO CONTROLLED FIXTURES, 3-3 WAY |
| $M | MOTOR RATED SWITCH WITH OVERLOAD PROTECTION |
| | LIGHTING FIXTURE, PENDANT MOUNT |
| | LIGHTING FIXTURE, EMERGENCY DUAL HEAD WITH INTEGRAL BATTERY PACK. |
| J | LIGHTING FIXTURE, EMERGENCY DUAL HEAD REMOTE MOUNTED FROM BATTERY PACK |
| | LIGHTING FIXTURE, POLE MOUNT |
| PC | PHOTOELECTRIC CONTROL UNIT. WALL MOUNTED |
| a | LIGHTING FIXTURE, FLUORESCENT, LOWER CASE LETTER REFERS TO SWITCHED CIRCUIT |
| | LIGHTING FIXTURE, WALL MOUNT |
| | EXIT SIGN, ARROWS AND MOUNTING AS INDICATED |
| | DUPLEX RECEPTACLE, GROUNDING TYPE |
| | FLOOR RECEPTACLE |
| | CEILING RECEPTACLE |
| | EQUIPMENT CONNECTION |
| TC | TELEPHONE CABINET |
| | CIRCUIT BREAKER PANELBOARD 208Y/120V OR 120/240V |
| | 480Y/277V |
| | CONDUIT, CONCEALED IN FINISHED AREAS, EXPOSED IN UNFINISHED AREAS |
| | CONDUIT BELOW GRADE |
| | DUCT BANK CONCRETE ENCASED |
| | DUCT BANK, CONCRETE ENCASED, STEEL REINFORCED |
| | CONDUIT BENT UP OR TOWARD |
| | CONDUIT BENT DOWN OR AWAY |
| G | GROUND WIRE WITH CADWELD CONNECTION PIGTAILED 18" ABOVE FINISHED FLOOR |
| G | GROUND WIRE WITH CADWELD CONNECTION |
| J | JUNCTION BOX |
| HH | MH-MANHOLE, HH-HANDHOLE, OR PB-PULL BOX (NUMBER IDENTIFIES MANHOLE, HANDHOLE, OR PULL BOX) |
| T | THERMOSTAT (T-STAT) |
| TB | TERMINAL BOX, SIZE AS REQUIRED. |
| | FLEXIBLE CORD OR CABLE |
| | FLEXIBLE METALLIC CONDUIT |
| # | FLAG NOTE |
| | LIGHTNING SURGE ARRESTOR |
| | PHASE/SWITCHLEG CONDUCTOR |
| | HOMERUN/CONDUIT |
| | GROUND CONDUCTOR |
| | NEUTRAL CONDUCTOR |
| 2L1-1,3 | PANEL AND CIRCUIT (EXAMPLE: PANEL 2L1, CIRCUITS 1 AND 3) |

| ABBREVIATION | WORD |
|---|---|
| A, AMP | AMPERE |
| AF | AMPERE FUSE |
| AFF | ABOVE FINISHED FLOOR |
| AHJ | AUTHORITY HAVING JURISDICTION |
| AIC | AMPERES INTERUPTING CURRENT |
| AIL | AMBER INDICATING LIGHT |
| AL | ALUMINUM |
| AS | AMPERE SWITCH |
| AUTO | AUTOMATIC |
| AUX | AUXILIARY |
| AWG | AMERICAN WIRE GAUGE |
| BLDG | BUILDING |
| BP | BY-PASS CONTACTOR |
| C | CONDUIT |
| CB | CIRCUIT BREAKER |
| CDR | CONDUCTOR |
| CKT | CIRCUIT |
| CNTL | CONTROL |
| CO | CONDUIT ONLY |
| COMPT | COMPARTMENT |
| CONTD | CONTINUED |
| CR | CONTROL RELAY |
| CT | CURRENT TRANSFORMER |
| CU | COPPER |
| DB | DUCT BANK |
| DET | DETAIL |
| DIAG | DIAGRAM |
| DISC | DISCONNECT |
| DWG(S) | DRAWING(S) |
| EL, ELEV | ELEVATION |
| EMER | EMERGENCY |
| EPR | ETHYLENE-PROPYLENE RUBBER |
| EQUIP | EQUIPMENT |
| ETM | ELAPSED TIME METER |
| FDR | FEEDER |
| FV | FRONT VIEW |
| GEN | GENERATOR |
| GFCI | GROUND-FAULT CIRCUIT INTERRUPTING |
| GFI | GROUND-FAULT INTERRUPTION |
| GFP | GROUND-FAULT PROTECTION |
| GIL | GREEN INDICATING LIGHT |
| GND | GROUND |
| GRS | GALVANIZED RIGID STEEL |
| HH | HAND HOLE |
| HOA | HAND-OFF-AUTO |
| HTR | HEATER |
| HZ | HERTZ (CYCLES PER SECOND) |
| I/O | INPUT/OUTPUT |
| IC | ISOLATION CONTACTOR |
| IG | ISOLATED GROUND |
| INST | INSTANTANEOUS |
| INTLK | INTERLOCK |
| IPB | ILLUMINATED PUSH BUTTON |
| J | JUNCTION BOX |
| KCMIL | THOUSAND CIRCULAR MILLS |
| KV | KILOVOLTS |
| KVA | KILOVOLT AMPERES (APPARENT POWER) |
| KVAR | KILOVARS (REACTIVE POWER) |
| KW | KILOWATTS (REAL POWER) |
| KWH | KILOWATT HOUR |
| LS | LEVEL SWITCH |
| LSH | LEVEL SWITCH HIGH |
| LT | LEVEL TRANSMITTER |
| LTFMC | LIQUID TIGHT FLEXIBLE METAL CONDUIT |
| LTG | LIGHTING |
| LV | LOW VOLTAGE |
| mA | MILLIAMPERES |
| MAN | MANUAL |
| MCC | MOTOR CONTROL CENTER |
| MH | MAN HOLE |
| MTR,M | MOTOR |
| MTS | MANUAL TRANSFER SWITCH |
| mV | MILLIVOLTS |
| NA | NON-AUTO |
| N.C. | NORMALLY CLOSED |
| NF | NON-FUSED |
| N.O. | NORMALLY OPEN |
| NO. | NUMBER |
| NP | NAMEPLATE |
| NTS | NOT TO SCALE |
| OL | OVERLOAD |
| PC | PHOTOELECTRIC CONTROL UNIT |
| PH. ø | PHASE |
| PNL | PANEL |
| PR | SHIELDED PAIR |
| PSI | POUNDS PER SQUARE INCH |
| PVC | POLYVINYL CHLORIDE |
| REF | REFERENCE |
| RECP | RECEPTACLE |
| RIL | RED INDICATING LIGHT |
| RTD | RESISTANCE TEMPERATURE DETECTOR |
| S, SEC | SECOND |
| SEL | SELECTOR |
| SPC | SHIELDED POWER CABLE |
| SPEC | SPECIFICATION |
| S.S. | STAINLESS STEEL |
| STA | STATION |
| SW | SWITCH |
| SWGR | SWITCH GEAR |
| TB | TERMINAL BOX, TERMINAL BLOCK |
| TOA | TEST-OFF-AUTO |
| TSP | TWISTED SHIELDED PAIR |
| TST | TWISTED SHIELDED TRIAD |
| TYP | TYPICAL |
| UP | UTILITY POWER |
| UPS | UNINTERRUPTIBLE POWER SUPPLY |
| V | VOLTS |
| Vac or VAC | VOLTS ALTERNATING CURRENT |
| Vdc or VDC | VOLTS DIRECT CURRENT |
| VFD | VARIABLE FREQUENCY DRIVE |
| W | WIRE |
| W/ | WITH |
| W/O | WITHOUT |
| WIL | WHITE INDICATING LIGHT |
| WP | WEATHER PROOF (NEMA 4) |
| XFMR | TRANSFORMER |
| XLP | CROSS LINKED POLYETHYLENE |
| XP | EXPLOSION PROOF |
| ZS | POSITION SWITCH |


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RICHARD E. HENSEL, STATE OF WASHINGTON, 38424, REGISTERED PROFESSIONAL ENGINEER, 10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE: NONE
DESIGN RH
DATE OCT 2008
CHECKED DMB

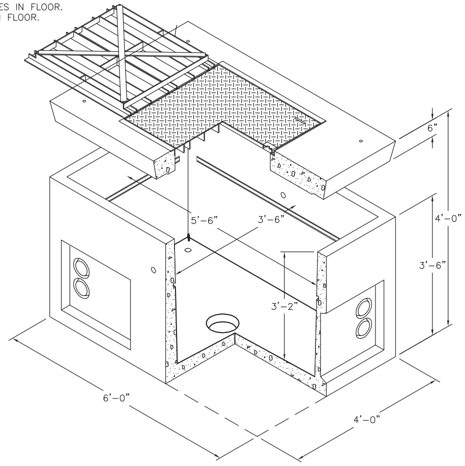
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
SYMBOLS AND ABBREVIATIONS

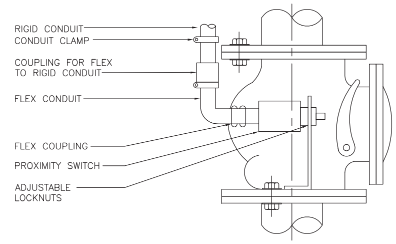
DRAWING NO. E300

## NOTES:

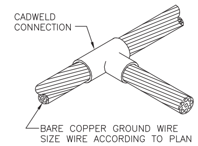
1. UTILITY VAULT BASE NO. 644–LA OR APPROVED EQUAL.
2. PROVIDE HANDHOLE AND HATCH PER SECTIONS 03415 AND 08310.
3. 2–1/2" DIAMETER GROUND ROD KNOCKOUT, 2 PLACES IN FLOOR. SUMP KNOCKOUT IN FLOOR.



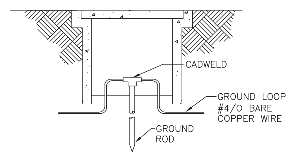

HH–1 HANDHOLE DETAIL (1/E304)
SCALE: NONE




TYPICAL ARRANGEMENT DETAIL PROXIMITY SWITCH INSTALL (3/E304)
SCALE: NONE



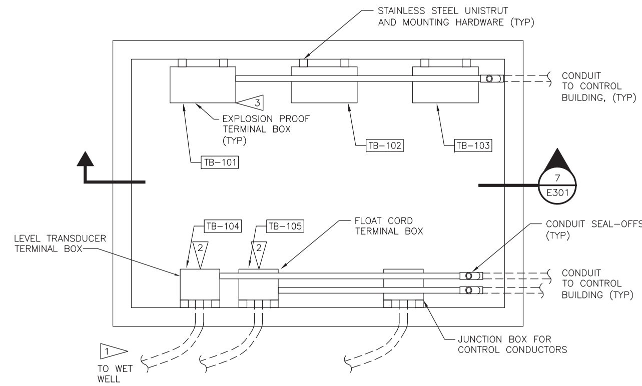

CADWELD DETAIL (4/E302)
SCALE: NONE




GROUND WELL DETAIL (5/E302)
SCALE: NONE

## FLAG NOTES:

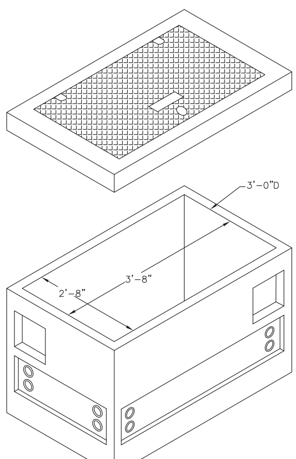
1. ALL RACEWAYS SHALL SLOPE TOWARDS WETWELL AT 5'.
2. PROVIDE INTRINSICALLY SAFE TERMINATIONS IN NEMA 4X, NON METALLIC ENCLOSURES PER NEC 504.
3. PUMP MOTOR CONTROL AND POWER VENDOR CABLE SHALL BE SEPARATED IN J–BOX. POWER AND CONTROL WIRING TO BE ROUTED THROUGH SEPARATE CONDUIT TO CONTROL STRUCTURE




HANDHOLE HH–1 DETAIL TOP VIEW (6/E304)
SCALE: NONE

## NOTES:

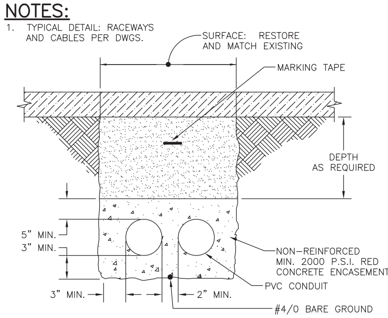
1. UTILITY VAULT BASE NO. 233–LA OR APPROVED EQUAL.
2. PROVIDE HANDHOLE AND HATCH PER SECTIONS 03415 AND 08310.
3. 2–1/2" DIAMETER GROUND ROD KNOCKOUT, 2 PLACES IN FLOOR. SUMP KNOCKOUT IN FLOOR.
4. STAINLESS STEEL "C" CHANNEL, FOR FASTENING BOXES AND RACEWAY, EACH SIDE, 4 SIDES.



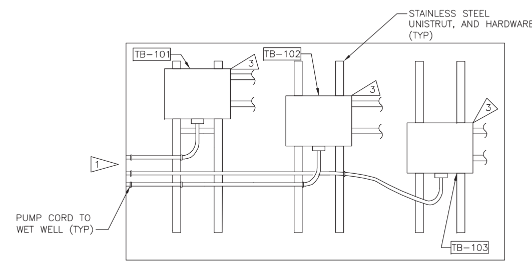

HH–2 AND HH–3 HAND HOLE DETAIL (2/E304)
SCALE: NONE

## NOTES:

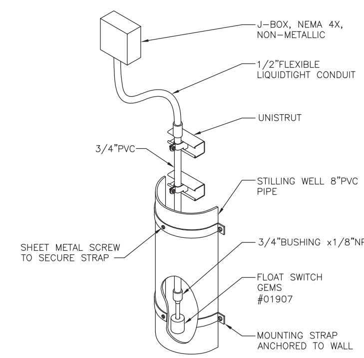
1. TYPICAL DETAIL: RACEWAYS AND CABLES PER DWGS.




CONCRETE ENCASED DUCT BANK DETAIL (8/E304)
SCALE: NONE




HANDHOLE HH–1 DETAIL INTERIOR WALL ELEVATION (7/E301)
SCALE: NONE




FLOOD SWITCH DETAIL (9/E302, E304)
SCALE: NONE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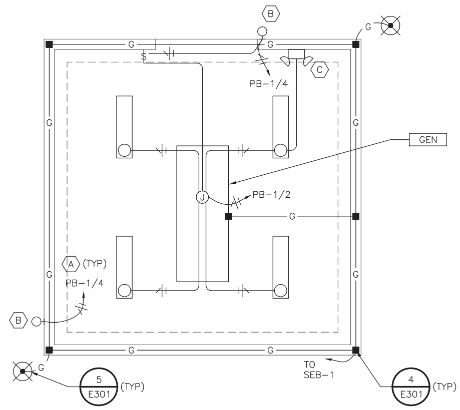
RICHARD E. HENSEL, STATE OF WASHINGTON, 38424, REGISTERED PROFESSIONAL ENGINEER
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

| | |
|---|---|
| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

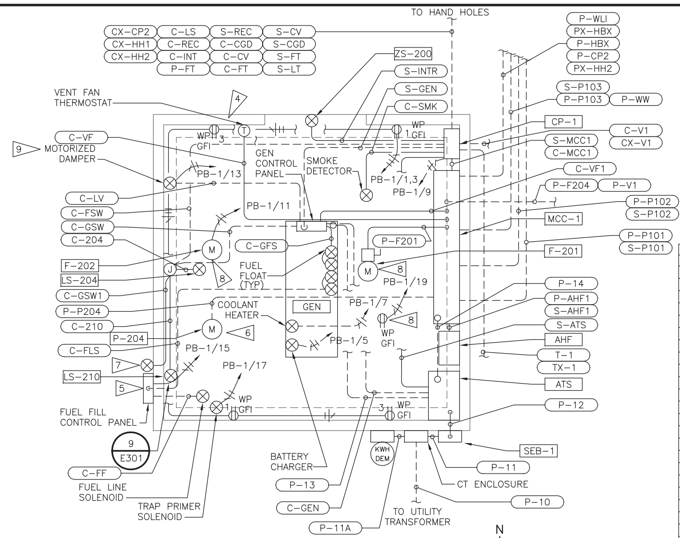
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
ELECTRICAL DETAILS

DRAWING NO. E301




## CONTROL BUILDING LIGHTING, AND GROUNDING PLAN

SCALE: 1/4"=1'-0"




## CONTROL BUILDING POWER AND CONTROLS PLAN

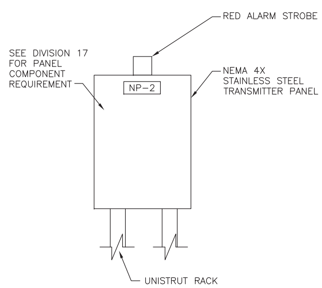
SCALE: 1/4"=1'-0"

## FLAG NOTES:

1. PROVIDE NOTCH AND CORD PROTECTING GROMMET TO ALLOW DOOR TO CLOSE WHEN CORD IS CONNECTED TO CP-3.
2. SIZE INDICATED SHALL BE CONSIDERED MINIMUM. UPSIZE AS REQUIRED TO FIT COMPONENTS.
3. RACK CHANNELS, FITTINGS AND FASTENERS SHALL BE STAINLESS STEEL.
4. PROVIDE STORAGE HOOKS FOR PANEL CP-3 AND CORD COIL ON INTERIOR WALL.
5. CONNECT FUEL FILL STATION TO EXTERNAL DEVICES PER VENDOR INSTRUCTIONS.
6. PROVIDE HEAT TRACE FOR WASH WATER EQUIPMENT. SEE SPECIFICATIONS AND M309.
7. PROVIDE 2-POLE MAINTAINED PUSHBUTTON SWITCH INSIDE A HINGED NEMA 3R ENCLOSURE WITH PADLOCK PROVISION. PROVIDE NAMEPLATE: GENERATOR REMOTE SHUTDOWN SWITCH.
8. ON ROOF.
9. VIA MCC. SEE E311.

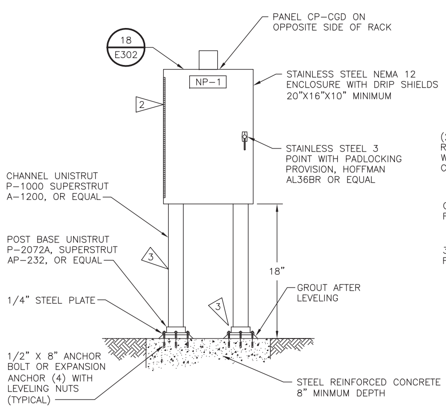
CONDUIT AND WIRE SCHEDULE

| LABEL | SIZE | CONTENTS | FROM | TO | NOTES |
|---|---|---|---|---|---|
| C-204 | 3/4" | 2#14, #14G | J-BOX | LS-204 | |
| C-210 | 3/4" | 2#14, #14G | J-BOX | LS-210 | |
| C-CGD | 3/4" | 2#12, #12G | CP-1 | CP-CGD | |
| C-CV | 3/4" | 4#14, #14G | CP-1 | VALVE VAULT | SPARE |
| C-FF | 3/4" | 2#14, #14G | FUEL FILL PANEL | SOLENOID | |
| C-FLS | 3/4" | 4#14, #14G | FUEL FILL PANEL | FUEL TANK | |
| C-FSW | 3/4" | 6#14, #14G | CP-1 | J-BOX | |
| C-FT | 3/4" | 4#14, #14G | CP-1 | LS-111, ZS-110 | |
| C-GEN | 3/4" | 4#14, #14G | ATS | GENERATOR CONTROL PANEL | |
| C-GFS | 3/4" | 3#14, #14G | GENERATOR CONTROL PANEL | FUEL TANK FLOATS | |
| C-GSW | 3/4" | 2#14, #14G | GENERATOR CONTROL PANEL | J-BOX | |
| C-GSW1 | 3/4" | 4#14, #14G | J-BOX | GEN PUSHBUTTON | |
| C-INT | 3/4" | 4#14, #14G | CP-1 | WET WELL | |
| C-LS | 1" | 6#14, #14G | CP-1 | TB-105 | |
| C-LS1 | 3" | FLOAT CABLES | TB-105 | WET WELL | |
| C-LV | 3/4" | 2#14, #14G | GENERATOR CONTROL PANEL | LOUVER | |
| C-MCC1 | 2" | 60#14 | CP-1 | MCC-1 | |
| C-REC | 1" | 22#14, #14G | CP-1 | CP-2 | VIA HH-2 |
| C-SMK | 3/4" | 5#14 | CP-1 | SMOKE DETECTOR | |
| C-V1 | 3/4" | 3#14 | CP-1 | VENTILATION VAULT | |
| C-V2 | 3/4" | 3#14 | ZS-251 | ZS-250 | |
| C-VF | 3/4" | 2#14, #14G | MCC-1 | THERMOSTAT | FOR F-201 |
| C-VF1 | 3/4" | 2#14, #14G | MCC-1 | GENERATOR CONTROL PANEL | |
| CX-CP2 | 1" | PULL CORD | CP-1 | CP-2 | |
| CX-CV | 3/4" | PULL CORD | HH-2 | VALVE VAULT | |
| CX-HH1 | 1-1/4" | PULL CORD | CP-1 | HH-1 | |
| CX-HH2 | 1-1/4" | PULL CORD | CP-1 | HH-2 | |
| CX-V1 | 3/4" | PULL CORD | CP-1 | VENTILATION VAULT | |
| CX-WW | 1" | PULL CORD | HH-1 | WET WELL | |
| CX-WW1 | 1" | PULL CORD | HH-1 | WET WELL | |
| P-1 | BY UTILITY | BY UTILITY | PSE POINT OF DELIVERY | UTILITY TRANSFORMER | |
| P-10 | 4" | 4#600 | UTILITY TRANSFORMER | CT CABINET | |
| P-11 | 4" | 4#600 | CT CABINET | SEB-1 | |
| P-11A | 2" | BY UTILITY | METER SOCKET | CT CABINET | |
| P-12 | 4" | 4#600, #2G | SERVICE DISCONNECT | MCC-1 | |
| P-13 | 3" | 4#250, #4G | GENERATOR BREAKER | ATS | |
| P-14 | 4" | 4#600, #2G | ATS | MCC-1 | |
| P-AHF1 | 2" | 3#4, #8G | MCC-1 | AHF | |
| P-CP2 | 1" | 4#12, #12G | PBD-1 | CP-2 | RECEPTACLE CIRCUITS |
| P-F201 | 3/4" | 3#12, #12G | MCC-1 | F-201 | |
| P-F204 | 3/4" | 3#12, #12G | MCC-1 | F-204 | |
| P-FT | 3/4" | 2#12, #12G | CP-1 | FT-100 | VIA HH-2 |
| P-HBX | 3/4" | 2#12, #12G | PBD-1 | HOT BOX | HEAT TRACE |
| P-P101 | 2-1/2" | 4#2 SPC | MCC-1 | HH-1 | |
| P-P101A | 3" | PUMP MFR CABLE | HH-1 | WET WELL | |
| P-P102 | 2-1/2" | 4#2 SPC | MCC-1 | HH-1 | |
| P-P102A | 3" | PUMP MFR CABLE | HH-1 | WET WELL | |
| P-P103 | 2-1/2" | 4#2 SPC | MCC-1 | HH-1 | |
| P-P103A | 3" | PUMP MFR CABLE | HH-1 | WET WELL | |
| P-P204 | 3/4" | 3#12, #12G | MCC-1 | P-204 | |
| P-V1 | 1" | PULL CORD | MCC-1 | VENTILATION VAULT | SPARE |
| P-WL1 | 3/4" | 2#12, #12G | PBD-1 | WET WELL LIGHTS | |
| P-WW | 1" | PULL CORD | MCC-1 | HH-1 | SPARE |
| PX-HBX | 3/4" | PULL CORD | HH-2 | HOTBOX | |
| PX-HH2 | 1" | PULL CORD | PBD-1 | HH-2 | |
| S-AHF1 | 1" | (3) TSP | MCC-1 | AHF | |
| S-ATS | 3/4" | 4#14 | CP-1 | ATS | |
| S-CGD | 1" | 8#14, #14G | CP-1 | AT-100 | |
| S-CGD1 | 1" | SAMPLE TUBE | CP-CGD | WET WELL | |
| S-CV | 1" | (3) TST | CP-1 | CHECK VALVES | |
| S-FT | 3/4" | (2) TSP | CP-1 | FT-100 | VIA HH-2 |
| S-GEN | 3/4" | 8#14 | CP-1 | GENERATOR CONTROL PANEL | |
| S-INTR | 3/4" | 2#14 | CP-1 | DOOR SWITCH | |
| S-LT | 1" | (1) TSP | CP-1 | TB-104 | |
| S-LT1 | 2" | XMTR CABLE | TB-104 | WET WELL | |
| S-MCC1 | 2" | (7) TSP | CP-1 | MCC-1 | |
| S-P101 | 3/4" | 3#14, #14G | MCC-1 | TB-101 | |
| S-P102 | 3/4" | 3#14, #14G | MCC-1 | TB-102 | |
| S-P103 | 3/4" | 3#14, #14G | MCC-1 | TB-103 | |
| S-REC | 1" | (2) TSP | CP-1 | CP-2 | |
| T-1 | 2" | TELEPHONE CABLE | TELEPHONE HANDHOLE | CP-1 | |
| TX-1 | 2" | PULL CORD | TELEPHONE HANDHOLE | CP-1 | |

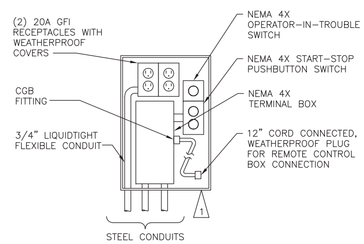



## CP-CGD TRANSMITTER PANEL

SCALE: NONE




### EXTERIOR ELEVATION




### INTERIOR ELEVATION

## CP-2 PUMP STATION CONTROL PEDESTAL

SCALE: NONE

NAMEPLATE ENGRAVING SCHEDULE

| NAMEPLATE NUMBER | ENGRAVING (1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | CP-2 |
| NP-2 | CP-CGD |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| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

SCALE: NONE
DESIGN RH
DATE OCT 2008
CHECKED DMB

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
ELECTRICAL DETAILS

DRAWING NO. E302

# LUMINAIRE SCHEDULE

| ID | DESCRIPTION | MOUNTING | LAMPS | VOLTAGE | FIXTURE VA | MANUFACTURE |
|---|---|---|---|---|---|---|
| A | FOUR (4) FOOT FLUORESCENT WRAP AROUND, MOISTURE RESISTANT THERMOPLASTIC HOUSING, ACRYLIC LENSE, UL LISTED DAMP LOCATIONS | SURFACE | (2) 32W, T8 | 120 | 68 | METALUX – SERIES: "VT2" |
| B | COMPACT CUTOFF WALL–PAK, DIE CAST ALUMINUM, DARK BRONZE FINISH, SS TAMPER PROOF FASTENERS, INJECTION MOULDED UV STABILIZED OPTICS, UL LISTED WET LOCATION, SINGLE, FUSED BALLAST, VANDAL–RESISTANT, PHOTOCELL CONTROL | WALL | 70W METAL HALIDE | 120 | 71 | HUBBELL – SERIES: "NRG–31X" |
| C | CMF / TMF SERIES EMERGENCY LIGHT. 12 VOLT, 100 WATT NICKEL CADMIUM BATTERY W/ WHITE HOUSING. TWO 25 WATT TUNGSTEN SEALED BEAM LAMP HEADS WITH LAMPS INSTALLED AT FACTORY. | WALL | | 120 | 22 | CHLORIDE – TNM100WWK2I |
| D | HAZARDOUS LOCATION HID FIXTURE SUITABLE FOR USE IN CLASS I, DIV. 1 LOCATIONS. WITH CAST GUARD | WALL | 70W METAL HALIDE | 120 | 90 | CROUSE HINDS – EVLS–BX–92072 |

# PANEL SCHEDULE

PB–1 — PROJECT: Mercer Island PS

120/240V, 1Ph, 3W. 100A Bus 80A M.C.B. FLUSH MOUNTED 6–Oct–08

| Ckt. No. | Description / Location | Load (VA) | Load Type | C.B. Amp | C.B. Pole | Phase | C.B. Amp | C.B. Pole | Load (VA) | Load Type | Description / Location | Ckt. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | RECEPTACLES | 540 | R | 20 | 1 | a | 15 | 1 | 284 | L | LIGHTING INTERIOR | 2 |
| 3 | RECEPTACLES | 360 | R | 20 | 1 | c | 15 | 1 | 522 | L | LIGHTING EXTERIOR | 4 |
| 5 | BATTARY CHARGER | 240 | G | 15 | 1 | a | 20 | 1 | 180 | R | RECEPTACLE AT PUMP STATION | 6 |
| 7 | ENGINE BLOCK HEATER | 1,500 | H | 15 | 1 | c | 20 | 1 | 180 | R | RECEPTACLE AT PUMP STATION | 8 |
| 9 | CONTROL PANEL CP–1 | 750 | C | 20 | 1 | a | 20 | 1 | 600 | L | LIGHTING WET WELL | 10 |
| 11 | CONTROL BLDG. VENT FAN, F–202 | 500 | LM | 20 | 1 | c | 20 | 2 | 250 | H | HOTBOX HEAT TRACE | 12 |
| 13 | LOUVER | 100 | M | 15 | 1 | a | | | 250 | H | | 14 |
| 15 | FUEL FILL CONTROL PANEL | 50 | G | 20 | 1 | c | 20 | 2 | 250 | H | CONTROL BLDG HEAT TRACE | 16 |
| 17 | TRAP PRIMER SOLENOID | 20 | G | 20 | 1 | a | | | 250 | H | | 18 |
| 19 | ROOF RECEPTACLE | 180 | R | 20 | 1 | c | | | | | SPACE | 20 |
| 21 | SPARE | | | 20 | 1 | a | 20 | 1 | | | SPARE | 22 |
| 23 | SPARE | | | 20 | 1 | c | 20 | 1 | | | SPARE | 24 |
| 25 | SPARE | | | 20 | 1 | a | 20 | 1 | | | SPARE | 26 |
| 27 | SPARE | | | 20 | 1 | c | 20 | 1 | | | SPARE | 28 |
| 29 | SPACE | | | | | a | | | | | SPACE | 30 |

Total Connected Load: Ph A 3,214 VA 27 A

Total Connected Load: Ph C 3,792 VA 32 A

"Maximum" Phase Connected Load: Ph C 3,792 VA

Total Connected Load (2 X Maximum): 7.6 KVA 31.6 AMPS Total Demand Load: 8.6 KVA 35.9 AMPS

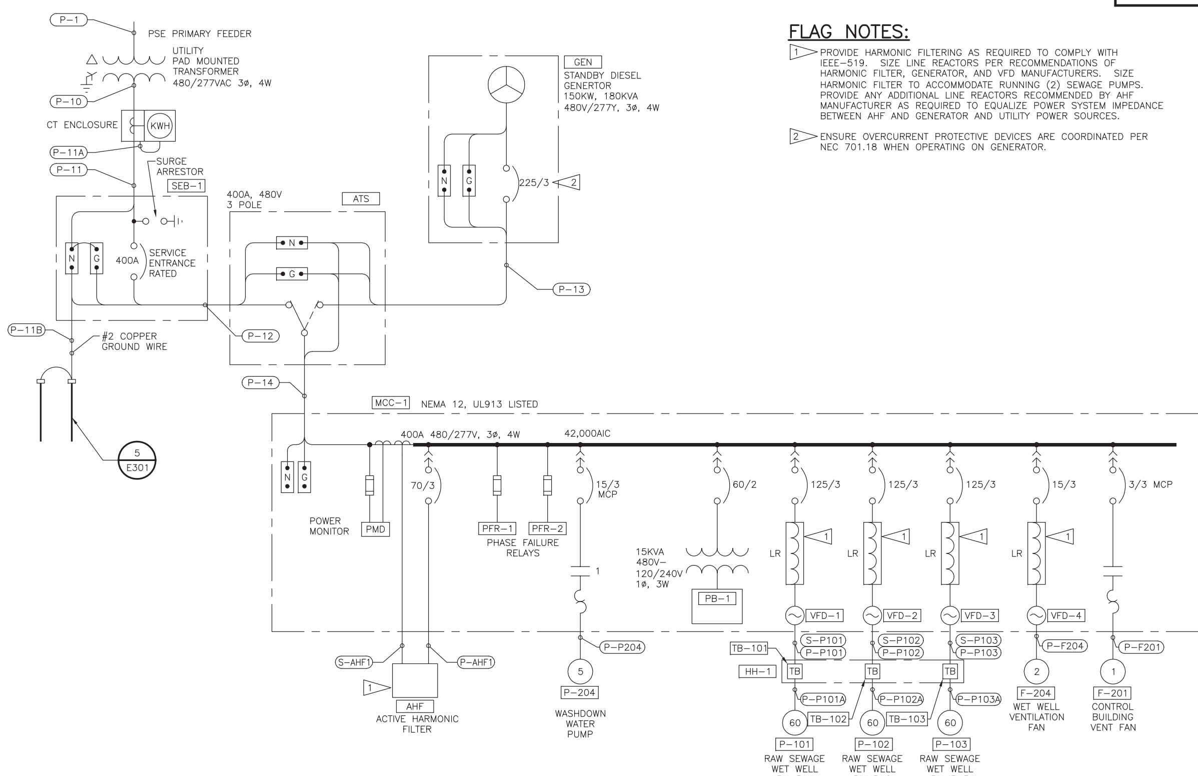
NOTES:
1. SOURCE MCC–1
2.
3.
4.
5.

## LOAD SCHEDULE
MERCER ISLAND PUMP STATION NO. 4

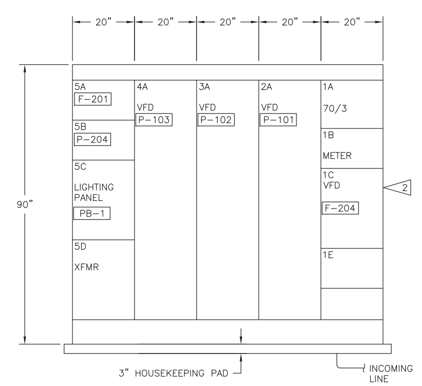
| EQUIP. NO. | DESCRIPTION | CONNECTED LOAD: LOAD | CONNECTED LOAD: HP/KVA | CONNECTED LOAD: AMPS (FLA) | DEMAND FACTOR | LOAD (AMPS) | GEN. DEMAND | GEN. (AMPS) |
|---|---|---|---|---|---|---|---|---|
| | PUMP P–101 | 60 | HP | 77.0 | 1.25 | 96.3 | 1.3 | 96.3 |
| | PUMP P–102 | 60 | HP | 77.0 | 1.0 | 77.0 | 1.0 | 77.0 |
| | PUMP P–103 | 60 | HP | 77.0 | 1.0 | 77.0 | 0.0 | 0.0 |
| | WASHDOWN PUMP P–204 | 5 | HP | 7.6 | 1.0 | 7.6 | 0.0 | 0.0 |
| | VENT FAN F–204 | 2 | HP | 3.4 | 1.0 | 3.4 | 1.0 | 3.4 |
| | VENT FAN F–201 | 1 | HP | 2.1 | 1.0 | 2.1 | 1.0 | 2.1 |
| | TRANSFORMER | 15 | kVA | 31.3 | 0.6 | 18.8 | 0.4 | 12.5 |
| | TOTAL CONNECTED | 228.9 | kVA | 275.4 | | 282.1 | | 191.3 |
| | GENERATOR LOAD | 159.0 | kVA | | | | AT 480V, 3–PHASE | |
| | TOTAL CONNECTED (DEMAND) | 234.5 | kVA | | | | | |

## FLAG NOTES:

1. PROVIDE HARMONIC FILTERING AS REQUIRED TO COMPLY WITH IEEE–519. SIZE LINE REACTORS PER RECOMMENDATIONS OF HARMONIC FILTER, GENERATOR, AND VFD MANUFACTURERS. SIZE HARMONIC FILTER TO ACCOMMODATE RUNNING (2) SEWAGE PUMPS. PROVIDE ANY ADDITIONAL LINE REACTORS RECOMMENDED BY AHF MANUFACTURER AS REQUIRED TO EQUALIZE POWER SYSTEM IMPEDANCE BETWEEN AHF AND GENERATOR AND UTILITY POWER SOURCES.
2. ENSURE OVERCURRENT PROTECTIVE DEVICES ARE COORDINATED PER NEC 701.18 WHEN OPERATING ON GENERATOR.




ONE LINE DIAGRAM




MCC–1 ELEVATION
SCALE: NONE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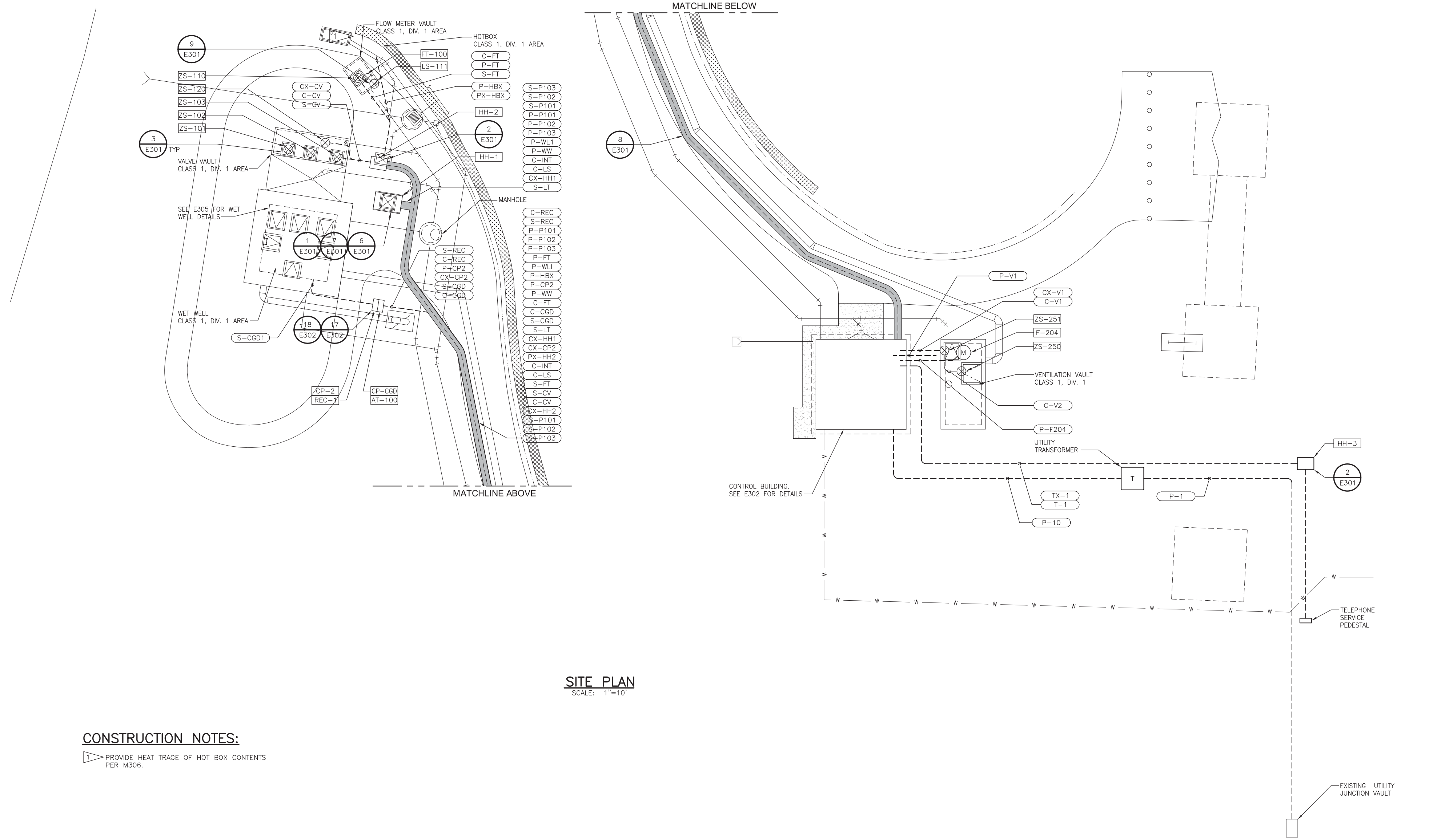
| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|
| | | | | |

SCALE: NONE
DESIGN RH
DATE OCT 2008
CHECKED DMB

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
ONE–LINE, LOAD CALCS, AND PANEL SCHEDULE

DRAWING NO. E303




## SITE PLAN
SCALE: 1"=10'

## CONSTRUCTION NOTES:

1. PROVIDE HEAT TRACE OF HOT BOX CONTENTS PER M306.

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NORTH

10 0 10 20
SCALE IN FEET

RICHARD E. HENSEL, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 38424
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

| | |
|---|---|
| SCALE: | 1"=10' |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
ELECTRICAL SITE PLAN

DRAWING NO. E304

SHEET 67 OF 77

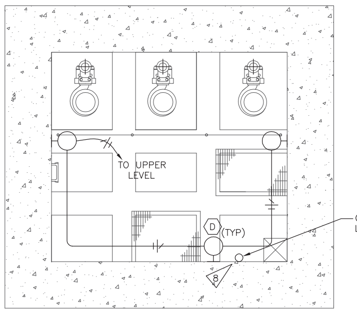
Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\Bothell\E304.dwg Plot date: Dec 09, 2008-11:18:30am CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | MAE03X04 | GSWA-REH |

## NOTES:

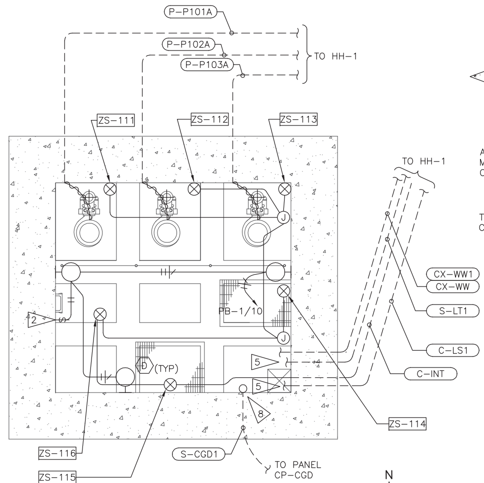
1. WET WELL IS CLASS 1, DIV 1 LOCATION.

## FLAG NOTES:

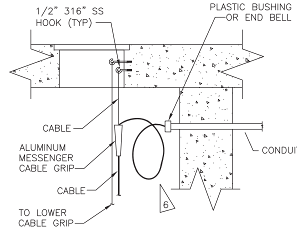
1. PROVIDE FIXTURE FOR EAST AND WEST WALL. MOUNT 7'-0" ABOVE TOP OF PLATFORM.
2. LOCATE LIGHT SWITCH NEAR ACCESS HATCH SO IT CAN BE REACHED WITHOUT ENTERING WELL.
3. SUPPORTS AND HARDWARE SHALL BE FRP OR 316 STAINLESS STEEL. ANCHOR BOLTS SHALL BE EPOXY SET.
4. PIPE SHALL ACCOMMODATE PERIODIC MAINTENANCE BY PULLING TRANSDUCER UP THROUGH STILLING WELL TO PLATFORM LEVEL.
5. ROUTE FLOAT AND TRANSMITTER CABLES IN PVC CONDUIT TO STRAIN RELIEF LOCATIONS.
6. PROVIDE 8' SLACK CORD AND COIL NEATLY. TYPICAL FOR EACH PUMP AND LEVEL TRANSDUCER.
7. PROVIDE BEND NEAR TOP OF STILLING WELL TO ENABLE REMOVAL OF LEVEL TRANSDUCER FROM ABOVE GRADE BY REACTING THROUGH HATCH AND LIFTING CABLE.
8. PROVIDE 3/16"ID STAINLESS STEEL SAMPLE TUBE INSIDE SCHEDULE 80 PVC CONDUIT FOR VERTICAL SEGMENT AND ATTACH TO WALL.



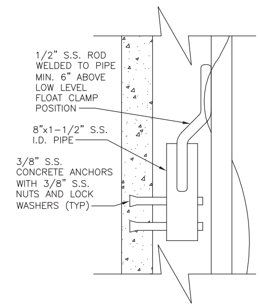

WET WELL LEVEL 1 PLAN
SCALE: 1/4"=1'-0"



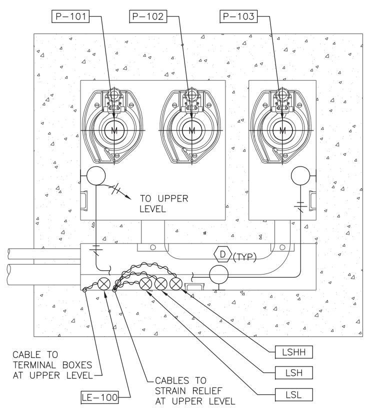

WET WELL UPPER LEVEL PLAN
SCALE: 1/4"=1'-0"



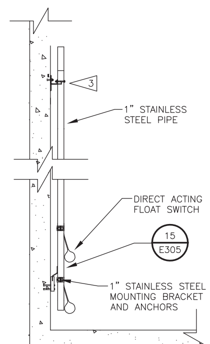

CABLE GRIP DETAIL (14/E305)
SCALE: NONE



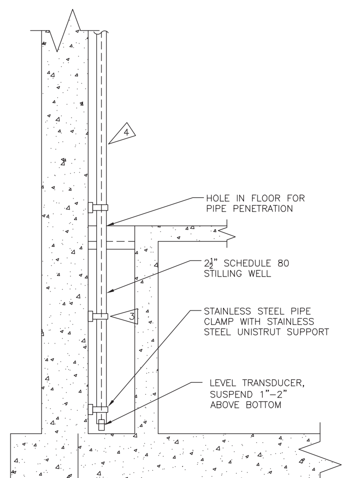

LOWER ANCHOR ASSEMBLY DETAIL (15/E305)
SCALE: NONE



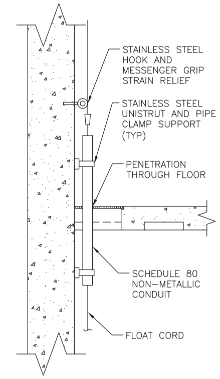

WET WELL BOTTOM LEVEL PLAN
SCALE: 1/4"=1'-0"



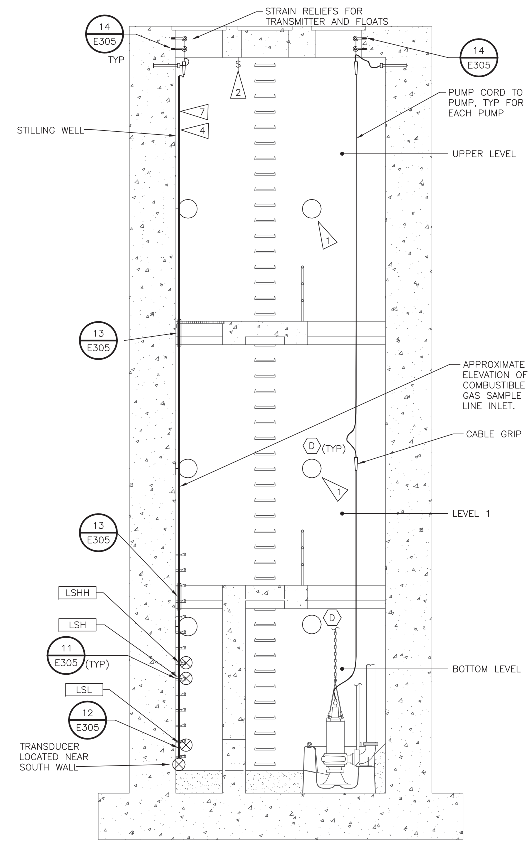

FLOAT SWITCH MOUNTING DETAIL (11/E305)
SCALE: NONE




LEVEL TRANSMITTER MOUNTING DETAIL (12/E305)
SCALE: NONE




FLOAT CABLE SUSPENSION DETAIL (13/E305)
SCALE: NONE




PUMP STATION ELEVATION
SCALE: 1/4"=1'-0"

4 0 4 8
SCALE IN FEET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| REV | DATE | BY | DESCRIPTION | APPR. | | |
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| | | | | | DESIGN | RH |
| | | | | | DATE | OCT 2008 |
| | | | | | CHECKED | DMB |

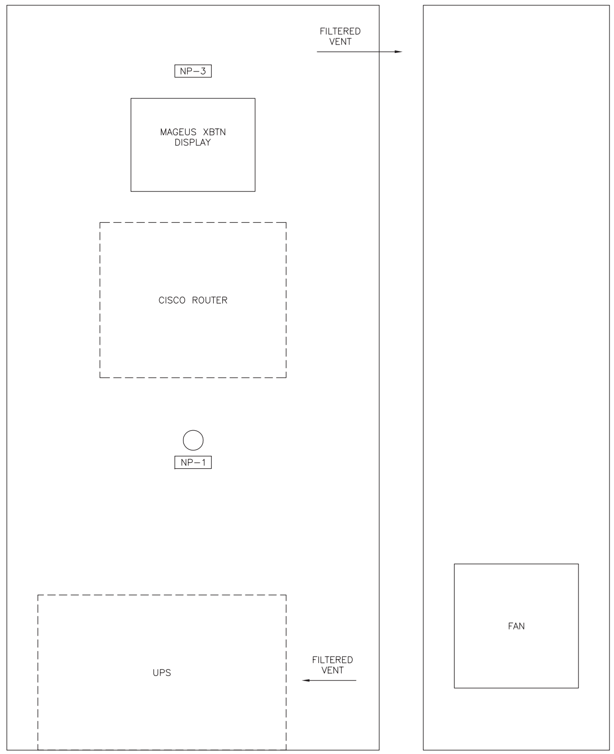
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
ELECTRICAL PLANS

DRAWING NO. E305

SHEET 68 OF 77

## FLAG NOTES:

1. PORTABLE CONTROL STATION TO BE USED AT WET WELL. UNIT WILL BE CAPABLE OF BEING PLUGGED INTO A CONNECTOR AT CP-2 TO ALLOW FOR READING WET WELL LEVELS AND CONTROLLING INDIVIDUAL PUMPS. PROVIDE AUDIBLE ALARM FOR PUMP FAIL.

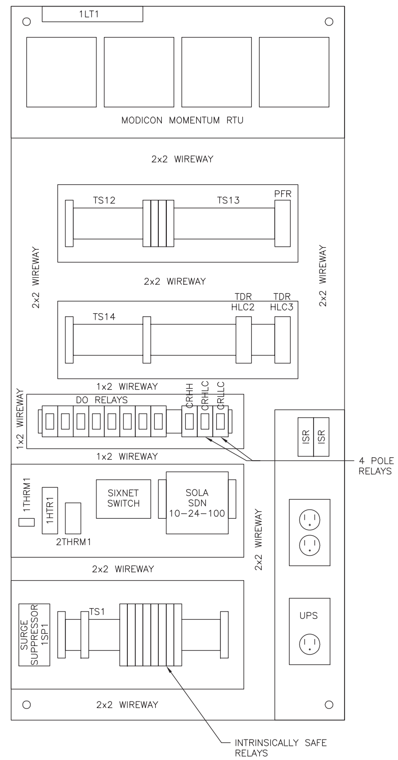



FRONT

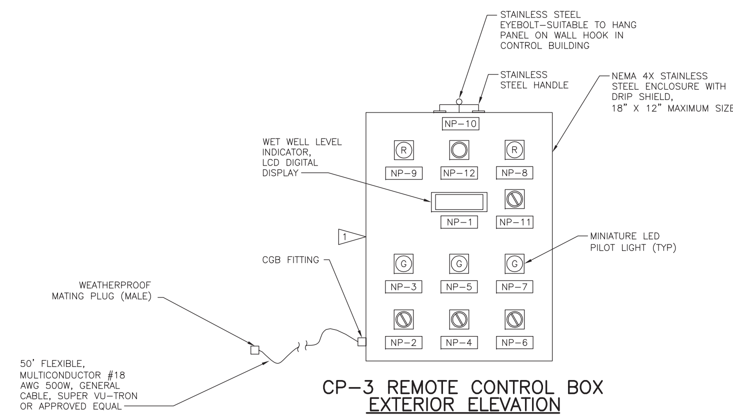
SIDE

## CP-1 EXTERIOR ELEVATION

| NAMEPLATE ENGRAVING SCHEDULE<br>NAMEPLATE NUMBER | ENGRAVING<br>(1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | OPERATOR IN TROUBLE |
| NP-2 | – |
| NP-3 | MERCER ISLAND PUMP STATION NO. 4 / CONTROL PANEL CP-1 |




## CP-1 INTERIOR ELEVATION




## CP-3 REMOTE CONTROL BOX EXTERIOR ELEVATION

SCALE: NONE

| NAMEPLATE ENGRAVING SCHEDULE<br>NAMEPLATE NUMBER | ENGRAVING<br>(1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | WET WELL LEVEL |
| NP-2 | PUMP 1 / START STOP |
| NP-3 | PUMP 1 RUNNING |
| NP-4 | PUMP 2 / START STOP |
| NP-5 | PUMP 2 RUNNING |
| NP-6 | PUMP 3 / START STOP |
| NP-7 | PUMP 3 RUNNING |
| NP-8 | LOW FLOAT |
| NP-9 | ALARM |
| NP-10 | CP-3 |
| NP-11 | LOW FLOAT BYPASS/NORMAL BYPASS |
| NP-12 | ALARM RESET |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|---|---|
| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL ELEVATIONS

DRAWING NO. E306



Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\Bothell\E306.dwg Plot date: Oct 09, 2008-12:40:47pm CAD User: jeff.wicke.
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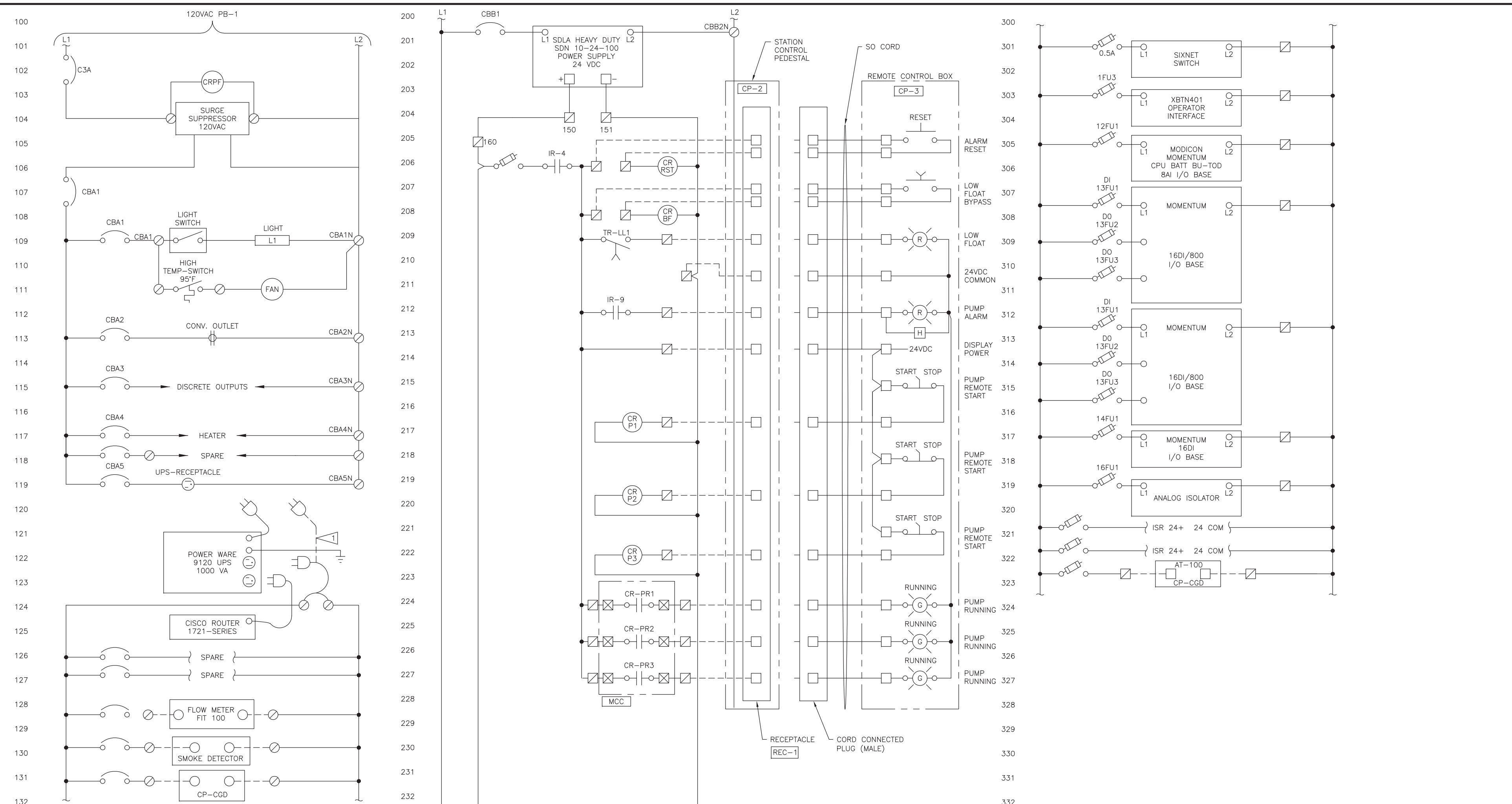


## CONSTRUCTION NOTES:

1. THE POWER CORD CONNECTED TO THE OUTPUT OF THE UPS SHALL BE LONG ENOUGH TO CONNECT DIRECTLY TO THE UPS RECEPTACLE. THIS WILL ALLOW THE UPS TO BE BYPASSED EASILY IN THE EVENT OF FAILURE.
2. ADJUST DELAY TO PROVIDE WELL DRAW-DOWN WITHOUT EMPTYING BELOW LOW FLOAT LEVEL.

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SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-1

DRAWING NO. E307

SHEET 70 OF 77

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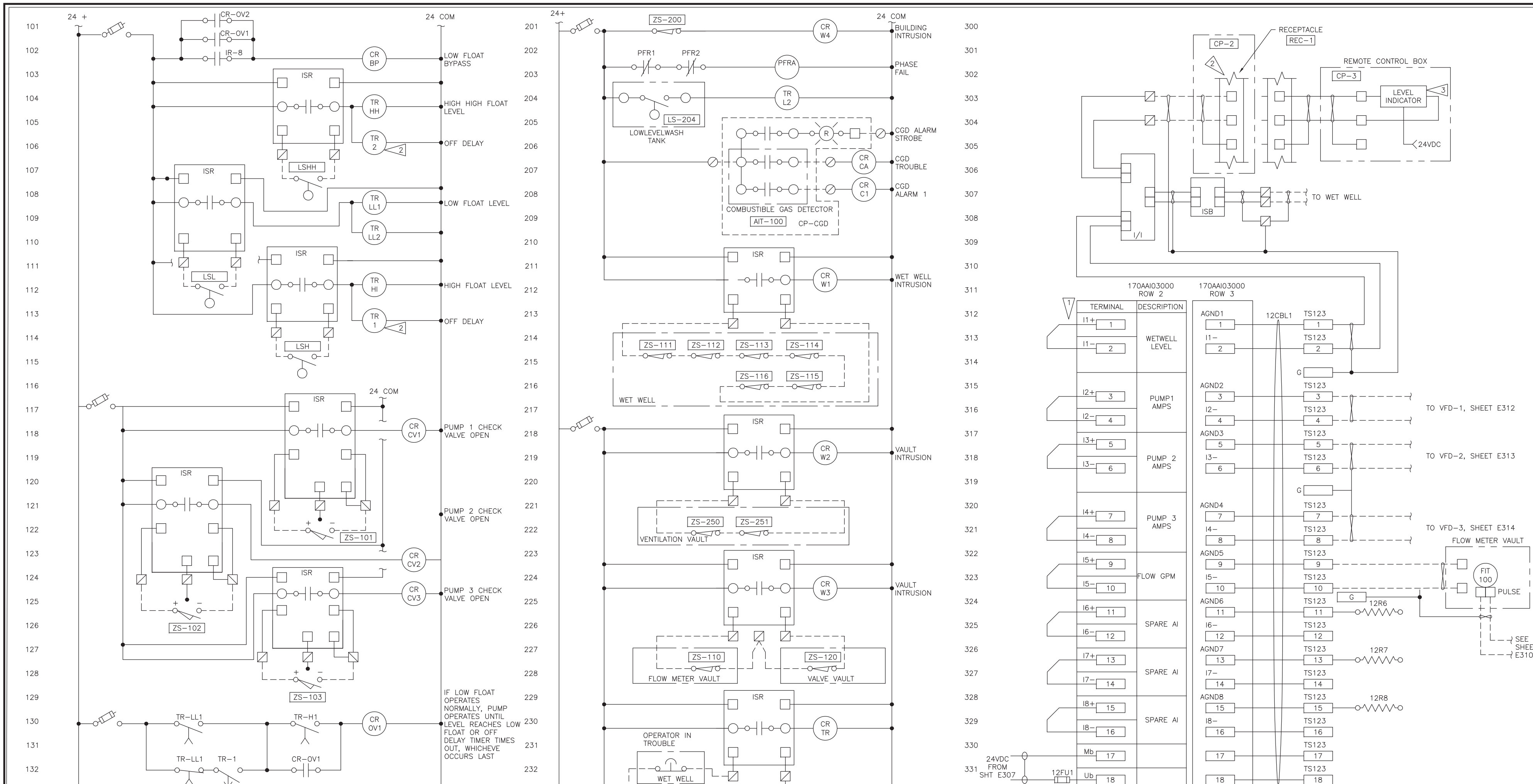

## FLAG NOTES:

1. WIRE ALL ANALOG INPUTS AS CURRENT 4–20mA. SUPPLY 0.1% 250 OHM PRECISION RESISTOR FOR ALL POINTS.
2. PROVIDE PLUG–RECEPTACLE FOR CORD CONNECTION TO CONTROL BOX, POS–E–ICON A SERIES WITH ACCESS COVER OR APPROVED EQUAL GROUND SHIELD AT ONE LOCATION ONLY.
3. PROVIDE LCD DIGITAL DISPLAY, RED LION CUB5IROO OR APPROVED EQUAL.


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10/10/08

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| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

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SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS–2

DRAWING NO.
E308



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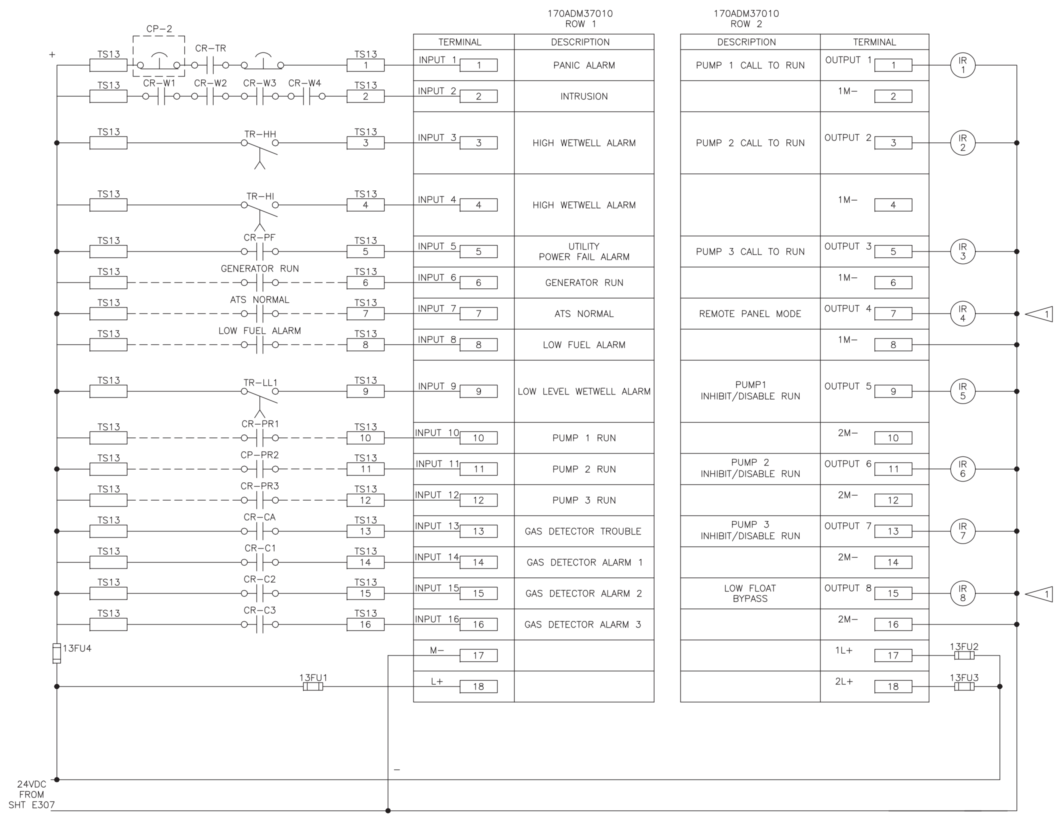


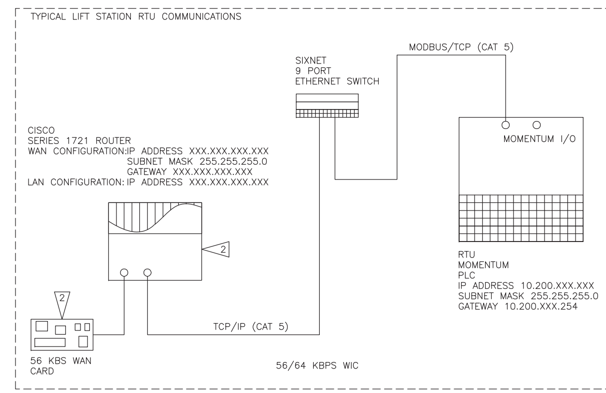


## CONSTRUCTION NOTES:

1. PROGRAM TO ENABLE WITH SOFT SWITCH ON OPERATOR INTERFACE. SEE SECTION 17500.
2. TO BE SUPPLIED BY PHONE COMPANY. MOUNT INSIDE CP−1.

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CITY OF MERCER ISLAND
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SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS−3

DRAWING NO. E309

SHEET 72 OF 77

Path: S:\Active\135−12528−08−134 Mercer Island Re−Packaging & Re−Bid\Deliverables\Drawings\Bothell\E309.dwg Plot date: Oct 09, 2008−12:42:23pm CAD User: jeff.wicke.
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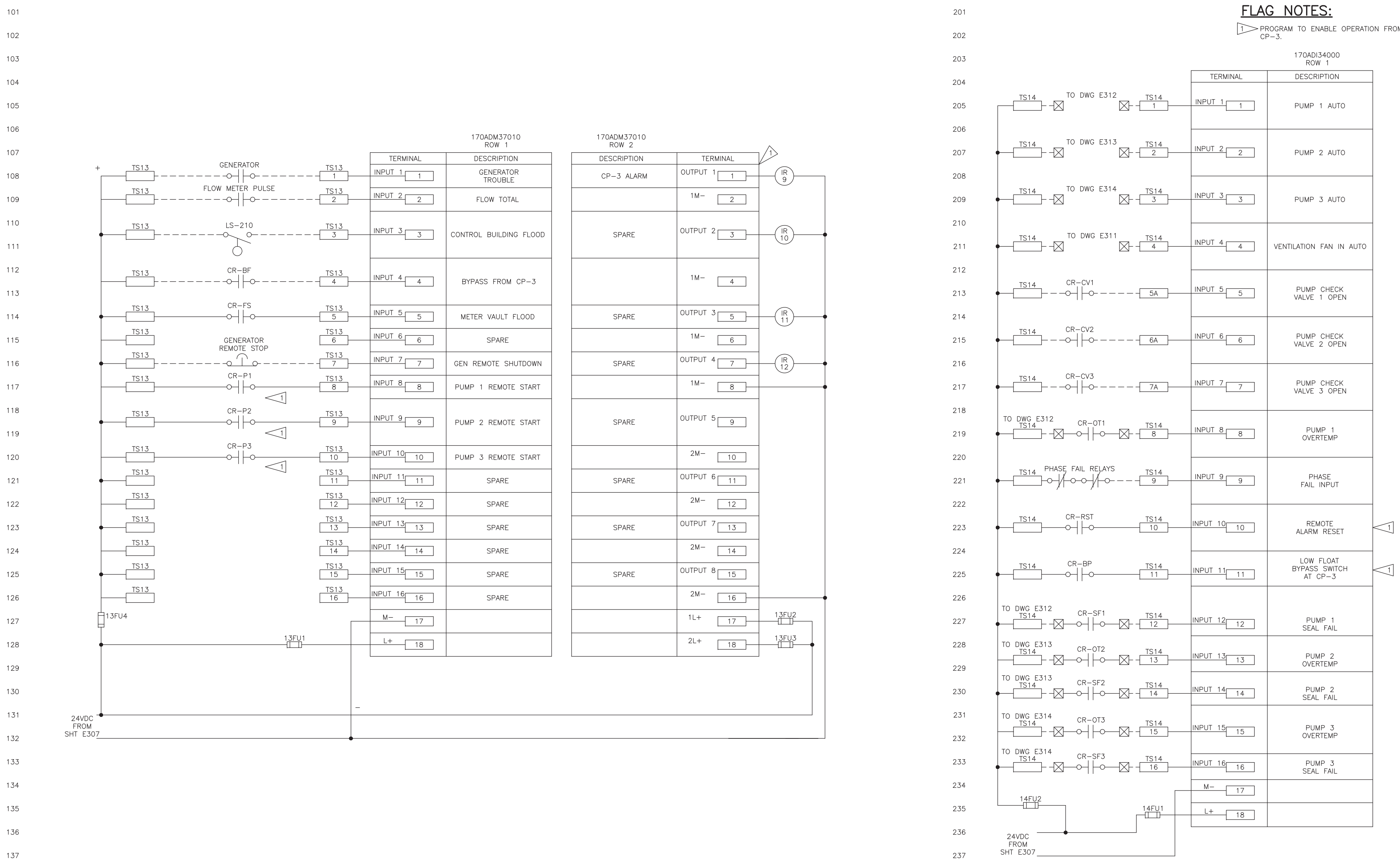


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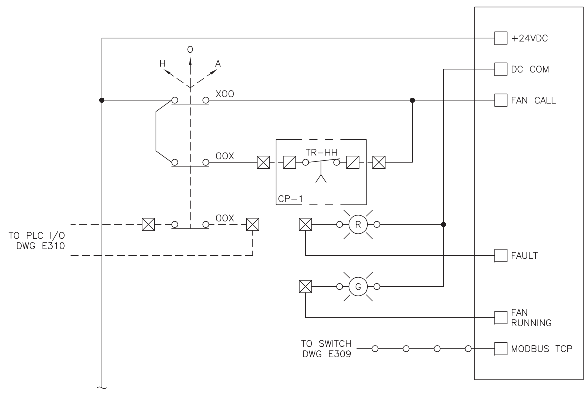
CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

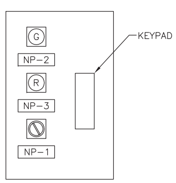
SEWER LAKE LINE AND P.S. NO. 4 REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-4

DRAWING NO. E310

SHEET 73 OF 77

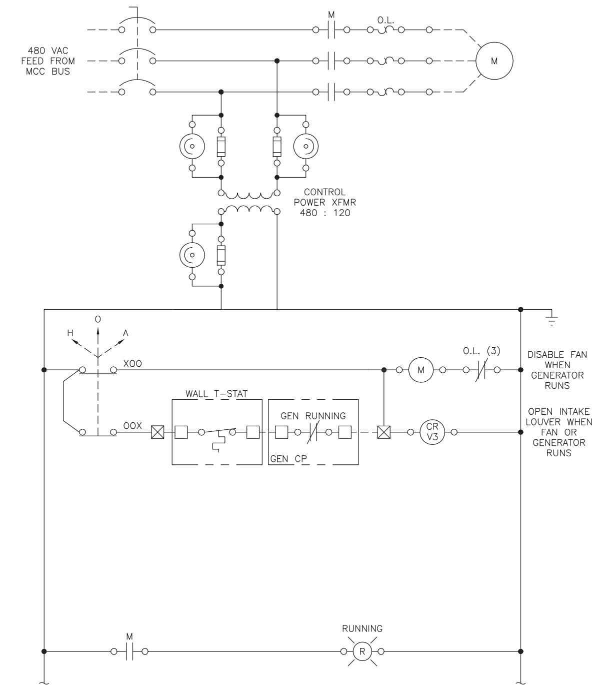



## F-204 VFD SCHEMATIC

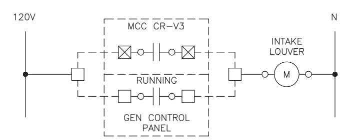



## MCC ELEVATION

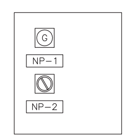
| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE ENGRAVING (1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | F-204 WET WELL VENT FAN / HAND-OFF-AUTO |
| NP-2 | F-204 WET WELL VENT FAN / RUNNING |
| NP-3 | F-204 WET WELL VENT FAN / FAULT |




## F-201 VENT FAN SCHEMATIC

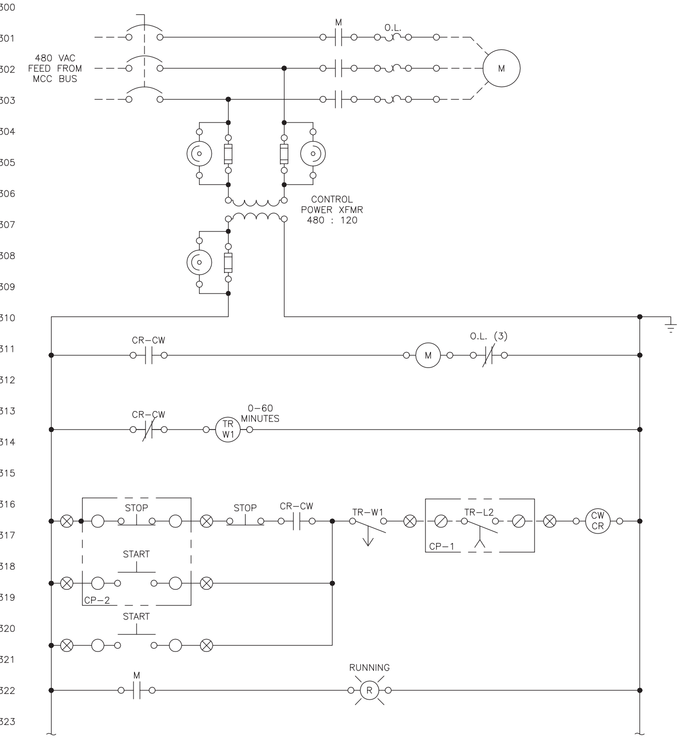



## INTAKE LOUVER SCHEMATIC

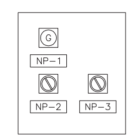



## MCC ELEVATION

| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE ENGRAVING (1ST LINE / 2ND LINE) |
|---|---|
| NP-1 | F-201 VENT FAN/RUNNING |
| NP-2 | F-201 VENT FAN/HAND-OFF-AUTO |




## P-204 WASH PUMP SCHEMATIC




## MCC ELEVATION

| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE ENGRAVING (1ST LINE / 2ND LINE) |
|---|---|
| NP-1 | P-204 WASH PUMP / RUNNING |
| NP-2 | P-204 WASH PUMP / START |
| NP-3 | P-204 WASH PUMP / STOP |

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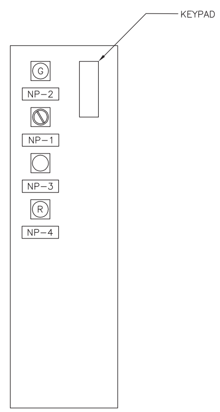
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-5

DRAWING NO. E311

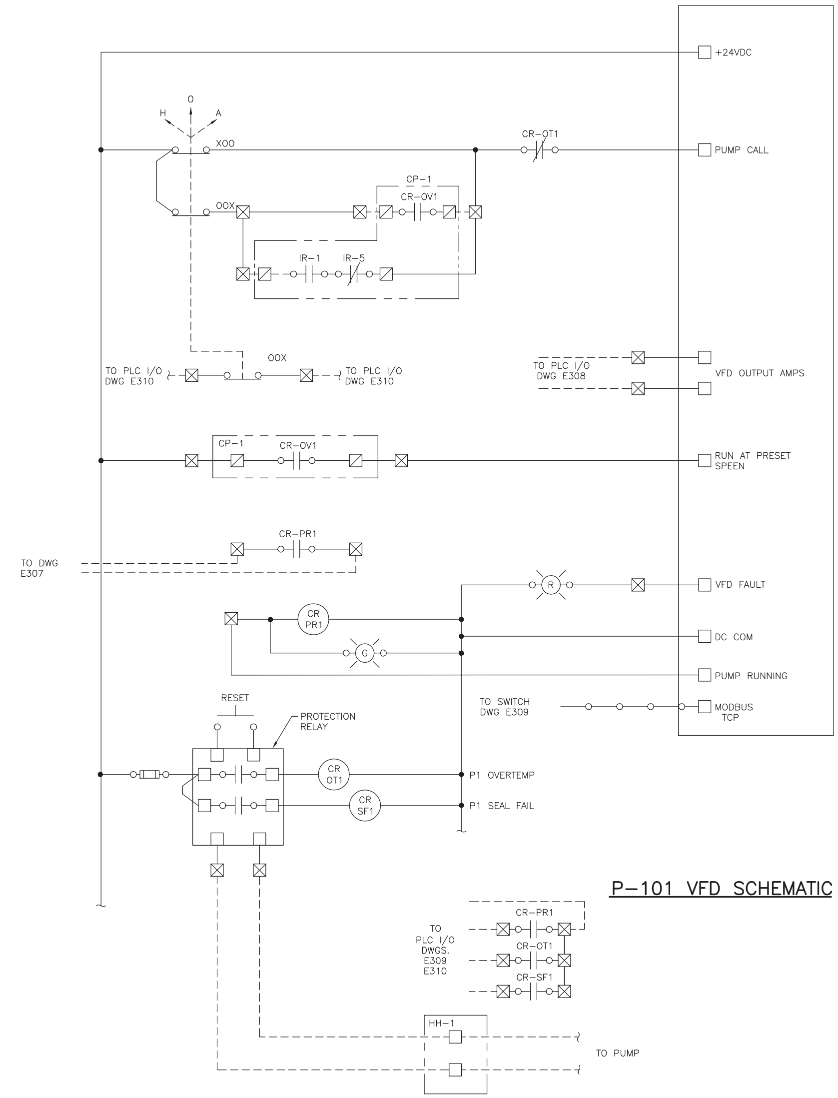
SHEET 74 OF 77

Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\Bothell\E311.dwg Plot date: Oct 09, 2008-12:43:41pm CAD User: jeff.wicke.
Xref Filename: | MAEO3FRM | GSWA-REH |




## MCC ELEVATION
SCALE: NONE

| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE ENGRAVING (1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | PUMP P-101 / HAND-OFF-AUTO |
| NP-2 | PUMP P-101 / RUNNING |
| NP-3 | PUMP P-101 / OVERTEMP-SEALFAIL-RESET |
| NP-4 | PUMP P-101 / VFD FAULT |




## P-101 VFD SCHEMATIC

TETRA TECH
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1420 Fifth Avenue, Suite 600
Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

RICHARD E. HENSEL
STATE OF WASHINGTON
38424
REGISTERED PROFESSIONAL ENGINEER
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

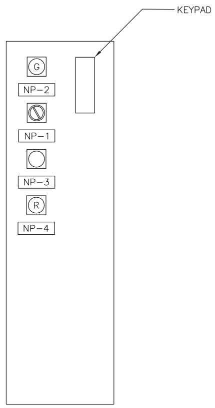
| | |
|---|---|
| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-6

DRAWING NO.
E312

SHEET 75 OF 77

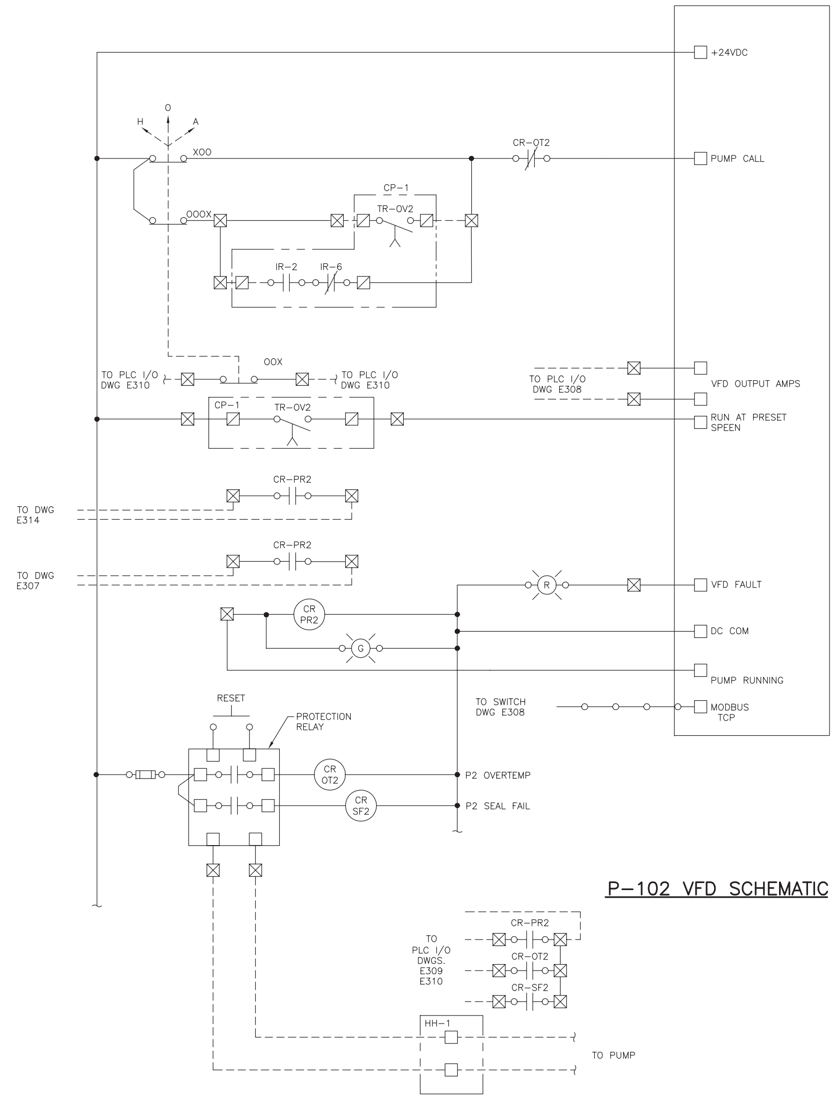
Path: S:\Active\135-12528-08-134 Mercer Island Re-Packaging & Re-Bid\Deliverables\Drawings\Bothell\E312.dwg Plot date: Oct 09, 2008-12:44:08pm CAD User: jeff.wicke.
Xref Filename: | MAE03FRM | GSWA-REH |




## MCC ELEVATION

SCALE: NONE

| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE<br>ENGRAVING<br>(1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | PUMP P-102 / HAND-OFF-AUTO |
| NP-2 | PUMP P-102 / RUNNING |
| NP-3 | PUMP P-102 / OVERTEMP-SEALFAIL-RESET |
| NP-4 | PUMP P-102 / VFD FAULT |




## P-102 VFD SCHEMATIC

TETRA TECH
www.tetratech.com
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Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

RICHARD E. HENSEL STATE OF WASHINGTON 38424 REGISTERED PROFESSIONAL ENGINEER 10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

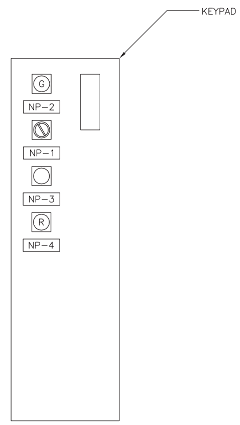
| | |
|---|---|
| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON

SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-7

DRAWING NO.
E313

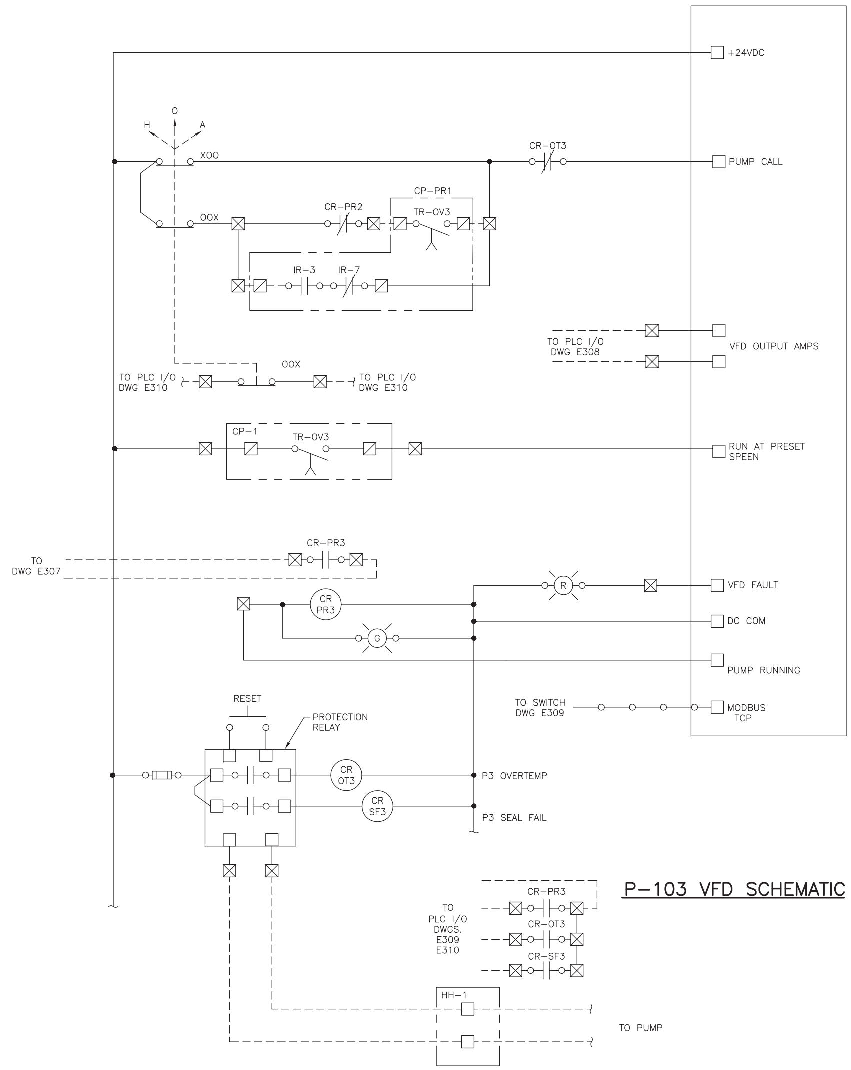
SHEET 76 OF 77




## MCC ELEVATION

SCALE: NONE

| NAMEPLATE NUMBER | NAMEPLATE ENGRAVING SCHEDULE ENGRAVING (1ST LINE / 2ND LINE / 3RD LINE) |
|---|---|
| NP-1 | PUMP P-103 / HAND-OFF-AUTO |
| NP-2 | PUMP P-103 / RUNNING |
| NP-3 | PUMP P-103 / OVERTEMP-SEALFAIL-RESET |
| NP-4 | PUMP P-103 / VFD FAULT |




## P-103 VFD SCHEMATIC

TETRA TECH
www.tetratech.com
1420 Fifth Avenue, Suite 600
Seattle, Washington 98101
Phone: 206-883-9300 Fax: 206-883-9301

RICHARD E. HENSEL, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, 38424
10/10/08

| REV | DATE | BY | DESCRIPTION | APPR. |
|---|---|---|---|---|

| | |
|---|---|
| SCALE: | NONE |
| DESIGN | RH |
| DATE | OCT 2008 |
| CHECKED | DMB |

CITY OF MERCER ISLAND
KING COUNTY, WASHINGTON
SEWER LAKE LINE AND P.S. NO. 4
REPLACEMENT PROJECT
SCHEDULE B
CONTROL PANEL SCHEMATICS-8

DRAWING NO.
E314

SHEET 77 OF 77

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## PUMP STATION 4 MCC DRAWINGS

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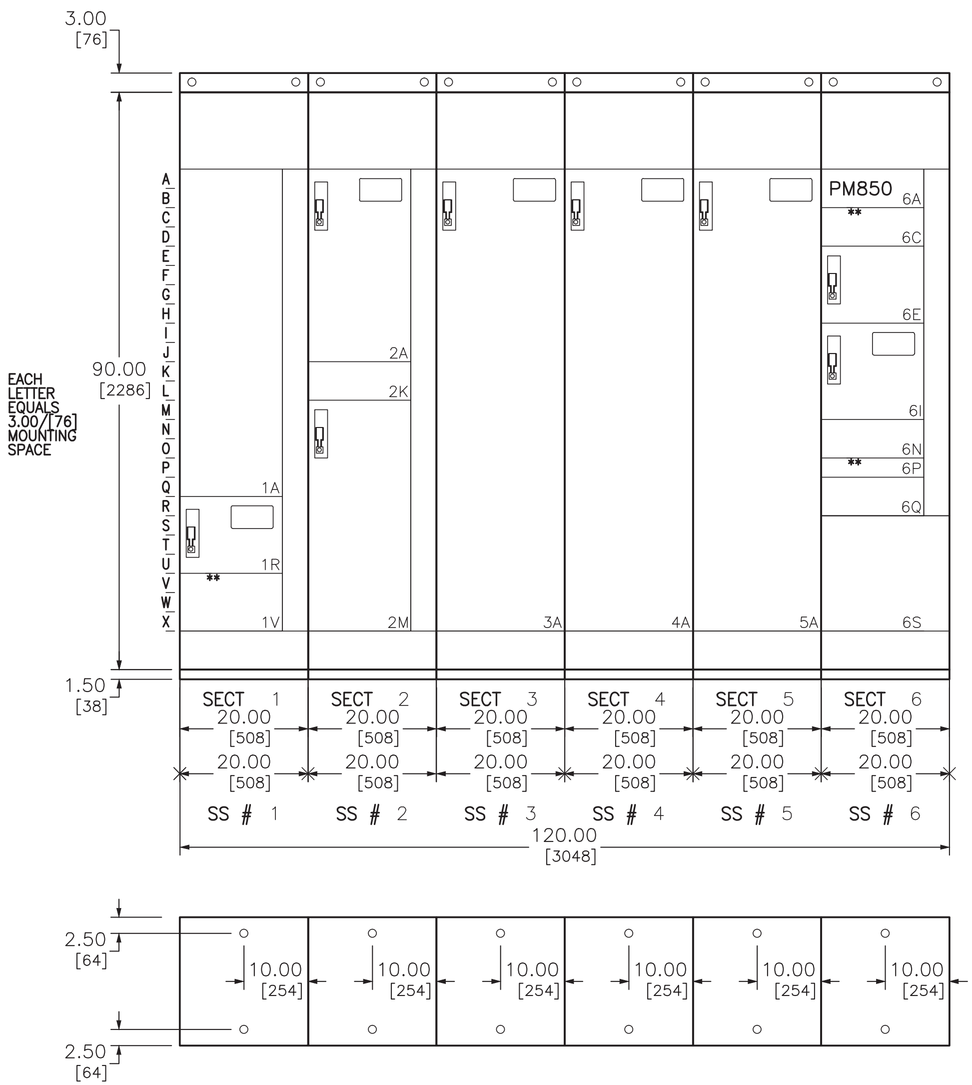
SQUARE D
by Schneider Electric

| | | | |
|---|---|---|---|
| Job Name: | SEWER LAKE LINE P.S.#4 REPL. | Square D Quotation #: | 26200178 |
| Job Location: | LYNNWOOD, WA | Quotation Revision #: | |
| | | Sales Contact: | ins – brad cummins |
| | | Sales Contact Location: | 636 |
| Purchaser: | GRAYBAR ELECT CO 5818836 | Customer: | TECHNICAL SYSTEM INC |
| Purchaser PO #: | 4700908926 | Customer PO #: | |
| User: | TECHNICAL SYSTEM INC | Architect: | TECHNICAL SYSTEM INC |
| User Location: | | Cons. Engineer: | |
| Drawing Status: | APPROVAL | | |

# TABLE OF CONTENTS

SQUARE D FACTORY ORDER NUMBER: 26200178–002

| REV | DESCRIPTION | BY | DATE | B | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | FIXED OVERLAPING ON FE AND OL | DJO | 03/04/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |




ANCHOR DETAIL

# GENERAL NOTES

Class 2 Type B Wiring

## PRODUCT DESCRIPTION AND RATINGS

**POWER SYSTEM DATA:**
480Y/277V 3PH 4W 60Hz
SHORT CIRCUIT RATING: 42kA
POWER ENTERS: Main Lug Bottom Section 6
CONTROL POWER: 120Vac

**BUS SYSTEM DATA:**
MAIN HORIZONTAL BUS: 600 Amp Copper/Tin Plated / 1.5"
BUS BRACING: 42kA
VERTICAL BUS: 300 Amp Tin Plated Copper
NEUTRAL BUS: 100 Percent Neutral
HORIZONTAL GROUND BUS: .25" X 2.0" (6.35mm X 50.8mm) Copper
Units Securely Grounded To Structure

**ENCLOSURE DATA:**
ENCLOSURE TYPE: 20" DEEP Type 12
EXTERIOR COLOR: Electrodeposition Finish ANSI 49 Medium Light Grey
INTERIOR COLOR: Electrodeposition Finish White

**STRUCTURE MODIFICATIONS:**
Rodent Barriers 1
Manual Bus Shutters 1,2,6
Fishtape Barriers 1,2,3,4,5,6
600A Vertical Bus 6
Copper Vertical Ground Bus 1,2,6
Wire Retainers 1,2,6
Master Nameplate 1
Neutral Bus Drop 1,2,6

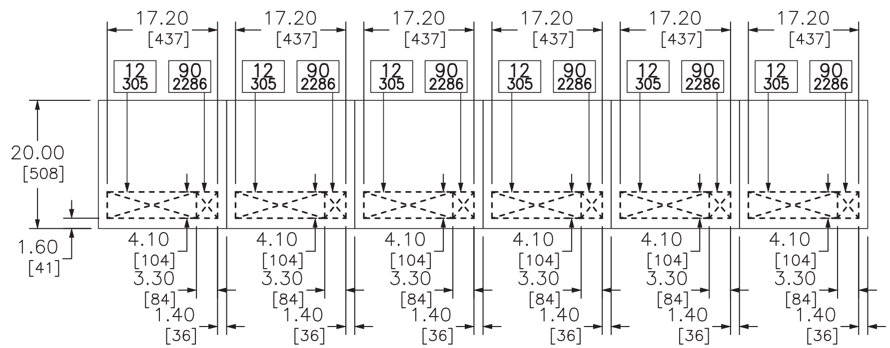
**EQUIPMENT WEIGHT:**
SHIPPING SPLIT # 1: 750.00 Lbs. (340.20 Kg.)
SHIPPING SPLIT # 2: 875.00 Lbs. (396.90 Kg.)
SHIPPING SPLIT # 3: 700.00 Lbs. (317.52 Kg.)
SHIPPING SPLIT # 4: 700.00 Lbs. (317.52 Kg.)
SHIPPING SPLIT # 5: 700.00 Lbs. (317.52 Kg.)
SHIPPING SPLIT # 6: 750.00 Lbs. (340.20 Kg.)
TOTAL LINEUP WEIGHT (APPROX): 4475.00 Lbs. (2029.86 Kg.)

**PRODUCT ACCESSORIES:**
Modbus TCP/IP Network

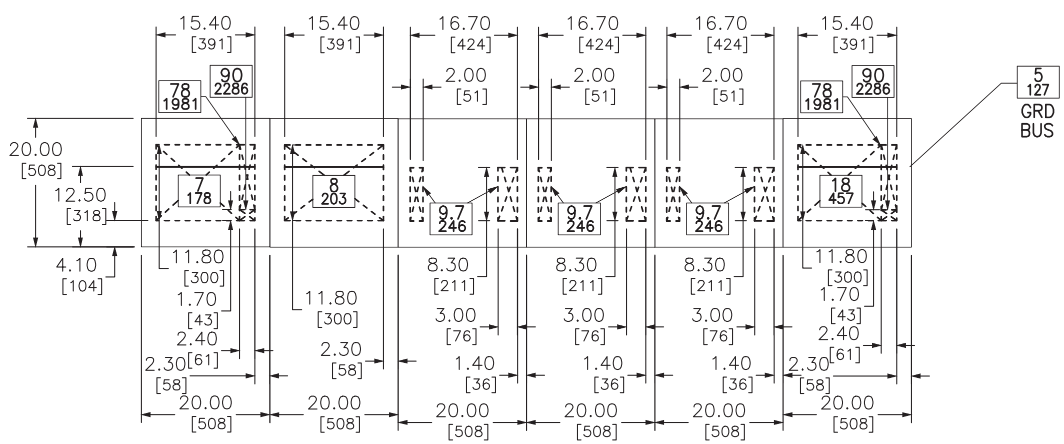
DUAL DIMENSIONS: INCHES / MILLIMETERS

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEVATION |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# F26200178-002-01 | PG 1 OF 2 REV B |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | FIXED OVERLAPING ON FE AND OL | DJO | 03/04/2009 | B | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- |
| | | | | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |




TOP VIEW




FLOOR VIEW

CROSSED AREA REPRESENTS CONDUIT ENTRY AREA. NUMBERS IN BOXES INDICATE VERTICAL CLEARANCE TO NEAREST OBSTRUCTION.

DUAL DIMENSIONS: INCHES / MILLIMETERS

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEVATION |
| ENGR: | DAVID O'CONNOR | SQUARE D Schneider Electric | |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# F26200178-002-01 | PG 2 OF 2 REV B |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |
| | | | | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |

| UNIT LOC | NAMEPLATE DESIGNATION (WHITE SURFACE/BLACK LETTERS) | UNIT TYPE | SIZE | HP | FRAME AMPS | TRIP AMPS | CONTROL SOURCE | VA | FUSE SIZE PRI | FUSE SIZE SEC | INTERLOCKS NO | INTERLOCKS NC | PILOT DEVICE FEATURES 30 mm- 9001K LED ON LIGHT | OFF LIGHT | ADDL P/L | SS / PB | OTHER UNIT FEATURES | ELEMENTARY # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | PB-1 | PANEL BOARD | 225A | | QB | | | | | | | | | | | | 42 CIRCUITS, CUSTOM WIRE LABELS, FULLY RATED, NQOD, POWER TERM BLOCKS, RING TONGUE TERMINALS, PADLOCK BRACKET | E26200178-002-01 |
| 1R | CONTROL BUILDING VENT FAN F-201 | FVNR | NEMA 1 | 1 | HJ 150 | ADJ 30 | CONTROL TRANSFORMER | 100 | .50 | 1.00 | 1 | 1 | GREEN PTT | | | HOA SS | 5 ADDITIONAL UNWIRED TERMINALS, CUSTOM WIRE LABELS, INT INTLK 1A/1B FORM C, MODBUS 2-WIRE, MOTOR CIRCUIT PROTECTOR, MOTOR LOGIC PLUS II O/L H50, POWER TERM BLOCKS, RING TONGUE TERMINALS, TRANSIENT SUPPRESSION, WIRED RELAY, BFI | E26200178-002-02 |
| 1V | | SPACE | | | | | | | | | | | | | | | | |
| 2A | WET WELL VENTILATION FAN F-204 | VT DRIVE | U15 | 2 | HL 150 | 15 | CONTROL TRANSFORMER | 150 | 1.00 | 1.60 | | | GREEN PTT | | | HOA SS SPD POT | 6" UNIT EXT, 8 INTERWIRED POINTS, CUSTOM WIRE LABELS, MODBUS/UNITELWAY COMM, RING TONGUE TERMINALS | E26200178-002-03 |
| 2K | | SPACE | | | | | | | | | | | | | | | | |
| 2M | DIST XFMR | 1PH DIST XFMR | 15 kVA | | HJ 150 | 40 | | | | | | | | | | | RING TONGUE TERMINALS, SECONDARY WIRE TO PANELBOARD, COPPER WINDINGS | E26200178-002-04 |
| 3A | WET WELL PUMP P-101 | VT DRIVE | D37 | 60 | JL 250 | 175 | CONTROL TRANSFORMER | 300 | 1.60 | 3.20 | | | GREEN PTT | | | HOA SS SPD POT | 8 INTERWIRED POINTS, CUSTOM WIRE LABELS, MODBUS/UNITELWAY COMM, RING TONGUE TERMINALS PUMP SUPERVISION RELAY | E26200178-002-05 |
| 4A | WET WELL PUMP P-102 | VT DRIVE | D37 | 60 | JL 250 | 175 | CONTROL TRANSFORMER | 300 | 1.60 | 3.20 | | | GREEN PTT | | | HOA SS SPD POT | 8 INTERWIRED POINTS, CUSTOM WIRE LABELS, MODBUS/UNITELWAY COMM, RING TONGUE TERMINALS PUMP SUPERVISION RELAY | E26200178-002-09 |

UNIT LOC | NAMEPLATE DESIGNATION | UNIT TYPE | SIZE | HP | FRAME AMPS | TRIP AMPS | CONTROL SOURCE | VA | PRI | SEC | NO | NC | ON LIGHT | OFF LIGHT | ADDL P/L | SS / PB | OTHER UNIT FEATURES | ELEMENTARY #
FUSE SIZE | INTERLOCKS | PILOT DEVICE FEATURES 30 mm- 9001K LED

MCC NAMEPLATE – MCC-1
(WHITE SURFACE/BLACK LETTERS)

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | UNIT INFORMATION |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# I26200178-002-01 | PG 1 OF 2 REV A |

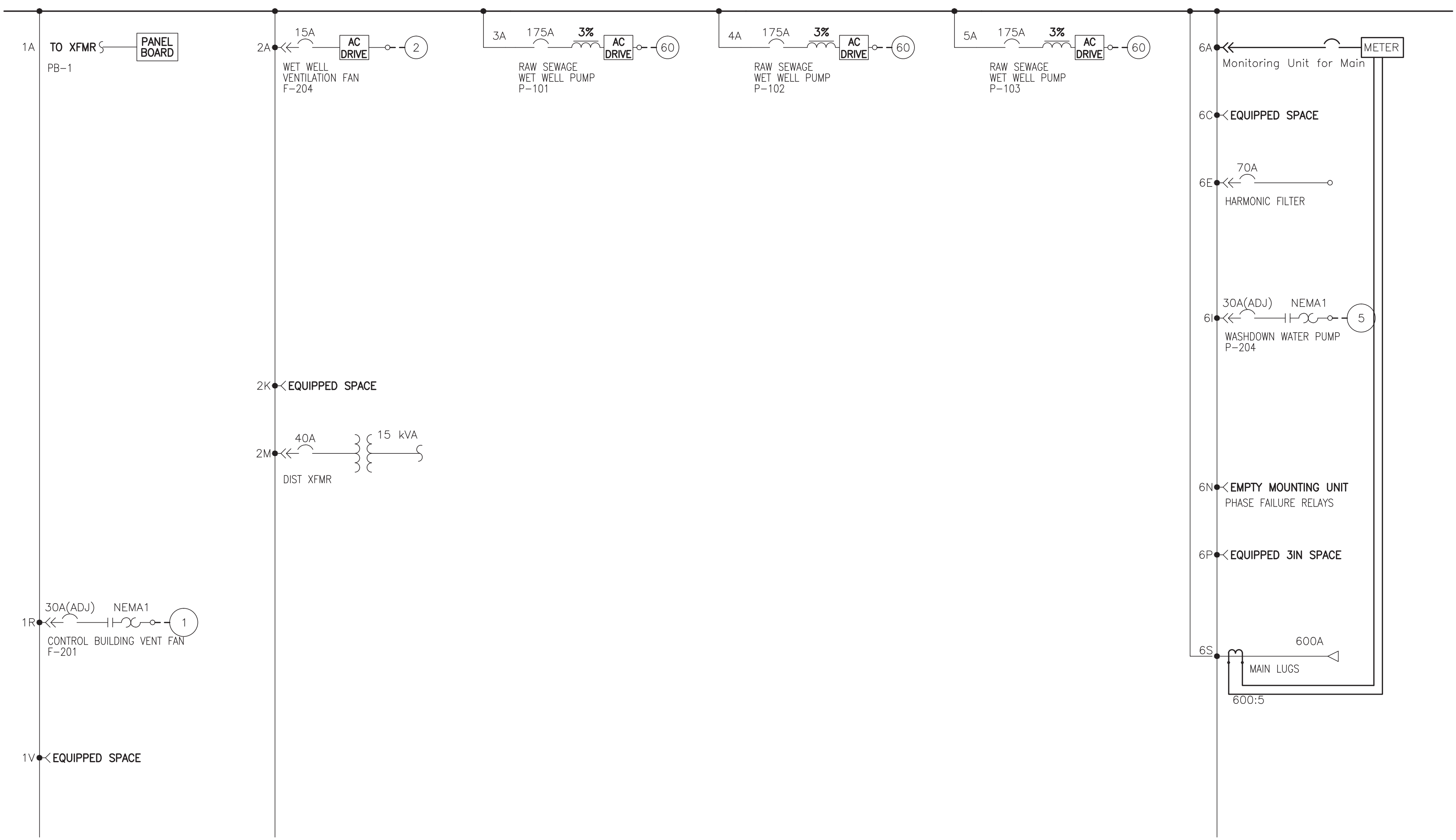
| REV | DESCRIPTION | BY | DATE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- | | |

| UNIT LOC | NAMEPLATE DESIGNATION | UNIT TYPE | SIZE | HP | FRAME AMPS | TRIP AMPS | CONTROL SOURCE | VA | FUSE SIZE PRI | FUSE SIZE SEC | INTERLOCKS NO | INTERLOCKS NC | PILOT DEVICE FEATURES 30 mm- 9001K LED ON LIGHT | OFF LIGHT | ADDL P/L | SS / PB | OTHER UNIT FEATURES | ELEMENTARY # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5A | WET WELL PUMP P-103 | VT DRIVE | D37 | 60 | JL 250 | 175 | CONTROL TRANSFORMER | 300 | 1.60 | 3.20 | | | GREEN PTT | | | HOA SS SPD POT | 8 INTERWIRED POINTS, CUSTOM WIRE LABELS, MODBUS/UNITELWAY COMM, RING TONGUE TERMINALS PUMP SUPERVISION RELAY | E26200178-002-10 |
| 6A | | POWER METER | | | | | | | | | | | | | | | PM850 W/DISPLAY | E26200178-002-08 |
| 6C | | SPACE | | | | | | | | | | | | | | | | |
| 6E | HARMONIC FILTER | BRANCH BKR | | | HJ 150 | 70 | | | | | | | | | | | 14-3/0AWG 1 LUG/PH, RING TONGUE TERMINALS | E26200178-002-06 |
| 6I | WASHDOWN WATER PUMP P-204 | FVNR | NEMA 1 | 5 | HJ 150 | ADJ 30 | CONTROL TRANSFORMER W/SPDT PWR DISC | 100 | .50 | 1.00 | 1 | 1 | GREEN PTT | | | START/STOP PB | 3" UNIT EXT, 5 ADDITIONAL UNWIRED TERMINALS, CUSTOM WIRE LABELS, INT INTLK 1A/1B FORM C, MODBUS 2-WIRE, MOTOR CIRCUIT PROTECTOR, MOTOR LOGIC PLUS II O/L H52, JCK TIMER, POWER TERM BLOCKS, RING TONGUE TERMINALS, TRANSIENT SUPPRESSION, WIRED RELAY, BFI | E26200178-002-07 |
| 6N | PHASE FAILURE RELAYS | MT UNIT | | | | | | | | | | | | | | | BFI, PHASE FAILURE RELAY | E26200178-002-08 |
| 6P | | SPACE | | | | | | | | | | | | | | | | |
| 6Q | Surge Arrestor | SURGE ARREST | | | | | | | | | | | | | | | | |
| 6S | | MAIN LUGS | | | | | | | | | | | | | | | 3/0-500KCMIL 2 LUGS/PH, RING TONGUE TERMINALS, SOLID NEUTRAL | E26200178-002-08 |

| UNIT LOC | NAMEPLATE DESIGNATION | UNIT TYPE | SIZE | HP | FRAME AMPS | TRIP AMPS | CONTROL SOURCE | VA | PRI | SEC | NO | NC | ON LIGHT | OFF LIGHT | ADDL P/L | SS / PB | OTHER UNIT FEATURES | ELEMENTARY # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | FUSE SIZE | | INTERLOCKS | | PILOT DEVICE FEATURES 30 mm- 9001K LED | | | | | |

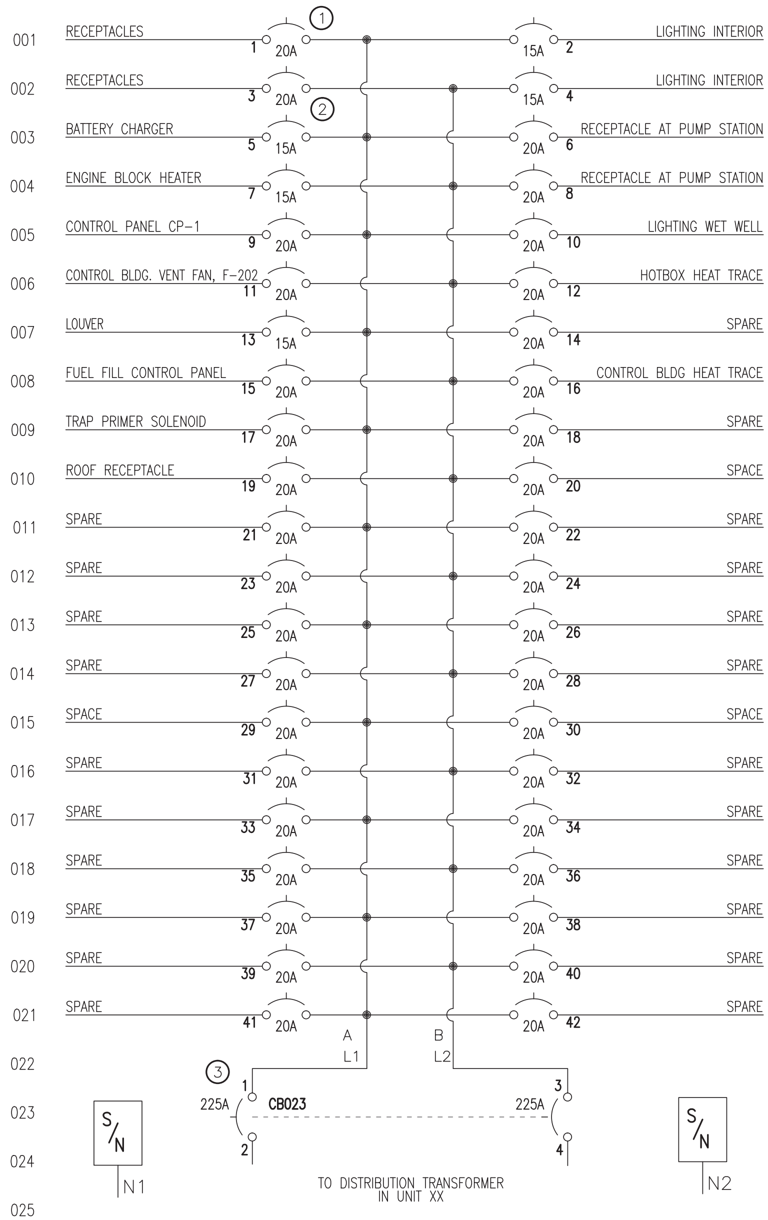
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | UNIT INFORMATION |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# I26200178-002-01 | PG 2 OF 2 REV A |

| REV | DESCRIPTION | BY | DATE | B | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | FIXED OVERLAPING ON FE AND OL | DJO | 03/04/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ONE LINE DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# 026200178-002-01 | PG 1 OF 1 REV B |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |




RING TONGUE TERMINALS WHERE POSSIBLE

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | QOB120 | BOLT-ON CIRCUIT BREAKER 20 A |
| 2 | QOB115 | BOLT-ON CIRCUIT BREAKER 15 A |
| 3 | QBL22225 | CIRCUIT BREAKER - POWERACT Q FRAME - 225 A |

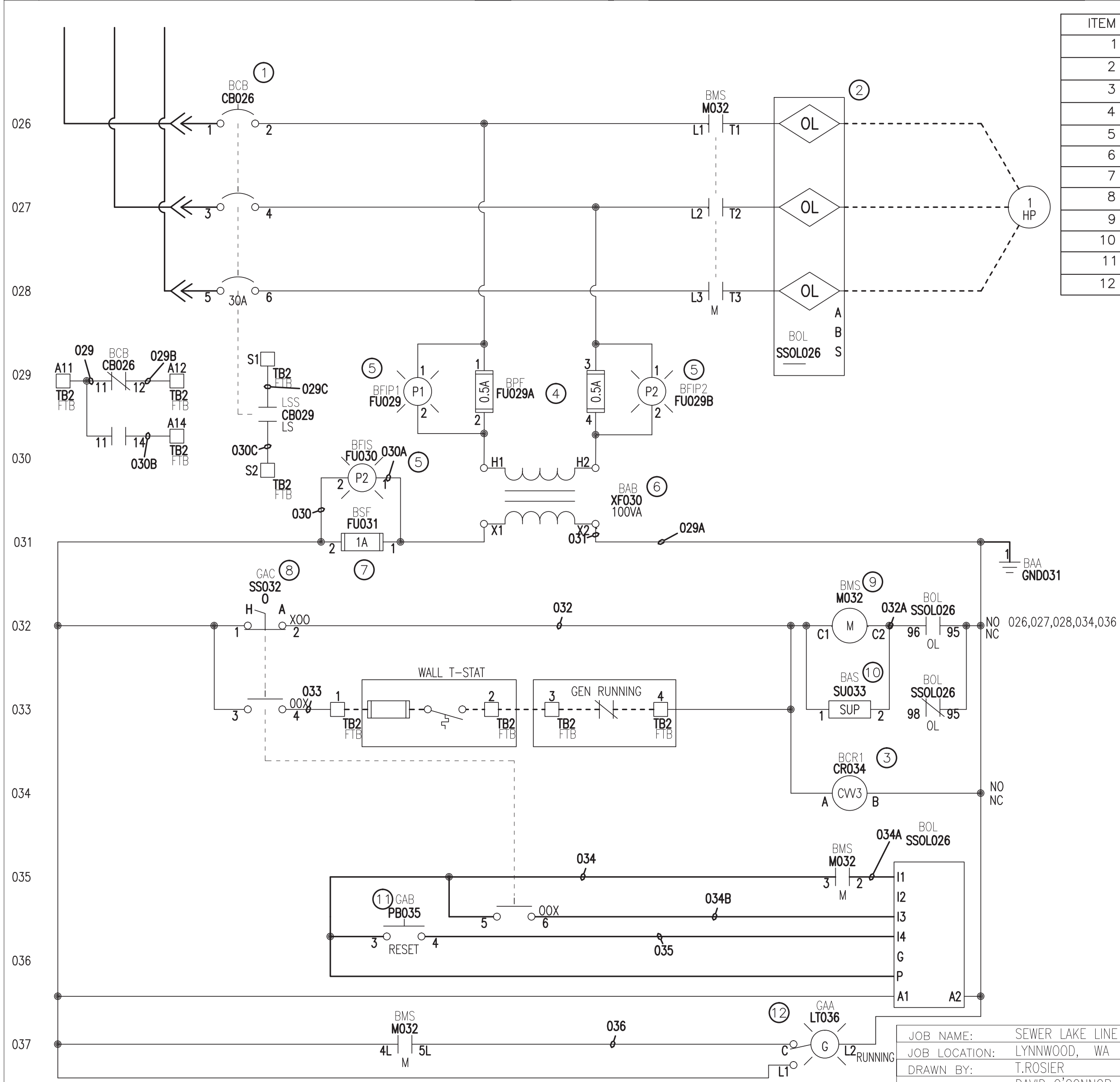
SEE UNIT & NAMEPLATE INFORMATION BELOW

UNIT 1A PB-1

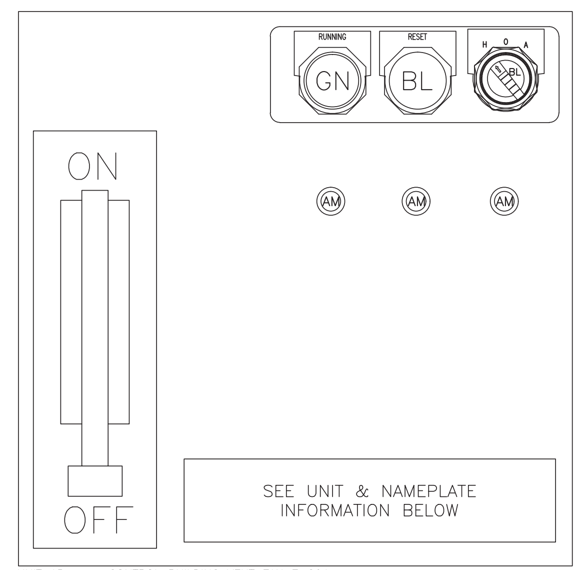
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAMS |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-01 | PG 1 OF 1 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- | -- | --/--/-- |
| | | | | A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- |

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | HJL36030M71AA | POWERPACT H-FRAME MCP CIRCUIT BREAKER 30A W/AUX SWITCH |
| 2 | 9065SP2B6 | MOTORLOGIC PLUS 2 OVERLOAD 0.5-2.3A (H50) (INC. W/ STARTER) |
| 3 | 8501KU13P14V20 | PLUG-IN RELAY TYPE KU W/ PILOT LIGHT |
| 4 | FNQ-R-1/2 | FUSE - CLASS CC |
| 5 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 6 | 9070EL2D9B | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 7 | FRN-R-1 | DUAL ELEMENT FUSE -CLASS RK5 |
| 8 | 9001-KS43BH24 | SELECTOR SW - 3 POS MAINT, NEMA 4/13 |
| 9 | 8536-SCO3V02H50S | MOTORLOGIC PLUS 2 SIZE 1 FVNR 0.5-2.3A 120V |
| 10 | 9999ST1 | TRANSIENT SUP SIZE 1-2 |
| 11 | KR1LH5 | PUSH BUTTON - MOMENTARY, NEMA 4/13 |
| 12 | KT38LGG31Y238 | RED LED PILOT LIGHT - PRESS TO TEST |



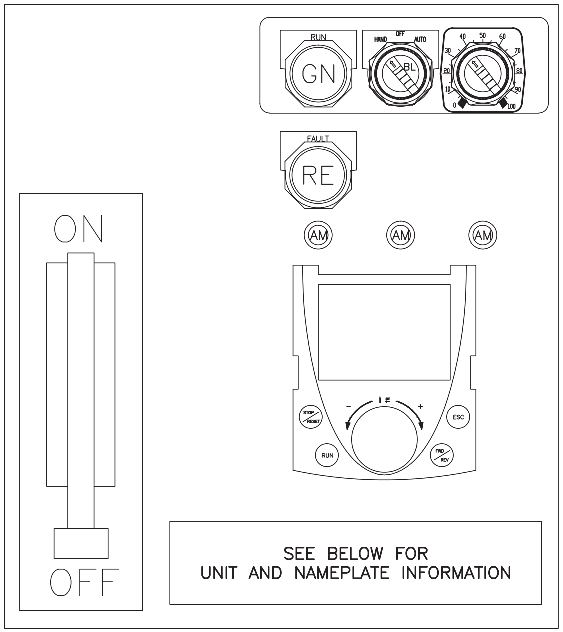

USE RING TONGUE TERMINALS WHERE POSSIBLE




UNIT 1R CONTROL BUILDING VENT FAN F-201

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAMS |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-02 | PG 1 OF 1 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |




UNIT 2A WET WELL VENTILATION FAN F-204

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | HLL36015 | POWERPACT H-FRAME TM CIRCUIT BREAKER 15A |
| 2 | 8501KU13P14V20 | PLUG-IN RELAY TYPE KU W/ PILOT LIGHT |
| 3 | FNQ-R-1 | FUSE - CLASS CC |
| 4 | 9070TF150D1 | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 5 | FNQ-R-1 6/10 | FUSE - CLASS CC |
| 6 | 028316 | MUFFIN XL AC - MX2A3 115VAC FAN |
| 7 | HTV61H075N4 | ALTIVAR 61 VARIABLE TORQUE DRIVE 2 HP |
| 8 | DCA000403 | DC CHOKE 4 AMPS |
| 9 | 9001-KS42BH75 | SELECTOR SW - 3 POS MAINT, NEMA 4/13 |
| 10 | 8044224750 | MCC, MMIR 24VDC RELAY MOD. KIT |
| 11 | KT38LRR31Y238 | YELLOW LED PILOT LIGHT - PRESS TO TEST, NEMA 4/13 |
| 12 | KT38LGG31Y238 | RED LED PILOT LIGHT - PRESS TO TEST |
| 13 | 9001K2106 | POTENTIOMETER 2.5KOHM 2W 30MM |
| 14 | VW3A3310 | MODBUS TCP/IP OPTION |
| 15 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |

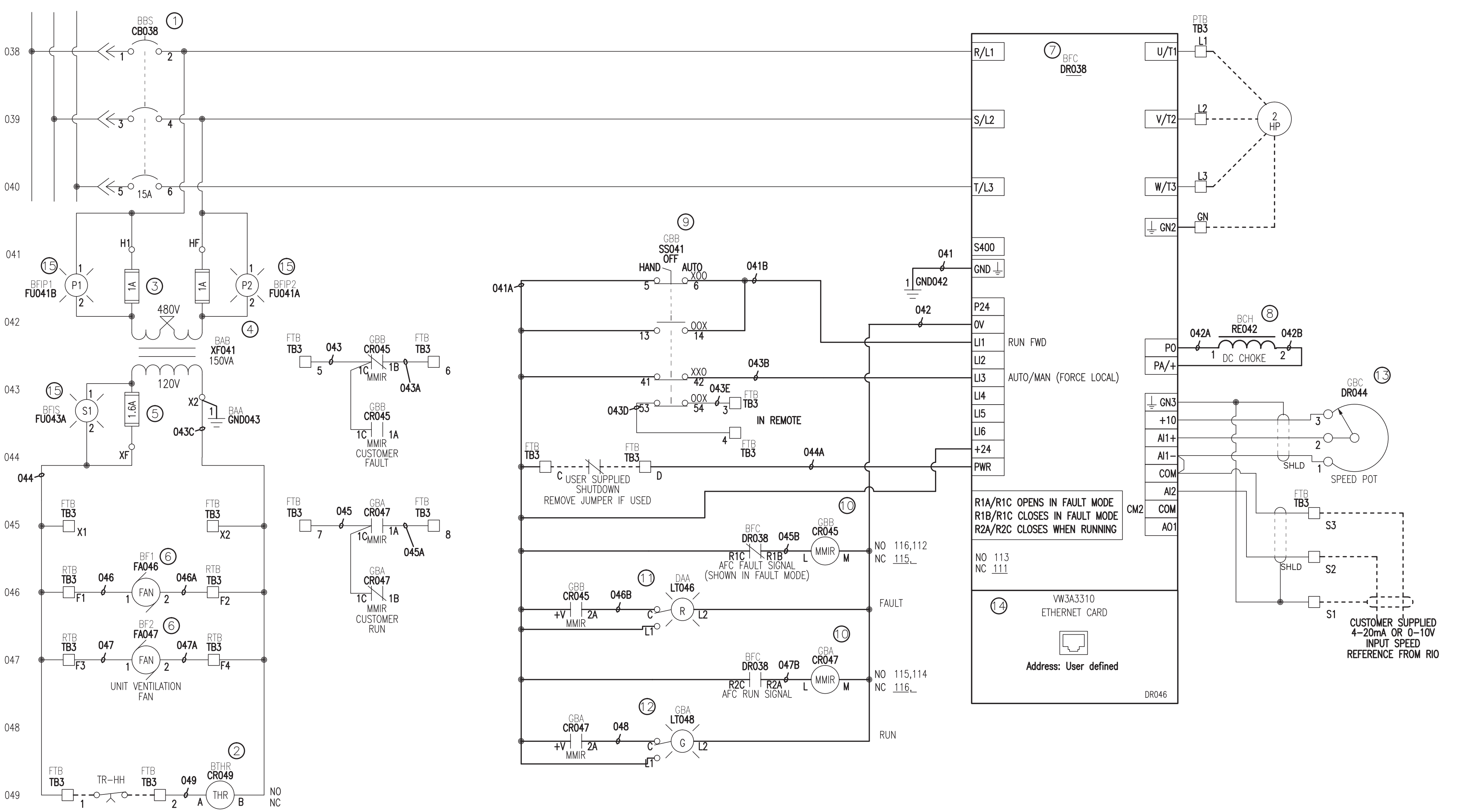
ATV 61-VT-No Bypass - HAND/OFF/AUTO SW

| MENU | No. | SUB-MENU | DESCRIPTION | CODE | ADJ. | |
|---|---|---|---|---|---|---|
| LAC | 2 | ---- | ACCESS LEVEL | LAC | EPr | 1 |
| drC | 1.4 | ---- | POWER IDENTIFICATION | Prt | IP00 | 1,2 |
| SIM | 1.1 | ---- | 2/3 WIRE CONTROL | tCC | 2C | 2 |
| SIM | 1.1 | ---- | MACRO CONFIGURATION | CFG | PnF | 2 |
| SIM | 1.1 | ---- | STANDARD MOT. FREQ. | bFr | 60 | |
| I-O | 1.5 | ---- | 2 WIRE TYPE | tCt | LEL | |
| I-O | 1.5 | AI2 CONFIGURATION | AI2 MIN. VALUE | CrL2 | 4 | |
| I-O | 1.5 | R2 CONFIGURATION | R2 ASSIGNMENT | r2 | rUn | |
| CtL | 1.6 | ---- | REF. 1 CHAN | Fr1 | AI2 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL ASSIGN. | FLO | LI3 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL REF. | FLOC | AI1 | |

[1] Frame 2-8, 230V & 460V ONLY, [2] Hold for 3 Sec.

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-03 | PG 1 OF 2 REV A |

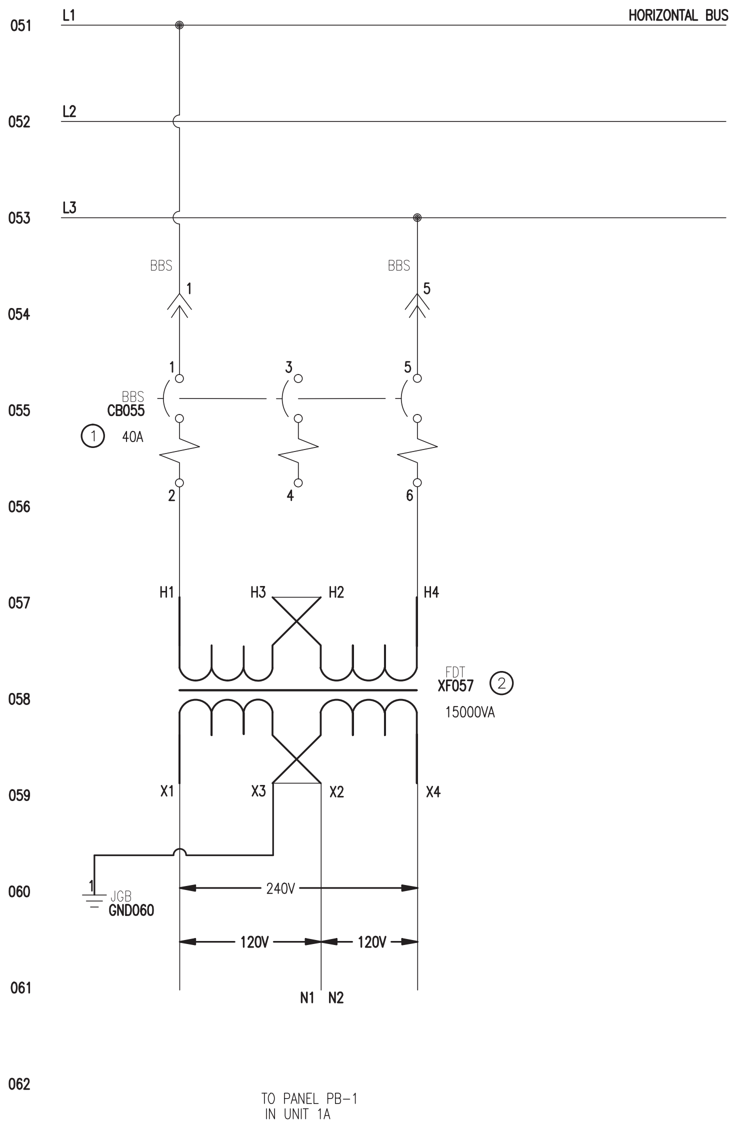
| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/-- | - | ---- | -- | --/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |

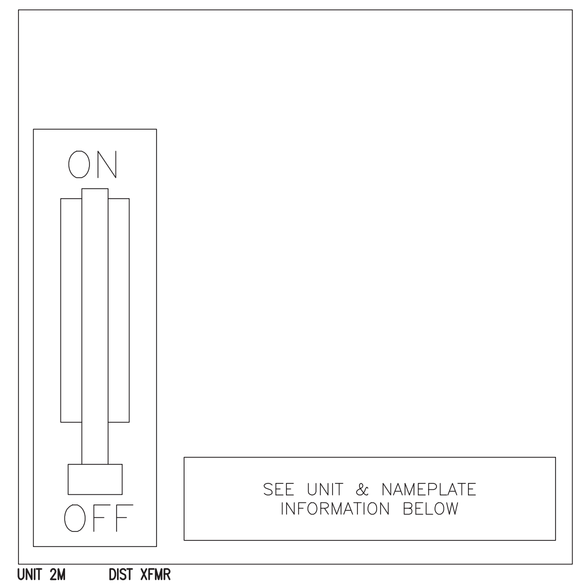



| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-03 | PG 2 OF 2 REV A |

| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |

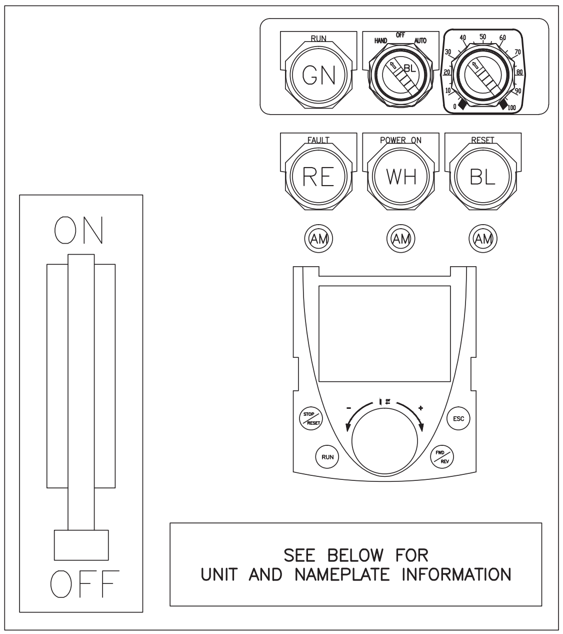
| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | HJL36040 | POWERPACT H-FRAME TM CIRCUIT BREAKER 40A |
| 2 | EE15S3HCUOC | 1PH TRANSFORMER, CLASS 7400, TYPE EE |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-04 | PG 1 OF 1 REV A |

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 |




UNIT 3A WET WELL PUMP P-101

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | JLL36175 | POWERPACT J-FRAME TM CIRCUIT BREAKER 175A |
| 2 | RL08002 | MTE LINE REACTOR |
| 3 | FNQ-R-1 6/10 | FUSE - CLASS CC |
| 4 | 9070T300D1 | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 5 | FNQ-R-3 2/10 | FUSE - CLASS CC |
| 6 | 028316 | MUFFIN XL AC - MX2A3 115VAC FAN |
| 7 | HTV61HD37N4 | ALTIVAR 61 VARIABLE TORQUE DRIVE 60 HP |
| 8 | 8501KUD13P14V53 | PLUG-IN RELAY TYPE KU WITH PILOT LIGHT |
| 9 | 9001-KS42BH75 | SELECTOR SW - 3 POS MAINT, NEMA 4/13 |
| 10 | 8044224750 | MCC, MMIR 24VDC RELAY MOD. KIT |
| 11 | KT38LRR31Y238 | RED LED PILOT LIGHT - PRESS TO TEST |
| 12 | KT38LGG31Y238 | GREEN LED PILOT LIGHT - PRESS TO TEST |
| 13 | 9001K2106 | POTENTIOMETER 2.5KOHM 2W 30MM |
| 14 | VW3A3310 | MODBUS TCP/IP OPTION |
| 15 | KP1W31 | WHITE PILOT LIGHT - STANDARD, NEMA 4/13 |
| 16 | 8501KP13P14V20 | PLUG-IN RELAY TYPE KP WITH PILOT LIGHT |
| 17 | 8501XLV02 | RELAY MECH. LATCH (PROVIDED BY PUMP SUPPLIER) |
| 18 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 19 | KR7BH5 | PUSH BUTTON - MOMENTARY, NEMA 4/13 |

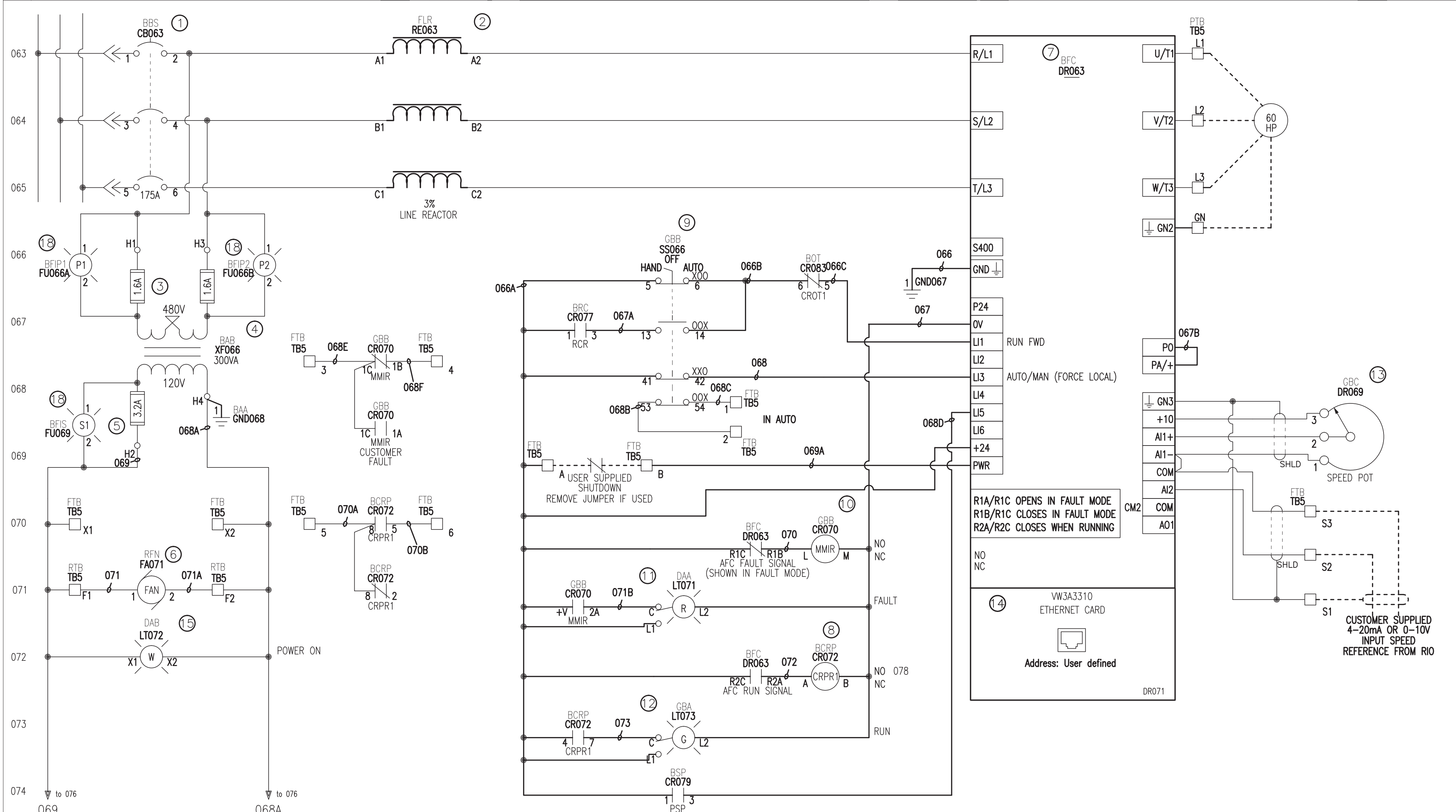
ATV 61-VT-No Bypass - HAND/OFF/AUTO SW

| MENU | No. | SUB-MENU | DESCRIPTION | CODE | ADJ. | |
|---|---|---|---|---|---|---|
| LAC | 2 | ---- | ACCESS LEVEL | LAC | EPr | 1 |
| drC | 1.4 | ---- | POWER IDENTIFICATION | Prt | IP00 | 1,2 |
| SIM | 1.1 | ---- | 2/3 WIRE CONTROL | tCC | 2C | 2 |
| SIM | 1.1 | ---- | MACRO CONFIGURATION | CFG | PnF | 2 |
| SIM | 1.1 | ---- | STANDARD MOT. FREQ. | bFr | 60 | |
| I-O | 1.5 | ---- | 2 WIRE TYPE | tCt | LEL | |
| I-O | 1.5 | AI2 CONFIGURATION | AI2 MIN. VALUE | CrL2 | 4 | |
| I-O | 1.5 | R2 CONFIGURATION | R2 ASSIGNMENT | r2 | rUn | |
| CtL | 1.6 | ---- | REF. 1 CHAN | Fr1 | AI2 | |
| FUn | 1.7 | PRESET SPEEDS | 2 PRESET SPEEDS | PS2 | LI5 | |
| FUn | 1.7 | PRESET SPEEDS | PRESET SPEED 2 | SP2 | 60.0 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL ASSIGN. | FLO | LI3 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL REF. | FLOC | AI1 | |

[1] Frame 2-8, 230V & 460V ONLY, [2] Hold for 3 Sec.

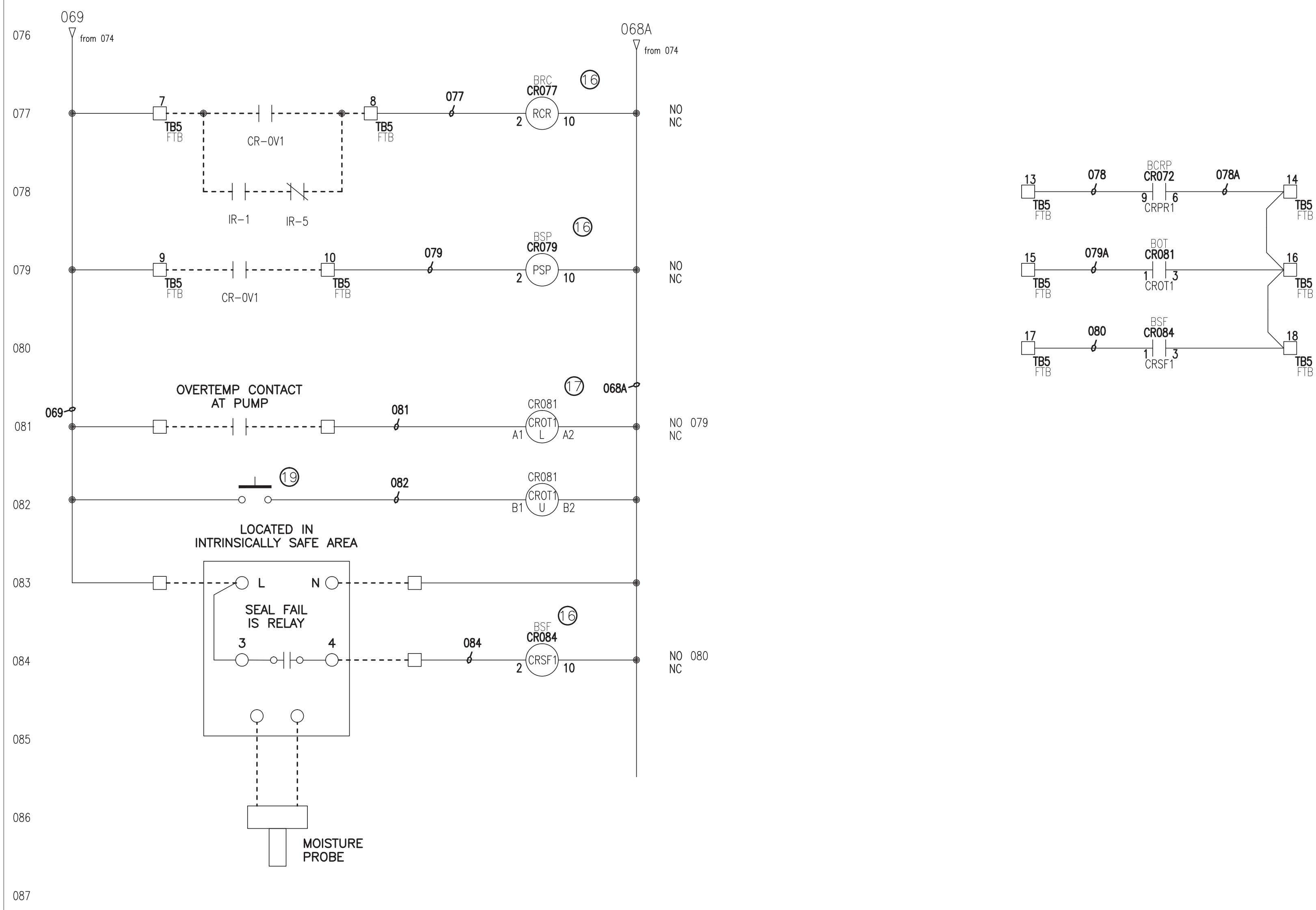
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-05 | PG 1 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | – | ---- | -- | --/-- | – | ---- | -- | --/-- |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-05 | PG 2 OF 3 REV A |

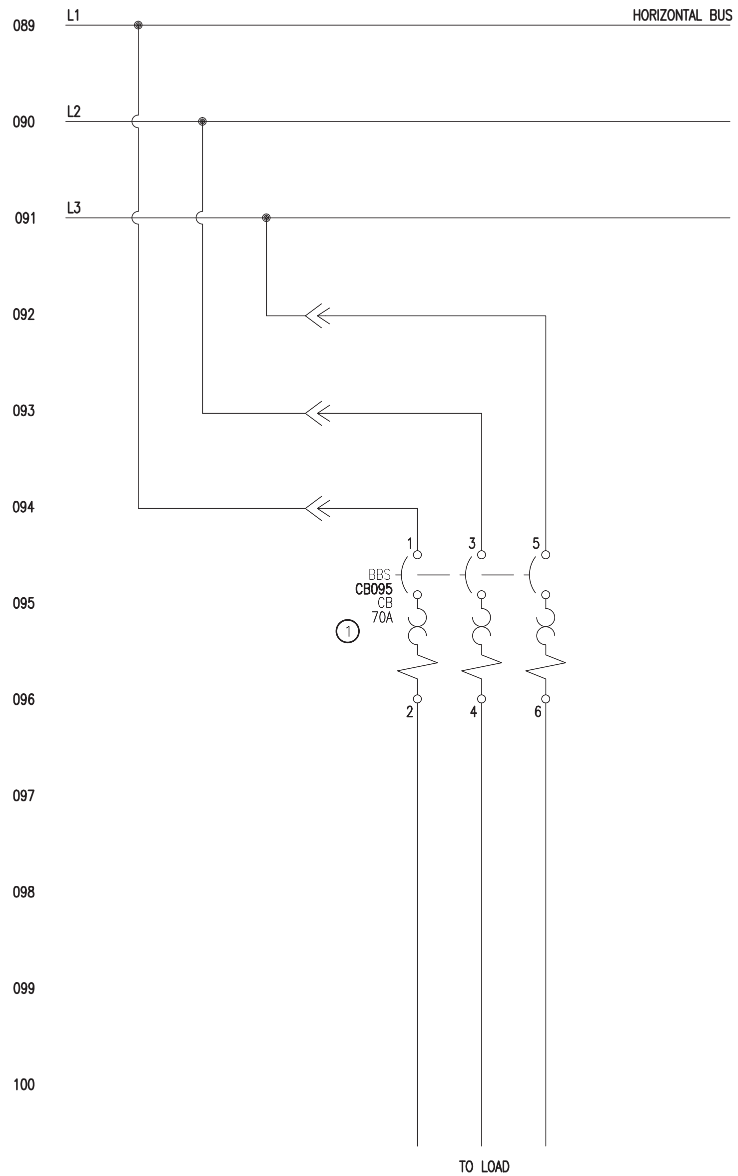
| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/-- | - | ---- | -- | --/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |

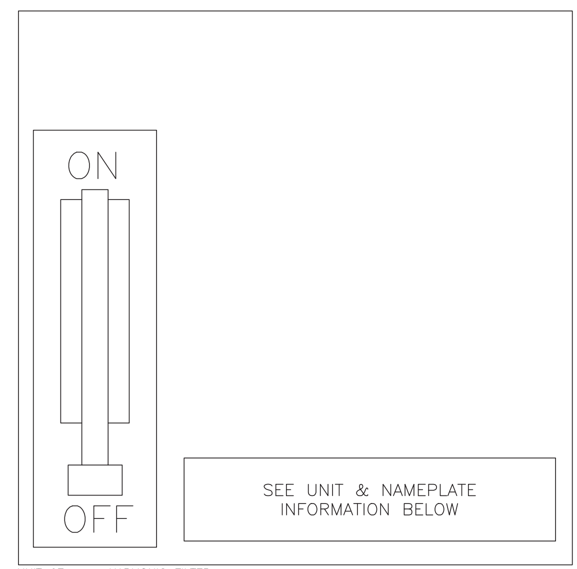



| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-05 | PG 3 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | HJL36070 | POWERPACT H-FRAME TM CIRCUIT BREAKER 70A |

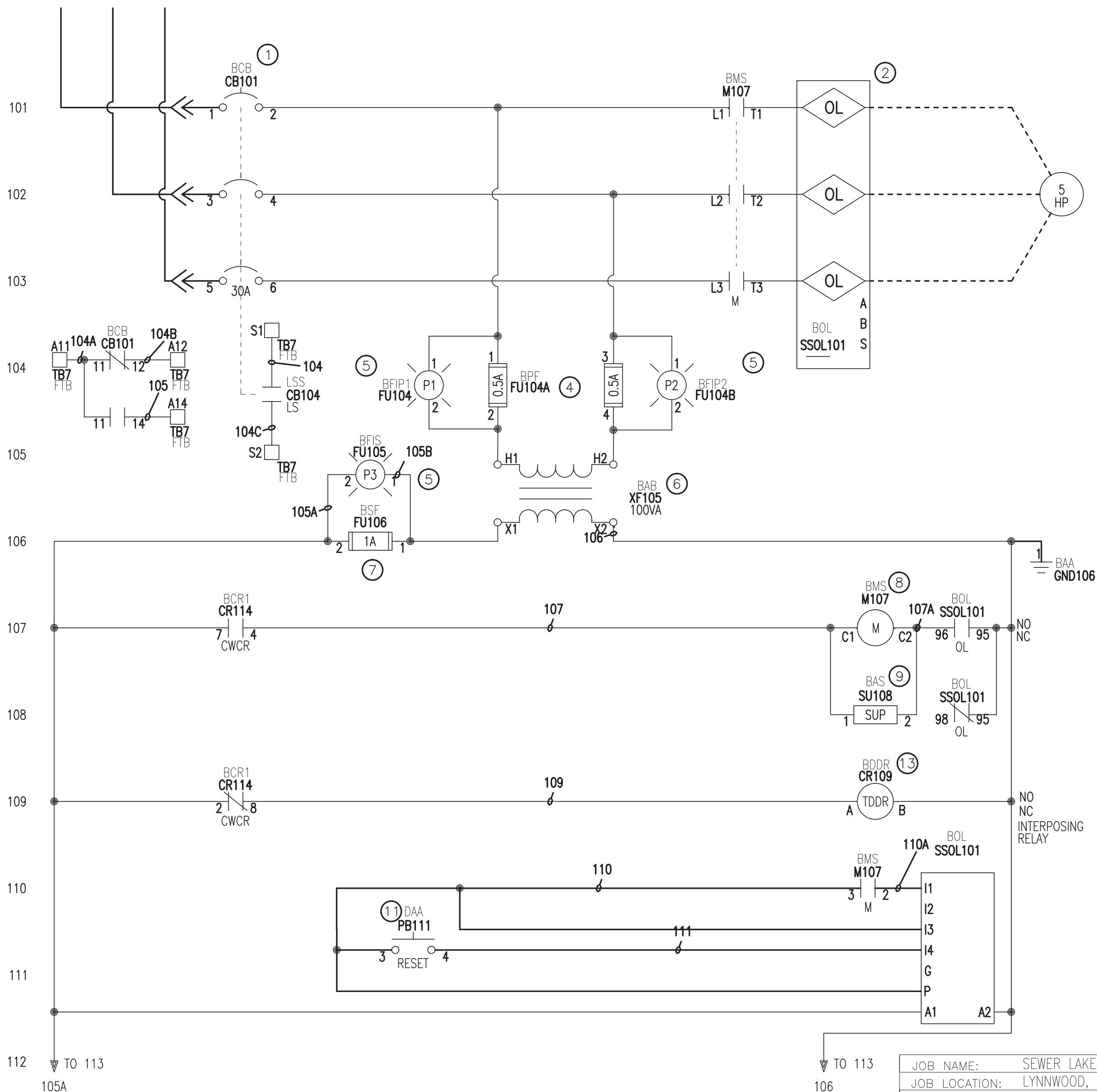



UNIT 6E HARMONIC FILTER

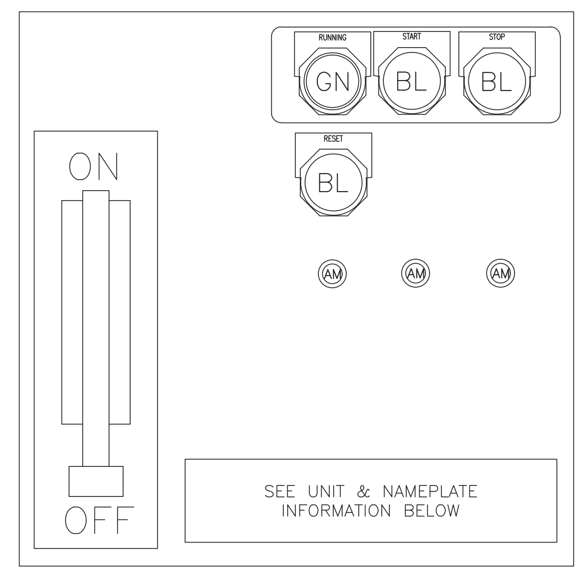
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-06 | PG 1 OF 1 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |
| | | | | A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- |




USE RING TONGUE TERMINALS WHERE POSSIBLE

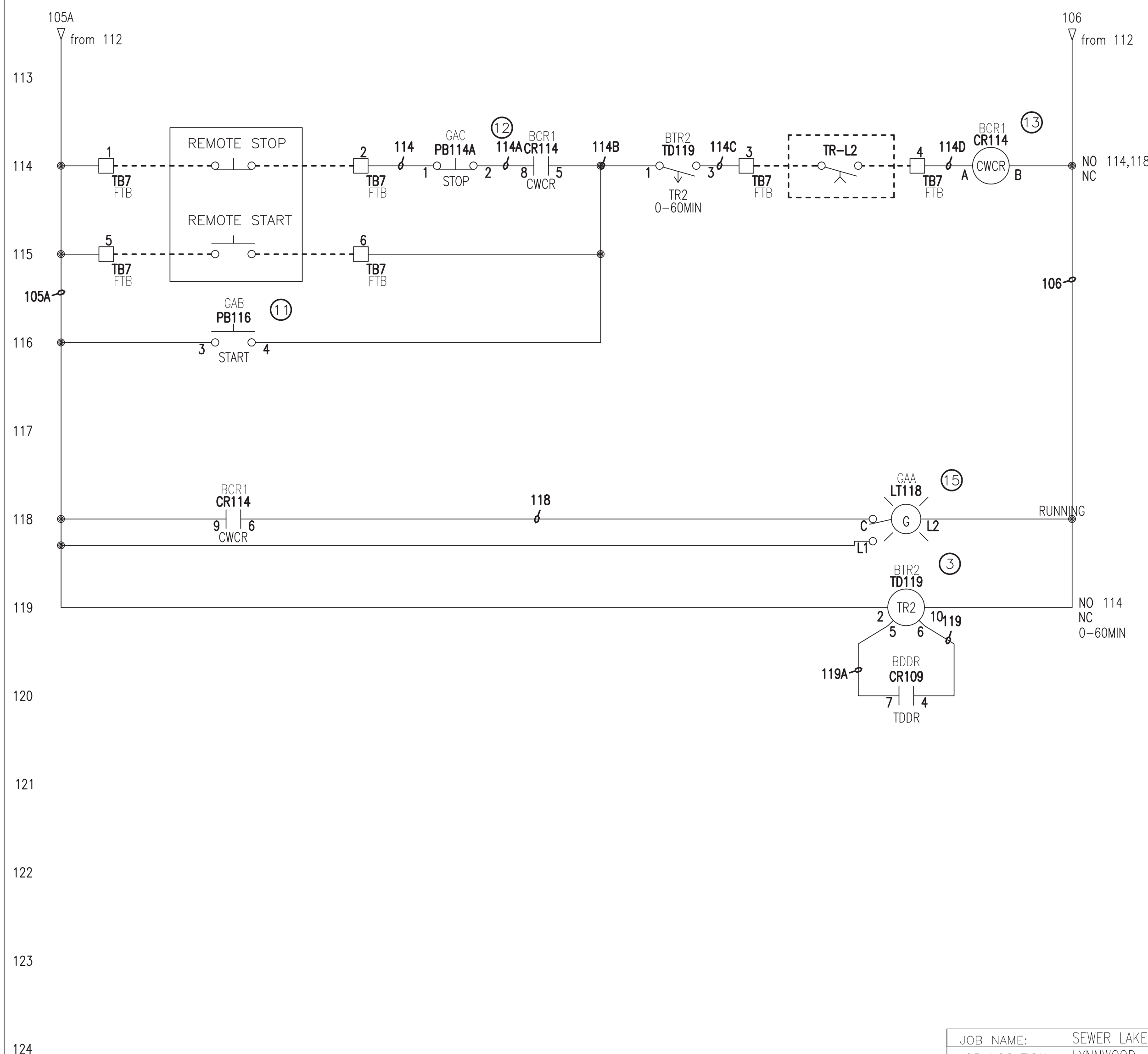
| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | HJL36030M71AA | POWERPACT H-FRAME MCP CIRCUIT BREAKER 30A W/AUX SWITCH |
| 2 | 9065SP2B6 | MOTORLOGIC PLUS 2 OVERLOAD 0.5–2.3A (H50) (INC. W/ STARTER) |
| 3 | 9050JCK70V20 | PLUG-IN MULTI-FUNCTION TIMER, GENERAL PURPOSE |
| 4 | FNQ-R-1/2 | FUSE – CLASS CC |
| 5 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 6 | 9070EL2D9B | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 7 | FRN-R-1 | DUAL ELEMENT FUSE –CLASS RK5 |
| 8 | 8536-SCO3V02H52S | MOTORLOGIC PLUS 2 SIZE 1 FVNR 6.0–27.0A 120V |
| 9 | 9999ST1 | TRANSIENT SUP SIZE 1–2 |
| 11 | KR1BH5 | PUSH BUTTON – MOMENTARY, NEMA 4/13 |
| 12 | KR1BH6 | PUSH BUTTON – MOMENTARY, NEMA 4/13 |
| 13 | 8501KU13P14V20 | PLUG-IN RELAY TYPE KU W/ PILOT LIGHT |
| 14 | KT38LGG31Y238 | GREEN LED PILOT LIGHT – PRESS TO TEST |




UNIT 6I WASHDOWN WATER PUMP P-204

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAMS |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-07 | PG 1 OF 2 REV A |

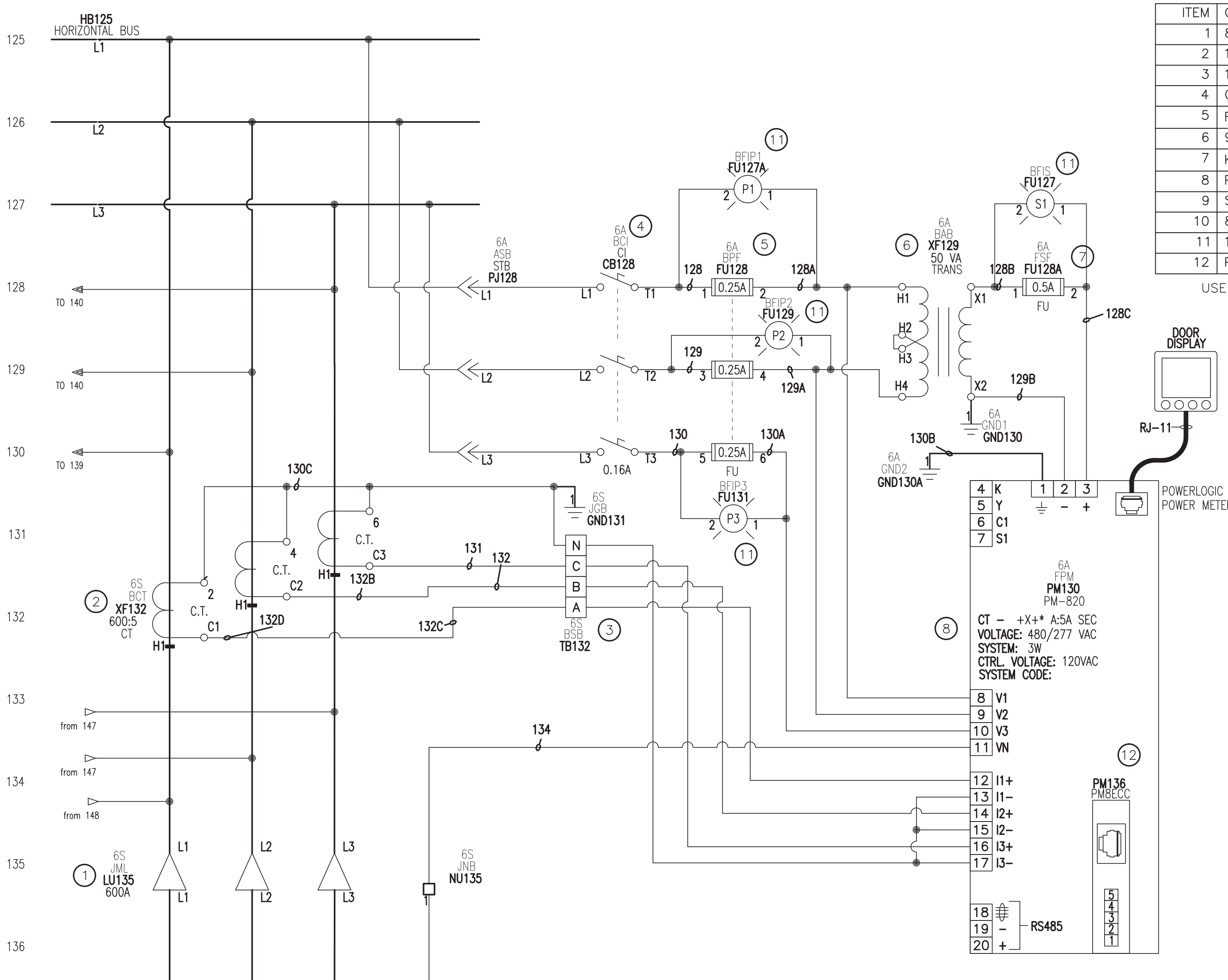
| REV | DESCRIPTION | BY | DATE | – | ---- | -- | --/--/-- | – | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| – | ---- | -- | --/--/-- | A | RESUBMITTAL | DJO | 04/08/2009 | – | ---- | -- | --/--/-- |




USE RING TONGUE TERMINALS WHERE POSSIBLE

| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAMS |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-07 | PG 2 OF 2 REV A |

| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |

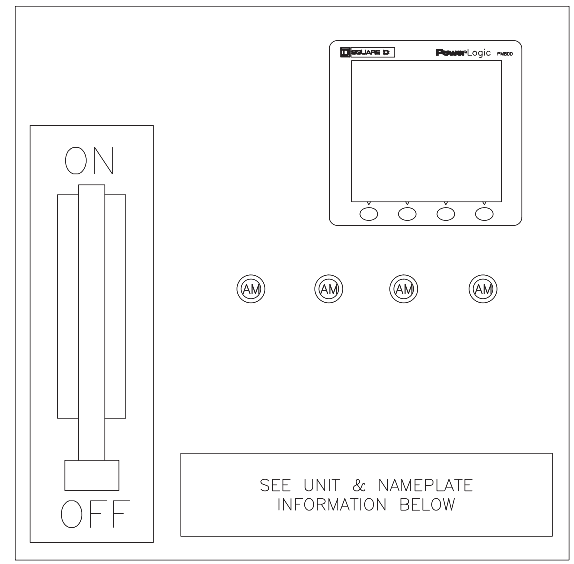



L1 L2 L3 N

INCOMING POWER

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | 80456-806-50 | BOTTOM INCOMING MAIN LUG 600A |
| 2 | 180R601 | CURRENT TRANSFORMER MODEL 180R |
| 3 | 1504SC | 4 POLE SHORT CIRCUIT TERMINAL BLOCK |
| 4 | GV2ME01 | IEC MANUAL STARTER 600VAC |
| 5 | FNQ-R-1/4 | FUSE – CLASS CC |
| 6 | 9070T50D1 | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 7 | KTK-R-1/2 | FUSE – CLASS CC |
| 8 | PM850RD | PM850 POWER METER WITH REMOTE DISPLAY |
| 9 | SDSA3650 | LIGHTING ARRESTOR |
| 10 | 8430MPSV29 | PHASE FAILURE RELAY |
| 11 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 12 | PM8ECC | PM800 SERIES ETHERNET COMMUNICATIONS BOARD |

USE RING TONGUE TERMINALS WHERE POSSIBLE

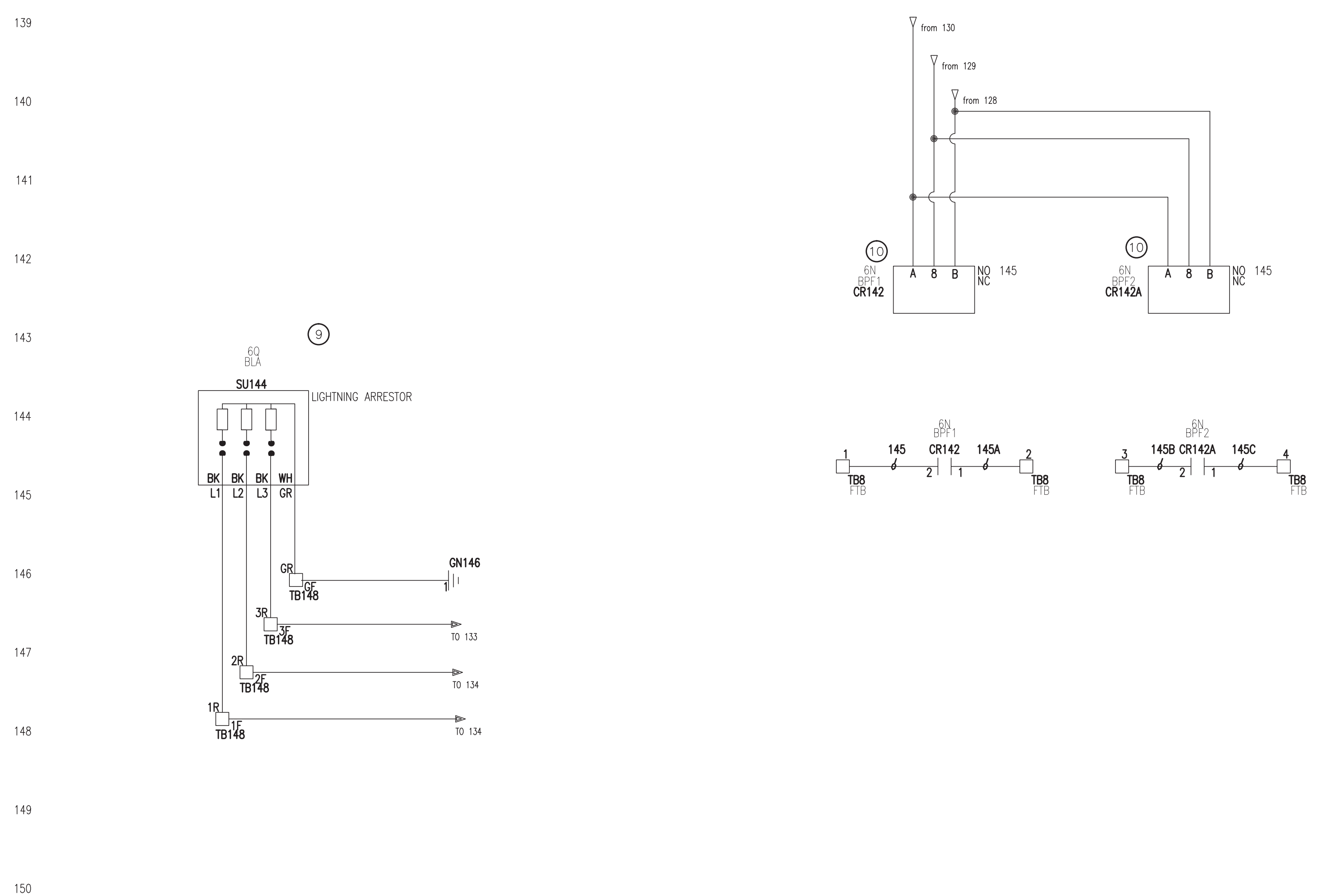



UNIT 6A
UNIT 6S

MONITORING UNIT FOR MAIN MAIN LUGS

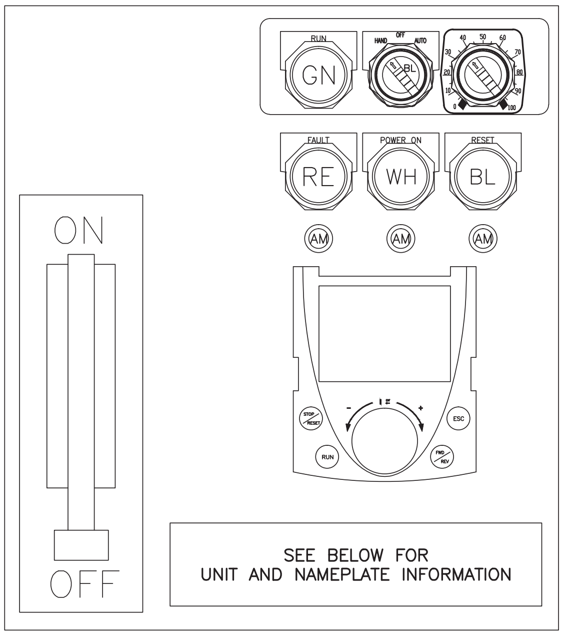
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-08 | PG 1 OF 2 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/--/-- | - | ---- | -- | --/--/-- |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-08 | PG 2 OF 2 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |




UNIT 4A WET WELL PUMP P-102

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | JLL36175 | POWERPACT J-FRAME TM CIRCUIT BREAKER 175A |
| 2 | RL08002 | MTE LINE REACTOR |
| 3 | FNQ-R-1 6/10 | FUSE - CLASS CC |
| 4 | 9070T300D1 | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 5 | FNQ-R-3 2/10 | FUSE - CLASS CC |
| 6 | 028316 | MUFFIN XL AC - MX2A3 115VAC FAN |
| 7 | HTV61HD37N4 | ALTIVAR 61 VARIABLE TORQUE DRIVE 60 HP |
| 8 | 8501KUD13P14V53 | PLUG-IN RELAY TYPE KU WITH PILOT LIGHT |
| 9 | 9001-KS42BH75 | SELECTOR SW - 3 POS MAINT, NEMA 4/13 |
| 10 | 8044224750 | MCC, MMIR 24VDC RELAY MOD. KIT |
| 11 | KT38LRR31Y238 | RED LED PILOT LIGHT - PRESS TO TEST |
| 12 | KT38LGG31Y238 | GREEN LED PILOT LIGHT - PRESS TO TEST |
| 13 | 9001K2106 | POTENTIOMETER 2.5KOHM 2W 30MM |
| 14 | VW3A3310 | MODBUS TCP/IP OPTION |
| 15 | KP1W31 | WHITE PILOT LIGHT - STANDARD, NEMA 4/13 |
| 16 | 8501KP13P14V20 | PLUG-IN RELAY TYPE KP WITH PILOT LIGHT |
| 17 | 8501XLV02 | RELAY, MECH. LATCH (PROVIDED BY PUMP SUPPLIER) |
| 18 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 19 | KR7BH5 | PUSH BUTTON - MOMENTARY, NEMA 4/13 |

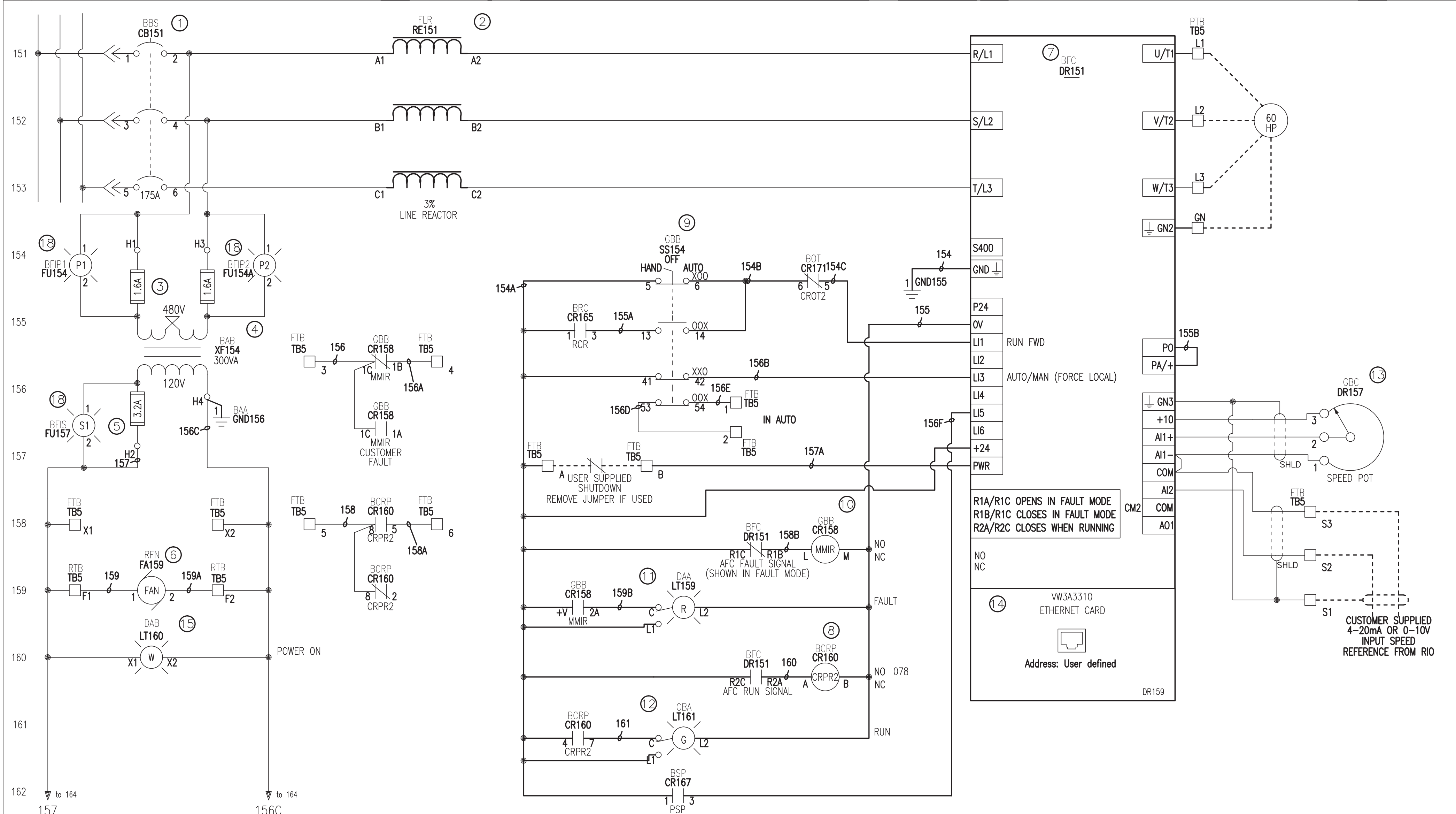
ATV 61-VT-No Bypass - HAND/OFF/AUTO SW

| MENU | No. | SUB-MENU | DESCRIPTION | CODE | ADJ. | |
|---|---|---|---|---|---|---|
| LAC | 2 | ---- | ACCESS LEVEL | LAC | EPr | 1 |
| drC | 1.4 | ---- | POWER IDENTIFICATION | Prt | IP00 | 1,2 |
| SIM | 1.1 | ---- | 2/3 WIRE CONTROL | tCC | 2C | 2 |
| SIM | 1.1 | ---- | MACRO CONFIGURATION | CFG | PnF | 2 |
| SIM | 1.1 | ---- | STANDARD MOT. FREQ. | bFr | 60 | |
| I-O | 1.5 | ---- | 2 WIRE TYPE | tCt | LEL | |
| I-O | 1.5 | AI2 CONFIGURATION | AI2 MIN. VALUE | CrL2 | 4 | |
| I-O | 1.5 | R2 CONFIGURATION | R2 ASSIGNMENT | r2 | rUn | |
| CtL | 1.6 | ---- | REF. 1 CHAN | Fr1 | AI2 | |
| FUn | 1.7 | PRESET SPEEDS | 2 PRESET SPEEDS | PS2 | LI5 | |
| FUn | 1.7 | PRESET SPEEDS | PRESET SPEED 2 | SP2 | 60.0 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL ASSIGN. | FLO | LI3 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL REF. | FLOC | AI1 | |

[1] Frame 2-8, 230V & 460V ONLY, [2] Hold for 3 Sec.

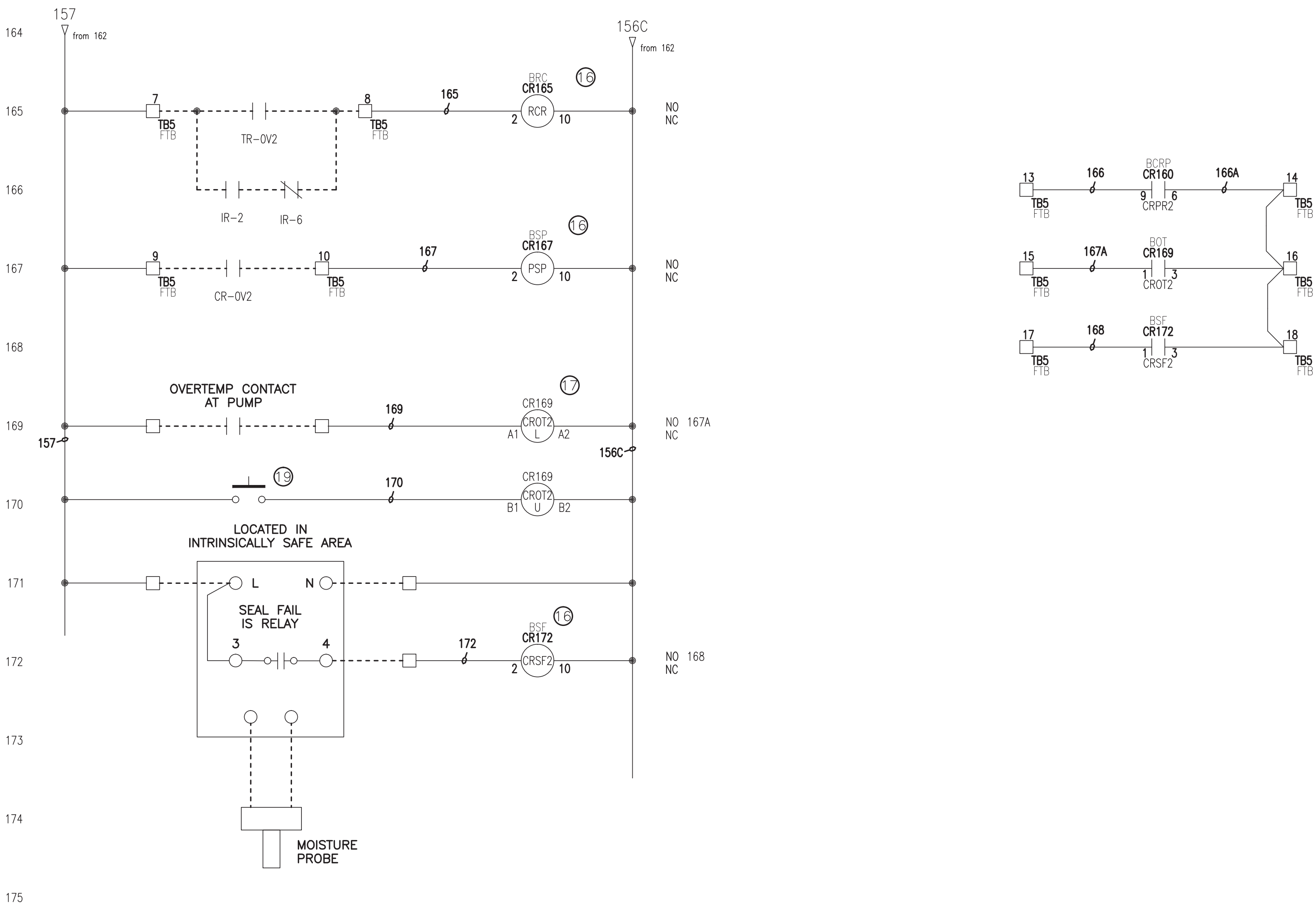
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-09 | PG 1 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-09 | PG 2 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | – | ---- | -- | --/-- | – | ---- | -- | --/-- |

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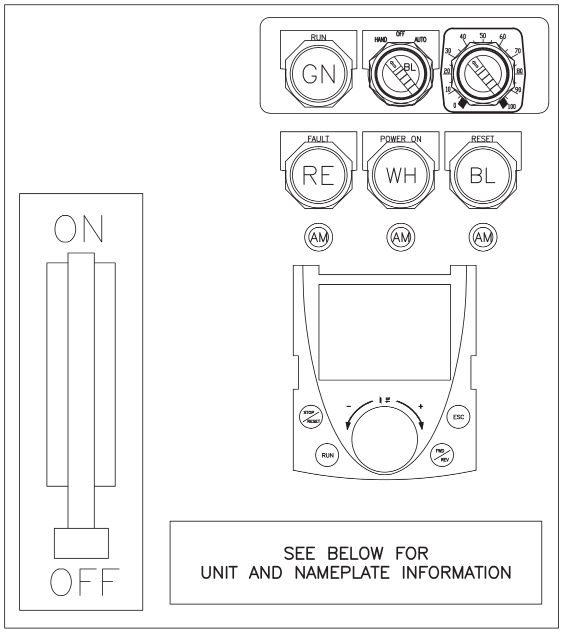
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-09 | PG 3 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |




SEE BELOW FOR
UNIT AND NAMEPLATE INFORMATION

UNIT 5A WET WELL PUMP P-103

| ITEM | CATALOG | DESCRIPTION |
|---|---|---|
| 1 | JLL36175 | POWERPACT J-FRAME TM CIRCUIT BREAKER 175A |
| 2 | RL08002 | MTE LINE REACTOR |
| 3 | FNQ-R-1 6/10 | FUSE - CLASS CC |
| 4 | 9070T300D1 | INDUSTRIAL CONTROL TRANSFORMER, CLASS 9070 |
| 5 | FNQ-R-3 2/10 | FUSE - CLASS CC |
| 6 | 028316 | MUFFIN XL AC - MX2A3 115VAC FAN |
| 7 | HTV61HD37N4 | ALTIVAR 61 VARIABLE TORQUE DRIVE 60 HP |
| 8 | 8501KUD13P14V53 | PLUG-IN RELAY TYPE KU WITH PILOT LIGHT |
| 9 | 9001-KS42BH75 | SELECTOR SW - 3 POS MAINT, NEMA 4/13 |
| 10 | 8044224750 | MCC, MMIR 24VDC RELAY MOD. KIT |
| 11 | KT38LRR31Y238 | RED LED PILOT LIGHT - PRESS TO TEST |
| 12 | KT38LGG31Y238 | GREEN LED PILOT LIGHT - PRESS TO TEST |
| 13 | 9001K2106 | POTENTIOMETER 2.5KOHM 2W 30MM |
| 14 | VW3A3310 | MODBUS TCP/IP OPTION |
| 15 | KP1W31 | WHITE PILOT LIGHT - STANDARD, NEMA 4/13 |
| 16 | 8501KP13P14V20 | PLUG-IN RELAY TYPE KP WITH PILOT LIGHT |
| 17 | 8501XLV02 | RELAY MECH. LATCH (PROVIDED BY PUMP SUPPLIER) |
| 18 | 1030D3 | AMBER 125V LED BLOWN FUSE INDICATOR |
| 19 | KR7BH5 | PUSH BUTTON - MOMENTARY, NEMA 4/13 |

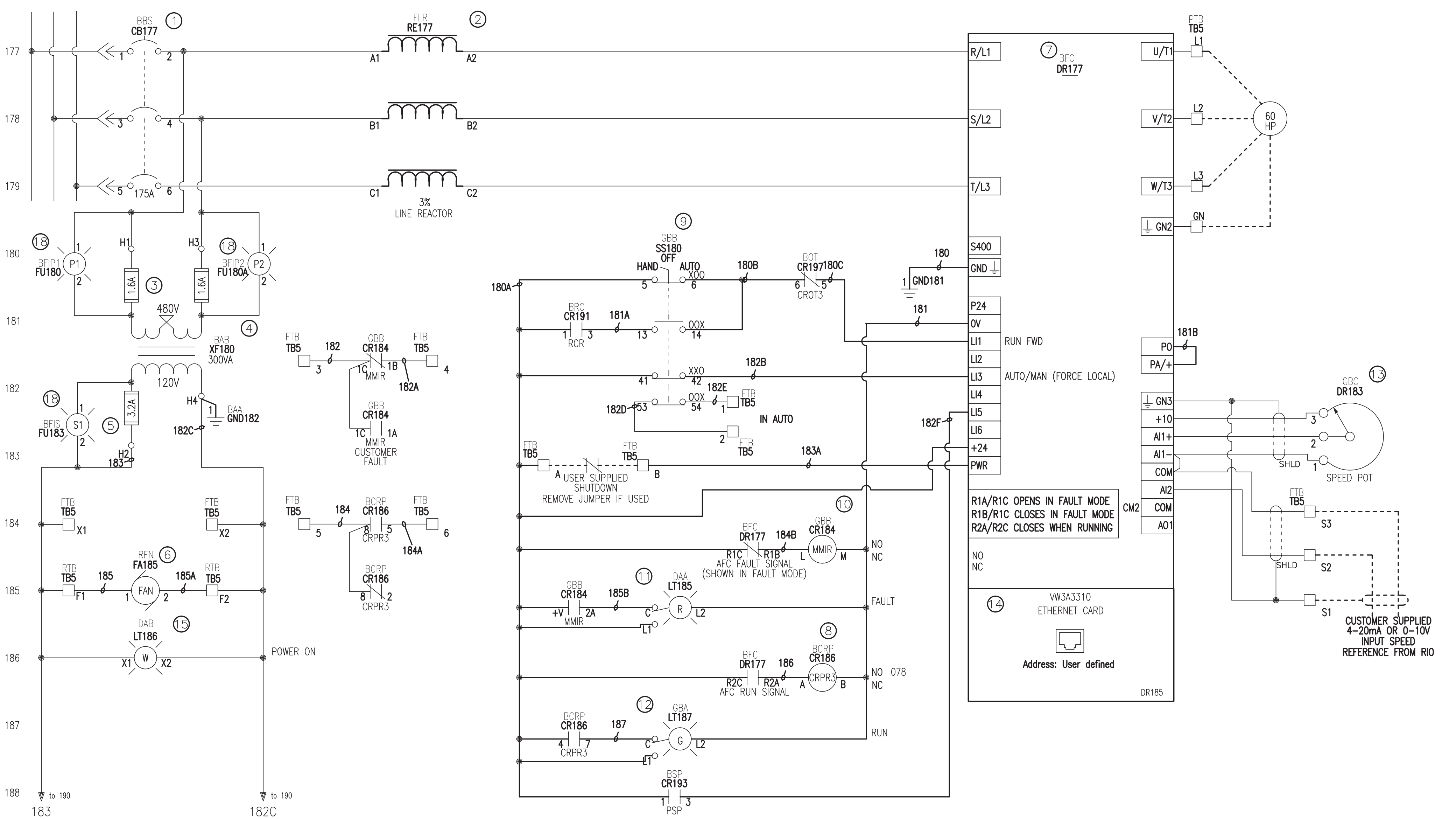
**ATV 61-VT-No Bypass - HAND/OFF/AUTO SW**

| MENU | No. | SUB-MENU | DESCRIPTION | CODE | ADJ. | |
|---|---|---|---|---|---|---|
| LAC | 2 | ---- | ACCESS LEVEL | LAC | EPr | 1 |
| drC | 1.4 | ---- | POWER IDENTIFICATION | Prt | IP00 | 1,2 |
| SIM | 1.1 | ---- | 2/3 WIRE CONTROL | tCC | 2C | 2 |
| SIM | 1.1 | ---- | MACRO CONFIGURATION | CFG | PnF | 2 |
| SIM | 1.1 | ---- | STANDARD MOT. FREQ. | bFr | 60 | |
| I-O | 1.5 | ---- | 2 WIRE TYPE | tCt | LEL | |
| I-O | 1.5 | AI2 CONFIGURATION | AI2 MIN. VALUE | CrL2 | 4 | |
| I-O | 1.5 | R2 CONFIGURATION | R2 ASSIGNMENT | r2 | rUn | |
| CtL | 1.6 | ---- | REF. 1 CHAN | Fr1 | AI2 | |
| FUn | 1.7 | PRESET SPEEDS | 2 PRESET SPEEDS | PS2 | LI5 | |
| FUn | 1.7 | PRESET SPEEDS | PRESET SPEED 2 | SP2 | 60.0 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL ASSIGN. | FLO | LI3 | |
| COM | 1.9 | FORCED LOCAL | FORCED LOCAL REF. | FLOC | AI1 | |

[1] Frame 2-8, 230V & 460V ONLY, [2] Hold for 3 Sec.

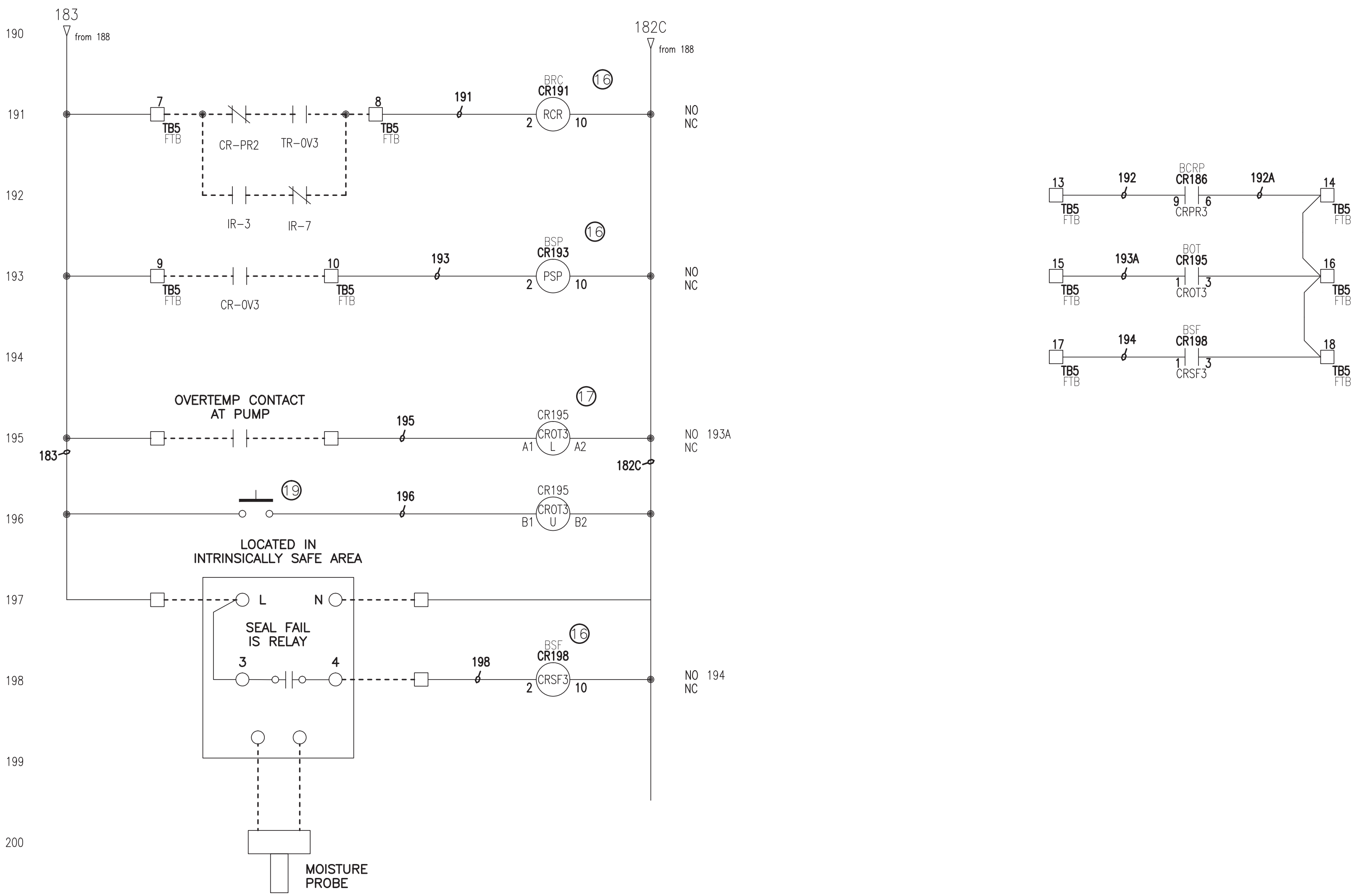
| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | | SQUARE D Schneider Electric |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-10 | PG 1 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | - | ---- | -- | --/-- | - | ---- | -- | --/-- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | - | ---- | -- | --/-- | - | ---- | -- | --/-- |




| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
|---|---|---|---|
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
| ENGR: | DAVID O'CONNOR | SQUARE D Schneider Electric | |
| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-10 | PG 2 OF 3 REV A |

| REV | DESCRIPTION | BY | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | RESUBMITTAL | DJO | 04/08/2009 | – | –––– | –– | ––/–– | – | –––– | –– | ––/–– |




| | | | |
|---|---|---|---|
| JOB NAME: | SEWER LAKE LINE P.S.#4 REPL. | EQUIPMENT DESIGNATION: | MCC-1 |
| JOB LOCATION: | LYNNWOOD, WA | EQUIPMENT TYPE: | MODEL 6 MOTOR CONTROL CENTER |
| DRAWN BY: | T.ROSIER | DRAWING TYPE: | ELEMENTARY DIAGRAM |
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| DATE: | APRIL 08, 2009 | | |
| DRAWING STATUS: | APPROVAL RESUBMITTAL | DWG# E26200178-002-10 | PG 3 OF 3 REV A |

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## PUMP STATION 4 CONTROL PANEL DRAWINGS

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# DRAWING INDEX

| DRAWING | DESCRIPTION |
|---|---|
| STDS_01 | DRAWING SYMBOLS & STANDARDS – ELECTRICAL SYMBOLS & ENCLOSURE SPECIFICATIONS |
| CP1–J01 | PUMP STATION No.4 – RTU CONTROL PANEL – CP–1 – PANEL LAYOUT |
| CP1–P01 | PUMP STATION No.4 – RTU CONTROL PANEL – CP–1 – AC/DC POWER DISTRIBUTION WIRING DIAGRAM |
| CP1–E01 | PUMP STATION No.4 – RTU CONTROL PANEL – CP–1 – CONTROL WIRING DIAGRAM |
| CP1–E02 | PUMP STATION No.4 – WETWELL FLOAT CONTROL – CONTROL WIRING DIAGRAM |
| CP1–E03 | PUMP STATION No.4 – PUMP CHECK VALVES STATUS & FLOAT CONTROL – CONTROL WIRING DIAGRAM |
| CP1–E04 | PUMP STATION No.4 – BUILDING INTRUSION & PHASE FAIL – CONTROL WIRING DIAGRAM |
| CP1–E05 | PUMP STATION No.4 – BUILDING INTRUSION & PHASE FAIL – CONTROL WIRING DIAGRAM |
| CP1–E06 | PUMP STATION No.4 – ANALOG INPUT MODULE – MODULE 1 – CONTROL WIRING DIAGRAM |
| CP1–E07 | PUMP STATION No.4 – DISCRETE I/O BASE – MODULE 2 – INPUT CONTROL WIRING DIAGRAM |
| CP1–E08 | PUMP STATION No.4 – DISCRETE I/O BASE – MODULE 2 – OUTPUT CONTROL WIRING DIAGRAM |
| CP1–E09 | PUMP STATION No.4 – DISCRETE I/O BASE – MODULE 3 – INPUT CONTROL WIRING DIAGRAM |
| CP1–E10 | PUMP STATION No.4 – DISCRETE I/O BASE – MODULE 3 – OUTPUT CONTROL WIRING DIAGRAM |
| CP1–E11 | PUMP STATION No.4 – DISCRETE I/O BASE – MODULE 4 – CONTROL WIRING DIAGRAM |
| CP2–J01 | PUMP STATION No.4 – PUMP STATION CONTROL PEDESTAL – CP–2 – PANEL LAYOUT |
| CP3–J01 | PUMP STATION No.4 – REMOTE CONTROL PANEL – CP–3 – PANEL LAYOUT |
| CP4–J01 | PUMP STATION No.4 – INTRINSICALLY SAFE BOX – CP–4 – PANEL LAYOUT |
| CP4–E01 | PUMP STATION No.4 – INTRINSICALLY SAFE BOX – CP–4 – CONTROL WIRING DIAGRAM |
| CGD–E01 | PUMP STATION No.4 – COMBUSTIBLE GAS DETECTOR PANEL – CP–CGD – CONTROL WIRING DIAGRAM |
| B01 | PUMP STATION No.4 – NETWORK DIAGRAM |

NOTES:
1. SITE ADDRESS – 2237 SE 60TH AVE, MERCER ISLAND, WA 98040
2. CONTACT – JEFF W/ DALTON ELEC. 206–920–5712

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS–BUILT / JC | 6/29/10 |
| | SHOP AS–BUILT / AZ | 9/9/09 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

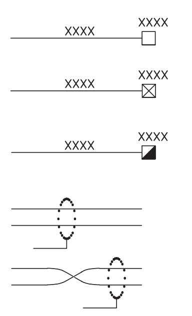
Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775–5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: AZ
CITY OF MERCER ISLAND

PUMP STATION No.4
DRAWING INDEX

DATE: 9 SEP 09
JOB NO.: 7189
DWG. NO.: INDEX
REV.: C

## TERMINAL AND WIRING IDENTIFICATION




- DC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)
- AC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)
- 277 OR HIGHER AC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)
- SHIELDED WIRE
- TWISTED SHIELDED WIRE

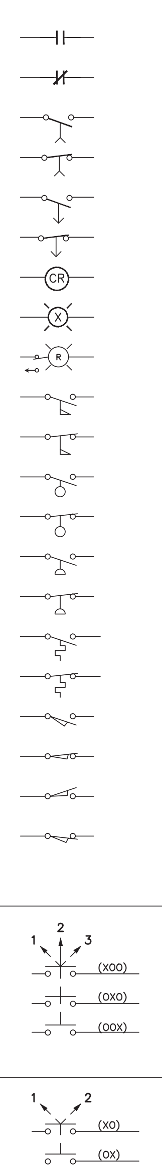
## CONTROL WIRE SPECIFICATION – (UL508A STANDARD)

| APPLICATION | COLOR | SIZE / TYPE |
|---|---|---|
| 480 VAC:<br>POWER<br>NEUTRAL<br>GROUND | LOCAL CODE<br>LOCAL CODE<br>LOCAL CODE | Min. 12 AWG AS REQUIRED MTW/TEW (TINNED) |
| 240 VAC:<br>POWER<br>NEUTRAL<br>GROUND | BLACK<br>WHITE<br>GREEN | 12 GA MTW/TEW (TINNED) |
| 120 VAC:<br>POWER<br>NEUTRAL<br>GROUND | RED<br>WHITE<br>GREEN | 14 AWG (Min) MTW/TEW (TINNED) |
| 24 VDC:<br>POSITIVE<br>NEGATIVE | BLUE<br>WHITE/BLUE | 16 AWG (Min) MTW/TEW (TINNED) |
| 12 VDC:<br>POSITIVE<br>NEGATIVE | BLUE<br>WHITE/BLUE | 16 AWG (Min) MTW/TEW (TINNED) |
| 120 VAC FOREIGN:<br>POWER<br>NEUTRAL | YELLOW<br>WHITE/YELLOW | 14 AWG (Min) MTW/TEW (TINNED) |
| SIGNAL: | RED/BLACK<br>BLACK/WHITE | 18 AWG (Min) TSP |

## DRAWING DESIGNATIONS

- E – ELECTRICAL DRAWINGS
- F – FABRICATION DRAWINGS
- J – PANEL LAYOUT DRAWINGS
- L – LOOP DRAWINGS
- M – MECHANICAL DRAWINGS
- N – P & ID
- P – PANEL POWER WIRING DIAGRAMS
- SD – INSTALLATION DETAIL or STANDARD DETAIL DRAWINGS

## DRAWING SYMBOLS




- CONTACT – NORMALLY OPEN
- CONTACT – NORMALLY CLOSED
- CONTACT –NORMALLY OPEN TIME TO CLOSE
- CONTACT –NORMALLY CLOSED TIME TO OPEN
- CONTACT –NORMALLY OPEN TIME TO OPEN
- CONTACT –NORMALLY CLOSED TIME TO CLOSE
- COIL – CONTROL RELAY
- PILOT LIGHT A–AMBER B–BLUE C–CLEAR G–GREEN R–RED W–WHITE
- PILOT LIGHT – PUSH–TO–TEST
- FLOW SWITCH – NORMALLY OPEN
- FLOW SWITCH – NORMALLY CLOSED
- FLOAT SWITCH – NORMALLY OPEN
- FLOAT SWITCH – NORMALLY CLOSED
- PRESSURE SWITCH – NORMALLY OPEN
- PRESSURE SWITCH – NORMALLY CLOSED
- TEMPERATURE SWITCH – NORMALLY OPEN
- TEMPERATURE SWITCH – NORMALLY CLOSED
- LIMIT SWITCH – NORMALLY OPEN (FREE)
- LIMIT SWITCH – NORMALLY CLOSED (FREE)
- LIMIT SWITCH – NORMALLY OPEN (HELD)
- LIMIT SWITCH – NORMALLY CLOSED (HELD)

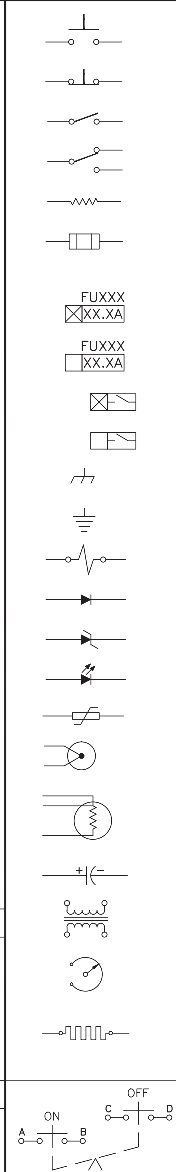
3–POSITION SELECTOR SWITCH

- CLOSED IN POSITION–1
- CLOSED IN POSITION–2
- CLOSED IN POSITION–3

2–POSITION SELECTOR SWITCH

- CLOSED IN POSITION–1
- CLOSED IN POSITION–2

## DRAWING SYMBOLS

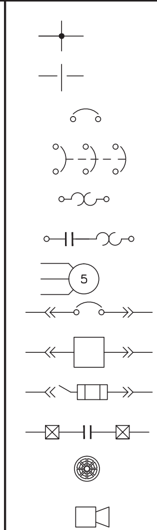



- PUSHBUTTON – NORMALLY OPEN
- PUSHBUTTON – NORMALLY CLOSED
- SWITCH, SINGLE POLE, SINGLE THROW (SPST)
- SWITCH, SINGLE POLE, DOUBLE THROW (SPDT)
- RESISTOR
- FUSE
- FUSE WITH BLOWN FUSE INDICATOR – AC
- FUSE WITH BLOWN FUSE INDICATOR – DC
- SWITCHING TERMINAL BLOCK – AC
- SWITCHING TERMINAL BLOCK – DC
- GROUND – EARTH
- GROUND – CHASSIS
- SOLENOID
- DIODE
- ZENER DIODE
- LIGHT EMITTING DIODE
- METAL OXIDE VARISTOR (MOV)
- THERMOCOUPLE
- RTD (3–WIRE)
- CAPACITOR – POLARIZED
- TRANSFORMER (CPT)
- POTENTIOMETER
- HEATER

2–POSITION PUSH BUTTON SWITCH

MAINTAINED CONTACTS WITH MECHANICAL INTERLOCK

## DRAWING SYMBOLS




- CONNECTION
- NO CONNECTION
- CIRCUIT BREAKER – SINGLE POLE
- CIRCUIT BREAKER – THREE POLE
- THERMAL OVERLOAD
- MAGNETIC STARTER
- MOTOR, 3 PHASE (5 HP)
- DRAWOUT CIRCUIT BREAKER – LOW VOLTAGE
- DRAWOUT CIRCUIT BREAKER – MEDIUM VOLTAGE
- DRAWOUT FUSED SWITCH – MEDIUM VOLTAGE
- REMOTE DEVICE WITH TERMINAL POINTS SHOWN
- HORN (PIEZO–ELECTRIC)
- HORN (VIBRATION)

## PANEL SPECIFICATION – (STANDARD)

PANEL MATERIALS:

| | |
|---|---|
| PANEL SHELL | 12 GA COLD ROLLED STEEL |
| DOORS | 12 GA COLD ROLLED STEEL |
| MOUNTING PANS | 12 GA COLD ROLLED STEEL |

EXTERIOR FINISH:
ALPHATIC AIR DRY POLYURETHANE ENAMEL AND PRIMER.
FINISHED DRY FILM THICKNESS IS 3.0 MILL MINIMUM.
COLOR IS ANSI–61 LIGHT GREY.

INTERIOR FINISH:
ALPHATIC AIR DRY POLYURETHANE ENAMEL AND PRIMER.
FINISHED DRY FILM THICKNESS IS 3.0 MILL MINIMUM.
COLOR IS WHITE

## PANEL LABELING REQUIREMENTS

UL 508A INDUSTRIAL CONTROL EQUIPMENT:

- ☑ UNDERWRITERS LABORATORY, INC. – UL
- ☐ ELECTRONIC TESTING LABS, INC. – ETL
- ☐ NON REQUIRED

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| C | FIELD AS–BUILT / JC | 6/28/10 |

LISTING
☐ UL508 S/N ____
☐ ETL
☐ OTHER ____

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775–5696

DRAWING SYMBOLS AND STANDARDS

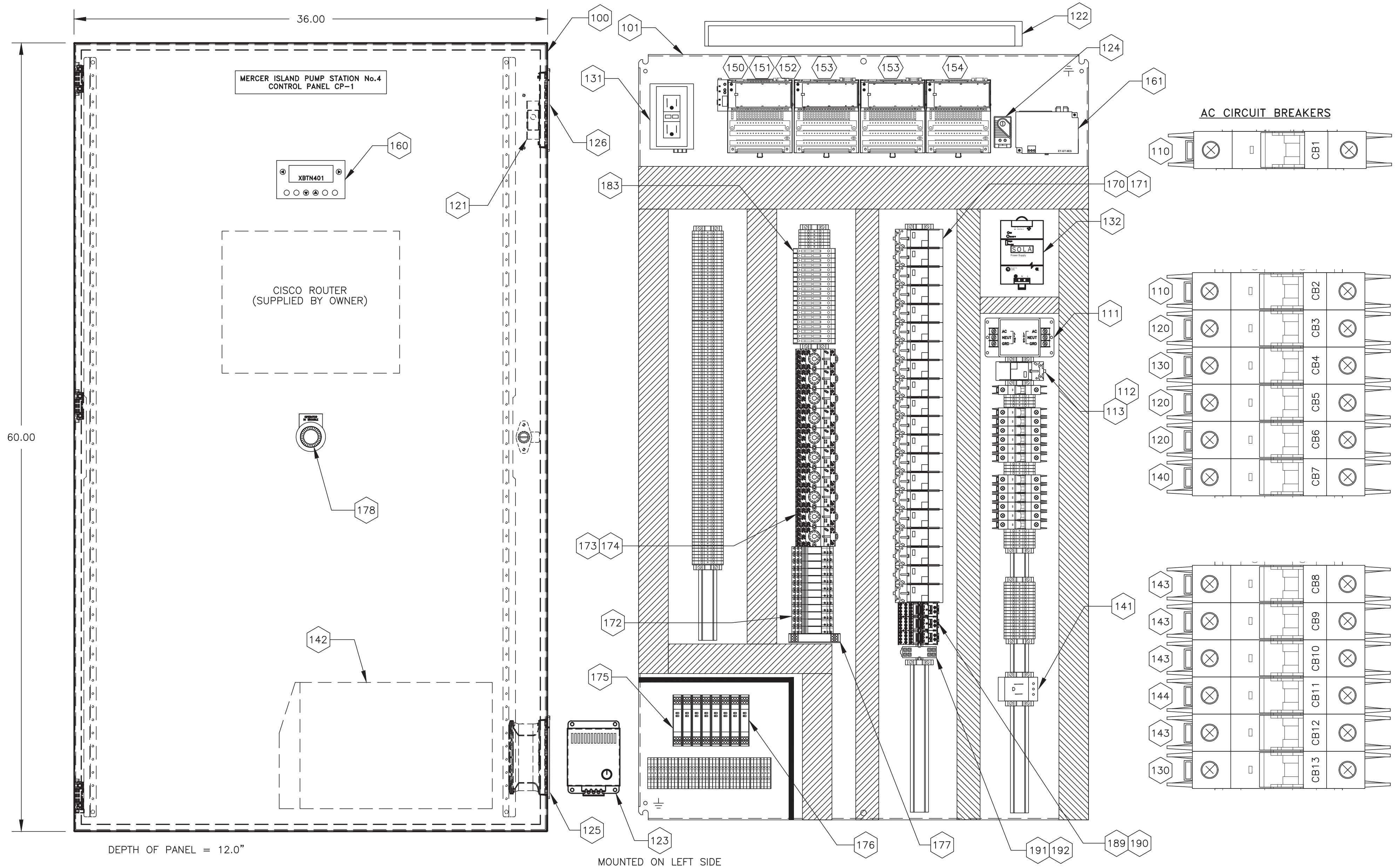
CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: SED
DRAWN: BR

TECHNICAL SYSTEMS Inc.
DRAWING SYMBOLS & STANDARDS
ELECTRICAL SYMBOLS & ENCLOSURE SPECIFICATIONS

DATE: 9 SEP 09
JOB NO.: 7189
DWG. NO.: STDS_01
REV.: C



DWG: TITLEBLK.DWG; REV FEB 03
P:\7000 series\7189 Mercer Island Pump Station-4\Dwg\stds_01.dwg, 3/30/2016 1:10:10 PM, robertc




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| C | FIELD AS-BUILT / JC | 6/28/10 |
| B | SHOP AS-BUILT / AZ | 7/24/09 |
| A | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
■ UL508 S/N BU-499157
☐ ETL
☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

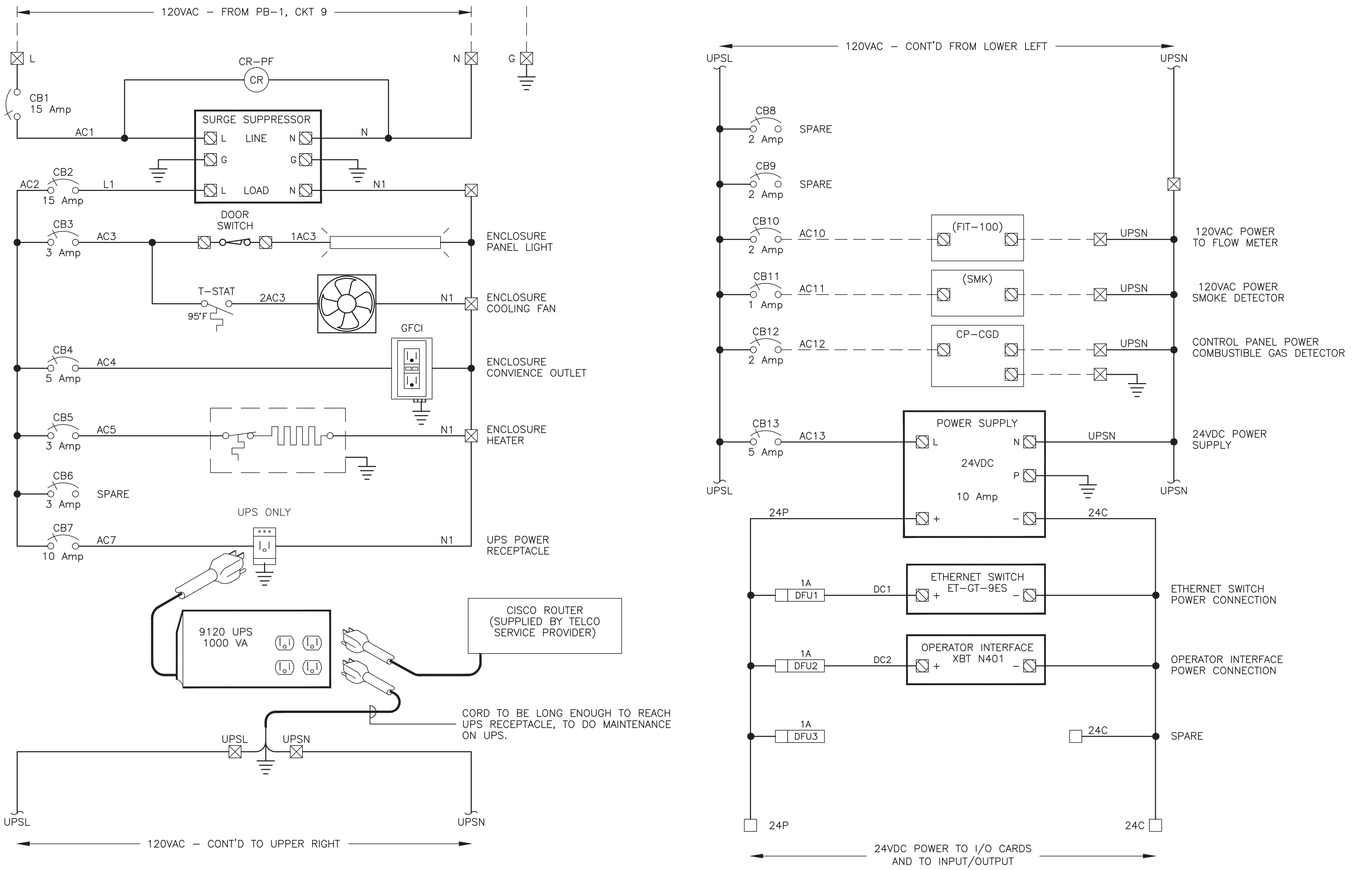
CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

PUMP STATION No.4
RTU CONTROL PANEL – CP–1
PANEL LAYOUT

DATE: 13 JAN 09
JOB NO. 7189
DWG. NO. CP1–J01
REV. C

DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______


TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

# PUMP STATION No.4
## RTU CONTROL PANEL CP-1
## AC/DC POWER DISTRIBUTION WIRING DIAGRAM

DATE: 13 JAN 09

JOB NO.: 7189

DWG. NO.: CP1-P01

REV.: C



DWG: TITLEBLK.DWG; REV 02/19/02

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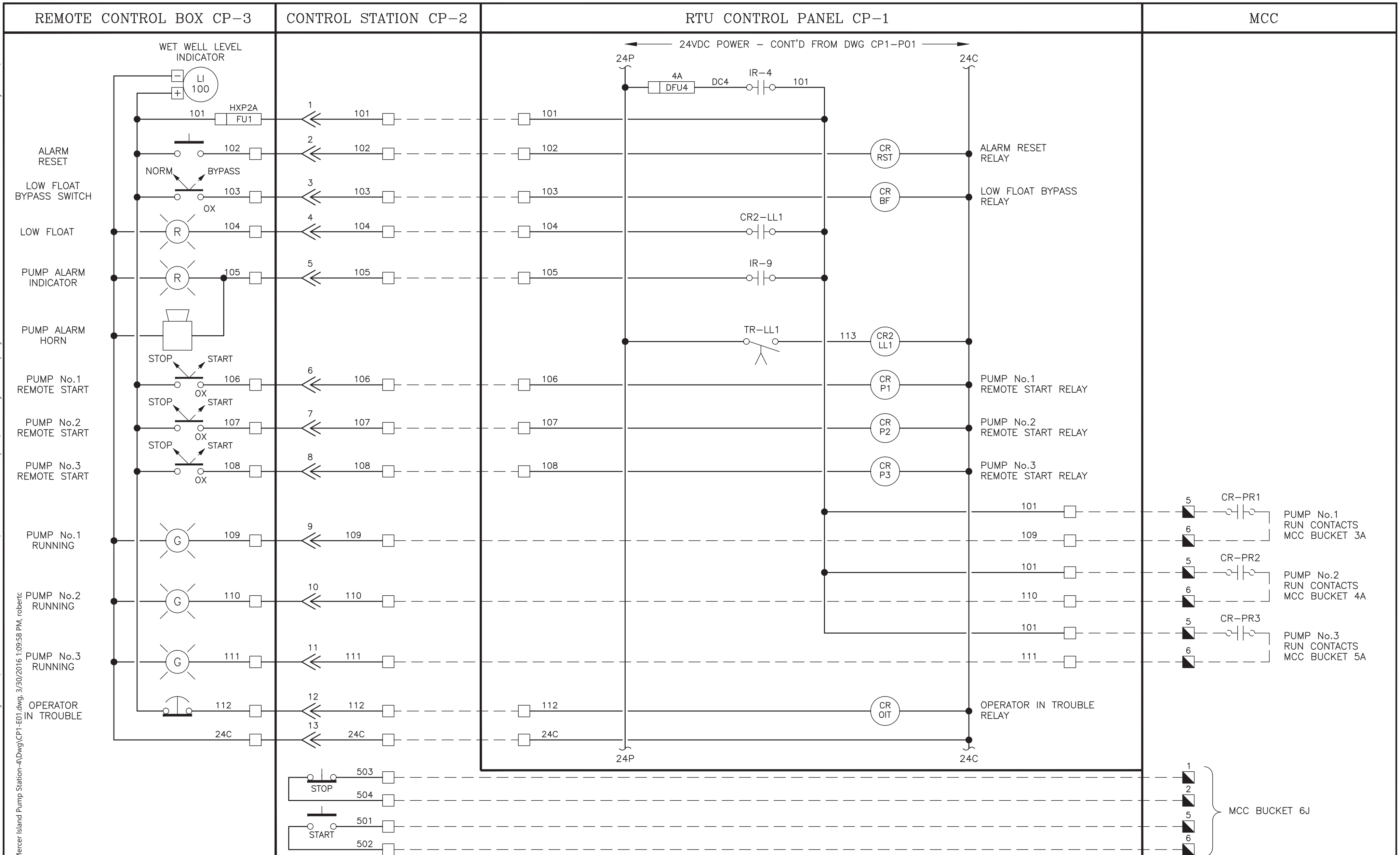




DWG: TITLEBLK.DWG; REV 02/19/02

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| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

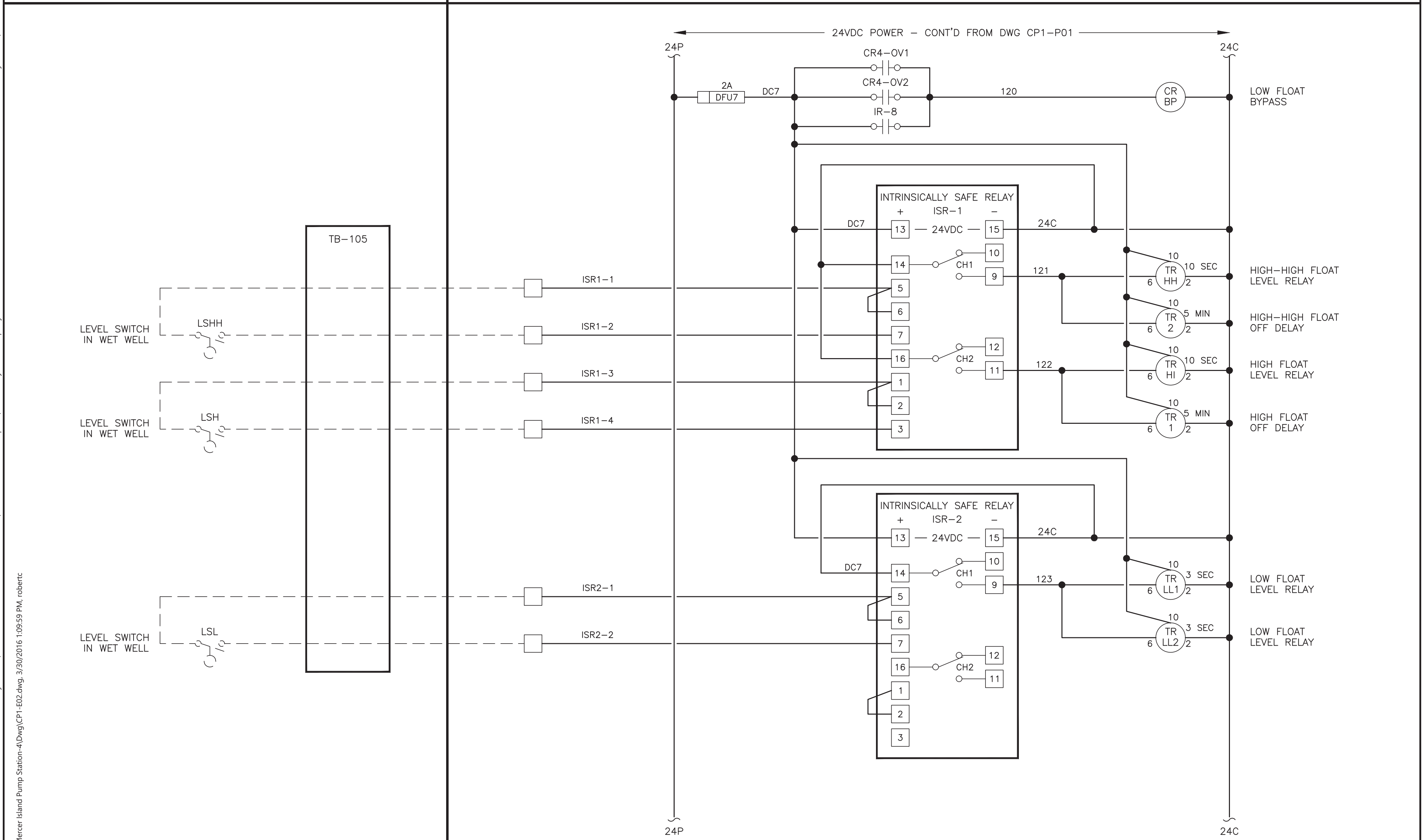
PUMP STATION No.4
RTU CONTROL PANEL CP-1
CONTROL WIRING DIAGRAM

DATE: 13 JAN 09

JOB NO.: 7189

DWG. NO.: CP1-E01

REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______


TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

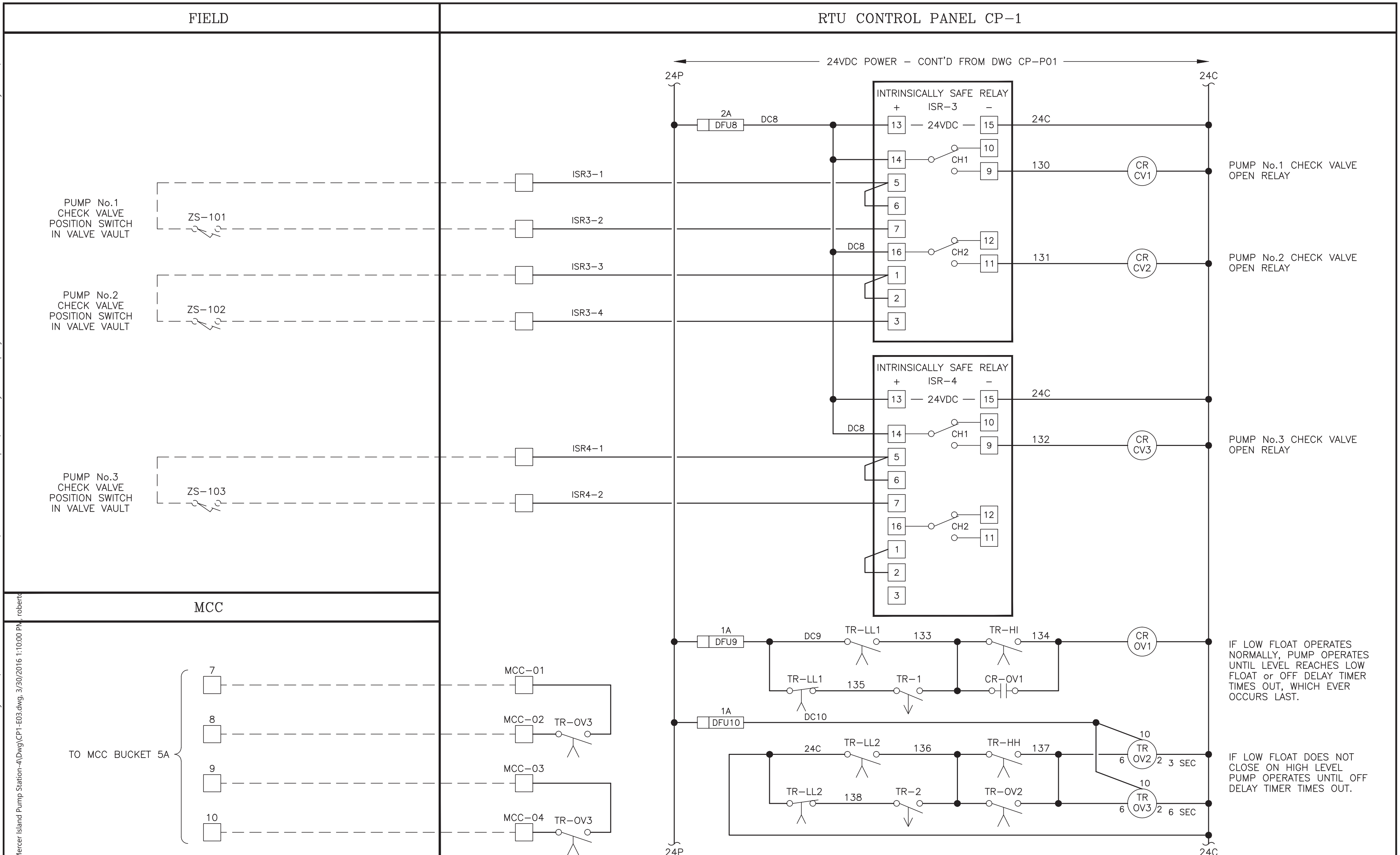
PUMP STATION No.4
WETWELL FLOAT CONTROL
CONTROL WIRING DIAGRAM

DATE: 13 JAN 09

JOB NO.: 7189

DWG. NO.: CP1-E02

REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

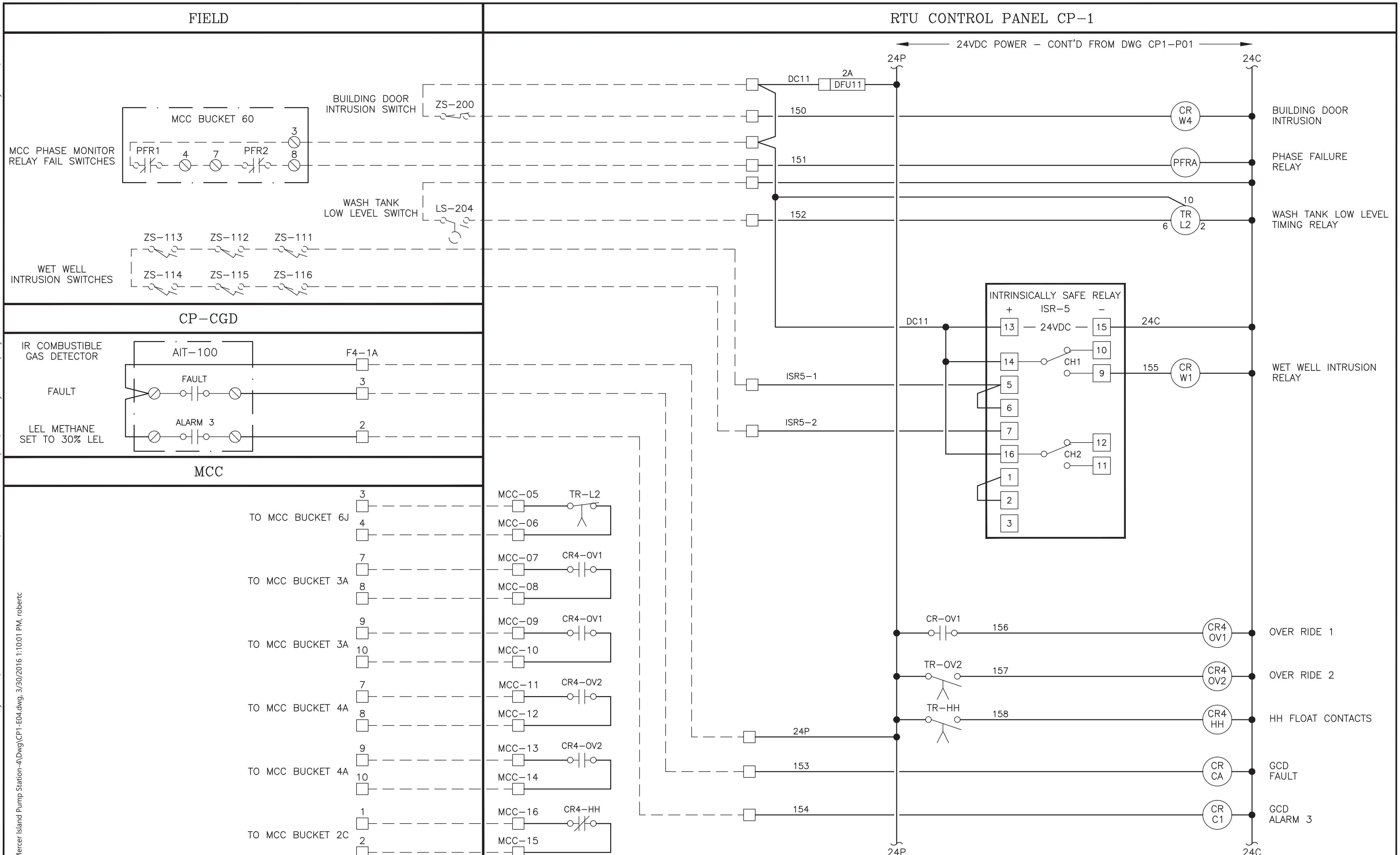
TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

PUMP STATION No.4
PUMP CHECK VALVES STATUS AND FLOAT CONTROL
CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CP1-E03
REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
- UL508 S/N
- ETL
- OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

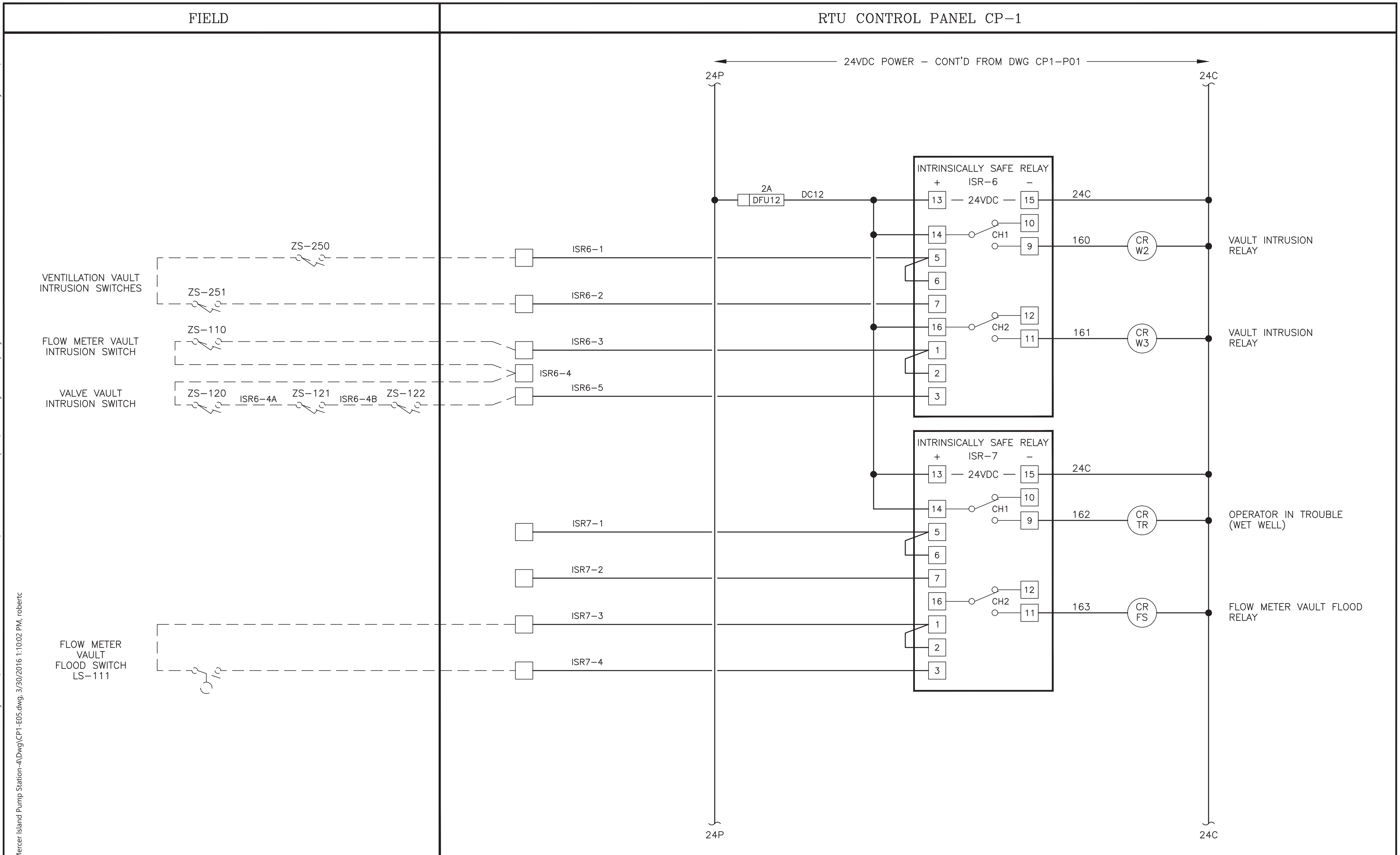
PUMP STATION No.4
BUILDING INTRUSION AND PHASE FAIL
CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CP1-E04
REV.: C



DWG: TITLEBLK.DWG; REV 02/19/02

P:\7000-series\7189 Mercer Island Pump Station-4\Dwg\CP1-E04.dwg, 3/30/2016 1:10:01 PM, robertc




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER DALTON ELECTRIC

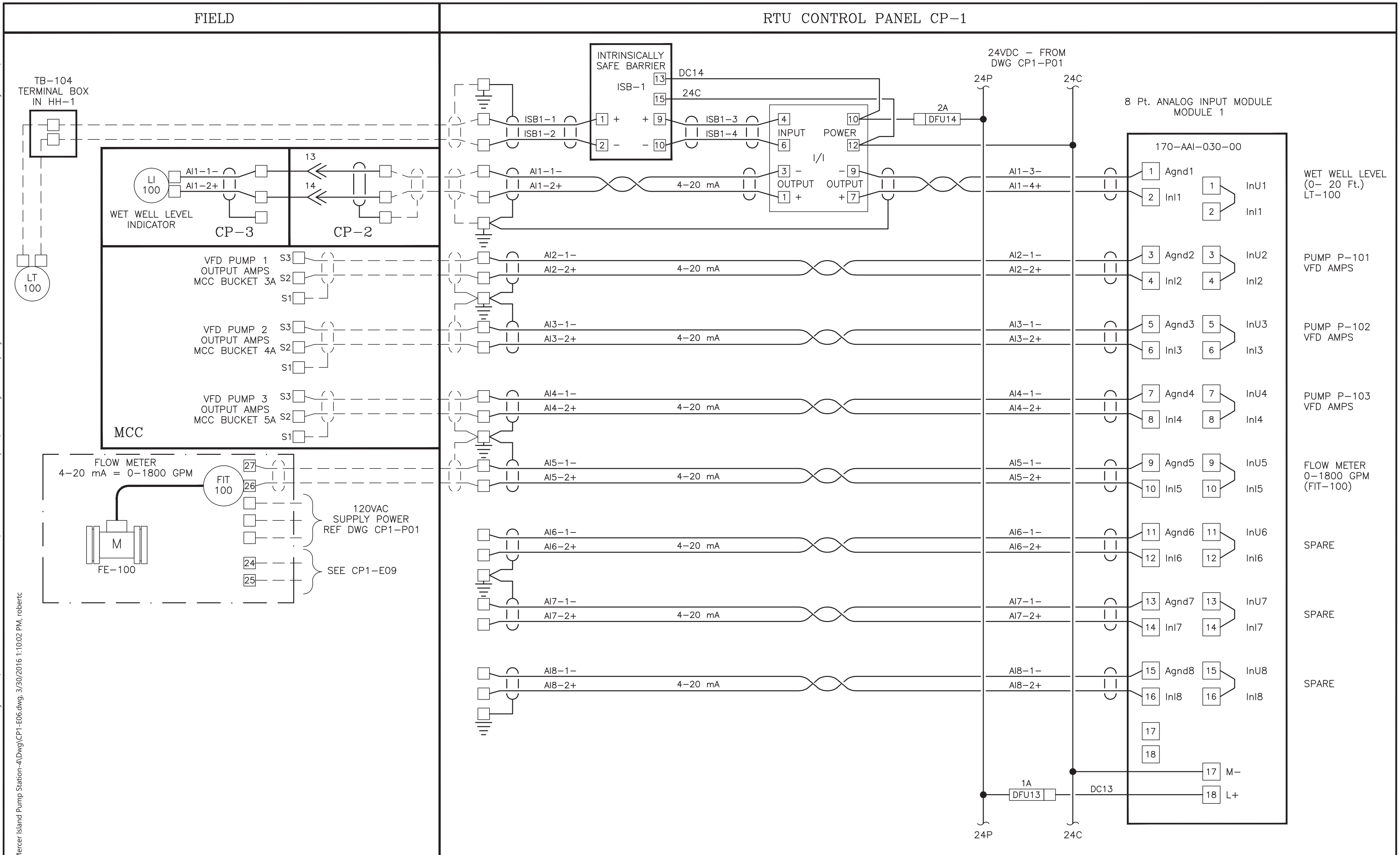
DESIGN / CHKD TH/SED

DRAWN BR

CITY OF MERCER ISLAND

PUMP STATION No.4
BUILDING INTRUSION AND PHASE FAIL
CONTROL WIRING DIAGRAM

DATE 13 JAN 09
JOB NO. 7189
DWG. NO. CP1-E05
REV. C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N____
☐ ETL
☐ OTHER ____

Technical Systems Inc.
2303 196TH ST. S.W.
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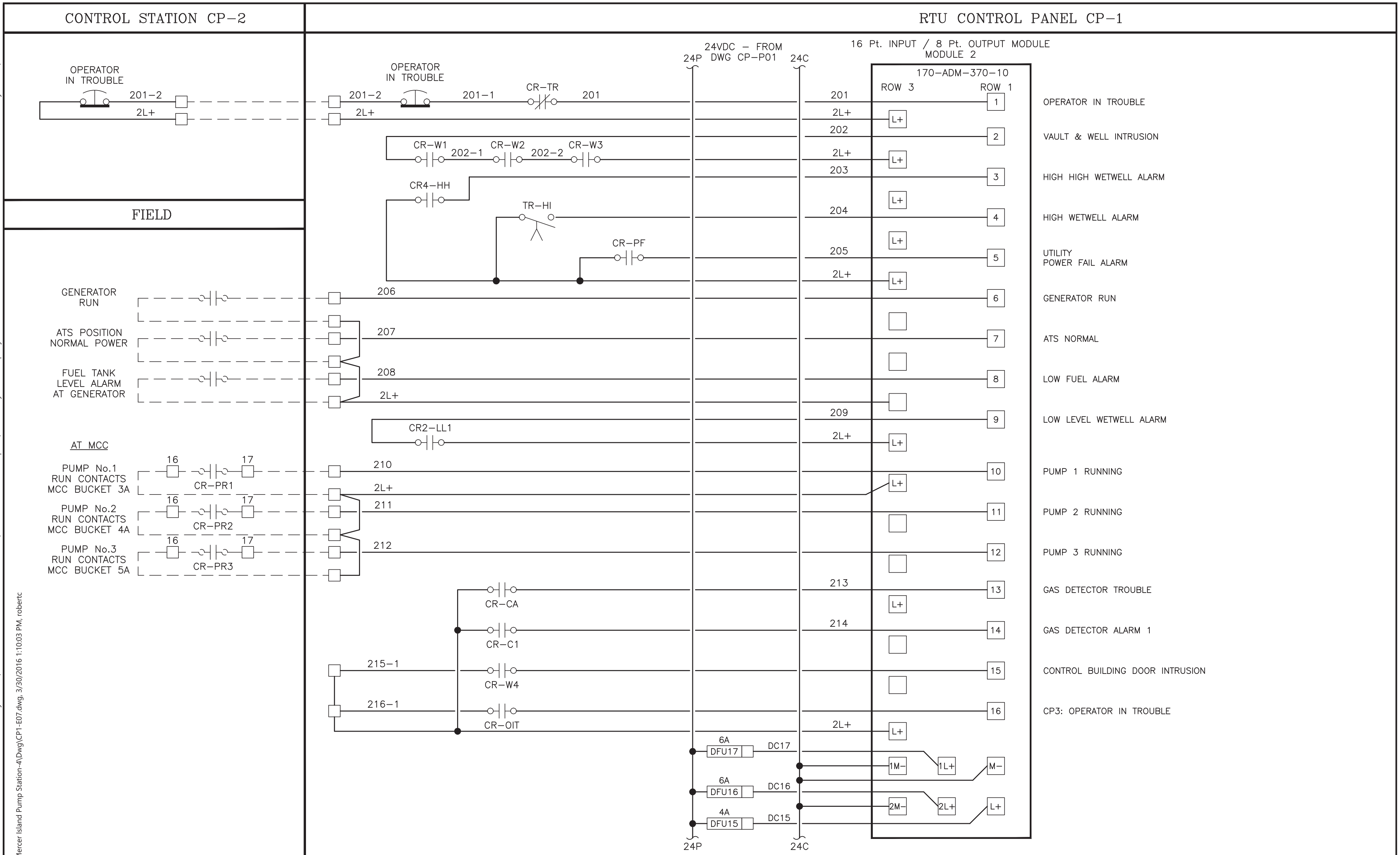
(425) 775-5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

PUMP STATION No.4
ANALOG INPUT MODULE - MODULE 1
CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CP1-E06
REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______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LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

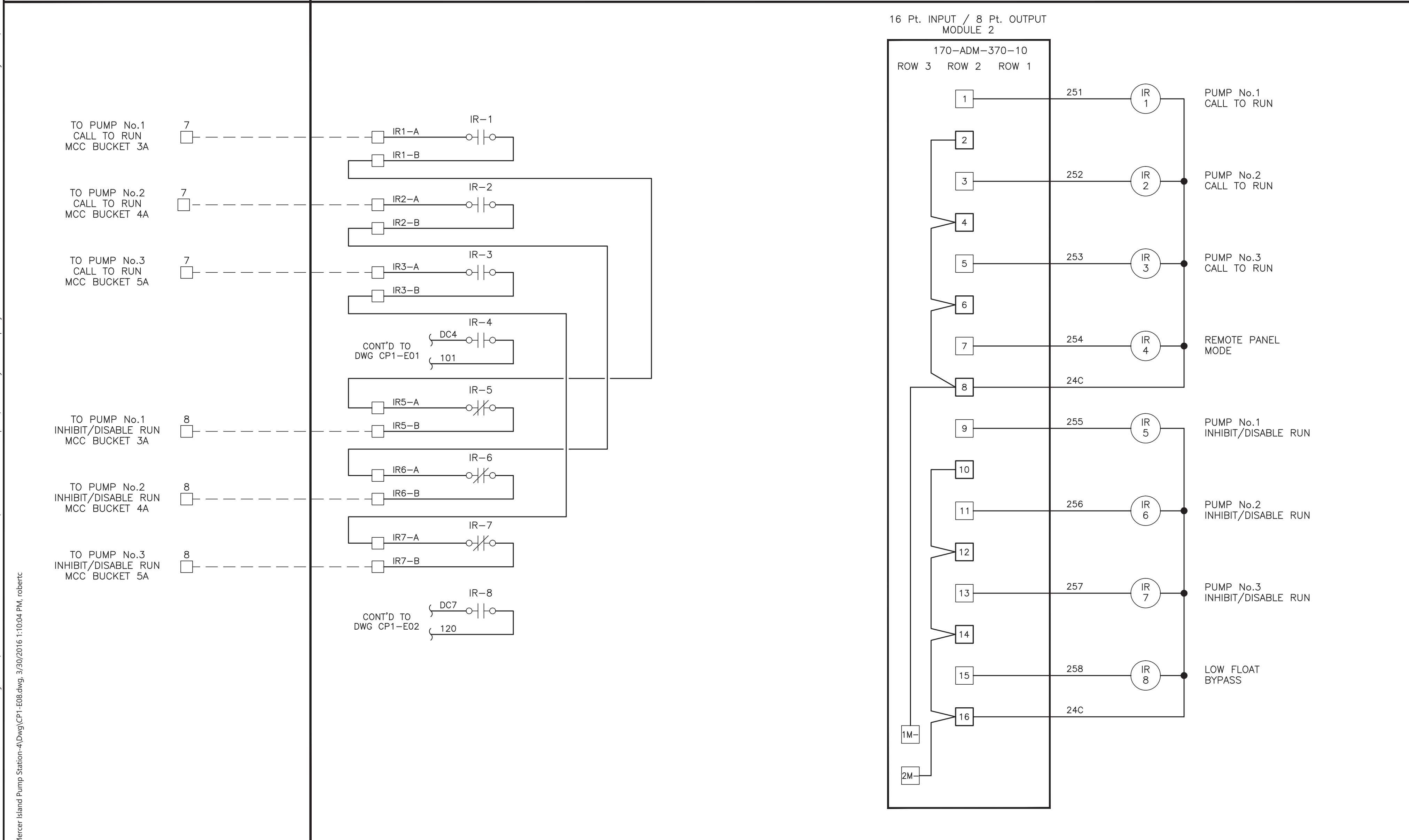
CITY OF MERCER ISLAND

# PUMP STATION No.4
## DISCRETE I/O BASE - MODULE 2
### INPUT CONTROL WIRING DIAGRAM

DATE: 13 JAN 09

JOB NO. 7189

DWG. NO. CP1-E07 REV. C






DWG: TITLEBLK.DWG; REV 02/19/02
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| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______

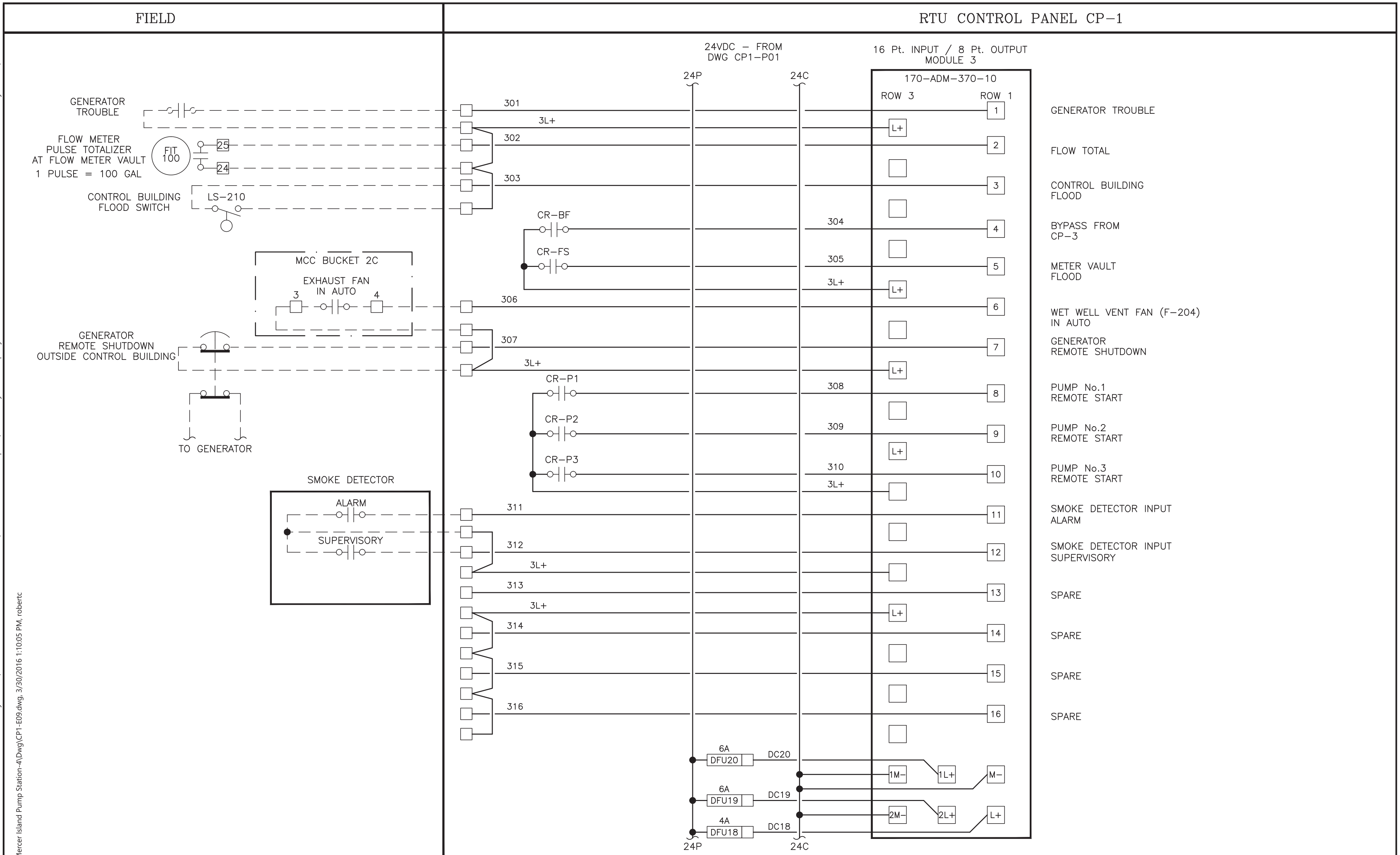
Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

# PUMP STATION No.4
## DISCRETE I/O BASE - MODULE 2
### OUTPUT CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CP1-E08
REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ____
☐ ETL
☐ OTHER ____

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC

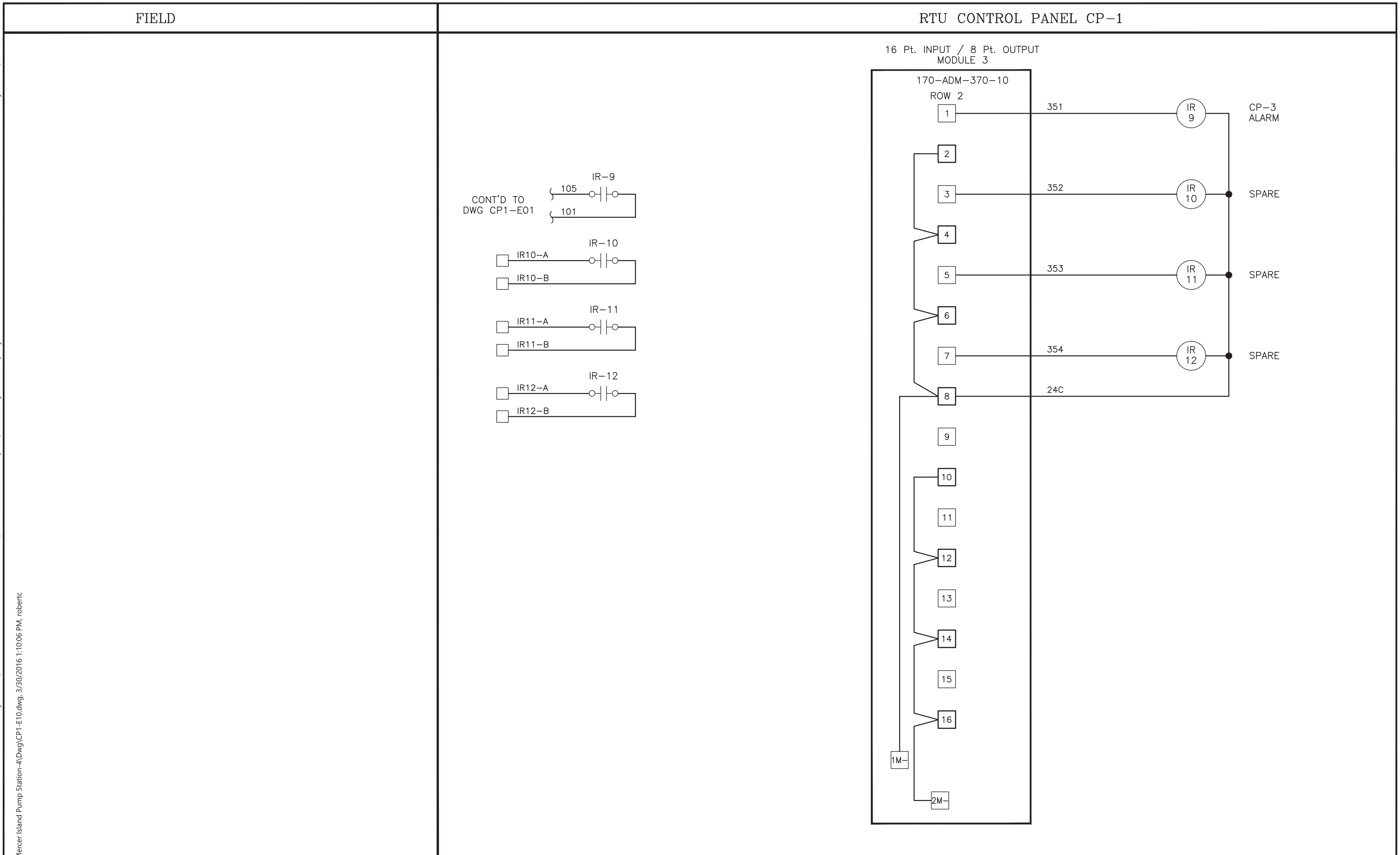
DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

PUMP STATION No.4
DISCRETE I/O BASE - MODULE 3
INPUT CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CP1-E09
REV.: C




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______


Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

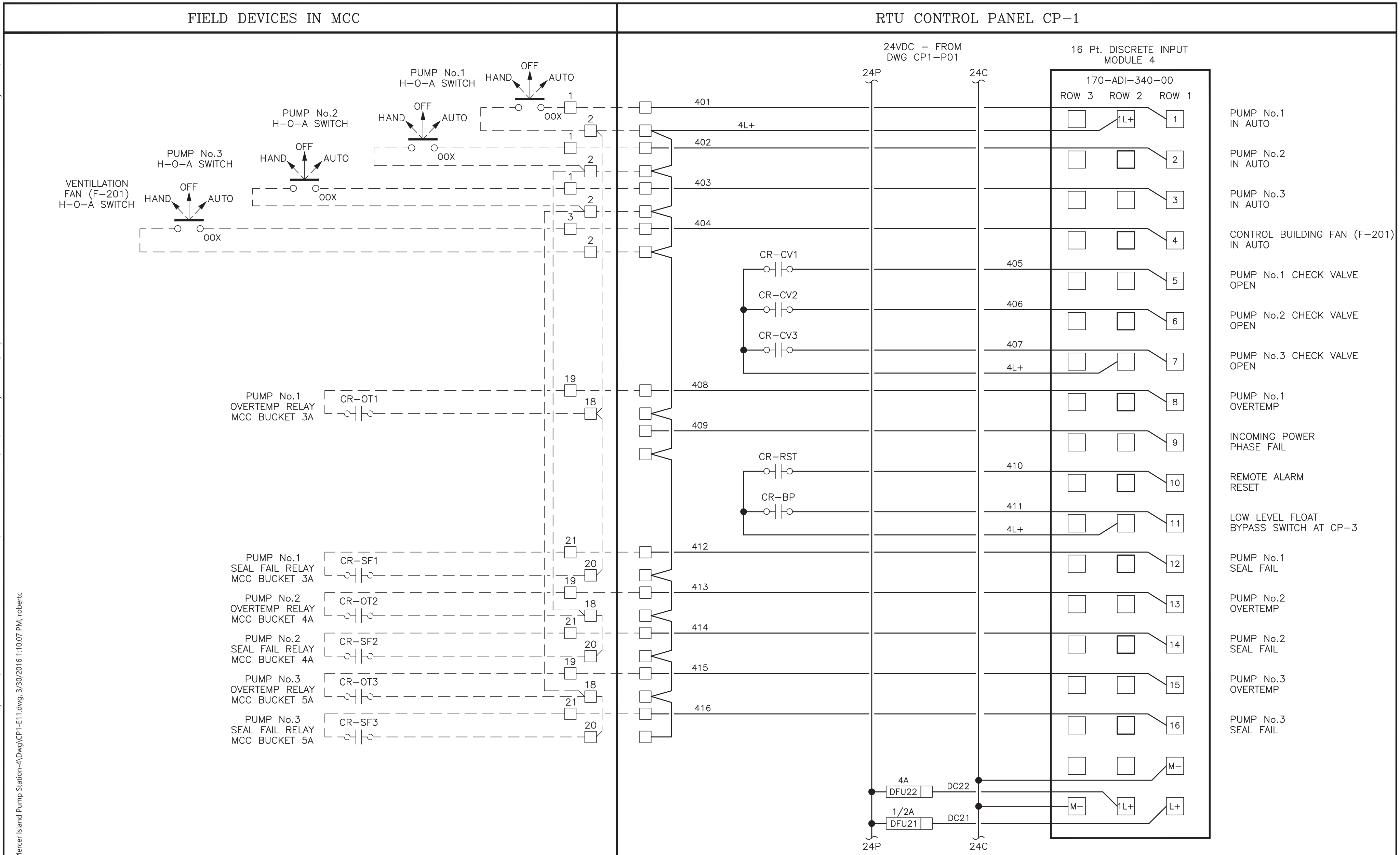
PUMP STATION No.4
DISCRETE I/O BASE – MODULE 3
OUTPUT CONTROL WIRING DIAGRAM

DATE: 13 JAN 09

JOB NO.: 7189

DWG. NO.: CP1-E10

REV.: C






DWG: TITLEBLK.DWG; REV 02/19/02

P:\7000-series\7189 - Mercer Island Pump Station-4\Dwg\CP1-E11.dwg, 3/30/2016 1:10:07 PM, robertc

| REV | DESCRIPTION/INIT | DATE |
| --- | --- | --- |
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
- ☐ UL508 S/N
- ☐ ETL
- ☐ OTHER

TSI Technical Systems Inc.
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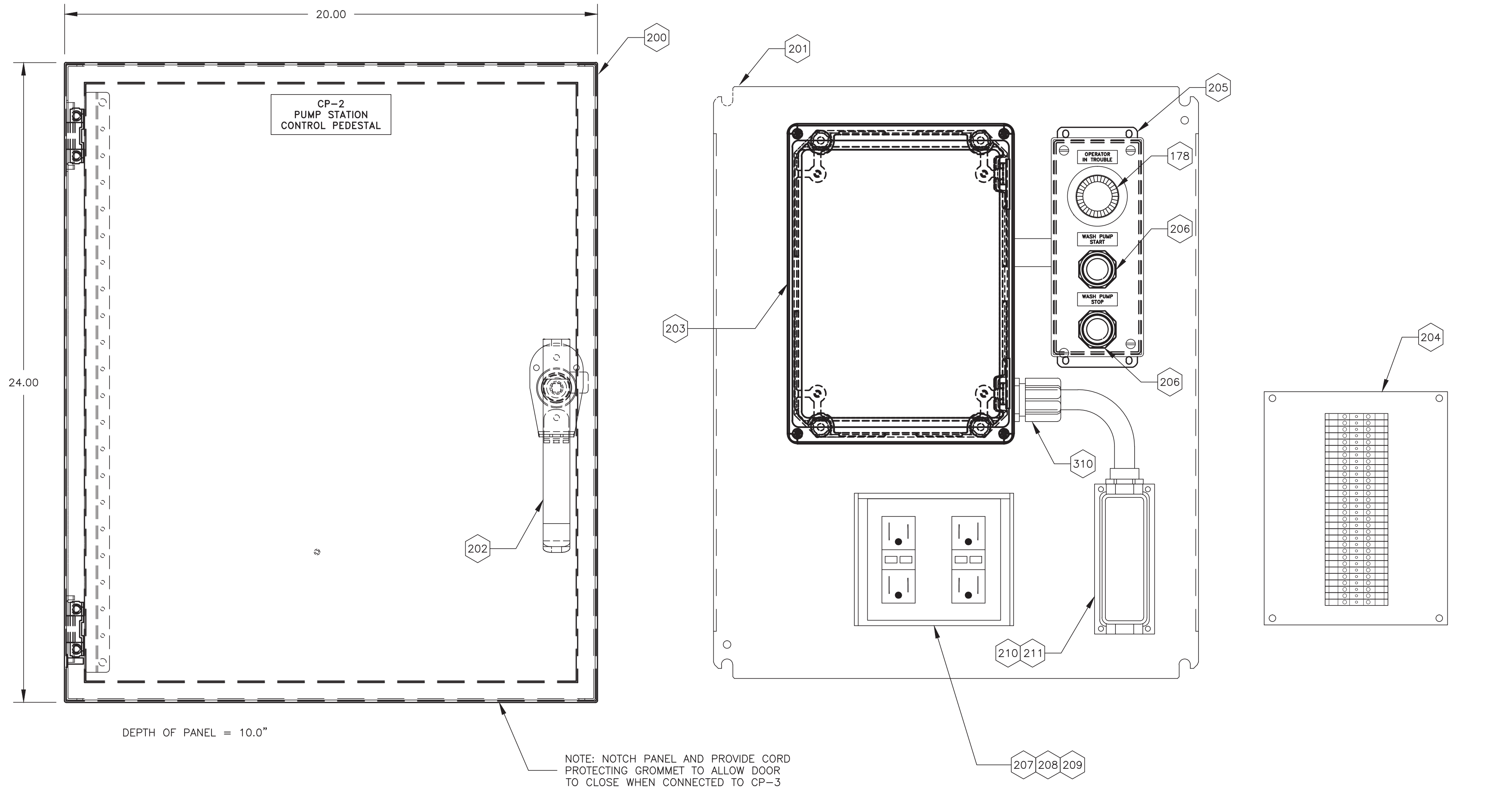
LYNNWOOD, WA. 98036
(425) 775-5696

| CUSTOMER | DESIGN / CHKD | DRAWN |
| --- | --- | --- |
| DALTON ELECTRIC | TH/SED | BR |

CITY OF MERCER ISLAND

PUMP STATION No.4
DISCRETE I/O BASE - MODULE 4
CONTROL WIRING DIAGRAM

| DATE | JOB NO. | DWG. NO. | REV. |
| --- | --- | --- | --- |
| 13 JAN 09 | 7189 | CP1-E11 | C |




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| C | FIELD AS-BUILT / JC | 6/28/10 |
| B | SHOP AS-BUILT / AZ | 7/24/09 |
| A | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
■ UL508 S/N BT-666610
☐ ETL
☐ OTHER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LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: BR

CITY OF MERCER ISLAND

PUMP STATION No.4
PUMP STATION CONTROL PEDESTAL – CP-2
PANEL LAYOUT

DATE: 13 JAN 09

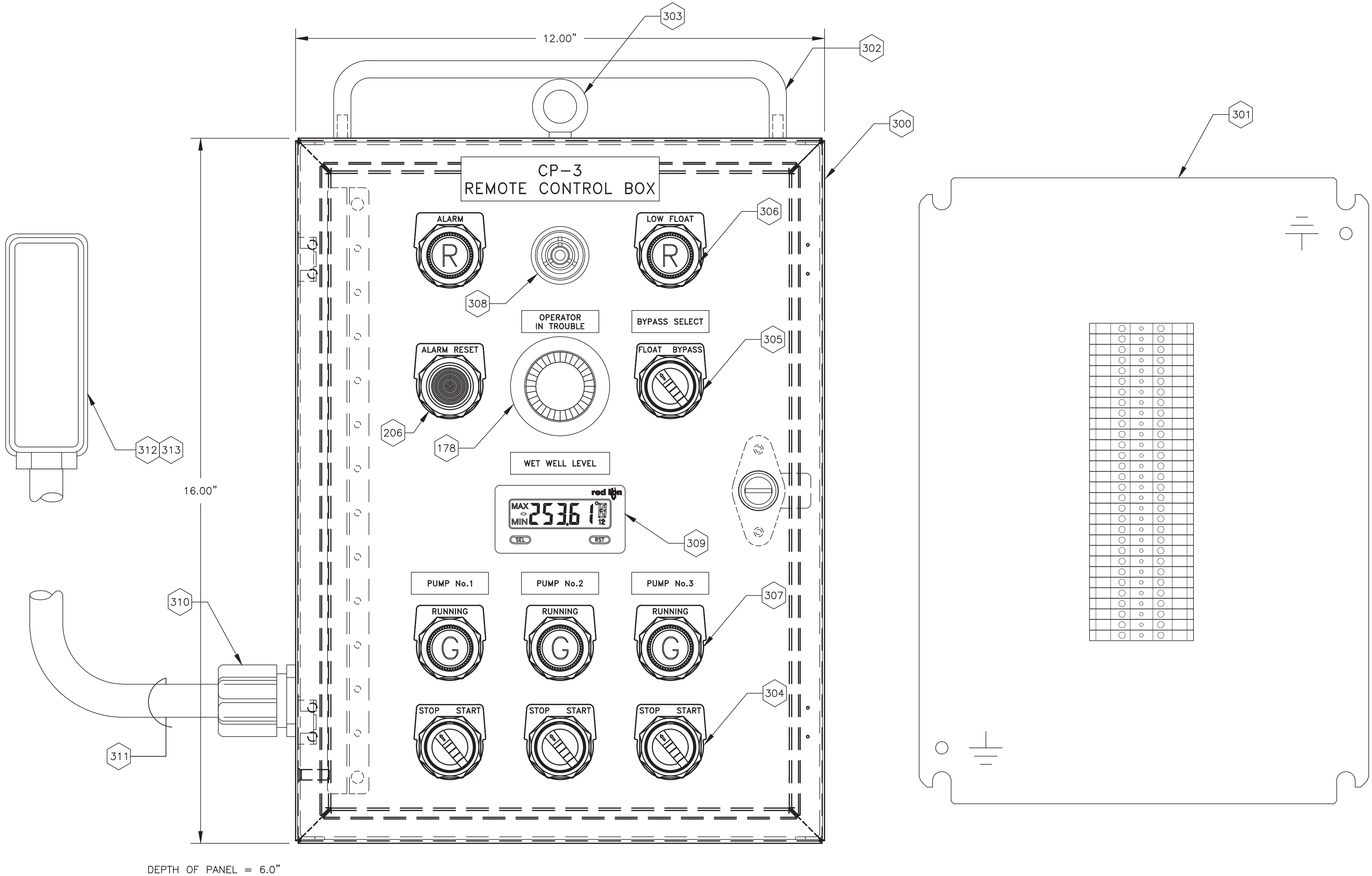
JOB NO.: 7189

DWG. NO.: CP2-J01

REV.: C



DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| C | FIELD AS-BUILT / JC | 6/28/10 |
| B | SHOP AS-BUILT / AZ | 7/24/09 |
| A | RESUBMITTED FOR APPROVAL | 4/2/09 |

LISTING
■ UL508 S/N BT-666611
☐ ETL
☐ OTHER

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2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

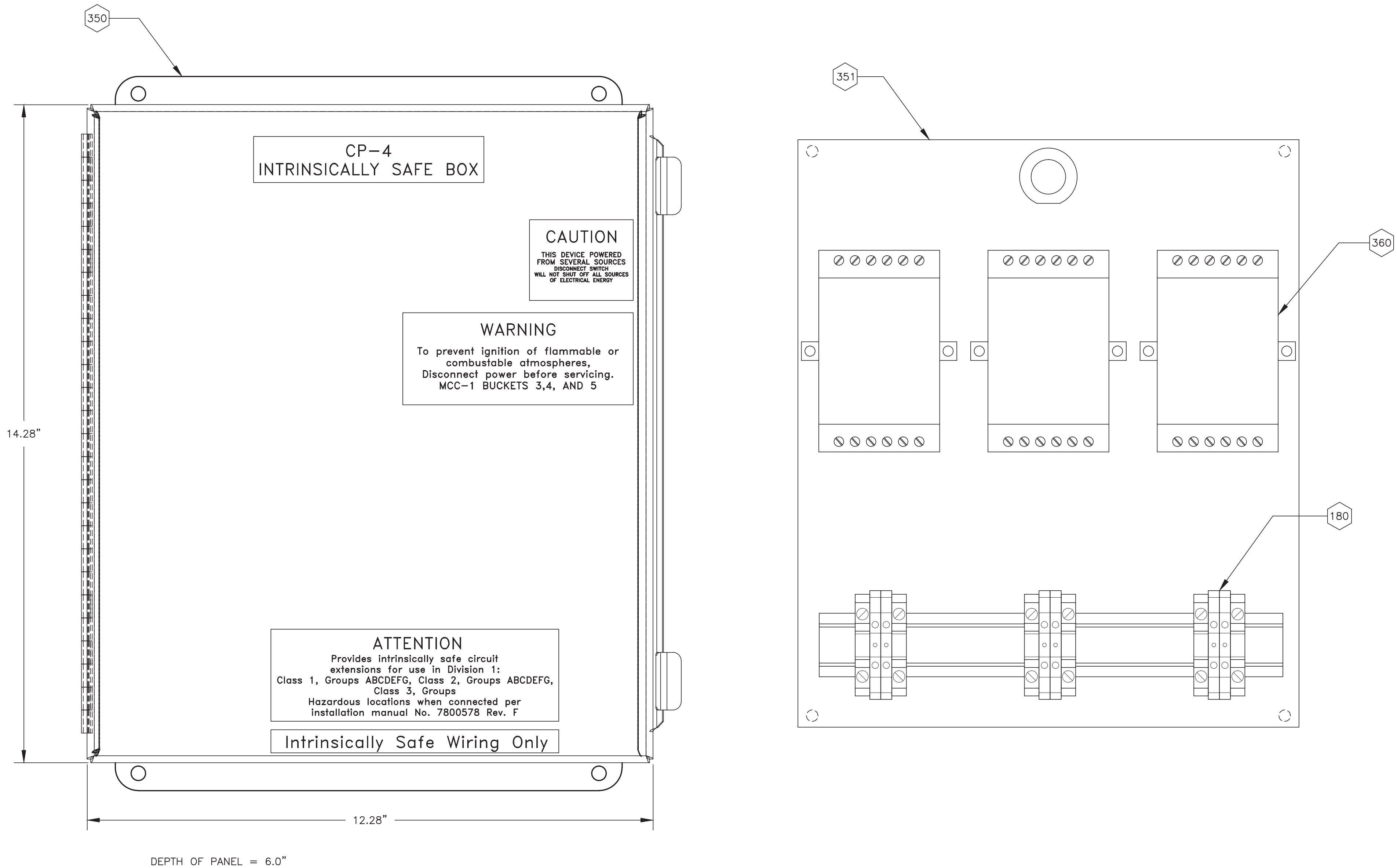
CITY OF MERCER ISLAND

PUMP STATION No.4
REMOTE CONTROL PANEL – CP-3
PANEL LAYOUT

DATE: 13 JAN 09
JOB NO. 7189
DWG. NO. CP3-J01
REV. C



DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| C | FIELD AS-BUILT / JC | 6/28/10 |
| B | SHOP AS-BUILT / AZ | 9/10/09 |

LISTING
- ■ UL508 S/N BU-499158
- ☐ ETL
- ☐ OTHER ________

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: AZ

CITY OF MERCER ISLAND

PUMP STATION No.4
INTRINSICALLY SAFE BOX – CP-4
PANEL LAYOUT

DATE: 10 SEP 09

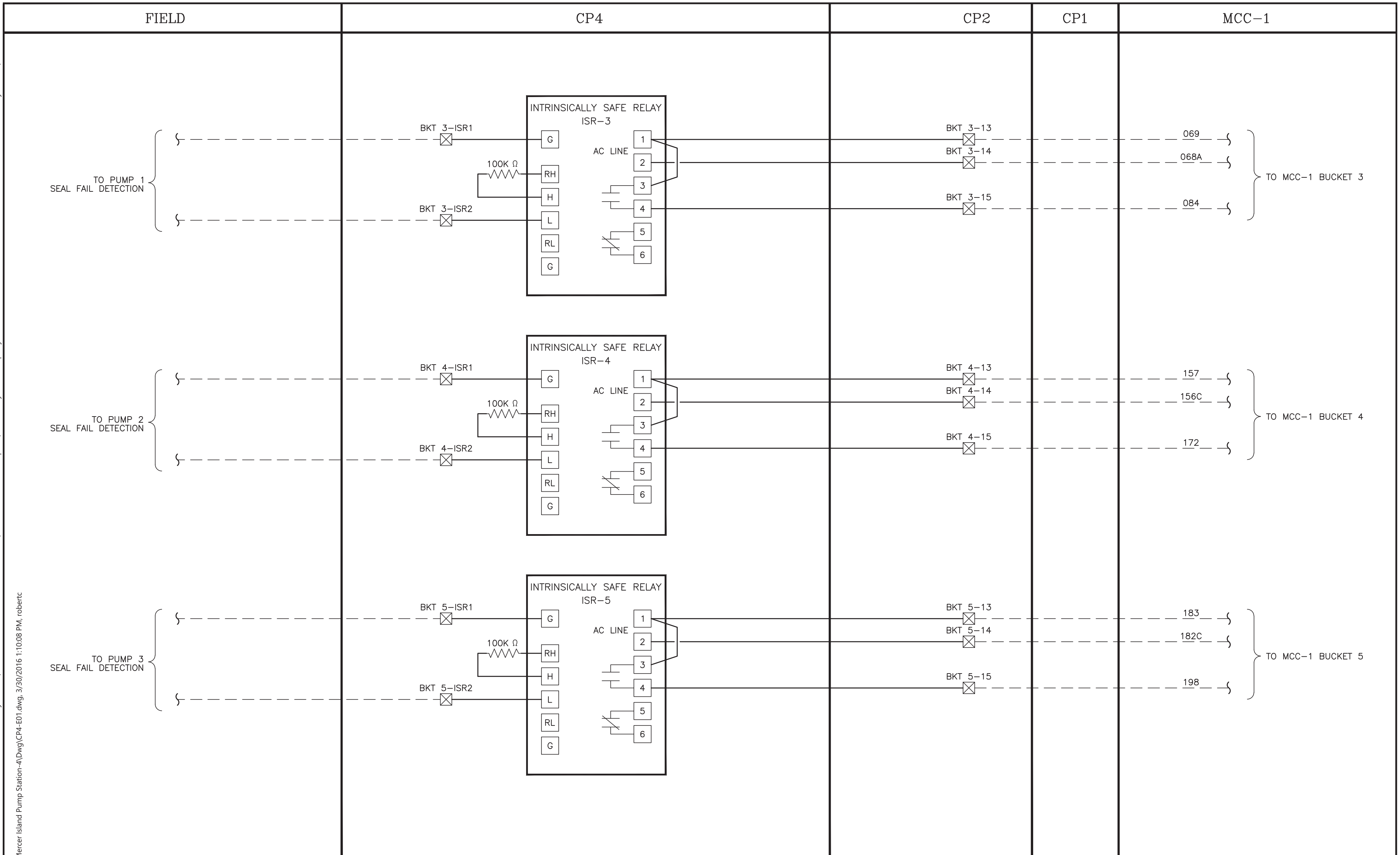
JOB NO.: 7189

DWG. NO.: CP4-J01

REV.: C



DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/28/10 |
| | SHOP AS-BUILT / AZ | 9/9/09 |

LISTING
- ☐ UL508 S/N ________
- ☐ ETL
- ☐ OTHER ________


Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696


CUSTOMER: DALTON ELECTRIC

DESIGN / CHKD: TH/SED

DRAWN: AZ

CITY OF MERCER ISLAND

PUMP STATION No.4
INTRINSICALLY SAFE BOX – CP-4
CONTROL WIRING DIAGRAM

DATE: 9 SEP 09

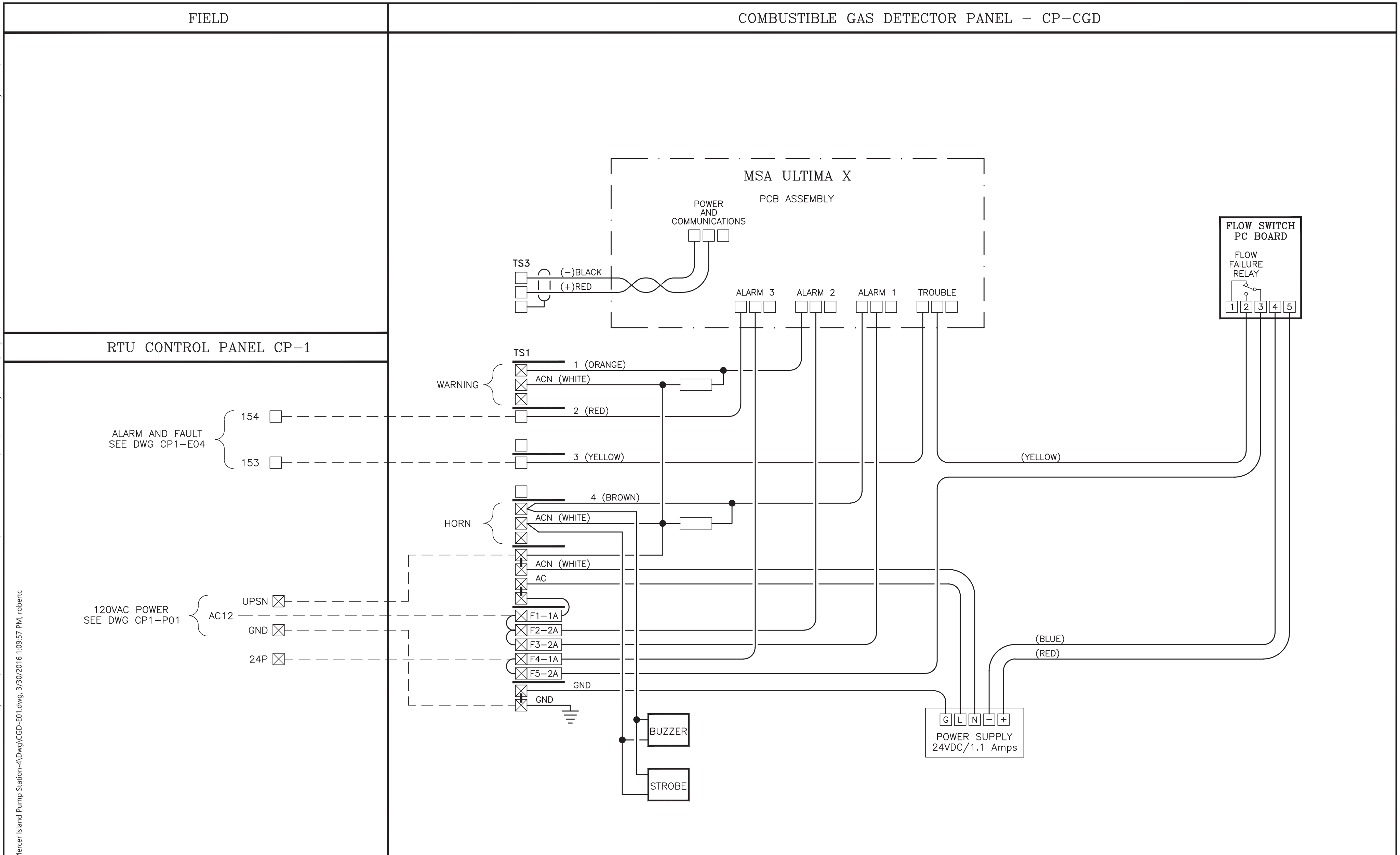
JOB NO.: 7189

DWG. NO.: CP4-E01

REV.: C




DWG: TITLEBLK.DWG; REV 02/19/02
P:\7000 Series\7189 - Mercer Island Pump Station-4\Dwg\CP4-E01.dwg, 3/30/2016 1:10:08 PM, robertc




| | | |
|---|---|---|
| | FIELD AS–BUILT / JC | 6/28/10 |
| | SHOP AS–BUILT / AZ | 7/24/09 |
| | RESUBMITTED FOR APPROVAL | 4/2/09 |
| REV | DESCRIPTION/INIT | DATE |

LISTING
- ☐ UL508 S/N
- ☐ ETL
- ☐ OTHER

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775–5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: BR

CITY OF MERCER ISLAND

# PUMP STATION No.4
# COMBUSTIBLE GAS DETECTOR PANEL – CP–CGD
## CONTROL WIRING DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: CGD–E01
REV.: C



DWG: TITLEBLK.DWG; REV 02/19/02
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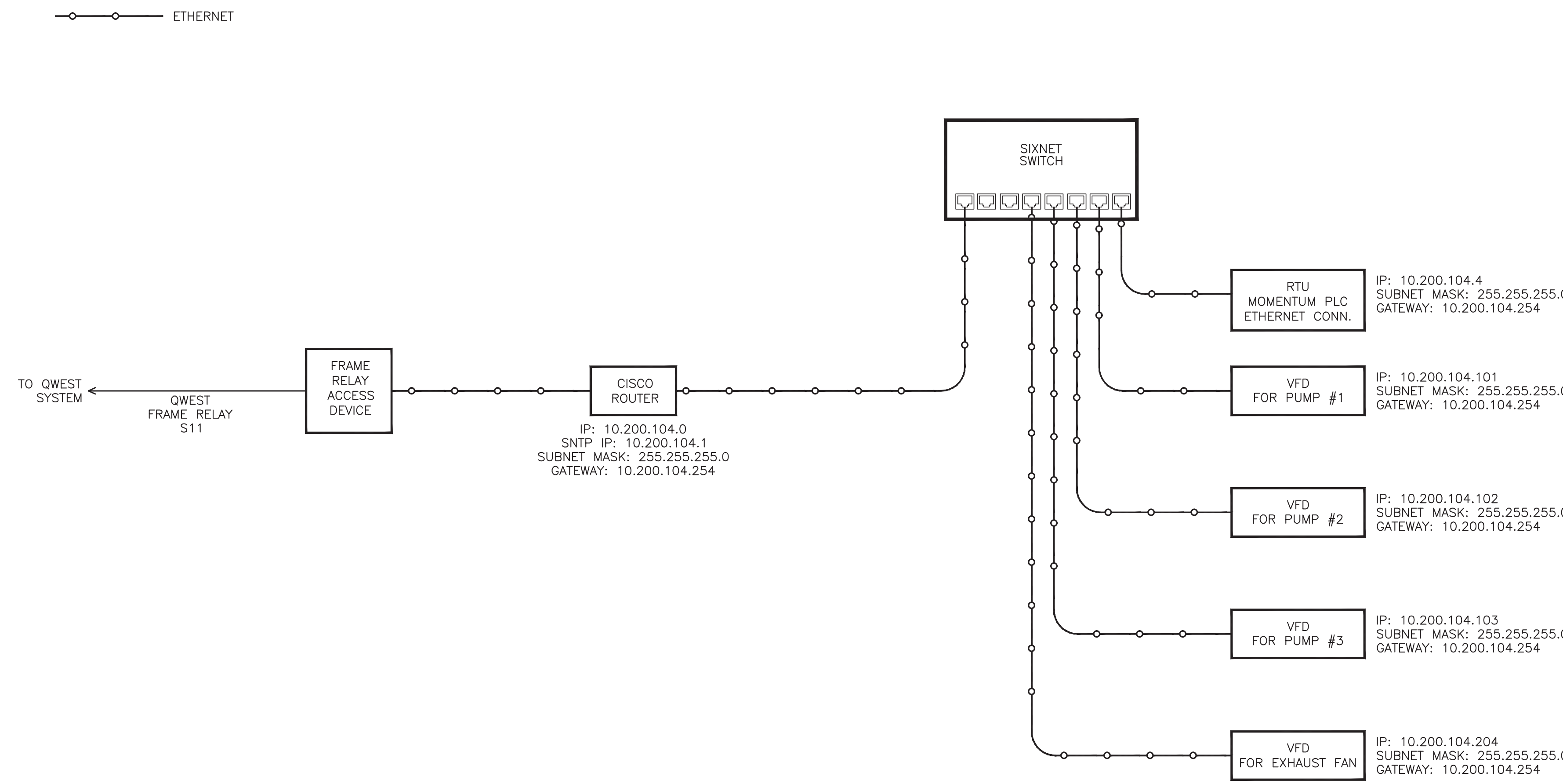


| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| | FIELD AS-BUILT / JC | 6/1/10 |

LISTING
☐ UL508 S/N ______
☐ ETL
☐ OTHER ______

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: DALTON ELECTRIC
DESIGN / CHKD: TH/SED
DRAWN: AZ

CITY OF MERCER ISLAND

# PUMP STATION No.4
# NETWORK DIAGRAM

DATE: 13 JAN 09
JOB NO.: 7189
DWG. NO.: B01
REV.: C



P:\7000 Series\7189 - Mercer Island Pump Station-4\Dwg\B01.dwg, 3/30/2016 1:09:57 PM, robertc

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## PHASE 2 PLC AS-BUILT DRAWINGS

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| DRAWING | DESCRIPTION |
|---|---|
| STDS_01 | DRAWING SYMBOLS & STANDARDS – ELECTRICAL SYMBOLS & ENCLOSURE SPECIFICATIONS |
| LS-J01 | RTU CONTROL PANEL – PANEL LAYOUT |
| LS-P01 | RTU CONTROL PANEL – AC/DC POWER DISTRIBUTION WIRING DIAGRAM |
| LS-E01 | ANALOG INPUT MODULE – MODULE 1 – CONTROL WIRING DIAGRAM |
| LS-E02 | DISCRETE I/O BASE – MODULE 2 – INPUT CONTROL WIRING DIAGRAM |
| LS-E03 | DISCRETE I/O BASE – MODULE 2 – OUTPUT CONTROL WIRING DIAGRAM |
| LS-E04 | DISCRETE I/O BASE – MODULE 3 – CONTROL WIRING DIAGRAM |
| LS-E05 | WETWELL FLOAT CONTROL – CONTROL WIRING DIAGRAM |



DWG: TITLEBLK.DWG; REV 02/19/02

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

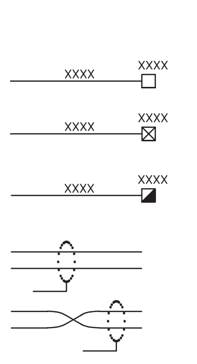
CUSTOMER: CITY OF MERCER ISLAND
DESIGN / CHKD: TP/SED
DRAWN:

CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
DRAWING INDEX

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: INDEX
REV.: D

## TERMINAL AND WIRING IDENTIFICATION




DC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)

AC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)

277 OR HIGHER AC FIELD DEVICE TERMINAL IN TSI PANEL (WIRE AND TERMINAL ARE THE SAME NUMBER)

SHIELDED WIRE

TWISTED SHIELDED WIRE

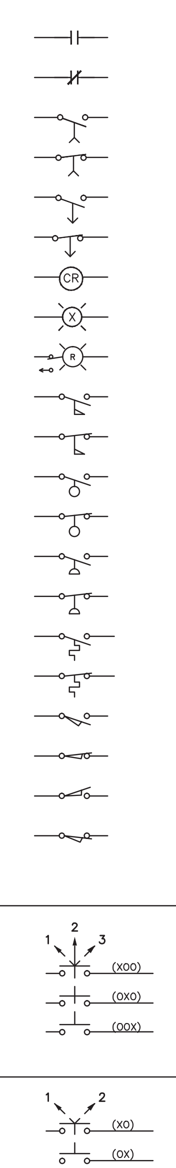
## CONTROL WIRE SPECIFICATION – (UL508A STANDARD)

| APPLICATION | COLOR | SIZE / TYPE |
|---|---|---|
| 480 VAC: POWER / NEUTRAL / GROUND | LOCAL CODE / LOCAL CODE / LOCAL CODE | Min. 12 AWG AS REQUIRED MTW/TEW (TINNED) |
| 240 VAC: POWER / NEUTRAL / GROUND | BLACK / WHITE / GREEN | 12 GA MTW/TEW (TINNED) |
| 120 VAC: POWER / NEUTRAL / GROUND | RED / WHITE / GREEN | 14 AWG (Min) MTW/TEW (TINNED) |
| 24 VDC: POSITIVE / NEGATIVE | BLUE / WHITE/BLUE | 16 AWG (Min) MTW/TEW (TINNED) |
| 12 VDC: POSITIVE / NEGATIVE | BLUE / WHITE/BLUE | 16 AWG (Min) MTW/TEW (TINNED) |
| 120 VAC FOREIGN: POWER / NEUTRAL | YELLOW / WHITE/YELLOW | 14 AWG (Min) MTW/TEW (TINNED) |
| SIGNAL: | RED/BLACK / BLACK/WHITE | 18 AWG (Min) TSP |

## DRAWING DESIGNATIONS

E – ELECTRICAL DRAWINGS
F – FABRICATION DRAWINGS
J – PANEL LAYOUT DRAWINGS
L – LOOP DRAWINGS
M – MECHANICAL DRAWINGS
N – P & ID
P – PANEL POWER WIRING DIAGRAMS
SD – INSTALLATION DETAIL or STANDARD DETAIL DRAWINGS

## DRAWING SYMBOLS




CONTACT – NORMALLY OPEN
CONTACT – NORMALLY CLOSED
CONTACT –NORMALLY OPEN TIME TO CLOSE
CONTACT –NORMALLY CLOSED TIME TO OPEN
CONTACT –NORMALLY OPEN TIME TO OPEN
CONTACT –NORMALLY CLOSED TIME TO CLOSE
COIL – CONTROL RELAY
PILOT LIGHT A–AMBER B–BLUE C–CLEAR G–GREEN R–RED W–WHITE
PILOT LIGHT – PUSH–TO–TEST
FLOW SWITCH – NORMALLY OPEN
FLOW SWITCH – NORMALLY CLOSED
FLOAT SWITCH – NORMALLY OPEN
FLOAT SWITCH – NORMALLY CLOSED
PRESSURE SWITCH – NORMALLY OPEN
PRESSURE SWITCH – NORMALLY CLOSED
TEMPERATURE SWITCH – NORMALLY OPEN
TEMPERATURE SWITCH – NORMALLY CLOSED
LIMIT SWITCH – NORMALLY OPEN (FREE)
LIMIT SWITCH – NORMALLY CLOSED (FREE)
LIMIT SWITCH – NORMALLY OPEN (HELD)
LIMIT SWITCH – NORMALLY CLOSED (HELD)

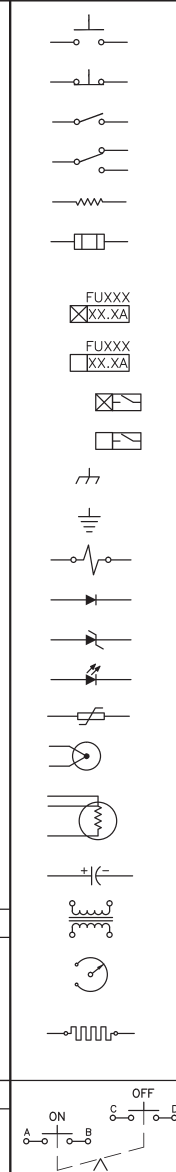
3–POSITION SELECTOR SWITCH

CLOSED IN POSITION–1
CLOSED IN POSITION–2
CLOSED IN POSITION–3

2–POSITION SELECTOR SWITCH

CLOSED IN POSITION–1
CLOSED IN POSITION–2

## DRAWING SYMBOLS

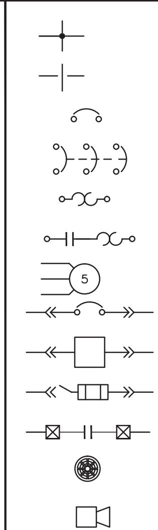



PUSHBUTTON – NORMALLY OPEN
PUSHBUTTON – NORMALLY CLOSED
SWITCH, SINGLE POLE, SINGLE THROW (SPST)
SWITCH, SINGLE POLE, DOUBLE THROW (SPDT)
RESISTOR
FUSE
FUSE WITH BLOWN FUSE INDICATOR – AC
FUSE WITH BLOWN FUSE INDICATOR – DC
SWITCHING TERMINAL BLOCK – AC
SWITCHING TERMINAL BLOCK – DC
GROUND – EARTH
GROUND – CHASSIS
SOLENOID
DIODE
ZENER DIODE
LIGHT EMITTING DIODE
METAL OXIDE VARISTOR (MOV)
THERMOCOUPLE
RTD (3–WIRE)
CAPACITOR – POLARIZED
TRANSFORMER (CPT)
POTENTIOMETER
HEATER

2–POSITION PUSH BUTTON SWITCH

MAINTAINED CONTACTS WITH MECHANICAL INTERLOCK

## DRAWING SYMBOLS




CONNECTION
NO CONNECTION
CIRCUIT BREAKER – SINGLE POLE
CIRCUIT BREAKER – THREE POLE
THERMAL OVERLOAD
MAGNETIC STARTER
MOTOR, 3 PHASE (5 HP)
DRAWOUT CIRCUIT BREAKER – LOW VOLTAGE
DRAWOUT CIRCUIT BREAKER – MEDIUM VOLTAGE
DRAWOUT FUSED SWITCH – MEDIUM VOLTAGE
REMOTE DEVICE WITH TERMINAL POINTS SHOWN
HORN (PIEZO–ELECTRIC)
HORN (VIBRATION)

## PANEL SPECIFICATION – (STANDARD)

PANEL MATERIALS:

| | |
|---|---|
| PANEL SHELL | 12 GA COLD ROLLED STEEL |
| DOORS | 12 GA COLD ROLLED STEEL |
| MOUNTING PANS | 12 GA COLD ROLLED STEEL |

EXTERIOR FINISH:
ALPHATIC AIR DRY POLYURETHANE ENAMEL AND PRIMER.
FINISHED DRY FILM THICKNESS IS 3.0 MILL MINIMUM.
COLOR IS ANSI–61 LIGHT GREY.

INTERIOR FINISH:
ALPHATIC AIR DRY POLYURETHANE ENAMEL AND PRIMER.
FINISHED DRY FILM THICKNESS IS 3.0 MILL MINIMUM.
COLOR IS WHITE

## PANEL LABELING REQUIREMENTS

UL 508A INDUSTRIAL CONTROL EQUIPMENT:

- [x] UNDERWRITERS LABORATORY, INC. – UL
- [ ] ELECTRONIC TESTING LABS, INC. – ETL
- [ ] NON REQUIRED

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|

LISTING
☐ UL508 S/N______
☐ ETL
☐ OTHER______

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775–5696

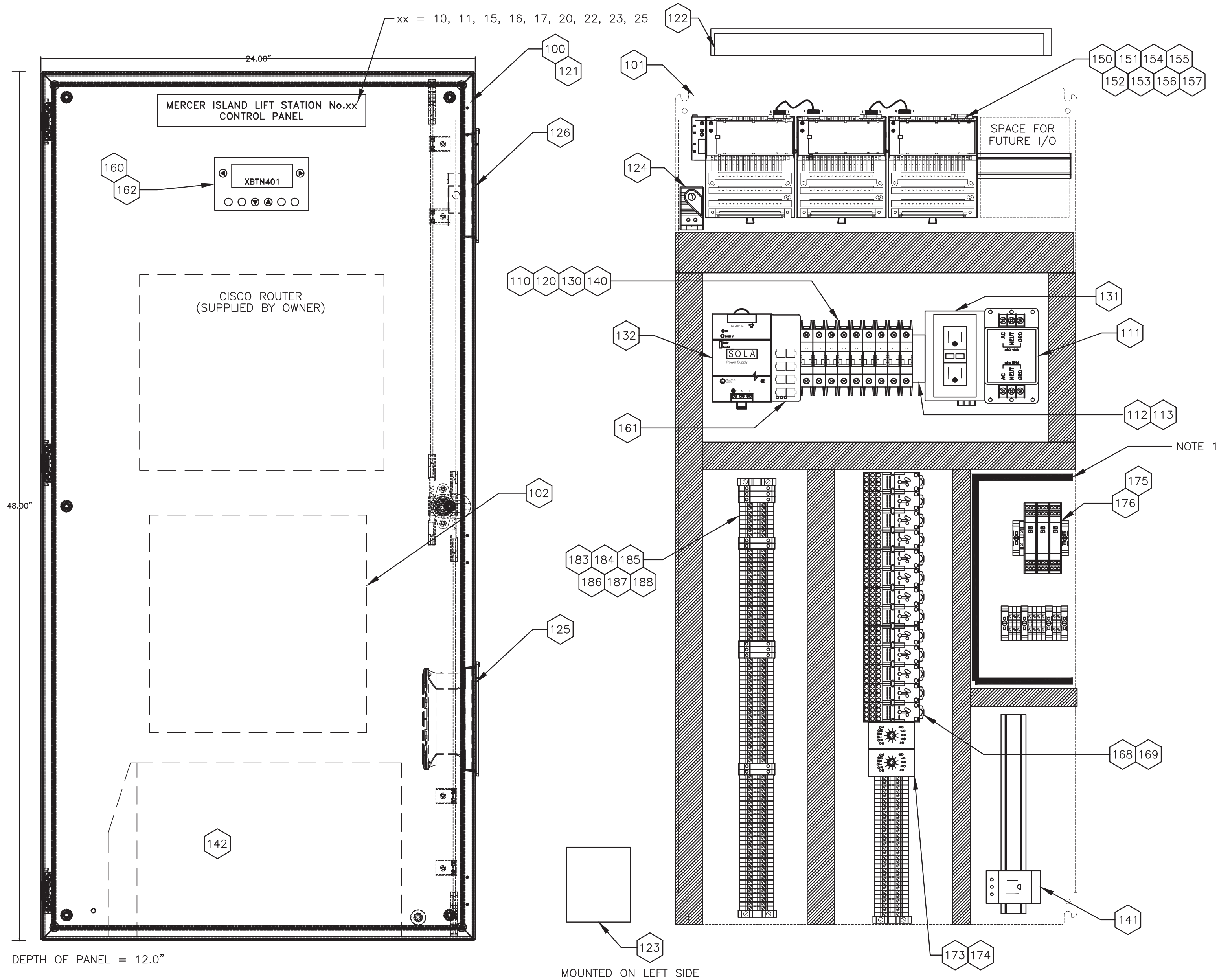
CUSTOMER: CITY OF MERCER ISLAND
DESIGN / CHKD: SED
DRAWN: BR

DRAWING SYMBOLS AND STANDARDS

TECHNICAL SYSTEMS Inc.
DRAWING SYMBOLS & STANDARDS
ELECTRICAL SYMBOLS & ENCLOSURE SPECIFICATIONS

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: STDS_01
REV.: 0

DWG: TITLEBLK.DWG; REV FEB 03




UL NUMBERS

| | |
|---|---|
| LS #10 | BU-499194 |
| LS #11 | BU-499195 |
| LS #15 | BU-499196 |
| LS #16 | BU-499197 |
| LS #17 | BU-499198 |
| LS #20 | BU-499199 |
| LS #22 | BU-499200 |
| LS #23 | BY-728771 |
| LS #25 | BY-728772 |

NOTES
1. CUSTOM METAL BRACKET FOR INTRINSIC SAFE AREA

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

LISTING
■ UL508 S/N
☐ ETL
☐ OTHER

TSI
Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND

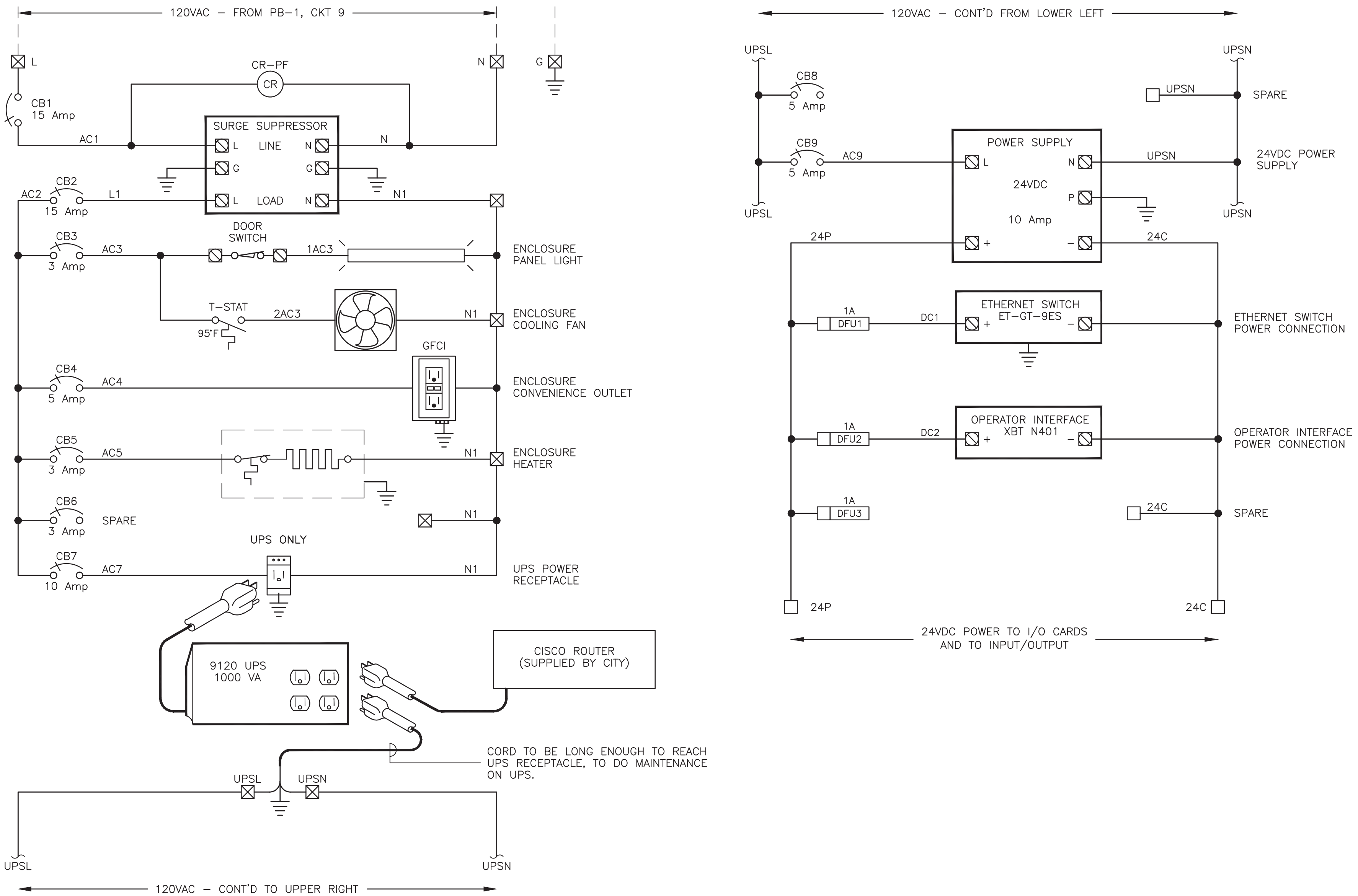
DESIGN / CHKD: TP/SED

DRAWN

CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
RTU CONTROL PANEL
PANEL LAYOUT

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: LS-J01
REV.: D




| | | |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |
| REV | DESCRIPTION/INIT | DATE |

LISTING
☐ UL508 S/N ________
☐ ETL
☐ OTHER ________

TSI Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND

DESIGN / CHKD: TP/SED

DRAWN:

CITY OF MERCER ISLAND

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25

RTU CONTROL PANEL

AC/DC POWER DISTRIBUTION WIRING DIAGRAM

DATE: 25 OCT 10

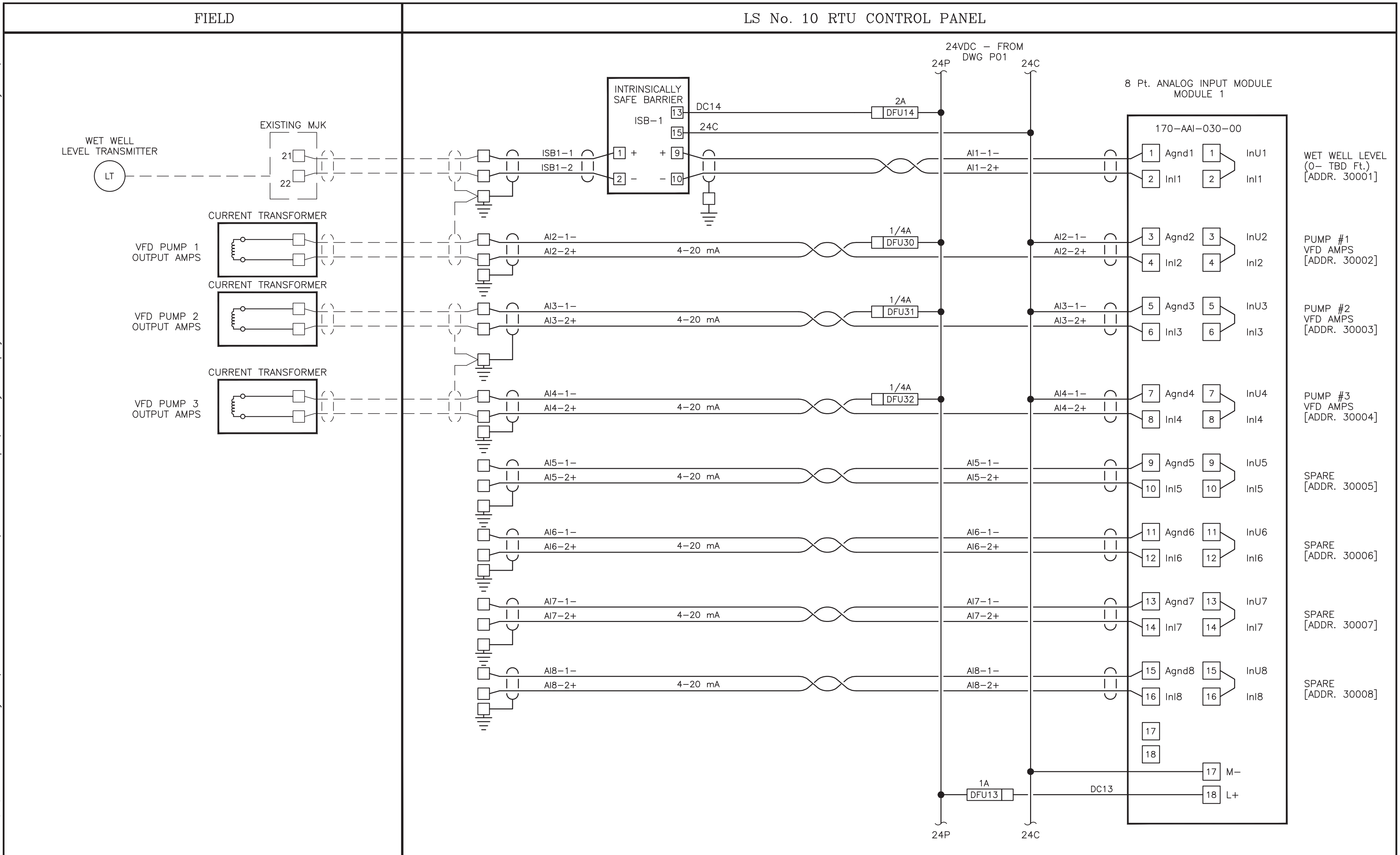
JOB NO.: 7293

DWG. NO.: LS-P01

REV.: D



DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND
DESIGN / CHKD: TP/SED
DRAWN

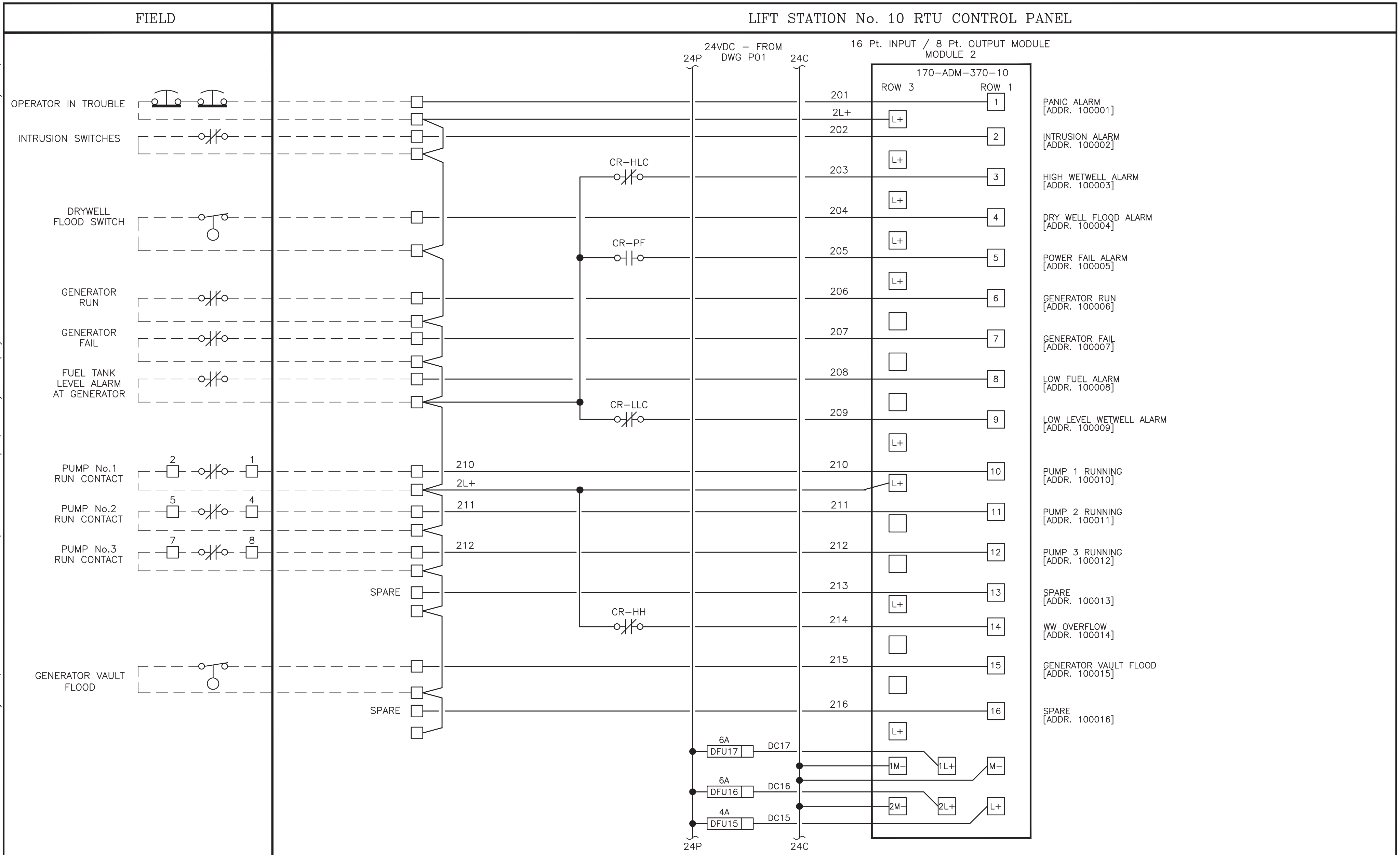
CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
ANALOG INPUT MODULE - MODULE 1
CONTROL WIRING DIAGRAM

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: LS-E01
REV.: D



DWG: TITLEBLK.DWG; REV 02/19/02






| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS–BUILT/JC | 6/16/11 |
| C | SHOP AS–BUILT/AZ | 3/18/11 |

LISTING: ☐ UL508 S/N ☐ ETL ☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775–5696

CUSTOMER: CITY OF MERCER ISLAND

DESIGN / CHKD: TP/SED

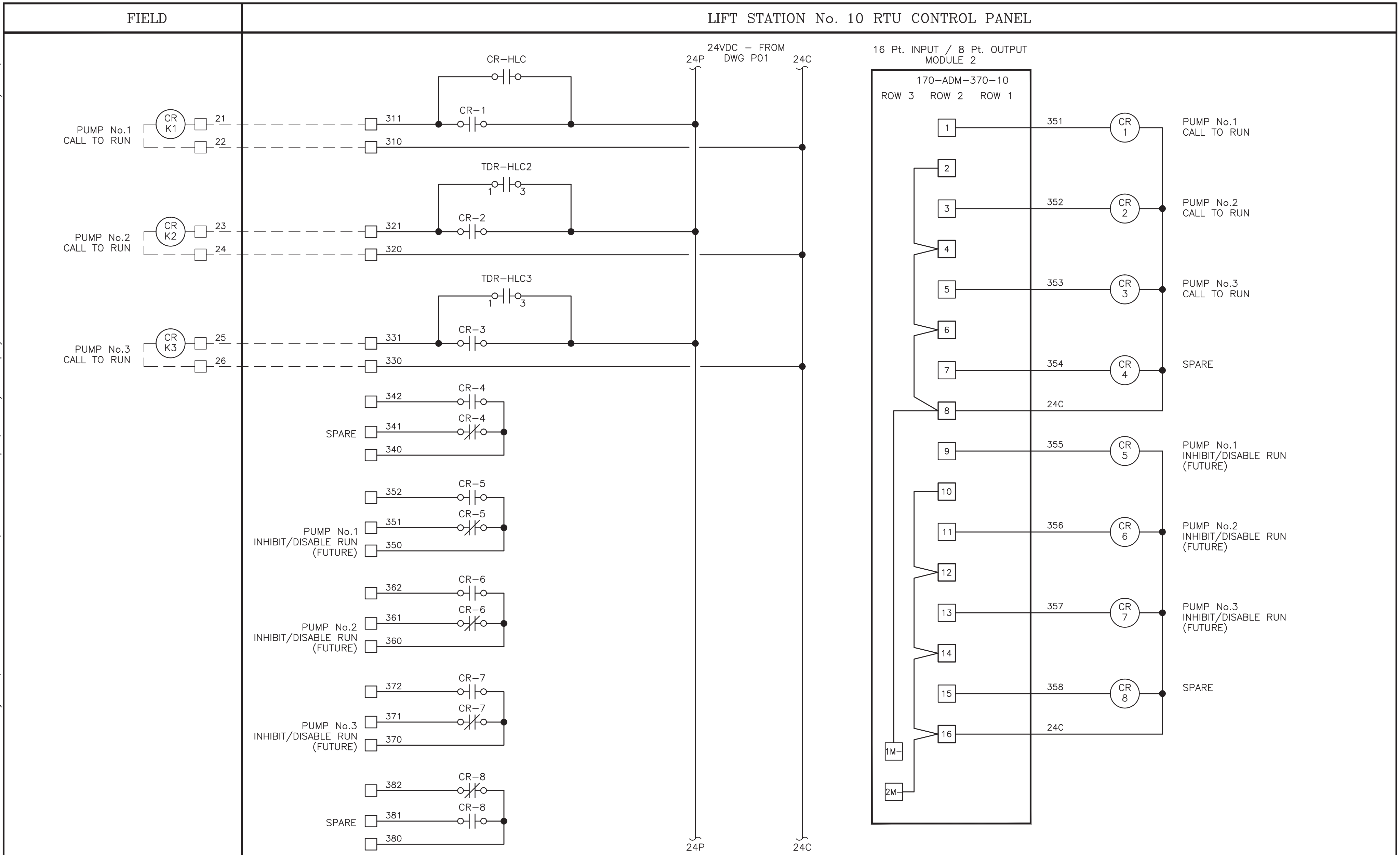
DRAWN

CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
DISCRETE I/O BASE – MODULE 2
INPUT CONTROL WIRING DIAGRAM

DATE: 25 OCT 10
JOB NO. 7293
DWG. NO. LS–E02
REV. D

DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

LISTING
☐ UL508 S/N ________
☐ ETL
☐ OTHER ________

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND
DESIGN / CHKD: TP/SED
DRAWN:

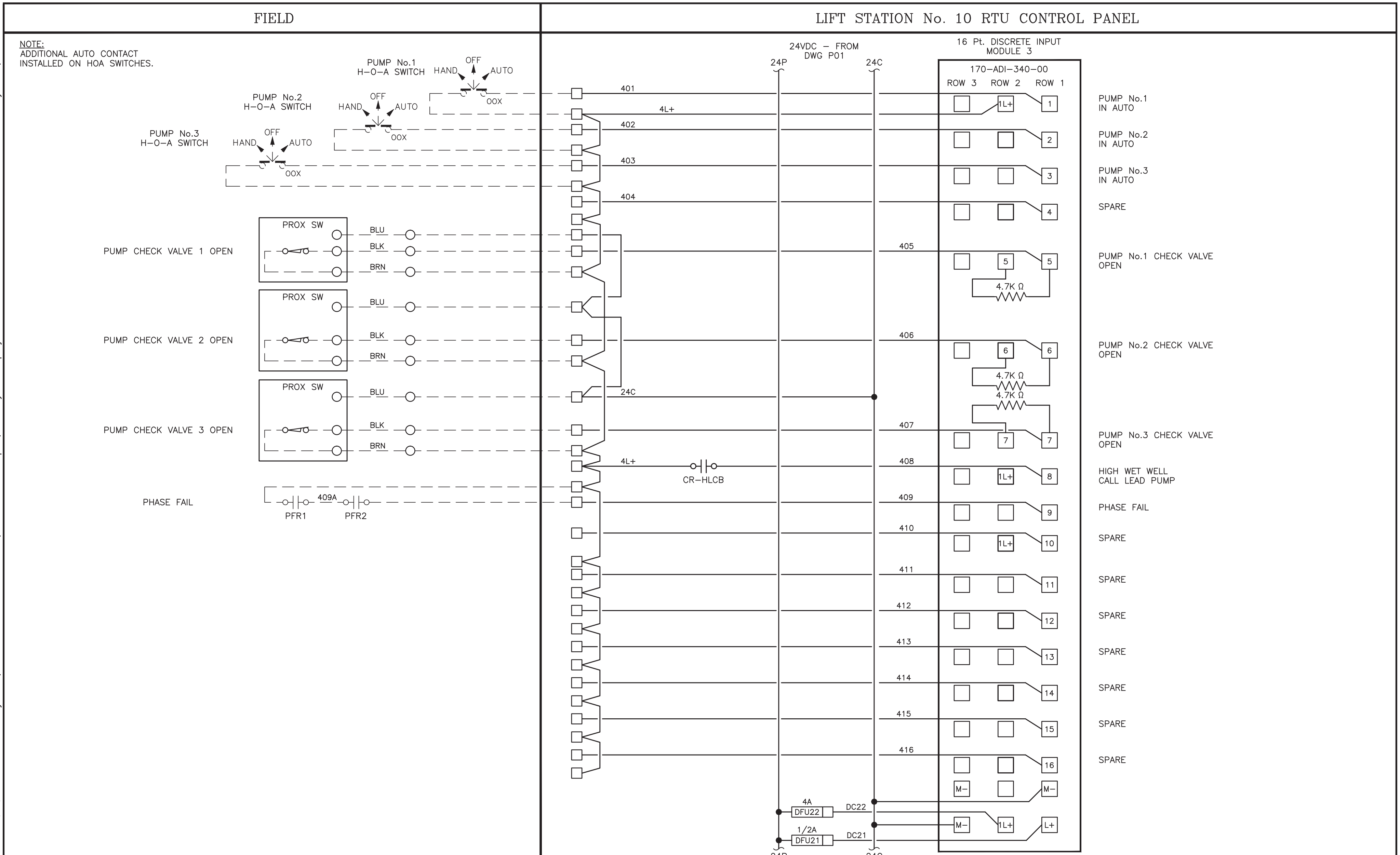
CITY OF MERCER ISLAND, WA

# LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
## DISCRETE I/O BASE - MODULE 2
### OUTPUT CONTROL WIRING DIAGRAM

DATE: 25 OCT 10
JOB NO. 7293
DWG. NO. LS-E03
REV. D



DWG: TITLEBLK.DWG; REV 02/19/02




| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

LISTING
☐ UL508 S/N
☐ ETL
☐ OTHER

Technical Systems Inc.
2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND

DESIGN / CHKD: TP/SED

DRAWN:

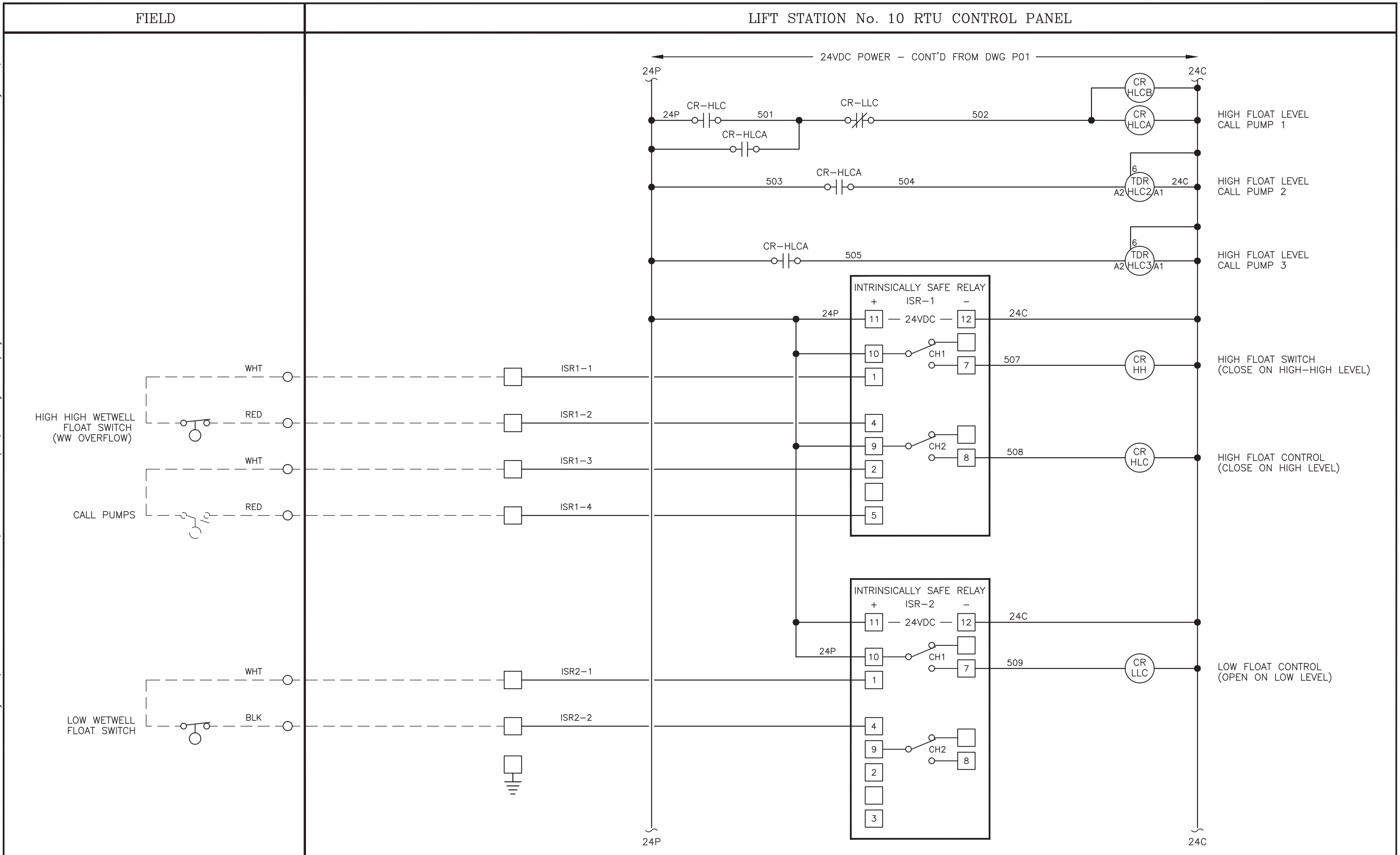
CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
DISCRETE I/O BASE - MODULE 3
CONTROL WIRING DIAGRAM

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: LS-E04
REV.: D



DWG: TITLEBLK.DWG; REV 02/19/02






DWG: TITLEBLK.DWG; REV 02/19/02

| REV | DESCRIPTION/INIT | DATE |
|---|---|---|
| D | FIELD AS-BUILT/JC | 6/16/11 |
| C | SHOP AS-BUILT/AZ | 3/18/11 |

**LISTING**
- ☐ UL508 S/N ______
- ☐ ETL
- ☐ OTHER ______

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2303 196TH ST. S.W.
LYNNWOOD, WA. 98036
(425) 775-5696

CUSTOMER: CITY OF MERCER ISLAND

DESIGN / CHKD: TP/SED

DRAWN:

CITY OF MERCER ISLAND, WA

LIFT STATION No. 10, 11, 15, 16, 17, 20, 22, 23, 25
WETWELL FLOAT CONTROL
CONTROL WIRING DIAGRAM

DATE: 25 OCT 10
JOB NO.: 7293
DWG. NO.: LS-E05
REV.: D

SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

PUMP STATION #14 MODERNIZATION CONSTRUCTION DRAWINGS

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# PUMP STATION #14 MODERNIZATION
## CITY OF MERCER ISLAND, WASHINGTON
## PROJECT NO. WS320R


LOCATION MAP


VICINITY MAP

| INDEX TO DRAWINGS | | |
|---|---|---|
| SHT NO. | DWG NO. | SHEET TITLE |
| GENERAL | | |
| 1 | G1 | TITLE SHEET, LOCATION AND VICINITY MAPS, AND INDEX TO DRAWINGS |
| 2 | G2 | GENERAL NOTES, LEGEND AND ABBREVIATIONS |
| DEMOLITION | | |
| 3 | D1 | WET WELL DEMOLITION PLAN |
| 4 | D2 | GENERATOR VAULT DEMOLITION PLAN |
| CIVIL | | |
| 5 | C1 | SITE PLAN |
| 6 | C2 | MECHANICAL SECTIONS |
| 7 | C3 | MECHANICAL SECTION AND DETAILS |
| STRUCTURAL | | |
| 8 | S1 | TANK LID PLAN AND DETAILS |
| 9 | S2 | DETAILS |
| ELECTRICAL | | |
| 10 | E1 | ELECTRICAL NOTES, SYMBOLS, AND LEGEND |
| 11 | E2 | ELECTRICAL SITE PLAN |
| 12 | E3 | ELECTRICAL PLANS AND SECTIONS |
| 13 | E4 | ELECTRICAL ONE-LINE DIAGRAM, LOAD SCHEDULE AND CONDUIT INTERCONNECT |
| 14 | E5 | PUMP CONTROL WIRING ELEMENTARY |

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED K. TAYLOR |
| | | | DRAWN K. TAYLOR |
| | | | CHECKED D. ROBERTS |
| | | | APPROVED D. ROBERTS |

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002G-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

Parametrix
1019 39TH AVENUE SE SUITE 100 PUYALLUP WASHINGTON 98374
T 253.604.6600 F 253.604.6799
www.parametrix.com
ENGINEERING PLANNING ENVIRONMENTAL SCIENCES

PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

TITLE SHEET
LOCATION AND VICINITY MAPS
AND INDEX TO DRAWINGS

SHEET NO. 1 OF 14
G1

LAYOUT: G1 PATH: L:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\98Scad\CADD\DWG\ PLOTTED BY: taylork DATE: Tuesday, October 08, 2013 3:08:30 PM

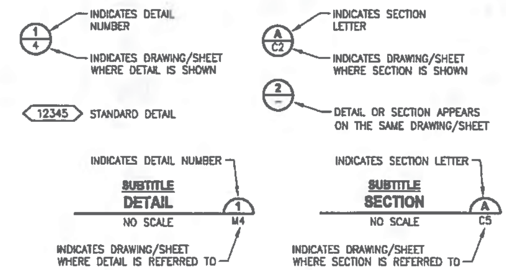
## LEGEND

| DESCRIPTION | EXISTING | PROPOSED |
|---|---|---|
| RIGHT OF WAY LINE | | |
| VACATED RIGHT OF WAY LINE | | |
| LOT LINE | | |
| CENTER LINE | | |
| MAJOR CONTOUR | | |
| MINOR CONTOUR | | |
| EDGE OF ASPHALT | | |
| CURB | | |
| CONCRETE | | |
| PATH | | |
| SIDEWALK | | |
| WOOD FENCE | | |
| SEWER PIPE | | |
| SEWER FITTINGS | | |
| CATCH BASIN | | |
| SANITARY SEWER MANHOLE | | |
| WATER VALVE | | |
| FIRE HYDRANT | | |
| WATER BIB | | |
| POWER METER | | |
| POWER POLE | | |
| POWER VAULT | | |
| BOLLARD | | |
| DECIDUOUS TREE | | |
| ROCKERY WALL | | |
| NEW PAVEMENT | | |
| OVERLAY | | |
| CHRUSHED SURFACING TOP COURSE | | |

## ABBREVIATIONS

| | |
|---|---|
| A | AMPERE |
| AB | ANCHOR BOLT |
| ATS | AUTOMATIC TRANSFER SWITCH |
| BF | BLIND FLANGE |
| BND | BND |
| CLR | CLEAR, CLEARANCE |
| CONT | CONTINUE, CONTINUOUS |
| CSTC | CRUSHED SURFACING TOP COURSE |
| D | DEEP, DRAIN |
| DEMO | DEMOLISH |
| DET | DETAIL |
| DI | DUCTILE IRON |
| DIA | DIAMETER |
| DIV | DIVISION |
| DP | DISTRIBUTION PANEL |
| E | EAST, EASTING |
| EL, ELEV | ELEVATION |
| EQ | EQUAL |
| EW | EACH WAY |
| EX | EXISTING |
| FCA | FLANGE COUPLING ADAPTER |
| FL | FLANGE |
| FVNR | FULL VOLTAGE, NON REVERSING |
| GEN | GENERATOR |
| GFCI | GROUND FAULT CIRCUIT INTERRUPTER |
| GPS | GLOBAL POSITIONING SYSTEM |
| H | HIGH |
| IE | INVERT ELEVATION |
| IPT | IRON PIPE THREAD |
| LED | LIGHT EMITTING DIODE |
| LT | LEFT |
| MFR | MANUFACTURER |
| MIN | MINIMUM |
| MJ | MECHANICAL JOINT |
| N | NORTH, NORTHING |
| NAD | NORTH AMERICAN DATUM |
| NE | NORTHEAST |
| NEMA | NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION |
| NFPA | NATIONAL FIRE PROTECTION ASSOCIATION |
| NW | NORTHWEST |
| OC | ON CENTER |
| PB | PUSH BUTTON |
| PE | PLAIN END |
| P | PHASE |
| PL | PLATE |
| PSE | PUGET SOUND ENERGY |
| PSI | POUNDS PER SQUARE INCH |
| REQ'D | REQUIRED |
| RT | RIGHT |
| RTU | REMOTE TELEMETRY UNIT |
| S | SEWER |
| SCH | SCHEDULE |
| SE | SOUTHEAST |
| SECT | SECTION |
| SIM | SIMILAR |
| SS | SANITARY SEWER |
| SSFM | SANITARY SEWER FORCE MAIN |
| SST | STAINLESS STEEL |
| STA | STATION |
| T & B | TOP AND BOTTOM |
| T.O. | TOP OF |
| TYP | TYPICAL |
| UNO | UNLESS NOTED OTHERWISE |
| V | VOLT |
| W/ | WITH |
| W | WIDE |

## DETAIL AND SECTION DESIGNATION




**HORIZONTAL DATUM:**
WASHINGTON STATE PLANE COORDINATE SYSTEM, NAD 83/2011, NORTH ZONE PER GPS TIES TO WASHINGTON STATE RESOURCE NETWORK (WSRN).

**VERTICAL DATUM:**
WASHINGTON STATE PLANE COORDINATE SYSTEM, NAD 83/2011, NORTH ZONE PER GPS TIES TO WASHINGTON STATE RESOURCE NETWORK (WSRN).

**PROJECT CONTROL:**

PMX #9001
SET MAGNETIC NAIL AT THE SOUTH EDGE OF ASPHALT 2' WEST OF ROCK PAINTED 4305.
N 210419.816 E 1294953.703 ELEV. 28.70

PMX #9002
SET MAGNETIC NAIL 1.0' S. OF THE NORTH EDGE OF ASPHALT AT THE EASTERLY RETURN FOR DRIVEWAY TO NEW HOUSE. ADDRESS NOT SHOWN.
N 210447.201 E 1294953.703 ELEV. 48.89


PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: taylork DATE: Tuesday, October 08, 2013 3:08:52 PM LAYOUT: G2

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED K. TAYLOR |
| | | | DRAWN K. TAYLOR |
| | | | CHECKED D. ROBERTS |
| | | | APPROVED D. ROBERTS |

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002G-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

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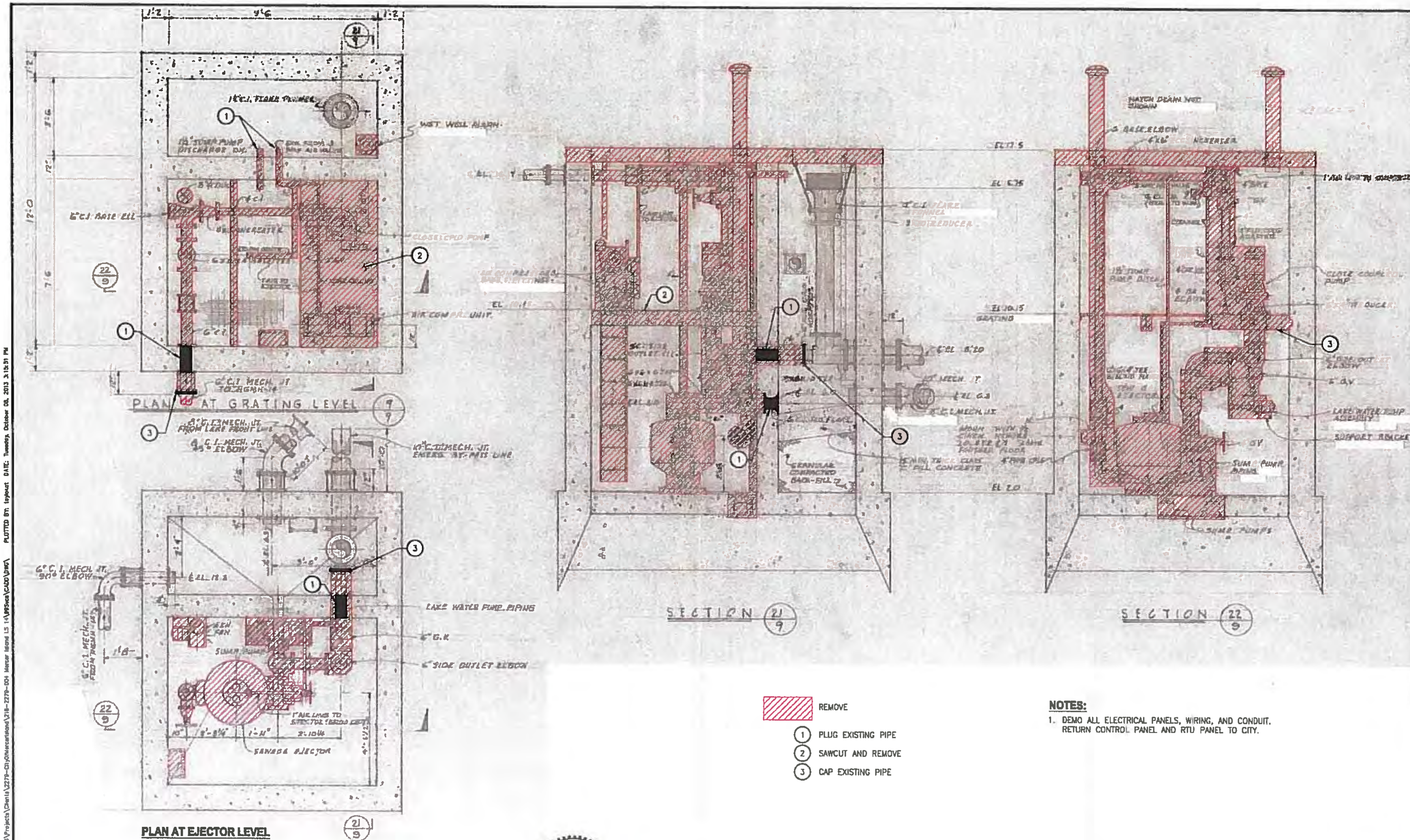
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON


GENERAL NOTES
LEGEND AND ABBREVIATION

SHEET NO. 2 OF 14
G2




REMOVE

1. PLUG EXISTING PIPE
2. SAWCUT AND REMOVE
3. CAP EXISTING PIPE

**NOTES:**

1. DEMO ALL ELECTRICAL PANELS, WIRING, AND CONDUIT. RETURN CONTROL PANEL AND RTU PANEL TO CITY.

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED R. HERMES |
| | | | DRAWN K. TAYLOR |
| | | | CHECKED D. ROBERTS |
| | | | APPROVED D. ROBERTS |

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU22790020-D1
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

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1019 39TH AVENUE SE, SUITE 100
PUYALLUP, WASHINGTON 98374
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PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

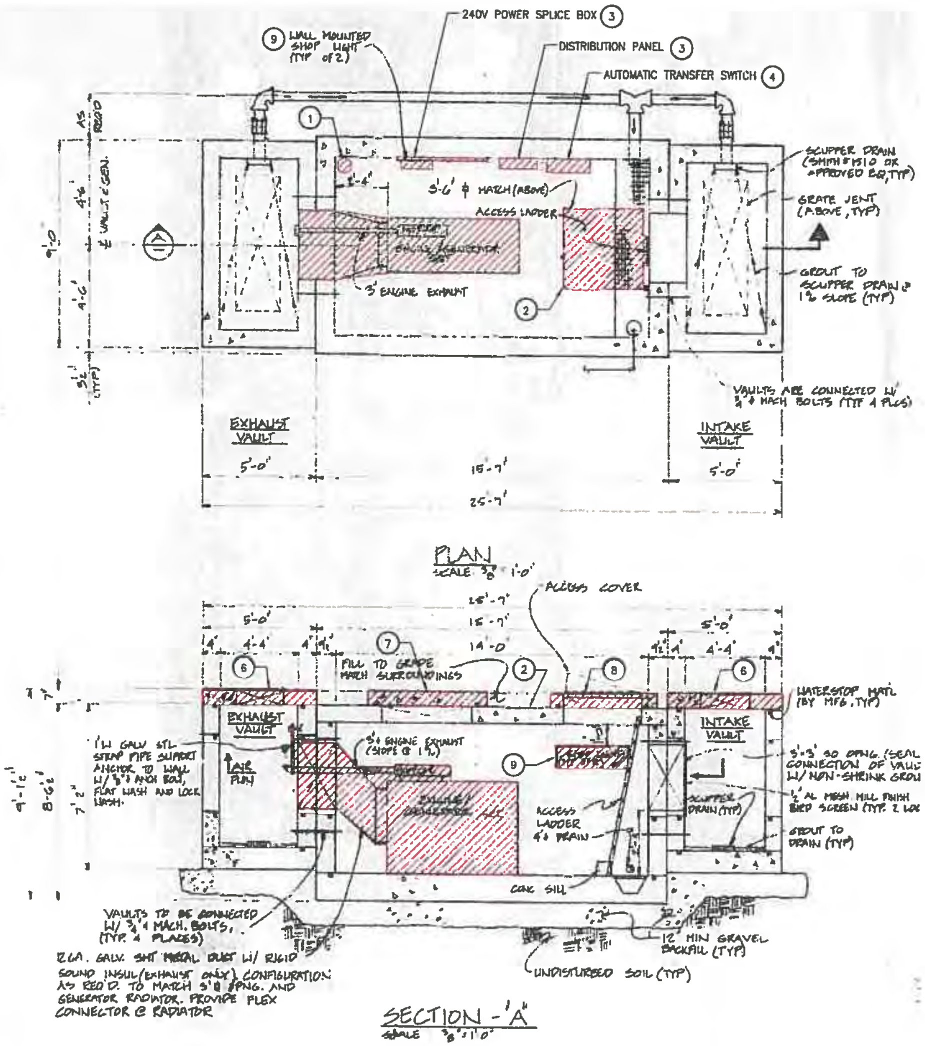
# WET WELL DEMOLITION PLAN

SHEET NO. 3 OF 14

D1

PLOTTED BY: laydout DATE: Tuesday, October 08, 2013 3:15:31 PM

LAYOUT: D1




**NOTES:**

1. SUMP PIT AND ASSOCIATED PIPING SHOWN ON OPPOSITE END OF VAULT. LOCATION OF SUMP & ASSOCIATED DRAIN PIPING CONNECTIONS TO BE FIELD LOCATED. REMOVE AND REPLACE EXISTING SUMP PUMP IN KIND. USE SCH 80 PVC FITTINGS (SAME SIZE AS EXISTING) TO CONNECT TO DISCHARGE.
2. REMOVE UTILITY VAULT 814 TOP SECTION AND LADDER AND REINSTALL AFTER INSTALLATION OF NEW GENERATOR.
3. CONDUITS FOR RECEPTACLES MAY BE SALVAGED FOR REUSE.
4. DEMOLISH ASSOCIATED POWER AND CONTROL CONDUITS AND WIRING. CAP CONDUITS EXITING VAULT.
5. CONTRACTOR TO SALVAGE GENERATOR AND ATS. CONTRACTOR TO ARRANGE DELIVERY TO THE CITY'S MAINTENANCE FACILITY.
6. REMOVE UTILITY VAULT NO. 4484-TL2-332P TOP SECTION WITH 2 NO. 332 GRATE/VENTS. REPLACE WITH SAME BUT WITH SPRING ASSISTED GRATE.
7. REMOVE UTILITY VAULT NO. 460 SOLID COVER AND REINSTALL AFTER INSTALLATION OF NEW GENERATOR.
8. REMOVE UTILITY VAULT NO. 4242 COVER AND REPLACE WITH NEW 4242 COVER WITH BILCO CO J-5ALH20 3'-6"x3'-6" ACCESS COVER WITH RECESSED PADLOCK HASP. CONNECT HATCH DRAIN TO SUMP PIT.
9. REMOVE WALL MOUNTED SHOP LIGHTS (TYP OF 2). REPLACE IN KIND.

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED O. AGUSTSSON |
| | | | DRAWN K. TAYLOR |
| | | | CHECKED D. ROBERTS |
| | | | APPROVED D. ROBERTS |

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002D-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

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PUYALLUP, WASHINGTON 98374
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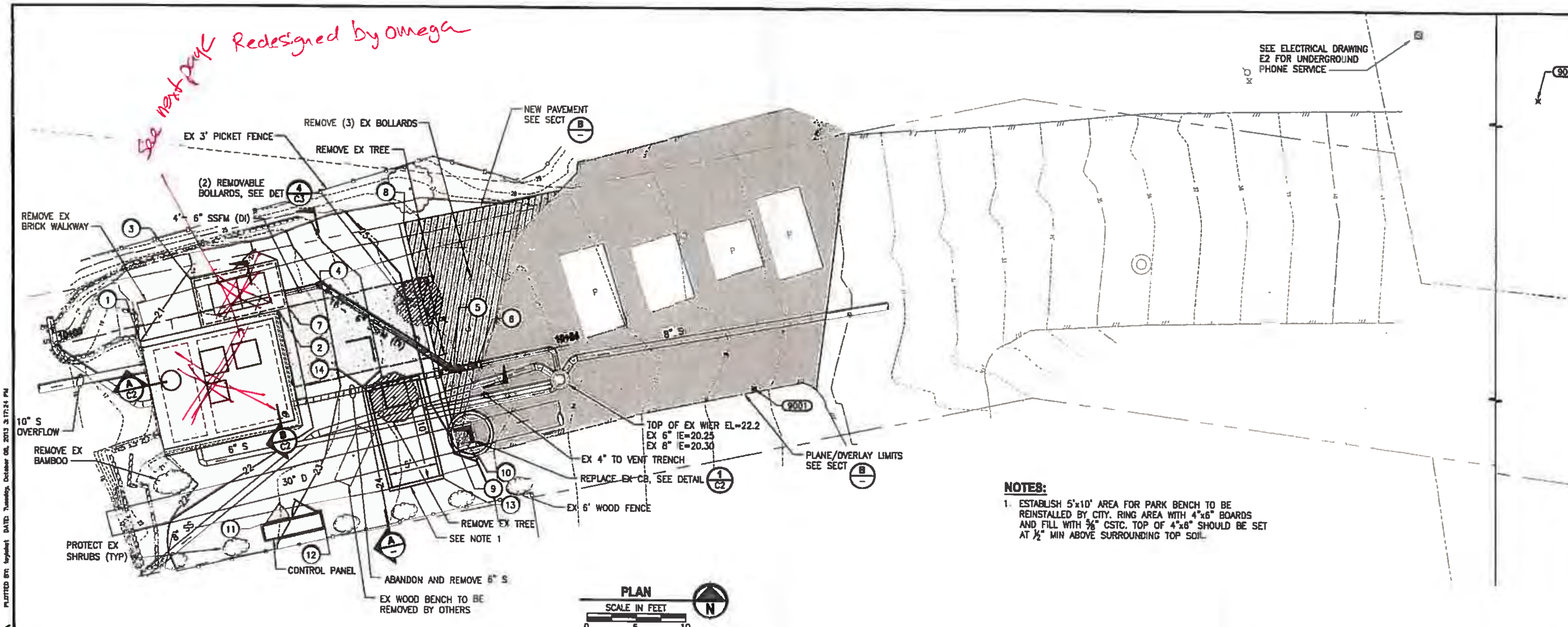
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

# GENERATOR VAULT DEMOLITION PLAN

SHEET NO. 4 OF 14
D2

See next page / Redesigned by omega

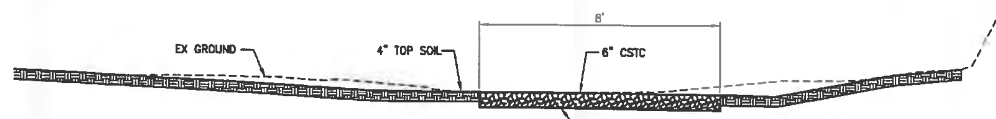



## NOTES:

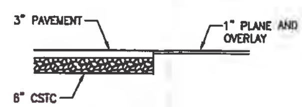
1. ESTABLISH 5'x10' AREA FOR PARK BENCH TO BE REINSTALLED BY CITY. RING AREA WITH 4"x6" BOARDS AND FILL WITH 5/8" CSTC. TOP OF 4"x6" SHOULD BE SET AT 1/2" MIN ABOVE SURROUNDING TOP SOIL.

PLAN
SCALE IN FEET
0 5 10

| NO. | STA / OFFSET | NORTHING | EASTING | EL / IE | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | 10+06.6, 1.5' RT | 210424.28 | 1294789.79 | EL=20.75 | TOP OF SLAB, NW CORNER OF PS14 |
| 2 | 10+21, 1.5' RT | 210427.49 | 1294803.76 | EL=22.00 | TOP OF WALL, NE CORNER OF PS14 |
| 3 | 10+13.1, 3.5' LT | 210430.59 | 1294794.94 | EL=22.00 | NW CORNER OF VALVE VAULT |
| 4 | 10+25.8 | 210430.04 | 1294808.15 | IE=19.3 | 6" 45' BND (PExMJ) |
| 5 | 10+41.8 | 210421.58 | 1294821.65 | IE=19.8 | 6" 45' BND (MJ) |
| 6 | 10+44.2 | 210422.09 | 1294824.01 | IE=19 9 | CONNECT TO EX 6"SS, 6" SOLID SLEEVE (MJ) |
| 7 | 10+22.1, 1.5' RT | 210427.73 | 1294804.83 | EL=22.00 | SE CORNER OF VALVE VAULT |
| 8 | 10+29.6, 9.9' LT | 210436.42 | 1294816.58 | TOC=26.00 | BEGIN CURB |
| 9 | 10+41.8, 8.1' RT | 210413.55 | 1294822.19 | TOC=25.00 | CURB |
| 10 | 10+42.4, 9.1' RT | 210432.38 | 1294813.15 | TOC=25.00 | CURB |
| 11 | 10+14.4, 22.2' RT | 210405.87 | 1294802.01 | EL=23.37 | NW CORNER ELECTRICAL PAD |
| 12 | 10+39.2, 20.6' RT | 210405.51 | 1294808.59 | EL=23.37 | SE CORNER ELECTRICAL PAD |
| 13 | 10+41.8, 10.8' RT | 210410.66 | 1294820.67 | EL=24.96 | SE CORNER PARK BENCH PAD, NE CORNER EL=24.96 |
| 14 | 10+35.1, 6.4' RT | 210419.67 | 1294812.62 | EL=24.11 | NW CORNER PARK BENCH PAD, SW CORNER EL=24.11 |




SITE SECTION
SECTION A
NO SCALE




PAVEMENT AND OVERLAY
SECTION B
NO SCALE

| REVISIONS | DATE | BY | DESIGNED R. HERMES; DRAWN K. TAYLOR; CHECKED D. ROBERTS; APPROVED D. ROBERTS |
|---|---|---|---|

ONE INCH AT FULL SCALE, IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002C-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

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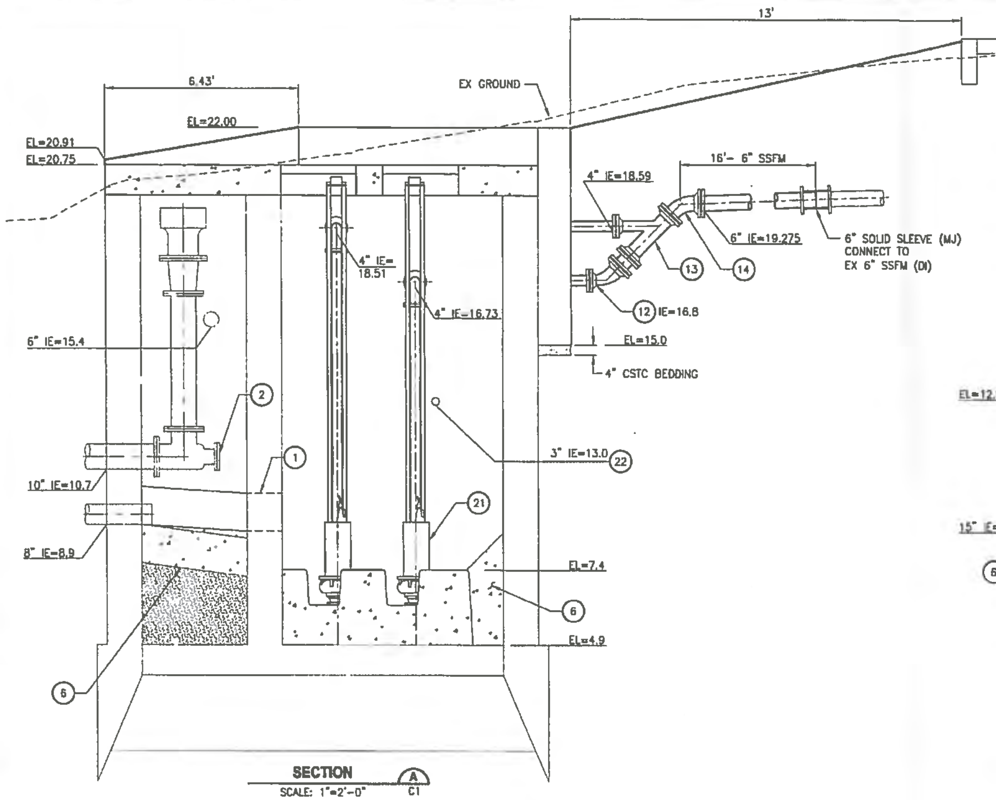
ENGINEERING. PLANNING. ENVIRONMENTAL SCIENCES
1019 39TH AVENUE SE, SUITE 100 PUYALLUP, WASHINGTON 98374

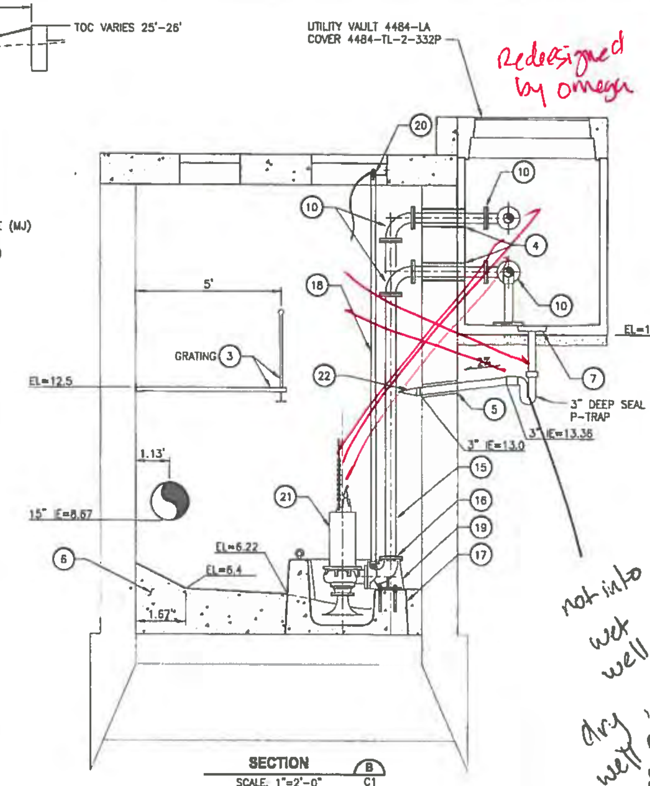
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

SITE PLAN

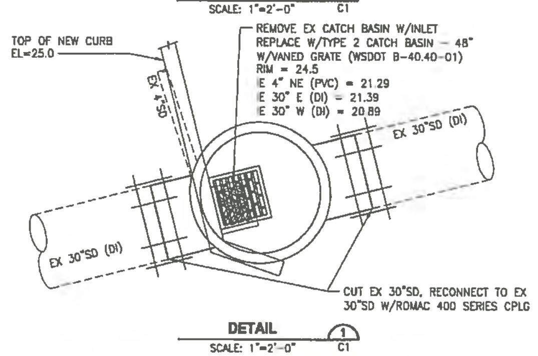
SHEET NO. 5 OF 14
C1




SECTION A / C1
SCALE: 1"=2'-0"




SECTION B / C1
SCALE: 1"=2'-0"




DETAIL 1 / C1
SCALE: 1"=2'-0"

**KEY NOTES:**

1. CORE 15" DIA HOLE, 15" IE 8.67
2. 6" BF W/2" IPT TAP
3. INSTALL NEW FIBERGLASS SUPPORT BEAM HANDRAIL AND GRATING
4. CORE 7" DIA HOLE, PIPE PENETRATION SEE DET 2/C3
5. CORE 5" DIA HOLE, PIPE PENETRATION SEE DET 2/C3
6. POURED IN-PLACE CONCRETE CHAMBER
7. VAULT FLOOR DRAIN, SEE DET 3/C3
8. 4" CHECK VALVE (FL) W/ LIMIT SWITCH
9. 4" PLUG VALVE (FL)
10. 4" 90° LONG RADIUS BND (FL)
11. 4" FCA
12. 4"x6" 45° BND (MJ)
13. 6"x4" WYE (MJ)
14. 6" 45° BND (PExMJ)
15. 4" DI PIPE
16. 4" DI FLANGE
17. WEMCO PRECAST PREROTATION BASIN 600
18. 1½" DIA SCH 40 PIPE GLIDE RAILS
19. WEMCO FAST-OUT/GLIDE-SHOE
20. WEMCO UPPER BRACKET
21. WEMCO-HIDROSTAL PUMP(S) DAK-HS W/LIFTING CHAIN
22. 3" TIDEFLEX SERIES TF-2

dry well goes under neath
over excavate and drain into ground

**GENERAL NOTES:**

1. ALL FITTINGS AND JOINTS TO BE RESTRAINED.

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED R. HERMES |
| | | | DRAWN K. TAYLOR |
| | | | CHECKED D. ROBERTS |
| | | | APPROVED D. ROBERTS |

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FILE NAME PU2279002C-01
JOB No. 218-2279-004
DATE OCTOBER 2013

RICKY V. HERMES — STATE OF WASHINGTON — 13828 — REGISTERED PROFESSIONAL ENGINEER
10/8/13

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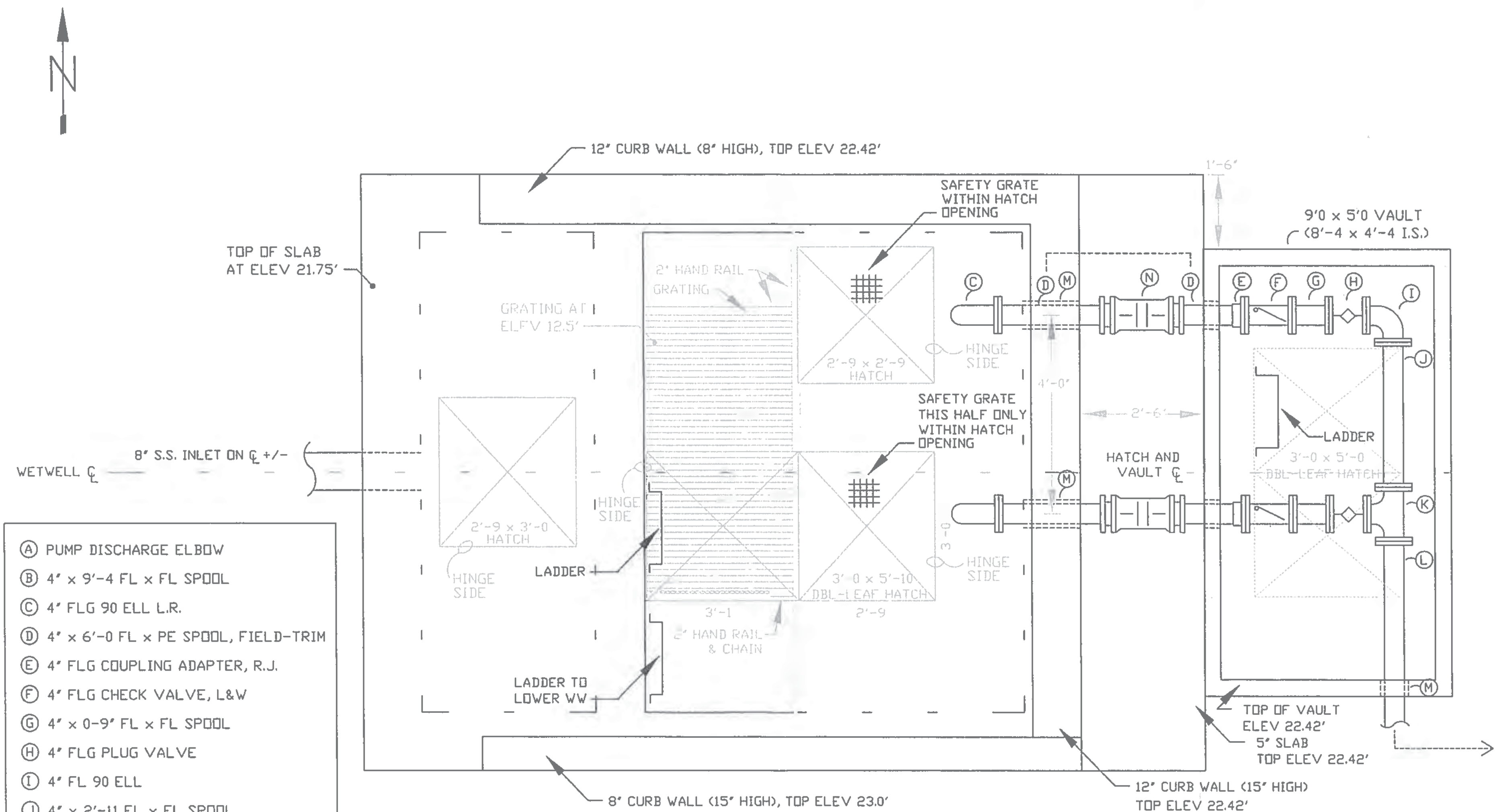
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND WASHINGTON

MECHANICAL SECTIONS

SHEET NO. 8 OF 14
C2

LAYOUT: C2 PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\218-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: bgiebel DATE: Tuesday, October 08, 2013 3:17:37 PM




- Ⓐ PUMP DISCHARGE ELBOW
- Ⓑ 4" x 9'-4 FL x FL SPOOL
- Ⓒ 4" FLG 90 ELL L.R.
- Ⓓ 4" x 6'-0 FL x PE SPOOL, FIELD-TRIM
- Ⓔ 4" FLG COUPLING ADAPTER, R.J.
- Ⓕ 4" FLG CHECK VALVE, L&W
- Ⓖ 4" x 0-9" FL x FL SPOOL
- Ⓗ 4" FLG PLUG VALVE
- Ⓘ 4" FL 90 ELL
- Ⓙ 4" x 2'-11 FL x FL SPOOL
- Ⓚ 4" FLG TEE
- Ⓛ 4" x 4'-6 FL x PE SPOOL
- Ⓜ CORED HOLES WITH LINK SEALS
- Ⓝ 4" MJ SLEEVE

| NO. | REVISION | BY | DATE | APPR |
|---|---|---|---|---|
| 1 | BUILD ISSUE | LP | 6-6-14 | GW |
| 0 | ORIGINAL ISSUE | LP | 5-2-14 | GW |

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1/2"=1'-0"

CITY OF MERCER ISLAND

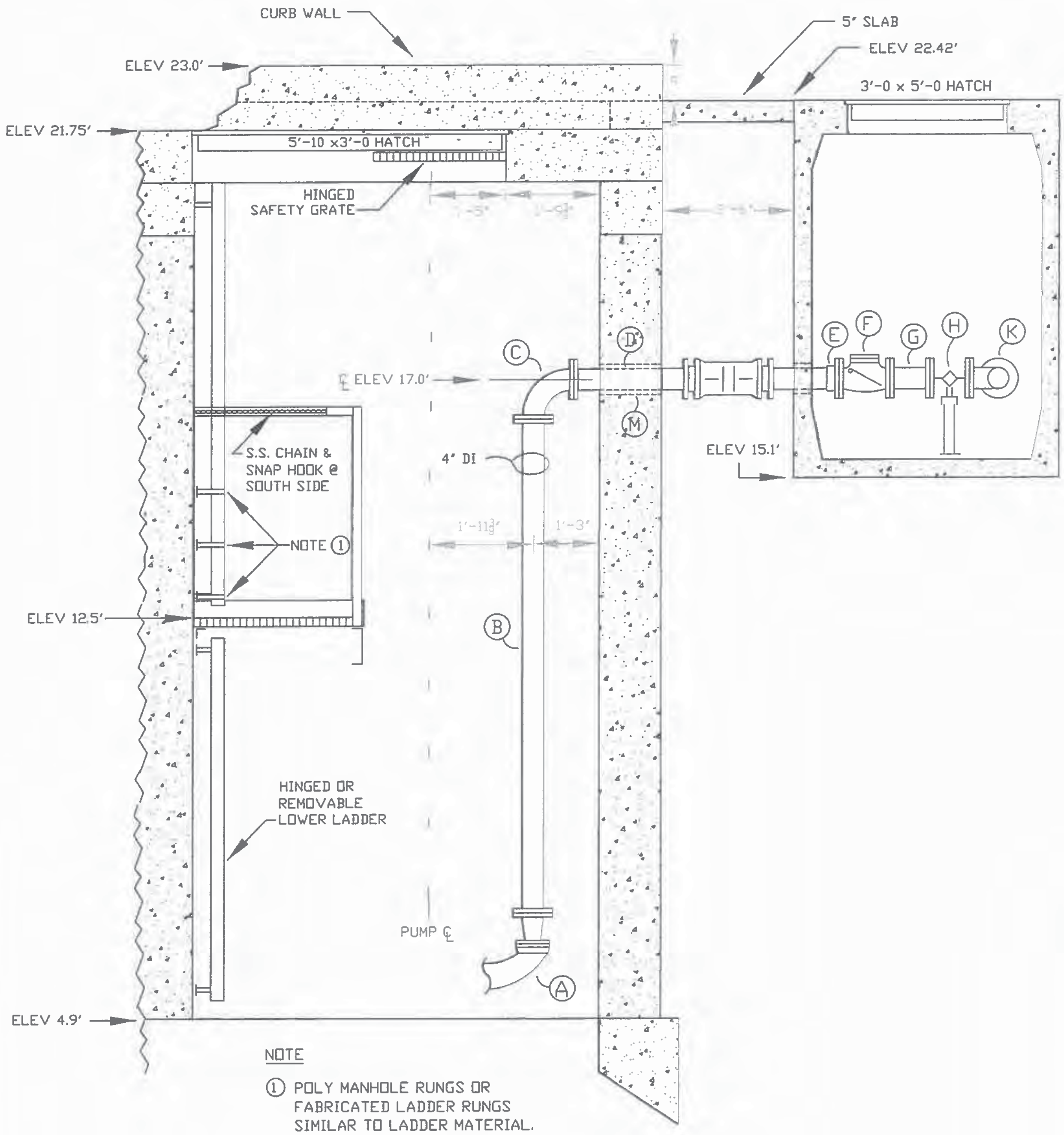
PUMP STATION NO 14 MODERNIZATION

MECHANICAL PLAN

6-6-14

1609

1 of 2




NOTE

① POLY MANHOLE RUNGS OR FABRICATED LADDER RUNGS SIMILAR TO LADDER MATERIAL.

| NO. | REVISION | BY | DATE | APPR |
|---|---|---|---|---|
| 1 | BUILD ISSUE | LP | 6-6-14 | GW |
| 0 | ORIGINAL ISSUE | LP | 4-28-14 | GW |

OMEGA CONTRACTORS, INC

OMEGA CONTRACTORS, INC

OMEGA CONTRACTORS, INC

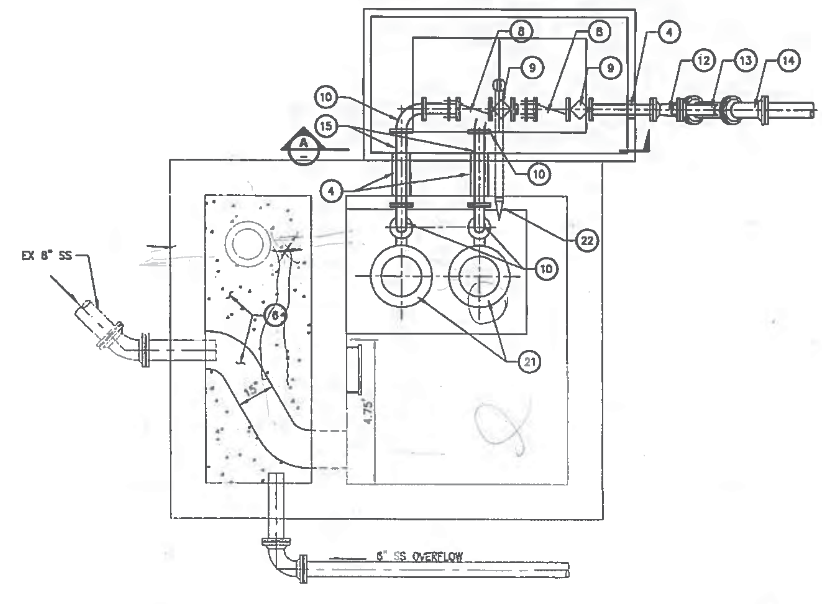
1/2"=1'-0"

CITY OF
MERCER ISLAND

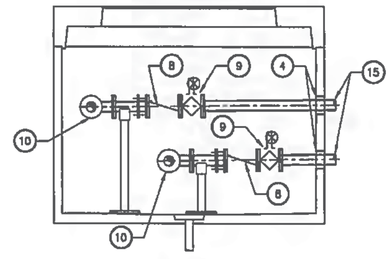
PUMP STATION NO. 14 MODERNIZATION
MECHANICAL ELEVATION

6-6-14

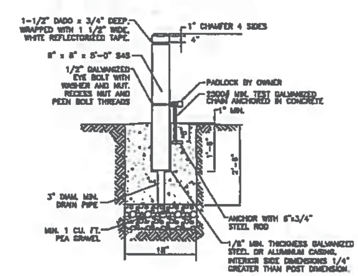
1609




**DETAIL** 1 / C1
SCALE: 1"=2'-0"



**SECTION** A
SCALE: 1"=2'-0"




**REMOVABLE BOLLARD**
NO SCALE

NOTES
1. TIMBER SHALL BE DOUGLAS FIR, DENSE CONSTRUCTION GRADE, AND SHALL BE PRESSURE TREATED WITH A WATERBORNE PRESERVATIVE (ACA, CCA, ACZA) IN ACCORDANCE WITH THE REQUIREMENTS OF SEC. 9-09.3(4) OF THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. THE BOLLARD SHALL BE STAINED WITH TWO COATS OF "OLYMPIC NEW BARK" STAIN, WITH TOP 5" PAINTED WHITE.
3. STEEL TUBE SHALL CONFORM TO ASTM A53 GRADE A.
4. NUTS, BOLTS, & WASHERS SHALL CONFORM TO ASTM A307.
5. ALL STEEL PARTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
6. CONCRETE SHALL BE CLASS A.
7. A HASP MAY BE SUBSTITUTED FOR THE CHAIN UPON APPROVAL BY THE ENGINEER.
8. PITCH GRADE ON BOTH FIXED AND REMOVABLE BOLLARD TO DRAIN AWAY FROM POST.
9. FIXED BOLLARDS NOT SPECIFIED, BUT SHOWN IN CASE CONTRACTOR MUST REPLACE DUE TO DAMAGE TO EXISTING BOLLARDS.

| CITY OF MERCER ISLAND STANDARD DETAILS STREETS | | |
|---|---|---|
| REMOVABLE BOLLARD DETAIL | | |
| 8/12/2013 | NO SCALE | PD-26 |

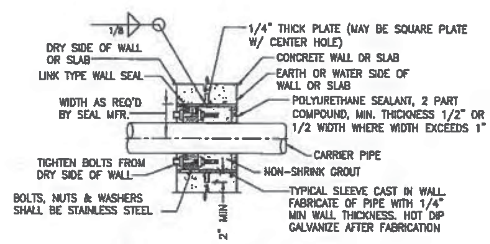
**REMOVABLE BOLLARD DETAIL** 4 / C1
NO SCALE

## KEY NOTES:

1. CORE 15" DIA HOLE, 15" IE 8.67
2. 6" BF W/2" IPT TAP
3. INSTALL NEW FIBERGLASS SUPPORT BEAM HANDRAIL AND GRATING
4. CORE 7" DIA HOLE, PIPE PENETRATION SEE DET 2/–
5. CORE 5" DIA HOLE, PIPE PENETRATION SEE DET 2/–
6. POURED IN-PLACE CONCRETE CHANNEL
7. VAULT FLOOR DRAIN, SEE DET 3/–
8. 4" CHECK VALVE (FL) W/ LIMIT SWITCH
9. 4" PLUG VALVE (FL)
10. 4" 90° LONG RADIUS BND (FL)
11. 4" FCA
12. 4"x6" 45° BND (MJ)
13. 6"x4" WYE (MJ)
14. 6" 45° BND (PExMJ)
15. 4" DI PIPE
16. 4" DI FLANGE
17. WEMCO PRECAST PREROTATION BASIN 600
18. 1½" DIA SCH 40 PIPE GUIDE RAILS
19. WEMCO FAST-OUT/GLIDE-SHOE
20. WEMCO UPPER BRACKET
21. WEMCO-HIDROSTAL PUMP(S) DAK-HS W/LIFTING CHAIN
22. 3" TIDEFLEX SERIES TF-2

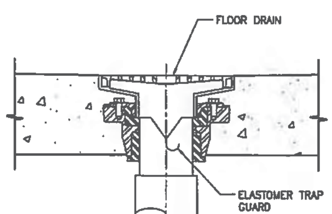
## GENERAL NOTES:

1. ALL FITTINGS AND JOINTS TO BE RESTRAINED.




**NOTES:**
1. AT EXISTING WALLS OR PREFABRICATED VAULTS OR MANHOLES CORE DRILL HOLE TO SUIT LINK TYPE WALL SEAL ASSEMBLY AND OMIT WALL SLEEVE.

**PIPE PENETRATION DETAIL** 2 / C2, C3
NONE




**VAULT FLOOR DRAIN DETAIL** 3 / C2
SCALE: 3"=1'-0"

Per AI this will not work especially draining into wet well

| REVISIONS | DATE | BY | DESIGNED R. HERMES<br>DRAWN J. BETZVOG<br>CHECKED D. ROBERTS<br>APPROVED D. ROBERTS |
|---|---|---|---|

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FILE NAME PU2279002C-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/8/13

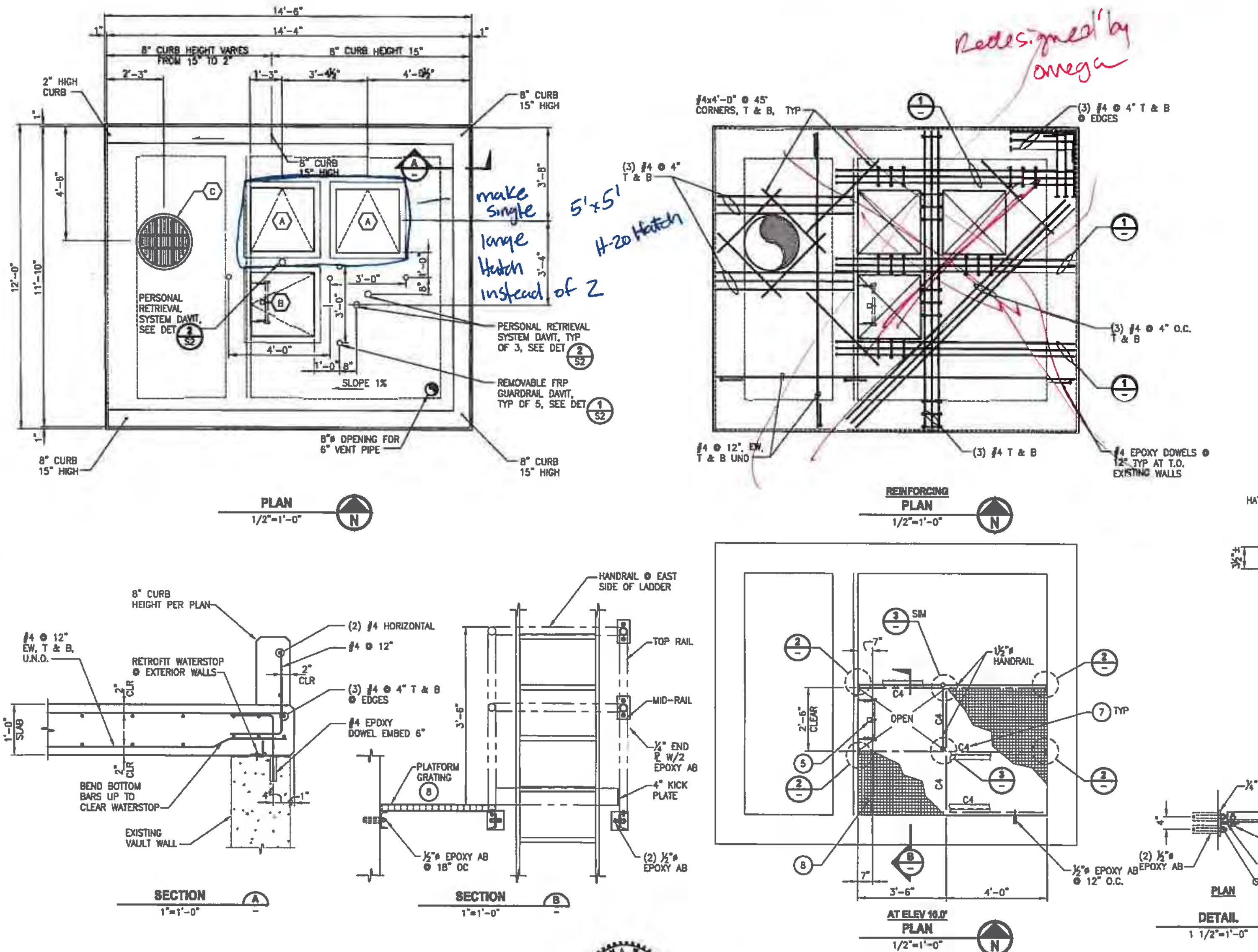
**Parametrix**
1019 39TH AVENUE SE, SUITE 100
PUYALLUP, WASHINGTON 98374

PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

**MECHANICAL SECTION AND DETAILS**

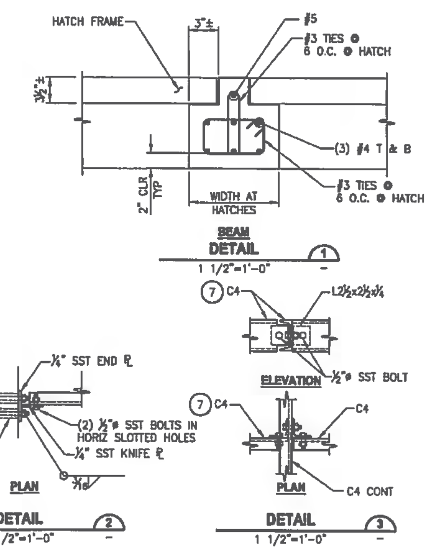
SHEET NO. 7 OF 14
C3

LAYOUT: C3 PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: DATED: Tuesday, October 08, 2013 3:17:50 PM




## NOTES:

1. CONCRETE SHALL HAVE f'c = 4000 PSI @ 28 DAYS.
2. WATERSTOP SHALL BE JP SPECIALTIES JP326L OR APPROVED EQUAL RETROFIT WATERSTOP.
3. CHAMFER EXPOSED EDGES ¾" @ 45°.
4. FLOOR HATCHES TO BE BILCO TYPE J-AL, SINGLE LEAF OR APPROVED EQUAL, MANHOLE TO BE PER WSDOT STD PLAN B-30.70-03 OR APPROVED EQUAL.
   - (A) 2'-6"x2'-6" OPENING W/ FALL TRHOUGH PROTECTION GRATE.
   - (B) 2'-6"x2'-6" OPENING
   - (C) 24"ø MANHOLE OPENING
5. PROVIDE 16" WIDE STAINLESS STEEL LADDER. PROVIDE BILCO LADDERUP STAINLESS STEEL SAFETY POST OR APPROVED EQUAL AT TOP.
6. PLATFORM FRAMING SHALL BE TYPE 316 SST.
7. C4 STAINLESS STEEL CHANNEL SECTION SHALL BE BREAK FORMED FROM ¼" TYPE 316 PLATE 4" DEEP X 2" FLANGE WIDTH.
8. PLATFORM GRATING SHALL BE MOLDED FIBERGLASS – 1 ½" X 1 ½" SQUARE PATTERN BY 1 ½" DEEP ENDURO OR APPROVED EQUAL VINYL ESTER RESIN, WITH SST HOLD DOWN HARDWARE.
9. CONCRETE ANCHORS SHALL BE STAINLESS STEEL EPOXY RESIN ANCHORS, HILTI OR APPROVED EQUAL, WITH 4" MINIMUM EMBEDMENT.
10. HAND RAILING SHALL BE ALUMINUM W/CAST ALUMINUM FITTINGS, KEE SAFETY OR EQUAL.




10/3/13

| REVISIONS | DATE | BY | DESIGNED S. WAGNER<br>DRAWN A. VALENCIA<br>CHECKED [signature]<br>APPROVED T. ROBERTS |
|---|---|---|---|

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FILE NAME PU2279002S-01
JOB No. 216-2279-004
DATE OCTOBER 2013

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PROJECT NAME
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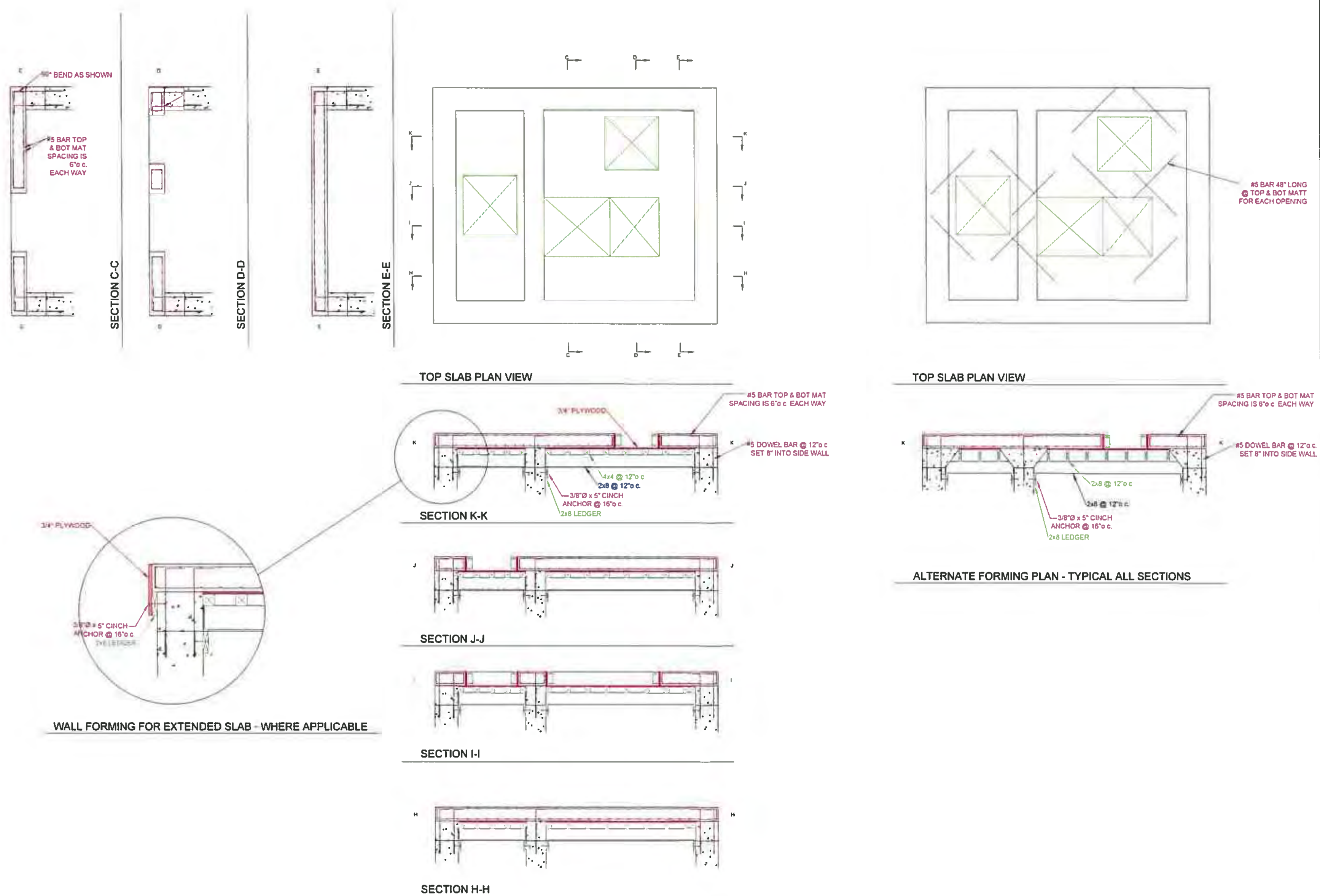
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

**TANK LID PLAN AND DETAILS**

SHEET NO. 8 OF 14
S1

LAYOUT: S1 PATH: L:\PSD\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: toylorl DATE: Tuesday, October 08, 2013 3:27:36 PM




**OMEGA CONTRACTORS, INC.**
**P.O. BOX 430**
**DUVALL, WA 98019**

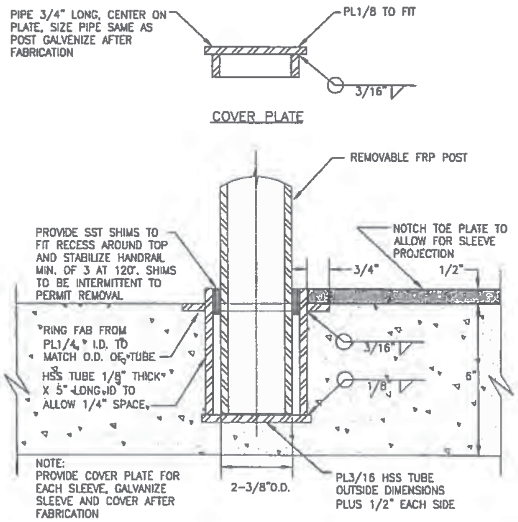
**MERCER ISLAND PUMP STATION 14**
**WALL EXTENSIONS**
**& TOP SLAB**


LUCIA E N G I N E E R I N G, I N C
11401 100TH AVENUE N E
KIRKLAND WASHINGTON 98033
PHONE (206) 790-8039
E-MAIL joe@luciaeng.com


JOSEPH M. LUCIA
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
05-07-14

| Number | Date | By | Description |
|---|---|---|---|
| 1 | 05-07-14 | JML | |

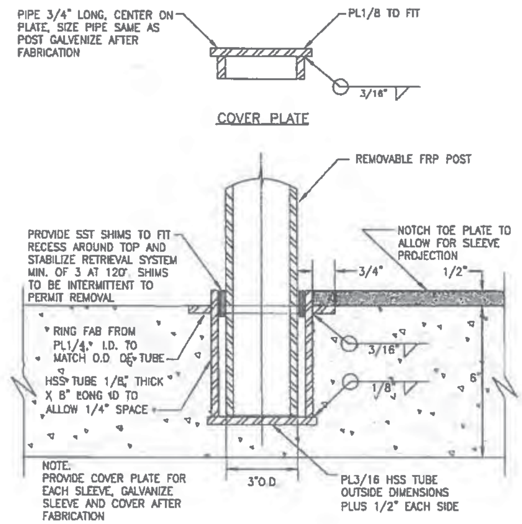
SHEET
1 of 1




**EMBEDDED SOCKET FOR REMOVEABLE SAFETY CHAIN POST**

**DETAIL** 1 / S1

NO SCALE




**EMBEDDED FLUSH FLOOR MOUNT SLEEVE FOR PERSONAL RETRIEVAL SYSTEM**

**DETAIL** 2 / S1

NO SCALE

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

DESIGNED R. HERMES
DRAWN K. TAYLOR
CHECKED R. Hermes
APPROVED D. Roberts

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FILE NAME PU2279002S-01
JOB No. 216-2279-004
DATE OCTOBER 2013

10/9/13

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CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

**DETAILS**

SHEET NO. 9 OF 14

**S2**

LAYOUT: S2 PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: taylorkat DATE: Wednesday, October 09, 2013 2:08:51 PM

## ABBREVIATIONS

ø CIRCUIT BREAKER AUX. CONTACT, CLOSED WHEN BREAKER IS CLOSED
A AMMETER, AMPERES
AC ALTERNATING CURRENT
A/D ANALOG TO DIGITAL
ADJ ADJUSTABLE
AF AMPERE FRAME
AFD ADJUSTABLE FREQUENCY DRIVE
AIC AMPERES INTERRUPTING CAPACITY
AMP AMPERES
ANN ANNUNCIATOR
AS AMMETER SWITCH
AT AMMETER TRIP
ATS AUTOMATIC TRANSFER SWITCH
AUTO AUTOMATIC
AWG AMERICAN WIRE GAGE
b CIRCUIT BREAKER AUX. CONTACT, CLOSED WHEN BREAKER IS OPEN
BCG BARE COPPER GROUND
C CONDUIT
CA CABLE
CAB CABINET
CAP CAPACITOR
CB CIRCUIT BREAKER
CC CONTROL CABLE, CLOSING COIL
CHH COMMUNICATION HANDHOLE
CC CLARIFIER CONSOLE
CKT CIRCUIT
CMH COMMUNICATION MANHOLE
CO CONDUIT ONLY
COMM COMMUNICATION
COND CONDUCTOR
CPT CONTROL POWER TRANSFORMER
CP CONTROL PANEL
CR CONTROL RELAY
CS CONTROL STATION
CT CURRENT TRANSFORMER
DB DIRECT BURIAL
DC DIRECT CURRENT
DIAG DIAGRAM
DISC DISCONNECT
DISTR DISTRIBUTION
DIV DIVISION
DP DISTRIBUTION PANEL
DPDT DOUBLE POLE, DOUBLE THROW
DPST DOUBLE POLE, SINGLE THROW
(E) EXISTING
EE ELECTRICAL ENCLOSURE
EHH ELECTRICAL HANDHOLE
ELEM ELEMENTARY
EMERG EMERGENCY
ENCL ENCLOSURE
EFFL EFFLUENT
EGC EQUIPMENT GROUND CONDUCTOR
EQPT EQUIPMENT
ETM ELAPSED TIME METER

FDR FEEDER
FE FLOW ELEMENT
FIT FLOW INDICATING TRANSMITTER
FLEX FLEXIBLE
FLUOR FLUORESCENT
FREQ FREQUENCY
FSH FLOAT SWITCH HIGH
FSO FLOAT SWITCH OVERFLOW
FU FUSE
FUT, (F) FUTURE
FVNR FULL VOLTAGE, NON REVERSING
FVR FULL VOLTAGE, REVERSING
FWD FORWARD
GEN GENERATOR
GFI GROUND FAULT INTERRUPTER
GND GROUND
GRS GALVANIZED RIGID STEEL
$H_2O_2$ HYDROGEN PEROXIDE
HH HANDHOLE
HOA HAND-OFF-AUTOMATIC
HOR HAND-OFF-REMOTE
HPS HIGH PRESSURE SODIUM
HT HEAT TAPE
HTR HEATER
HV HIGH VOLTAGE
HZ HERTZ (CYCLES PER SECOND)
IND LT INDICATING LIGHT
INCAND INCANDESCENT
INSTR INSTRUMENT, INSTRUMENTATION
I/O INPUT/OUTPUT
ISB INTRINSICALLY SAFE BARRIER
ISR INTRINSICALLY SAFE RELAY
JB JUNCTION BOX
KA KILOAMPERES
KCMIL THOUSANDS OF CIRCULAR MILS
KV KILOVOLTS
KVA KILOVOLT AMPERES
KVAR KILOVOLT AMPERES REACTIVE
KVARH KILOVOLT AMPERES REACTIVE HOURS
KWH KILOWATT HOURS
LCS LOCAL CONTROL STATION
LTG LIGHTING
LTS LIGHTS
LP LIGHTING PANEL
(M) MODIFIED
mA MILLIAMPERES
MANUF. MANUFACTURER
MCC MOTOR CONTROL CENTER
MCP MOTOR CIRCUIT PROTECTION OR MAIN CONTROL PANEL
MCM THOUSAND CIRCULAR MILS (KCMIL)
MON MONITOR
MOV MOTOR OPERATED VALVE
MS MOTOR STARTER
MTD MOUNTED
MTG MOUNTING
MTS MANUAL TRANSFER SWITCH
(N) NEW
NC NORMALLY CLOSED
NEMA NATIONAL ELECTRICAL MANUFACTURER'S ASSOC.
NEUT NEUTRAL
NO NORMALLY OPEN, NUMBER
OCP OZONE CONTROL PANEL
OL OVERLOAD
OT OVER TEMPERATURE
OVLD THERMAL OVERLOAD RELAY
OIT OPERATOR INTERFACE TERMINAL

P POLE, PUMP
PB PULLBOX
PBSW PUSHBUTTON SWITCH
PEC PHOTOELECTRIC CELL
PF POWER FACTOR
PFR POWER FAILURE RELAY
PGE PORTLAND GENERAL ELECTRIC
pH MEASURE OF ACIDITY OR ALKALINITY
PH PHASE
PIOP PLC I/O PANEL
PLC PROGRAMMABLE LOGIC CONTROLLER
PNL PANEL
PNLBD PANELBOARD
POSN POSITION
POT POTENTIOMETER
PPS PACKAGED POWER SUPPLY
PRI PRIMARY
PSH PRESSURE SWITCH HIGH
PWR POWER
(R) RELOCATED
RCPT RECEPTACLE
RCT REPEAT CYCLE TIMER
RT RESET TIMER
SCCR SHORT CIRCUIT CURRENT RATING
SCR SILICON CONTROLLED RECTIFIER
SD SMOKE DETECTOR
SIG SIGNAL
SN SOLID NEUTRAL
SPDT SINGLE POLE, DOUBLE THROW
SST STAINLESS STEEL
SV SOLENOID VALVE
SW SWITCH
SWBD SWITCHBOARD
SWGR SWITCHGEAR
SYNC SYNCHRONIZING
TB TERMINAL BOX
TC TELEPHONE CABINET
TEL TELEPHONE
TERM TERMINAL
TD TIMED OPENING
TDA TEST-OFF-AUTOMATIC
TSP TWISTED SHIELDED PAIR
TST TWISTED SHIELDED TRIAD
TVSS TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP TYPICAL
UGND UNDERGROUND
VA VOLT-AMPERES
VAR VOLT AMPERES REACTIVE
VFD VARIABLE FREQUENCY DRIVE
VH VAR-HOUR
VS VOLTMETER SWITCH
W WIRE, WATTS
WH WATTHOUR METER
WHDM WATTHOUR DEMAND METER
WP WEATHERPROOF
WR WEATHER RESISTANT
WT WATERTIGHT
WWR WASHWATER RECOVERY
XFMR TRANSFORMER
XP EXPLOSION PROOF

### GENERAL NOTES

G1 THE INSTALLATION OF ALL EQUIPMENT SHOWN ON THESE DRAWINGS OR DESCRIBED IN THE SPECIFICATIONS SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE LATEST EDITIONS OF ALL APPLICABLE CODES AND UTILITY COMPANY STANDARDS. CONTACT THE UTILITY COMPANY REPRESENTATIVES AND VERIFY THEIR REQUIREMENTS.

G2 THIS IS A GENERALIZED LEGEND SHEET. THIS CONTRACT MAY NOT USE ALL INFORMATION SHOWN.

G3 NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS IN EQUIPMENT LOCATIONS ARE DISCOVERED OR IF PROBLEMS ARISE DUE TO FIELD CONDITIONS, LACK OF INFORMATION OR ANY OTHER REASON.

G4 INFORMATION SHOWN MAY NOT BE ALL INCLUSIVE. SEE ALSO ANSI C37.2, Y1.1, Y32.2, AND Y32.9.

G5 VERIFY ALL COLOR REQUIREMENTS BEFORE ORDERING MATERIALS.

G6 REFER TO THE MECHANICAL DRAWINGS FOR EXACT LOCATIONS OF MECHANICAL EQUIPMENT AND FOR CERTAIN CONNECTIONS TO BE MADE TO ELECTRICAL CIRCUITS.

G7 EQUIPMENT SHOWN IN ½ TONE OR GREY TONE ARE EXISTING OR BY OTHERS.

## PLAN SYMBOLS

OVERHEAD POWER LINE
UNDERGROUND DIRECT BURIAL CABLE
UNDERGROUND DUCT LINE (CONC. ENCASEMENT)
UNDERGROUND DIRECT BURIAL CONDUIT(S)
CONDUIT(S) CONCEALED IN WALL OR CEILING
CONDUIT(S) CONCEALED IN FLOOR
EXPOSED CONDUIT(S)
¾"C-3#12 CALLOUT INDICATING CONDUIT(S) SIZE, NUMBER OF WIRES AND WIRE SIZE
HOME RUN TO PANELBOARD OR AS INDICATED
FLEXIBLE CONDUIT(S)
CONDUIT(S) RUN, BROKEN AND CONTINUED SAME SHEET OR AS NOTED
CONDUIT(S) WITH SEAL FITTING
CAP ON CONDUIT(S) STUB
OPEN CIRCLE DENOTES UPWARD CONDUIT(S) RISER
SOLID CIRCLE DENOTES DOWNWARD CONDUIT(S) RISER
INDICATES REMOVAL
SURFACE MOUNTED PANELBOARD
FLUSHED MOUNTED PANELBOARD
LOCAL CONTROL STATION
30A(F-20A) CONTROL STATION W/SAFETY SWITCH (SEE NOTE P4)
EQUIPMENT MOUNTING STAND
MOTOR
30A(F-20A) SAFETY SWITCH (SEE NOTE P4)
30A(F-20A) COMBINATION MOTOR STARTER AND SAFETY SWITCH (SEE NOTE P4)
$S^{MS}$ MANUAL MOTOR STARTER
GROUND ROD AND BOX
GROUNDING BRANCH CONNECTION
CONDUIT NUMBER P-POWER C-CONTROL S-SIGNAL

$(CKT) SINGLE POLE SWITCH *(SEE NOTES P2 & P3) 2 = 2 POLE, 3 = 3 WAY, 4 = 4 WAY, K = KEY OPERATED, WP = WEATHERPROOF, D = DIMMER, P = SWITCH WITH PILOT LIGHT, M = HP RATED, LOCKABLE
(a,b) FLUORESCENT FIXTURE (SEE NOTES P2 & P3)
WALL/CEILING MOUNTED FIXTURE
POLE MOUNTED FIXTURE
WALL/CEILING MOUNTED EXIT LIGHT - DIRECTIONAL ARROW WHERE INDICATED, SHADED AREA INDICATES ILLUMINATED FACE
WALL/CEILING MOUNTED EMERGENCY LIGHT WITH REMOTE BATTERY
PHOTO ELECTRIC CELL
EMERGENCY LIGHT WITH SELF CONTAINED BATTERY
(CKT) LIGHT FIXTURE IDENTIFICATION (SEE LIGHTING FIXTURE SCHEDULE)
SINGLE RECEPTACLE, 120V
SINGLE RECEPTACLE, 208V/240V
(CKT) TYPE DUPLEX WALL RECEPTACLE, 120V WP = WEATHERPROOF, G = GROUNDED, IG = ISOLATED GROUND, GF = GROUND FAULT INTERRUPTER
DUPLEX FLOOR RECEPTACLE, 120V
X IN. MULTI-OUTLET ASSEMBLY WITH SINGLE RECEPTACLE, 120V SPACING (X INCHES) AS NOTED MOUNTING HEIGHT AS NOTED
SPECIAL PURPOSE WALL RECEPTACLE, RATING AS NOTED
FLOOR, WALL AND CEILING JUNCTION BOXES
DATA PORT (DUPLEX RJ45)
WALL TELEPHONE OUTLET (+12")
WALL TELEPHONE OUTLET (+60")
FLOOR TELEPHONE OUTLET
BELL/BUZZER
ELECTRIC METER SOCKET
MH HH MANHOLE OR HANDHOLE
EQUIPMENT CONNECTION
INSTRUMENT
EQUIPMENT ID #
THERMOSTAT

### PLAN SYMBOL NOTES

P1 CONDUIT SIZE AND FILL SHALL BE AS INDICATED. WHERE NO SIZE IS SHOWN, THE CONDUIT SHALL BE SIZED IN ACCORDANCE WITH THE EDITION OF THE NATIONAL ELECTRICAL CODE ADOPTED BY THE AUTHORITY HAVING CODE ENFORCEMENT JURISDICTION. WHERE NO FILL IS INDICATED, PROVIDE (3) #12 WIRES. PROVIDE 3/16 INCH NYLON PULL ROPE IN EACH EMPTY CONDUIT.

P2 LOWER CASE LETTERS IN PARENTHESIS ADJACENT TO A SWITCH OR LIGHT FIXTURE INDICATE A SWITCHED CIRCUIT AND IDENTIFY THE FIXTURE/SWITCH COMBINATIONS.

P3 NUMBERS IN PARENTHESIS ADJACENT TO A LIGHT FIXTURE IDENTIFICATION OR RECEPTACLE INDICATE THE LIGHTING PANEL BRANCH CIRCUIT FEEDING THE DEVICE.

P4 NUMBER INDICATES THE AMPERAGE RATING OF THE SWITCH. IDENTIFIERS IN PARENTHESIS INDICATE THAT THE SWITCH IS PROVIDED WITH FUSES AND THE AMPERAGE RATING OF THE FUSE(S).

## SINGLE LINE SYMBOLS

GROUND CONNECTION
SWITCH, 3 POLE EXCEPT WHERE NOTED. RATING IN AMPERES AS NOTED (NOTE 1)
TEST SWITCH WITH SHORTING BLOCK
AUTOMATIC TRANSFER SWITCH 3 POLE, RATING AS NOTED
SV SHUNT TRIP
FUSE
FUSE CUTOUT
DMCP DOAT / DDDAF DDDAT CIRCUIT BREAKER, 3 POLE EXCEPT WHERE NOTED. RATING IN AMPERES AS NOTED.
POWER CIRCUIT BREAKER DRAWOUT ABOVE 1500V RATING AS NOTED
SURGE ARRESTER
CURRENT TRANSFORMER
VOLTAGE TRANSFORMER
POWER OR DISTRIBUTION TRANSFORMER RATING AS NOTED
7.5 MOTOR. NUMBER INDICATES HORSEPOWER
EQUIPMENT NAME EQUIPMENT ID #
G GENERATOR
BUS STAB ON MCC OR SWITCHGEAR, CORD & PLUG CONNECTION FOR MOTORS
THERMAL OVERLOAD
* A - AMMETER, V - VOLTMETER, WH - WATTHOUR METER, GS - GROUND FAULT SENSOR
AS AMMETER SWITCH
VS VOLTMETER SWITCH
3 ELEMENTARY DIAGRAM NUMBER
K KIRK KEY INTERLOCK
POWER RECEPTACLE FOR PORTABLE EQUIPMENT
TERMINATOR/POTHEAD
SPLICE, TERMINATION
1* MOTOR STARTER. NUMBER INDICATES NEMA SIZE * (NONE) FULL VOLTAGE NONREVERSING A = AUTOTRANSFORMER REDUCED VOLTAGE SS = SOLID STATE -2S = TWO SPEED
CAPACITOR - KVAR INDICATED
VACUUM BREAK SWITCH
VFD VARIABLE FREQUENCY DRIVE
P200 CALLOUT INDICATING CONDUIT AND WIRE PER SCHEDULE

## LOOP WIRING/ELEMENTARY DIAGRAM SYMBOLS

FUSE. RATING IN AMPERES
M MOTOR
ETM ELAPSED TIME METER
CR1 CONTROL DEVICE COIL. NUMBER, WHEN USED, DISTINGUISHES BETWEEN DEVICES OF THE SAME TYPE.
ALT - ALTERNATOR
CR - CONTROL RELAY
GR - GENERAL RELAY
ISR - INTRINSICALLY SAFE RELAY
LR - LATCH RELAY
SV - SOLENOID VALVE
PR - PROBE RELAY
TR - TIMING RELAY
TOF - TIMING OFF RELAY
MPR - MODE PRIORITY RELAY
W INDICATING LIGHT
INDICATING LIGHT COLORS:
A - AMBER
B - BLUE
C - CLEAR
G - GREEN
R - RED
N - NEON
W - WHITE
Y - YELLOW
TERMINAL
OPEN CLOSED SWITCH
OPEN CLOSED PUSHBUTTON,
SWITCH, 3-POLE
MULTI-POSITION SELECTOR SWITCH
H O A HAND-OFF-AUTOMATIC SWITCH
H O R HAND-OFF-REMOTE SWITCH
CONTROL POWER TRANSFORMER
120 VAC
MOTOR HTR MOTOR HEATER
GROUND CONNECTION
OPEN CLOSED CONTACT
WIRING INSIDE ENCLOSURE
FIELD WIRING

BUS STAB ON MCC, CORD & PLUG CONNECTION FOR MOTORS
THERMAL OVERLOAD
BUZZER
HORN
BELL
2P/3P CIRCUIT BREAKER

| SENSING SWITCHES | | |
|---|---|---|
| CLOSE ON | | |
| RISING | FALLING | SENSED VARIABLE |
| | | FLOW |
| | | LEVEL |
| | | PRESSURE |
| | | TEMPERATURE |
| LIMIT SWITCHES | | |
| LS | | CLOSE ON REACHING LIMIT |
| LS | | CLOSE ON LEAVING LIMIT |

| TIMED CONTACTS | | | |
|---|---|---|---|
| SYMBOL | NORMAL | OPEN TO CLOSED | CLOSED TO OPEN |
| | OPEN | DELAYED | INSTANTANEOUS |
| | CLOSED | INSTANTANEOUS | DELAYED |
| | OPEN | INSTANTANEOUS | DELAYED |
| | CLOSED | DELAYED | INSTANTANEOUS |

### ELEMENTARY DIAGRAMS

E1 UNDERLINED WORDS SHOWN AT A PUSHBUTTON, LIGHT, SELECTOR SWITCH, ETC. INDICATE THE LEGEND PLATE REQUIREMENT FOR THAT PARTICULAR DEVICE. ANY ADDITIONAL NAMEPLATES ARE INDICATED ON ELEVATIONS WITH THE REQUIRED NAMEPLATE INSCRIPTIONS.

E2 "NORMAL" STATUS OF SWITCHES OR CONTACTS IS THE SHELF POSITION.

E3 NUMBERS AND LETTERS IDENTIFY DEVICE.

| REVISIONS | DATE | BY | DESIGNED D. AGUSTSSON / DRAWN D. PETERSON / CHECKED R. Burgette / APPROVED B. Roberts | ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY / FILE NAME PU227P002E-01 / JOB NO. 216-2279-004 / DATE OCTOBER 2013 |
|---|---|---|---|---|

Howard Woodward 10/4/2013

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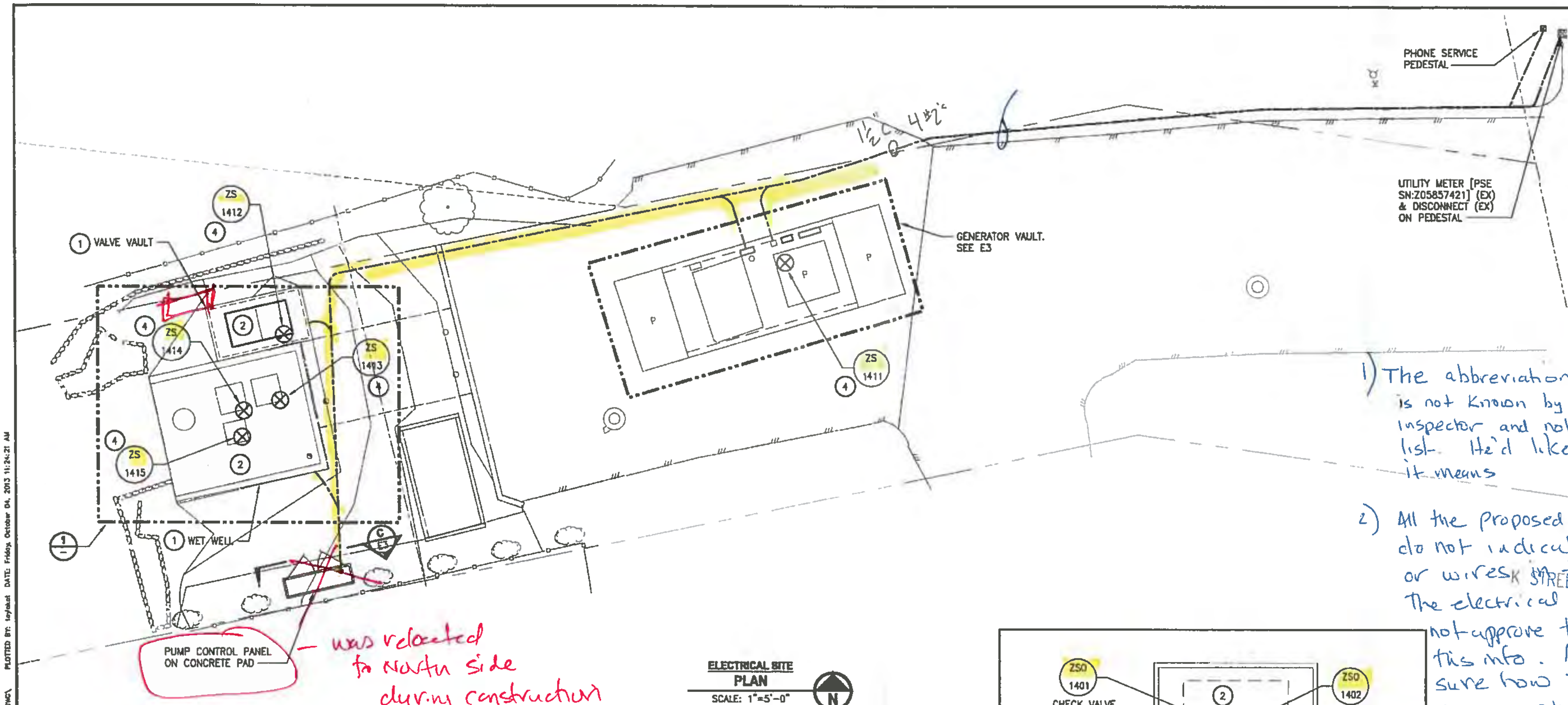
1019 39TH AVENUE SE, SUITE 100 PUYALLUP, WASHINGTON 98374 T. 253.604.6600 F. 253.604.6799 www.parametrix.com

PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

ELECTRICAL NOTES, SYMBOLS, AND LEGEND

SHEET NO. 10 OF 14
E1

LAYOUT: Layout1 PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: taylodel DATE: Friday, October 04, 2013 11:14:33 AM

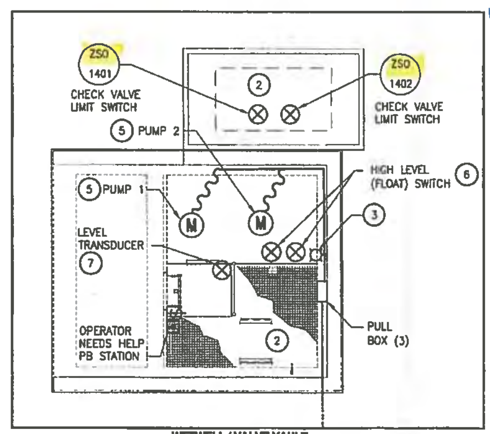



— was relocated to North side during construction

ELECTRICAL SITE PLAN
SCALE: 1"=5'-0"

1) The abbreviation ZS and ZSO is not known by the electrical inspector and not on the abb's list. He'd like to know what it means

2) All the proposed conduit do not indicated size/type or wires in them. The electrical inspector will not approve the permit w/o this info. And I'm not sure how the contractor knows what to install.




WETWELL / VALVE VAULT
DETAIL
SCALE: 1"=3'-0"

**NOTES:**

1. EXISTING UTILITIES NOT SHOWN. CONTRACTOR RESPONSIBLE FOR IDENTIFYING ROUTING OF PROPOSED CONDUITS.
2. HAZARDOUS AREA CLASSIFICATION PER NFPA 820:
   WET WELL (TABLE 4.2, ROW 15) CLASS I, DIV 1
   VALVE VAULT (TABLE 4.2, ROW 31) CLASS I DIV 2
3. PROVIDE LED LIGHT, 30W, COPPER-FREE ALUMINUM HOUSING, SILICONE GASKETS, STAINLESS STEEL HARDWARE, WALL MOUNT BRACKET, MANUFACTURER COOPER CROUSE-HINDS MODEL C201 OR EQUAL.
4. MOUNT INTRUSION SWITCHES ON UNDER SIDE OF VAULT COVER. PROVIDE MAGNETIC TARGET AS REQUIRED.
5. SUPPORT PUMP POWER AND CONTROL CABLES WITH STAINLESS STEEL CABLE GRIPS.
6. SUPPORT FLOAT CABLES WITH STAINLESS STEEL CABLE GRIPS. SET FLOATS TO OPERATE AT ELEVATIONS SHOWN ON DRAWING C2.
7. MOUNT TRANSDUCER USING OPTIONAL BRACKET (INCLUDED WITH TRANSDUCER). POSITION TRANSDUCER APPROXIMATELY 6" FROM SOUTH (OUTSIDE) EDGE OF PRE-ROTATION BASIN WITH TRANSDUCER SIGNAL HITTING BOTTOM OF WET WELL.

**LEGEND:**

GENERAL CONDUIT ROUTING (SEE NOTE 1)

| REVISIONS | DATE | BY | |
|---|---|---|---|
| | | | DESIGNED O. AGUSTSSON |
| | | | DRAWN D. PETERSON |
| | | | CHECKED [signature] |
| | | | APPROVED D. ROBERTS |

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002E-02
JOB No. 216-2279-004
DATE OCTOBER 2013

HOWARD R. WOODWARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
10/4/2013

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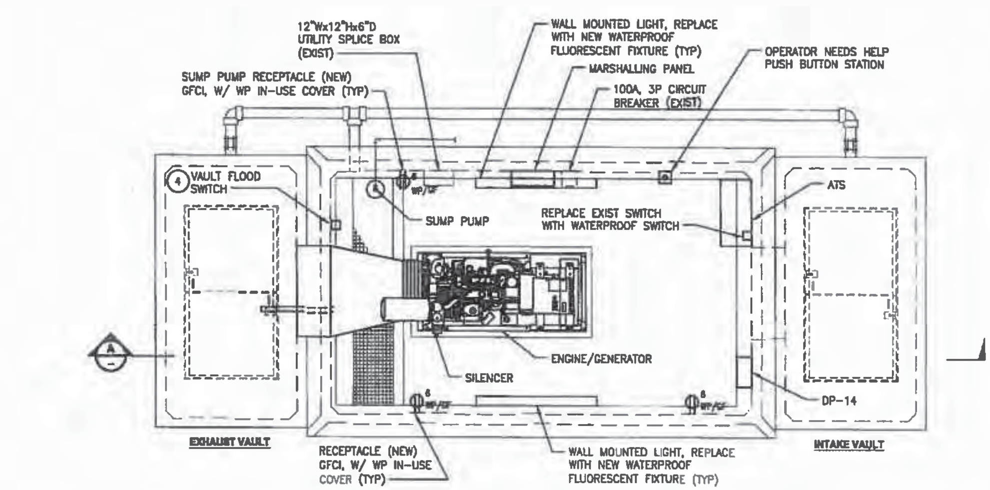
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

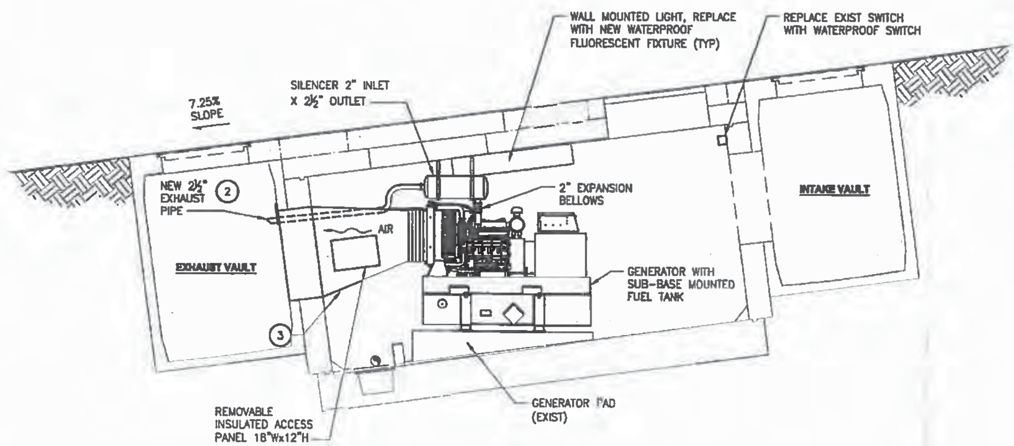
ELECTRICAL SITE PLAN

SHEET NO. 11 OF 14
E2

LAYOUT: E2 PATH: ...\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: Leyland DATE: Friday, October 04, 2013 11:24:21 AM



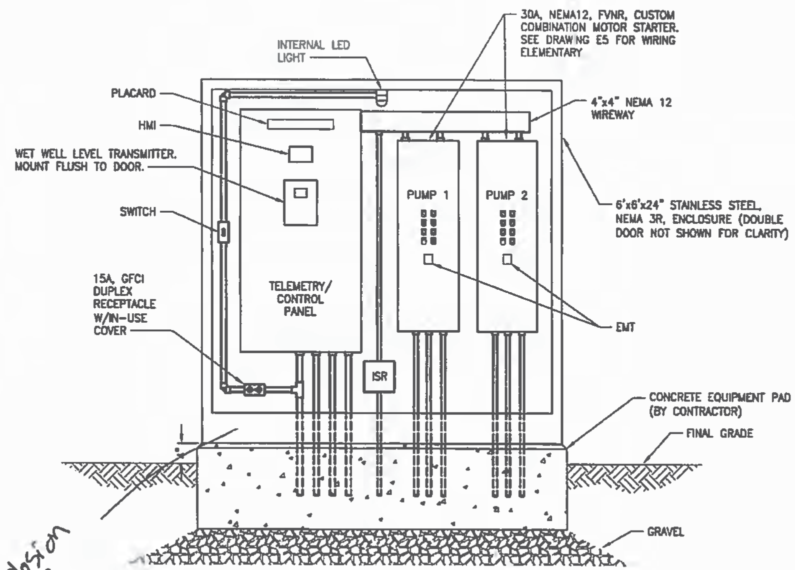

**GENERATOR VAULT**
**INTERIOR PLAN**
SCALE: 1/2"=1'-0"




**SECTION** (A)
SCALE: 1/2"=1'-0"

**NOTES:**

1. EXISTING CONDUITS AND PIPING NOT SHOWN. CONTRACTOR RESPONSIBLE FOR IDENTIFYING ROUTING OF PROPOSED CONDUITS.
2. SILENCER AND EXPANSION BELLOWS ARE SUPPLIED LOOSE WITH GENERATOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY MOUNTING HARDWARE, TUBING AND FITTINGS TO ROUTE THE GENERATOR EXHAUST PIPE FROM EXHAUST MANIFOLD IN EXHAUST VAULT.
3. FABRICATED 12 GAGE GALVANIZED SHEET METAL DUCT WITH RIGID SOUND INSULATION (EXHAUST ONLY). ATTACH TO GENERATOR RADIATOR FLANGES WITH EXPANSION JOINT. PROVIDE INSULATED REMOVABLE ACCESS PANEL IN SIDE OF DUCT FOR RADIATOR INSPECTION AND DEBRIS CLEANOUT. NO SHARP EDGES ON SHEET METAL.
4. MOUNT FLOOD SWITCH TO ALARM 1" BEFORE OVERFLOW OF SUMP BASIN.




explosion proof seal all conduit Into wet well Generator

**PUMP CONTROL PANEL**
**SECTION** (C / E2)
SCALE: 1"=1'-0"

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

DESIGNED O. AGUSTSSON
DRAWN D. PETERSON
CHECKED [signature]
APPROVED D. ROBERTS

ONE INCH AT FULL SCALE, IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002E-03
JOB NO. 216-2279-004
DATE OCTOBER 2013

Howard Woodward 10/4/2013

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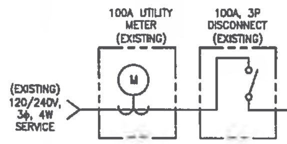
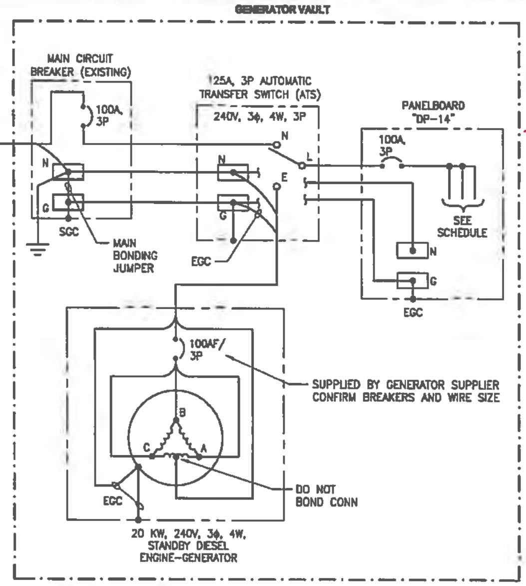
PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

**ELECTRICAL PLANS AND SECTIONS**

SHEET NO. 12 OF 14
E3

LAYOUT: Layout1 PATH: U:\PSO\Projects\Clients\2279-CityOfMercerIsland\216-2279-004 Mercer Island LS 14\99Svcs\CADD\DWG\ PLOTTED BY: lcpaloal DATE: Friday, October 04, 2013 11:19:11 AM



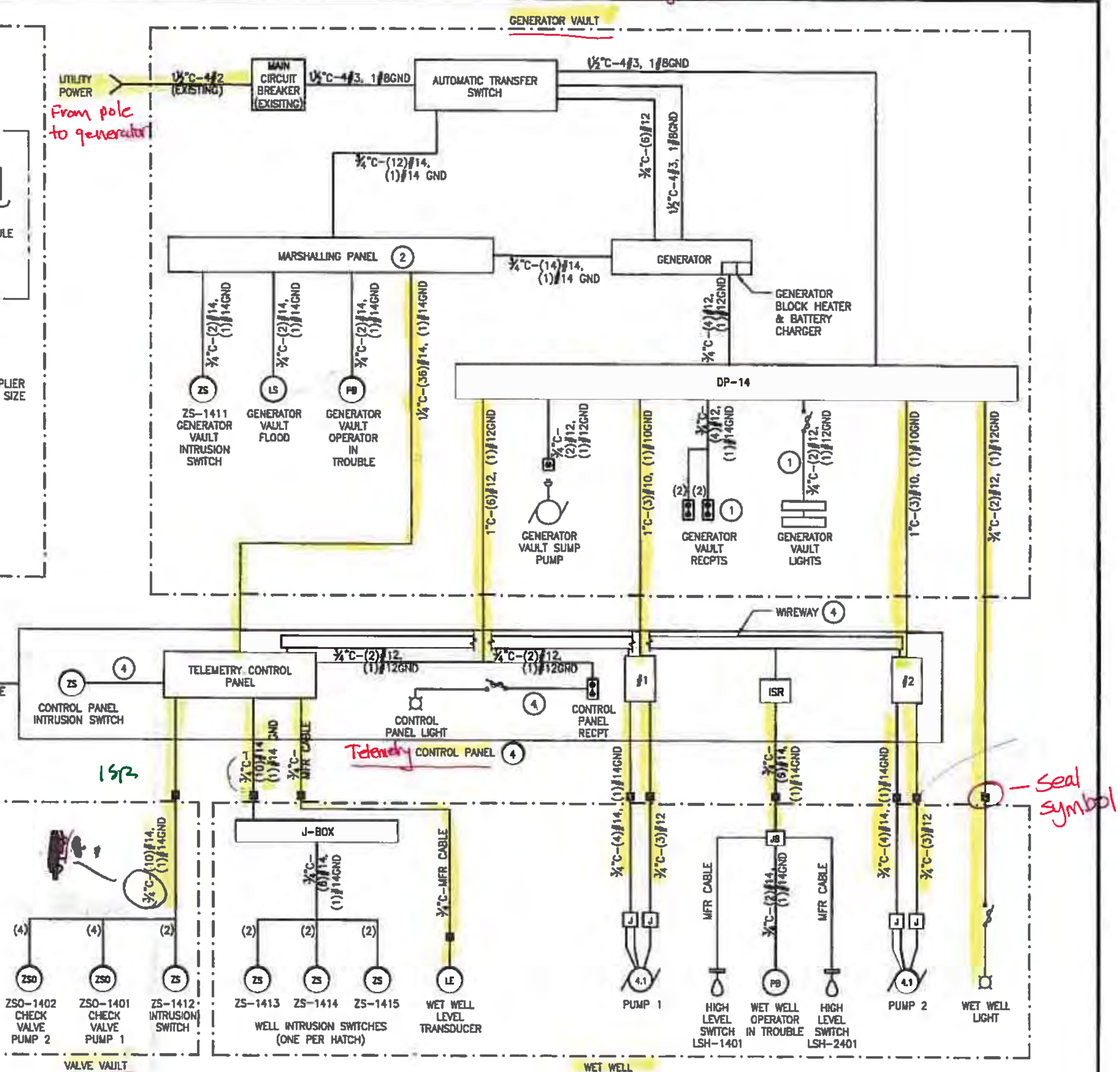




**LIFT STATION 14 ELECTRICAL ONE-LINE**

**NOTES:**

1. REMOVE AND REPLACE IN KIND EXISTING CONDUIT, CONDUCTORS, RECEPTACLES, SWITCHES, AND LIGHTING FIXTURES.
2. MARSHALLING PANEL ONLY PULL ADEQUATE LENGTH TO REACH FINAL DEVICE. COIL SPARES TO REACH ANY LOCATION IN VAULT. NO SPLICES.
3. INTERCEPT EXISTING TELEPHONE CONDUIT TO OLD PUMP ROOM. PULL NEW TELEPHONE CABLE AS DIRECTED BY CITY.
4. CONDUCTORS & RACEWAY BETWEEN DEVICES INSIDE THE CONTROL PANEL SHALL BE PROVIDED BY THE CONTROL PANEL FABRICATOR.

wire type = THWN




**CONDUIT INTERCONNECT**

**DISTRIBUTION PANEL (DP-14) SCHEDULE:**

NAME: DP-14
LOCATION: GENERATOR VAULT
FED FROM: ATS

VOLTAGE RATING: 240V, 3-PHASE, 4W
BUS RATING: 200A
MAIN BREAKER: 100A

FEED: BOTTOM
MOUNTING: WALL
A/C BRACING: 42,000

| LOAD TYPE | CIRCUIT DESCRIPTION | VA | CKT | BRKR | L1 | L2 | L3 | BRKR | CKT | VA | CIRCUIT DESCRIPTION | LOAD TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | GENERATOR BLOCK HEATER | 1,500 | 1 | 20A / 1P | A | | | 20A / 1P | 2 | 200 | GENERATOR VAULT LIGHTS | L |
| | BLANK - NOT AVAILABLE | | 3 | | | B | | | 4 | | BLANK - NOT AVAILABLE | |
| M | GENERATOR VAULT SUMP PUMP | 1,200 | 5 | 20A / 1P | | | C | 20A / 1P | 6 | 360 | GENERATOR VAULT RECEPTACLES | R |
| R | ELECTRICAL ENCLOSURE RECEPTACLE & LIGHT | 360 | 7 | 20A / 1P | A | | | 20A / 1P | 8 | 180 | WETWELL/VALVE VAULT LIGHTS | L |
| | BLANK - NOT AVAILABLE | | 9 | | | B | | | 10 | | BLANK - NOT AVAILABLE | |
| X | TELEMETRY CONTROL PANEL | 1,500 | 11 | 20A / 1P | | | C | 20A / 1P | 12 | | (SPARE) | |
| M | PUMP 1 | 2,120 | 13 | 30A / 3P | A | | | 30A / 3P | 14 | 2,120 | PUMP 2 | M |
| M | PUMP 1 | 2,120 | 15 | 30A / 3P | | B | | 30A / 3P | 16 | 2,120 | PUMP 2 | M |
| M | PUMP 1 | 2,120 | 17 | 30A / 3P | | | C | 30A / 3P | 18 | 2,120 | PUMP 2 | M |
| | (SPACE) | | 19 | | A | | | 20A / 1P | 20 | 500 | BATTERY CHARGER | X |
| | (SPACE) | | 21 | | | B | | | 22 | | (SPACE) | |
| | (SPACE) | | 23 | | | | C | | 24 | | (SPACE) | |
| | (SPACE) | | 25 | | A | | | | 26 | | (SPACE) | |
| | (SPACE) | | 27 | | | B | | | 28 | | (SPACE) | |
| | (SPACE) | | 29 | | | | C | | 30 | | (SPACE) | |

LINE LOADS: 6,850 VA (L1) 4,240 VA (L2) 7,700 VA (L3)

**LOAD CALCULATION:**

| | CONNECTED KVA | METHOD | NEC DEMAND | CALC. KVA |
|---|---|---|---|---|
| TOTAL LIGHTING (L) LOAD: | 0.35 | ALL @ | 100% | 0.35 |
| TOTAL RECEPTACLE (R) LOAD: | 0.72 | FIRST 10KVA @ | 100% | 0.72 |
| | | REMAINDER OVER 10KVA @ | 50% | 0.00 |
| TOTAL MOTOR (M) LOAD: | 13.92 | ALL @ | 100% | 13.92 |
| | | 25% OF LARGEST | 25% | 1.06 |
| TOTAL HVAC (H) LOAD: | 0.00 | ALL @ | 100% | 0.00 |
| TOTAL MISCELLANEOUS (X) LOAD: | 3.90 | ALL @ | 100% | 3.90 |
| TOTAL KVA: | 18.89 KVA | | | 19.95 KVA |
| CONNECTED AMPS @ 240V: | 45.44 AMPS | | | |

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

DESIGNED: G. AGUSTSSON
DRAWN: D. PETERSON
CHECKED: [signature]
APPROVED: D. ROBERTS

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME: PU2279002E-04
JOB No.: 216-2279-004
DATE: OCTOBER 2013

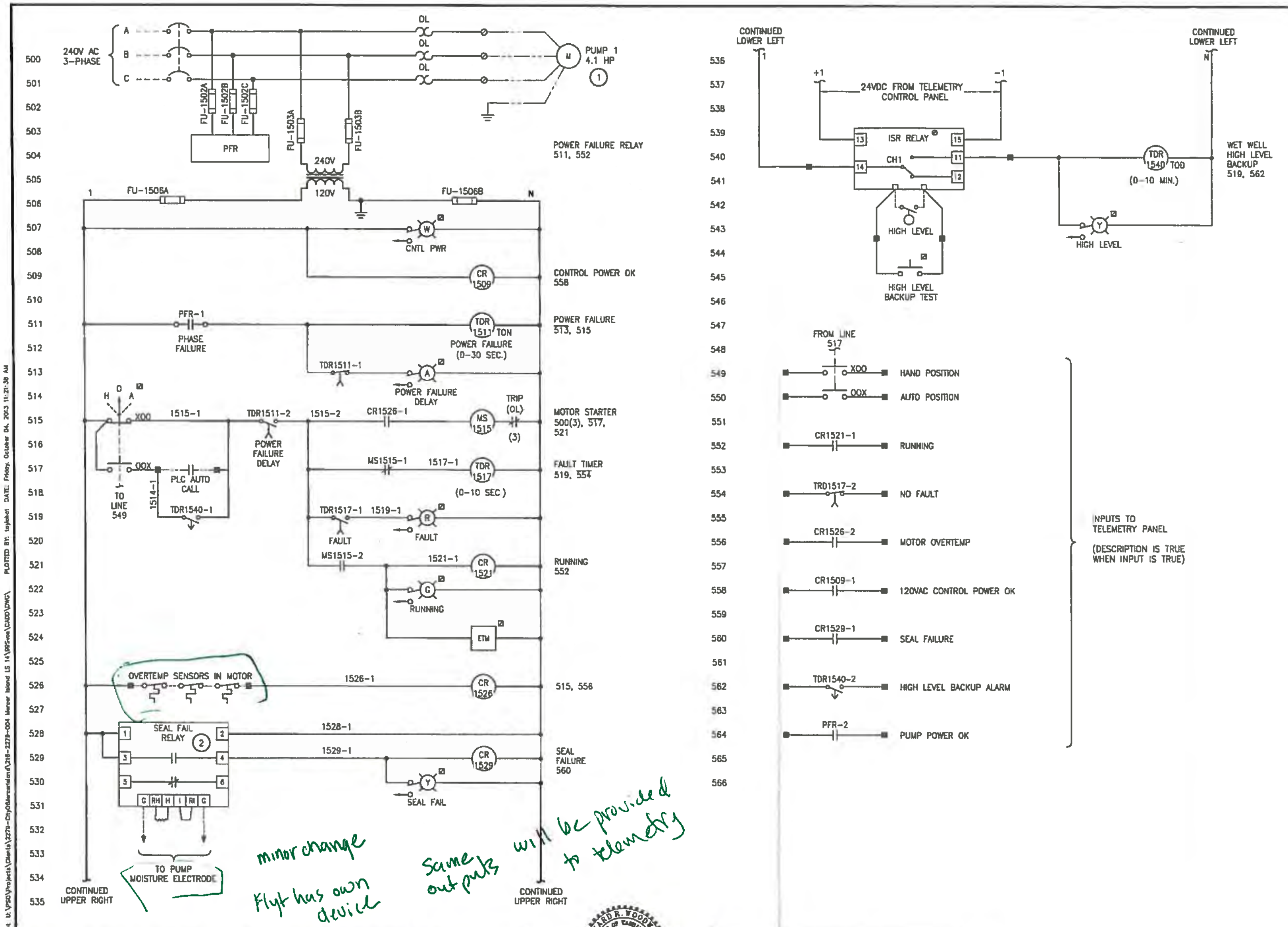
HOWARD R. WOODARD
10/4/2013

**Parametrix**
1019 39TH AVENUE SE, SUITE 100 PUYALLUP, WASHINGTON 98374

PROJECT NAME: CITY OF MERCER ISLAND PUMP STATION #14 MODERNIZATION, MERCER ISLAND, WASHINGTON

**ELECTRICAL ONE-LINE DIAGRAM, LOAD SCHEDULE AND CONDUIT INTERCONNECT**

SHEET NO. 13 OF 14
E4




**LEGEND:**

- ■ COMBINATION MOTOR STARTER TERMINAL BLOCK
- ⊠ DEVICE MOUNTED ON DOOR OF STARTER
- ⊘ DEVICE MOUNTED IN INTRINSICALLY SAFE RELAY BOX.

**NOTES:**

1. PUMP 1 ELEMENTARY SHOWN, PUMP 2 ELEMENTARY SIMILAR EXCEPT ALL FUSES, RELAYS AND WIRE NUMBERS ARE 2000 SERIES.
2. WIRING BASED ON WARRICK SERIES 17 CONDUCTIVITY RELAY BEING SUPPLIED WITH PUMP. CONTRACTOR SHALL WIRE AS REQUIRED IF PUMP SUPPLIER PROVIDES A DIFFERENT MAKE AND/OR MODEL.

| REVISIONS | DATE | BY |
|---|---|---|

DESIGNED O. AGUSTSSON
DRAWN D. PETERSON
CHECKED
APPROVED D. ROBERTS

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME PU2279002E-05
JOB No. 216-2279-004
DATE OCTOBER 2013

HOWARD R. WOODWARD 10/4/2013

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PROJECT NAME
CITY OF MERCER ISLAND
PUMP STATION #14 MODERNIZATION
MERCER ISLAND, WASHINGTON

PUMP CONTROL WIRING ELEMENTARY

SHEET NO. 14 OF 14
E5

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SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

PUMP STATION 14 DESIGN DRAWINGS

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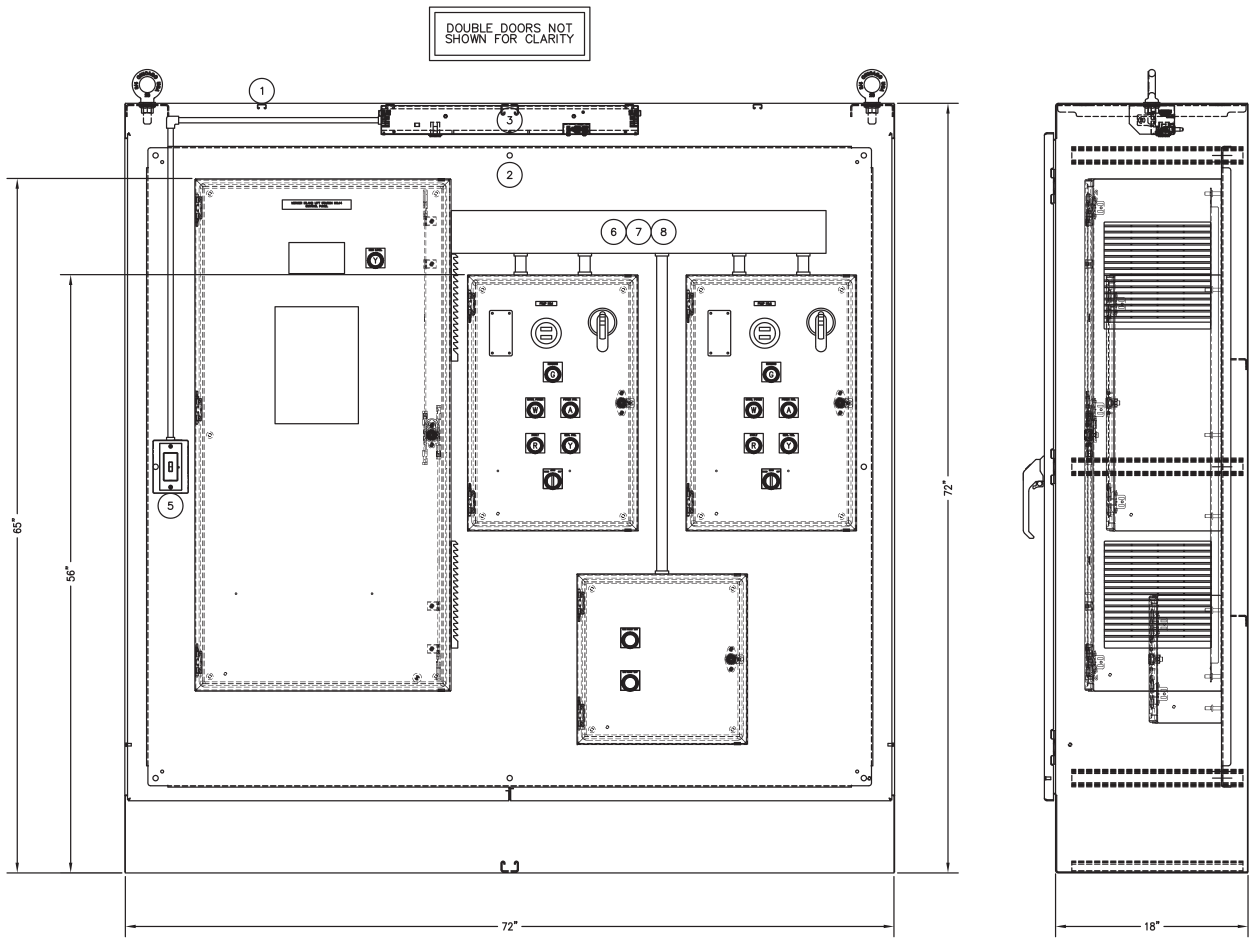



## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | SAGINAW | SCE727218SSFSD | SS FREE STANDING ENCLOSURE |
| 2 | 1 | SAGINAW | SCE72P72F1 | FULL SUBPANEL FOR ABOVE |
| 3 | 1 | SAGINAW | SCELF24 | 24" LED LIGHT W/ RECEPTACLE |
| 4 | 1 | SAGINAW | SCEDS72SS | 72" DRIP SHIELD |
| 5 | 1 | SAGINAW | SCEDV4XKIT | N4X VENT KIT |
| 6 | AR | HOFFMAN | F44136GVP | WIRE TROUGH N1 WO/NK |
| 7 | AR | HOFFMAN | F44GPS | WIREWAY PNL ADAPTER 4X4 |
| 8 | AR | HOFFMAN | F44GCP | WIREWAY PNL CLOSE PLT 4X4 |
| 9 | 1 | BELL | RD1H31 | ALUM BOX W/ (3) 1/2 |
| 10 | 1 | LEVITON | 1101-2I | 15A SP SWITCH – IVORY |
| 11 | 1 | LEVITON | 84009 | SS COVER SINGLE POLE SWITCH |
| 12 | AR | MEYERS | ST-1 | 1/2" |
| 13 | 1 | CROUSE-HINDS | LB17 | CONDUIT CONDULET LB 1/2 |
| 14 | AR | MEYERS | ST-3 | 1" |
| 15 | 4 | POLYPHASER | 1" NIPPLE | 1X2 GALVANIZED NIPPLE |
| 16 | 1 | EPAC | MISC | MISCELLANEOUS MATERIAL |
| 17 | 1 | EPAC | UL LABEL (NITW) | S1844 ENCLOSED CONTROL PANEL |
| 18 | 1 | EPAC | VARIES | RTU TELEMETRY PANEL PER 001 |
| 19 | 1 | EPAC | VARIES | PUMP 1 CONTROL PANEL PER 100 |
| 20 | 1 | EPAC | VARIES | PUMP 1 CONTROL PANEL PER 200 |
| 21 | 1 | EPAC | VARIES | ISR PANEL PER 300 |

**PORTLAND Engineering Inc.**
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

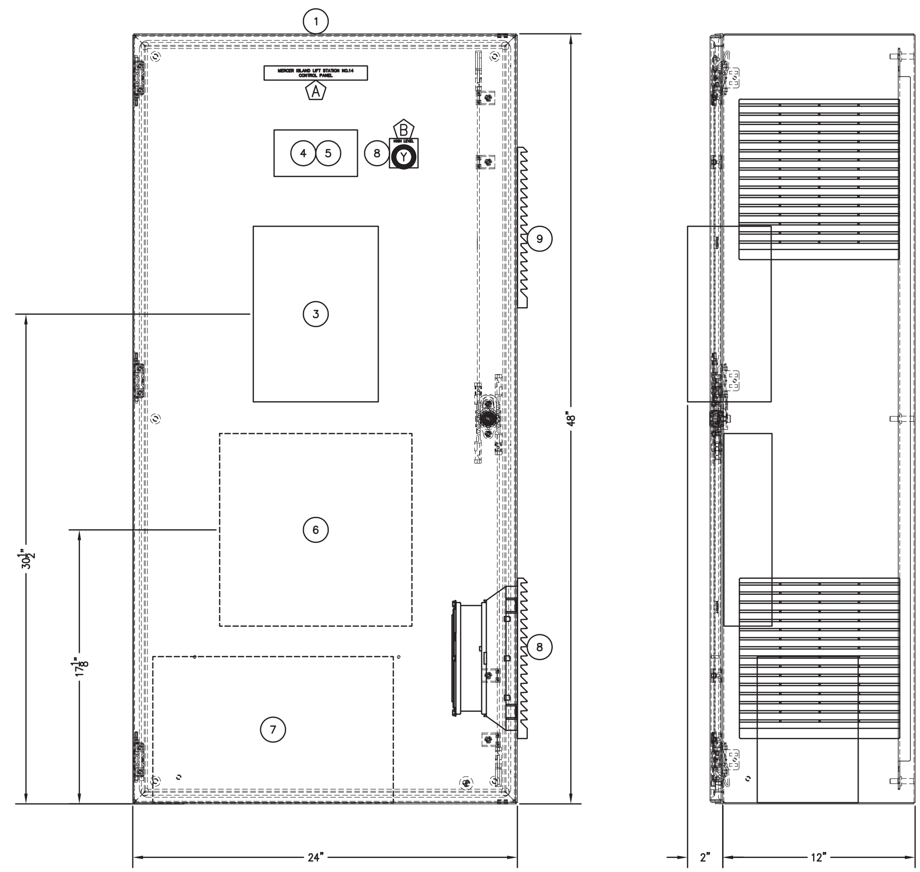
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
PUMP CONTROL PANEL
FRONT OF PANEL LAYOUT AND BOM

PLOT SCALE: N.T.S. | SCALE: 1/2:1 | REV.

DWG. NO. PEI-Q140-000 | SHEET SHT. 1 | 2




## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | HOFFMAN | CSD482412 | WALL MNT TYPE 4/12 ENCL |
| 2 | 1 | HOFFMAN | CMFK | MOUNTING FOOT KIT |
| 3 | 1 | SIEMENS | 7ML5034-3AA01 | PANEL MNT UT TRANSMITTER |
| 4 | 1 | SCHNEIDER | XBT N401 | MAGELIS RTU MODBUS 4 LINE HMI |
| 5 | 1 | SCHNEIDER | XBT Z9711 | 2.5m CABLE FOR ABOVE |
| 6 | 1 | CISCO | ? | OWNER PROVIDED ROUTER |
| 7 | 1 | EATON | PW9130L1000T-XL | 1000VA 120V UPS |
| 8 | 1 | RITTAL | 3241110 | 115VAC 147CFM FILTER FAN PKG |
| 9 | 1 | RITTAL | 3240200 | EXHAUST GRILL / FILTER |
| 10 | 1 | AB | 800T-QTH2Y | YELLOW PTT 12-130VAC/DC IND LED |

## ENGRAVING SCHEDULE

| LTR | DESCRIPTION |
|---|---|
| A | MERCER ISLAND PUMP STATION NO.14 / CONTROL PANEL |
| B | HIGH LEVEL |

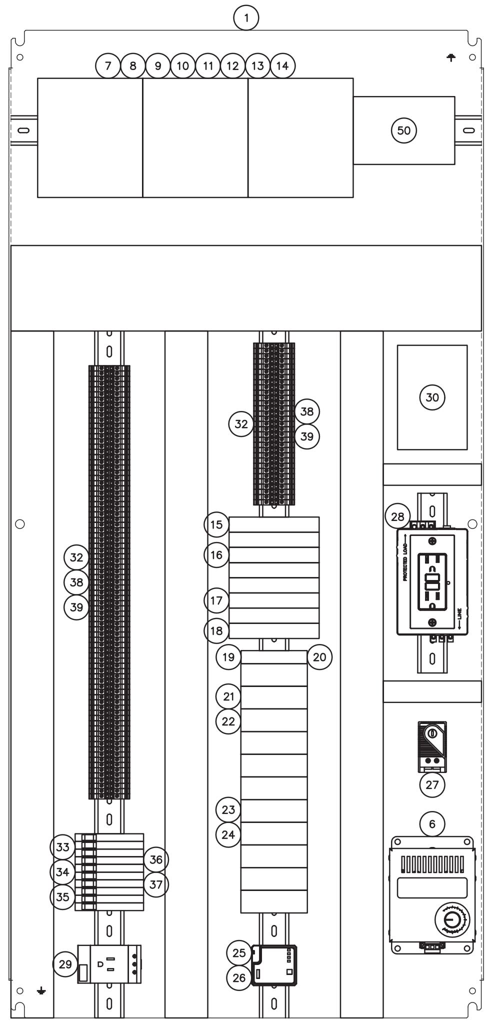
PORTLAND Engineering Inc.
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | |
|---|---|---|
| DRAWN BY: | JLD | DATE 18OCT10 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 18OCT10 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
FRONT OF PANEL LAYOUT AND BOM

| | | | | |
|---|---|---|---|---|
| PLOT SCALE: N.T.S. | | SCALE: 3/4:1 | | REV. |
| DWG. NO. | PEI-Q140-001 | | SHEET SHT. 1 | 2 |




## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | HOFFMAN | CP4824 | 46.20x22.20 BACK-PANEL |
| 2 | 1 | HOFFMAN | LF120V18 | 18" FLUORESCENT LIGHT |
| 3 | 1 | HOFFMAN | ALFSWD | REMOTE DOOR SWITCH FOR ABOVE |
| 4 | 1 | HOFFMAN | LPC72 | 72" POWER CABLE FOR ABOVE |
| 5 | 1 | HOFFMAN | LDSWITCH72 | 72" D. SWITCH CABLE FOR ABOVE |
| 6 | 1 | HOFFMAN | DAH1001A | 100W ELECTRIC HEATER |
| 7 | 1 | MODICON | 171-CCC-960-30 | M1E PROCESS ADAPTER |
| 8 | 1 | MODICON | 172-JNN-210-32 | RS 232/RS 485 SERIAL ADAPTER |
| 9 | 1 | MODICON | 170-AAI-030-00 | 8 DIFF AI MODULE |
| 10 | 1 | MODICON | 170-ADM-370-10 | SS DC 16DI / 8DO MODULE |
| 11 | 1 | MODICON | 170-ADI-340-00 | 24VDC 16DI MODULE |
| 12 | 3 | MODICON | 170-INT-110-00 | INTERBUS COMM ADAPTER |
| 13 | 3 | MODICON | 170-MCI-007-00 | INTERBUS .36' CABLE |
| 14 | 4 | MODICON | 170-XTS-001-00 | SCREW TERMINAL BLCK (SET OF 3) |
| 15 | 1 | SQUARE D | 60112 | 120VAC-60VDC 15A CKT BRKR |
| 16 | 3 | SQUARE D | 60104 | 120VAC-60VDC 3A CKT BRKR |
| 17 | 3 | SQUARE D | 60106 | 120VAC-60VDC 5A CKT BRKR |
| 18 | 1 | SQUARE D | 60110 | 120VAC-60VDC 10A CKT BRKR |
| 19 | 1 | TELEMECANIQUE | RSB1A120F7 | 120VAC SPDT 12A RELAY |
| 20 | 1 | TELEMECANIQUE | RSZE1S35M | BASE FOR ABOVE RELAY |
| 21 | 3 | TELEMECANIQUE | RXM4AB3BD | 24VDC 4PDT 6A LED/TEST RELAY |
| 22 | 3 | TELEMECANIQUE | RXZE2S114M | BASE FOR ABOVE RELAY |
| 23 | 8 | TELEMECANIQUE | RXM2AB3BD | 24VDC DPDT 12A LED/TEST RELAY |
| 24 | 8 | TELEMECANIQUE | RXZE2S108M | BASE FOR ABOVE RELAY |
| 25 | 1 | AB | 700H-R52TU24 | GEN PURP TIME RELAY |
| 26 | 1 | AB | 700H-N101 | BASE FOR ABOVE RELAY |
| 27 | 1 | STEGO | KTS01141-9-00 | COOLING THERMOSTAT |
| 28 | 1 | HUBBELL | DRUBGFI15 | DIN-R 15A 125V DUP GFCI RECPT |
| 29 | 1 | PHOENIX | 2963860 | 125VAC 16A CNTRL CAB RECPT |
| 30 | 1 | SOLA | SDN-10-24-100P | 24VDC 10A POWER SUPPLY |
| 31 | – | – | – | – |
| 32 | 118 | PHOENIX | 3044102 | GRAY TERMINAL BLOCK |
| 33 | 10 | AB | 1492-WFB424 | 10-57V FUSED TB W/ BFI GMA |
| 34 | 1 | BUSSMANN | GMA-500MA | MINATURE GLASS FUSE |
| 35 | 5 | BUSSMANN | GMA-1MA | MINATURE GLASS FUSE |
| 36 | 2 | BUSSMANN | GMA-4MA | MINATURE GLASS FUSE |
| 37 | 2 | BUSSMANN | GMA-6MA | MINATURE GLASS FUSE |
| 38 | AR | PHOENIX | 3047028 | END PLATE D-UT2.5 TB |
| 39 | AR | PHOENIX | 0800886 | END BRACKET |
| 40 | AR | PHOENIX | 5ST1146 | DIN RAIL |
| 41 | AR | AB | 11492-DR6 | HIGH RISE DIN RAIL |
| 42 | AR | T&B | TY4X4NPW6 | 4"X4" WHITE DUCT |
| 43 | AR | T&B | TY4CPW6 | 4" WHITE DUCT COVER |
| 44 | AR | T&B | TY2X4NPW6 | 2"X4" WHITE DUCT |
| 45 | AR | T&B | TY2CPW6 | 2" WHITE DUCT COVER |
| 46 | AR | T&B | TY1X4NPW6 | 1"X4" WHITE DUCT |
| 47 | AR | T&B | TY1CPW6 | 1" WHITE DUCT COVER |
| 48 | AR | ELECTRO PAC | GRAVO 3.75X1.5 | ENGRAVED PANEL LEGEND |
| 49 | 1 | EPAC | UL508 | INDUSTRIAL CONTROL PANEL |
| 50 | 1 | SIXNET | ET-GT-9ES-1 | NETWORK SWITCH |

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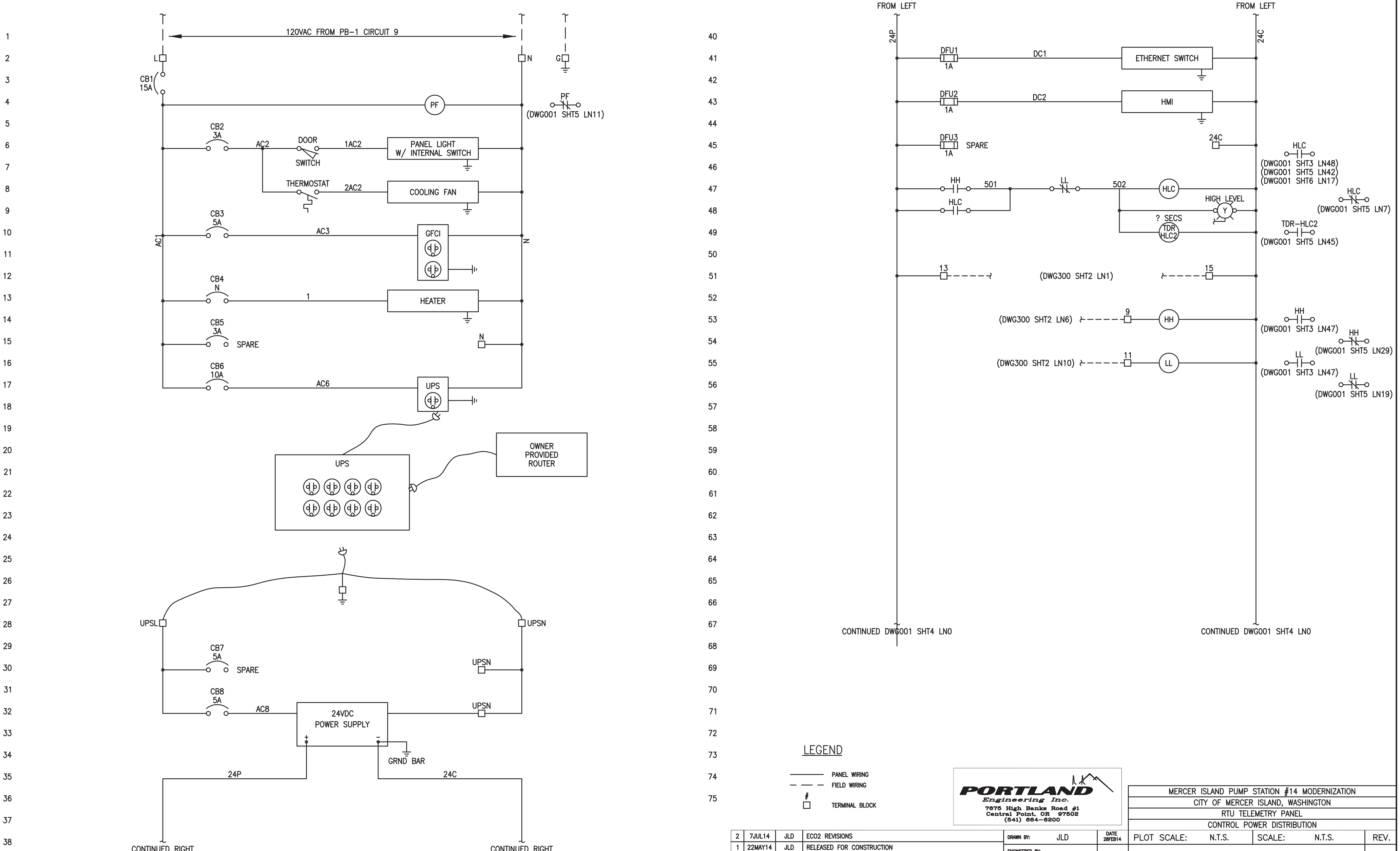
MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
BACK-PANEL LAYOUT & BOM

| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

PLOT SCALE: N.T.S. | SCALE: 1:1 | REV. 2

DWG. NO. PEI-Q140-001 | SHEET SHT. 2




LEGEND

PANEL WIRING
FIELD WIRING
TERMINAL BLOCK

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Central Point, OR 97502
(541) 664-6200

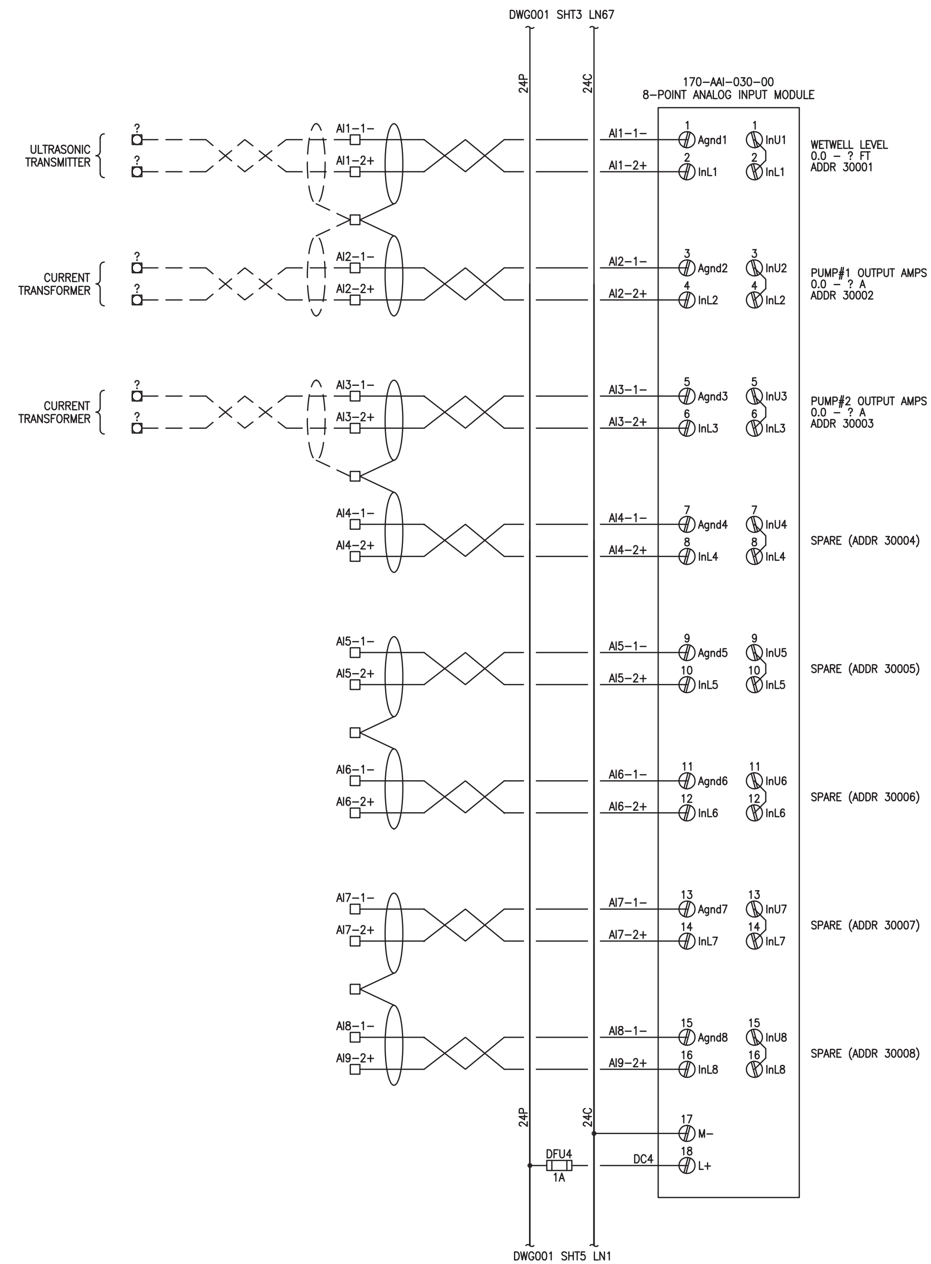
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
CONTROL POWER DISTRIBUTION

PLOT SCALE: N.T.S. | SCALE: N.T.S. | REV.

DWG. NO. PEI-Q140-001 | SHEET SHT. 3 | 2




LEGEND

PANEL WIRING
FIELD WIRING
TERMINAL BLOCK

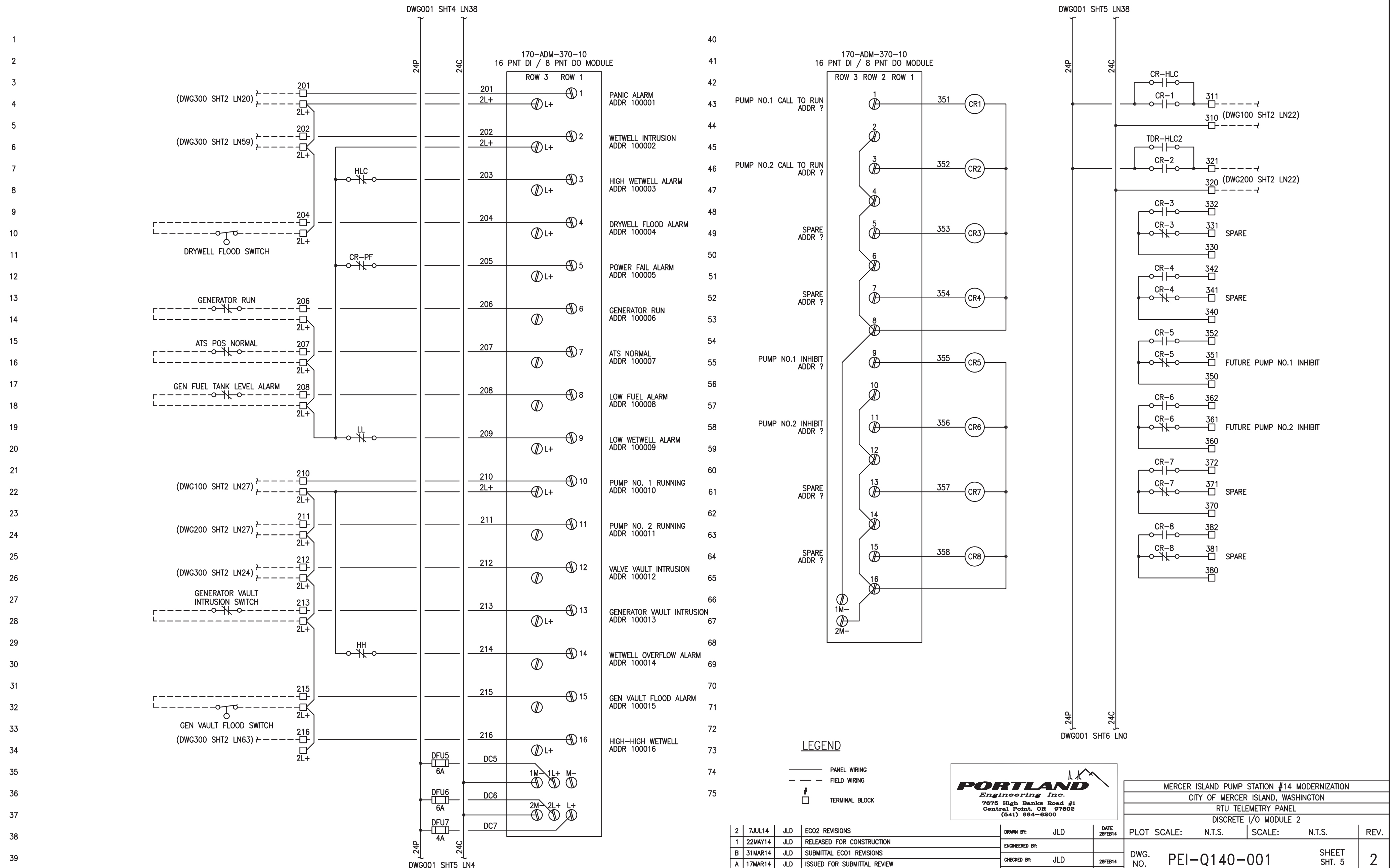
**PORTLAND**
*Engineering Inc.*
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
ANALOG INPUT MODULE 1

| PLOT SCALE: | N.T.S. | SCALE: | N.T.S. | REV. |
|---|---|---|---|---|
| DWG. NO. | PEI-Q140-001 | | SHEET SHT. 4 | 2 |




LEGEND

PANEL WIRING
FIELD WIRING
TERMINAL BLOCK

**PORTLAND**
Engineering Inc.
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

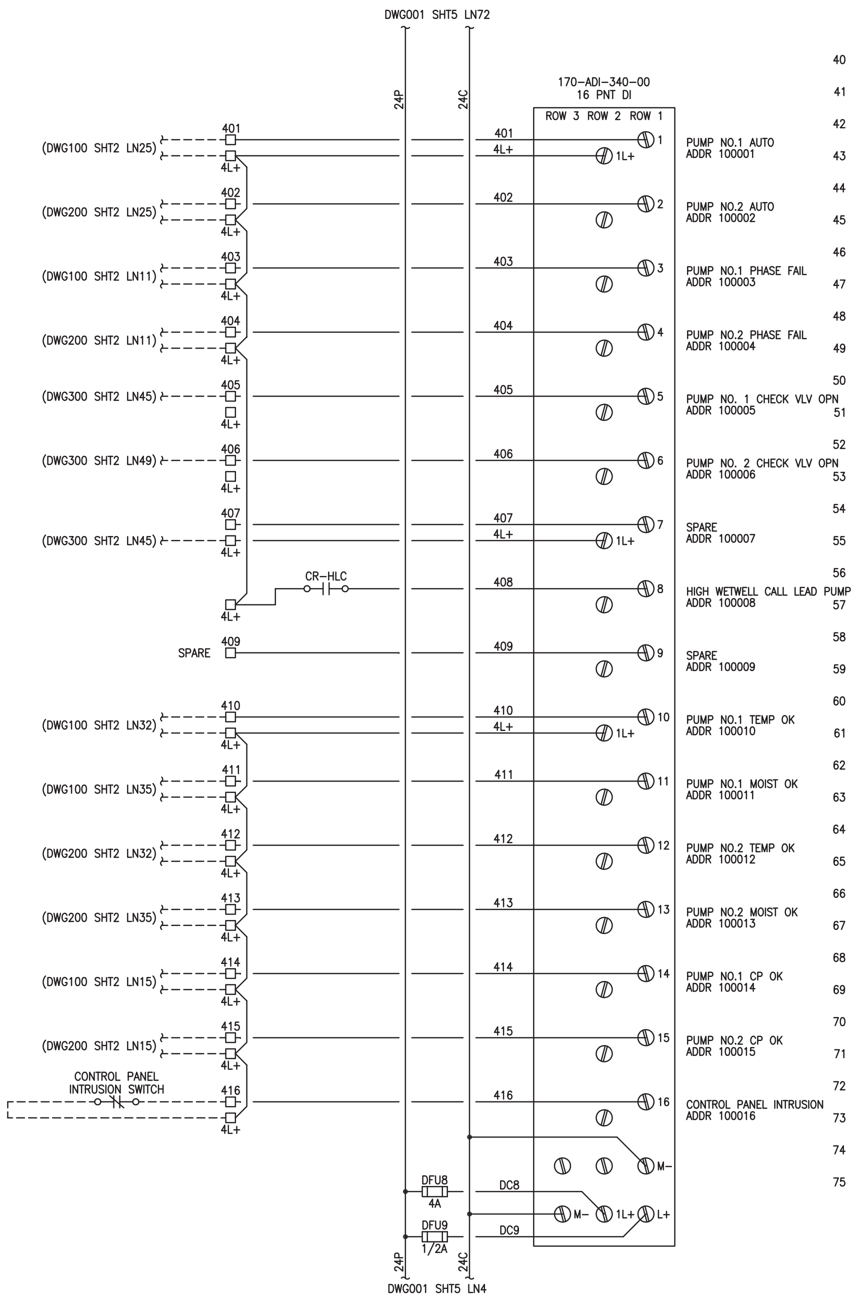
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 17MAR14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
DISCRETE I/O MODULE 2

PLOT SCALE: N.T.S. SCALE: N.T.S. REV.

DWG. NO. PEI-Q140-001 SHEET SHT. 5 2




## LEGEND

PANEL WIRING
FIELD WIRING
TERMINAL BLOCK

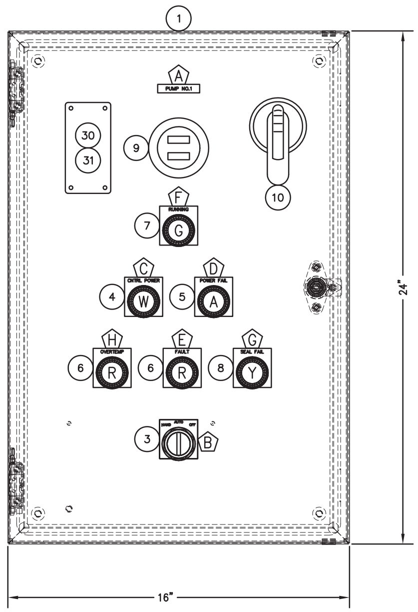
**PORTLAND** Engineering Inc.
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

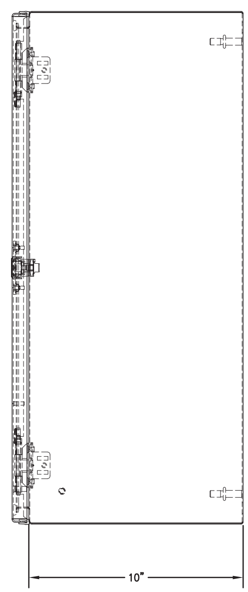
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

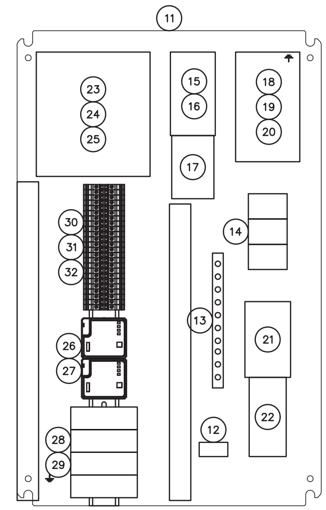
| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
RTU TELEMETRY PANEL
DISCRETE I/O MODULE 3

| | | | | |
|---|---|---|---|---|
| PLOT SCALE: N.T.S. | SCALE: N.T.S. | | | REV. |
| DWG. NO. | PEI-Q140-001 | SHEET SHT. 6 | | 2 |




## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | HOFFMAN | CSD241610 | WALL MNT TYPE 4/12 ENCL |
| 2 | 1 | HOFFMAN | CMFK | MOUNTING FOOT KIT |
| 3 | 1 | AB | 800T–J2B | 3 POS SEL SW W/ 2NO & 2NC |
| 4 | 1 | AB | 800T–QTH2W | WHITE PTT 12–130VAC/DC IND LED |
| 5 | 1 | AB | 800T–QTH2A | AMBER PTT 12–130VAC/DC IND LED |
| 6 | 2 | AB | 800T–QTH2R | RED PTT 12–130VAC/DC IND LED |
| 7 | 1 | AB | 800T–QTH2G | GREEN PTT 12–130VAC/DC IND LED |
| 8 | 1 | AB | 800T–QTH2Y | YELLOW PTT 12–130VAC/DC IND LED |
| 9 | 1 | ENM | T39 | LCD HOUR/COUNTER COMBO |
| 10 | 1 | ABB | OHB65J6 | BLACK N4X HANDLE |
| 11 | 1 | HOFFMAN | CP2416 | 22.20x14.20 BACK–PANEL |
| 12 | 1 | PANDUIT | LAMA6–14–Q | #14–4 COPPER LUG |
| 13 | 1 | CH | GBK10 | GROUND BAR KIT |
| 14 | 3 | ERICO | 569010 | SINGLE POLE DIST BLOCK |
| 15 | 1 | SSAC | P0700–241 | 3P FUSE BLOCK/DISCONNECT |
| 16 | 3 | SSAC | P0600–11 | 2A HRC MIDGET FUSE FOR ABOVE |
| 17 | 1 | SSAC | DLMUDLAAA | 200–480VAC VOLTAGE MONITOR |
| 18 | 1 | ABB | T1N040TL | 600V 3 POLE 40A UL 489 CB |
| 19 | 1 | ABB | KT3VD–M | T1–T3 VARI DEPTH N1, 3R, N12 |
| 20 | 1 | ABB | OXP6X430 | 19.7" SHAFT |
| 21 | 1 | ABB | A26N1–30–10–84 | S1 10HP 3P CTR CTR 1NO 120VAC |
| 22 | 1 | ABB | TA25DU19–20 | 13–19A 109–A40 OLR C20 |
| 23 | 1 | GE | 9T58K2807G38SAMI | 250VA 480/240X120/240 XFMR |
| 24 | 2 | BUSSMANN | LPCC–2.5 | CLASS CC 600V 2.5A FUSE |
| 25 | 1 | BUSSMANN | FNM–3.2 | 250V MIN. FUSE |
| 26 | 2 | AB | 700–HT12BU120 | 1–100SEC ON DELAY 120VAC |
| 27 | 1 | AB | 700H–N100 | BASE FOR ABOVE RELAY |
| 28 | 4 | TELEMECANIQUE | RXM2AB3BD | 24VDC DPDT 12A LED/TEST RELAY |
| 29 | 4 | TELEMECANIQUE | RXZE2S108M | BASE FOR ABOVE RELAY |
| 30 | 1 | FLYGT | 14–40 71 29 | MINICAS II/FUS–120 (BY OTHERS) |
| 31 | 1 | FLYGT | 14–40 70 97 | 11 PIN SOCKET (BY OTHERS) |
| 32 | 24 | PHOENIX | 3044102 | GRAY TERMINAL BLOCK |
| 33 | AR | PHOENIX | 3047028 | END PLATE D–UT2.5 TB |
| 34 | AR | PHOENIX | 0800886 | END BRACKET |
| 35 | AR | PHOENIX | 5ST1146 | DIN RAIL |
| 36 | AR | T&B | TY1X3NPW6 | 1"X3" WHITE DUCT |
| 37 | AR | T&B | TY1CPW6 | 1" WHITE DUCT COVER |
| 38 | AR | ELECTRO PAC | GRAVO 3.75X1.5 | ENGRAVED PANEL LEGEND |
| 39 | 1 | EPAC | UL508 | INDUSTRIAL CONTROL PANEL |

## ENGRAVING SCHEDULE

| LTR | DESCRIPTION |
|---|---|
| A | PUMP NO.1 |
| B | HAND – OFF – AUTO |
| C | CONTROL POWER |
| D | POWER FAIL |
| E | FAULT |
| F | RUNNING |
| G | SEAL FAIL |
| H | OVERTEMP |

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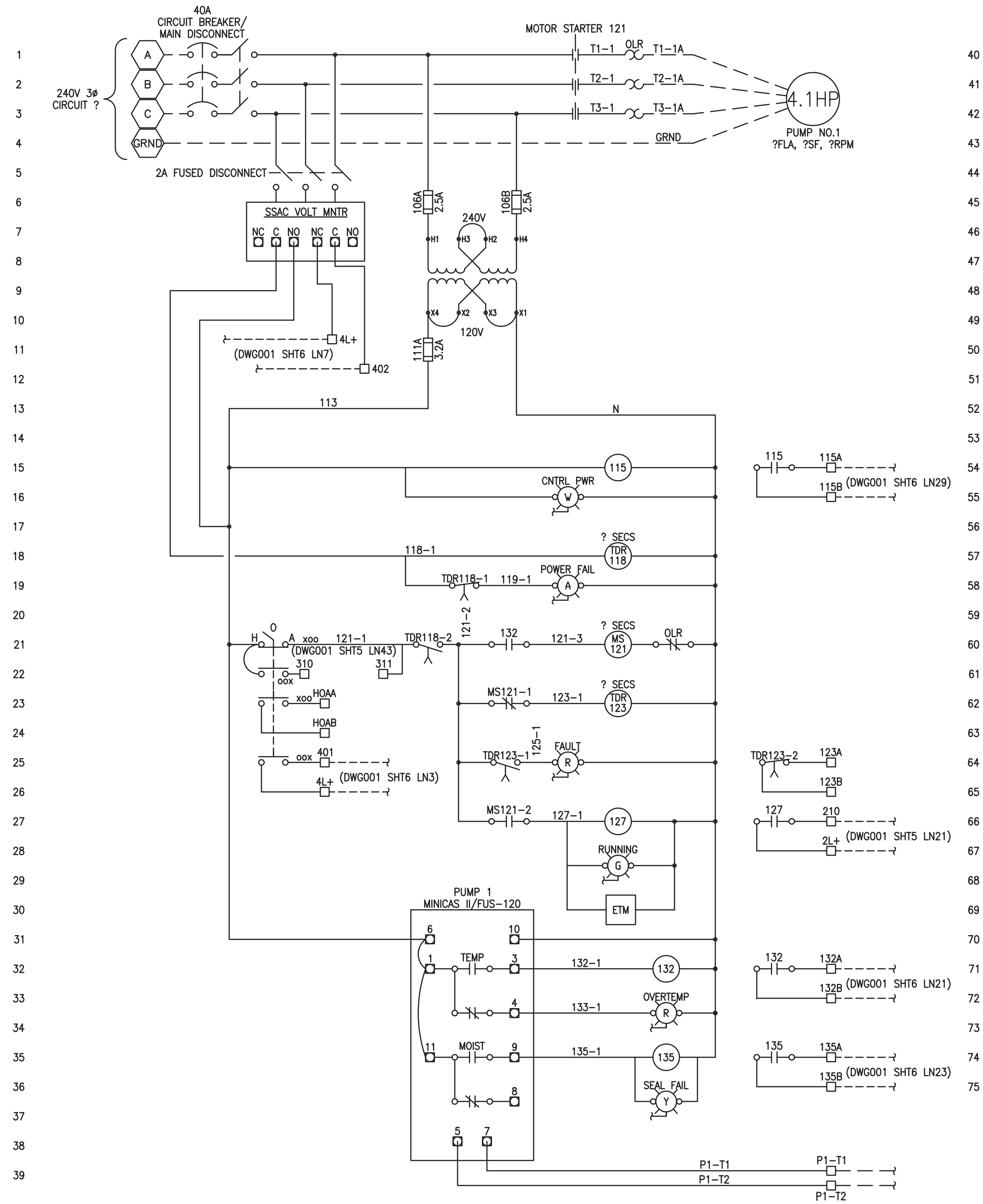
Central Point, OR 97502
(541) 664–6200

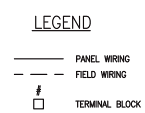
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
PUMP 1 CONTROL PANEL
FRONT & BACK–PANEL LAYOUT AND BOM

| PLOT SCALE: | N.T.S. | SCALE: | 1:1 | REV. |
|---|---|---|---|---|
| DWG. NO. | PEI–Q140–100 | | SHEET SHT. 1 | 2 |




| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

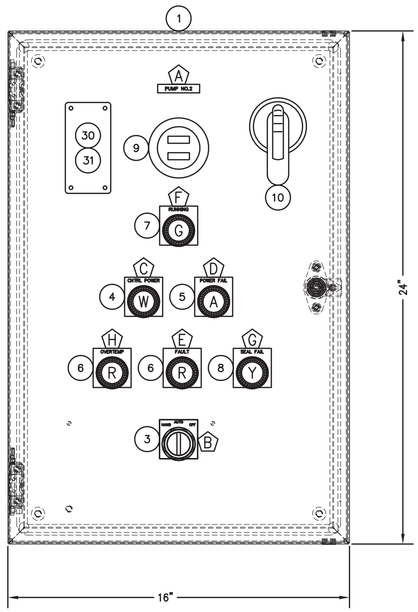
**PORTLAND** Engineering Inc.
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

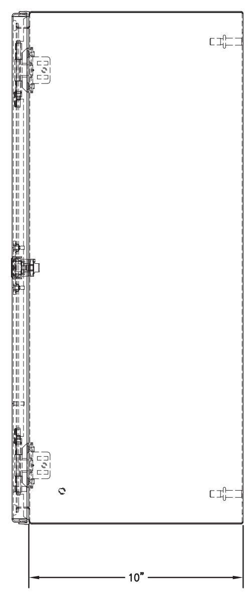
| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

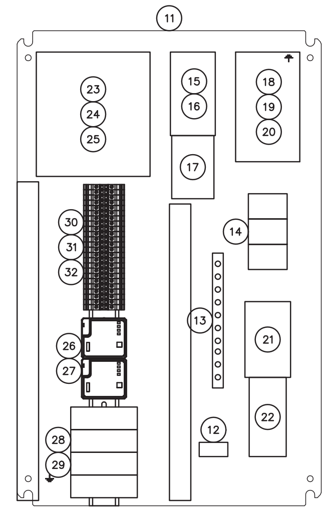
MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
PUMP 1 CONTROL PANEL
CONTROL POWER DISTRIBUTION

PLOT SCALE: N.T.S. | SCALE: N.T.S. | REV.

DWG. NO. PEI-Q140-100 | SHEET SHT. 2 | 2



## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | HOFFMAN | CSD241610 | WALL MNT TYPE 4/12 ENCL |
| 2 | 1 | HOFFMAN | CMFK | MOUNTING FOOT KIT |
| 3 | 1 | AB | 800T-J2B | 3 POS SEL SW W/ 2NO & 2NC |
| 4 | 1 | AB | 800T-QTH2W | WHITE PTT 12-130VAC/DC IND LED |
| 5 | 1 | AB | 800T-QTH2A | AMBER PTT 12-130VAC/DC IND LED |
| 6 | 2 | AB | 800T-QTH2R | RED PTT 12-130VAC/DC IND LED |
| 7 | 1 | AB | 800T-QTH2G | GREEN PTT 12-130VAC/DC IND LED |
| 8 | 1 | AB | 800T-QTH2Y | YELLOW PTT 12-130VAC/DC IND LED |
| 9 | 1 | ENM | T39 | LCD HOUR/COUNTER COMBO |
| 10 | 1 | ABB | OHB65J6 | BLACK N4X HANDLE |
| 11 | 1 | HOFFMAN | CP2416 | 22.20x14.20 BACK-PANEL |
| 12 | 1 | PANDUIT | LAMA6-14-Q | #14-4 COPPER LUG |
| 13 | 1 | CH | GBK10 | GROUND BAR KIT |
| 14 | 3 | ERICO | 569010 | SINGLE POLE DIST BLOCK |
| 15 | 1 | SSAC | P0700-241 | 3P FUSE BLOCK/DISCONNECT |
| 16 | 3 | SSAC | P0600-11 | 2A HRC MIDGET FUSE FOR ABOVE |
| 17 | 1 | SSAC | DLMUDLAAA | 200-480VAC VOLTAGE MONITOR |
| 18 | 1 | ABB | T1N040TL | 600V 3 POLE 40A UL 489 CB |
| 19 | 1 | ABB | KT3VD-M | T1-T3 VARI DEPTH N1, 3R, N12 |
| 20 | 1 | ABB | OXP6X430 | 19.7" SHAFT |
| 21 | 1 | ABB | A26N1-30-10-84 | S1 10HP 3P CTR CTR 1NO 120VAC |
| 22 | 1 | ABB | TA25DU19-20 | 13-19A 109-A40 OLR C20 |
| 23 | 1 | GE | 9T58K2807G38SAMI | 250VA 480/240X120/240 XFMR |
| 24 | 2 | BUSSMANN | LPCC-2.5 | CLASS CC 600V 2.5A FUSE |
| 25 | 1 | BUSSMANN | FNM-3.2 | 250V MIN. FUSE |
| 26 | 2 | AB | 700-HT12BU120 | 1-100SEC ON DELAY 120VAC |
| 27 | 1 | AB | 700H-N100 | BASE FOR ABOVE RELAY |
| 28 | 4 | TELEMECANIQUE | RXM2AB3BD | 24VDC DPDT 12A LED/TEST RELAY |
| 29 | 4 | TELEMECANIQUE | RXZE2S108M | BASE FOR ABOVE RELAY |
| 30 | 1 | FLYGT | 14-40 71 29 | MINICAS II/FUS-120 (BY OTHERS) |
| 31 | 1 | FLYGT | 14-40 70 97 | 11 PIN SOCKET (BY OTHERS) |
| 32 | 24 | PHOENIX | 3044102 | GRAY TERMINAL BLOCK |
| 33 | AR | PHOENIX | 3047028 | END PLATE D-UT2.5 TB |
| 34 | AR | PHOENIX | 0800886 | END BRACKET |
| 35 | AR | PHOENIX | 5ST1146 | DIN RAIL |
| 36 | AR | T&B | TY1X3NPW6 | 1"X3" WHITE DUCT |
| 37 | AR | T&B | TY1CPW6 | 1" WHITE DUCT COVER |
| 38 | AR | ELECTRO PAC | GRAVO 3.75X1.5 | ENGRAVED PANEL LEGEND |
| 39 | 1 | EPAC | UL508 | INDUSTRIAL CONTROL PANEL |

## ENGRAVING SCHEDULE

| LTR | DESCRIPTION |
|---|---|
| A | PUMP NO.2 |
| B | HAND - OFF - AUTO |
| C | CONTROL POWER |
| D | POWER FAIL |
| E | FAULT |
| F | RUNNING |
| G | SEAL FAIL |
| H | OVERTEMP |

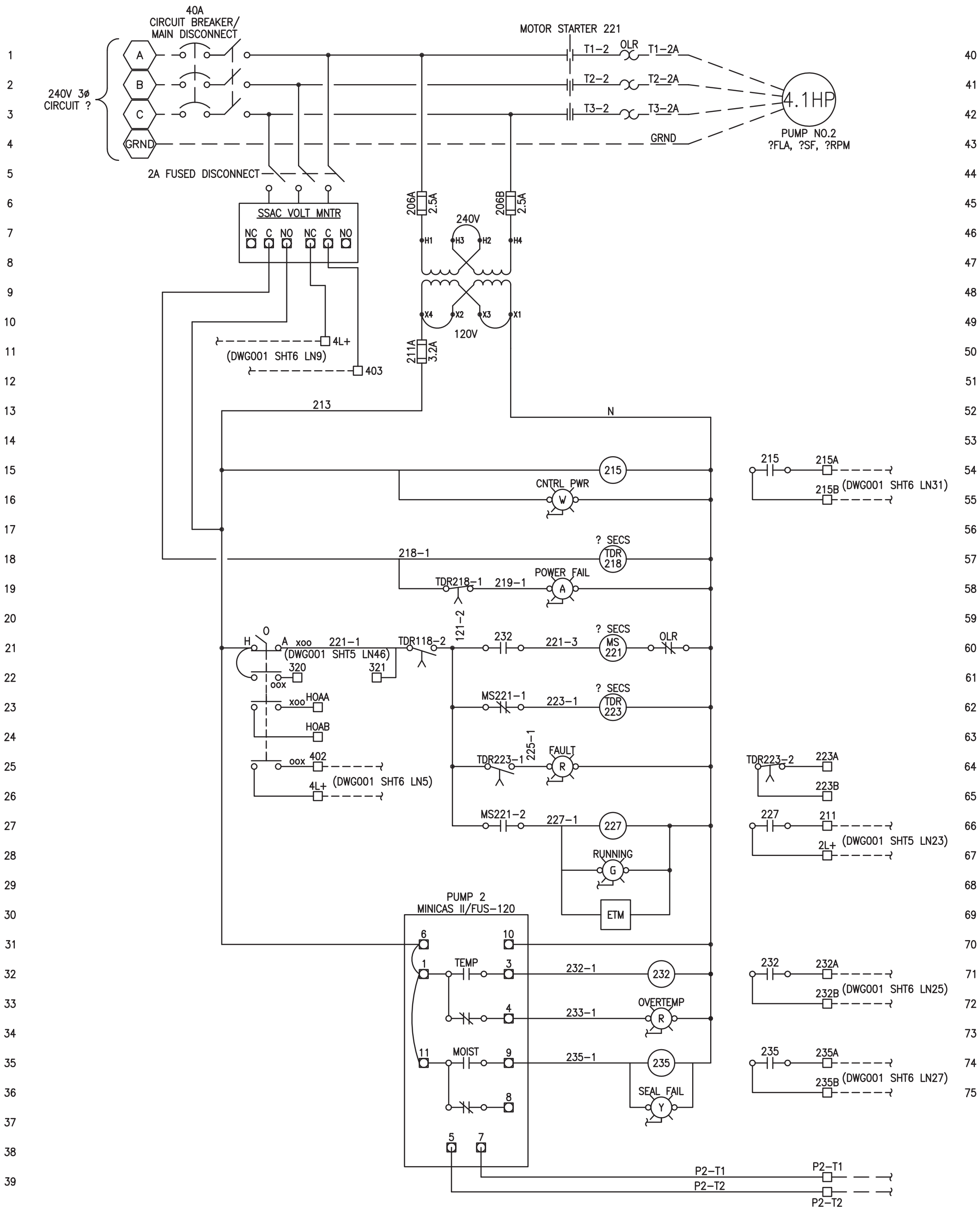
**PORTLAND** Engineering Inc.
7675 High Banks Road #1
Central Point, OR 97502
(541) 664-6200

| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
PUMP 2 CONTROL PANEL
FRONT & BACK-PANEL LAYOUT AND BOM

| PLOT SCALE: N.T.S. | SCALE: 1:1 | REV. |
|---|---|---|
| DWG. NO. PEI-Q140-200 | SHEET SHT. 1 | 2 |




LEGEND

PANEL WIRING
FIELD WIRING
TERMINAL BLOCK

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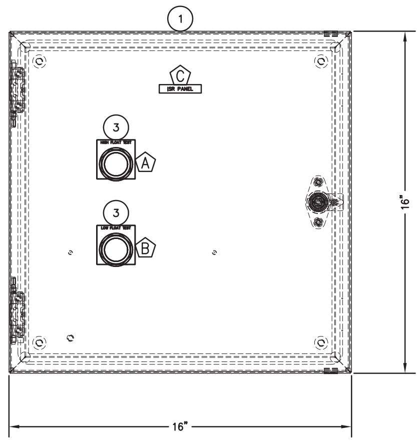
Central Point, OR 97502
(541) 664-6200

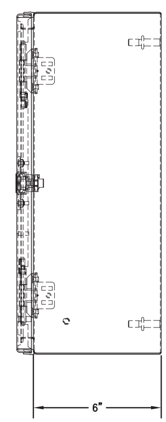
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

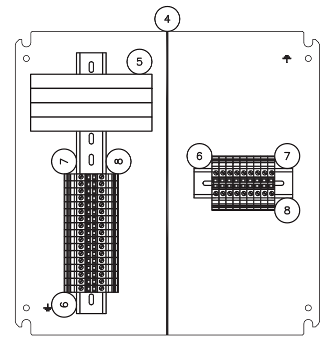
| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
PUMP 2 CONTROL PANEL
CONTROL POWER DISTRIBUTION

| PLOT SCALE: | N.T.S. | SCALE: | N.T.S. | REV. |
|---|---|---|---|---|
| DWG. NO. | PEI-Q140-200 | | SHEET SHT. 2 | 2 |




## BILL OF MATERIALS

| NO. | QTY. | BRAND | PART NO. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 1 | HOFFMAN | CSD12126 | WALL MNT TYPE 4/12 ENCL |
| 2 | 1 | HOFFMAN | CMFK | MOUNTING FOOT KIT |
| 3 | 2 | AB | 800T-A2D1 | BLK PUSH BUTTON |
| 4 | 1 | HOFFMAN | CP1212 | 10.20x10.20 BACK-PANEL |
| 5 | 4 | PHOENIX | 2865476 | 2 CH INTRINSIC RELAY |
| 6 | 26 | PHOENIX | 3044102 | GRAY TERMINAL BLOCK |
| 7 | AR | PHOENIX | 3047028 | END PLATE D-UT2.5 TB |
| 8 | AR | PHOENIX | 0800886 | END BRACKET |
| 9 | AR | SIEMENS | 5ST1146 | DIN RAIL |
| 10 | 1 | ELECTRO PAC | BARRIER | INTRINSIC ISOLATION BARRIER |
| 11 | 1 | ELECTRO PAC | UL S1861 | INTRINSICALLY SAFE LABEL |

## ENGRAVING SCHEDULE

| LTR | DESCRIPTION |
|---|---|
| A | HIGH FLOAT TEST |
| B | LOW FLOAT TEST |
| C | ISR PANEL |
| D | PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN CLASS 1, GROUP D, HAZARDOUS LOCATIONS WHEN CONNECTED PER PEI-L225 AND GEMS FORM 270. |
| E | WARNING – TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING |

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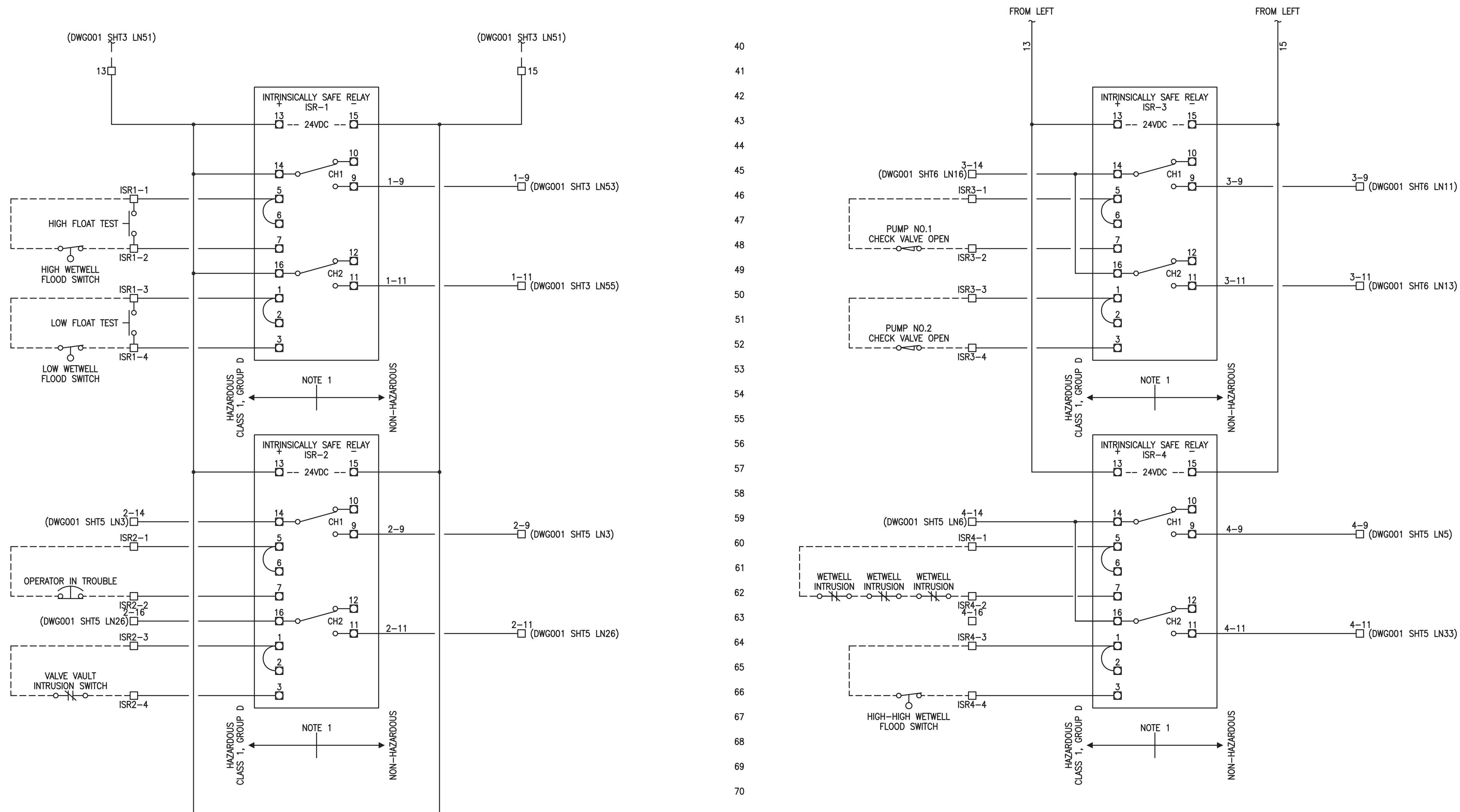
| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
INTRINSICALLY SAFE RELAY PANEL
FRONT & BACK-PANEL LAYOUT AND BOM

| PLOT SCALE: N.T.S. | SCALE: 1:1 | REV. |
|---|---|---|
| DWG. NO. PEI-Q140-300 | SHEET SHT. 1 | 2 |




CONTINUED RIGHT    CONTINUED RIGHT

NOTE 1: INSTALL IN ACCORDANCE WITH ART. 504 OF THE NEC. FOR CONNECTIVITY TO PURELY RESISTIVE NON-ENERGY STORING DEVICES

## LEGEND

- PANEL WIRING
- FIELD WIRING
- TERMINAL BLOCK

PORTLAND Engineering Inc.
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Central Point, OR 97502
(541) 664-6200

| NO. | DATE | DRAWN BY | REVISION |
|---|---|---|---|
| 2 | 7JUL14 | JLD | ECO2 REVISIONS |
| 1 | 22MAY14 | JLD | RELEASED FOR CONSTRUCTION |
| B | 31MAR14 | JLD | SUBMITTAL ECO1 REVISIONS |
| A | 28FEB14 | JLD | ISSUED FOR SUBMITTAL REVIEW |

| | | DATE |
|---|---|---|
| DRAWN BY: | JLD | 28FEB14 |
| ENGINEERED BY: | | |
| CHECKED BY: | JLD | 28FEB14 |
| SR PROJECT ENG.: | | |

MERCER ISLAND PUMP STATION #14 MODERNIZATION
CITY OF MERCER ISLAND, WASHINGTON
INTRINSICALLY SAFE RELAY PANEL
CONTROL POWER DISTRIBUTION

| PLOT SCALE: N.T.S. | SCALE: N.T.S. | REV. |
|---|---|---|
| DWG. NO. PEI-Q140-300 | SHEET SHT. 2 | 2 |

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# SECTION 01 11 00_SUMMARY OF WORK

## ATTACHMENT A

## PHASE III SEWER TELEMETRY 2014 UPDGRADE

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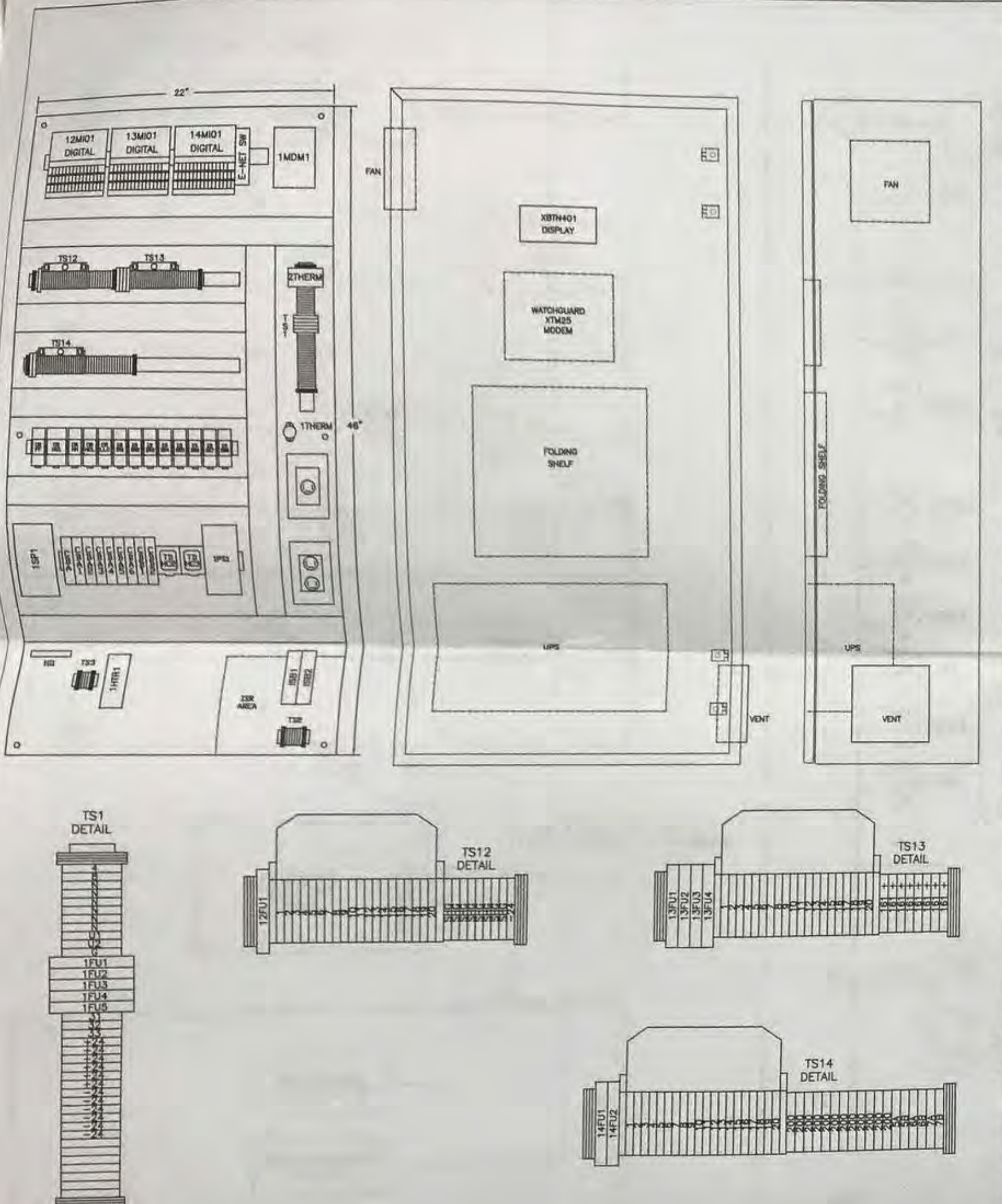


## LIST OF MATERIALS

| EQUIP. TAG | ITEM | QTY | DESCRIPTION | | | MFGR. |
|---|---|---|---|---|---|---|
| | 1 | 1 | CONCEPT ENCLOSURE 48X24X12 | | CSD482412 | HOFFMAN |
| | 2 | 1 | BACKPAN | | CP4824 | HOFFMAN |
| 1UPS1 | 3 | 1 | 9130 1000VA UPS | | PW9130 1000 | POWERWARE |
| CBA | 4 | 1 | 15AMP 1 POLE BREAKER | 1POLE | 60112 | SQUARED |
| CBA2 | 5 | 1 | 15AMP 1 POLE BREAKER | 1POLE | 60112 | SQUARED |
| CBA1 | 6 | 1 | 10AMP 1 POLE BREAKER | 1POLE | 60110 | SQUARED |
| CBA5 | 7 | 1 | 10AMP 1 POLE BREAKER | 1POLE | 60110 | SQUARED |
| CBB1 | 8 | 1 | 8AMP 1 POLE BREAKER | 1POLE | 60109 | SQUARED |
| CBA3 | 9 | 1 | 5AMP 1 POLE BREAKER | 1POLE | 60106 | SQUARED |
| CBA4 | 10 | 1 | 5AMP 1 POLE BREAKER | 1POLE | 60106 | SQUARED |
| CBB2 | 11 | 1 | 2AMP 1 POLE BREAKER | 1POLE | 60103 | SQUARED |
| 1D1 | 12 | 8 | DIODE | | 1N4007 | NEWARK |
| 1FU1 | 13 | 2 | FUSE BLOCK | | 3004126 | PHOENIX |
| 1FU1 | 14 | 1 | 2A GLASS FUSE | | GMC-2 | BUSSMAN |
| 1FU2 | 15 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 1FU2 | 16 | 1 | 500mA GLASS FUSE | | GMD-500MA | BUSSMAN |
| 1FU3 | 17 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 1FU3 | 18 | 1 | 500mA GLASS FUSE | | GMD-500MA | BUSSMAN |
| 1FU4 | 19 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 1FU4 | 20 | 1 | GMD-500mA | | GMD-500MA | BUSSMAN |
| 1FU5 | 21 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 1G1 | 22 | 1 | EQUIPMENT GROUND TERMINALS | | PK15-GTA | HOFFMAN |
| 1HTR1 | 23 | 1 | ENCLOSURE HEATER | 30W | DAH301 | HOFFMAN |
| ISB1,2 | 24 | 2 | INTRINSICALLY SAFE RELAY | 2CH | 2865476 | PHOENIX |
| 1LT1 | 25 | 1 | ENCLOSURE LIGHT | | TL108R | AMER FLUOR |
| | 26 | 1 | BULB | | F8T5/CW | AMER FLUOR |
| 1PS1 | 27 | 1 | 24VDC POWER SUPPLY 10 AMP | 24VDC | SDN-10-24-100P | SOLA |
| 1RCPT1 | 28 | 1 | DUPLEX RECEPTACLE | | 5600461 | PHOENIX |
| 1RCPT2 | 29 | 1 | OUTLET, SINGLE BROWN | | 5261 | HUBBEL |
| 1RCPT2 | 30 | 1 | HANDY BOX | | 670 | RACO |
| 1SP1 | 31 | 1 | 120VAC SURGE SUPPRESSOR | | HSP121BT1RU | EMERSON |
| 1THRM1 | 32 | 1 | DISC THERMOSTAT FOR HEATER | | STO-60 | NEWARK |
| 2THRM1 | 33 | 1 | FAN THERMOSTAT | | ATEMNO | HOFFMAN |
| 1FAN1 | 34 | 1 | EXHAUST FAN PACKAGE / FILTER PACKAGE | | TFP41/TEP4 | HOFFMAN |
| 11CBL2 | 35 | 2 | 11CM INTERBUS CABLE ASSEMBLY | | 170MCI00700 | MODICON |
| 12FU1 | 36 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 12FU1 | 37 | 1 | 500mA FUSE | | GMD-500MA | BUSSMAN |
| 12MI01 | 38 | 1 | MOMENTUM 8CH DIFFERENTIAL A.I. | | 170AAI03000 | MODICON |
| 12MI01 | 39 | 3 | SCREW TERMINAL | | 170XTS00100 | MODICON |
| 12MI01 | 40 | 1 | MOMENTUM 512K/ETHERNET/IOBUS/ 50MHZ | | 171CCC96030 | MODICON |
| 12MI01 | 41 | 1 | OPTION ADAPTOR, MODBUS/TOD/BATTERY | | 172JNN21032 | MODICON |
| 12MI01 | 42 | 1 | GANG TERMINAL BLOCK | | BOM-16 | ENTRELEC |
| 12MI01 | 43 | 1 | INTERFACE CABLE I/O CARD TO TERMS | 1SNA | 038 038 R 2200 | ABB |
| 13FU1 | 44 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 13FU1 | 45 | 1 | 500mA FUSE | | GMD500MA | BUSSMAN |
| 13FU2 | 46 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 13FU2 | 47 | 1 | 3A FUSE | | GMC-3A | BUSSMAN |
| 13FU3 | 48 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 13FU3 | 49 | 1 | 3A FUSE | | GMC-3A | BUSSMAN |
| 13FU4 | 50 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 13FU4 | 51 | 1 | 3A FUSE | | GMC-3A | BUSSMAN |
| 13RT-8,CRHH, CRH,CRLL | 52 | 11 | 24VDC 2POLE RELAYS | | RH2B-UL24VDC | IDEC |
| 13RT-8,CRHH, CRH,CRLL | 53 | 12 | RELAY BASES | | SH2B-05 | IDEC |
| CRPF | 54 | 1 | 120VAC 2POLE RELAY | | RH2B-UL120VAC | IDEC |
| CRHC1 | 55 | 1 | 24VDC 3POLE RELAY | | RH3B-UL24VDC | IDEC |
| CRHC1 | 56 | 1 | RELAY BASES | | SH3B-05 | IDEC |
| 13MI01 | 57 | 1 | MOMENTUM 16DI/8DO 24VDC | | 170ADM37010 | MODICON |
| 13MI01 | 58 | 1 | MOMENTUM INTERBUS-S TOPHAT | | 170INT11000 | MODICON |
| 13MI01 | 59 | 3 | SCREW TERMINAL | | 170XTS00100 | MODICON |
| 13MI01 | 60 | 1 | GANG TERMINAL BLOCK | | BOM-16 | ENTRELEC |
| 13MI01 | 61 | 1 | INTERFACE CABLE I/O CARD TO TERMS | 1SNA | 038 038 R 2200 | ABB |
| 14FU1 | 62 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 14FU1 | 63 | 1 | 500mA FUSE | | GMD-500MA | BUSSMAN |
| 14FU2 | 64 | 1 | FUSE BLOCK | | 3004126 | PHOENIX |
| 14FU2 | 65 | 1 | 3A FUSE | | GMC-3A | BUSSMAN |
| 14MI01 | 66 | 1 | MOMENTUM 16DI 24VDC | | 170ADI34000 | MODICON |

## LIST OF MATERIALS CONT.

| EQUIP. TAG | ITEM | QTY | DESCRIPTION | | | MFGR. |
|---|---|---|---|---|---|---|
| 14MI01 | 67 | 1 | MOMENTUM INTERBUS-S TOPHAT | | 170INT11000 | MODICON |
| 14MI01 | 68 | 3 | SCREW TERMINAL | | 170XTS00100 | MODICON |
| 14MI01 | 69 | 1 | GANG TERMINAL BLOCK | | BOM-16 | ENTRELEC |
| 14MI01 | 70 | 1 | INTERFACE CABLE I/O CARD TO TERMS | 1SNA | 038 038 R 2200 | ABB |
| TS1 | 71 | 1 | DIN RAIL 35MM | | 801733 | PHOENIX |
| TS1 | 72 | 33 | TERMINAL BLOCK | | 3044102 | PHOENIX |
| TS1 | 73 | 4 | END BARRIER | | 3047028 | PHOENIX |
| TS1 | 74 | 3 | END BLOCK | | 0800886 | PHOENIX |
| TS12 | 75 | 9 | TERMINAL BLOCK | | 3044102 | PHOENIX |
| TS12 | 76 | 1 | END BARRIER | | 3047028 | PHOENIX |
| TS12 | 77 | 2 | END BLOCK | | 0800886 | PHOENIX |
| TS13 | 78 | 8 | TERMINAL BLOCK | | 3044102 | PHOENIX |
| TS13 | 79 | 1 | END BARRIER | | 3047028 | PHOENIX |
| TS13 | 80 | 2 | END BLOCK | | 0800886 | PHOENIX |
| TS14 | 81 | 18 | TERMINAL BLOCK | | 3044102 | PHOENIX |
| TS14 | 82 | 1 | END BARRIER | | 3047028 | PHOENIX |
| TS14 | 83 | 2 | END BLOCK | | 0800886 | PHOENIX |
| 1OI1 | 84 | 1 | OPERATOR INTERFACE | | XBTN401 | TELEMECANIQUE |
| 1SW1 | 85 | 1 | 5 PORT ETHERNET SWITCH | | SLX-5ES | SIXNET |
| 1MDM1 | 86 | 1 | CELLULAR VPN GATEWAY | | GX440/400 | SIERRA WIRELESS |
| 1VPN1 | 87 | 1 | BRANCH OFFICE VPN DEVICE | | XTM25 | WATCHGUARD |
| | 88 | 1 | FOLDING SHELF | | ACSHELF12 | HOFFMAN |
| | 89 | 4 | LIMIT INT. SW/LIMIT LIGHT SW. | | 9007C54B2 9007HA1 | SQ D |
| | 90 | 1 | PROXIMITY SWITCH | | 9007C54B2 9007HA1 | SQ D |
| | 91 | 2 | PANIC BUTTON | | 10250T32R | CH |
| | 92 | 6 | FLOATS 30' NORMALLY CLOSED | | PUASS30NC | ANCHOR |
| 1TD1,2 | 93 | 2 | TIMERS | | GT3A-3AD24 | IDEC |
| | 94 | 2 | SOCKETS | | SR2P-05 | IDEC |
| | 95 | | | | | |

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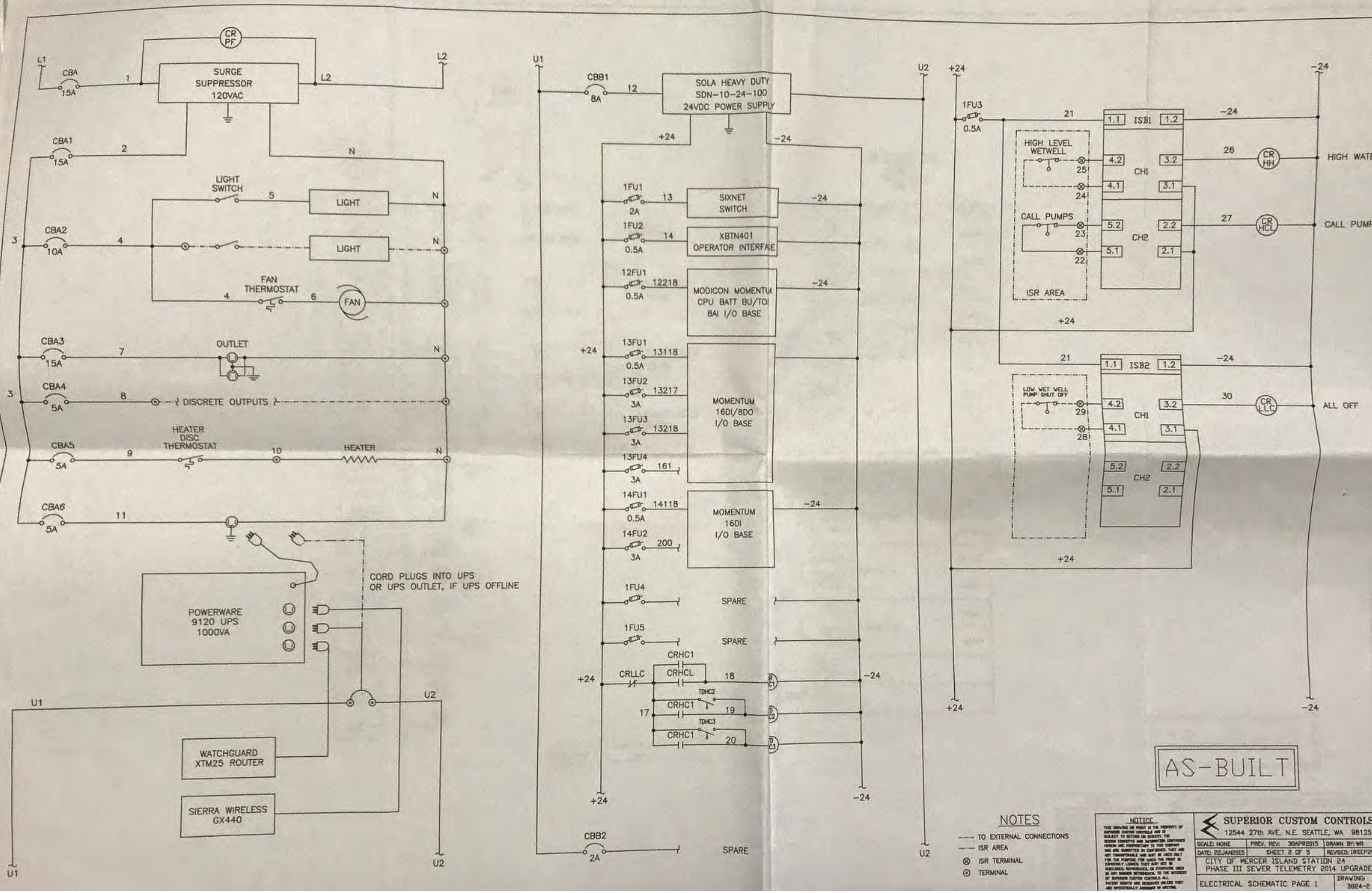
|---|---|---|
| DATE: 22JAN2015 | SHEET 1 OF 5 | REVISED:30APR2014 |

CITY OF MERCER ISLAND STATION 24
PHASE III SEWER TELEMETRY 2014 UPGRADE

PARTS LIST AND LAYOUT DRAWINGS — DRAWING: 3924-1




## NOTES

- - - TO EXTERNAL CONNECTIONS
— - — ISR AREA
⊗ ISR TERMINAL
⊙ TERMINAL

NOTICE

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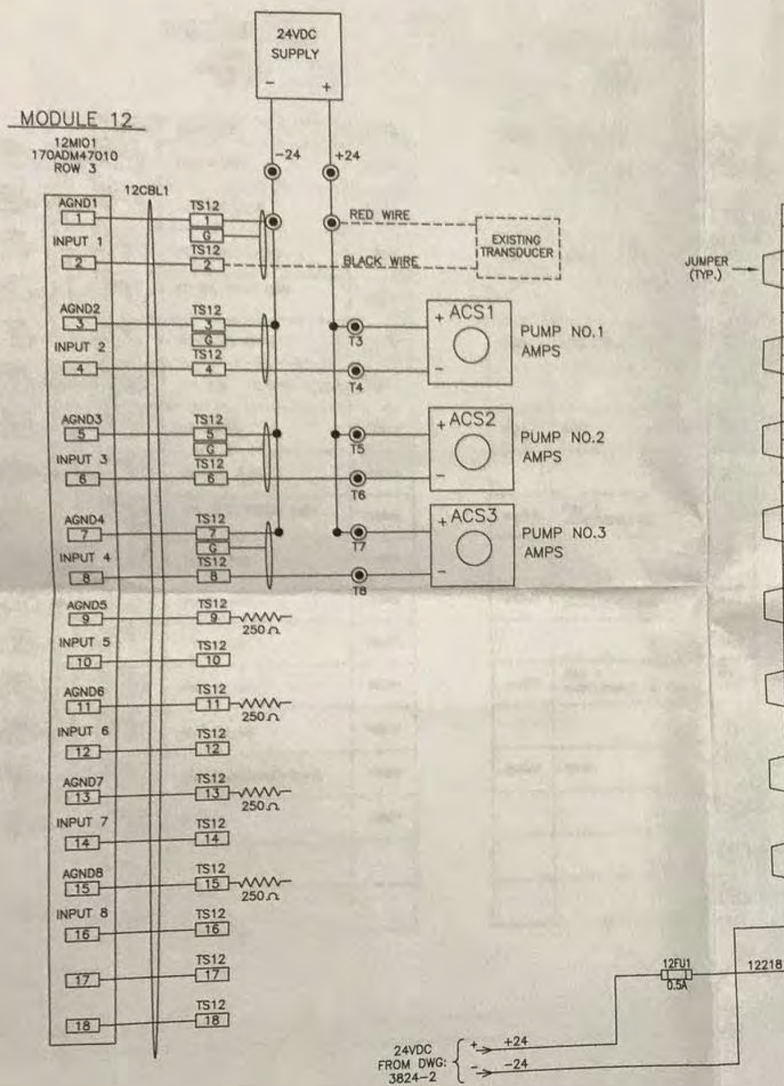
CITY OF MERCER ISLAND STATION 24
PHASE III SEWER TELEMETRY 2014 UPGRADE

ELECTRICAL SCHEMATIC PAGE 1 | DRAWING: 3824-2




MODULE 12
12MI01
170ADM37010
ROW 2

| TERMINAL | DESCRIPTION | ADDRESS |
|---|---|---|
| INPUT 1 1 + | WETWELL LEVEL | 30008 |
| INPUT 1 2 - | | 30008 |
| INPUT 2 3 + | PUMP 1 AMPS | 30007 |
| INPUT 2 4 - | | 30007 |
| INPUT 3 5 + | PUMP 2 AMPS | 30006 |
| INPUT 3 6 - | | 30006 |
| INPUT 4 7 + | PUMP 3 AMPS | 30005 |
| INPUT 4 8 - | | 30005 |
| INPUT 5 9 + | SPARE AI | 30004 |
| INPUT 5 10 - | | 30004 |
| INPUT 6 11 + | SPARE AI | 30003 |
| INPUT 6 12 - | | 30003 |
| INPUT 7 13 + | SPARE AI | 30002 |
| INPUT 7 14 - | | 30002 |
| INPUT 8 15 + | SPARE AI | 30001 |
| INPUT 8 16 - | | 30001 |
| Mb 17 | | |
| Ub 18 | | |

## NOTE:

① -WIRE ALL ANALOG INPUTS AS CURRENT 4-20mA. SUPPLY .1% 250 OHM PRECISION RESISTOR FOR ALL POINTS.

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NOTICE

SUPERIOR CUSTOM CONTROLS
12544 27th AVE. N.E. SEATTLE, WA 98125

| | | |
|---|---|---|
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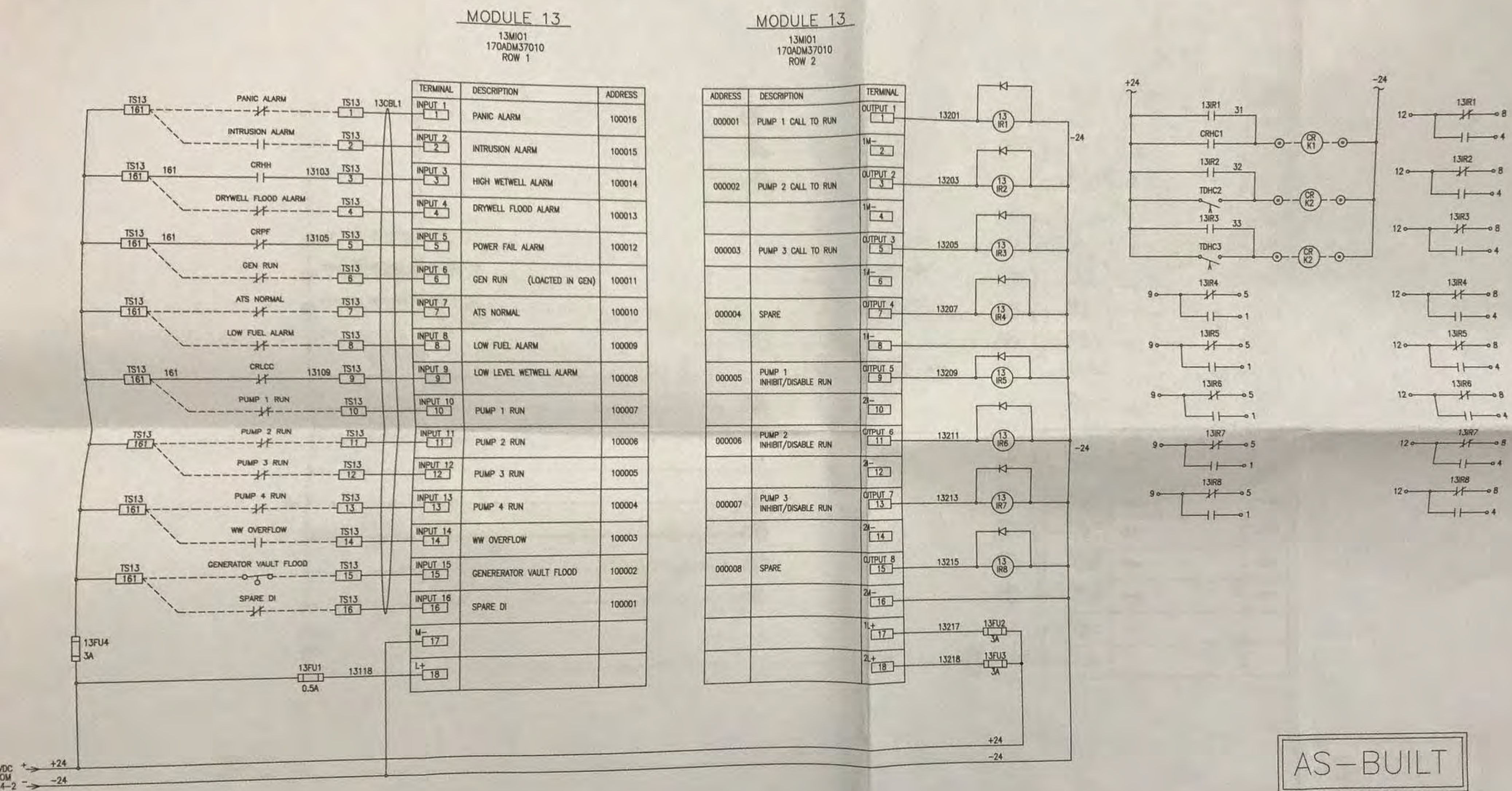
| DATE: 22JAN2015 | SHEET 3 OF 5 | REVISED: 18SEP2015 |

CITY OF MERCER ISLAND STATION 24
PHASE III SEWER TELEMETRY 2014 UPGRADE

ELECTRICAL SCHEMATIC PAGE 2

DRAWING: 3824-3




## MODULE 13

13MI01
170ADM37010
ROW 1

| TERMINAL | DESCRIPTION | ADDRESS |
|---|---|---|
| INPUT 1 / 1 | PANIC ALARM | 100016 |
| INPUT 2 / 2 | INTRUSION ALARM | 100015 |
| INPUT 3 / 3 | HIGH WETWELL ALARM | 100014 |
| INPUT 4 / 4 | DRYWELL FLOOD ALARM | 100013 |
| INPUT 5 / 5 | POWER FAIL ALARM | 100012 |
| INPUT 6 / 6 | GEN RUN (LOACTED IN GEN) | 100011 |
| INPUT 7 / 7 | ATS NORMAL | 100010 |
| INPUT 8 / 8 | LOW FUEL ALARM | 100009 |
| INPUT 9 / 9 | LOW LEVEL WETWELL ALARM | 100008 |
| INPUT 10 / 10 | PUMP 1 RUN | 100007 |
| INPUT 11 / 11 | PUMP 2 RUN | 100006 |
| INPUT 12 / 12 | PUMP 3 RUN | 100005 |
| INPUT 13 / 13 | PUMP 4 RUN | 100004 |
| INPUT 14 / 14 | WW OVERFLOW | 100003 |
| INPUT 15 / 15 | GENERERATOR VAULT FLOOD | 100002 |
| INPUT 16 / 16 | SPARE DI | 100001 |
| M– / 17 | | |
| L+ / 18 | | |

## MODULE 13

13MI01
170ADM37010
ROW 2

| ADDRESS | DESCRIPTION | TERMINAL |
|---|---|---|
| 000001 | PUMP 1 CALL TO RUN | OUTPUT 1 / 1 |
| | | 1M– / 2 |
| 000002 | PUMP 2 CALL TO RUN | OUTPUT 2 / 3 |
| | | 1M– / 4 |
| 000003 | PUMP 3 CALL TO RUN | OUTPUT 3 / 5 |
| | | 1M– / 6 |
| 000004 | SPARE | OUTPUT 4 / 7 |
| | | 1M– / 8 |
| 000005 | PUMP 1 INHIBIT/DISABLE RUN | OUTPUT 5 / 9 |
| | | 2M– / 10 |
| 000006 | PUMP 2 INHIBIT/DISABLE RUN | OUTPUT 6 / 11 |
| | | 2M– / 12 |
| 000007 | PUMP 3 INHIBIT/DISABLE RUN | OUTPUT 7 / 13 |
| | | 2M– / 14 |
| 000008 | SPARE | OUTPUT 8 / 15 |
| | | 2M– / 16 |
| | | 1L+ / 17 |
| | | 2L+ / 18 |

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## NOTES

--- TO EXTERNAL CONNECTIONS

⊙ TERMINAL

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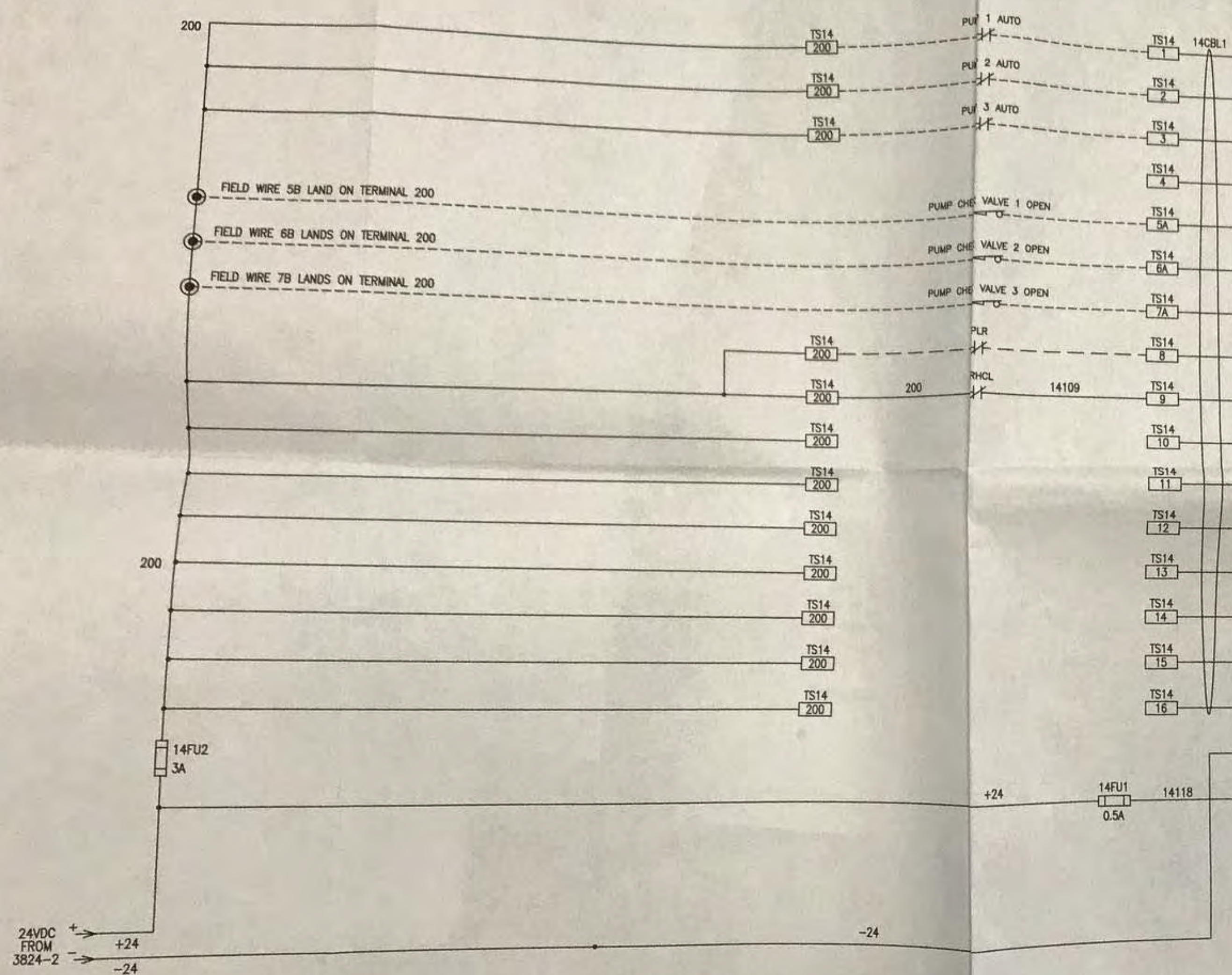
12544 27th AVE. N.E. SEATTLE, WA 981

| | | |
|---|---|---|
| SCALE: NONE | PREV. REV: 29OCT2014 | DRAWN BY: W |
| DATE: 22JAN2015 | SHEET 4 OF 5 | REVISED: 18SE |

CITY OF MERCER ISLAND STATION 24
PHASE III SEWER TELEMETRY 2014 UPGRADE
DRAWING:

## MODULE 14

14MI01
170ADI34000
ROW 1




| TERMINAL | DESCRIPTION | ADDRESS |
|---|---|---|
| INPUT 1 [1] | PUMP 1 AUTO | 100032 |
| INPUT 2 [2] | PUMP 2 AUTO | 100031 |
| INPUT 3 [3] | PUMP 3 AUTO | 100030 |
| INPUT 4 [4] | SPARE | 100029 |
| INPUT 5 [5] | PUMP CHECK VALVE 1 OPEN | 100028 |
| INPUT 6 [6] | PUMP CHECK VALVE 2 OPEN | 100027 |
| INPUT 7 [7] | PUMP CHECK VALVE 3 OPEN | 100026 |
| INPUT 8 [8] | PHASE FAIL INPUT | 100025 |
| INPUT 9 [9] | HIGH WET WELL CALL LEAD PUMP | 100024 |
| INPUT 10 [10] | SPARE | 100023 |
| INPUT 11 [11] | SPARE | 100022 |
| INPUT 12 [12] | SPARE | 100021 |
| INPUT 13 [13] | SPARE | 100020 |
| INPUT 14 [14] | SPARE | 100019 |
| INPUT 15 [15] | SPARE | 100018 |
| INPUT 16 [16] | SPARE | 100017 |
| M- [17] | | |
| L+ [18] | | |

AS-BUILT

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SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

PUMP STATION NO. 18 PUMP REPLACEMENT, PUMP STATIONS 13, 17, & 24 GENERATORS REPLACEMENT

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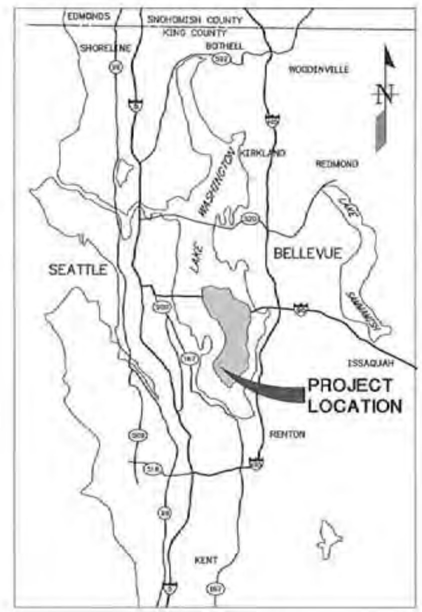
# CITY OF MERCER ISLAND

## PUMP STATION NO. 18 PUMP REPLACEMENT
## PUMP STATIONS 13, 17 & 24
## GENERATORS REPLACEMENT

### CONTRACT NO. P18G131724

### CITY CONTACT


BRIAN McDANIEL
CITY OF MERCER ISLAND
UTILITIES OPERATIONS MANAGER
9611 SE 36TH ST
MERCER ISLAND, WA 98040
206-275-7812
brian.mcdaniel@mercergov.org


VICINITY MAP

CHS ENGINEERS

PS #13, 17, 18 & 24 EQUIPMENT
VICINITY MAP & CONTACT PERSONNEL
Sheet 1 of 24
Job No. 801703

## GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE RULES AND REGULATIONS OF THE CITY OF MERCER ISLAND CONSTRUCTION STANDARDS AND SPECIFICATIONS. THE STANDARDS AND SPECIFICATIONS ARE CONTAINED IN A BOUND VOLUME TITLED "SPECIFICATIONS AND CONTRACT DOCUMENTS FOR PUMP STATION NO. 18 PUMP REPLACEMENT – PUMP STATIONS 13, 17 & 24 GENERATORS REPLACEMENT". INCLUDED HEREIN BY REFERENCE. IN THE EVENT THAT THERE IS A CONFLICT BETWEEN THE VARIOUS REFERENCED STANDARDS AND/OR THE PLANS, THE MORE RESTRICTIVE SHALL APPLY, AS DETERMINED BY THE OWNERS. A COPY OF THESE DOCUMENTS SHALL BE ON SITE DURING CONSTRUCTION.
2. ALL WORK SHALL CONFORM TO THE PERMIT REQUIREMENTS OF THE CITY OF MERCER ISLAND AND OTHER PROJECT PERMIT REQUIREMENTS AS APPLICABLE. A COPY OF THE APPROVED PLANS MUST BE ON SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
3. THE OWNER SHALL BE NOTIFIED AND A PRECONSTRUCTION CONFERENCE SHALL BE HELD PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL TESTING AND CONSTRUCTION SHALL BE INSPECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 24 HOURS NOTICE PRIOR TO REQUIRED PERFORMANCE TESTING OR COVERING OF BURIED UTILITIES OR STATION APPURTENANCES. CONSTRUCTION HOURS ARE FROM 7AM TO 7PM WEEKDAYS AND 8AM TO 7PM WEEKENDS OR FEDERAL, STATE AND CITY HOLIDAYS. WORK REQUIRING INSPECTION BY THE CITY MUST BE PERFORMED BETWEEN 7AM AND 3:30 PM WEEKDAYS.
4. LOCATIONS SHOWN FOR EXISTING UTILITIES ARE APPROXIMATE. IDENTIFICATION, LOCATION, MARKING, AND RESPONSIBILITY FOR UNDERGROUND FACILITIES OR UTILITIES IS GOVERNED BY THE PROVISIONS OF CHAPTER 19.122, REVISED CODE OF WASHINGTON. CALL 811 OR 1-800-424-5555 TWO BUSINESS DAYS BEFORE DIGGING. SEE SECTION 02760 OF THE SPECIFICATIONS.
5. ALL EQUIPMENT AND MATERIAL WHICH IS NOTED AS "TO BE REMOVED" SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR, UNLESS SUCH EQUIPMENT OR MATERIAL IS NOTED AS "TO BE SALVAGED" OR "RELOCATED" (OR SIMILAR WORDING). SALVAGED AND RELOCATED ITEMS SHALL BE CLEANED AND DELIVERED TO THE OWNER OR RE-USED AS DIRECTED.
6. IN GENERAL, EXISTING STRUCTURES AND FACILITIES ARE NOTED AS "EXISTING" AND ARE SHOWN LIGHT IN LINE WEIGHTS OR AS A SCREENED BACKGROUND. NEW OR RELOCATED CONSTRUCTION, STRUCTURES, FACILITIES AND FEATURES ARE SHOWN IN HEAVIER LINE WEIGHTS.
7. MANY SYMBOLS ON THE LEGEND ARE USED ONLY WHERE THEY PROVIDE CLARITY AND ARE NOT NECESSARILY USED IN ALL APPLICATIONS. SOME CONTRACT DRAWINGS MAY HAVE ADDITIONAL LEGENDS APPLICABLE FOR THAT SPECIFIC DRAWING. SYMBOLS SHOWN ON SPECIFIC DRAWINGS GOVERN.
8. ALL DIMENSIONS SHOWN ON THE CONTRACT DRAWINGS AND DESCRIBED IN THE SPECIFICATIONS REFER TO THE HORIZONTAL AND VERTICAL PROJECTED PLANES, UNLESS OTHERWISE INDICATED.
9. WHERE OWNER'S STANDARD DETAILS ARE AVAILABLE OR REFERENCED IN PLAN DOCUMENTS, SUCH DETAILS ARE APPLICABLE REGARDLESS IF CALLED OUT OR NOT, UNLESS NOTED OTHERWISE.
10. ALL TREES, HEDGES, SHRUBS, AND OTHER VEGETATION SHOWN ON THE PLANS ARE EXISTING AND SHALL REMAIN UNLESS OTHERWISE NOTED. NO TREES SHALL BE REMOVED FROM PUBLIC RIGHT-OF-WAY OR ADJACENT PROPERTY WITHOUT APPROVAL FROM THE CITY. CARE SHALL BE TAKEN TO AVOID ROOT DAMAGE TO EXISTING TREES.
11. CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY FENCING AND OTHER MEASURES AS NECESSARY TO PREVENT THE GENERAL PUBLIC FROM ENTERING AND/OR PARKING ON PRIVATE PROPERTY, ADJACENT TO THE PUMP STATION SITES OR CONSTRUCTION STAGING AREAS.
12. CONTRACTOR SHALL ENSURE SEWER SERVICE IS NOT INTERRUPTED AT THE PUMP STATIONS OR IN THE SEWER COLLECTION SYSTEM. THIS WILL REQUIRE INSTALLATION AND MAINTENANCE OF TEMPORARY EQUIPMENT AND APPURTENANCES. SHUT DOWNS OF THE STATIONS WILL BE NECESSARY FOR PORTIONS OF THE WORK. CONTRACTOR SHALL COORDINATE THE SCHEDULE OF SHUT DOWNS WITH THE CITY AND SHALL PROVIDE A MINIMUM NOTICE OF FIVE WORKING DAYS FOR EACH SHUT DOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO MAINTAIN SEWER SERVICE AT ALL TIMES AND TO CONTAIN ALL WASTEWATER WITHIN THE EXISTING SEWER SYSTEM OR TEMPORARY TANK TYPE VEHICLES FOR BYPASS HAULING. CONTRACTOR SHALL SUBMIT PLAN FOR TEMPORARY SEWER SERVICE TO CITY FOR APPROVAL, SEE SECTION 01200 OF THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
13. CONTRACTOR SHALL MAINTAIN UTILITY AND BACKUP POWER SUPPLY FOR CONTINUOUS STATION OPERATION. CITY WILL PROVIDE STANDBY GENERATOR FOR CONTRACTOR'S USE LIMITED TO 20 DAYS PER STATION. CONTRACTOR'S USE BEYOND THIS ALLOWANCE OF TIME SHALL BE CAUSE FOR CHARGE TO CONTRACTOR OF $300/DAY OF EXTENDED USE PER STATION. CONTRACTOR SHALL MAKE TEMPORARY GENERATOR CONNECTION AS NECESSARY PER STATION. USE OF CITY GENERATOR SHALL BE LIMITED TO 1 UNIT & 1 STATION AT A TIME UNTIL WORK IS SUBSTANTIALLY COMPLETE.
14. CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO INSURE SEDIMENT LADEN WATERS DO NOT ENTER THE NATURAL AND/OR EXISTING DRAINAGE SYSTEM OR ADJACENT WATER BODIES. ALL DISTURBED EARTHEN AREAS, SHALL BE SEEDED WITH A PERENNIAL GROUND COVER OR COVERED WITH MULCH TO MINIMIZE EROSION. GRASS SEEDING WILL BE DONE USING AN APPROVED HYDRO-SEEDER OR OTHER APPROVED METHOD. ALL EARTHWORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARDS AND TEMPORARY EROSION/SEDIMENTATION CONTROL NOTES HEREIN.
15. CAUTION — EXTREME HAZARD — OVERHEAD ELECTRICAL SERVICE LINES ARE GENERALLY NOT SHOWN ON THE DRAWINGS. ELECTRICAL LINES SHOWN ON THE DRAWINGS ARE LOCATED BY POINT-TO-POINT, POWER-POLE-TO-POWER-POLE CONNECTION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXTENT OF ANY HAZARD CREATED BY OVERHEAD ELECTRICAL POWER OR CONFLICT OR CONSTRUCTION CHALLENGE CREATED BY OTHER OVERHEAD UTILITIES IN ALL AREAS AND SHALL FOLLOW PROCEDURES DURING CONSTRUCTION AS REQUIRED BY LAW AND REGULATION. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL MEET WITH UTILITY OWNERS AND DETERMINE THE EXTENT OF HAZARD AND REMEDIAL MEASURES AND SHALL TAKE WHATEVER PRECAUTIONS MAY BE REQUIRED. SEE SECTION 02760 OF SPECIFICATIONS.

(CONTINUED AT TOP RIGHT OF THIS SHEET)

16. THE CONTRACTOR SHALL DOCUMENT ALL VARIATIONS FROM THE PLANS AND PROVIDE THAT INFORMATION TO THE ENGINEER FOR PREPARATION OF RECORD DRAWINGS.
17. THE CONTRACTOR SHALL SECURE ALL LOADS PER RCW 46.61.655.
18. CITY PROVIDED PUMPS, GENERATORS, MUFFLERS, AND FUEL LINES ARE LOCATED AT 9601 SE 36TH ST, MERCER ISLAND, WA 98040. CONTRACTOR SHALL BE RESPONSIBLE FOR PICKING UP (INCLUDING LOADING) AND DELIVERING ALL CITY PROVIDED COMPONENTS TO THE JOB SITE.
18. CONTRACTOR SHALL HAVE ALL MATERIALS TO BE INCORPORATED IN THE WORK AVAILABLE FOR INSPECTION ON SITE (OR AT AN OTHERWISE AGREED LOCATION) BY THE CITY A MINIMUM OF TWO BUSINESS DAYS PRIOR TO USE OR INSTALLATION OF SUCH MATERIALS. THE MATERIALS REQUIRED PER SITE INCLUDE BUT ARE NOT LIMITED TO:

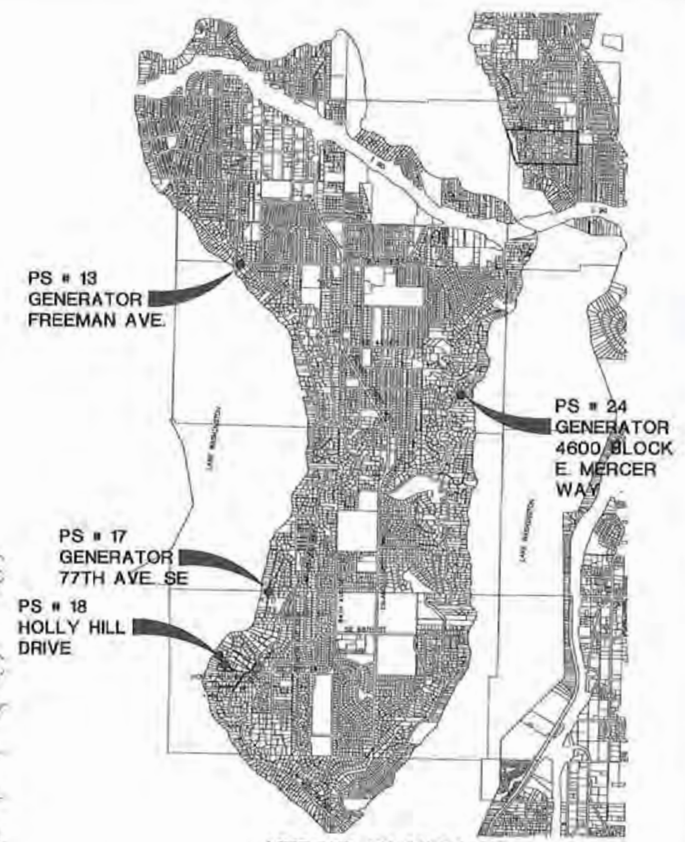
    PUMP STATION NO. 18:
    OWNER-PROVIDED PUMPS, PIPE, FITTINGS, VALVES, SUMP PUMPS, DRY AND WET WELL LADDER, ALUMINUM MANHOLE RING AND COVER WITH WATERTIGHT SEAL, SQUARE ALUMINUM ACCESS HATCH, ETC.

    GENERATOR VAULT NO. 17:
    OWNER-PROVIDED GENERATOR, OWNER-PROVIDED MUFFLER, FAN/DUCT ASSEMBLY, LADDER, PIPING, ASSOCIATED APPURTENANCES, SUMP PUMPS, SENSORS, ETC.

    GENERATOR VAULT NO. 24:
    OWNER-PROVIDED FUEL TANK, OWNER-PROVIDED GENERATOR, OWNER-PROVIDED MUFFLER, FAN/DUCT ASSEMBLY, LADDER, PIPING, ASSOCIATED APPURTENANCES, SUMP PUMPS, SENSORS, UTILITY VAULTS, ETC.

    GENERATOR VAULT NO. 13:
    OWNER-PROVIDED FUEL TANK, OWNER-PROVIDED GENERATOR, OWNER-PROVIDED MUFFLER, FAN/DUCT ASSEMBLY, LADDER, PIPING, SENSORS, ETC.


PS # 18 LOCATION MAP




MERCER ISLAND MAP

SCALE IN FEET

### SHEET INDEX



Know what's below. Call before you dig.

CHS ENGINEERS

PS #13, 17, 18 & 24 EQUIPMENT

GENERAL NOTES, VICINITY MAPS & SHEET INDEX

Sheet 2 of 24

Job No. 801703

# PLAN SYMBOLS AND CALLOUTS

PLAN

PROFILE

VIEW CALLOUT

NORTH ARROW

SCALE IN FEET

HORIZONTAL

PROFILE GRID SCALE BAR

SCALE IN FEET

PLAN VIEW SCALE BAR

STANDARD CONSTRUCTION OR KEY NOTE BUBBLE

MATCH LINE - SEE SHEET XX

MATCH LINE CONTINUATION

## REFERENCE SYMBOLS

DETAIL REFERENCED BY NUMBER OR LETTER

SHEET ON WHICH REFERENCE TO FIGURE APPEARS

DETAIL -

ELEVATION REFERENCED BY LETTER

TWO SHEETS ON WHICH REFERENCE TO FIGURE APPEARS

ELEVATION -

SECTION REFERENCED BY LETTER

MORE THAN TWO SHEETS ON WHICH REFERENCE TO FIGURE APPEARS

SECTION -

811 Know what's below. Call before you dig.

# LEGEND

| PROPOSED | EXISTING | DESCRIPTION |
|---|---|---|
| | | MONUMENT IN CASE |
| | | PK NAIL W/WASHER |
| | | REBAR AND CAP |
| | | WATER METER W/ SERVICE |
| | | WATER FITTINGS |
| | | FIRE HYDRANT |
| | | POWER POLE W/ GUY |
| | | SEWER MANHOLE |
| | | CATCH BASIN (CB) |
| | | CB PROTECTION |
| | | STORM DRAIN CULVERT |
| | | SIGN |
| | | POWER JUNCTION BOX |
| | | POWER METER |
| | | POWER VAULT |
| | | POWER BOX |
| | | TELEPHONE VAULT |
| | | TELEPHONE RISER |
| | | GAS VALVE |
| | | GAS METER |
| | | WATER VALVE |
| | | HOSE BIB |
| | | SEWER VALVE |
| | | BORE HOLE (#) |
| | | ROCKERY |
| | | VEGETATION |
| | 128 | CONTOUR (MINOR) |
| | 130 | CONTOUR (MAJOR) |
| | | WATER MAIN |
| | | WATER SERVICE |
| | | RIGHT OF WAY (R/W) |
| | | PROPERTY LINE |
| | | UTILITY EASEMENT |
| | | CENTER LINE |
| | | EDGE OF PAVEMENT |
| | | EDGE OF GRAVEL |
| | | DITCH CENTERLINE |
| | | GAS |
| | | SANITARY SEWER |
| | | SEWER SERVICE |
| | | FORCE MAIN |
| | | STORM DRAINAGE |
| | | OVERHEAD POWER |
| | UG PWR | UNDERGROUND POWER |
| | | FIBER OPTICS |
| | | CABLE |
| | UG TEL | TELEPHONE |
| | | GUARD RAIL |
| | | FENCE |
| | | TESC/SILT FENCE |

# ABBREVIATIONS

| | |
|---|---|
| AB | ANCHOR BOLT |
| ABAND | ABANDONED |
| AC | ASBESTOS CEMENT, ASPHALTIC CONCRETE |
| AFF | ABOVE FINISH FLOOR |
| ALT | ALTERNATE |
| APPROX | APPROXIMATELY |
| APWA | AMERICAN PUBLIC WORKS ASSOCIATION |
| ARV | AIR RELIEF VALVE |
| ASPH | ASPHALT |
| AVE | AVENUE |
| AVG | AVERAGE |
| AWG | AMERICAN WIRE GAUGE |
| BLDG | BUILDING |
| BLDG | BUILDING |
| BLVD | BOULEVARD |
| BM | BENCH MARK |
| BOC | BACK OF CURB |
| BOW | BACK OF WALK |
| BOT | BOTTOM |
| BRG | BEARING |
| BSBL | BUILDING SETBACK LINE |
| BTWN | BETWEEN |
| CB | CATCH BASIN |
| CC | CENTER TO CENTER |
| CDF | CONTROLLED DENSITY FILL |
| CFM | CUBIC FEET PER MINUTE |
| CFS | CUBIC FEET PER SECOND |
| CG | CURB & GUTTER |
| CI | CAST IRON |
| CIP | CAST IN PLACE |
| CJ | CONSTRUCTION JOINT |
| CLF | CHAIN LINK FENCE |
| C/L | CENTERLINE |
| CLR | CLEARANCE, CLEAR |
| CMP | CORRUGATED METAL PIPE |
| CMU | CONC MASONRY UNIT |
| CO | CLEAN OUT |
| CONC | CONCRETE |
| CONN | CONNECTION |
| CONST | CONSTRUCT |
| CONT | CONTINUED/CONTINUOUS |
| COP | COPPER |
| CPEP | CORRUGATED POLYETHYLENE PIPE |
| CSBC | CRUSHED SURFACING BASE COURSE |
| CSTC | CRUSHED SURFACING TOP COURSE |
| CU | CUBIC |
| CULV | CULVERT |
| CYL | CYLINDER |
| D | DRAIN |
| DBL | DOUBLE |
| DEG | DEGREE |
| DET | DETAIL |
| DI | DUCTILE IRON |
| DIA | DIAMETER |
| D/L | DAYLIGHT |
| D/W | DRIVEWAY |
| DWG | DRAWING |
| E | EAST |
| EA | EACH |
| EL | ELEVATION |
| EO | EDGE OF |
| EOA | EDGE OF ASPHALT |
| EOC | EDGE OF CONCRETE |
| EOD | EDGE OF DIRT |
| EOG | EDGE OF GRAVEL |
| EOP | EDGE OF PAVEMENT |
| EQ | EQUAL |
| EW | EACH WAY |
| EXC | EXCAVATION |
| EX | EXISTING |
| EXP | EXPANSION |
| EXT | EXTERIOR |
| FCA | FLANGED COUPLING ADAPTER |
| FF | FAR FACE |
| FFE | FINISH FLOOR ELEVATION |
| FH | FIRE HYDRANT |
| FIG | FIGURE |
| FIN | FINISH, FINISHED |
| FL | FLANGE |
| FM | FORCE MAIN |
| FNC | FENCE |
| FOC | FACE OF CURB |
| FOW | FACE OF WALL |
| FRP | FIBERGLASS REINFORCED PLASTIC |
| FT | FEET/FOOT |
| FTG | FOOTING |
| G | GAS LINE |
| GA | GAUGE |
| GAL | GALLON |
| GALV | GALVANIZED |
| GM | GAS METER |
| GPM | GALLONS PER MINUTE |
| GR | GUARD RAIL |
| GRD | GROUND |
| GV | GAS VALVE |
| H | HEIGHT |
| HB | HOSE BIB |
| HD | HEAD |
| HDCP | HANDICAP |
| HDG | HOT DIPPED GALV |
| HDPE | HIGH-DENSITY POLYETHYLENE |
| HMA | HOT MIX ASPHALT |
| HORIZ | HORIZONTAL |
| HP | HORSEPOWER, HIGH POINT |
| HPG | HIGH PRESSURE GAS |
| HSE | HOUSE |
| HT | HEIGHT |
| HWY | HIGHWAY |
| ID | INSIDE DIAMETER |
| IE | INVERT ELEVATION |
| IF | INSIDE FACE |
| IL | INLET |
| IN | INCH/INCHES |
| INV | INVERT |
| IP | IRON PIPE |
| IPS | IRON PIPE SIZE |
| JB | JUNCTION BOX |
| JT | JOINT |
| L | LENGTH |
| LBS | POUNDS |
| LF | LINEAL FOOT/FEET |
| LP | LONG PATTERN |
| M | METER |
| MAX | MAXIMUM |
| MB | MAILBOX |
| MH | MANHOLE |
| MIC | MONUMENT IN CASE |
| MIN | MINIMUM, MINUTE |
| MISC | MISCELLANEOUS |
| MJ | MECHANICAL JOINT |
| ML | MATCH LINE |
| MON | MONUMENT |
| N | NORTH |
| NA | NOT APPLICABLE |
| NF | NEAR FACE |
| NOM | NOMINAL |
| NPT | NATIONAL PIPE THREAD |
| NTS | NOT TO SCALE |
| NO | NUMBER |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| OF | OUTSIDE FACE |
| OPNG | OPENING |
| OPP | OPPOSITE |
| OPT | OPTIC |
| OT | OVERHEAD TELEPHONE |
| P | POLE, POWER |
| PAR | PARALLEL |
| PC | POINT OF CURVE/CURVATURE |
| PD | PERFORATED DRAIN LINE |
| PE | PLAIN END |
| PED | PEDESTRIAN |
| PERF | PERFORATED |
| PI | POINT OF INTERSECTION |
| PL | PLASTIC |
| PR | PAIR |
| PROP | PROPERTY |
| PRV | PRES REDUCING VALVE |
| PS | PUMP STATION |
| PSI | POUNDS PER SQ. IN. |
| PT | POINT OF TANGENCY |
| PVC | POLYVINYL CHLORIDE |
| PVMT | PAVEMENT |
| P/C | PRECAST |
| P/L | PROPERTY LINE |
| R | RADIUS |
| RC | REINF CONC |
| RCP | REINF CONC PIPE |
| RD | ROAD, ROUND |
| REF | REFERENCE |
| REINF | REINFORCED |
| REQD | REQUIRED |
| RET | RETAINING |
| RETW | RETAINING WALL |
| RFCA | RESTRAINED FLANGED COUPLING ADAPTER |
| RGS | RIGID GALVANIZED STEEL |
| RR | RAILROAD |
| RRC | RR CROSSING |
| RT | RIGHT |
| R/W | RIGHT OF WAY |
| S | SOUTH |
| SB | SOIL BORING |
| SC | SECTION CORNER |
| SCHED | SCHEDULE |
| SD | STORM DRAIN |
| SDCB | STORM DRAIN CATCH BASIN |
| SDMH | STORM DRAIN MANHOLE |
| SE | SPOT EL. SOUTHEAST |
| SEC | SECOND |
| SECT | SECTION |
| SERV | SERVICE |
| SHT | SHEET |
| SIM | SIMILAR |
| SL | SECTION LINE |
| SP | STATIC PRESSURE |
| STLT | STREET LIGHT |
| S/L | SURVEY LINE |
| SLJB | STREET LIGHTING JUNCTION BOX |
| SST | STAINLESS STEEL |
| SPECS | SPECIFICATIONS |
| SQ | SQUARE |
| SS | SANITARY SEWER |
| SSMH | SANITARY SEWER MANHOLE |
| ST | STREET |
| STA | STATION |
| STD | STANDARD |
| STL | STEEL |
| S/W | SIDEWALK |
| SYM | SYMMETRICAL |
| T | TOP |
| TB | THRUST BLOCK |
| T&B | TOP & BOTTOM |
| TBM | TEMP. BENCHMARK |
| TELB | BURIED TELEPHONE CABLE |
| TEL | TELEPHONE |
| TEMP | TEMPORARY |
| THD | THREADED |
| TJB | TELEPHONE JUNCTION BOX |
| TMH | TELEPHONE MANHOLE |
| TOC | TOP OF CURB |
| TOW | TOP OF WALL |
| TRJB | TRAFFIC CONTROL JUNCTION BOX |
| TV | TELEVISION |
| TYP | TYPICAL |
| UTIL | UTILITY |
| UG | UNDERGROUND |
| UP | UTILITY POLE |
| UPA | UTILITY POLE ANCHOR |
| V | VALVE |
| VAR | VARIES |
| VERT | VERTICAL |
| VLT | VAULT |
| W | WEST, WATER LINE |
| W/ | WITH |
| WCR | WHEEL CHAIR RAMP |
| WM | WATER METER |
| W/O | WITHOUT |
| WV | WATER VALVE |
| WWF | WELDED WIRE FABRIC |
| YD | YARD |

## SYMBOLS

| | |
|---|---|
| Ø | PHASE, DIAMETER |
| & | AND |
| ' | FEET, MINUTES |
| " | INCHES, SECONDS |
| ° | DEGREE |

## ELECTRICAL SYMBOLS LEGEND

- EXPOSED CONDUIT
- INDICATES CONDUIT CONTINUES BUT NOT SHOWN
- INDICATES CONDUIT TURNS DOWN
- CONCEALED CONDUIT OR BELOW GRADE
- FLEXIBLE CORD
- DUPLEX RECEPTACLE
- LIQUID TIGHT FLEXIBLE STEEL CONDUIT
- LIGHT SWITCH
- LIMIT SWITCH
- JUNCTION BOX

| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|
| | | | | |

Drawn: DJ/SB
Designed: CC
Checked: RL
Approved: RL

CHS ENGINEERS
12507 BEL-RED RD. STE. 101 BELLEVUE, WA 98005-2500
TEL 425-637-3693
www.chsengineers.com

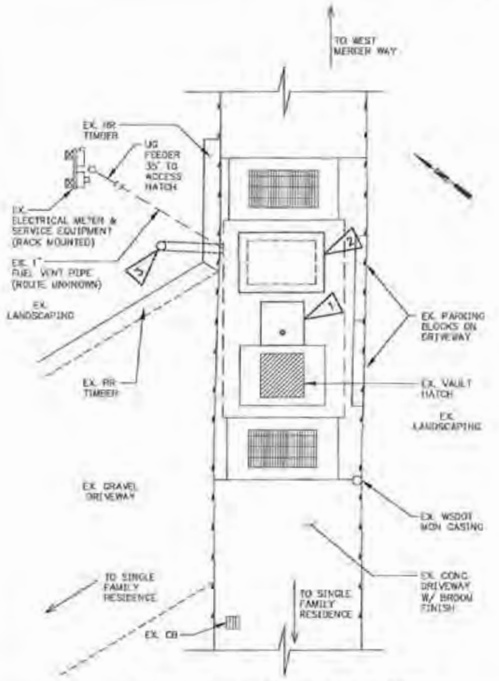
PS #13, 17, 18 & 24 EQUIPMENT

LEGEND, ABBREVIATIONS, PLAN SYMBOLS & CALLOUTS

Sheet 3 of 24

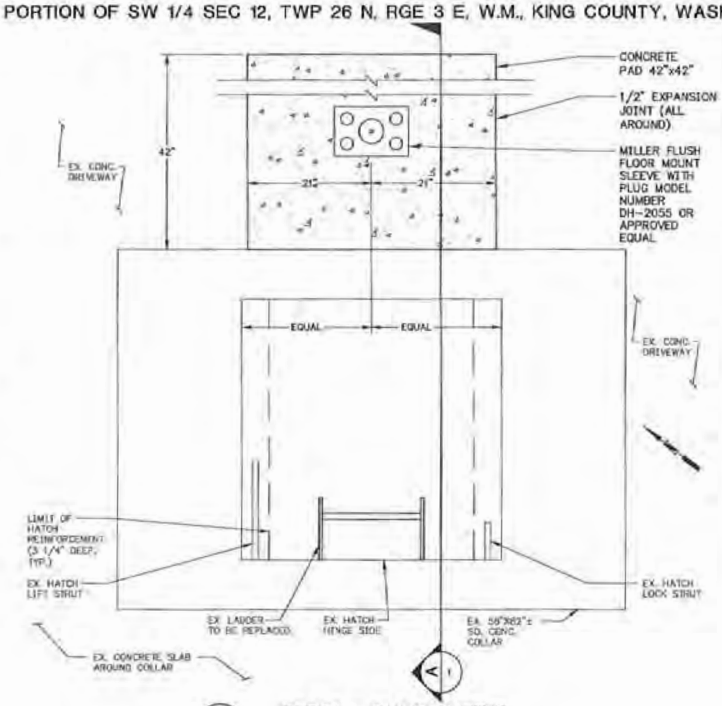
Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON



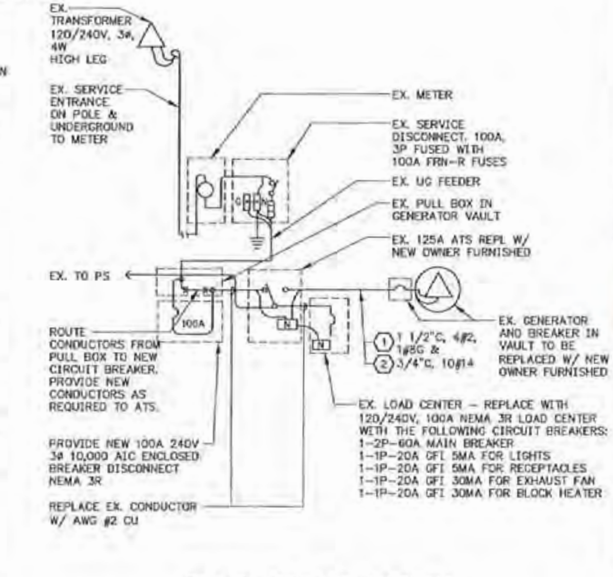

PLAN - PS #13 GENERATOR SITE

SCALE IN FEET



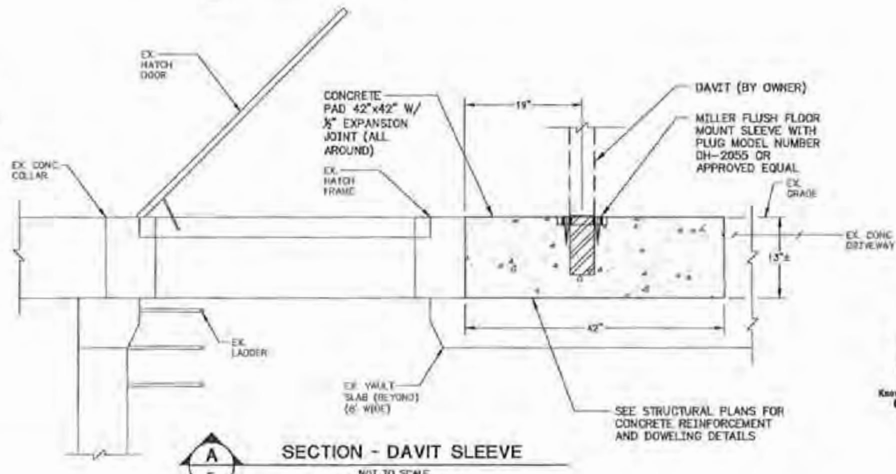

1 DETAIL - DAVIT SLEEVE

NOT TO SCALE




PS #13 - ONE LINE DIAGRAM

NOT TO SCALE




A SECTION - DAVIT SLEEVE

NOT TO SCALE

## NOTES

1. EXISTING UTILITIES NOT SHOWN. CALL FOR UTILITY LOCATE PRIOR TO ANY EXCAVATION.
2. CONTRACTOR SHALL COORDINATE WITH LOCAL PROPERTY OWNERS AND CITY TO PROVIDE VEHICULAR ACCESS TO RESIDENCE AT ALL TIMES. CONTRACTOR PARKING IS LIMITED TO A MAXIMUM OF ONE VEHICLE ADJACENT TO GENERATOR VAULT, OFF ROADWAY. ADDITIONAL VEHICLES MUST BE PARKED OFF-SITE.
3. ONSITE WORK HOURS SHALL BE LIMITED TO BUSINESS DAYS FROM 8:00AM TO 7:00PM.
4. CONTRACTOR SHALL PROVIDE ACCESS FOR GARBAGE PICKUP ON FRIDAYS.
5. EXISTING DISCONNECT SW. LOCATED APPROX. 35' N OF ACCESS HATCH.

## FLAG NOTES:

1. ADD DAVIT SLEEVE PER DETAIL 1/SECTION A, THIS SHEET. SAWCUT FULL DEPTH AND REMOVE EX. CONC. DRIVEWAY AT LIMIT OF PAD/EXPANSION JOINT. DO NOT CUT INTO VAULT TOP SLAB.
2. REMOVE CONCRETE COVER OVER OPENING TO GRADE. SAWCUT FULL DEPTH AND REMOVE EX. CONC. DRIVEWAY 8" BEYOND EXTENT OF COVER SLAB. DO NOT CUT INTO VAULT TOP SLAB. PROVIDE TEMPORARY STEEL TRENCH PLATE FOR VEHICULAR ACCESS WHEN OPENING NOT IN USE, UNTIL FINAL DRIVEWAY, RESTORATION. REPLACE CONCRETE DRIVEWAY TO MATCH EXISTING.
3. AIR INLET PER SECTION D, SHEET 19. LOCATE WITHIN EX. LANDSCAPE AREA TO AVOID DAMAGE TO OR REMOVAL OF EX. SHRUBS. RESTORE GROUND COVER AND DISTURBED VEGETATION TO MATCH EXISTING CONDITIONS.

Know what's below. Call before you dig.

RJC ENGINEERING, PLLC
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CAMANO ISLAND, WA 98282
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| | | | | |

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Designed: RL
Checked: RL
Approved: RL

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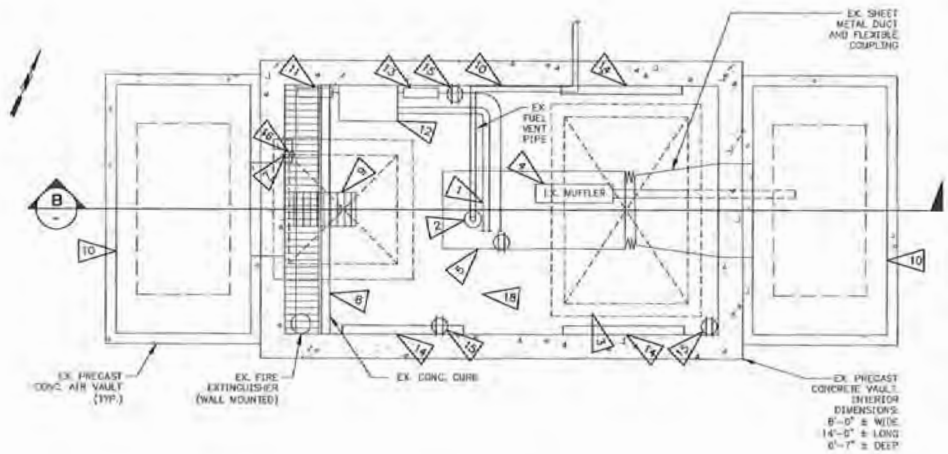
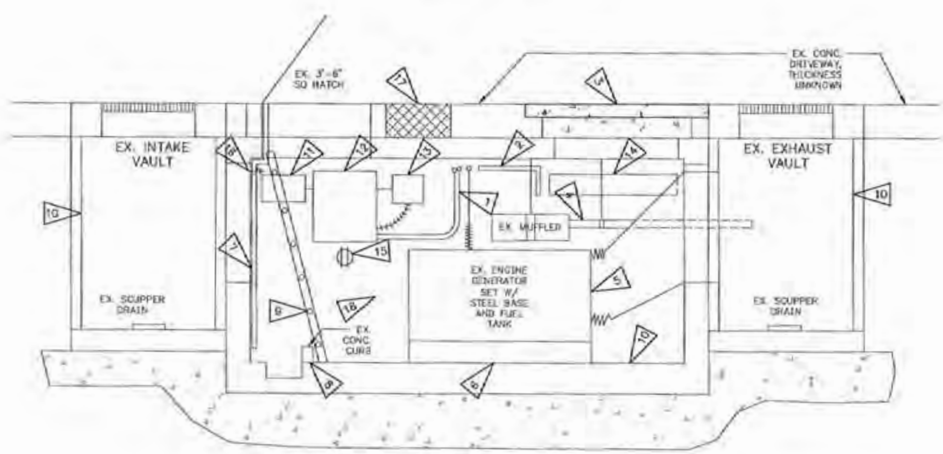
PS #13, 17, 18 & 24 EQUIPMENT
PS #13 GENERATOR VAULT SITE PLAN & ONE-LINE DIAGRAM

Sheet 4 of 24
Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PLAN - PS #13 EXISTING GENERATOR VAULT




SECTION - PS #13 EXISTING GENERATOR VAULT

## FLAG NOTES:

1. EXISTING CONDUIT AND WIRE CONNECTIONS FROM ATS TO GEN – REMOVE.
2. REMOVE ABANDONED FUEL VENT PIPE FROM CEILING PENETRATION TO WALL AND ACCESS CASING.
3. TEMPORARILY REMOVE CONCRETE COVER OVER OPENING REMOVE CONCRETE DRIVEWAY TO GRADE. SAWCUT FULL DEPTH AND REMOVE EX. CONC. DRIVEWAY A MINIMUM OF 8" BEYOND EXTENT OF COVER SLAB. PROVIDE TEMPORARY STEEL TRENCH PLATE FOR VEHICULAR ACCESS WHEN OPENING NOT IN USE, UNTIL FINAL DRIVEWAY RESTORATION.
4. REMOVE EX. MUFFLER AND EXHAUST PIPE AND SUPPORTS.
5. DRAIN ALL FLUIDS, COOLANT, OIL AND FUEL. REMOVE BATTERIES, WIRING TO COOLANT HEATER AND BATTERY CHARGER. REMOVE GENERATOR AND DUCT. IF NECESSARY REMOVE GENERATOR SET FROM SUB BASE FUEL TANK THEN REMOVE FUEL TANK SEPARATELY. SALVAGE GENERATOR TO CITY MAINTENANCE SHOP, WITHIN ONE WEEK OF REMOVAL. COVER EQUIPMENT UNTIL DELIVERED.
6. REMOVE STEEL GENERATOR BASE.
7. REMOVE DEBRIS FROM ACCESS HATCH DRAIN CHANNEL AND DRAIN. CLEAR OR REPLACE EX. PVC FRAME DRAIN TO SUMP. CLEAN SURFACE DEBRIS FROM EX. OPENING, CONDUIT, DRAIN, FLOOR, CEILING AND WALLS.
8. REMOVE EX. CURB TO FLOOR LEVEL. GRIND AND/OR GROUT AT FLOOR TO RECLAIM FLOOR AREA.
9. REMOVE EX. LADDER.
10. REMOVE DEBRIS, SEDIMENT AND OTHER LOOSE MATERIALS FROM AIR VAULTS AND GENERATOR VAULT.
11. EX. PULL BOX TO REMAIN.
12. REMOVE EX. ATS. SALVAGE TO CITY MAINTENANCE SHOP, WITHIN ONE WEEK OF REMOVAL. COVER EQUIPMENT UNTIL DELIVERED.
13. EX. 120/240V LOAD CENTER RECEPTACLE – SEE ONE LINE DIAGRAM, SHEET 4.
14. EX LIGHT FIXTURE – REMOVE. CONDUIT & WIRE NOT SHOWN MAY REMAIN & BE REUSED.
15. EX. DUPLEX RECEPTACLE TO REMAIN. CONDUIT & WIRING NOT SHOWN FOR CLARITY MAY REMAIN.
16. LIGHT SW TO REMAIN.
17. SAWCUT FULL DEPTH AND REMOVE EX. CONCRETE DRIVEWAY, WITHOUT CUTTING VAULT TOP SLAB, FOR SPACE FOR DAVIT BASE PER DETAIL 1, SHEET 4.
18. REMOVE AND PATCH ALL ABANDONED ANCHORS AND PENETRATIONS PER DETAIL 13, SHEET 20.

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Designed: RL
Checked: RL
Approved: RL

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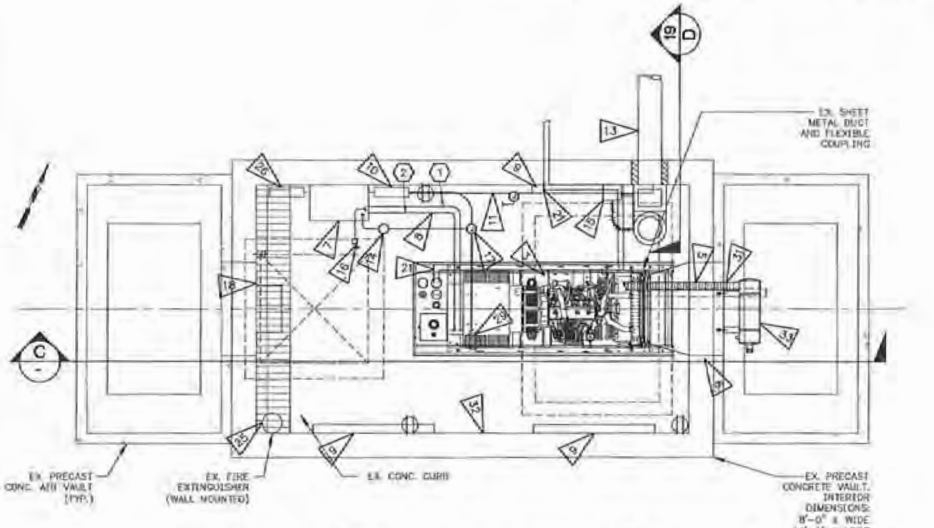
PS #13, 17, 18 & 24 EQUIPMENT

PS #13 GENERATOR VAULT
DEMOLITION PLAN & SECTION

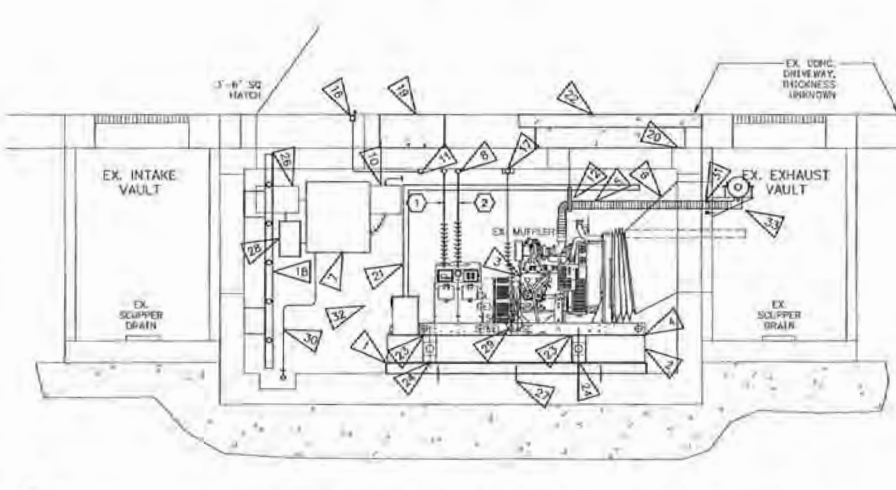
Sheet 5 of 24
Job No. 801703

## A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PLAN - PS #13 REPLACEMENT GENERATOR INSTALLATION

SCALE IN FEET

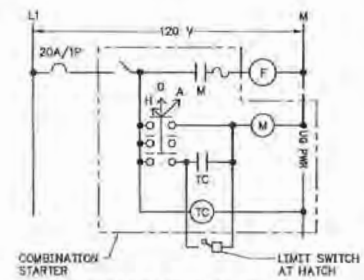



SECTION - PS #13 REPLACEMENT GENERATOR INSTALLATION

SCALE IN FEET

### FLAG NOTES:

1. CONCRETE BASE 101"x36" - VARIABLE HEIGHT TO MAKE LEVEL TOP.
2. INSTALL OWNER FURNISHED FUEL TANK. SEE DRAWINGS 15-26665 SHT 18 GLOBAL POWER COMPONENTS.
3. INSTALL OWNER FURNISHED GENERATOR. SEE CUMMINS DRAWING A047-S606. CONTRACTOR SHALL PLAN FOR AND IMPLEMENT ALL STEPS NECESSARY TO INSTALL EQUIPMENT. FUEL TANK MAY NEED TO BE PUT INTO POSITION AFTER GENERATOR ASSEMBLY IS LOWERED INTO VAULT. TANK MAY NEED TO BE POSITIONED IN INTAKE VAULT AIR OPENING OR TO ONE SIDE. GENERATOR ASSEMBLY APPURTENANCES MAY NEED TO BE REMOVED AND REPLACED TO ALLOW MOVEMENT INTO POSITION.
4. MOUNT GENERATOR ON FUEL TANK SEE GLOBAL POWER COMPONENTS REFERENCE DRAWINGS 15-26665 SHT 19.
5. INSTALL OWNER FURNISHED MUFFLER. SLOPE TO DRAIN TOWARDS DRAIN BOSS IN MUFFLER. PROVIDE CONDENSATION DRAIN LINE TO VAULT FLOOR. SUPPORT MUFFLER WITH THREADED ROD AND HANGING BRACKET MAKE FLEX CONNECTION TO ENGINE.
6. PROVIDE SHEET METAL DUCTING FROM RADIATOR TO EXHAUST VAULT. USE FLEX CONNECTION AT RADIATOR.
7. REPLACE EXISTING ATS WITH NEW OWNER FURNISHED ATS. EXTEND RECEPTACLE CIRCUIT INTO ATS TO PROVIDE POWER TO STRIP HTR - PROVIDE HTR. WATLOW 020100 C1-100W. PROVIDE 1P DISCONNECT SW INSIDE ATS W/LABEL "WARNING 120V HEATER DISCONNECT".
8. NEW CONDUITS AND CONDUCTORS TO GENERATOR. SEE ONE-LINE DIAGRAM.
9. REPLACE EXISTING FLUORESCENT LIGHTS WITH T8 LED VAPOR-PROOF LIGHT FIXTURES, SUPERBRIGHT LED'S INC VRLF-2NW18F OR EQUAL (TYP. OF ALL 3).
10. EXISTING LOAD CENTER, REPLACE - SEE ONE LINE DIAGRAM, SHEET 4.
11. PROVIDE NEW CIRCUIT TO EXHAUST FAN & LIMIT SWITCH. 1/2"C, 2#12, 1#12G.
12. INSULATE EXHAUST PIPE AND SILENCER W/ 1" THICK HIGH TEMPERATURE INSULATION. INSULATION SHALL CONSIST OF REMOVABLE PADS OF GLASS CLOTH/GLASS TEMPMAT/STAINLESS STEEL MESH FASTENED WITH STAINLESS STEEL LACING HOOKS AND 16 GAUGE COPPER WIRE (BALLARD INSULATION OR APPROVED EQUAL).
13. FAN/DUCT ASSEMBLY PER SECTION D, SHEET 19.
14. COMBINATION CO/SMOKE DETECTOR, 120V HARDWIRED W/SEALED LITHIUM BATTERY BACKUP. ALARM WIRED TO COMMON GENERATOR FAIL ALARM IN ATS KIDDE 112010SCO OR EQUAL.
15. COMBINATION MOTOR STARTER FOR EXHAUST FAN, 120V, HOA, NEMA SIZE 0, TIME CLOCK CONTROL WITH ADJUSTMENT AT 15 MINUTE INTERVALS - SEE SCHEMATIC WIRING DIAGRAM.
16. VENT FAN LIMIT SWITCH SQ D 9007 C OR EQUAL.
17. JUNCTION BOX - PROVIDE 120 PWR TO CARBON MONOXIDE/SMOKE DETECTOR.
18. VERTICAL LADDER PER DETAIL 9, SHEET 19, CENTER IN OPENING. H=95"±, CONTRACTOR TO VERIFY IN FIELD.
19. DAVIT SLEEVE AND CONCRETE PAD PER DETAIL 1, SHEET 4.
20. PRIOR TO CONCRETE COVER REPLACEMENT, CLEAN ALL SURFACES, GROUT VOIDS IN SEALING SURFACE AREAS AND SEAL AROUND PERIMETER WITH MASTIC STRIP OR WATERSTOP-RX.
21. REMOVE AND SALVAGE 2" VENT CAP, 2" BLACK IRON PIPE TANK VENT TO 2"x1" REDUCER AND 1"x1/2" TEE JUST INSIDE VAULT. CONNECT TEE TO EX. 1" VENT PIPE THRU WALL. INCLUDE 1/2" NIPPLE WITH 1/4 TURN VALVE ON TEE BRANCH TO DRAIN CONDENSATION. SUPPORT PIPE FROM CEILING W/ PIPE ANCHORS. ROUTE TO EAST END OF VAULT OVER EDGE OF GENERATOR FOOTPRINT.
22. REPLACE CONCRETE DRIVEWAY TO MATCH EXISTING.
23. BOLT GENERATOR FRAME TO FRAME OF FUEL TANK USING 1/2" DIA. STAINLESS STEEL BOLTS, 4 PLACES.
24. BOLT FUEL TANK FRAME TO CONCRETE BASE USING 1/2" DIA. STAINLESS BOLTS, 8" LONG.
25. RELOCATE FIRE EXTINGUISHER. PROVIDE NEW CIRCUIT BREAKER DISCONNECT & MOUNT ON WALL BELOW EXISTING PULL BOX - SEE ONE LINE DIAGRAM.
26. EXISTING PULL BOX - SEE ONE LINE DIAGRAM.
27. 1/2"X6" LONG ANCHOR BOLTS, ALL-THREAD OR REBAR GROUTED INTO FLOOR AND CAST INTO BASE (TYP. OF 6 EQUALLY SPACED).
28. NEW MAIN DISCONNECT. SEE ONE-LINE DIAGRAM. MOUNT BELOW EX. PULL BOX.
29. PROVIDE NEW RECEPTACLE FOR ENGINE COOLANT HEATER MOUNT ON GEN FRAME.
30. PROVIDE WATER IN VAULT SENSOR AND ALARM CIRCUIT. 1/2"-2#14 FROM ATS TO GEMS LEVEL SW NO 35682 OR EQUIVALENT. CONNECT TO GENERATOR FAIL ALARM.
31. CITY PROVIDED CARBON STEEL - 321 STAINLESS STEEL FLANGE, FITTING, AND PIPE.
32. REMOVE AND PATCH ALL ABANDONED ANCHORS AND PENETRATIONS PER DETAIL 13, SHEET 20.
33. CITY PROVIDED HARCO MANUFACTURING CO. 824VR52-BSI MPT H MUFFLER. ATTACH TO WALL WITH PIPE CLAMPS UNLESS DIRECTED BY CITY. NOTE: MUFFLER AND APPURTENANCES WILL NOT BE AVAILABLE UNTIL MARCH 2019.




SCHEMATIC WIRING DIAGRAM

NOT TO SCALE

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PS #13, 17, 18 & 24 EQUIPMENT

PS #13 GENERATOR VAULT
PLAN & SECTION
GENERATOR INSTALLATION

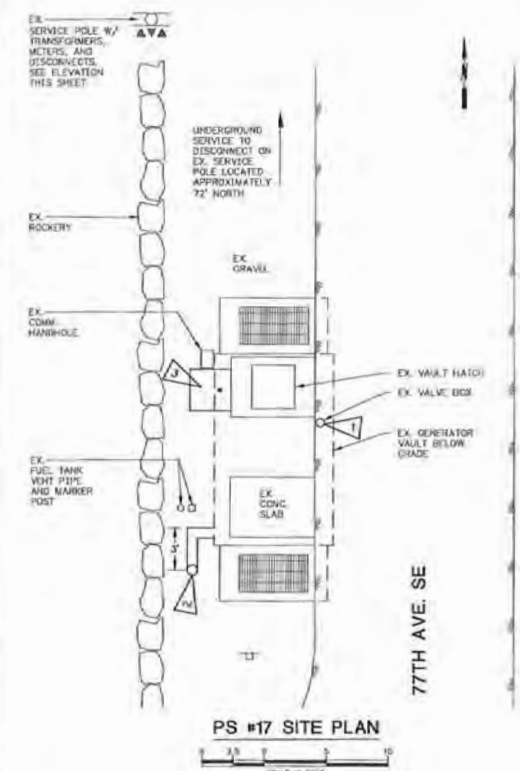
Sheet 6 of 24

Job No. 801703

No. | Date | By | Ckd | Revision

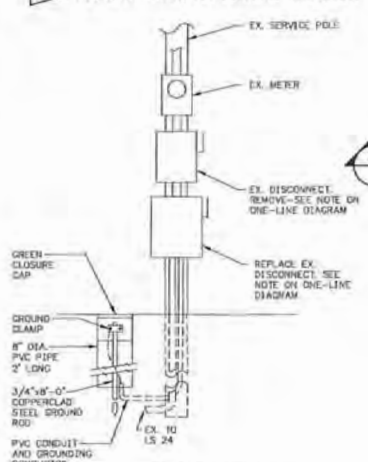
## FLAG NOTES:

1. REMOVE EX. FUEL FILL CASING. SEAL VOID FROM VAULT CEILING TO GRADE. PLACE MIN. 2 STUDS IN OPENING FOR ANCHORAGE. SEAL WATER TIGHT WITH CONCRETE AND WATERSTOP RX OR EQUAL. SEAL TO TOP OF VAULT. FILL VOID OVER VAULT WITH CRUSHED ROCK.
2. AIR INLET PER SECTION D, SHEET 19. ADD 90° HORIZONTAL BEND TO PROVIDE SEPARATION FROM FUEL VENT AS SHOWN.
3. ADD DAVIT SLEEVE PER DETAIL 2, THIS SHEET.



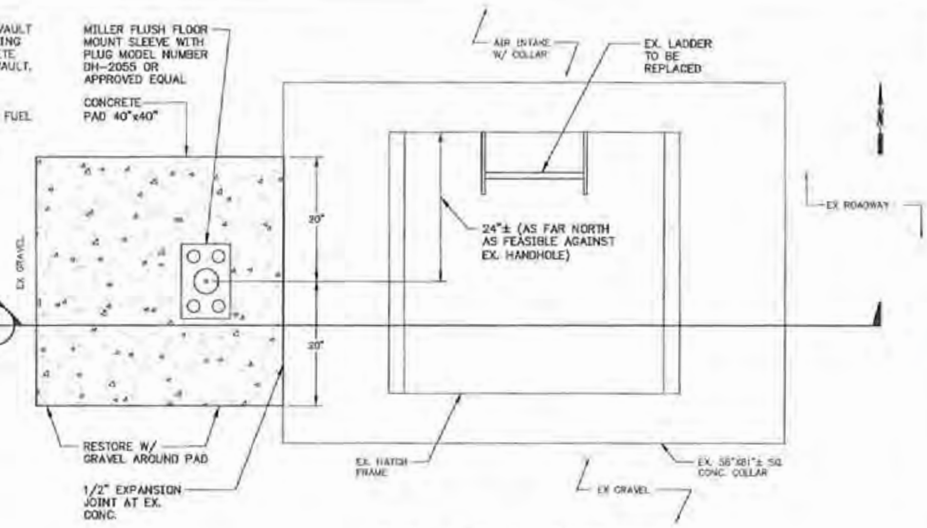

PS #17 SITE PLAN

SCALE IN FEET



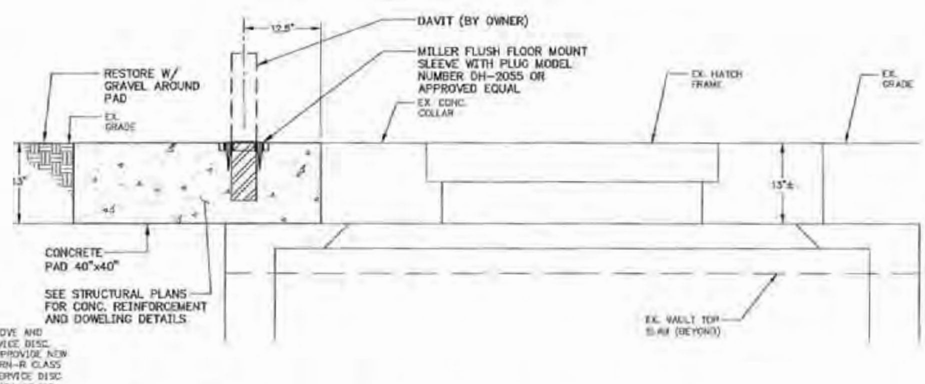

EX. SERVICE POLE ELEVATION

NOT TO SCALE



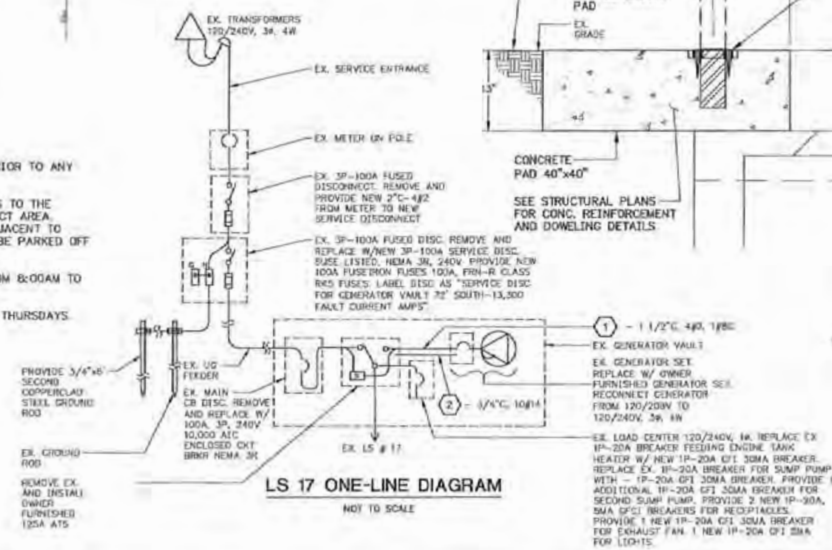

DETAIL - DAVIT SLEEVE

NOT TO SCALE




SECTION - DAVIT SLEEVE

NOT TO SCALE




LS 17 ONE-LINE DIAGRAM

NOT TO SCALE

### NOTES

1. EXISTING UTILITIES NOT SHOWN. CALL FOR UTILITY LOCATE PRIOR TO ANY EXCAVATION.
2. CONTRACTOR SHALL MAINTAIN VEHICULAR ACCESS AT ALL TIMES TO THE GENERATOR VAULT AND RESIDENTIAL PROPERTIES IN THE PROJECT AREA. CONTRACTOR PARKING IS LIMITED TO TWO PARKING SPACES ADJACENT TO GENERATOR VAULT, OFF ROADWAY. ADDITIONAL VEHICLES MUST BE PARKED OFF SITE.
3. ONSITE WORK HOURS SHALL BE LIMITED TO BUSINESS DAYS FROM 8:00AM TO 7:00PM.
4. CONTRACTOR SHALL PROVIDE ACCESS FOR GARBAGE PICKUP ON THURSDAYS.

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CITY OF MERCER ISLAND WASHINGTON

Drawn: SS  Designed: RL  Checked: RL  Approved: RL


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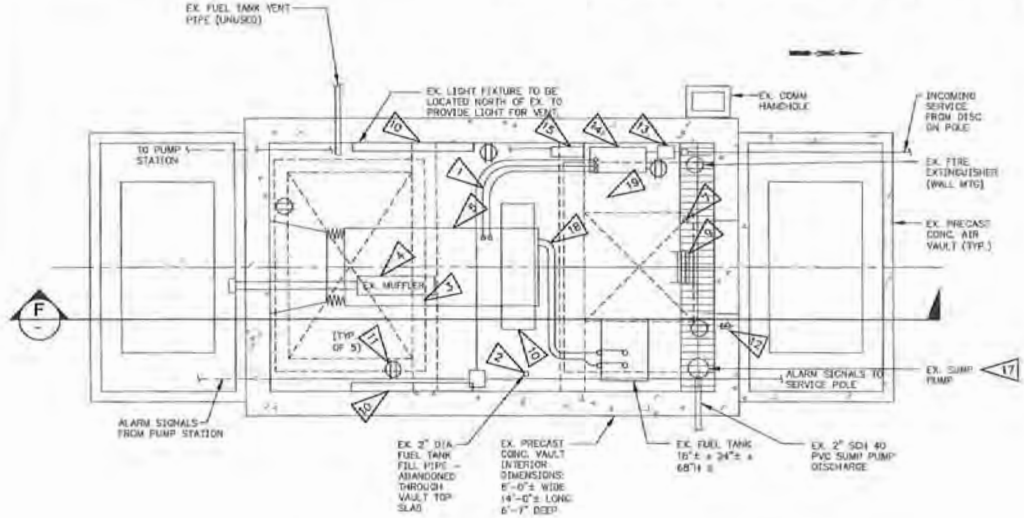
PS #13, 17, 18 & 24 EQUIPMENT

PS #17 GENERATOR VAULT
SITE PLAN & ONE-LINE DIAGRAM

Sheet 7 of 24

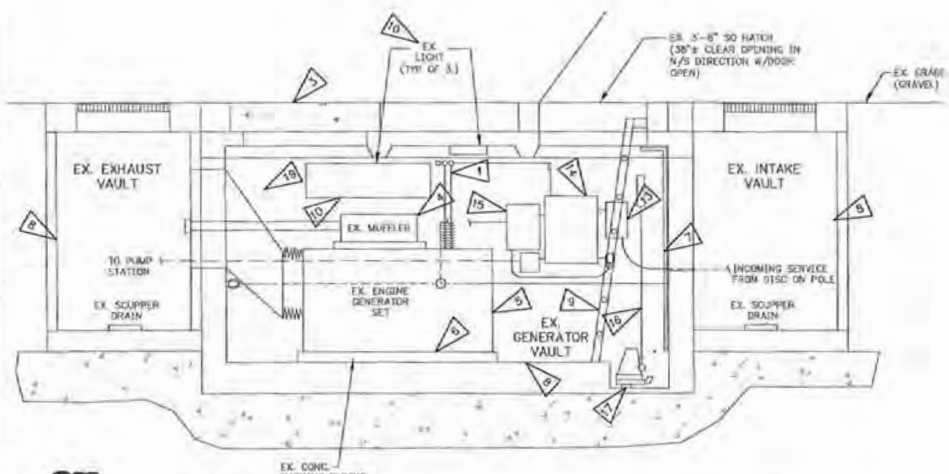
Job No. 801703

## A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PLAN - PS #17 EXISTING GENERATOR VAULT

SCALE IN FEET




SECTION - PS #17 EXISTNG GENERATOR VAULT

SCALE IN FEET

811 Know what's below. Call before you dig.

## FLAG NOTES:

1. EXISTING CONDUIT AND WIRE CONNECTIONS FROM ATS TO GEN - REMOVE.
2. REMOVE ABANDONED FUEL FILL PIPE.
3. TEMPORARILY REMOVE EXISTING CONCRETE COVER OVER OPENING. COVER OPENINGS WITH STEEL PLATE DURING CONSTRUCTION.
4. TEMPORARILY REMOVE EXISTING MUFFLER AND EXHAUST PIPE AND SUPPORTS.
5. DRAIN ALL FLUIDS, COOLANT, OIL AND FUEL. REMOVE BATTERIES, WIRING TO COOLANT HEATER. REMOVE GENERATOR AND DUCT. DISCONNECT EXISTING FUEL LINES. SALVAGE GENERATOR TO CITY MAINTENANCE SHOP, WITHIN ONE WEEK OF REMOVAL. COVER EQUIPMENT UNTIL DELIVERED.
6. REMOVE PARKING BLOCKS BASE.
7. REMOVE DEBRIS FROM ACCESS HATCH DRAIN CHANNEL AND DRAIN. CLEAR OR REPLACE EXISTING PVC FRAME DRAIN TO SUMP. CLEAN SURFACE DEBRIS FROM EXISTING OPENING, CONDUIT, DRAIN, FLOOR, CEILING AND WALLS.
8. REMOVE DEBRIS, SEDIMENT AND OTHER LOOSE MATERIALS FROM AIR AND GENERATOR VAULTS.
9. REMOVE EXISTING LADDER.
10. EXISTING LIGHT FIXTURE-REMOVE. CONDUIT & WIRING NOT SHOWN FOR CLARITY MAY REMAIN & BE REUSED.
11. EXISTING DUPLEX RECEPT TO REMAIN. CONDUIT & WIRING NOT SHOWN FOR CLARITY MAY REMAIN. TYPICAL.
12. LIGHT SWITCH MTD ON WALL ABOVE RECEPTACLE TO REMAIN. WIRING TO REMAIN.
13. EXISTING MAIN CKT BREAKER, REMOVE AND REPLACE - SEE ONE LINE DIAGRAM, SHEET 7.
14. EXISTING ATS-REMOVE. SALVAGE GENERATOR TO CITY MAINTENANCE SHOP, WITHIN ONE WEEK OF REMOVAL. COVER EQUIPMENT UNTIL DELIVERED.
15. EXISTING 120/240 VOLT LOAD CENTER-TO REMAIN. REPLACE BREAKERS PER ONE LINE DIAGRAM, SHEET 7.
16. VAULT FLOOD SENSOR TO REMAIN.
17. REMOVE EXISTING SUMP PUMP, CHECK VALVE AND PVC UNION.
18. EXISTING RUBBER SUPPLY & RETURN FUEL LINES ROUTED ON FLOOR. REUSE.
19. REMOVE AND PATCH ALL ABANDONED ANCHORS AND PENETRATIONS PER DETAIL 13, SHEET 20.

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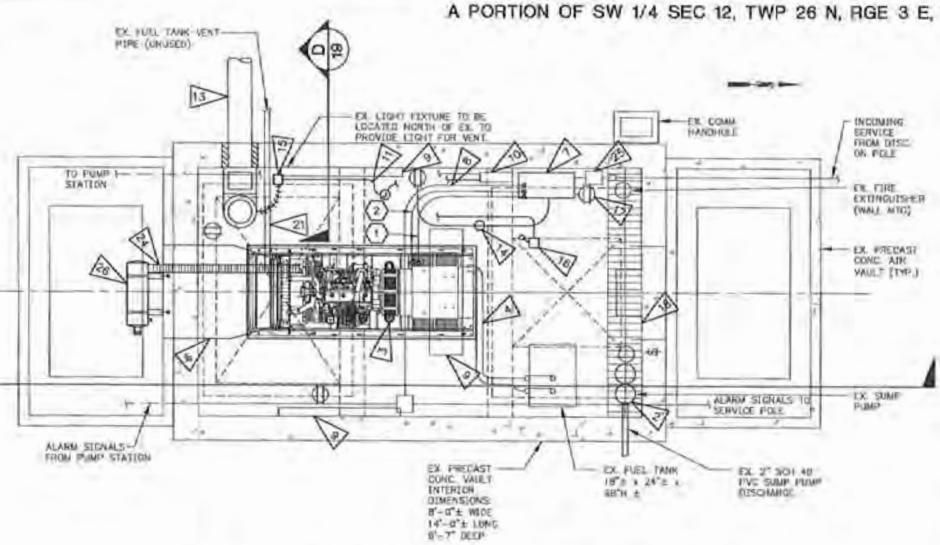
PS #13, 17, 18 & 24 EQUIPMENT

PS #17 GENERATOR VAULT
DEMOLITION PLAN & ELEVATION

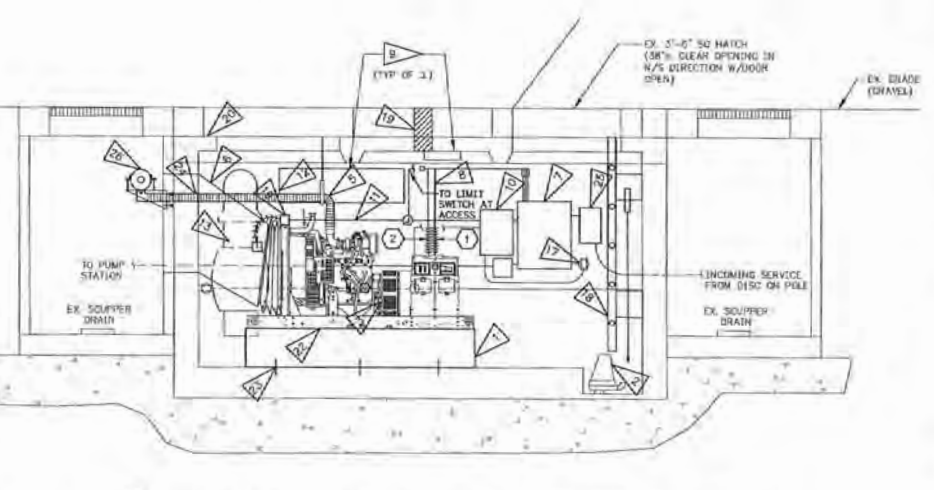
Sheet 8 of 24
Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PLAN - PS #17 REPLACEMENT GENERATOR INSTALLATION

SCALE IN FEET

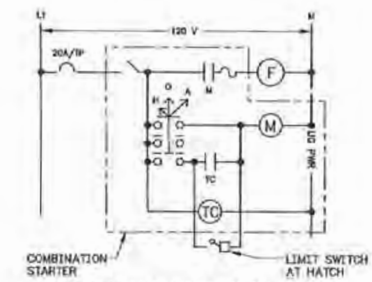



SECTION - PS #17 REPLACEMENT GENERATOR INSTALLATION

SCALE IN FEET

## FLAG NOTES:

1. CONCRETE BASE 101"x36" – VARIABLE HEIGHT TO MAKE LEVEL TOP.
2. REPLACE EX. SUMP PUMP WITH TWO SUMP PUMPS IN PARALLEL. TRIM AND REMOVE EX. SUMP GRATING AS NECESSARY. TWO TSURUMI MODEL HS2.45-62 SUMP PUMPS WITH FLOAT SWITCHES (TWO SJE-RHOMBUS SJE VERTICAL MASTER PUMP SWITCHES, P/N 1003770) AND 1 1/2" NPT DISCHARGE. CONNECT EACH PUMP WITH SCH 80 PVC PIPING, CHECK VALVE AND ISOLATION VALVE TO TEE RISER AND CONNECTION TO 2" EX. PIPE WITH UNION.
3. INSTALL OWNER FURNISHED GENERATOR. SEE CUMMINS DRAWING A047-S606. CONTRACTOR SHALL PLAN FOR AND IMPLEMENT ALL STEPS NECESSARY TO INSTALL EQUIPMENT. GENERATOR ASSEMBLY APPURTENANCES MAY NEED TO BE REMOVED AND REPLACED TO ALLOW MOVEMENT INTO POSITION. GENERATOR IS CURRENTLY CONNECTED FOR 208Y/120V. RECONNECT FOR 120/240V – 3Ø OPERATION.
4. SALVAGE AND REUSE EX SUPPLY AND RETURN FUEL LINES ALONG THE FLOOR OR USE OWNER PROVIDED FUEL LINES. CONNECT TO NEW GENERATOR.
5. INSTALL OWNER FURNISHED MUFFLER. SLOPE TO DRAIN TOWARDS DRAIN BOSS IN MUFFLER. PROVIDE CONDENSATION DRAIN LINE TO VAULT FLOOR. SUPPORT MUFFLER WITH THREADED ROD AND HANGING BRACKET MAKE FLEX CONNECTION TO ENGINE.
6. PROVIDE SHEET METAL DUCTING FROM RADIATOR TO EXHAUST VAULT. USE FLEX CONNECTION AT RADIATOR.
7. REPLACE THE EXISTING ATS W/ OWNER FURNISHED. MOUNT IN SAME LOCATION.
8. NEW CONDUITS AND CONDUCTORS TO GENERATOR. SEE ONE-LINE DIAGRAM, SHEET 7.
9. REPLACE EXISTING FLUORESCENT LIGHTS WITH T8 LED VAPOR-PROOF LIGHT FIXTURES, SUPERBRIGHT LED'S INC. VTLF-2NW18F OR EQUAL (TYP. OF ALL 3).
10. EX. LOAD CENTER. PROVIDE NEW BREAKERS PER ONE-LINE DIAGRAM, SHEET 7.
11. PROVIDE NEW CIRCUIT TO EXHAUST FAN AND LIMIT SWITCH. 1/2"C-2#12, 1#12G
12. INSULATE EXHAUST PIPE AND SILENCER W/ 1" THICK HIGH TEMPERATURE INSULATION. INSULATION SHALL CONSIST OF REMOVABLE PADS OF GLASS CLOTH/GLASS TEMPMAT/STAINLESS STEEL MESH FASTENED WITH STAINLESS STEEL LACING HOOKS AND 16 GAUGE COPPER WIRE (BALLARD INSULATION OR APPROVED EQUAL).
13. FAN/DUCT ASSEMBLY PER SECTION D, SHEET 19.
14. COMBINATION CO/SMOKE DETECTOR, 120V HARDWIRED W/SEALED LITHIUM BATTERY BACKUP. ALARM WIRED TO COMMON GENERAL FAIL ALARM IN ATS. KIDDE 112010S00 OR EQUAL.
15. COMBINATION MOTOR STARTER FOR EXHAUST FAN, 120V, HOA, NEMA SIZE 0, TIME CLOCK CONTROL WITH ADJUSTMENT AT 15 MINUTE INTERVALS. SEE SCHEMATIC WIRING DIAGRAM.
16. VENT FAN LIMIT SWITCH SQ D 9007 C OR EQUAL.
17. EXTEND RECEPTACLE CIRCUIT INTO ATS TO PROVIDE POWER TO STRIP HTR – PROVIDE HTR. WALTON 020100 CI-100W. PROVIDE 1P DISCONNECT SW INSIDE ATS WITH LABEL "WARNING 120V HEATER DISCONNECT"
18. VERTICAL LADDER PER DETAIL 9, SHEET 18, CENTER IN OPENING. H=95"±, CONTRACTOR TO VERIFY IN FIELD.
19. SEAL VOID IN CONCRETE SLAB. PLACE MIN. 2 STUDS IN OPENING FOR ANCHORAGE. SEAL WATER TIGHT WITH CONCRETE AND WATERSTOP-RX OR EQUAL.
20. PRIOR TO CONCRETE COVER REPLACEMENT, CLEAN ALL SURFACES, GROUT VOIDS IN SEALING SURFACE AREAS AND SEAL AROUND PERIMETER WITH MASTIC STRIP OR WATERSTOP-RX.
21. REMOVE AND SALVAGE 2" VENT CAP. 2" BLACK IRON PIPE TANK VENT TO 2"X1" REDUCER AND 1 1/2" TEE JUST INSIDE VAULT. CONNECT TEE TO EX. 1" VENT PIPE THRU WALL. INCLUDE 1/2" NIPPLE WITH 1/4 TURN VALVE ON TEE BRANCH TO DRAIN CONDENSATION. SUPPORT PIPE FROM CEILING W/ PIPE ANCHORS. ROUTE TO SOUTH END OF VAULT OVER EDGE OF GENERATOR FOOTPRINT.
22. BOLT GENERATOR FRAME TO CONCRETE BASE USING 1/2" DIA. STAINLESS STEEL WEDGE ANCHOR BOLTS, 8" LONG.
23. 1/2"X6" LONG ANCHOR BOLTS, ALL-THREAD OR REBAR GROUTED INTO FLOOR AND CAST INTO BASE (TYP. OF 6 EQUALLY SPACED)
24. CITY PROVIDED CARBON STEEL-321 STAINLESS STEEL FLANGE, FITTINGS AND PIPE.
25. EXISTING MAIN DISCONNECT, REMOVE AND REPLACE, SEE ONE LINE DIAGRAM, SHEET 7.
26. CITY PROVIDED HARCO MANUFACTURING CO. B24VRS2-851 MPT H MUFFLER. ATTACH TO WALL WITH PIPE CLAMPS UNLESS DIRECTED BY CITY. NOTE: MUFFLER AND APPURTENANCES WILL NOT BE AVAILABLE UNTIL MARCH 2019.




SCHEMATIC WIRING DIAGRAM

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CHS ENGINEERS

Drawn: SS
Designed: RL
Checked: RL
Approved: RL

PS #13, 17, 18 & 24 EQUIPMENT

PS #17 GENERATOR VAULT
PLAN & SECTION
GENERATOR INSTALLATION

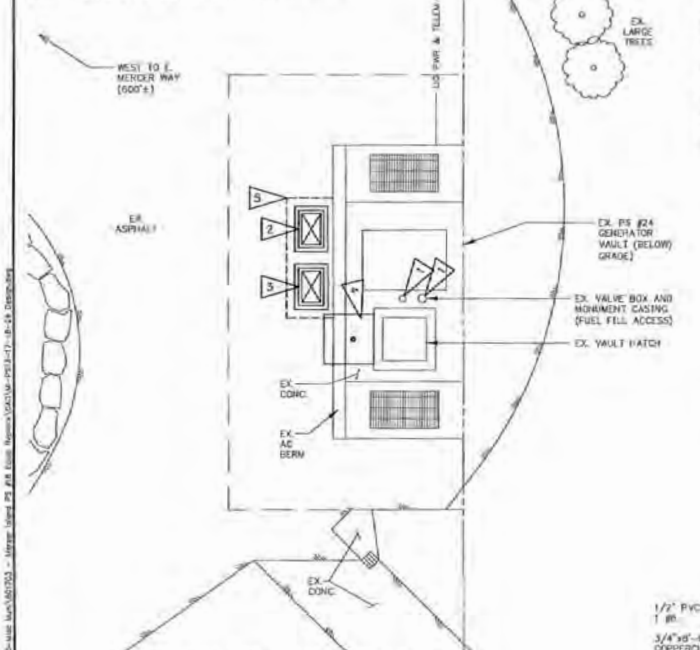
Sheet 9 of 24
Job No. 601703

| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|

# A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON

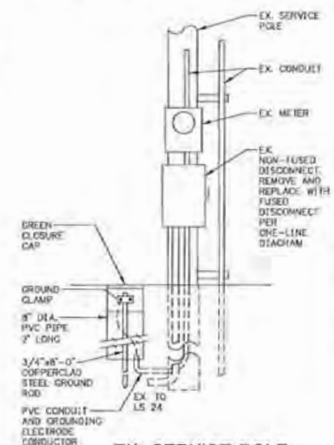
## FLAG NOTES:

1. REMOVE EX. FUEL FILL CASING. SEAL VOID FROM VAULT CEILING TO GRADE. PLACE MIN. 2 STUDS IN OPENING FOR ANCHORAGE. SEAL WATER TIGHT WITH CONCRETE AND WATERSTOP RX OR EQUAL.
2. INTAKE VAULT PER DETAIL 11, SHEET 20.
3. VENT VAULT PER DETAIL 12, SHEET 20.
4. ADD DAVIT SLEEVE PER DETAIL 3, SECTION H THIS SHEET. SAWCUT AND REMOVE EX. CONC. SLAB.
5. SAWCUT EX. ASPHALT MIN. 12" FROM VAULTS. RESTORE ASPHALT TO MATCH EX.



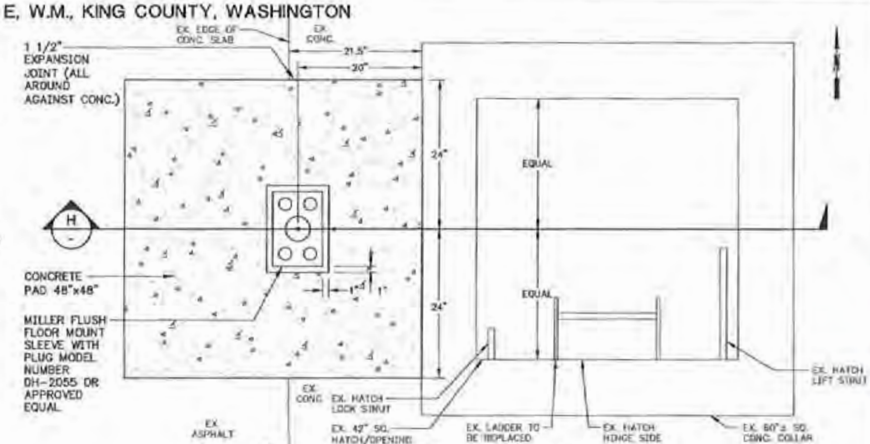

PS #24 GENERATOR SITE PLAN

SCALE IN FEET



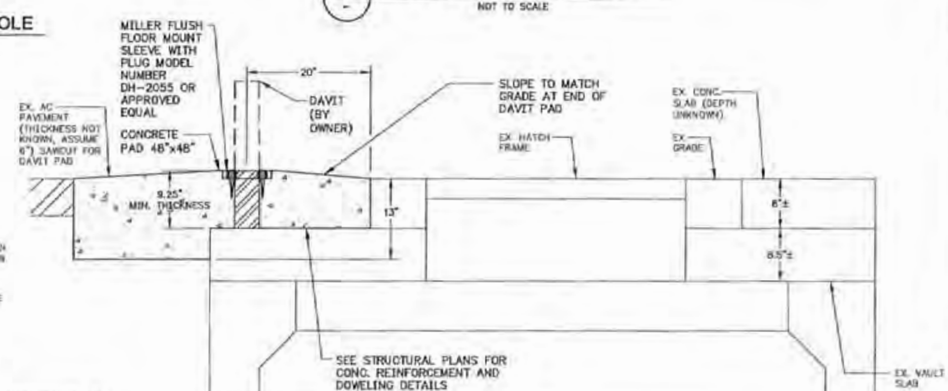

EX. SERVICE POLE

NOT TO SCALE



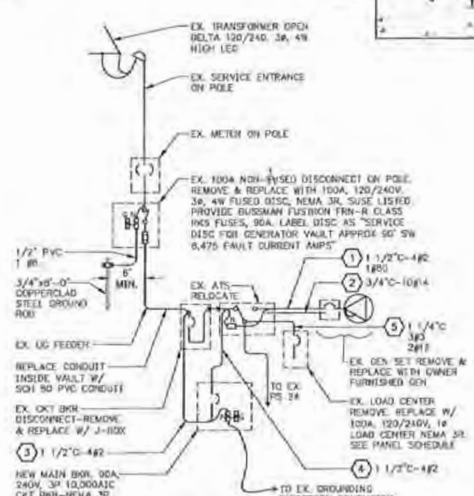

3 DETAIL - DAVIT SLEEVE

NOT TO SCALE



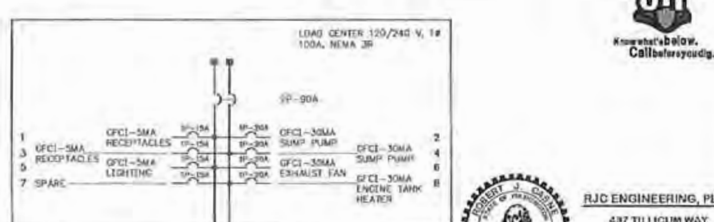

H SECTION - DAVIT SLEEVE

NOT TO SCALE




PS 24 ONE-LINE DIAGRAM

NOT TO SCALE




PANEL SCHEDULE LS 24

NOT TO SCALE

## NOTES

1. EXISTING UTILITIES NOT SHOWN. CALL FOR UTILITY LOCATE PRIOR TO ANY EXCAVATION.
2. GENERATOR VAULT IS LOCATED IN DRIVEWAY FOR ACCESS TO MULTIPLE RESIDENTIAL PROPERTIES. CONTRACTOR SHALL MAINTAIN VEHICULAR ACCESS AT ALL TIMES TO THE GENERATOR VAULT AND RESIDENTIAL PROPERTIES IN THE PROJECT AREA. CONTRACTOR PARKING IS LIMITED TO ONE PARKING SPACE ADJACENT TO GENERATOR VAULT. ADDITIONAL OFF-STREET PARKING IS AVAILABLE ALONG SHOULDER OF EAST MERCER WAY.
3. CONTRACTOR SHALL PROVIDE ACCESS FOR GARBAGE PICKUP ON WEDNESDAYS. PICKUP LOCATION IS ON EAST SIDE OF GENERATOR VAULT, REQUIRING ACCESS OVER VAULT.
4. ONSITE WORK HOURS SHALL BE LIMITED TO BUSINES DAYS FROM 8:00AM TO 7:00PM.

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CITY OF MERCER ISLAND WASHINGTON

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Checked: RL
Approved: RL


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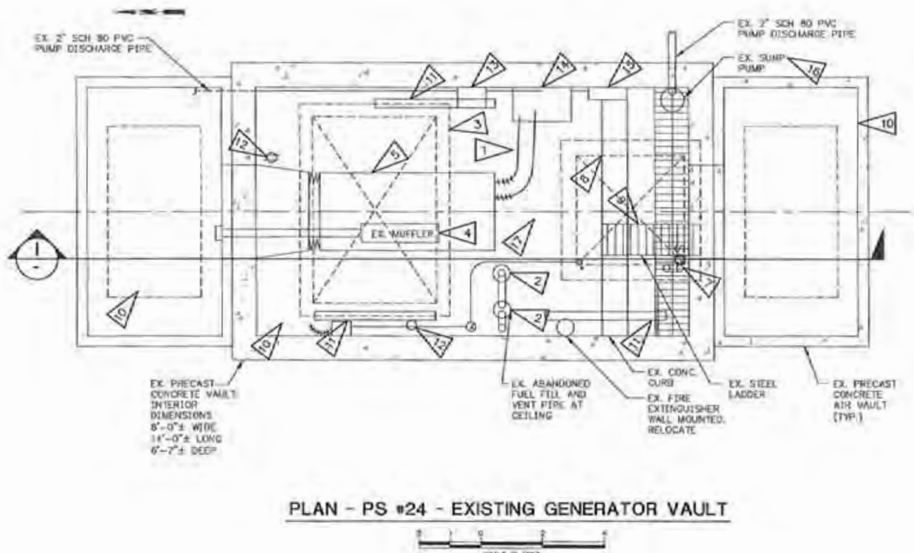
PS #13, 17, 18 & 24 EQUIPMENT

PS #24 GENERATOR VAULT SITE PLAN & ONE-LINE DIAGRAM

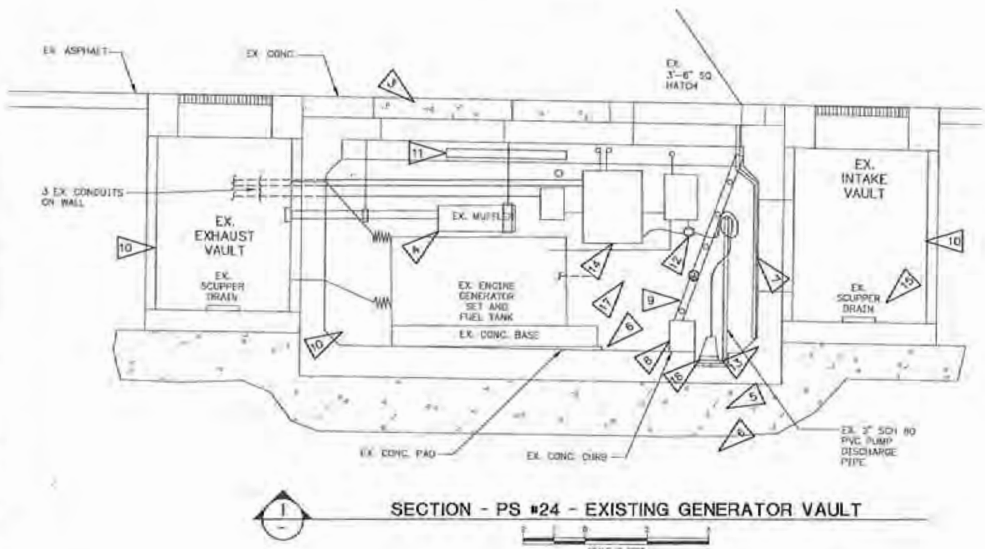
Sheet 10 of 24

Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PLAN - PS #24 - EXISTING GENERATOR VAULT




SECTION - PS #24 - EXISTING GENERATOR VAULT

## FLAG NOTES:

1. EXISTING CONDUIT AND WIRE CONNECTIONS FROM ATS TO GEN – REMOVE.
2. REMOVE ABANDONED FUEL VENT AND FILL PIPES.
3. TEMPORARILY REMOVE CONCRETE COVER OVER OPENING. COVER OPENINGS WITH STEEL PLAT DURING CONSTRUCTION.
4. REMOVE EX. MUFFLER AND EXHAUST PIPE AND SUPPORTS.
5. DRAIN ALL FLUIDS, COOLANT, OIL AND FUEL. REMOVE BATTERIES, WIRING TO COOLANT HEATER AND BATTERY CHARGER. REMOVE GENERATOR AND DUCT. IF NECESSARY REMOVE GENERATOR SET FROM SUB BASE FUEL TANK THEN REMOVE FUEL TANK SEPARATELY.
6. REMOVE BASE AND CONCRETE LEVELING PAD.
7. REMOVE DEBRIS FROM ACCESS HATCH DRAIN CHANNEL AND DRAIN. CLEAR OR REPLACE EX. PVC FRAME DRAIN TO SUMP. CLEAN SURFACE DEBRIS FROM EX. OPENING, CONDUIT, DRAIN, FLOOR, CEILING AND WALLS.
8. REMOVE EX. CURB TO FLOOR LEVEL. GRIND AND/OR GROUT AT FLOOR TO RECLAIM FLOOR AREA.
9. REMOVE EX. LADDER.
10. REMOVE DEBRIS, SEDIMENT AND OTHER LOOSE MATERIALS FROM AIR VAULTS AND GENERATOR VAULT.
11. EX. LIGHT FIXTURE – REMOVE. CONDUIT & WIRING NOT SHOWN FOR CLARITY, MAY REMAIN & BE RE-USED.
12. EX. DUPLEX RECEPTACLE TO REMAIN. CONDUIT & WIRING NOT SHOWN FOR CLARITY, MAY REMAIN.
13. EX. MAIN CKT BREAKER – REMOVE.
14. EX. ATS MOVE TO RIGHT TO PROVIDE WORKING CLEARANCE.
15. EX. 120/240V LOAD CENTER – REMOVE.
16. REMOVE EX. SUMP PUMP, VALVES AND RISER PIPE/FITTINGS.
17. REMOVE AND PATCH ALL ABANDONED ANCHORS AND PENETRATIONS PER DETAIL 13, SHEET 20.

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Designed: RL
Checked: RL
Approved: RL

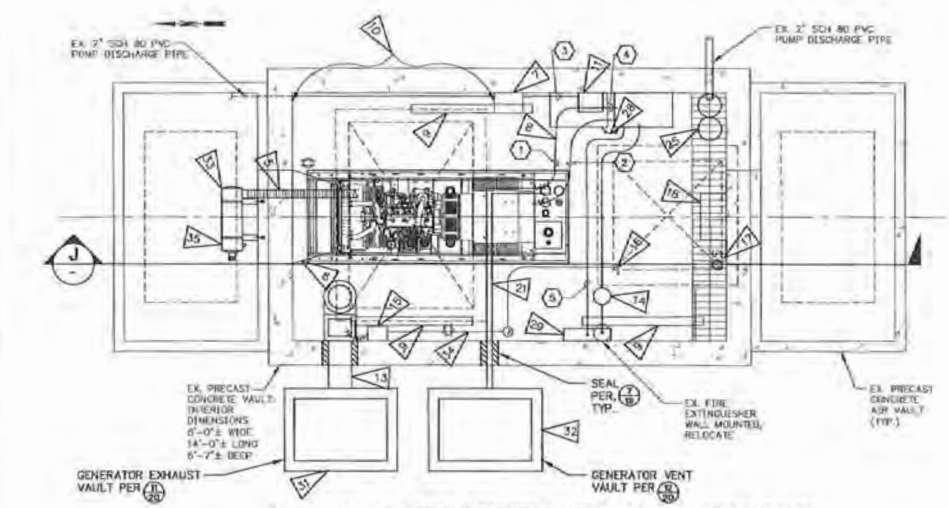
| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|

PS #13, 17, 18 & 24 EQUIPMENT

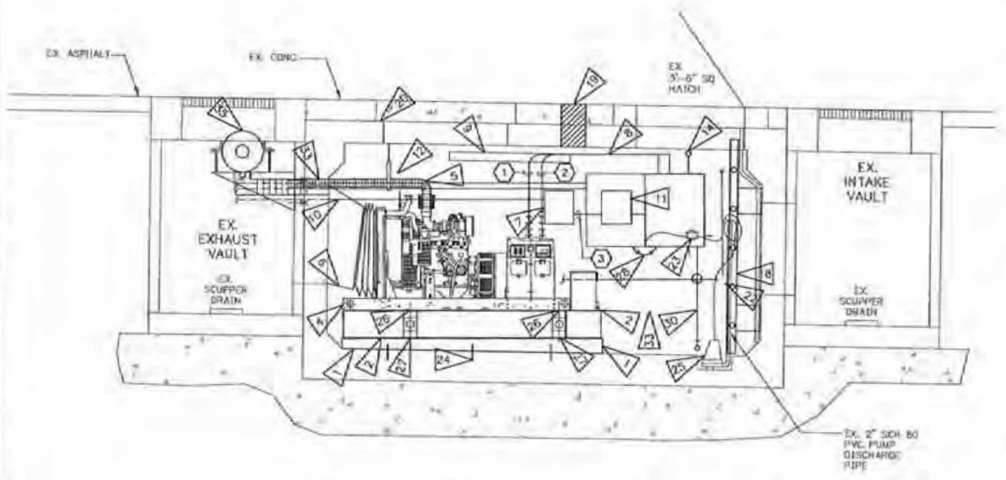
PS #24 GENERATOR VAULT
DEMOLITION PLAN & SECTION

Sheet 11 of 24
Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON



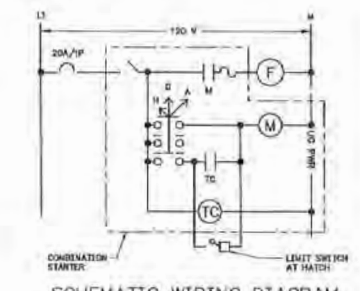

PLAN - PS #24 REPLACEMENT GENERATOR INSTALLATION




SECTION - PS #24 REPLACEMENT GENERATOR INSTALLATION

## FLAG NOTES:

1. CONCRETE BASE 101"x36" – HEIGHT VARIES TO MAKE LEVEL TOP. BASE TO BE AS CLOSE TO NORTH END OF VAULT AS POSSIBLE TO PROVIDE SPACE IN FRONT OF ATS.
2. INSTALL OWNER FURNISHED FUEL TANK. SEE DRAWINGS 15-26665 SHT 18 GLOBAL POWER COMPONENTS.
3. INSTALL OWNER FURNISHED GENERATOR. SEE CUMMINS DRAWING A047-S606. CONTRACTOR SHALL PLAN FOR AND IMPLEMENT ALL STEPS NECESSARY TO INSTALL EQUIPMENT. FUEL TANK MAY NEED TO BE PUT INTO POSITION AFTER GENERATOR ASSEMBLY IS LOWERED INTO VAULT. TANK MAY NEED TO BE POSITIONED IN INTAKE VAULT AIR OPENING OR TO ONE SIDE. GENERATOR ASSEMBLY APPURTENANCES MAY NEED TO BE REMOVED AND REPLACED TO ALLOW MOVEMENT INTO POSITION.
4. MOUNT GENERATOR ON FUEL TANK SEE GLOBAL POWER COMPONENTS REFERENCE DRAWINGS 15-26665 SHT 18.
5. INSTALL OWNER FURNISHED MUFFLER. SLOPE TO DRAIN TOWARDS DRAIN BOSS IN MUFFLER. PROVIDE CONDENSATION DRAIN LINE TO VAULT FLOOR. SUPPORT MUFFLER WITH THREADED ROD AND HANGING BRACKET MAKE FLEX CONNECTION TO ENGINE.
6. PROVIDE SHEET METAL DUCTING FROM RADIATOR TO EXHAUST VAULT. USE FLEX CONNECTION AT RADIATOR.
7. REMOVE EX. MAIN DISCONNECT & REPLACE WITH JUNCION BOX. SPLICE SERVICE CONDUCTORS & EXTEND TO NEW MAIN BRKR LOCATION – SEE ONE-LINE DIAGRAM.
8. NEW CONDUITS AND CONDUCTORS TO GENERATOR. SEE ONE-LINE DIAGRAM.
9. REPLACE EXISTING FLUORESCENT LIGHTS WITH T8 LED VAPOR-PROOF LIGHT FIXTURES, SUPERBRIGHT LED'S INC VILF-2NW18F OR EQUAL (TYP. OF ALL 3).
10. REPLACE SERVICE ENTRANCE CONDUIT INSIDE VAULT W/ SCH 80 PVC.
11. NEW MAIN BREAKER DISCONNECT – SEE ONE-LINE DIAGRAM.
12. INSULATE EXHAUST PIPE AND SILENCER W/ 1" THICK HIGH TEMPERATURE INSULATION. INSULATION SHALL CONSIST OF REMOVABLE PADS OF GLASS CLOTH/GLASS TEMPMAT/STAINLESS STEEL MESH FASTENED WITH STAINLESS STEEL LACING HOOKS AND 16 GAUGE COPPER WIRE (BALLARD INSULATION OR APPROVED EQUAL).
13. FAN/DUCT ASSEMBLY PER SECTION D, SHEET 19.
14. COMBINATION CO/SMOKE DETECTOR, 120V HARDWIRED W/SEALED LITHIUM BATTERY BACKUP, ALARM WIRED TO COMMON GENERAL FAIL ALARM IN ATS, KIDDE 1120105CO OR EQUAL.
15. COMBINATION MOTOR STARTER FOR EXHAUST FAN, 120V, HOA, NEMA SIZE 0, TIME CLOCK CONTROL WITH ADJUSTMENT AT 15 MINUTE INTERVALS, SEE THIS SHEET (RIGHT) FOR SCHEMATIC WIRING DIAGRAM.
16. VENT FAN LIMIT SWITCH SQ D 9007 C OR EQUAL.
17. REPLACE EXISTING LT SWITCH & RECEPTACLE.
18. VERTICAL LADDER PER DETAIL 9, SHEET 19, CENTER IN OPENING. H=87"±, CONTRACTOR TO VERIFY IN FIELD.
19. SEAL VOID IN CONCRETE SLAB. PLACE MIN. 2 STUDS IN OPENING FOR ANCHORAGE. SEAL WATER TIGHT WITH CONCRETE AND WATERSTOP-RX OR EQUAL.
20. PRIOR TO CONCRETE COVER REPLACEMENT, CLEAN ALL SURFACES, GROUT VOIDS IN SEALING SURFACE AREAS AND SEAL AROUND PERIMETER WITH MASTIC STRIP OR WATERSTOP-RX.
21. REMOVE AND SALVAGE 2" VENT CAP. 2" BLACK IRON PIPE TANK VENT TO 2"x½" TEE JUST INSIDE VAULT. CONNECT TEE TO EX. 2" VENT PIPE THRU WALL. INCLUDE 1/2" NIPPLE WITH 1/4 TURN VALVE ON TEE BRANCH TO DRAIN CONDENSATION. SUPPORT PIPE FROM CEILING W/ PIPE ANCHORS.
22. INTERCEPT EX. RECEPTACLE CKT, PROVIDE J BOX & NEW HOME RUNS TO LOAD CENTER.
23. REMOVE PORTABLE CORD, RELOCATE RECEPTACLE. PROVIDE NEW CONDUCTORS IN CONDUIT INTO ATS & RECEPTACLE W/ 1/2"C, 2#12 FOR HEATER. PROVIDE 1P DISCONNECT IN ATS FOR HEATER, LABEL "WARNING 120V HEATER DISCONNECT".
24. 1/2"X6" LONG ANCHOR BOLTS, ALL-THREAD OR REBAR GROUTED INTO FLOOR AND CAST INTO BASE (TYP. OF 8 EQUALLY SPACED)
25. REPLACE EX. SUMP PUMP WITH TWO SUMP PUMPS IN PARALLEL. TRIM AND REMOVE EX. SUMP GRATING AS NECESSARY. TWO TSURUMI MODEL HS2.45-62 SUMP PUMPS WITH FLOAT SWITCHES (TWO SHE-RHOMBUS SJE VERTICAL MASTER PUMP SWITCHES, P/N 1003770) AND 1 1/2" NPT DISCHARGE. CONNECT EACH PUMP WITH SCH 80 PVC PIPING, CHECK VALVE AND ISOLATION VALVE TO TEE RISER AND CONNECTION TO 2" EX. PIPE WITH UNION.
26. BOLT GENERATOR FRAME TO FRAME OF FUEL TANK USING 1/2" DIA. STAINLESS STEEL BOLTS, 4 PLACES.
27. BOLT FUEL TANK FRAME TO CONCRETE BASE USING 1/2" DIA. STAINLESS STEEL WEDGE ANCHOR BOLTS, 8" LONG.
28. RELOCATE ATS TO RIGHT TO PROVIDE WORKING CLEARANCE.
29. NEW LOAD CENTER – SEE ONE LINE DIAGRAM. PROVIDE NEW CONDUIT & CONDUCTORS TO RE-ENERGIZE RECEPTACLE & LIGHTING CIRCUITS.
30. PROVIDE WATER IN VAULT SENSOR & ALARM CIRCUIT. 1/2"C, 2#14 FROM ATS TO GEMS LEVEL SW NO 35682 OR EQUAL. CONNECT TO GENERATOR FAIL ALARM.
31. INTAKE VAULT PER DETAIL 11, SHEET 20.
32. VENT VAULT PER DETAIL 12, SHEET 20.
33. CITY PROVIDED CARBON STEEL-321 STAINLESS STEEL FLANGE, FITTINGS AND PIPE.
34. PROVIDE NEW CIRCUIT TO EXHAUST FAN & LIMIT SWITCH ¾"C, 2#12, 1#12G.
35. CITY PROVIDED HARCO MANUFACTURING CO. 824VRS2-8SI MPT H MUFFLER. ATTACH TO WALL WITH PIPE CLAMPS UNLESS DIRECTED BY CITY. NOTE: MUFFLER AND APPURTENANCES WILL NOT BE AVAILABLE UNTIL MARCH 2019.




SCHEMATIC WIRING DIAGRAM

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Drawn: SS
Designed: RL
Checked: RL
Approved: RL

| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|
| | | | | |

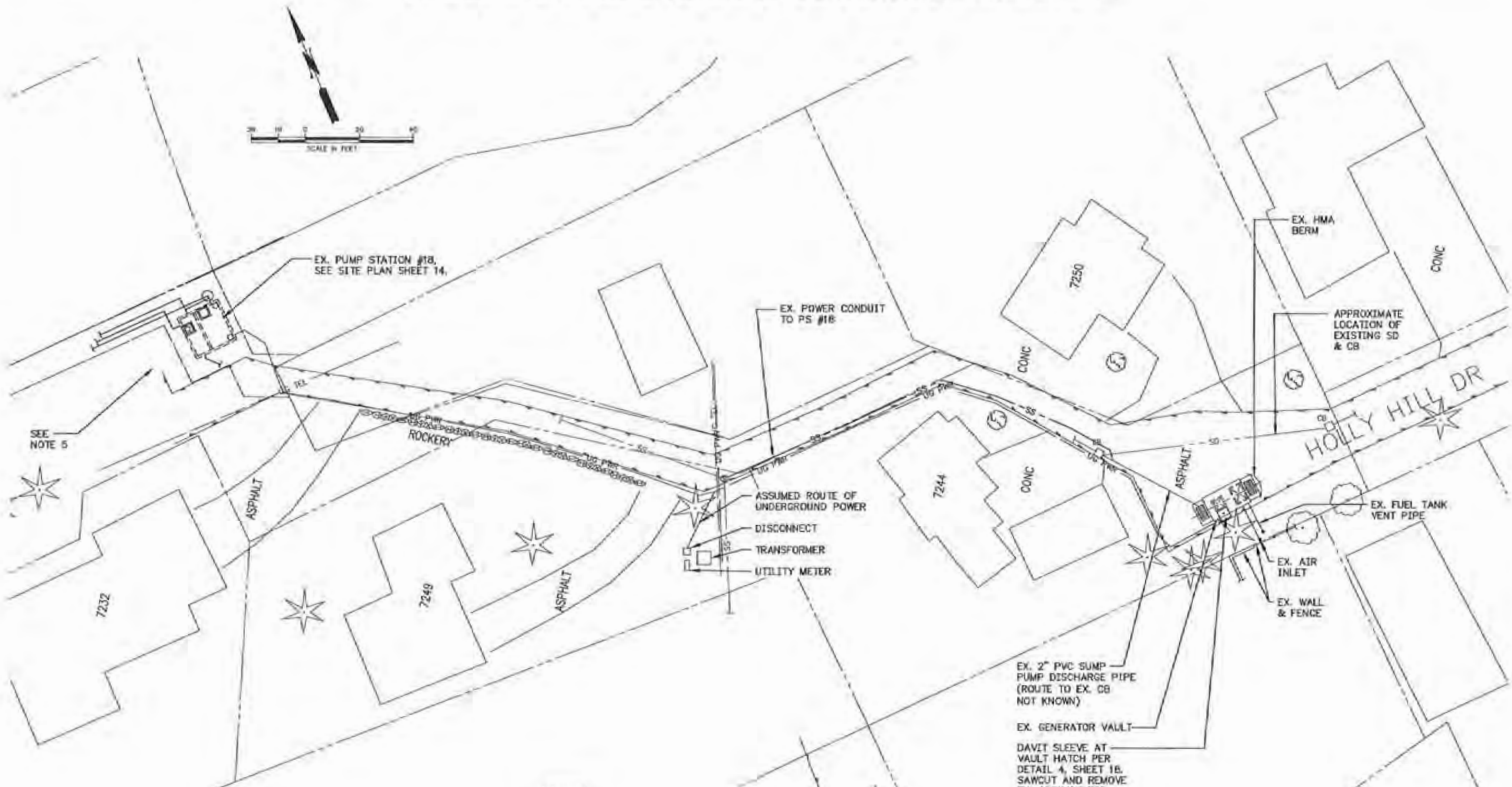
PS #13, 17, 18 & 24 EQUIPMENT

PS #24 GENERATOR VAULT
PLAN & SECTION
GENERATOR INSTALLATION

Sheet 12 of 24

Job No. 801703

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




## NOTES

1. EXISTING UTILITIES NOT SHOWN. CALL FOR UTILITY LOCATE PRIOR TO ANY EXCAVATION.
2. CONTRACTOR SHALL MAINTAIN VEHICULAR ACCESS AT ALL TIMES TO THE GENERATOR VAULT, PUMP STATION AND RESIDENTIAL PROPERTIES IN THE PROJECT AREA. CONTRACTOR PARKING IS LIMITED TO ONE SPACE ADJACENT TO GENERATOR VAULT AND ONE SPACE ADJACENT TO PUMP STATION. ADDITIONAL OFF-SITE PARKING IS AVAILABLE ALONG SHOULDER OF WEST MERCER WAY.
3. ONSITE WORK HOURS SHALL BE LIMITED TO BUSINESS DAYS FROM 8:00AM TO 7:00PM.
4. CONTRACTOR SHALL PROVIDE ACCESS FOR GARBAGE PICKUP ON THURSDAYS.
5. CONTRACTOR SHALL DETERMINE MEANS OF MOBILIZATION, DELIVERY, SALVAGE AND ACCESS TO EX. STATION, BUT SUCH SHALL BE LIMITED TO USE OF EX. DRIVEWAY AND PARKING AREA. TIMING OF USE OF DRIVEWAY IN A MANNER THAT BLOCKS LOCAL PROPERTY ACCESS SHALL BE COORDINATED A MINIMUM OF FIVE BUSINESS DAYS IN ADVANCE WITH OWNER AND IMPACTED PROPERTY OWNERS. CONTRACTOR SHALL UTILIZE A CRANE OR BOOM TRUCK TO MOVE EQUIPMENT AND MATERIALS TO AND FROM EX. PAVED AREAS TO THE STATION, INCLUDING FOR PUMP INSTALLATION AND REMOVAL. EX. VEGETATION SHALL NOT BE REMOVED FOR ACCESS OR CRANE/BOOM SERVICE OF THE STATION.

PUMP STATION #18 & GENERATOR VAULT SITE PLAN

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| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|

Drawn: SS
Designed: RL
Checked: RL
Approved: RL

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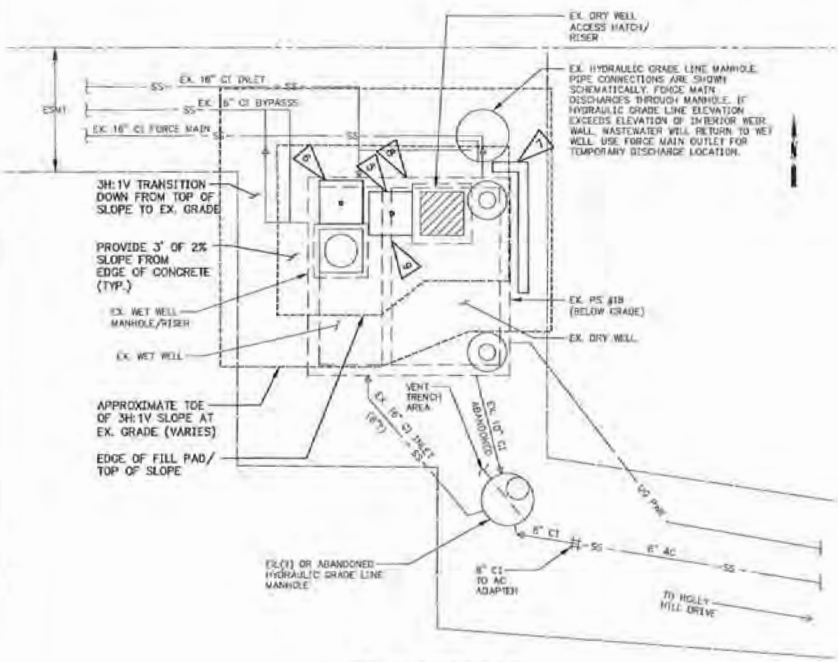
PS #13, 17, 18 & 24 EQUIPMENT
PS #18 & GENERATOR VAULT
SITE PLAN

Sheet 13 of 24
Job No. 801203

A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PS #18 SITE PLAN

SCALE IN FEET

## FLAG NOTES:

5. DAVIT SLEEVE PER DETAIL 5, SHEET 18.
6. DAVIT SLEEVE PER DETAIL 6, SHEET 18.
7. REMOVE AND DISPOSE OF EX. GRAVEL SACK BERM. CREATE DRAINAGE BERM FROM NATURAL MATERIAL.
8. RAISE EX. GRADE AND STATION ENTRY RISERS 18" PER DETAIL 10, SHEET 20.
9. RAISE EX. WATER SERVICE BOX. ADJUST EX. BOX AND ADD 1 OR 2 12" RISERS (CARSON 1324-12 HW OR EQUAL) TO SUIT EX. CONDITIONS.

## NOTES

1. EXISTING UTILITIES NOT SHOWN. CALL FOR UTILITY LOCATE PRIOR TO ANY EXCAVATION.
2. GENERATOR VAULT IS LOCATED IN DRIVEWAY FOR ACCESS TO MULTIPLE RESIDENTIAL PROPERTIES. CONTRACTOR SHALL MAINTAIN VEHICULAR ACCESS AT ALL TIMES TO THE GENERATOR VAULT AND RESIDENTIAL PROPERTIES IN THE PROJECT AREA. CONTRACTOR PARKING IS LIMITED TO ONE PARKING SPACE, ADJACENT TO GENERATOR VAULT. ADDITIONAL OFF-STREET PARKING IS AVAILABLE ALONG SHOULDER OF EAST MERCER WAY.
3. CONTRACTOR SHALL PROVIDE ACCESS FOR GARBAGE PICKUP ON THURSDAYS.
4. ONSITE WORK HOURS SHALL BE LIMITED TO BUSINESS DAYS FROM 8:00AM TO 7:00PM.

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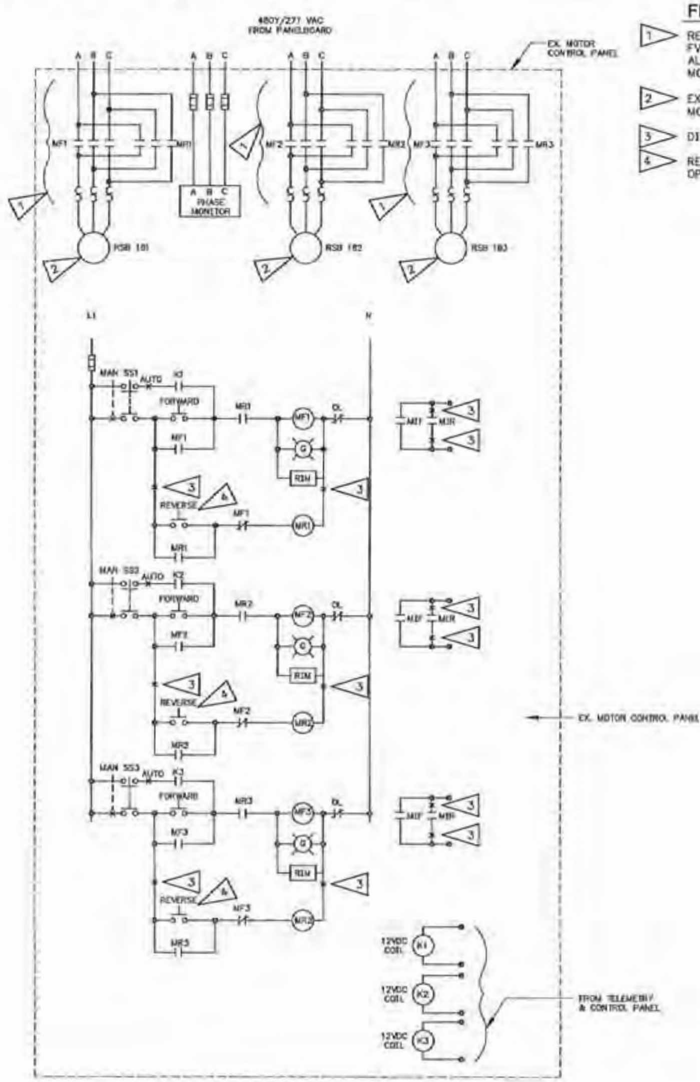


## FLAG NOTES:

1. REPLACE EX. REVERSING MOTOR STARTER WITH FVNR NEMA SIZE 1 STARTER WITH MELTING ALLOY OVERLOADS BASED ON FLA OF NEW MOTORS WITH 1.15 SERVICE FACTOR.
2. EX. 7-1/2 HP MOTORS – REPLACE WITH 10 HP MOTORS.
3. DISCONNECT REVERSE CONTROL CIRCUITRY.
4. REMOVE PUSH BUTTON ON DOOR & CLOSE OPENING.

| No. | Date | By | Chd | Revision |
|---|---|---|---|---|

Drawn: SS
Designer: RL
Checked: RL
Approved: RL

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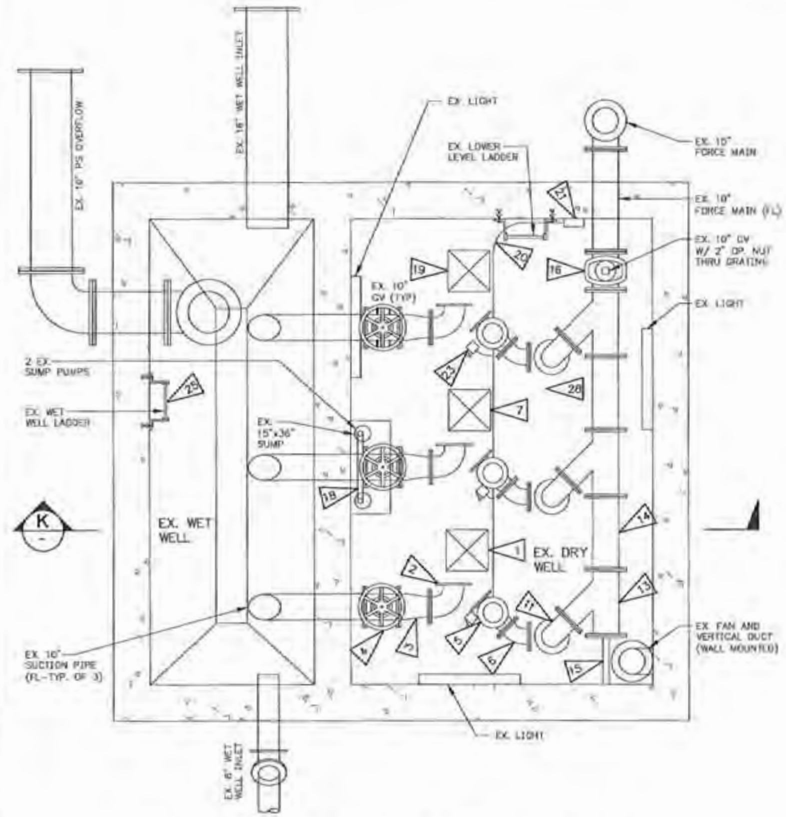
PS #13, 17, 18 & 24 EQUIPMENT

PS #18 SITE PLAN

Sheet 14 of 24

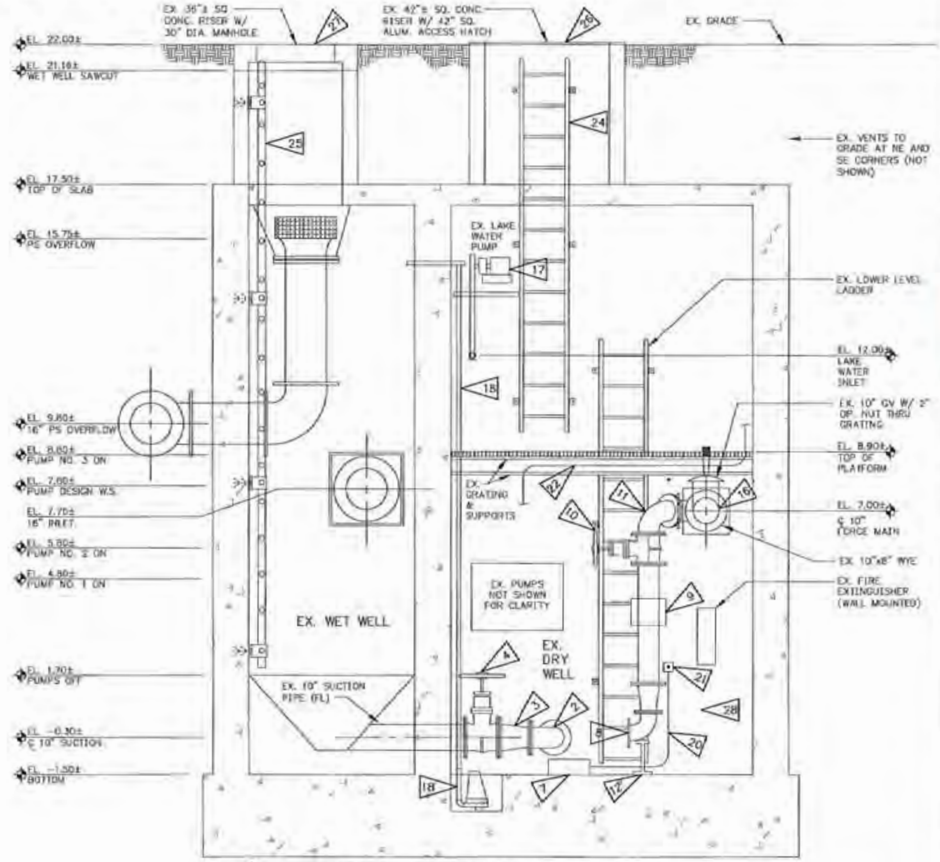
Job No. 801703

## A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




PUMP STATION #18 EXISTING PLAN - LOWER LEVEL

SCALE IN FEET




SECTION - PUMP STATION #18 EXISTING

SCALE IN FEET

## FLAG NOTES:

1. REMOVE EX. VERTICAL PUMP (TYP. OF 3, NOT SHOWN FOR CLARITY)
2. REMOVE EX. 90 DEG. BEND (TYP. OF 3)
3. REMOVE EX. REDUCER (TYP. OF 3)
4. REMOVE EX. 10" GATE VALVE (TYP. OF 3)
5. REMOVE EX. CHECK VALVE (TYP. OF 3)
6. REMOVE EX. 45 DEG. BEND (TYP. OF 3)
7. REMOVE EX. 18" CONCRETE PUMP PAD, GRIND FLUSH TO FLOOR ELEVATION. (TYP. OF 3)
8. REMOVE EX. 90 DEG. BEND AT THE BASE OF VERTICAL RISER (TYP. OF 3)
9. REMOVE EX. 8" SPOOL, CONNECTED REDUCER AND RELATED FITTINGS (TYP. OF 3)
10. REMOVE EX. GATE VALVE (TYP. OF 3)
11. REMOVE EX. 90 DEG. BEND AT THE TOP OF VERTICAL RISER (TYP. OF 3)
12. REMOVE EX. SUPPORT ATTACHED TO FLOOR (TYP. OF 3)
13. REMOVE EX. 10"x8" WYE (TYP. OF 3)
14. REMOVE EX. 10" SPOOL (TYP. OF 2)
15. REMOVE EX. HORIZONTAL SUPPORT
16. REMOVE EX. 10" GATE VALVE
17. REMOVE EXISTING LAKE WATER PUMP AND ALL ASSOCIATED PIPING AND APPURTENANCES. PLUG/SEAL PIPE AT WALL PENETRATIONS.
18. REMOVE 2 EX. SUMP PUMPS AND ALL RELATED APPURTENANCES, TO 12" FROM DISCHARGE WALL PENETRATION
19. DISCONNECT EX. MOTOR CIRCUIT FROM MOTOR (TYP. OF 3).
20. EX. CONDUIT & WIRE ROUTED ALONG FLOOR FROM EMERGENCY STOP PUSH BUTTON ON WALL TO LIMIT SWITCHES ON CHECK VALVES – REMOVE.
21. EX. EMERGENCY STOP PUSH BUTTON ON WALL TO REMAIN.
22. EX. MOTOR CIRCUITS SUPPORTED FROM GRATING SUPPORTS TO REMAIN & BE RE-USED FOR NEW MOTORS (TYP. OF 3).
23. RE-USE EX. LIMIT SWITCHES ON NEW SWING CHECK VALVES (TYP. OF 3).
24. REMOVE EX. DRY WELL LADDER AND SALVAGE TO CITY. GRIND ALL ANCHOR BOLTS FLUSH TO WALL.
25. REMOVE EX. WET WELL LADDER AND SALVAGE TO CITY. GRIND ALL ANCHOR BOLTS FLUSH TO WALL.
26. REMOVE EX. DRY WELL HATCH AND FRAME AND SALVAGE TO CITY.
27. SAWCUT 10"± BELOW EX. WET WELL TOP SLAB ELEV. AND REMOVE EX. WET WELL TOP SLAB AND MANHOLE AND SALVAGE TO CITY.
28. REMOVE AND PATCH ALL ABANDONED ANCHORS AND PENETRATIONS PER DETAIL 15, SHEET 20.

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CITY OF MERCER ISLAND, WASHINGTON

| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|

Drawn: SS  Designed: RL  Checked: RL  Approved: RL

PS #13, 17, 18 & 24 EQUIPMENT

PS #18 DEMOLITION PLAN & ELEVATION



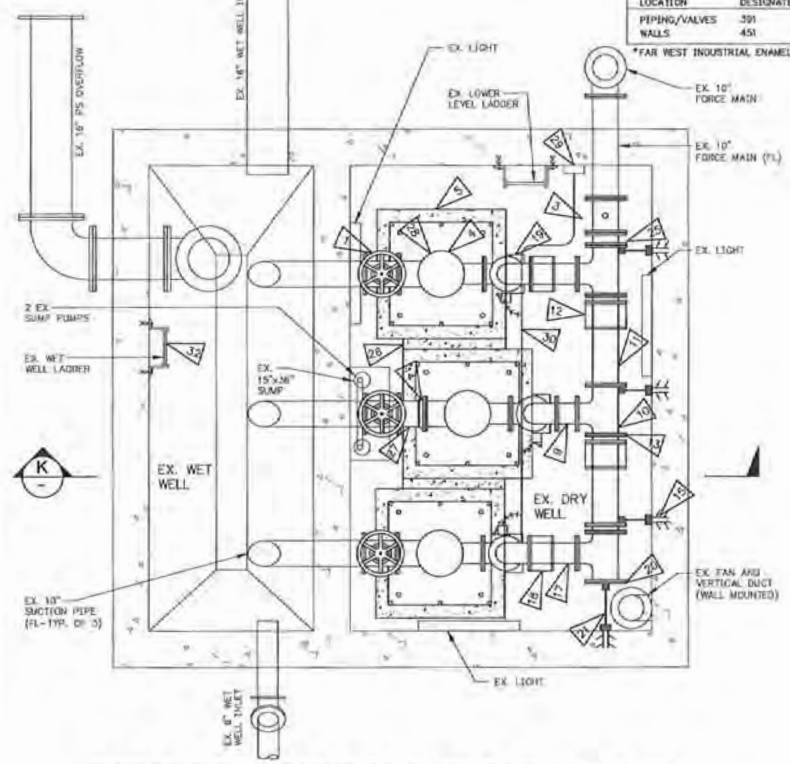
Job No. 801703

## A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON

### FINISH SCHEDULE

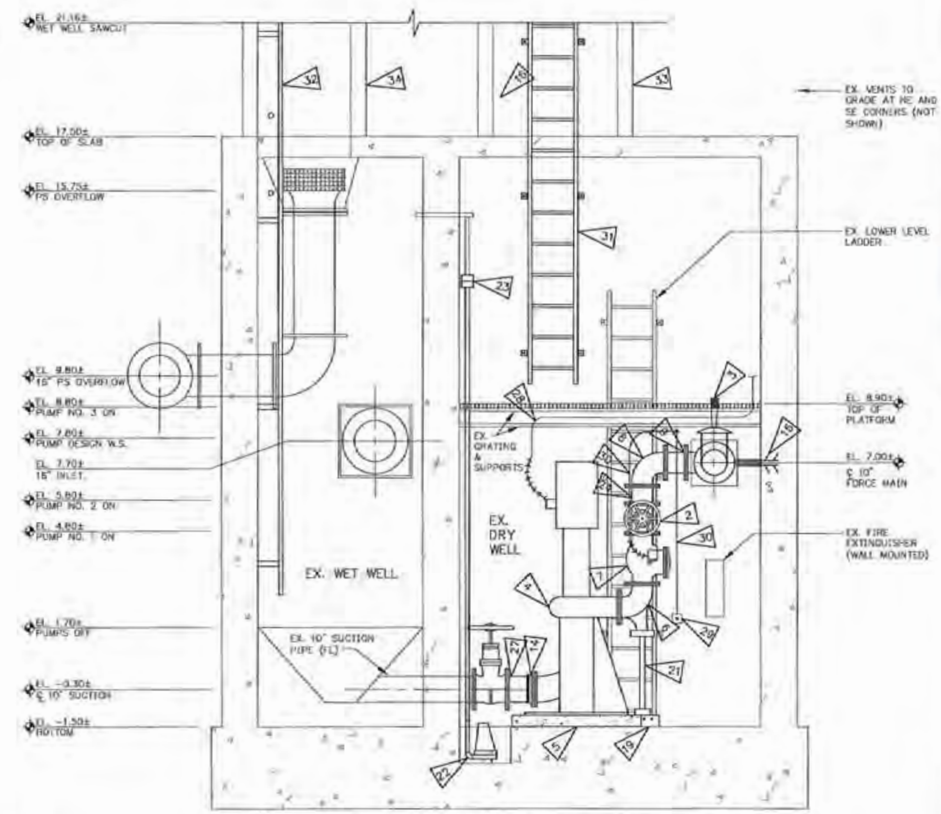
| LOCATION | DESIGNATION* | COLOR |
|---|---|---|
| PIPING/VALVES | 391 | GRAY |
| WALLS | 451 | WHITE |

*FAR WEST INDUSTRIAL ENAMEL CODE #




PUMP STATION #18 PUMP REPLACEMENT PLAN - LOWER LEVEL

SCALE IN FEET




SECTION - PUMP STATION #18 PUMP REPLACEMENT

SCALE IN FEET

### FLAG NOTES:

1. 10" RESILIENT SEAT GATE VALVE (FLXFL) WITH HAND WHEEL (TYP. OF 3).
2. 10" RESILIENT SEAT GATE VALVE IN VERTICAL ORIENTATION (FLXFL) WITH CHAIN WHEEL (TYP. OF 3).
3. 10" RESILIENT SEAT GATE VALVE (FLXFL) WITH 2" OPERATING NUT.
4. INSTALL OWNER-FURNISHED VAUGHAN E SERIES CHOPPER PUMP AND MOTOR ASSEMBLY (TYP. OF 3).
5. 50" SQ. CONCRETE PAD TO SUPPORT PUMP, THICKNESS AS REQUIRED (TYP. OF 3).
6. 8" 90 DEG. DI BASE ELBOW OR EQUIVALENT (FLXFL) (TYP. OF 3).
7. 8" HORIZONTAL SWING CHECK VALVE IN VERTICAL ORIENTATION (FLXFL) (TYP. OF 3).
8. 8" 90 DEG. DI BEND (FLXFL) (TYP. OF 3).
9. 8" LONG 8" DI SPOOL (FLXFL).
10. 8"x10" TEE, FL (TYP. OF 3).
11. 10" DI SPOOL (FLxPE), LENGTH AS REQUIRED (TYP. OF 2).
12. 10" RFCA (TYP. OF 2)
13. CLEVIS HANGAR ATTACHED TO I BEAM ABOVE TO SUPPORT 10" PIPE (TYP. OF 3)
14. 10" UNIFLANGE OR EQUAL RESTRAINED FLANGE ADAPTER
15. STAND-ON PIPE SUPPORT WITH FLANGE PLATE - MOUNTED HORIZONTALLY (TYP. OF 3)
16. OWNER FURNISHED VAUGHAN E SERIES CHOPPER PUMP AND MOTOR ASSEMBLIES HAVE A 40" SQUARE BASE PLATE. THE CONCRETE OPENING TO THE DRY WELL IS 42"x42". TEMPORARILY REMOVE AND REPLACE EXISTING ELECTRICAL APPURTENANCES AND REMOVE LADDER TO LOWER PUMPS INTO DRY WELL.
17. 8" DI SPOOL (FLXPE), LENGTH AS REQUIRED (TYP. OF 3)
18. 8" RFCA (TYP. OF 2).
19. 7"x15" CONCRETE PAD (THICKNESS TO MATCH PUMP BASE).
20. 10" BLIND FLANGE.
21. STAND-ON PIPE SUPPORT WITH TWO BASE PLATES, LENGTH AS REQUIRED (TYP OF 4).
22. TWO SUMP PUMPS IN PARALLEL. TWO TSURUMI MODEL HS2.45-62 PUMPS W/ FLOAT SWITCHES (TWO SJE-RHOMBUS SJE VERTICAL MASTER PUMP SWITCHES, P/N 1003770) AND 1 1/2" NPT DISCHARGE. CONNECT EACH PUMP WITH SCH 80 PVC PIPE, CHECK VALVE AND ISOLATION VALVE TO TEE/RISER.
23. INSTALL AND CONNECT 2" DISCHARGE PIPE TO EXISTING 2" PIPE, 12" BELOW DISCHARGE WALL PENETRATION.
24. 8" FILLER FLANGE OR FLANGE SPOOL, LENGTH AS REQUIRED
25. 10" FILLER FLANGE OR FLANGE SPOOL, LENGTH AS REQUIRED
26. CONTINUE CONCRETE WHERE ADJACENT TO ANOTHER PAD
27. 10" DI SPOOL (FLXPE), LENGTH AS REQUIRED (TYP. OF 3)
28. RE-USE EX. MOTOR CIRCUITS FOR NEW MOTORS. RE-ROUTE OR EXTEND AS REQUIRED (TYP. OF 3).
29. EX. EMERGENCY STOP PUSH BUTTON
30. EXTEND CIRCUIT FROM EMERGENCY STOP PUSH BUTTON UP TO GRATING SUPPORTS & TO LIMIT SWITCHES ON SWING CHECK VALVES - 3/4"C - 6#14. 2#14 FOR EACH LIMIT SWITCH. RE-USE EX. LIMIT SWITCHES (TYP OF 3)
31. DRY WELL LADDER PER DETAIL 9, SHEET 19. H=166"±
32. WET WELL LADDER PER DETAIL 9, SHEET 19. H=240"±.
33. RAISE DRY WELL HATCH 18" ABOVE EX. ELEVATION PER DETAIL 10, SHEET 20.
34. RAISE WET WELL MANHOLE 18" ABOVE EX. ELEVATION PER DETAIL 10, SHEET 20.

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| | |
|---|---|
| Drawn: | SS |
| Designed: | RL |
| Checked: | RL |
| Approved: | RL |

PS #13, 17, 18 & 24 EQUIPMENT

PS #18 PUMP REPLACEMENT
PLAN & ELEVATION

Sheet 16 of 24

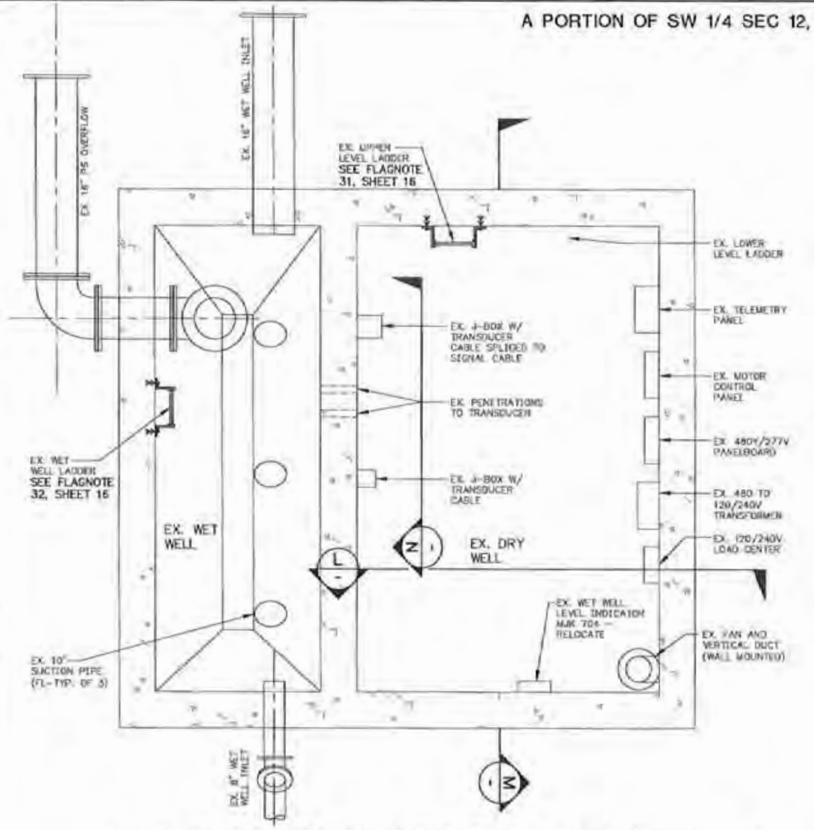
Job No. 881203

| No. | Date | By | Ckd | Revision |
|---|---|---|---|---|

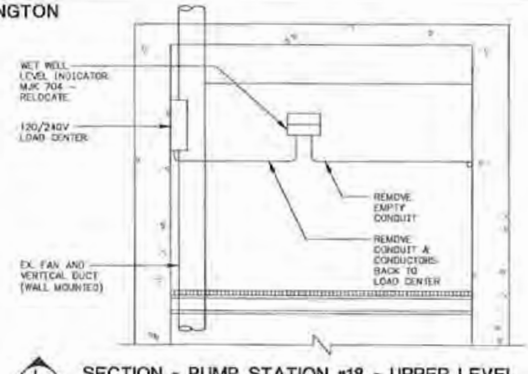
A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON

## FLAG NOTES:

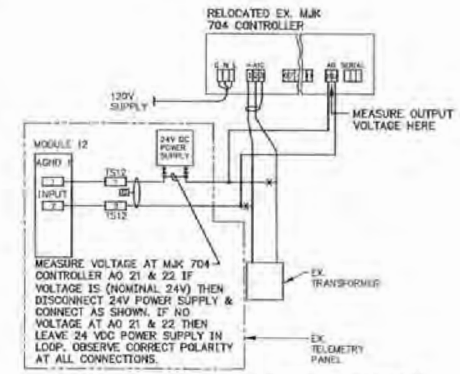
1. REPLACE REVERSING MOTOR STARTERS IN EXISTING MOTOR CONTROL PANEL WITH FVNR STARTERS PER NOTE 1 SHT 14 (TYP. OF 3)
2. REMOVE EX. "REVERSE" PUSH BUTTONS ON DOOR. CLOSE OPENINGS (TYP. OF 3)




PLAN - PUMP STATION #18 - UPPER LEVEL

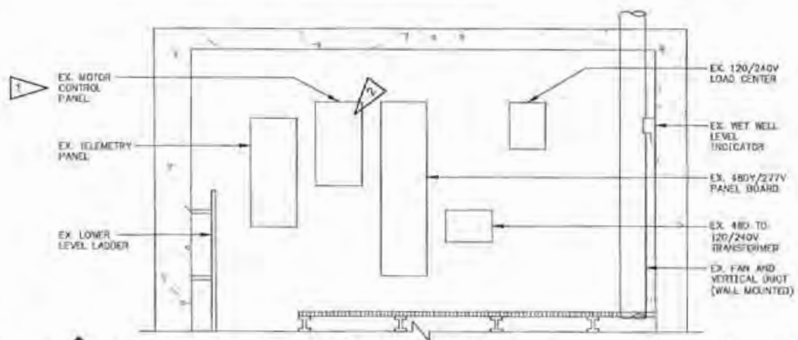



SECTION - PUMP STATION #18 - UPPER LEVEL

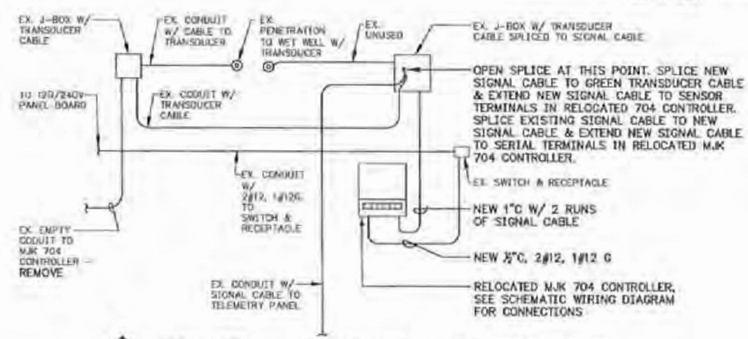



MJK 704 SCHEMATIC WIRING DIAGRAM

NOT TO SCALE




SECTION - PUMP STATION #18 - UPPER LEVEL




ELEVATION - PUMP STATION #18 - UPPER LEVEL

NOT TO SCALE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CITY OF MERCER ISLAND, WASHINGTON

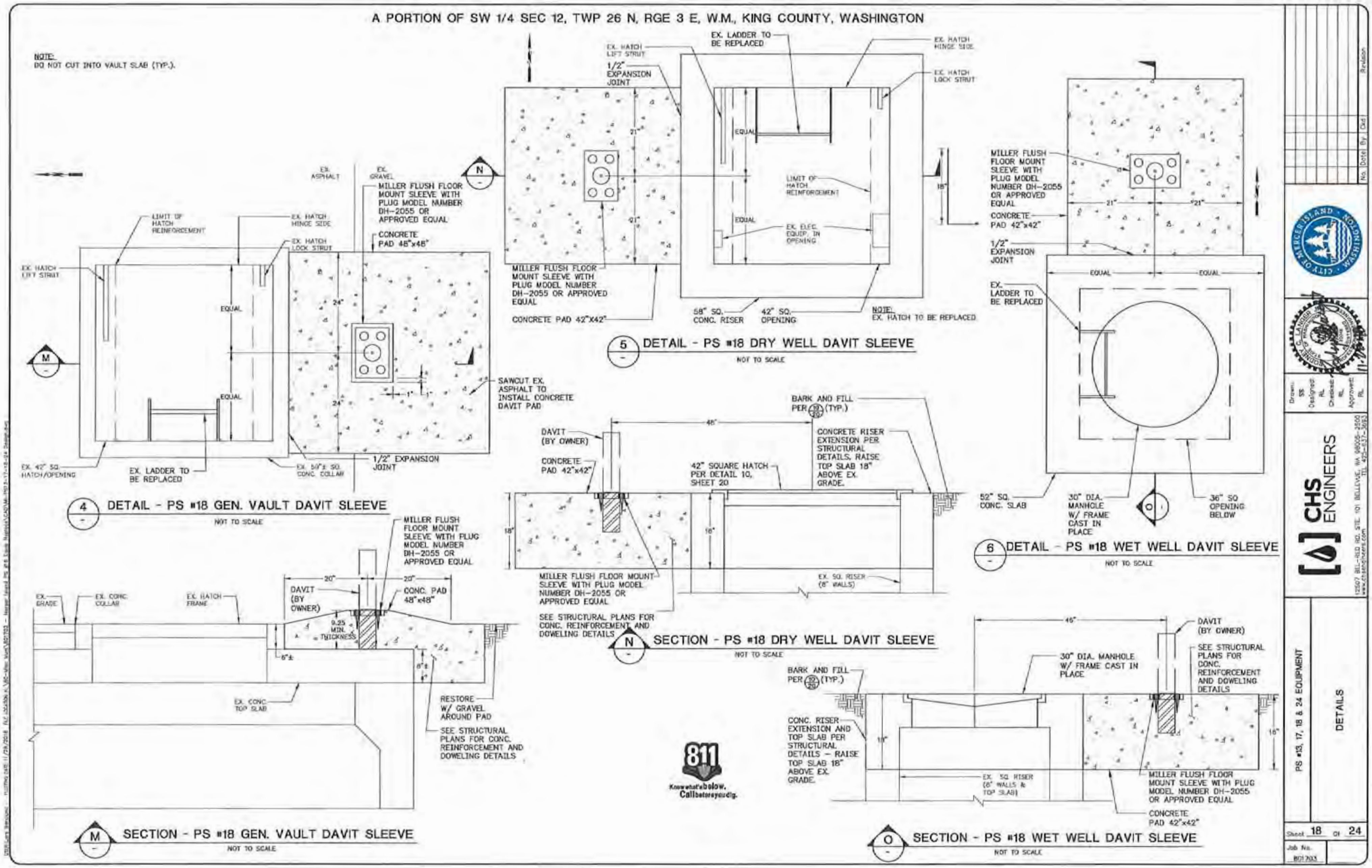
| Drawn: | Designed: | Checked: | Approved: |
| --- | --- | --- | --- |
| SS | RL | RL | RL |

PS #18 DRY WELL PLAN - UPPER LEVEL

PS #13, 17, 18 & 24 EQUIPMENT



Job No. 801703



A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON
NOTE:
DO NOT CUT INTO VAULT SLAB (TYP.).
EX. HATCH LIFT STRUT
LIMIT OF HATCH REINFORCEMENT
EX. HATCH HINGE SIDE
EX. HATCH LOCK STRUT
EX. ASPHALT
EX. GRAVEL
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
CONCRETE PAD 48"x48"
EQUAL
SAWCUT EX. ASPHALT TO INSTALL CONCRETE DAVIT PAD
EX. 42" SQ. HATCH/OPENING
EX. LADDER TO BE REPLACED
EX. 59"± SQ. CONC. COLLAR
1/2" EXPANSION JOINT
4 DETAIL - PS #18 GEN. VAULT DAVIT SLEEVE
NOT TO SCALE
EX. LADDER TO BE REPLACED
EX. HATCH LIFT STRUT
1/2" EXPANSION JOINT
EX. HATCH HINGE SIDE
EX. HATCH LOCK STRUT
LIMIT OF HATCH REINFORCEMENT
EX. ELEC. EQUIP. IN OPENING
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
CONCRETE PAD 42"X42"
58" SQ. CONC. RISER
42" SQ. OPENING
NOTE: EX. HATCH TO BE REPLACED
5 DETAIL - PS #18 DRY WELL DAVIT SLEEVE
NOT TO SCALE
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
CONCRETE PAD 42"x42"
1/2" EXPANSION JOINT
EX. LADDER TO BE REPLACED
52" SQ. CONC. SLAB
30" DIA. MANHOLE W/ FRAME CAST IN PLACE
36" SQ OPENING BELOW
6 DETAIL - PS #18 WET WELL DAVIT SLEEVE
NOT TO SCALE
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
EX. GRADE
EX. CONC. COLLAR
EX. HATCH FRAME
DAVIT (BY OWNER)
9.25 MIN. THICKNESS
CONC. PAD 48"x48"
EX. CONC. TOP SLAB
RESTORE W/ GRAVEL AROUND PAD
SEE STRUCTURAL PLANS FOR CONC. REINFORCEMENT AND DOWELING DETAILS
M SECTION - PS #18 GEN. VAULT DAVIT SLEEVE
NOT TO SCALE
BARK AND FILL PER 10/20 (TYP.)
DAVIT (BY OWNER)
CONCRETE PAD 42"x42"
42" SQUARE HATCH PER DETAIL 10, SHEET 20
CONCRETE RISER EXTENSION PER STRUCTURAL DETAILS. RAISE TOP SLAB 18" ABOVE EX. GRADE.
EX. SQ. RISER (8" WALLS)
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
SEE STRUCTURAL PLANS FOR CONC. REINFORCEMENT AND DOWELING DETAILS
N SECTION - PS #18 DRY WELL DAVIT SLEEVE
NOT TO SCALE
811 Know what's below. Call before you dig.
DAVIT (BY OWNER)
30" DIA. MANHOLE W/ FRAME CAST IN PLACE
SEE STRUCTURAL PLANS FOR CONC. REINFORCEMENT AND DOWELING DETAILS
BARK AND FILL PER 10/20 (TYP.)
CONC. RISER EXTENSION AND TOP SLAB PER STRUCTURAL DETAILS - RAISE TOP SLAB 18" ABOVE EX. GRADE.
EX. SQ. RISER (8" WALLS & TOP SLAB)
MILLER FLUSH FLOOR MOUNT SLEEVE WITH PLUG MODEL NUMBER DH-2055 OR APPROVED EQUAL
CONCRETE PAD 42"x42"
O SECTION - PS #18 WET WELL DAVIT SLEEVE
NOT TO SCALE
No. Date By Ckd Revision
CITY OF MERCER ISLAND WASHINGTON
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Designed: RL
Checked: RL
Approved: RL
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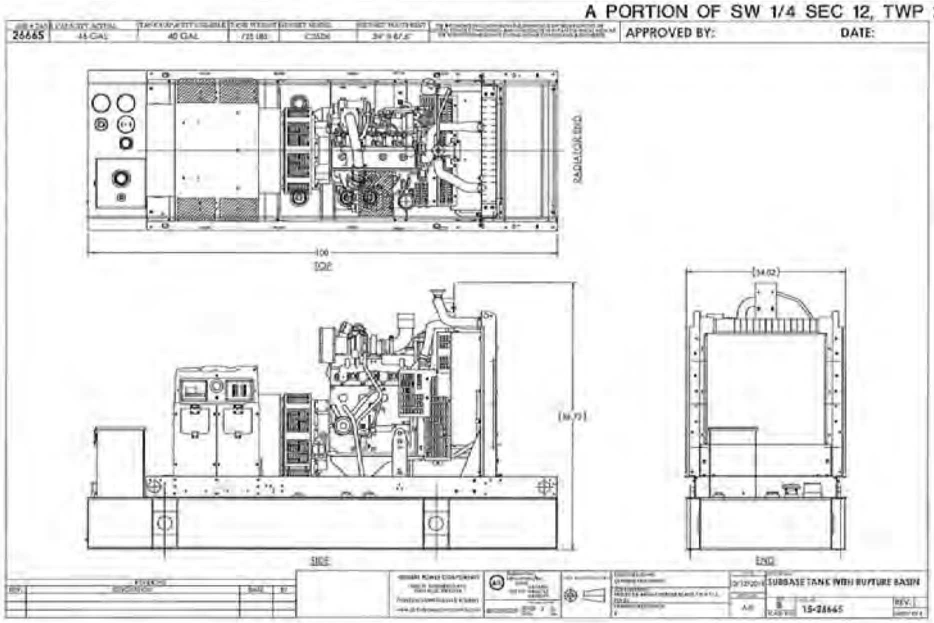
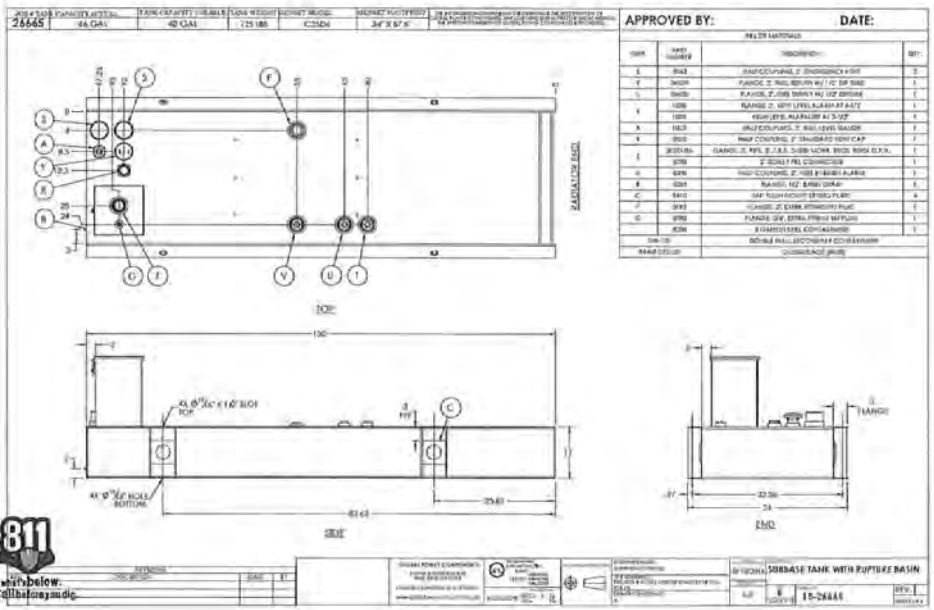
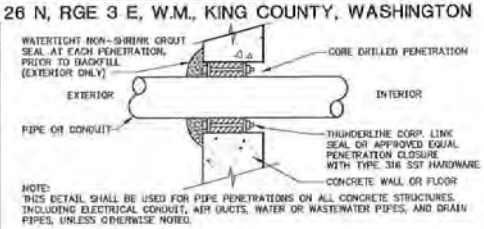
PS #13, 17, 18 & 24 EQUIPMENT
DETAILS
Sheet 18 of 24
Job No. 801703

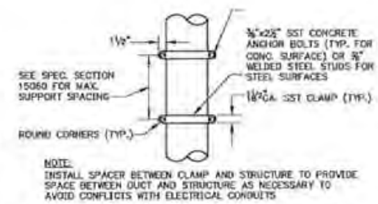
# A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON



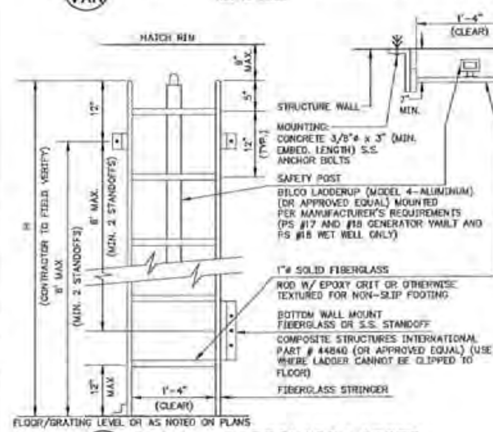




7 VAR — DETAIL - WALL PENETRATION
NOT TO SCALE



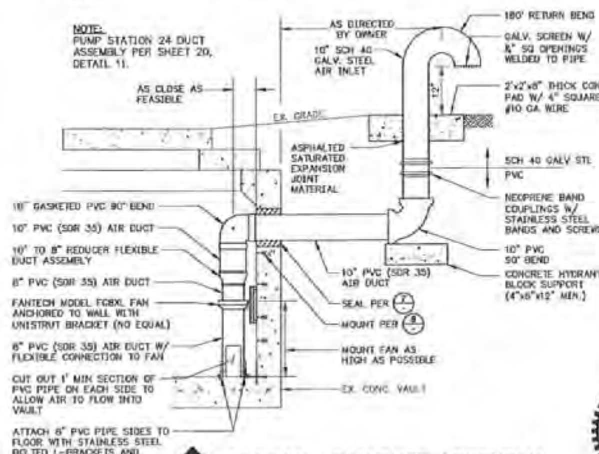

8 VAR — DETAIL - PIPE / DUCT CLAMP
NOT TO SCALE




9 VAR — DETAIL - FIBERGLASS LADDER
NOT TO SCALE

## NOTES

1. DETAILS TO LEFT SIDE OF THIS SHEET ARE FOR GENERATOR AND SUB BASE TANK AS PROVIDED BY OWNER TO BE INSTALLED BY CONTRACTOR.
2. CONTRACTOR SHALL LOAD AND HAUL OWNER FURNISHED EQUIPMENT FROM CITY PROPERTY AT 4300 BLOCK, 66TH AVE SE, MERCER ISLAND TO THE PROJECT SITE.




D VAR — SECTION - FAN/DUCT ASSEMBLY
NOT TO SCALE

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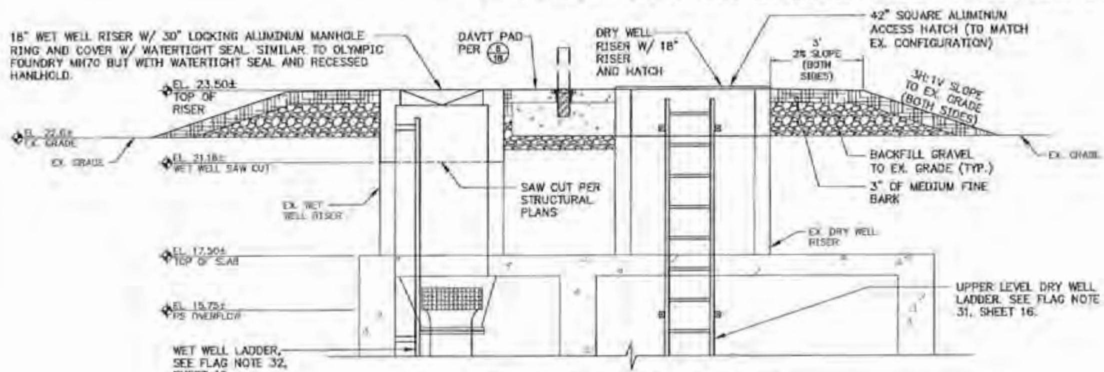
PS #13, 17, 18 & 24 EQUIPMENT

DETAILS

Sheet 19 of 24
Job No. 601763

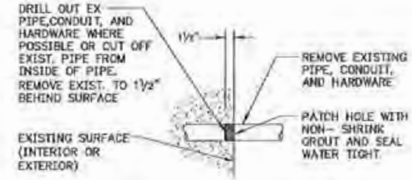
## A PORTION OF SW 1/4 SEC 12, TWP 26 N, RGE 3 E, W.M., KING COUNTY, WASHINGTON




NOTE: SEE STRUCTURAL DETAILS FOR 18" RISER EXTENSIONS

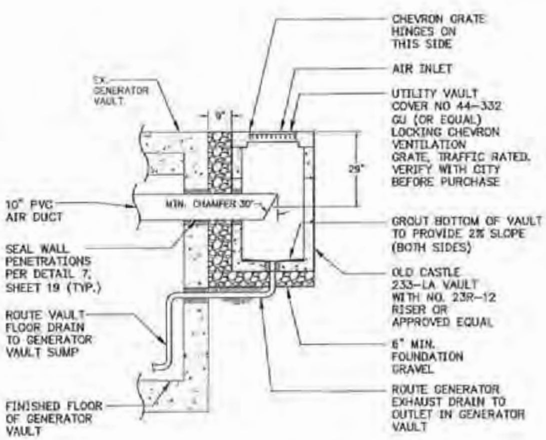
10/16 DETAIL - PS #18 DRY AND WET WELL RISER EXTENSION

NOT TO SCALE



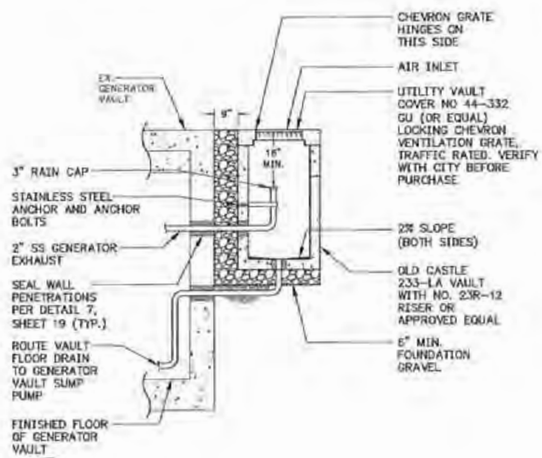

13/VAR DETAIL - PIPE/HARDWARE REMOVAL

NOT TO SCALE



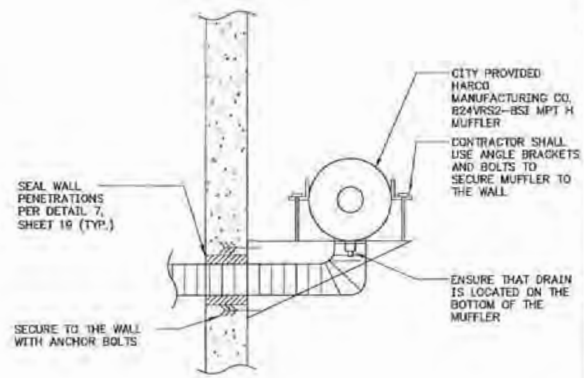

11/10 DETAIL - GENERATOR EXHAUST VAULT

NOT TO SCALE




12/10 DETAIL - GENERATOR VENT VAULT

NOT TO SCALE




14/VAR DETAIL - MUFFLER INSTALLATION AND REVISION

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PS #13, 17, 18 & 24 EQUIPMENT

DETAILS

Sheet 20 of 24

Job No. 801703

SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

SEWER SYSTEM LAKELINE ACCESS EVALUATION

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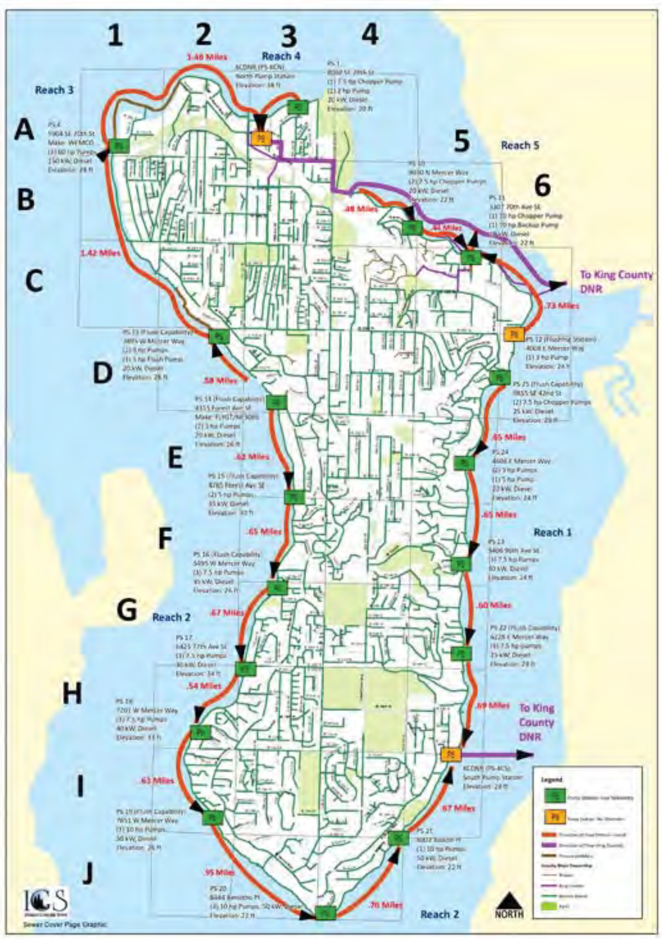
City of Mercer Island

# Sewer System Lake Line Access Evaluation and Lake Line Program Development

## Draft Final

May 2019




TETRA TECH

carollo

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# Sewer System Lake Line Access Evaluation and Lake Line Program Development

May 2019

## PREPARED FOR

City of Mercer Island
9611 SE 36th Street
Mercer Island, Washington 98040

## PREPARED BY

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Tetra Tech Project #200-12528-18002

https://sites.tetratech.com/projects/200-12528-18002/Shared Documents/Draft Deliverables/Draft Final Report/MercerIsLakelineAccess_SummaryReport_2019-05-24.docx

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# CONTENTS

## Appendix



## Tables

## Figures

# EXECUTIVE SUMMARY

## PURPOSE

The backbone of the City of Mercer Island's sanitary sewer system is a sewer in Lake Washington that surrounds the island and receives flow from adjacent upland areas, discharging it to King County's regional sewer system. The lake line system includes 16 miles of pipeline, 17 pump stations, one flush station, and 48 "special catch basins" that trap debris before it enters the lake line.

Existing access to the lake line, pump stations, flush station and special catch basins is limited. City operations staff can walk to each facility, but moving tools and parts to them is often challenging, and getting mobile construction equipment to them is, in many cases, impossible. Access to the pipeline in the lake is even more restricted. Some portions are accessible at street ends by way of manholes, but cleaning and inspection options are limited by the small size of the pipe, the undulating profile of the pipe, and potential sedimentation.

The Sewer System Lake Line Access Evaluation and Lake Line Program Development project was implemented to address these challenges. The project included review of existing documentation about the lake line and associated easements, field investigation of access conditions, and development of a preliminary lake line program with projects, estimated costs and priorities. Elements considered for inclusion in the lake line program include future planning studies, capital projects, surveys of existing lake line facilities, confirmation of property and easement boundaries, lake line cleaning, improved access facilities, and upgrades to pump stations.

## FINDINGS

Investigations conducted for this study were extensive, and the identified issues related to accessing the lake line system are many. The evaluation report itemizes challenges and recommended actions for the entire lake line pipeline, all 17 pump stations, the flush station, and nine of the special catch basins. Each of these facilities has its particular issues and needs, but certain types of problems were identified as common issues throughout much or all of the system:

- The lake line sewer is generally within 5 to 100 feet of the shoreline, and no access to it is currently available from land.
- Portions of the lake line are within easements on private property, but coverage is incomplete.
- Many of the lake line system pump stations and special catch basins are on private property rather than in public right of way. Easements for the facilities and for accessing them have been acquired in some cases, but not all.
- Generally, the easements are expected to be sufficient to cover the City's ownership of the pipeline and pump stations, but not necessarily sufficient for access across the properties to reach the facilities or to conduct major maintenance or repairs as needed.
- Available information about existing easements is not complete. Precise locations are not defined in some cases. The rights granted by some easements are not clear.
- In some places where access easements do exist, they are impeded by physical obstacles such as steep slopes, structures, landscaping and other vegetation.

- Facility access from the water is limited. At some locations, the City built docks for water access and paid property owners for access rights, but many of the docks have not been maintained and payments for access have been discontinued.

## THE LAKE LINE PROGRAM

This lake line program that was developed based on the access evaluation consists of the following major elements:

- Recommendations for new or modified capital projects in the City's wastewater system Capital Improvement Program (CIP) to address needs identified in the access evaluation.
- Estimates of costs and implementation periods for the new and modified recommended projects
- A plan for establishing priorities for implementation of the recommended projects.

Costs and phasing for the recommended projects are presented in Table ES-1.

**Table ES-1.** Lake Line Program Implementation Plan

| Project No. | Project Name | Total Estimated Project Cost | CIP Phasing | | | |
|---|---|---|---|---|---|---|
| | | | Short-Term (2018-2023) | Mid-Term (2024-2028) | Long-Term (2029-2037) | Extended |
| General | | $77,500 | $77,500 | | | |
| G-5 | Access Code and Standards Review (New) | $52,500 | $52,500 | | | |
| G-6 | Easement Review and Confirmation (New) | $25,000 | $25,000 | | | |
| Pump Station | | $9,895,500 | $1,533,000 | $8,362,500 | | |
| PS-1 | Pump Station Accessibility Improvements (Modified) | $592,000 | $259,000 | $333,000 | | |
| PS-7a | Capacity Analysis (New) | $546,000 | $546,000 | | | |
| PS-7b | Pump Station Alternative Analysis (New) | $1,820,000 | $728,000 | $1,092,000 | | |
| PS-7c | Future Capacity Improvements (New) | $6,937,500 | | $6,937,500 | | |
| | | $537,147,501 | $6,583,800 | $6,898,800 | $47,273,300 | $476,391,601 |
| L-1 | Lakeline Access (Modified) | $22,424,300 | $3,763,000 | | $7,513,000 | $11,148,300 |
| L-2 | Lakeline Condition Assessment (Modified) | $7,555,400 | | $2,097,900 | $5,457,500 | |
| L-4a | Lakeline Locate/Marking (Modified) | $3,220,600 | $2,080,600 | $1,140,000 | | |
| L-4b | Lakeline Monitoring Evaluation (New) | $840,000 | $140,000 | $140,000 | | $560,000 |
| L-4c | Lakeline Cleaning and Evaluation (New) | $19,182,800 | | $2,108,000 | $5,902,400 | $11,172,400 |
| L-4d | Lakeline Alternatives Analysis (New) | $350,000 | | $350,000 | | |
| L-4e | Lakeline Repair & Replacement Program (New) | $55,500,000 | | | $27,750,000 | $27,750,000 |
| L-5b | Special Catch Basin Access Improvements (New) | $740,000 | | $740,000 | | |
| L-5c | Special Catch Basin Effectiveness Evaluation (New) | $315,000 | $315,000 | | | |
| L-5d | Special Catch Basin Preventive Maintenance (New) | $277,800 | $185,200 | $46,300 | $46,300 | |
| L-5e | Special Catch Basin Repair & Replacement (New) | $910,200 | | $151,600 | $379,300 | $379,300 |
| L-5f | Special Catch Basin Relocation & Improvement (New) | $699,600 | $100,000 | $125,000 | $224,800 | $249,800 |
| L-6 | Lakeline Replacement (New) | $425,131,801 | | | | $425,131,801 |
| CIP Total | | $547,120,501 | $8,194,300 | $15,261,300 | $47,273,300 | $476,391,601 |
| Annual Cost | | $27,356,000 | $1,366,000 | $3,815,000 | $4,727,000 | $47,639,000 |

a. Project name includes an indication of whether the project was newly identified based on the access evaluation or was modified from a previously developed City CIP project.

## Project Prioritization

The lake line program represents the largest capital investment in the sewer system since its creation. The program will likely be implemented over decades, with projects implemented for portions of the lake line system based on need, rather than system-wide. It is anticipated that projects will generally be implemented for relatively short lake line segments or for a small number of pump stations to address a specific issue as funding allows. However, the City may gain efficiencies by implementing projects on a greater scale, which should be considered if sufficient resources are available. For longer term projects, decision trees have been developed to help determine priorities for project implementation.

Based on a preliminary review of the relationship between CIP projects, four of the projects have been identified as early priorities:

- **G-5 Access Code and Standards Review**—Supports all Utility in clarifying authority for access and maintenance requirements.
- **G-6 Easement Review and Confirmation**—Support use of existing easements for Operations and Maintenance, as well as Capital projects.
- **PS-1 Pump Station Accessibility Improvements**—Address access challenges to allow increased access for operations, maintenance, and capital projects.
- **L-1 Lake Access**—Address access challenges to allow increased access for operations, maintenance, and capital projects.

The early priority projects may not need to be implemented completely at one time. For each project, work can be initially focused only the areas required in order to carry out other related City projects. For example, initial work for easement review and confirmation (Project G-6) could focus on easements needed in order to install pump station telemetry/SCADA upgrades, which are recommended in a previous CIP project. This approach would delay early expenditures and it would allow the City to work on a limited scale, gaining valuable institutional knowledge without the risk of a large-scale project.

## Facilities Affected by Recommendations

Tables ES-2 and ES-3 summarize the projects that address site-specific access recommendations for the pump stations and special catch basins that were developed based on project site visits.

**Table ES-2.** Applicability of Recommendations to Specific Pump Stations

| Project No.—Project Name | Access Recommendation | Pump Station No. | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 4 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| G-6—Easement Review and Confirmation | Easement Review & Confirmation | X | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Review dock access and ownership | X | | X | | | X | | | X | | | X | | X | X | X | X | |
| PS-1—Pump Station Accessibility Improvements | Construct roadway to PS | | | | | X | | | | | | X | | | | | | | |
| | Stairway access (repairs/installation) | | | | | | X | | X | | | | | | | X | | X | |
| | Maintain easement/City property (remove vegetation) | X | | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | X |
| | Proposed easement acquisition | | | X | | | | | X | | | X | X | | | | | | X |
| | Bulkhead/shoreline condition assessment (related to City boat access) | X | | X | X | | X | | X | X | | | X | X | | X | | X | |
| | Wetland delineation (related to proposed easement acquisition) | | | | | | | | | | | X | | | | | | | |
| | Dock condition assessment (related to City boat access) | X | | X | | | X | | | X | | | X | | | | | | |
| | Coordinate with utilities (related access for upgrading electrical supply) | | | | | | | | | | | | | | | | X | | |
| | Coordinate regarding exposed utilities (related to City boat access) | | | | | X | | | | | | | | | | | | | |
| PS-2—Generator Replacement | Generator upgrades/replacement (confirm location in existing easement) | | | | | | | | | | X | X | | | X | | | | |

**Table 1-1.** Applicability of Recommendations to Specific Special Catch Basins

| Project No.—Project Name | Access Recommendation | Special Catch Basin No. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2-1 | 13-3 | 42-1 | 40-2 | 44-1 | 14-1 | 16A-1 | 17-1 | 23-1 |
| G-6—Easement Review and Confirmation | Easement Review & Confirmation | X | X | X | X | X | X | X | X | X |
| L-5b—Special Catch Basin Access | New easement recommended | X | X | | | | | | | |
| | Expand easement recommended | X | | | | | | | | |
| | Shared access with pump station | | | | X | | | | | |
| | Potential water access | | | X | | | X | | | X |
| L-5c—Special Catch Basin Preventative Maintenance | Raise Manhole lid | | | | | | | | X | |
| L-5d—Special Catch Basin Repair and Replacement | Substantial restoration maybe required | | X | | | | | X | | |
| | Roadway/Driveway improvements required for heavy equipment | | | X | | | | | X | |
| L-5f—Special Catch Basin Relocation & Improvements | Moving SCB suggested by City Staff | X | | | X | X | X | X | | |

# 1. INTRODUCTION

The City of Mercer Island owns and maintains a sanitary sewer system, the backbone of which is a sewer in Lake Washington that surrounds the island and receives flow from adjacent upland areas. This lake line system consists of over 16 miles of pipeline with 17 sewer pump stations and 1 flush station. The system discharges wastewater at three points to King County's regional sewer system. Throughout the system, 48 structures identified as "special catch basins" trap debris before it enters the lake line, and 11 hydraulic grade structures limit how high liquid levels can rise in the pipeline.

Existing access to the lake line, pump stations and catch basins is challenging. While each station can be walked to by City operations staff, moving tools and parts to them is often challenging, and getting mobile construction equipment to them is, in many cases, impossible. Access to the pipeline is even more restricted. Some portions are accessible at street ends by way of manholes, but cleaning and inspection options are limited by the small size of the pipe, the undulating profile of the pipe, and potential sedimentation.

To address these challenges, the City has implemented an evaluation of access to the lake line system. This report presents the findings of that evaluation and outlines a program of actions to improve system access based on those findings.

## 1.1 EXISTING SYSTEM OVERVIEW

The majority of Mercer Island's lake line system was built between 1956 and 1966. With the exception of Reach 3 on the northwest corner of the island, which was rebuilt in 2010, the system has seen no substantive upgrades since then. Maintenance has primarily included repairs to broken pipes and limited cleaning, along with repairs to existing equipment at the pump stations. The City is currently implementing SCADA Master Plan that will lead to recommendations for remote monitoring and control of some functions of the pump stations, but that does not address continuing needs for maintenance or future improvements.

The lake line sewer is generally within 5 to 100 feet of the shoreline. Portions of the lake line are within easements on private property, but coverage is incomplete. Several of the pump stations are in public rights-of-way at street ends, but most are on private property within easements. Generally, the easements are expected to be sufficient to cover the City's ownership of the pipeline and pump stations, but not sufficient for access across the properties to reach the facilities or to conduct major maintenance or repairs as needed.

## 1.2 ACCESS EVALUATION PROJECT

The project was conducted in accordance with Contract WS712P and one amendment. This included review of existing lake line and easement documentation, development of access approaches to lake line related facilities, field investigation of access conditions, and development of a preliminary lake line program with projects, estimated costs and priorities.

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# 2. Lake Line System Facilities and Operation

The lake line system encircles Mercer Island to collect and convey wastewater for eventual treatment by King County. Wastewater enters the lake line through City-owned collectors and numerous private laterals that discharge directly into the lake line system. The system consists of the lake line main, pump stations, special catch basins, hydraulic grade structures, and emergency bypasses. It conveys the wastewater to King County's wastewater system, which pumps it to the east via pump stations on the east side of the island. The lake line system infrastructure is summarized in the following sections.

## 2.1 LAKE LINE MAIN

The lake line main consists of 12.9 miles of pipe. It is divided into five reaches for planning, as shown in Figure 2-1. Reaches 1 and 2 were constructed in 1966; Reach 3 was built in 1956 and re-constructed in 2011; Reach 4 was constructed in 1956; and Reach 5 was constructed in 1960. Pipe diameters vary from 8 to 18 inches, as summarized in Table 2-1. Reaches 1 and 2 consist solely of cast-iron material; Reaches 3 and 5 consist of both ductile-iron and cast-iron material; Reach 4 consists mostly of asbestos cement and may include some cast iron.

Information on the lake line was obtained from multiple sources. The City provided construction drawings for the pump stations. Construction drawings of the lake line were available for Utility Local Improvement Districts No. 2 (Reach 5) and No. 3 (Reach 1 and 2). Construction drawings for Reach 3 were provided but not evaluated in detail, as the design has provided sufficient access to the new lake line. Reach 4 replacement planning, anticipated to begin in 2021, might relocate the lake line; therefore, it was not considered in this study. The City's GIS reflects the location of the lake line from the as-built drawings; however, it has not been field verified.

The original lake line main is generally within 20 feet of shore and follows the contours of the lake bottom. As-built drawings indicate that the pipe was buried with 2 feet minimum cover; however, the action of tides and waves has exposed some sections of lake line and presumably further buried other sections. The rebuilt section of Reach 3 is up to 100 feet offshore.

## 2.2 PUMP STATIONS

There are currently 17 pump stations and one flush station conveying wastewater flow through the lake line main to the King County facilities. Figure 2-2 shows the location and details of all the pump stations. Table 2-2 summarize the pump station locations, conditions, and characteristics. Pump stations are generally located within 50 feet of the shoreline, and some cases directly on the Lake front. While some pump stations are located in street right of way, the hydraulics of the lake line required most to be located on residential Lakefront properties. The pump stations are generally consistent in design with a wet pit and dry pit configuration. Pump Station #14 was updated in 2016 to use submersible pumps (wet pit only).

Pump Station #4 has been completely replaced as part of the Reach 3 replacement. Due to the Reach 3 alignment and profile, Pump Station #4 is much deeper and requires much larger pumps than the original pump stations. Backup generators for the pump stations are generally located uphill of the pump stations. The city is addressing generator replacement in its ongoing effort; therefore, they were not evaluated as part of this study.

**Table 2-1.** Mercer Island Lake Line Pipes

| Pipe Segment Location | Diameter (inches) | Length (feet) | Material |
|---|---|---|---|
| Reach 1 (Built in 1966) | | | |
| King County System—Pump Station 22 | 14 | 3,400 | Cast Iron |
| Pump Station 22—Pump Station 23 | 12 | 2,950 | Cast Iron |
| Pump Station 23—Pump Station 24 | 12 | 3,250 | Cast Iron |
| Pump Station 24—Pump Station 25 | 12 | 3,200 | Cast Iron |
| Reach 2 (Built in 1966) | | | |
| Pump Station 14—Pump Station 15 | 8 | 3,090 | Cast Iron |
| Pump Station 15—Pump Station 16 | 10 | 1,139 | Cast Iron |
| | 12 | 1,861 | Cast Iron |
| Pump Station 16—Pump Station 17 | 14 | 2,825 | Cast Iron |
| Pump Station 17—Pump Station 18 | 14 | 758 | Cast Iron |
| | 16 | 1,942 | Cast Iron |
| Pump Station 18—Pump Station 19 | 16 | 3,336 | Cast Iron |
| Pump Station 19—Pump Station 20 | 16 | 2,252 | Cast Iron |
| | 18 | 2,568 | Cast Iron |
| Pump Station 20—Pump Station 21 | 18 | 3,400 | Cast Iron |
| Pump Station 21—King County System | 18 | 3,200 | Cast Iron |
| Reach 3 (Built in 2011) | | | |
| MH—Pump Station 4 | 16 | 2,858 | Cast Iron |
| | 8 | 432 | Cast Iron |
| Pump Station 4—Pump Station 13 | 16 | 3,349 | Ductile Iron |
| | 10 | 13 | Cast Iron |
| | 8 | 530 | Cast Iron |
| Reach 4 (Built in 1956) | | | |
| MH—Pump Station 1 | 12 | 433 | Asbestos Cement |
| | 12 | 46 | Cast Iron |
| | 10 | 1,109 | Asbestos Cement |
| | 10 | 199 | Cast Iron |
| Reach 5 (Built in 1960) | | | |
| Special Catch Basin 47-B—Pump Station 10 | 10 | 2,497 | Cast Iron |
| | 10 | 113 | Ductile Iron |
| Pump Station 10—Pump Station 11 | 10 | 2,283 | Cast Iron |
| LS 11—FS 12 | 10 | 3,810 | Cast Iron |

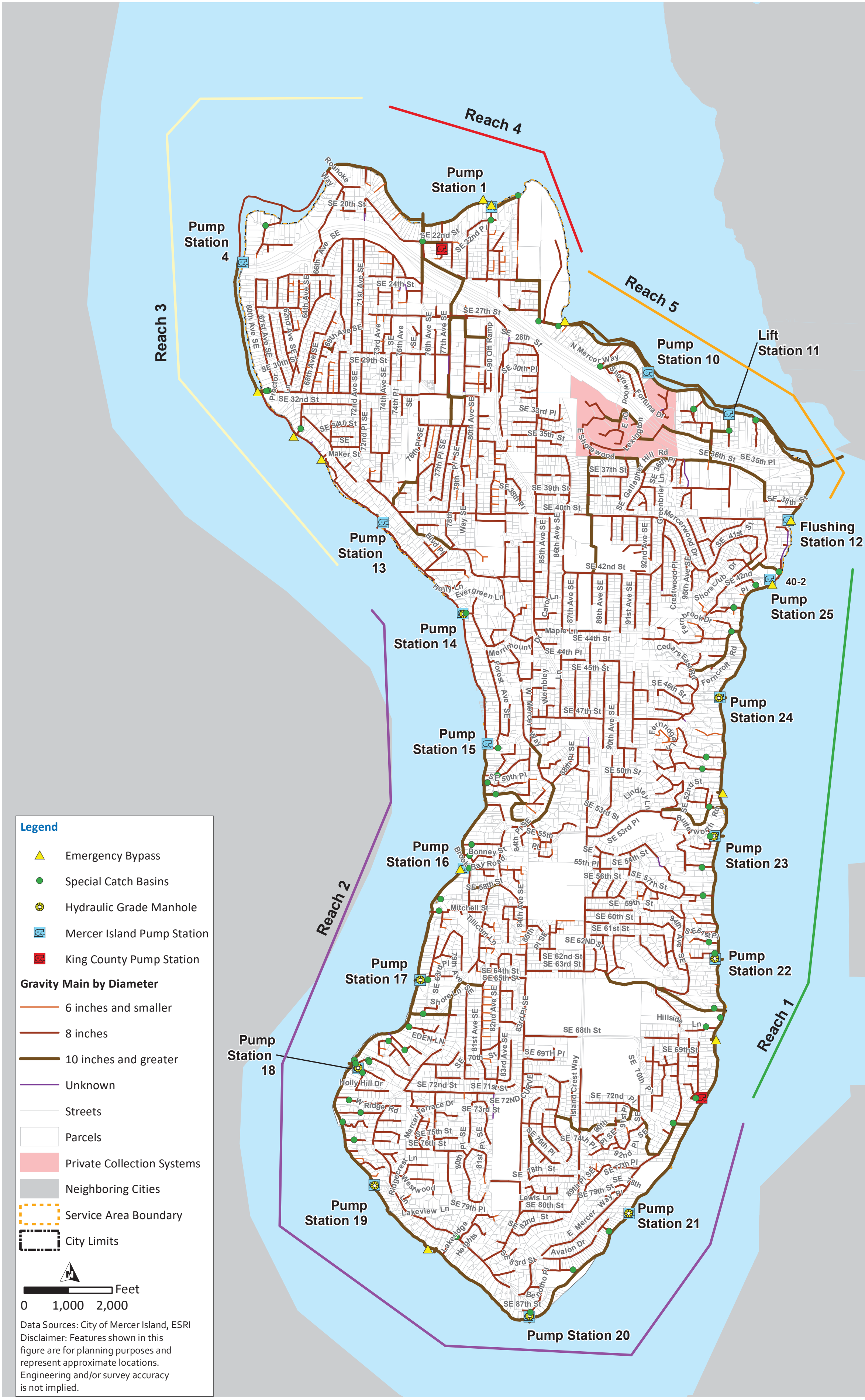




Figure 1 Lakeline Facilities

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**Figure 2-2.** Existing Lake Line System Pump Station Information

**Table 2-2.** Pump Stations

| Name | Reach | Property Parcel # | Address | No. of Pumps | Rating of Pumps |
|---|---|---|---|---|---|
| Pump Station #1 | 4 | 5452302218, 5452302217 | 8002 SE 20th Street | 1<br>1 | 5 hp<br>7.5 hp chopper |
| Pump Station #4 | 3 | 5442300595 | 2239 60th Avenue SE- Aubrey Davis Park | 3 | 60 hp submersible |
| Pump Station #10 | 5 | 8106100220, 8106100230 | 9036 North Mercer Way | 2 | 7.5 hp chopper |
| Pump Station #11 | 5 | ROW | 3309 97th Avenue SE-Fruitland Landing | 2 | 7.5 hp chopper |
| Pump Station #12 | 5 | ROW | 4000 E. Mercer Way | 1 | 3 hp Cornell |
| Pump Station #13 | 3 | 3623500361 | 3897 West Mercer Way-Freeman Landing | 3 | 5 hp |
| Pump Station #14 | 2 | ROW | 4315 Forest Avenue SE | 2 | 5 hp submersible |
| Pump Station #15 | 2 | ROW | 4765 Forest Avenue SE | 2 | 5 hp |
| Pump Station #16 | 2 | ROW | 5495 W. Mercer Way | 3 | 7.5 hp |
| Pump Station #17 | 2 | 2524049191, 2524049220 | 6415 77th Avenue SE | 3 | 7.5 hp |
| Pump Station #18 | 2 | 252404TRCT | 7220 Holly Hill Drive | 3 | 7.5 hp |
| Pump Station #19 | 2 | ROW | 7697 W. Mercer Way | 3 | 10 hp |
| Pump Station #20 | 2 | ROW | 8710 85th Avenue SE | 3 | 10 hp |
| Pump Station #21 | 2 | 3124059059 | 8000 Avalon Drive | 3 | 10 hp |
| Pump Station #22 | 1 | 1924059196, 1924059255 | 6223 E. Mercer Way | 3 | 7.5 hp |
| Pump Station #23 | 1 | 143870TRCT | 5406 96th Avenue SE | 3 | 7.5 hp |
| Pump Station #24 | 1 | 7558700040, 7558700036 | 4606 E. Mercer Way | 2<br>1 | 5 hp<br>7.5 hp chopper |
| Pump Station #25 | 1 | 4131900075, 777670TRCT | 4226 E. Mercer Way | 2 | 7.5 hp |

Note: ROW = right of way

## 2.3 SPECIAL CATCH BASINS

There are 48 special catch basins (SCBs) in the lake line system. These catch basins collect debris, garbage, and other solids that can impede flow, preventing these materials from entering the lake line. Generally, the special catch basins are specialized manholes with a settling plate on the outlet pipe and a sump to collect materials. The City's goal is to vacuum out collected materials from the SCBs twice per year. Accessing and maintaining these catch basins is difficult. There are 21 SCBs with limited access, generally located in residential backyards or off private roads or driveways that are inaccessible to a vacuum truck. These SCBs are maintained using long lengths of flex hose that are routed overland to the location. Some SCBs are near enough to road right of ways that a flagger is required during maintenance for traffic control. Table 2-3 details SCB locations, the need for flex hose or flaggers, the City's defined priority of maintenance, and a general assessment of accessibility.

**Table 2-3.** Special Catch Basin Accessibility and Location

| Location | Special Catch Basin ID # | Flex Hose | Flagger | Priority | Accessible? |
|---|---|---|---|---|---|
| 1910 Faben Drive | 53-1 | N | N | | Accessible |
| 8019 SE 20th Street | 48-7 | N | N | | Accessible |
| 5957 SE 32nd Street-Proctor Landing | 54-1 | N | N | | Accessible |
| N Mercer Way & 84th | 47-A | N | 2 | | Limited Accessibility |
| 8750 North Mercer Way | 46-2 | N | N | | Accessible |
| 8420 N Mercer Way | 47-B | 100-foot | N | High Priority | Limited Accessibility |
| 3625 67th Avenue SE | 55-1 | Y | N | | Limited Accessibility |

| Location | Special Catch Basin ID # | Flex Hose | Flagger | Priority | Accessible? |
|---|---|---|---|---|---|
| 14 Eldorado Beach Club Drive | 42-1 | 300-foot ADS | N | | Limited Accessibility |
| 3350 97th Avenue SE Pump Station #11 | 43-1 | N | N | | Accessible |
| 3312 94th Avenue SE | 44-1 | N | N | | Accessible |
| 4305 Forest Avenue Se | 1-2 | N | N | | Accessible |
| 4400 Cedar Cove Road | 37-1 | Y | N | | Limited Accessibility |
| 4324 East Mercer Way | 38-1 | Y | N | | Accessible |
| Pump Station #25 | 40-2 | Y | N | | Limited Accessibility |
| 4808 Forest Avenue SE | 2-1 | 250-foot | N | | Limited Accessibility |
| 4887 Forest Avenue SE | 3-1 | N | N | | Limited Accessibility |
| 5021 SE 50th Street | 64-1 | Y | N | | Accessible |
| 5061 84th Avenue SE | 4-1 | N | N | High Priority | Accessible |
| 5405 West Mercer Way | 6-1 | N | N | | Cannot Locate |
| #16 Meadow Lane | 14-1 | 450-foot | N | | Limited Accessibility |
| 7 Brook Bay Road | 7-1 | 250-foot | N | | N/A |
| 5404 96th Avenue SE | 33-1 | N | N | | N/A |
| 5060 96th Avenue SE-Butterworth Road | 34-2 | N | N | High Priority | Accessible |
| 4834 East Mercer Way | 35-2 | N | N | | Accessible |
| 4822 East Mercer Way | 36-1 | N | N | | Accessible |
| #9 & 10 Brook Bay Road | 8-1 | N | N | | N/A |
| 5911 77th Avenue SE | 9-1 | N | N | | Accessible |
| 6411 77th Avenue SE | 10-2 | N | N | | Accessible |
| 9651 East Mercer Way | 27 B-2 | 150-foot | N | | Limited Accessibility |
| 5804 East Mercer Way | 31-1 | N | N | | N/A |
| 5602 East Mercer Way | 32-1 | 200-foot | N | | Limited Accessibility |
| 7428 SE 71st Street | 13-6 | Y | N | | Accessible |
| 7520 SE 71st Street | 13-3 | N | N | | Limited Accessibility |
| 7017 Meadow Lane | 14-5 | N | N | | Accessible |
| 7236 Holly Hill Drive | 14A-3 | 250-foot | N | | Accessible |
| 12 Shore Lane | 11-2 | 300-foot | N | | Limited Accessibility |
| 7 Eden Lane | 12-1 | N | N | | Limited Accessibility |
| 6610 East Mercer Way | 27-1 | N | N | | Limited Accessibility |
| 6626 East Mercer Way-North Star | 26A-1 | 300-foot | N | | Limited Accessibility |
| 7251 West Ridge Road | 16-36 | N | N | | Accessible |
| 7301 West Mercer Way | 16A-1 | 600-foot | N | | Limited Accessibility |
| 7447 West Mercer Way | 17-1 | 300-foot | N | | Limited Accessibility |
| 7245 East Mercer Way | 24-1 | N | 2 | | Accessible |
| 9605 SE 72nd Street | 25-1 | Y | N | | Limited Accessibility |
| 8100 Blk West Mercer Way | 20-4 | N | 2 | High Priority | Accessible |
| 8710 85th Avenue SE | 21-2 | N | N | | Accessible |
| 8326 Avalon Drive | 22-1 | N | N | | Limited Accessibility |
| 8048 Avalon Place | 23-1 | 400-foot | N | | Limited Accessibility |

## 2.4 HYDRAULIC GRADE STRUCTURES

Hydraulic grade structures are incorporated into many of the existing pump stations to prevent potential sanitary sewer overflows. These structures generally have a pipe outlet for normal operating conditions and an overflow weir to prevent the hydraulic grade line in the lake line from rising above certain elevations. The overflow is directed back to the pump station wet well. Table 2-4 lists the existing hydraulic grade structures by location. Locations are shown on Figure 2-1.

**Table 2-4.** Hydraulic Grade Structure Locations

| Name | Associated Pump Station | Property # | Address |
|---|---|---|---|
| SS-MH-HGMH14 | Pump Station #14 | ROW | 4315 Forest Avenue SE |
| SS-MH-HGMH15 | Pump Station #15 | ROW | 4765 Forest Avenue SE |
| SS-MH-HGMH16 | Pump Station #16 | ROW | 5495 W. Mercer Way |
| SS-MH-HGMH17 | Pump Station #17 | 2524049191, 2524049220 | 6415 77th Avenue SE |
| SS-MH-HGMH18 | Pump Station #18 | 252404TRCT | 7220 Holly Hill Drive |
| SS-MH-HGMH19 | Pump Station #19 | ROW | 7697 W. Mercer Way |
| SS-MH-HGMH20 | Pump Station #20 | ROW | 8790 85th Avenue SE |
| SS-MH-HGMH21 | Pump Station #21 | 3124059059 | 8000 Avalon Drive |
| SS-MH-HGMH22 | Pump Station #22 | 1924059196, 1924059255 | 6223 E. Mercer Way |
| SS-MH-HGMH23 | Pump Station #23 | 143870TRCT | 5406 96th Avenue SE |
| SS-MH-HGMH24 | Pump Station #24 | 7558700040, 7558700036 | 4606 E. Mercer Way |

Note: ROW = right of way

## 2.5 EMERGENCY BYPASSES

Similar to hydraulic grade structures, emergency bypasses, also known as mid-line relief structures, are located away from pump stations to prevent sanitary sewer overflows from the lake line. The bypasses discharge excessive flows that might otherwise overflow into homes. No known overflows have occurred from the emergency bypasses. Table 2-5 lists the locations of these structures. Locations are shown on Figure 2-1.

**Table 2-5.** Mercer Island Emergency Bypass (Overflow)

| GIS Name | Properties | Address |
|---|---|---|
| DP-PS5 | 2174500005 | 3061 60th Avenue SE |
| DP-55 | Right of Way adjacent to 3708900070 | Right of Way adjacent to 3265 67th Avenue SE |
| DP-56-1 | 3623500260 | 3603 W. Mercer Way |
| DP-PS1 | 5452302218, 5452302217 | 8004 SE 20th Street |
| DP-48-1 | 5452302216, 5315102116 | 7838 22nd Place SE |
| DP-PS9 | 8106100010, 0724059054 | 8428 N. Mercer Way 98040 |
| DP-PS16 | 1137000090 | 9 Brook Bay Road |
| DP-20-1 | 3358500265, 3358500287 | 8095 W. Mercer Way |
| DP-26-1 | 3024059098, 3024059098 | 6802 96th Avenue SE |
| DP-34-1 | 1924059026 | 5026 Butterworth Road |
| DP-PS25 | 4131900075, 4131900066 | 4134 100th Avenue SE |
| DP-PS12 | 4131900005 | 4006 E. Mercer Way |

## 2.6 OPERATION AND HYDRAULICS

The lake line uses a series of pump stations to convey flows to King County facilities. Pump stations are operated in a cascade, as upstream flows trigger downstream pumping. When pump stations are in operation, the lake line operates as a low-pressure force main. When the pump stations are not operating, lake line flows are conveyed by gravity; however, the lake line's undulating profile creates complex hydraulics. Figure 2-3 shows pipeline elevations on the lake line between the upstream Pump Station 25 and downstream Pump Station 24, as an example of the irregular profile that is consistent with the entire system.

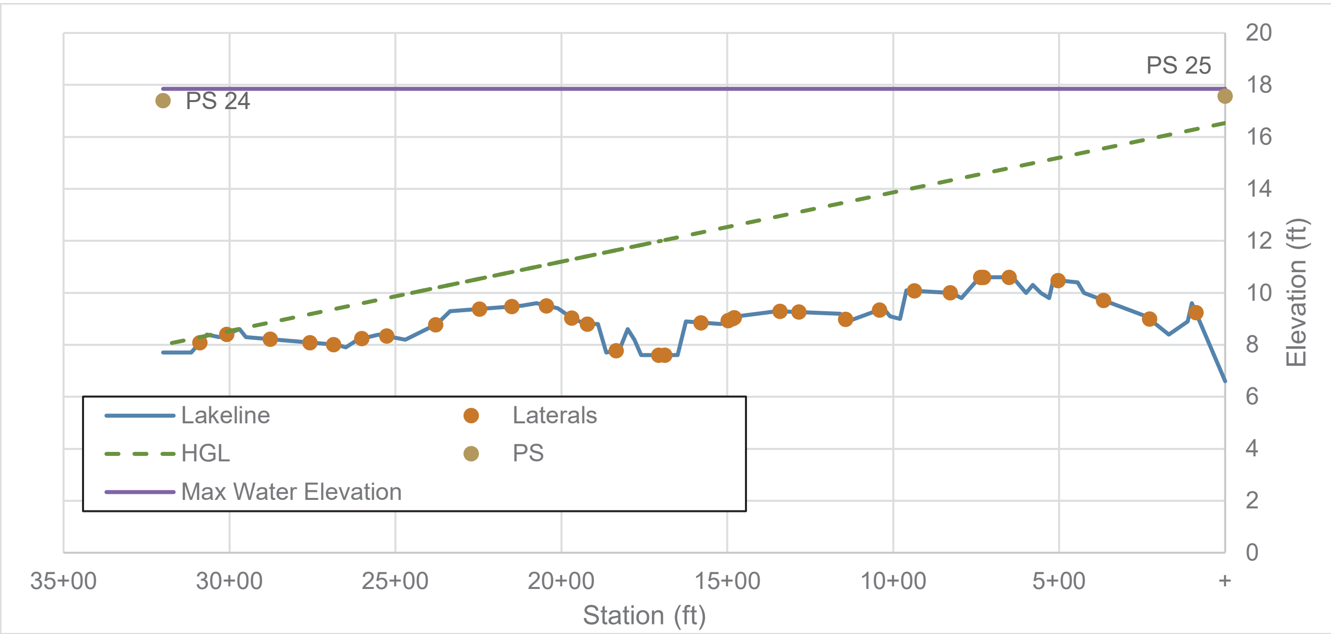


**Figure 2-3.** Lake Line Pipeline Elevations Between Pump Stations 24 and 25

Flows in the lake line are limited by the controls established by the hydraulic grade structures and emergency bypass structures. While flows are sufficient to move sewage to King County facilities, settling of wastewater solids likely occurs in the lake line when pumps are not running. The design flow velocity of 2.5 feet per second is not high enough to re-suspend heavy solids when pumping resumes. The extent of deposition that results is largely unknown due to the lack of access for maintenance of the lake line. Table 2-6 outlines the flows and pump station intake volumes associated with a 2.5-foot-per-second flow velocity between pump stations.

The hydraulic grade structures and emergency bypass structures also establish limits to how high the lake line system water surface elevation can rise. The resulting maximum water elevation between the pump stations is indicated for reference on Figure 2-3, and is shown for Reaches 1 and 2 on Figure 2-4 and Figure 2-5. These figures also show the hydraulic gradeline for the maximum (design) operating condition, indicating how close it rises to the maximum allowed water elevation. The greatest risk of the hydraulic gradeline reaching the maximum allowed water elevation occurs at pump stations; hydraulic grade structures protect low elevations.

**Table 2-6.** Flow Conditions Between Pump Stations

| Segment | Diameter (inches) | Number of Laterals | Length (feet) | Flow (gallons/minute) | Flow Volume (gallons) |
|---|---|---|---|---|---|
| Pump Station 14 – 15 | 8 | 31 | 3,090 | 392 | 24,206 |
| Pump Station 15 – 16 | 10 | 13 | 1,139 | 612 | 13,941 |
| | 12 | 19 | 1,861 | 881 | 32,801 |
| Pump Station 16 – 17 | 14 | 20 | 2,825 | 1,200 | 67,773 |
| Pump Station 17 – 18 | 14 | 4 | 758 | 1,200 | 18,185 |
| | 16 | 11 | 1,942 | 1,567 | 60,851 |
| Pump Station 18 – 19 | 16 | 25 | 3,336 | 1,567 | 104,531 |
| Pump Station 19 – 20 | 16 | 19 | 2,252 | 1,567 | 70,565 |
| | 18 | 24 | 2,568 | 1,983 | 101,840 |
| Pump Station 20 – 21 | 18 | 35 | 3,400 | 1,983 | 134,836 |
| Pump Station 21 – KC Pump Station | 18 | 33 | 3,200 | 1,983 | 126,904 |
| KC Pump Station – Pump Station 22 | 14 | 34 | 3,400 | 1,200 | 81,567 |
| Pump Station 22 – 23 | 12 | 27 | 2,950 | 881 | 51,995 |
| Pump Station 23 – 24 | 12 | 30 | 3,250 | 881 | 57,283 |
| Pump Station 24 – 25 | 10 | 33 | 3,200 | 612 | 39,168 |
| Pump Station 10 – 11 | 10 | | 2,225 | 612 | 27,234 |
| Pump Station 11 – 12 | 10 | | 3,650 | 612 | 44,676 |

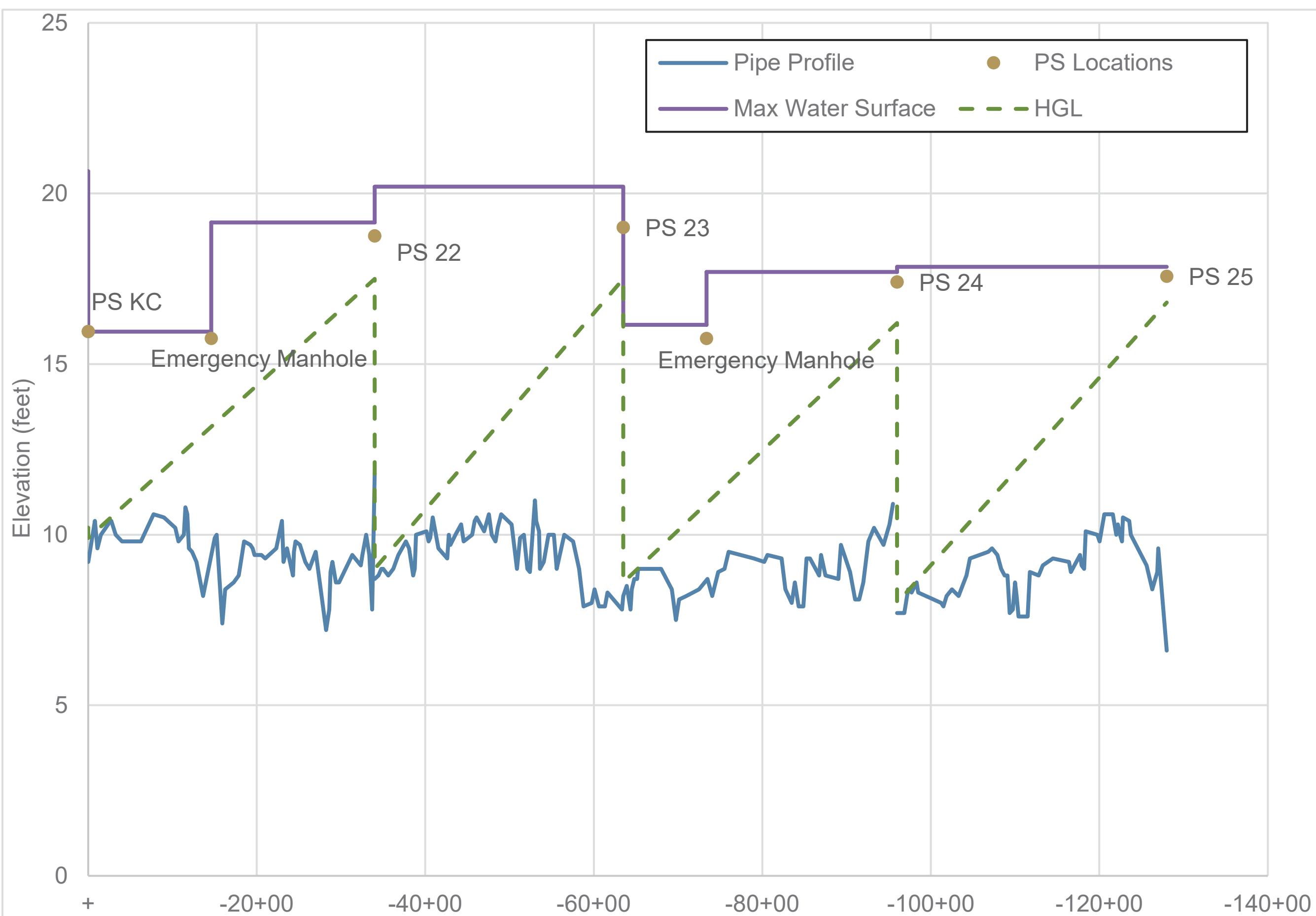

**Figure 2-4.** Reach 1 Hydraulic Analysis

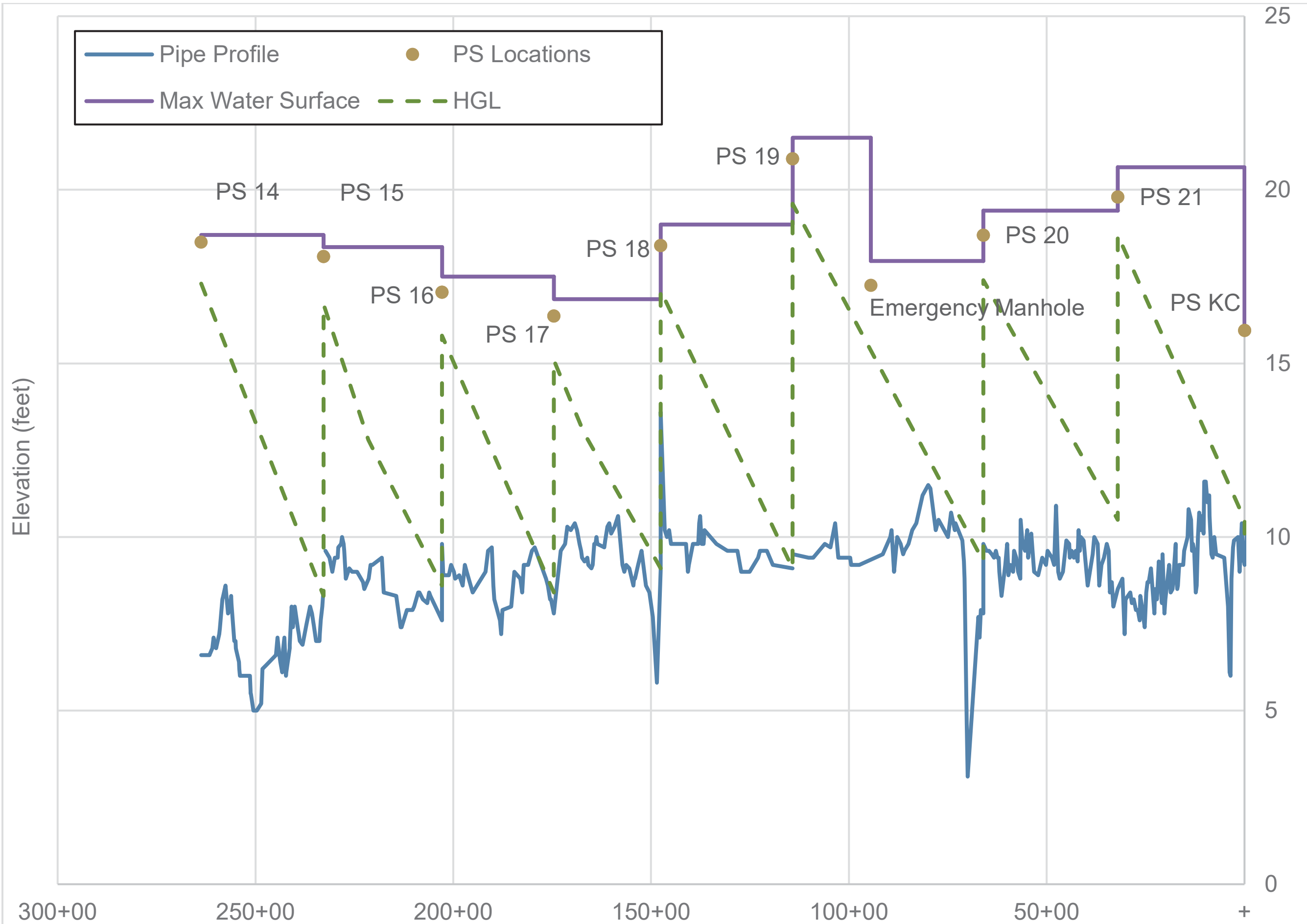


**Figure 2-5.** Reach 2 Hydraulic Analysis

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# 3. Lake Line Access Evaluation

Overall, the City has access to only a minor portion of the overall lake line. Therefore, the City is seeking additional access to assist in the maintenance, condition assessment, and eventual repair and replacement of the lake line.

The General Sewer Plan recommended the City continue operation and maintenance (O&M) activities to the extent possible on the lake line, including periodic cleaning. However, additional access is needed to expand lake line O&M activities. Additionally, the Plan recommended a comprehensive lake line condition assessment followed by a repair and replacement program. It is anticipated the condition assessment will require greater access than currently available. As part of this study, the access required for these activities were evaluated and a conceptual plan was recommended.

## 3.1 CURRENT ACCESS PRACTICES

The lake line can be accessed from the intake side of most of the system's pump stations. The presence of hydraulic grade control structures and other obstacles typically limit the City from accessing the lake line from the pump station discharge side. Between pump stations, the lake line has hundreds of connections from gravity sewers and private service laterals. However, the City has limited ability to access the lake line through these connections, since these they were not designed for access and the City does not have access easements for the private laterals. Technical challenges associated with accessing the lake line through laterals include the following:

- Large upstream flows limit effectiveness of O&M activities.
- The drop into larger diameter lake line from smaller diameter sewer/lateral may preclude wheel or track mounted closed-circuit television (CCTV) inspection, as well as limit solids removal during cleaning.
- The connections typically do not allow the operator to choose a direction when using a push cam CCTV or cleaning using a hydro-jet.

The City may consider improving existing connections to the lake line to provide access on a case by case basis, especially at those locations with good land access for maintenance equipment. An additional access structure could be added to allow access from Pump Station discharges. These improvements will likely require additional easements directly adjacent to the PSs.

## 3.1 EXISTING EASEMENTS

The City's GIS shows a 10-foot easement associated with the lake line. Additional easements are mapped for pump stations. It is recommended the City review the conditions of the easements to understand if they will support future operations, maintenance and repair and replacement activities. Lake line locations do not always correspond to the easement location in the City's GIS. However, the location of the lake line has not been verified in the field. Therefore, it is recommended the City delay review of potential discrepancies until the lake line location is confirmed.

The GIS data does not show easements associated with emergency bypass structures. These structures were constructed at the same time as the lake line and pump stations that have consistent easements; therefore, it is recommended the City review its records to confirm the GIS data is accurate.

## 3.2 PERMITTING

To protect threatened and endangered species, work on the lake line system requires permits from multiple local, state, and federal agencies. Projects may require City shoreline permits, a State Environmental Policy Act (SEPA) process, Washington Department of Fish and Wildlife Hydraulic Project Approval, and U.S. Army Corps of Engineers permits, which include multiple supporting studies and agency reviews. Permits for work within Lake Washington typically limit work to 2 to 3 months in the summer or early fall to protect salmonid species. Projects on the shoreline or above the lake surface generally have fewer permit conditions and generally allow work year-round.

Permitting for most O&M activities should be expected to take 3 to 12 months, with potentially longer timeframes for work in Lake Washington. A Corps of Engineers permit can apply for up to 5 years, providing the City with an opportunity to coordinate multiple projects to reduce the time and effort associated with permitting. Permitting time varies with site conditions and the nature of the work.

## 3.3 LAKE LINE ACCESS OPTIONS

Access to the lake line is needed to facilitate inspection and maintenance of the existing pipe. To effectively maintain the lake line, access points must be able to allow inspection and cleaning equipment into the pipe and retrieve solids or other debris collected during cleaning activities. The City requested consideration of both submerged access and un-submerged access. There are three general types of lake line access that may be located in the water or on land:

- In-Lake Manhole / Clean out
- On-shore Access lateral
- Lakeshore Access

### 3.3.1 In-Lake Manholes and Cleanouts

In-Lake Manholes and Cleanouts allow direct access to the lake line from the water. In-Lake manholes and cleanouts are intended to function similarly to on-land gravity sewer manholes; however, some specialized features and access equipment is needed due to the aquatic environment.

For example, King County and other jurisdiction have implemented a “nautilus” style submerged manhole, shown in Figure 3-1, that uses an aluminum caisson to create a temporary riser from the manhole above the water surface. The manhole lid is sealed when not in use to restrict inflow into the underwater pipes. Similarly, a riser can be used to access cleanouts that are installed inline on underwater pipes.

There are several general configurations of In-Lake Manholes and Cleanouts, which are described below. Each configuration has benefits that may be suitable for certain conditions along the City’s lake line.

- **Temporary**—Added and removed for specific activities. Temporary manholes/cleanouts allow the City to mitigate navigation issues or property owner concerns that might arise from permanent structures. Temporary manholes require substantial permitting, as activities disturb lake sediments.

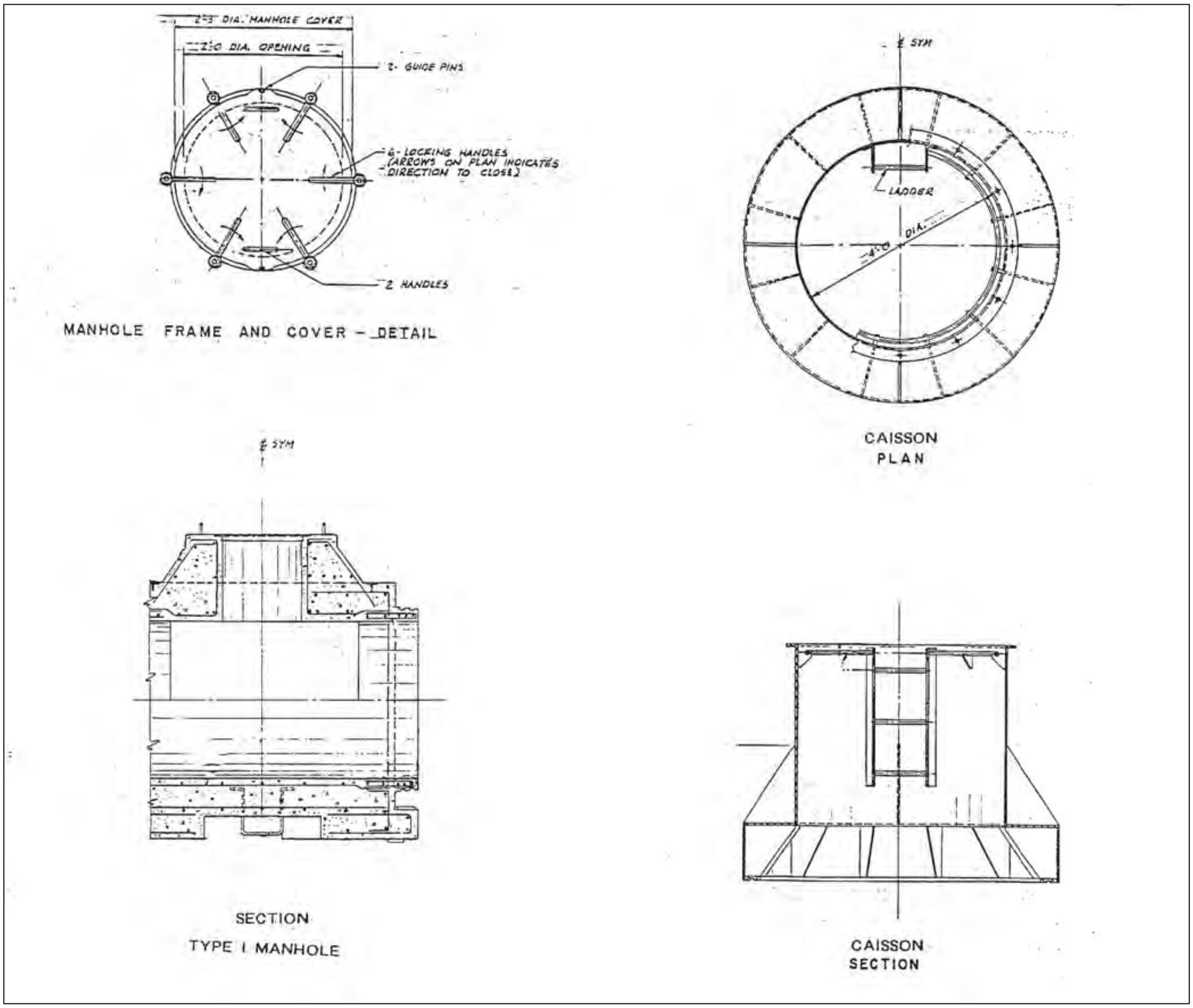



**Figure 3-1.** Typical Submerged Manhole

- **Submerged above the Lake bed**—Manholes/cleanouts that extend above the lake bed. Using specialized risers or manhole caissons to extend the access above the Lake surface. Submerged manholes/cleanouts should be placed to avoid navigation impacts. Submerged manholes may have less permitting than access activities disturbing lake sediment, though any new permanent structure associated with them will have its own associated permitting requirements.
- **Buried below the Lake bed**—To avoid navigation impacts or property owner concerns, a manhole/cleanout may be buried in approximately 6 inches or more of sediment. The City would be required to unbury these facilities before use, which requires substantial permitting as activities disturb Lake sediments.
- **Under Docks**—Placing a manhole/cleanout under a dock potentially provides a more stable work environment and potentially land access to facility. It is preferable the facility extends above the water surface, so once constructed, the City can conduct maintenance without State or Federal permitting (City Shoreline permit may still be required). It is anticipated that dock associated with the facility would need

to be replaced or upgraded to meet the City's weight and safety requirements associated with maintenance activities. Such a project would require property owner agreement and potentially an additional access easement.

To facilitate cleaning activities and maintenance, it is preferred for In-Lake manholes/cleanouts be located directly in-line with the lake line.

### 3.3.2 On Shore Access Laterals

The City may construct on-shore access lateral. The lateral would extend for an accessible area on land through the lake to the lake line. The lateral would be built specifically to allow access and cleaning. Due to the developed nature of the shoreline, there are likely limited locations where an onshore lateral could be constructed. Note that the permitting and associated environmental mitigation are likely greater for constructing an onshore lateral than for an in-lake manhole/cleanout, as it is disturbing a new area.

### 3.3.3 Lakeshore Access

In addition to direct access, the City should pursue lakeshore access locations for mobilization and staging. There are limited facilities on Lake Washington, so having close facilities with direct access is anticipated to reduce the cost of construction projects. This may include boat ramps or similar facilities in City-owned properties and rights of way. The City could also pursue access from private facilities, which will likely require additional easements and potentially the need to repair/reinforce roadways to support heavy machinery.

## 3.4 LAKE LINE O&M ACTIVITIES ACCESS

The lake line ideally would have regular O&M activities like that provided for the City's gravity sewers, including monitoring hydraulic conditions, regular cleaning and periodic CCTV inspection. The study included a conceptual evaluation of potential O&M activities and related access.

### 3.4.1 Lake Line Monitoring

The City currently monitors the hydraulic conditions of the lake line indirectly at the Pump Stations. Pump run times and wet well level sensors are used to determine when the lake line is reaching capacity. Sudden changes in hydraulics may also indicate a pipe break (from boating, construction of docks, deteriorating condition etc.). Historically, pipe breaks were also identified by residents based on floating debris.

The City will improve instrumentation and control at its pump stations in the coming years to better quantify conditions at the pump stations. These improvements, made as part of the SCADA program, are a major effort by the City and may require changes to the pump stations and immediately adjacent lake line. It is recommended that the City work with the contractor to understand access needs for this work. Section 4 of this report provides documentation of existing access and suggested improvements.

The City is not currently able to monitor hydraulic conditions directly away from the pump stations. Access to the lake line largely limits the ability to directly monitoring hydraulic conditions. If direct hydraulic monitoring is sought, it is recommended that the City pursue manholes or cleanouts under docks or on-land access laterals to provide access for required instrumentation maintenance (remove ragging, battery changes, instrumentation calibration, etc.). These facilities also provide a good location to install an antenna to transmit instrumentation readings, where the aquatic conditions and metallic pipe severely limit transmitting signals without an antenna.

### 3.4.2 Hydro-Jet Cleaning

**Feasibility Considerations**

The primary cleaning method for City sewers is hydro-jet cleaning. Hydro-jet cleaning removes accumulated solids, Fats Oils and Grease (FOG), and other debris from a pipe. High pressure jet heads use water to scour material from the pipe and carry the debris along until they can be removed (typically by a vacuum truck at a manhole). Cleaning settled debris from pipes will help reduce the risk of overflows. A downside of hydro-jet cleaning is that it can damage pipe lining; therefore, caution should be used where pipes are known to be compromised.

Hydro-jetting requires access points at regular intervals to both insert the hydro-jet and remove accumulated solids. Hydro-jetting activities on lake lines in nearby Utilities have generally achieved cleaning distances of 250 feet to 700 feet. Restrictions in the lake line, typically a bend or deflected joint, commonly limit the extent of hydro-jetting to less than the available hose length. In worst case scenarios, a jetter-head has become stuck, requiring emergency pipe access for extraction. To help identify problem areas, it is recommended that the City perform CCTV inspection prior to hydro-jetting to the extent possible.

Additionally, sags in the lake line filled with wastewater may reduce the effectiveness of the hydro-jet, which is normally used in partial pipe-full conditions. To mitigate this issue, access points can be placed in large sags to allow them to be pumped dry. It is recommended that post-cleaning CCTV inspections be conducted, if possible, to provide confirmation that debris has been removed from the lake line, as well as provide valuable information on the interior condition of the pipe.

**Estimated Hydro-Jet Cleaning Access Points**

New access points are required to clean the lake line more effectively. It is anticipated the cleaning effort will require multiple barges and crews. Hydro-jetting will likely require that a vacuum truck be floated on a barge to the access points.

Several access points will be required for hydro-jet cleaning of lake line Reaches 1, 2, and 5, where the pipe profile is known from construction drawings. For planning purposes, in-lake access points, either manholes or cleanouts, were placed at regular intervals based on assumed cleaning length that depended on pipe size. Access points were located to provide cleaning in both directions; therefore, access spacing is assumed to double the cleaning length:

- 8-inch pipe: 250 feet cleaning length (500-foot access spacing)
- 10-inch pipe: 400 feet cleaning length
- 12-inch pipe: 500 feet cleaning length
- 14-inch and greater pipe: 700 feet cleaning length

These cleaning lengths are within typical capabilities of hydro-jet systems but may require more hose than typically used for gravity sewer cleaning. Actual distance jetted may vary depending on site specific conditions.

Proposed regular access point locations were shifted, as required, to be placed at the bottom of mapped pipe sags. Locations were adjusted away from docks for planning purposes. The resulting conceptual manhole locations, shown in Figure 3-2, should be revised once the location and profile of the lake line have been confirmed.

It was assumed that the City could hydro-jet from the suction side of each pump station. An additional manhole was set at the discharge side of each pump station, from where the City does not currently have the ability to hydro-jet. As previously discussed, Reaches 3 and 4 were not considered in this analysis. Reach 3 is a self-cleaning gravity sewer. Reach 4 was not considered due to the near-term planned replacement.


**Figure 3-2.** Conceptual Manhole Locations

### 3.4.3 Flushing

High flows can scour settled debris from the lake line, as well as potentially remove loose debris from pipe walls. Flushing typically requires velocities of 5 to 7 feet per second, which corresponds to between 800 gallons per minute (8-inch pipe) and 4,000 gallons per minute (18-inch pipe). These flows exceed current pump and flush station capacities and would require separate equipment. At these flow rates, the resulting pressure in the lake line would result in sanitary sewer overflows and potential backups into houses. Further, to achieve the flows, the City would need to bypass the hydraulic grade manholes and likely isolate service laterals and gravity sewers to prevent sewer overflows or backups. A conceptual approach to flushing is shown in Figure 3-3. The approach uses temporary pumps to provide the necessary flushing flows. Storage is provided on the downstream end to capture flows in excess of the capacity of the downstream pump station. This downstream storage could potentially be large, from 30,000 gallons for an 8-inch pipe to 180,000 gallons for an 18-inch pipe. Smaller storage is also proposed to capture upstream flows that could not be pumped during cleaning.

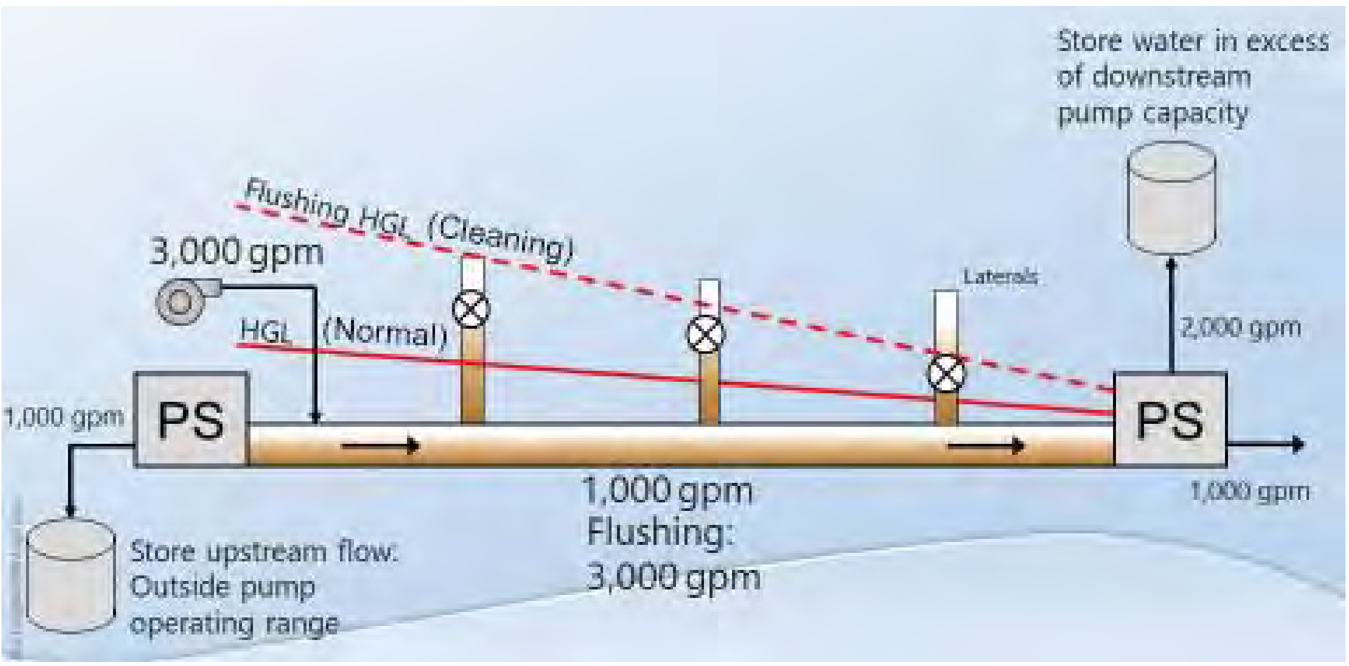



**Figure 3-3.** Conceptual Approach to Flushing

Discussion with City staff indicate flushing is likely not feasible due to the need to isolate private service laterals. Therefore, no access improvements were planned for this option.

### 3.4.4 Pigging/Ice Pigging Technologies

Pipes can be physically cleaned using a variety of pigging technologies. In general, pigging technologies require access similar to that needed for hydro-jetting. Concerns associated with these technologies include the need for sufficient flow and pressure to transport the pig and the potential for pigs becoming stuck in the sewer pipe.

Ice pigging uses a thick slurry of ice as an alternative to conventional pigging technologies. The City has investigated ice pigging for the lake line with Suez, currently the sole provider of ice pigging in the United States, and has chosen not to implement it at this time. This section documents the City’s rationale for this decision.

The ice slurry is injected into a 2-inch port in the pipe and can travel for several thousand feet before being removed. Injection would not require the construction of manholes or cleanouts, representing a major cost savings. The major advantage of ice pigging is that the ice plug will melt and not become stuck in the pipe. Ice pigging is also typically not as aggressive on pipe walls as conventional pigging or hydro-jetting.

While a promising technology, ice pigging has not been proven effective on 12-inch and larger pipes. The City understanding is that large solids, rocks, and debris may not be removed through the ice pigging. Additionally, the pigging has the potential to create pressurized conditions that may result in a sewer overflow or potentially backups into homes.

From an implementation stand point, gaining access for the specialized ice slurry equipment was seen as a major challenge. To help mitigate this issue, longer run lengths could be used; however, Suez indicated that maintaining temperatures for long run lengths can be an issue. Finally, it is possible that an Industrial Discharge Permit may be needed for the ice slurry solution due to its sodium content.

Since no manhole or cleanout is required, the effectiveness of the cleaning cannot be directly confirmed. The City may be able to evaluate pre- and post-hydraulics to infer the impact on the entire line; however, the approach is limited in the information it can provide.

## 3.5 LAKE LINE CONDITION ASSESSMENT ACCESS

The *City of Mercer Island General Sewer Plan* recommended a comprehensive condition assessment project, as the lake line is aging. Understanding the condition of the pipe will allow the City to plan for the repair and replacement of the lake line. Timing these follow-on repair and replacement efforts is important for City financial planning. However, additional access is needed to facilitate this condition assessment and follow-on repair and replacement efforts. This study did not consider the condition assessment in detail. However, if a condition assessment requires access to the interior of the pipe, then it is anticipated it will need to be hydro-jetted. This would require access manholes or cleanouts as described in the above section. No additional access is anticipated to evaluate the condition of the exterior of the pipe or pipe wall using non-invasive assessment technologies.

## 3.6 LAKE LINE REPAIR AND REPLACEMENT ACCESS

The General Sewer Plan recommended a comprehensive repair and replacement program to address defects in the lake line as it ages. This study did not consider the repair and replacement program in detail. However, access will likely be a major factor in repairing the lake line. Identifying the location of pipe defects for repair is likely difficult without access to the interior of the pipe, likely through manholes or cleanouts. It is anticipated that proactively installing regular manholes in the lake line would be cost-prohibitive; therefore, manholes or cleanouts will be installed, based on expected issues, to support other programs, such as hydro-jetting, or on a case-by-case basis.

# 4. PUMP STATION ACCESS EVALUATION

## 4.1 OVERVIEW

Gravity sewer systems across the island flow downhill to the lake line sewer, which rings the island. At intervals along the lake line, pump stations push the flow through the downstream lake line segment to points where they discharge to the King County system. These pump stations are a fundamental part of the City's sewer system.

The City provided GIS layers showing easements and their GIS ID number and recording number. While the site figures show potential layout of future upgraded equipment at the site, the project team decided not to show proposed permanent easements for that type of work, as some level of design would be needed before an appropriate easement boundary could be established. Likewise, temporary construction easements are not shown, but would certainly be needed for major upgrades.

Docks were constructed in the past adjacent to some pump station sites to facilitate water access and cleaning of the pump stations, although the City does not currently own a boat designated for pump station maintenance. Previous provision of boats for pump station maintenance has used contractors. Most of the docks are in disrepair, and in some cases they have been removed. The City's GIS does not indicate whether the City has easements or ownership of the docks in most cases. Therefore, it is recommended that the City further research its access rights for each dock. This should be considered along with other easement recommendations herein.

There were three days of field investigation during which all pump stations were visited. Pump station numbering is non-sequential as a result of previously abandoned pump stations. City O&M staff accompanied consultants to each pump station, coordinated with property owners, and assisted with access to the sites. Discussions of current methods for cleaning and maintenance were provided by staff while consultants documented conditions on field work sheets. Photos were taken to document conditions including, but not limited to trees, play structures, concrete sidewalks, stairs, etc. Each pump station is in a unique location including public right of way, private properties, and/or City-owned property. Each pump station was evaluated for the following concepts:

- Access
    - Driving
    - Walking
    - Water
- Existing condition of ground surface to and around the pump station
    - Grade
    - Generator location
    - Location of pump station
    - Available space on grade for O&M and future upgrades
    - Dock
    - Odorous air
    - Obstacles

Consideration was given to future upgrades and/or rehabilitation of existing facilities. Pump station components considered in the evaluation include the following:

- Pump station structure
- Odor control unit
- Control panel
- Junction box
- Valve vault
- Reduced pressure backflow assembly
- Manhole (hydraulic grade structure)
- Generator to be moved next to pump station when driving access to pump station is available.

Figure 4-1 shows the symbols used for these components. The documentation provided for each pump station includes the following information:

- General site description—Provides input from arriving on site, parking, getting to the pump station and the conditions surrounding the site
- Pump station equipment and features—Information on pumps, generator, electrical service, hydraulic grade structure, sand filter and other that each pump station has currently
- Existing easements—Describes all existing easements that overlap with the pump station including:
    - ➢ Pump station easement
    - ➢ Access easement
    - ➢ General utility easement
    - ➢ Multiple use easement
    - ➢ Sewer easement
    - ➢ Storm easement
    - ➢ Vegetation easement
    - ➢ Water easement
    - ➢ Right of way
- Existing access
    - ➢ Land access—Describes whether land access is possible and if so, what is it like for O&M staff
    - ➢ Water access—Due to site conditions, water access is the most practical way to access some pump stations
- Challenges
    - ➢ Access and easement items—Describes access challenges, including items such as parking, vegetation, grade, etc.
    - ➢ Other site-specific O&M items—O&M staff noted non-access related items needed at the pump stations. These were recorded for documentation purposes, but do not reflect a condition assessment.
- Recommended access and easement improvements—Describes access and easement improvements required for O&M activities such as replacement of pumps, general maintenance checks, pump station replacement, and foot access from crew vehicles on roadway to pump station. Any improvements noted during the site visits that are not related to easement and access are also listed here.

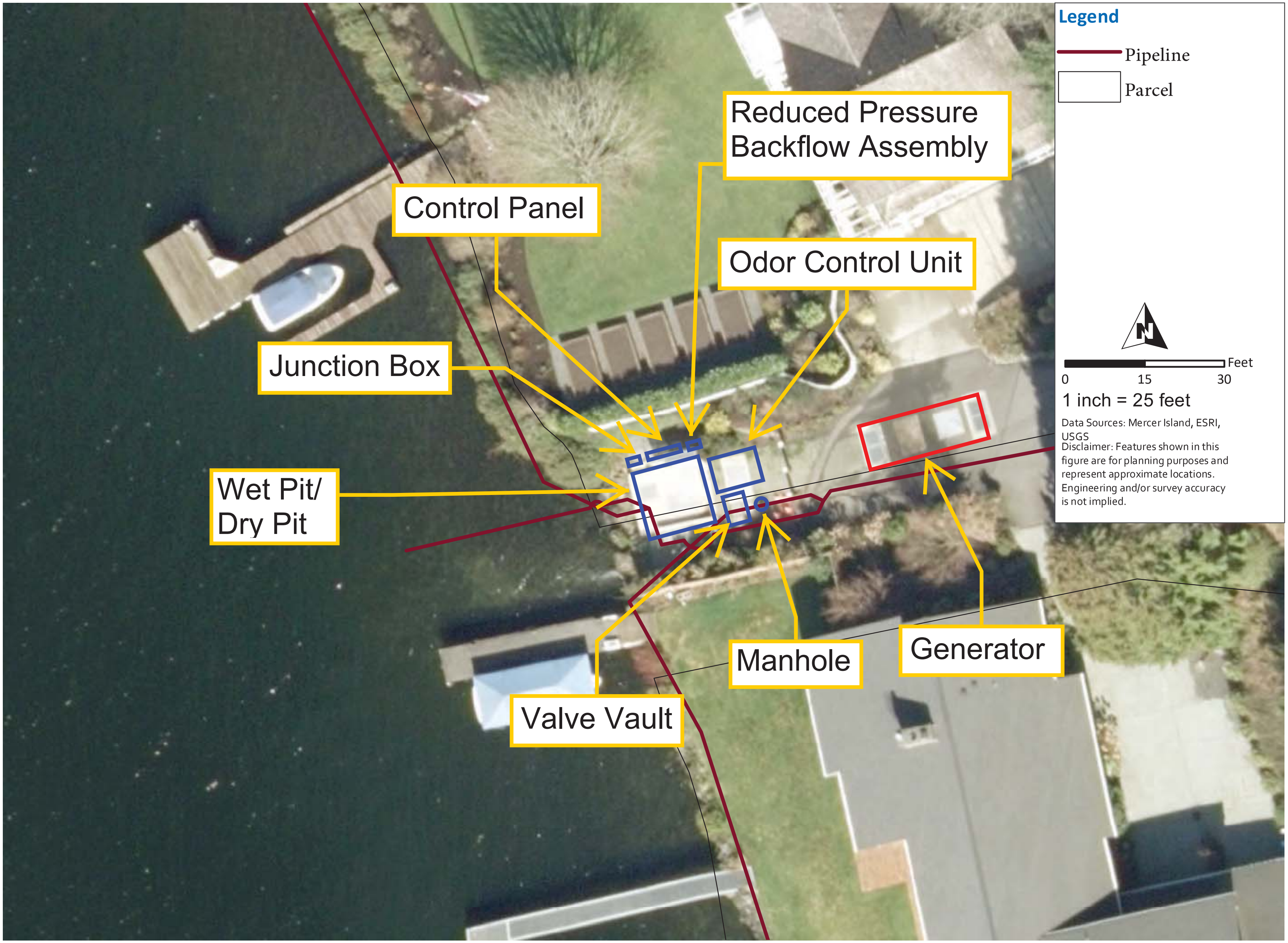



**Figure 4-1.**
**Key for Components Addressed in Pump Station Access Evaluations**

# 4.2 PUMP STATION #1

## 4.2.1 General Site Description

Pump Station #1 (address 8002 SE 20th Street) is on an upland site at 8004 SE 20th Street, in the grassy backyard of the adjoining residential property. A nearby dock into Lake Washington is unused because of its poor condition. A bulkhead rockery lines the shore. The property is heavily vegetated, and the grass was soggy at the time of the site field investigation (August 28, 2018). Figure 4-2 shows the overall site and vicinity.

## 4.2.2 Pump Station Equipment and Features

Table 4-1 summarizes equipment and features of the pump station.

**Table 4-1.** Pump Station #1 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 1<br>2 | Vaughn Chopper<br>Vaughn Chopper | 2 hp<br>5 hp | Diesel, below grade adjacent to pump station | 20 kW | None | Not Noted |

## 4.2.3 Existing Easements

A pump station easement covers the existing pump station, its force main, and the access across the site from the roadway (see Figure 4-2). Inlet pipes are within existing sewer easements. Table 4-2 lists the recorded easements. Inlet pipes are within existing sewer easements.  lists the recorded easements.

**Table 4-2.** Pump Station #1 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1015 | 4655645 | Sewer Easement |
| 1016 | 4664738 | Sewer Easement |
| 1017 | 4664740 | Sewer Easement |
| 1018 | 4669346 | Sewer Easement |
| 1045 | 4803213 | Sewer Easement |
| 1046 | 4655617 | Sewer Easement |
| 1048 | 4655648 | Sewer Easement |
| 1091 | 198406269002 | Multiple Use Easement |
| 1094 | 194812203863792 | Storm Easement |
| 3340 | 5998362 | Access Easement |
| 3500 | 4691123 | Sewer Easement |
| 3652 | 4655618 | Sewer Easement |
| 3787 | 20180119001411 | Sewer Easement |
| 3788 | 20180119001412 | Access Easement |

## 4.2.4 Existing Access

Primary access to Pump Station #1 is land access from SE 20th Street. Water access is not currently used due to dock condition, but could be considered for the future. Table 4-3 summarizes access conditions.

**Table 4-3.** Pump Station #1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (grass) |
| Upland Driving Access/Barriers | At house. Property states "keep out." |
| On-Street Parking | Yes |
| On-Site Parking | No |
| Vacuum Truck Accessible | Yes (w/flex hose 300 to 400 feet from street. Maybe an option from barge) |
| Water Access | |
| Water Access | Maybe |
| Dock Access | No |

**Land Access**

For current access, crews park on the shoulder of SE 20th Street or in the driveway of the property. They walk along the driveway and a paved path to the west side of the residence, and then through trees and across a lawn to the pump station, which is near the shoreline. The pump station can be accessed by a vacuum truck parked at the south end of the property with a 300- to 400-foot flexible hose carried through the pump station easement.

**Water Access**

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline and a dock is present. However, the dock structure is in poor condition and it is overgrown with vegetation. If the dock were sound, there is room for a barge up to about 20 feet in width.

## 4.2.5 Challenges

The following are the key access challenges at Pump Station #1:

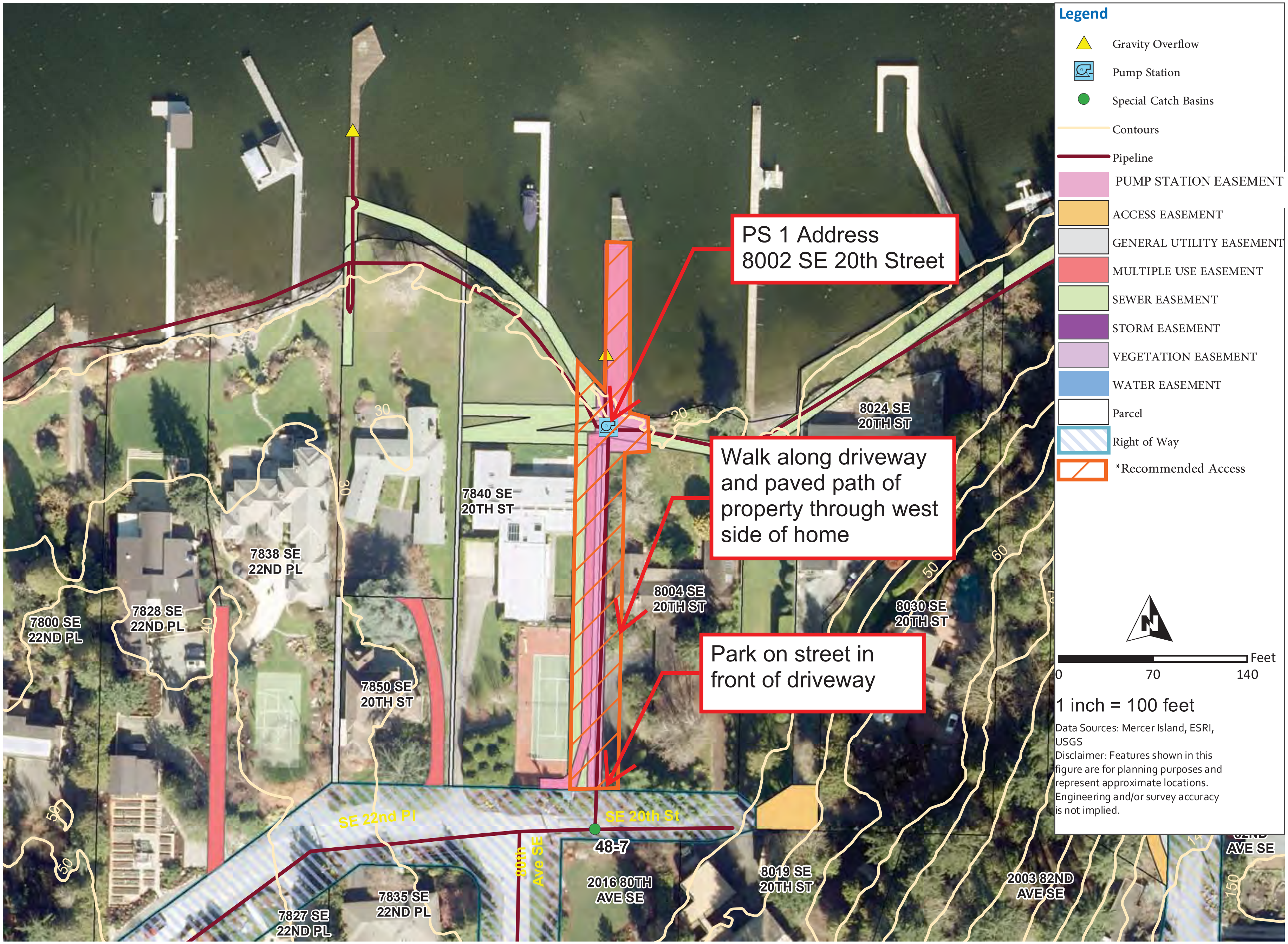
- Parking for crews is in the private driveway or on the roadway, not next to the pump station.
- Current access easement is narrow.
- The property is overgrown with vegetation along the path of the designated easement (see Figure 4-3).
- The existing dock is partially overgrown with vegetation and structurally unsound (see Figure 4-3).

Another challenge identified by City staff during the site visit at Pump Station #1, unrelated to access, is that the current lights in the wet well are not explosion-proof.

## 4.2.6 Recommendations

For adequate future access, the pump station easement for Pump Station #1 should resemble what is shown on Figure 4-4, which also shows the preferred future layout for the pump station and its accessory equipment. Future needs for the pump station should also include:

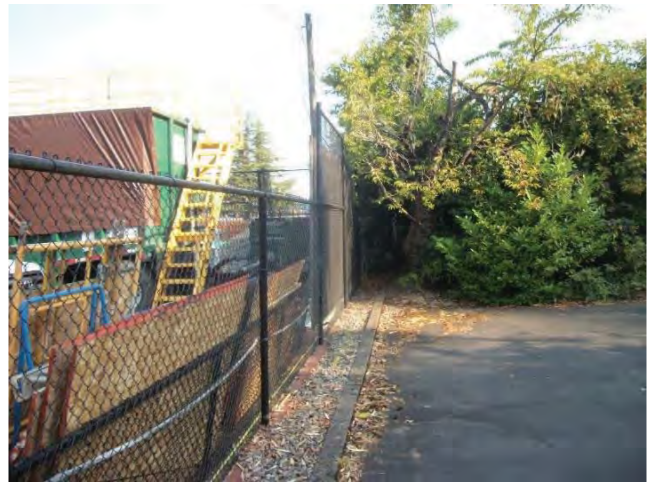
- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Review dock access and ownership
- Dock condition assessment (related to City boat access)
- Bulkhead/shoreline condition assessment (related to City boat access)




*Recommended access subject to further revision

**Figure 4-2. Pump Station #1**
**All Existing Easements Access Map**

*Access for crews along driveway towards pump station*

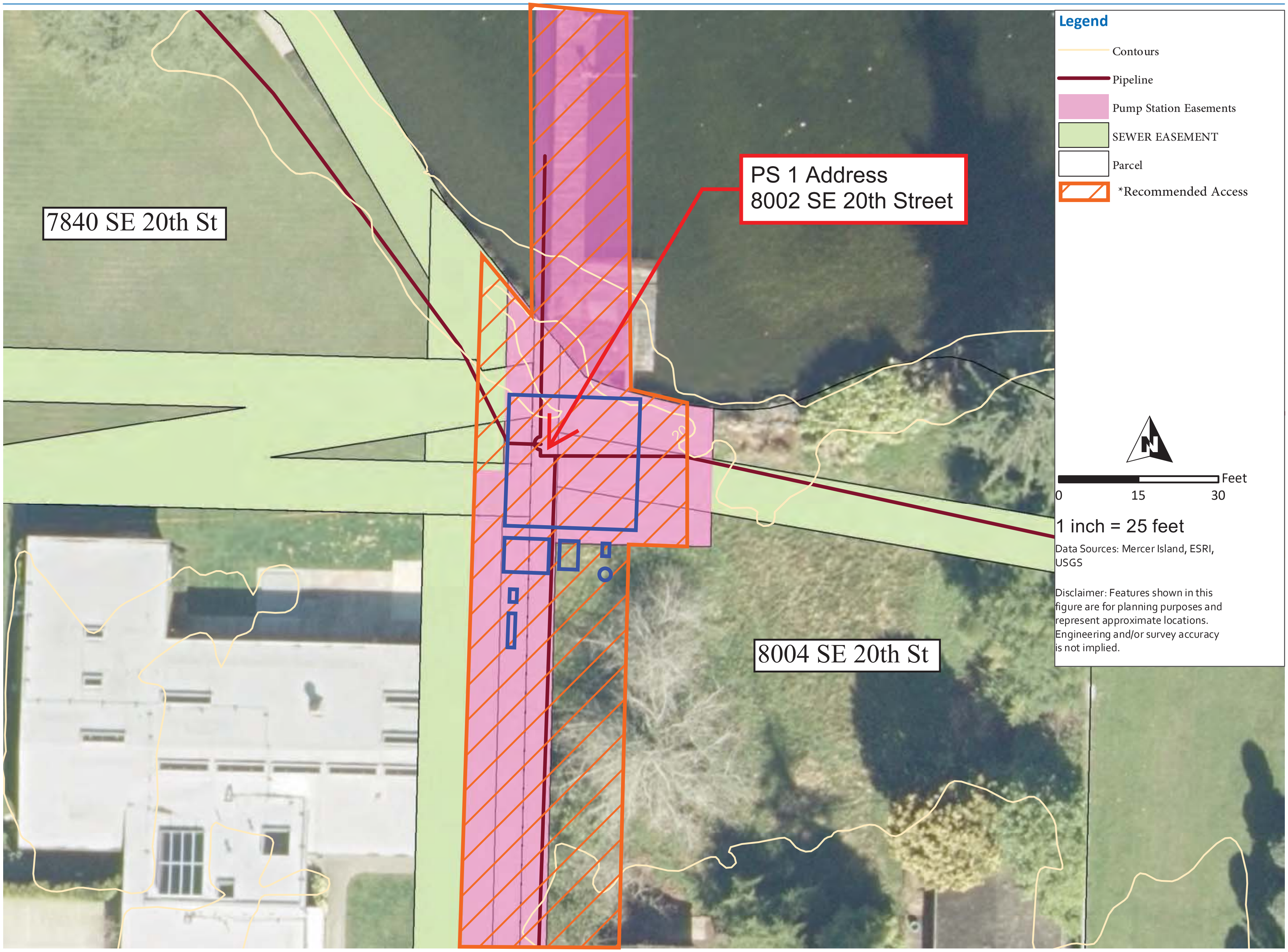


*Current easement inaccessible due to vegetation & fencing*

*View from pump station along current easement inaccessible due to vegetation & fencing*

*Looking north from pump station 01, existing wooden dock*

**Figure 4-3.**
**Pump Station #1 Existing Site Photos**




carollo TETRA TECH

*Recommended access subject to further revision

**Figure 4-4. Pump Station #1 Layout Map**

## 4.3 PUMP STATION #4

### 4.3.1 General Site Description

Pump Station #4 (address 2237 60th Avenue SE) is on an upland site, in the concrete on WSDOT right of way. A parking lot and asphalt driveway provide access to the pump station. The property is accessible by asphalt walking and driving path in good condition at the time of the site field investigation (August 28, 2018). Figure 4-5 shows the overall site and vicinity.

### 4.3.2 Pump Station Equipment and Features

Table 4-4 summarizes equipment and features of the pump station.

**Table 4-4.** Pump Station #4 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor | |
|---|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control | Other |
| 3 | WEMCO | 60 hp | Diesel, in control building | 150 kW | No | Powered Activated Carbon System | Flow Meter, Air-Vacuum Valves to vent force main |

### 4.3.3 Existing Easements

This pump station is located within public right of way (see Figure 4-5). The City holds Utility Permit 18850 from WSDOT, issued with the pump station during construction. The permit is subject to terms and conditions of Easement Deed IC 1-17-05732/33/34, I-17-05525 and Airspace Lease AA-1-10625. Table 4-5 lists the recorded easements outside of WSDOT). The City holds Utility Permit 18850 from WSDOT, issued with the pump station during construction. The permit is subject to terms and conditions of Easement Deed IC 1-17-05732/33/34, I-17-05525 and Airspace Lease AA-1-10625. lists the recorded easements outside of WSDOT.

**Table 4-5.** Pump Station #4 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1394 | 4659070 | Sewer Easement |
| 3660 | 20091203000275 | Sewer Easement |

### 4.3.4 Existing Access

Primary access to Pump Station #4 is land access from 60th Avenue SE. Water access is not currently used but could be considered if necessary. Table 4-6 summarizes access conditions.

#### Land Access

City crews drive directly to the pump station as there is a paved driving path for access (see Figure 4-6).

#### Water Access

Water access is possible as the pump station is located near the shoreline, but it is not needed, as there is adequate land access. There is no dock at the site.

### 4.3.5 Challenges

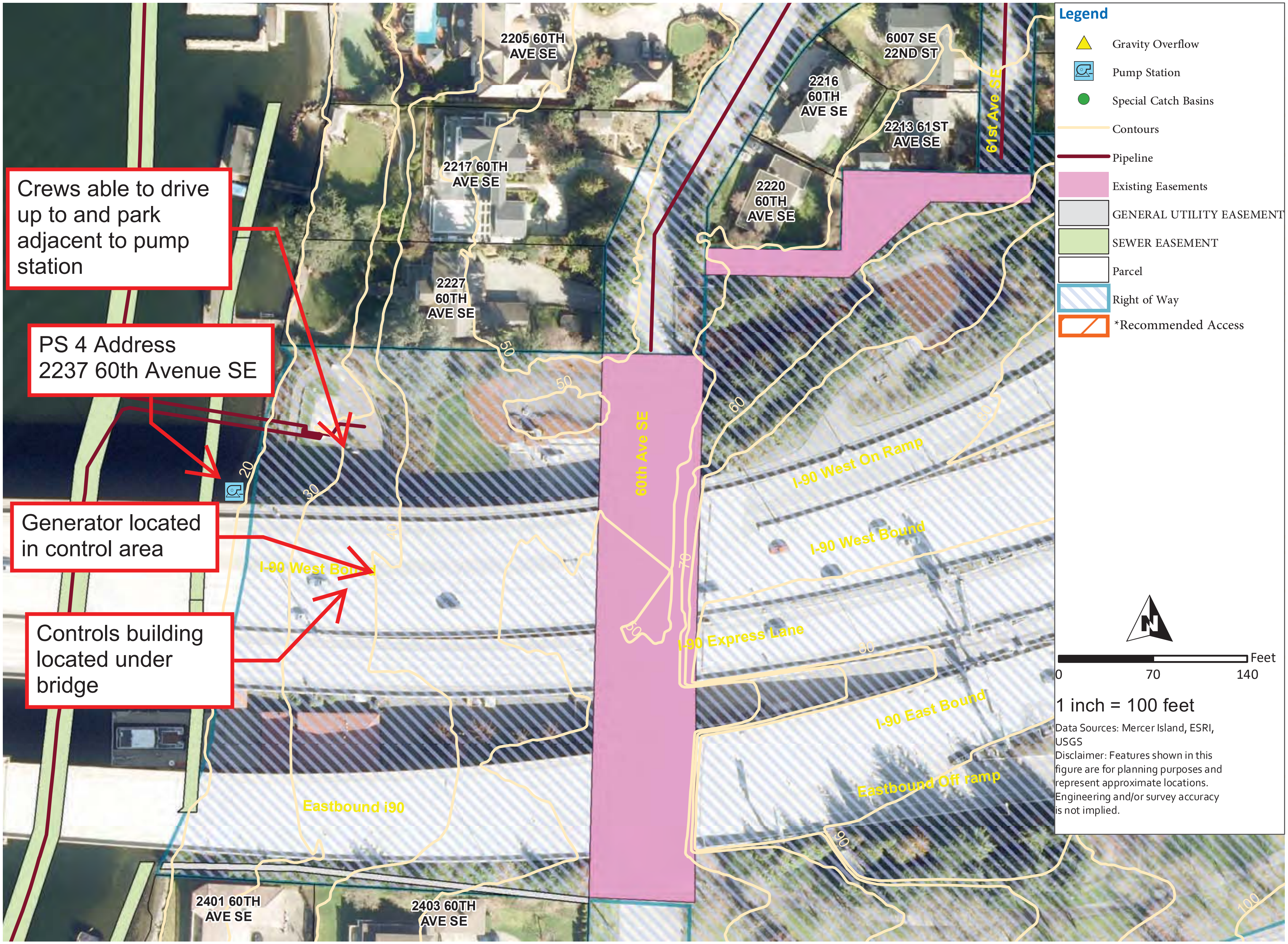
Current access crosses WSDOT right of way. Easements should be reviewed to determine access rights.

**Table 4-6.** Pump Station #4 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | Bollards in parking lot |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | None |
| On-Street Parking | No |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

## 4.3.6 Recommendations

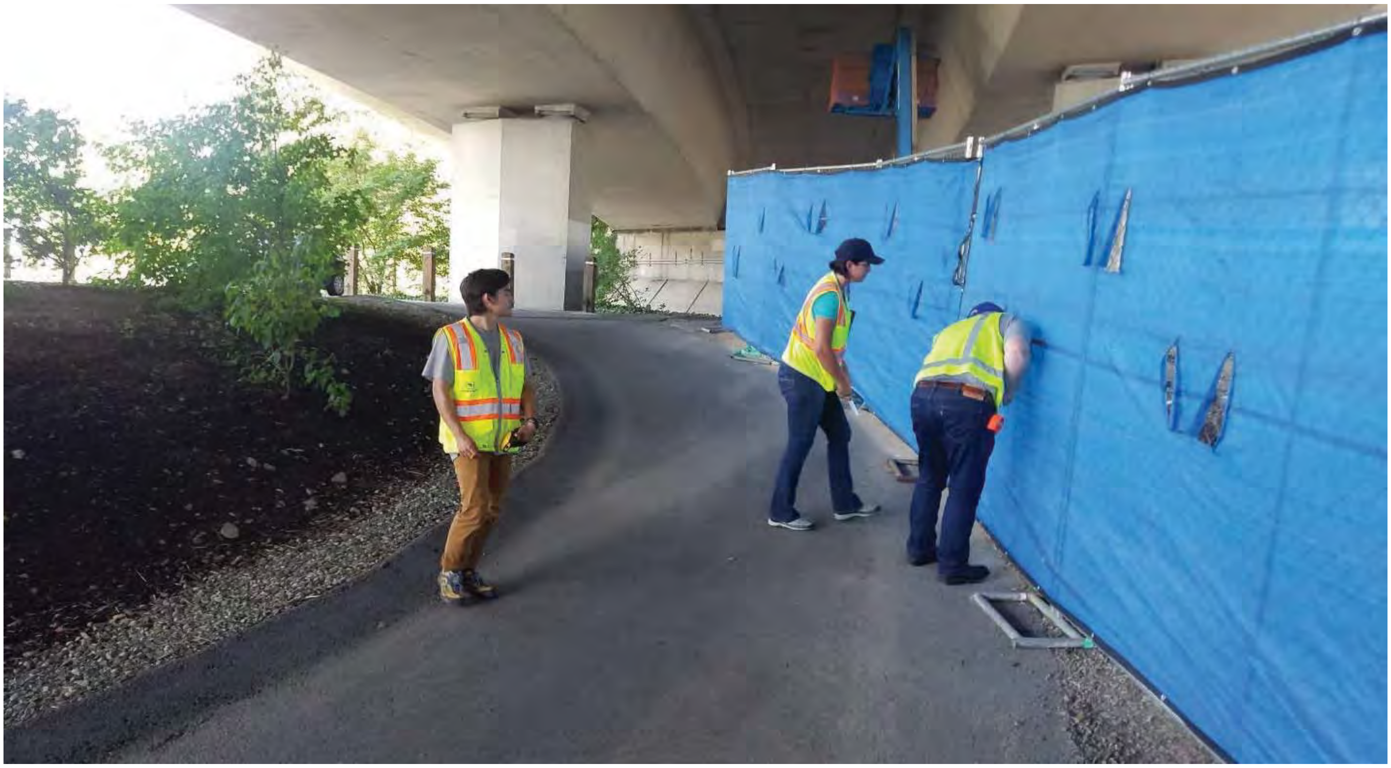
Pump Station #4 has sufficient access for future needs. No improvements are recommended to the existing layout, which is shown on Figure 4-7.




carollo TETRA TECH

*Recommended access subject to further revision

**Figure 4-5. Pump Station #4**
**All Existing Easements Access Map**



*View of access upland of Pump Station 4*

*Pump Station 4 with access from Lake WA or land*

**Figure 4-6**
**Pump Station #4 Existing Site Photos**

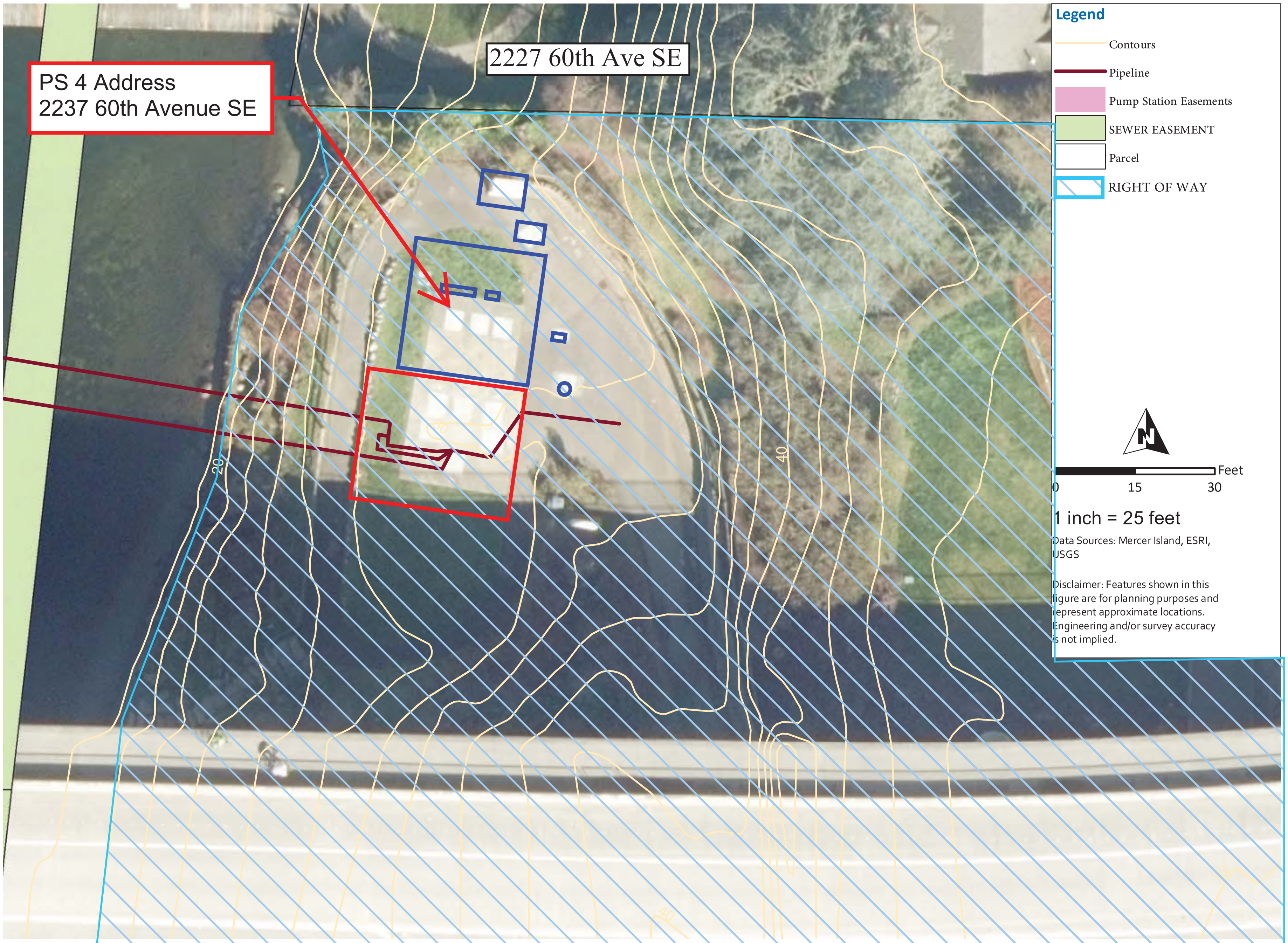



**Figure 4-7. Pump Station #4 Layout Map**

# 4.4 PUMP STATION #10

## 4.4.1 General Site Description

Pump Station #10 is on City-owned property at 9036 N. Mercer Way on the shoreline. The site includes a poor-quality pathway with switchbacks down a steep slope surrounded by vegetation. A nearby dock into Lake Washington is not useful due to its poor condition. Further research is needed to determine if the dock is owned by the City. The pump station is exposed to the lake and the ground has been eroding due to wave action at the time of the site field investigation (August 28, 2018). Figure 4-8 shows the overall site and vicinity.

## 4.4.2 Pump Station Equipment and Features

Table 4-7 summarizes equipment and features of the pump station.

**Table 4-7.** Pump Station #10 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control | Other |
|---|---|---|---|---|---|---|---|
| Number | Type | Power | | | | | |
| 2 | Vaughan Chopper | 7.5 hp | Diesel, above ground, 200 feet west (upland) of pump station | 20 kW | None | Not noted | None |

## 4.4.3 Existing Easements

A pump station easement covers the existing pump station, its force main and the dock (see Figure 4-8). No easements are currently required for access due to the City owning this property. Table 4-8 lists the recorded easements. No easements are currently required for access due to the City owning this property.  lists the recorded easements.

**Table 4-8.** Pump Station #10 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 940 | 5028697 | Sewer Easement |
| 3152 | 199206181122 | Access Easement |
| 3472 | 198510300965 | Water Easement |

## 4.4.4 Existing Access

Primary access to Pump Station #10 is land access from N. Mercer Way. Water access is currently used for cleaning purposes, but minor maintenance is completed by land. Table 4-9 summarizes access conditions. Photos are provided in Figure 4-9 and Figure 4-10.

### Land Access

For current access by land, crews park on west shoulder of N. Mercer Way. They walk down steep, uneven ground toward the south, then switchback to the north then east to reach the pump station. Along the way, the ground changes from broken, uneven concrete to soft soils and slick leaves. The pathway is surrounded by heavy vegetation and large trees.

### Water Access

The pump station is on shoreline and is exposed to the lake. Due to proximity to the water it is cleaned by barge. The existing concrete dock is connected to land by a wooden platform but covered by an overgrown tree across it.

**Table 4-9.** Pump Station #10 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | No |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Steep access on poor quality roadway that switchbacks down slope to shore, no vehicle access |
| On-Street Parking | Yes, on shoulder of N. Mercer Way |
| On-Site Parking | No |
| Vacuum Truck Accessible | No |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes, requires dock repairs to continue use |

### 4.4.5 Challenges

The following are the key access challenges at Pump Station #10:

- No parking for crews on site
- Property is too steep and unstable for vehicle access, and unsafe for walking access with heavy equipment on hand cart.
- Pump station exposed to lake with wave action causing erosion for soils under facility
- Dock has overgrown tree across it
- Dock's wooden planks not solid for access from lake portion to land

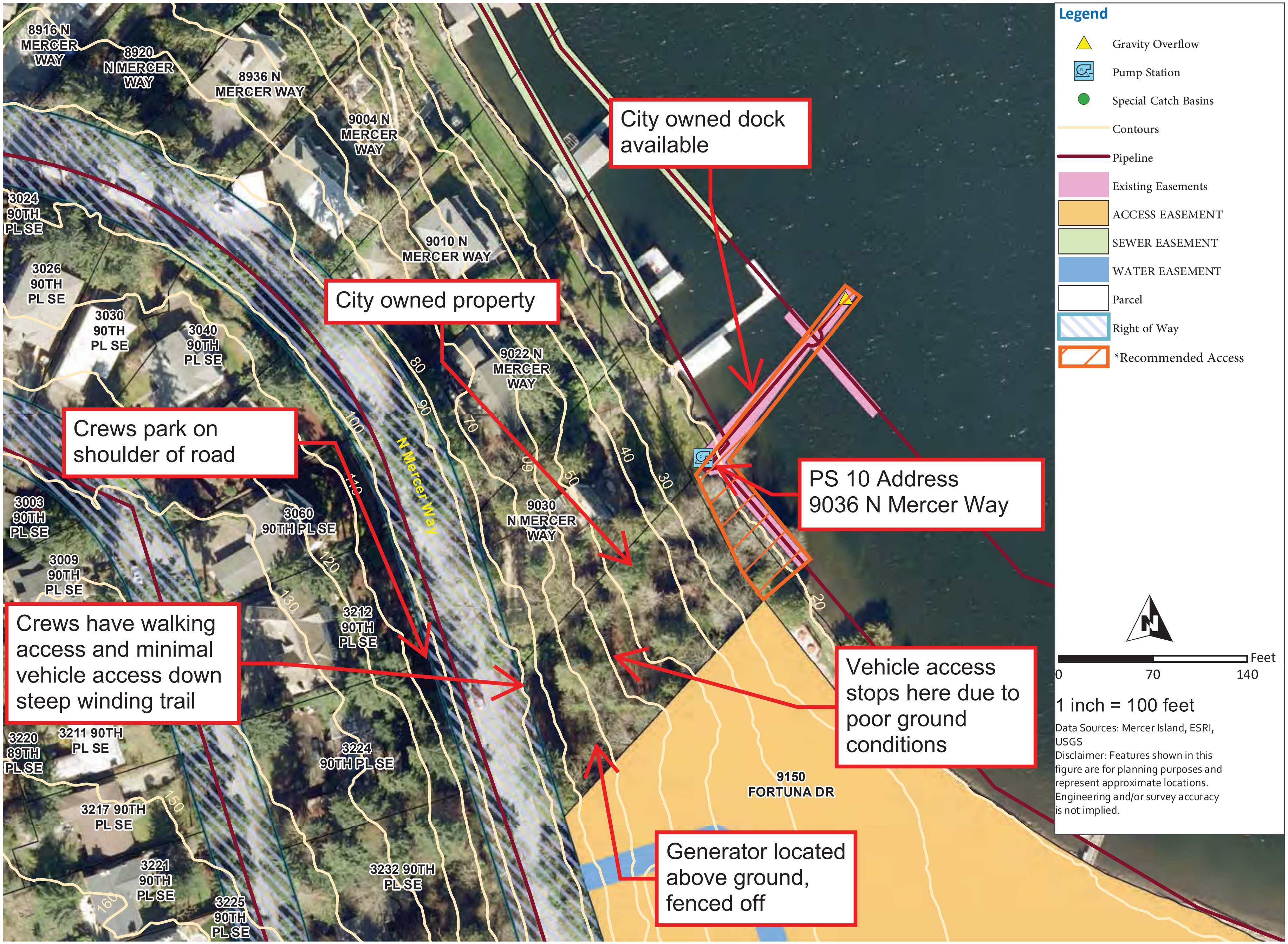
The following are the other challenges at Pump Station #10, unrelated to access:

- Rats are getting into generator and eating wiring
- Odors from pump station

### 4.4.6 Recommendations

For adequate future access, the pump station easement for Pump Station #10 should be extended westward through the City's property if property is intended to be sold. Figure 4-11 shows the recommended site layout. Future needs for the pump station should also include:

- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Proposed easement acquisition
- Bulkhead/shoreline condition assessment (related to City boat access)
- Review dock access and ownership
- Dock condition assessment (related to City boat access)




carollo TETRA TECH

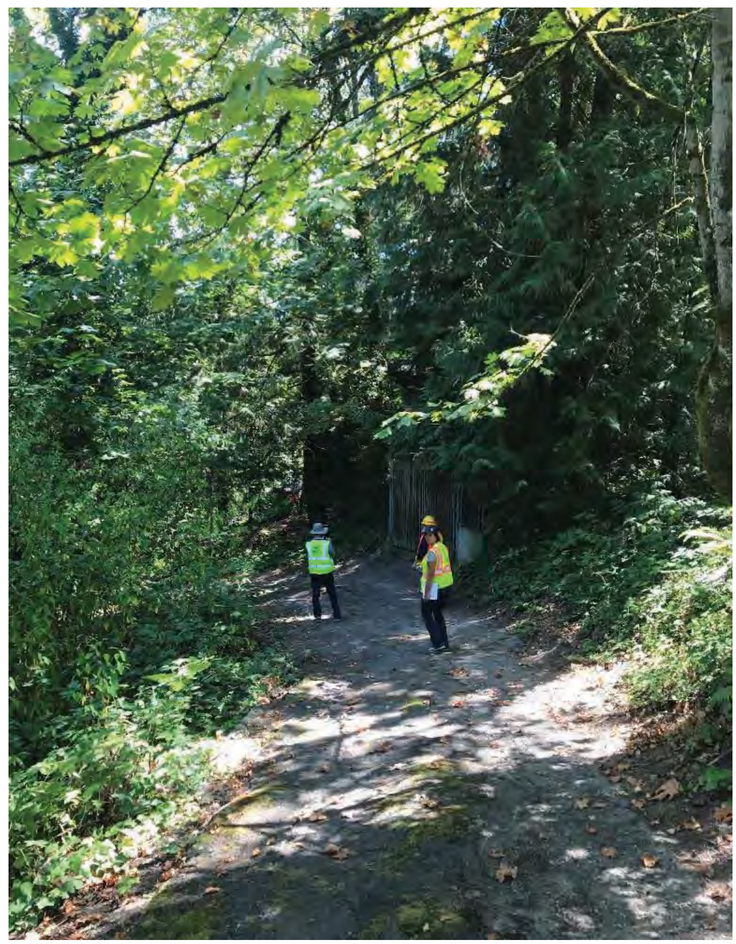
*Recommended access subject to further revision

**Figure 4-8. Pump Station #10**
**All Existing Easements Access Map**

*Crew currently parks on shoulder of road, opposite of properties*

*Walking path downhill towards pump station, above ground generator on right*

*On Pump Station 10 property looking upland towards road*



*Walking path downhill towards pump station*

**Figure 4-9.**
**Pump Station #10 Existing Site Photos (1 o 2)**

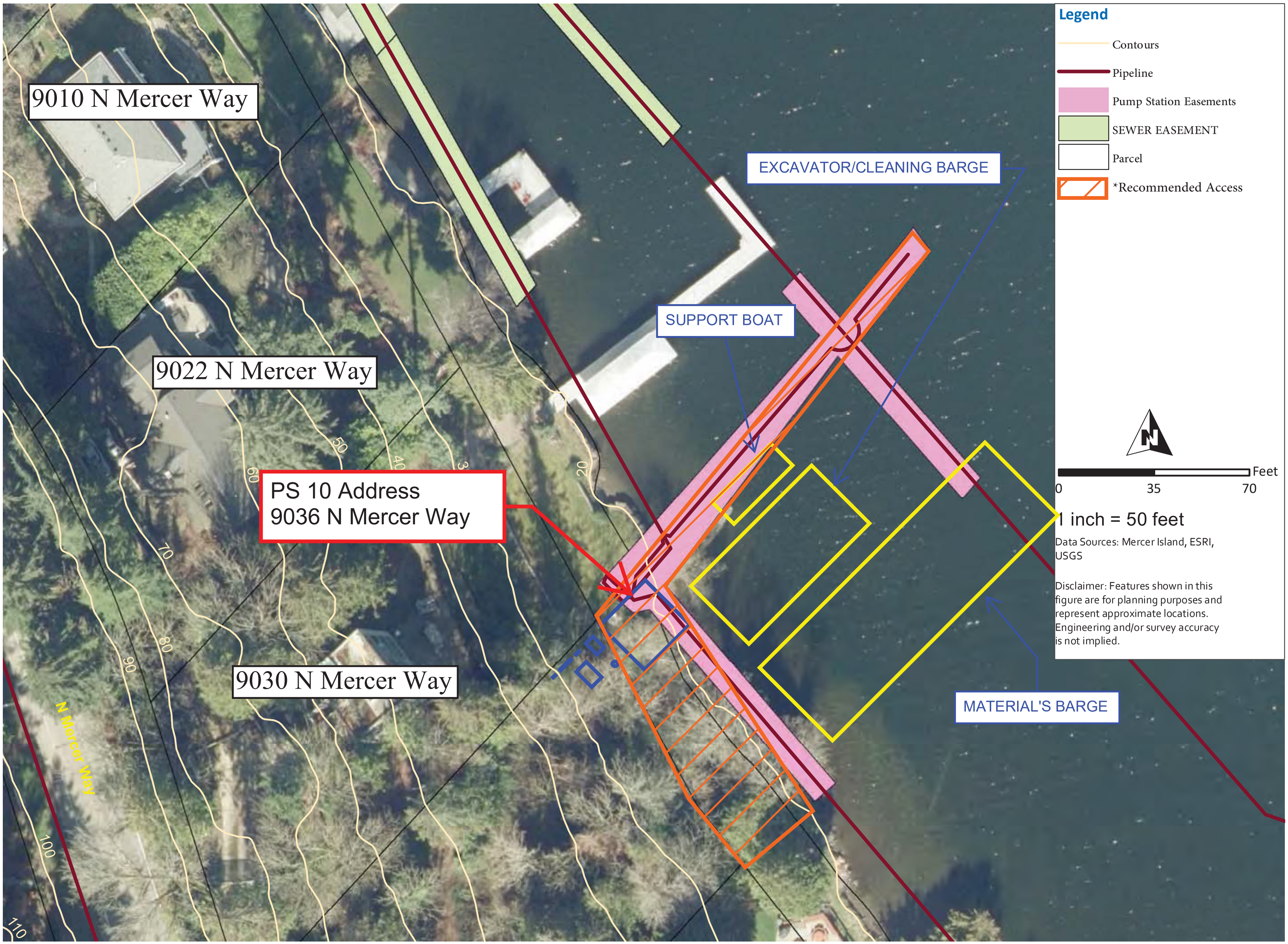
*Change of road condition from concrete to compact gravel*

*Dock at pump station 11 with overgrown trees*

*City dock degrading, unable to use in current condition*

*Pump Station 11 with vegetation growing over dock*

**Figure 4-10.**
**Pump Station #10 Existing Site**
**Photos (2 of 2)**




*Recommended access subject to further revision

**Figure 4-11. Pump Station #10 Layout Map**

# 4.5 PUMP STATION #11

## 4.5.1 General Site Description

Pump Station #11 is on an upland site at 3309 97th Avenue SE, within a street end park (Fruitland Landing). The site is accessible by a gravel walking and driving path in good condition. Vegetation surrounding the site was well maintained at the time of site field investigation. (August 8, 2018). A rebuilt bulkhead rockery lines the shore. Figure 4-12 shows the overall site and vicinity.

## 4.5.2 Pump Station Equipment and Features

Table 4-10 summarizes equipment and features of the pump station.

**Table 4-10.** Pump Station #11 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 1<br>1 | Vaughn Chopper<br>Backup | 10 hp<br>10 hp | Diesel, below grade, 100 ft south of pump station | 40 kW | None | Not Noted |

## 4.5.3 Existing Easements

The pump station, force main, generator, and access all lie within City right of way (see Figure 4-12). Sewer easements cover both inlet and outlet pipes. A multiple use easement on the shoreline of 3310 90th Avenue SE provides access for landing water crafts. Table 4-11 summarizes recorded easements. Sewer easements cover both inlet and outlet pipes. A multiple use easement on the shoreline of 3310 90th Avenue SE provides access for landing water crafts.  summarizes recorded easements.

**Table 4-11.** Pump Station #10 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 856 | SUB6511-002 | Multiple Use Easement |
| 859 | 198107160069 | Multiple Use Easement |
| 863 | SUB7209-002 | Multiple Use Easement |
| 867 | SUB7004-001 | Multiple Use Easement |

## 4.5.4 Existing Access

Primary access to Pump Station #11 is land access by gravel path that extends north from the termination of 97th Avenue SE to the Lake Washington shoreline. Water access is not currently used but could be considered. Table 4-12 summarizes access conditions. Photos are provided in Figure 4-13.

### Land Access

For current access by land, crews approach the site by 97th Avenue SE. After removing the wooden bollards, located at the end of the street, they park on the gravel path that runs the length of the street end park (Fruitland Landing) and adjacent to the pump station, which is near the shoreline. The pump station can be accessed by a vacuum truck parked in its immediate vicinity.

### Water Access

Future water access—for cleaning or construction—is possible as the pump station is near Lake Washington and no obstacles exist that would prevent a barge from anchoring near the shoreline.

**Table 4-12.** Pump Station #11 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (gravel) |
| Upland Driving Access/Barriers | Removable bollards at street end park (Fruitland Landing) |
| On-Street Parking | Yes |
| On-Site Parking | Yes, on gravel path adjacent to pump station |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

### 4.5.5 Challenges

The following are the key access challenges at Pump Station #11:

- Coordination with property owner of 3310 90th Avenue SE for landing water craft

The following is a challenge identified at Pump Station #11, unrelated to access:

- Obstruction downstream of pump station at bend toward El Dorado Beach Club

### 4.5.6 Recommendations

For adequate future access, the pump station easement for Pump Station #11 should be as shown on Figure 4-14. The following are also recommended:

- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)


carollo TETRA TECH *Recommended access subject to further revision

**Figure 4-12. Pump Station #11**
**All Existing Easements Access Map**

*View from Fruitland Landing Park upland*


*View of generator at Pump Station 11 at Fruitland Landing*

*Access to pump station through Fruitland Landing Park*

*Pump Station 11 adjacent to Lake WA*

**Figure 4-13.**
**Pump Station #11 Existing Site Photos**




**Figure 4-14. Pump Station #11 Layout Map**

# 4.6 PUMP STATION #12

## 4.6.1 General Site Description

Pump Station #12 is on an upland site at 4006 E. Mercer Way, in the grassy backyard of the adjoining residential property and within public right of way. A private dock in poor condition runs into Lake Washington. Exposed gas pipelines run adjacent to the northern edge of the dock from Lake Washington and onto the shoreline where they continue below grade. A sign from Puget Sound Energy upland on public right of way and to the north of the dock cautions gas pipelines. The flush station is above grade and was being used by property owner as watercraft storage at the time of the site field investigation (August 28, 2018). Figure 4-15 shows the overall site and vicinity.

## 4.6.2 Flush Station Equipment and Features

Table 4-13 summarizes equipment and features of the pump station.

**Table 4-13.** Pump Station #12 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 1 | Cornell | 3.0 hp | None | None | None | None |

## 4.6.3 Existing Easements

Public right of way covers the existing pump station, its force main, and access along the north side of the residential property at 4006 E. Mercer Way (see Figure 4-15). Inlet pipes are within existing sewer easements. Table 4-14 lists the recorded easements. Inlet pipes are within existing sewer easements.  lists the recorded easements.

**Table 4-14.** Pump Station #12 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 3230 | 5110645 | Access Easement |
| 3338 | 5998360 | Access Easement |

## 4.6.4 Existing Access

Primary access to Pump Station #12 is land access from SE 40th Street. Water access is not currently used but could be considered for the future. Table 4-15 summarizes access conditions. Photos are provided in Figure 4-16 and Figure 4-17.

### Land Access

For current access by land, crews park in the public right of way on SE 40$^{th}$ Street or in the concrete paved driveway of the residence whose northern edge borders the right of way. They walk east, along the hedges, across the length of the driveway and through the grassy lawn to the pump station. The pump station is used for flushing only and does not need vacuum truck access.

### Water Access

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline. A dock is present but is not city owned and would require an easement for access. Gas lines must be avoided if a barge is to anchor on the northern side of the dock.

**Table 4-15.** Pump Station #12 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | No |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Steep drive way |
| On-Street Parking | Yes |
| On-Site Parking | Park in right of way |
| Vacuum Truck Accessible | N/A (flush only) |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

## 4.6.5 Challenges

The following are the key access challenges at Pump Station #12:

- Steep driveway along right of way
- Current parking access is in right of way although part of property owner's parking as well
- Shallow water making water access less likely

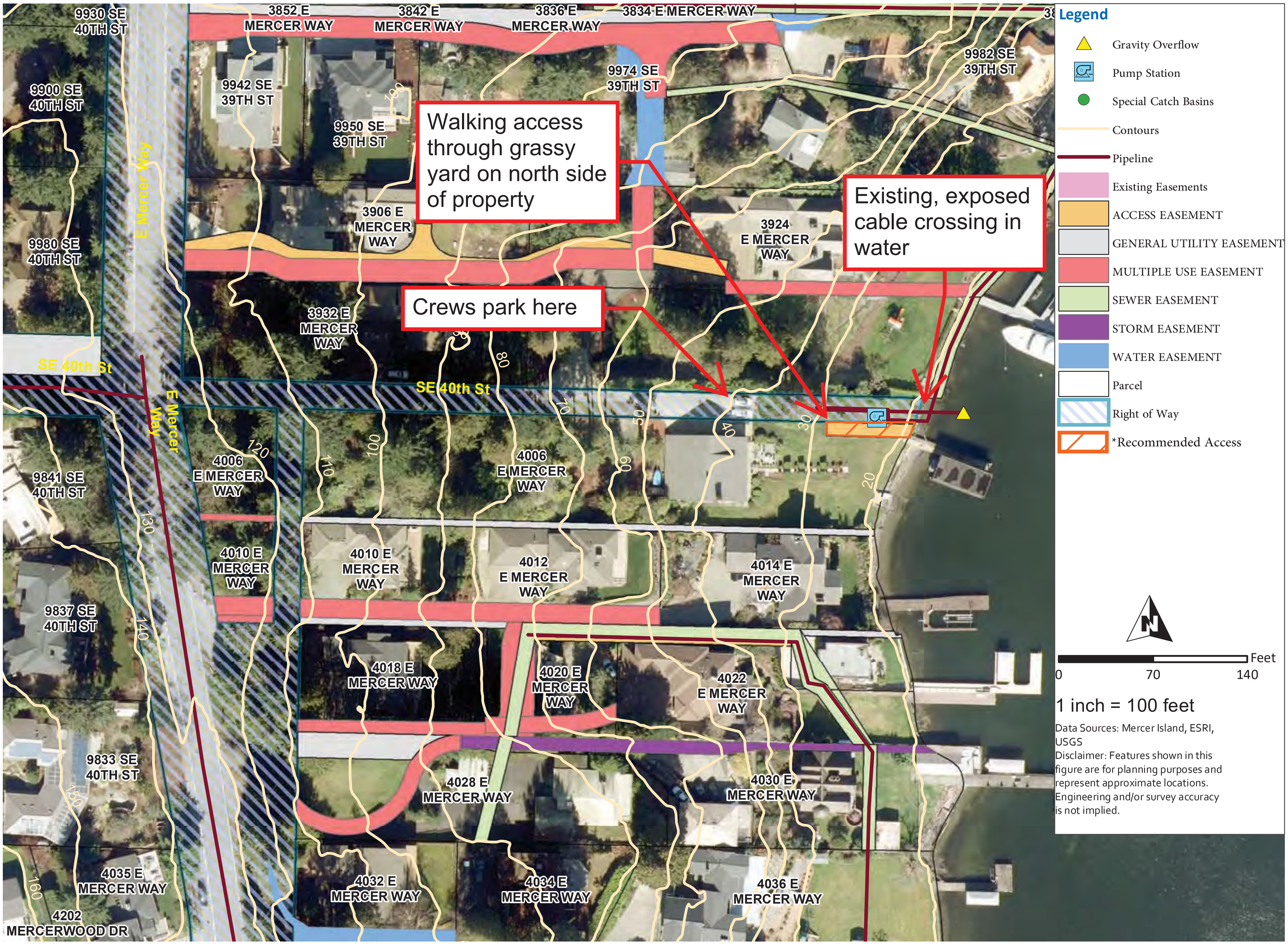
The following are the other challenges at Pump Station #12, unrelated to access:

- Inlet pipe to Pump Station #12 is in poor condition. Inlet pipe clogs with sewage and Hydrogen Sulfide backs up to wet well
- Gas pipeline crossing exposed at shoreline
- Poor flow conditions due to inlet pipe being in poor condition

## 4.6.6 Recommendations

For adequate future access, the pump station easement for Pump Station #12 should be as shown on Figure 4-18). The following are also recommended:

- Easement review and confirmation
- Construct roadway to pump station
- Maintain easement/City property (remove vegetation)
- Coordinate regarding exposed utilities (confirm location in existing easement)




*Recommended access subject to further revision

**Figure 4-15. Flush Station #12**
**All Existing Easements Access Map**

*Park in driveway, view of driveway*

*Grassy hill, pathway to flush station*

*Flush station currently used as boat rack*

*Wooden dock in need of rehabilitation*

**Figure 4-16.**
**Flush Station #12 Existing Site**
**Photos (1 of 2)**


*Gas pipe line crossing located east of flush station*

*Exposed gas pipe lines located east of flush station*

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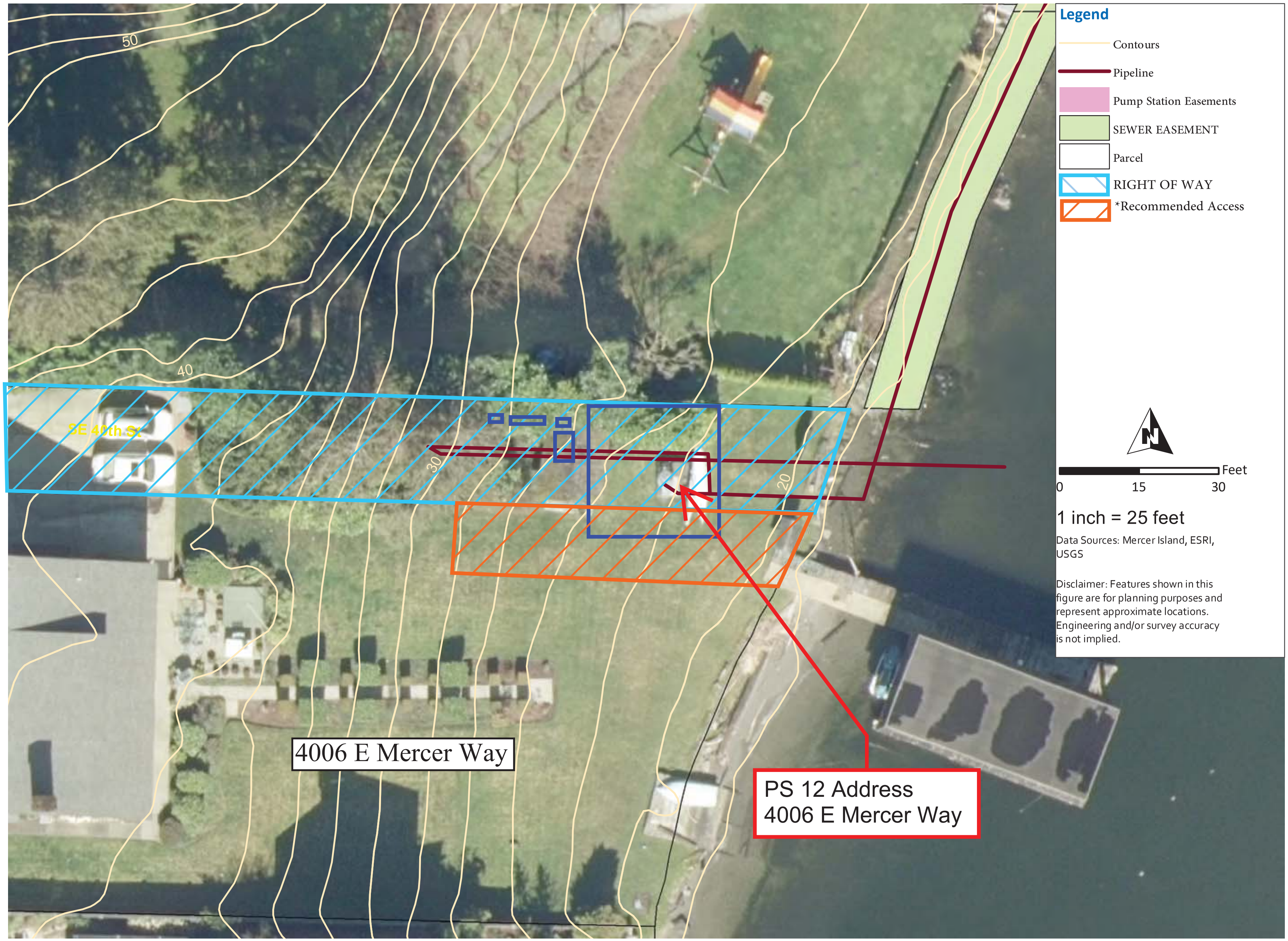
**Figure 4-17.**
**Flush Station #12 Existing Site**
**Photos (2 of 2)**




*Recommended access subject to further revision

**Figure 4-18. Flush Station #12 Layout Map**

# 4.7 PUMP STATION #13

## 4.7.1 General Site Description

Pump Station #13 (address 3897 W. Mercer Way) is an upland site in the middle of two grassy backyards of 4003 W. Mercer Way and 3887 W. Mercer Way. A nearby dock into Lake Washington is unused because of its poor condition. A bulkhead rockery lines the shore. The property is heavily vegetated, and the grass was soggy at the time of the site field investigation (August 28, 2018). Figure 4-19 shows the overall site and vicinity.

## 4.7.2 Pump Station Equipment and Features

Table 4-16 summarizes equipment and features of the pump station.

**Table 4-16.** Pump Station #13 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor |
|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control |
| 1<br>2 | Cornell<br>Cornell | 5 hp<br>5 hp | Diesel, below grade, 185 ft north west from pump station | 20 kW | None | Not Noted |

## 4.7.3 Existing Easements

Public right of way extends to the northeast property line of 3887 W. Mercer Way along Freeman Avenue. The City has a pump station easement that extends from that property line southwest toward the lake shore (see Figure 4-19). The pump station easement also extends along a pathway through 3887 W. Mercer Way and along the side of the house, then along the shoreline onto a dock. A sewer easement extends from the northeast property line of 3881 W. Mercer Way to the southwest corner of 3887 W. Mercer Way. There is also a multi-use easement extending from Freeman Avenue through 4003 W. Mercer Way driveway to the 4009 W. Mercer Way property line. Table 4-17 lists the recorded easements. The pump station easement also extends along a pathway through 3887 W. Mercer Way and along the side of the house, then along the shoreline onto a dock. A sewer easement extends from the northeast property line of 3881 W. Mercer Way to the southwest corner of 3887 W. Mercer Way. There is also a multi-use easement extending from Freeman Avenue through 4003 W. Mercer Way driveway to the 4009 W. Mercer Way property line.  lists the recorded easements.

**Table 4-17.** Pump Station #13 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1827 | 197789280725 | Multiple Use Easement |
| 3230 | 5110645 | Access Easement |
| 3338 | 5998360 | Access Easement |

## 4.7.4 Existing Access

Primary maintenance access to Pump Station #13 is land access from Freeman Avenue. Water access is also used for cleaning purposes. Table 4-18 summarizes access conditions. Photos are provided in Figure 4-20.

### Land Access

For current access by land, crews park on the shoulder of Freeman Avenue, and walk down the access path per the pump station easement. Sometimes crews park in the driveway of 4003 W. Mercer Way and walk along a path, upon approval from the property owner, then northwest toward the pump station. This area is an open grass space, but the pump station is located at the bottom of a steep hill going toward Freeman Avenue.

## Water Access

Current water access is used for cleaning and will be used for construction since the pump station is located near the Lake Washington shoreline. A dock is present but requires an easement for access.

**Table 4-18.** Pump Station #13 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Property is too steep to clean from land, minimal parking |
| On-Street Parking | Yes |
| On-Site Parking | No |
| Vacuum Truck Accessible | Only from water |
| Water Access | |
| Water Access | Yes |
| Dock Access | No, dock needs to be rehabbed |

## 4.7.5 Challenges

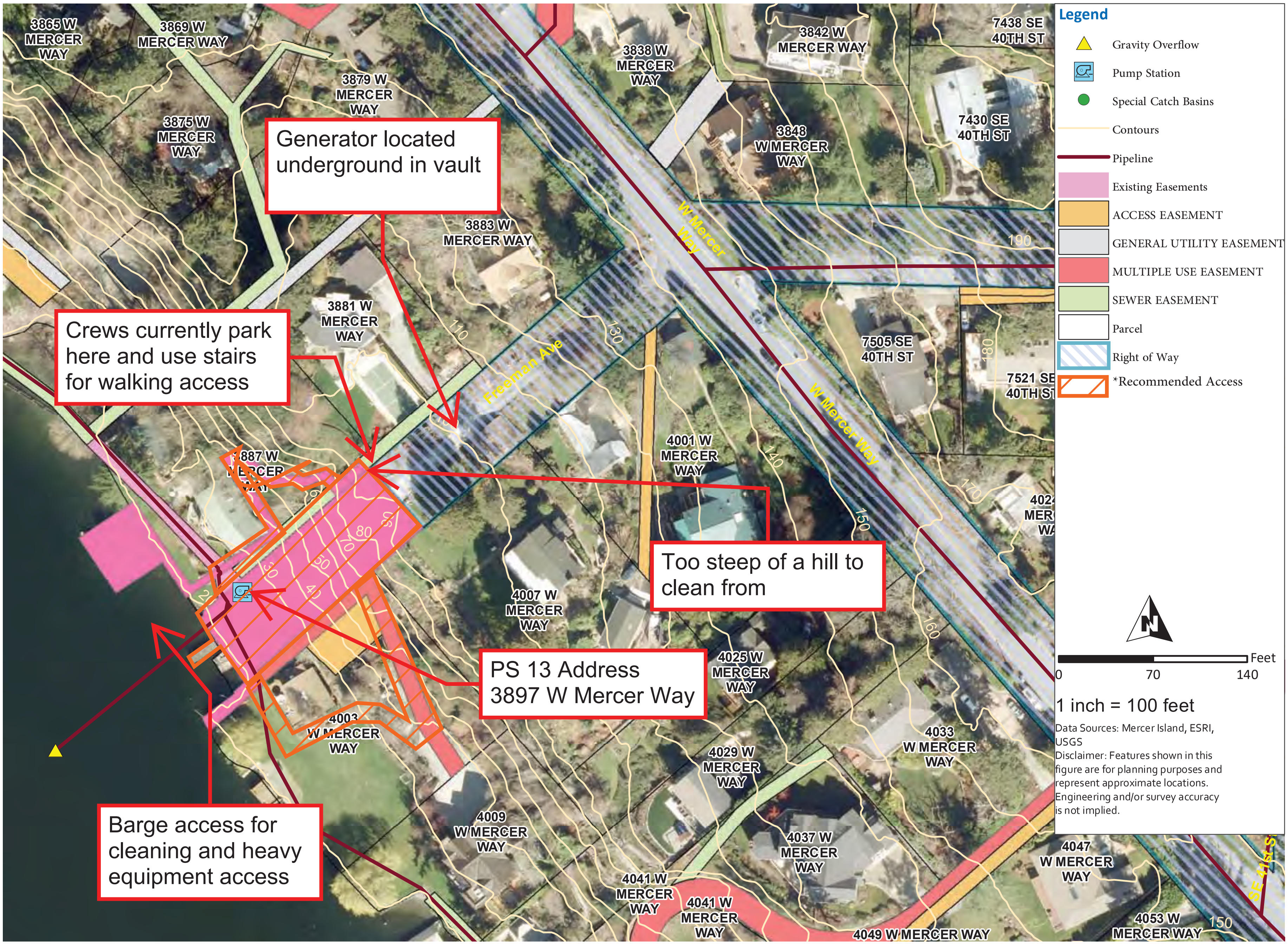
The following are the key access challenges at Pump Station #13:

- Steep hill makes it unable to clean from land
- Minimal parking and access for crews
- Dock is unstable making it unable to be used

## 4.7.6 Recommendations

For adequate future access, the pump station easement for Pump Station #13 should be as shown on Figure 4-21. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Stairway access (repairs/installation)
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)
- Dock condition assessment (related to City boat access)




*Recommended access subject to further revision

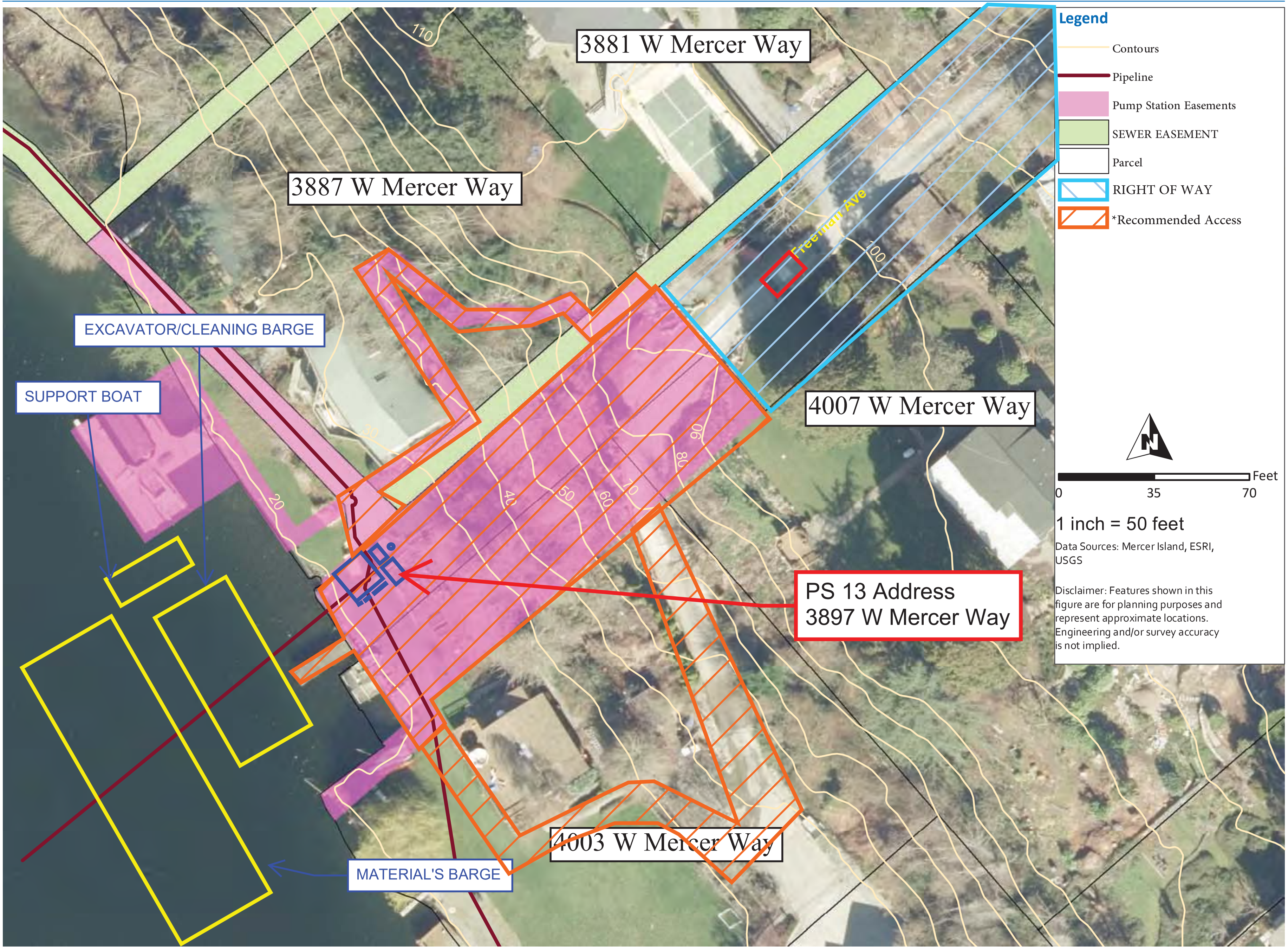
**Figure 4-19. Pump Station #13 All Existing Easements Access Map**

*View from Pump Station 13 upland towards roadway*

*Existing access comes from house stairs on left with Pump Station 13 near Lake WA*

*City dock at Pump Station 13*

**Figure 4-20.**
**Pump Station #13 Existing Site Photos**




carollo TETRA TECH *Recommended access subject to further revision

**Figure 4-21. Pump Station #13 Layout Map**

# 4.8 PUMP STATION #14

## 4.8.1 General Site Description

Pump Station #14 is on an upland site at 4315 Forest Avenue, within a street end park (Forest Landing) and along the Lake Washington shoreline. The site was rebuilt in 2014 and includes a hydraulic grade structure. Removable wooden bollards separate Forest Landing and SE 43rd Street. A city dock is at the southern edge of the site and is being used as a watercraft holding bay and launch site by the residents at 4305 Forest Avenue. Access to the dock from the pump station is blocked due to a fence the residents installed prior to the time of the site field investigation (August 8, 2018). A small bulkhead rockery, with eye bolt anchors installed for recreational kayakers, separates the site and Lake Washington. Figure 4-22 shows the overall site and vicinity.

## 4.8.2 Pump Station Equipment and Features

Table 4-19 summarizes equipment and features of the pump station.

**Table 4-19.** Pump Station #14 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 2 | Flygt (NP3085) | 3 hp | Diesel, below grade, adjacent to pump station | 20 kW | Yes | None |

## 4.8.3 Existing Easements

An access easement between the residential properties at 4311 and 4305 Forest Avenue and at the end of public right of way covers the existing pump station. Public right of way along Forest Avenue provides an approach to the site. The pump station force main, south of the site, is within a sewer easement and the inlet pipe, north of the site, is within a pump station easement. Figure 4-22 shows existing pump station and sewer easements. Table 4-20 lists the recorded easements.

**Table 4-20.** Pump Station #14 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1794 | 5770448 | Sewer Easement |
| 1797 | 6011026 | Access Easement |

## 4.8.4 Existing Access

Primary access to Pump Station #14 is land access from Forest Avenue. Water access is not currently used but could be considered for the future. Table 4-21 summarizes the access conditions. Photos are provided in Figure 4-23.

### Land Access

For current access by land, crews approach the site by Forest Avenue. After removing the wooden bollards, located at the end of the street and at the entrance to Forest Landing, they park on the paved surface east and immediately adjacent to the pump station. Same means of land access for vacuum truck.

### Water Access

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline. A city dock is present but is unused due to its lack of access from being connected to adjacent property. There is sufficient space for a barge to anchor offshore and access the site.

**Table 4-21.** Pump Station #14 Field Investigation Access Summary

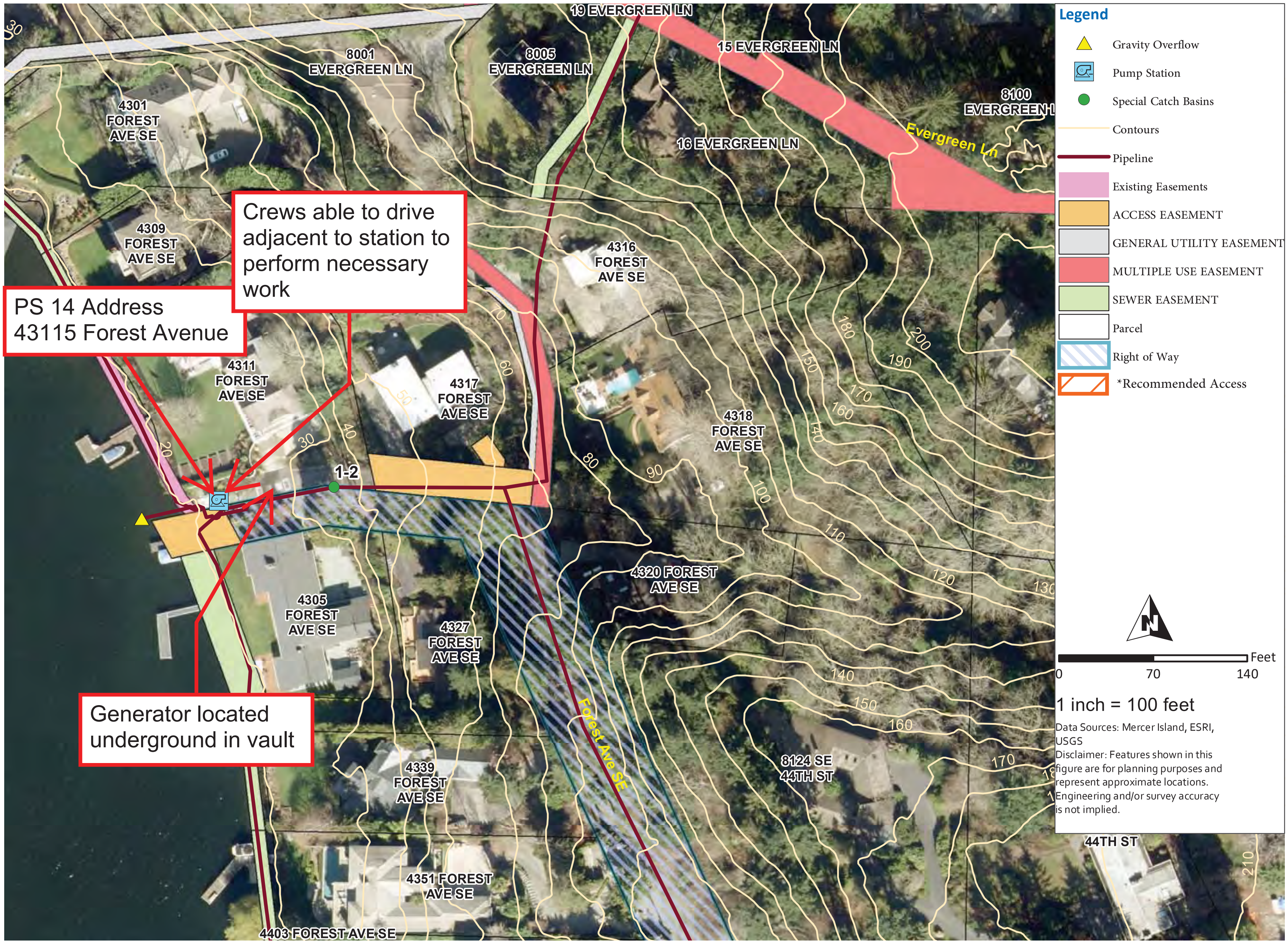
| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Removable bollards at street end park (Forest Landing) |
| On-Street Parking | Yes, on the shoulder of SE 43rd Street |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

## 4.8.5 Challenges

The key access challenge at Pump Station #14 is that the City dock is in poor condition.

## 4.8.6 Recommendations

Pump Station #14 has sufficient access for currently anticipated needs. No access improvements are recommended to the existing layout, which is shown on Figure 4-24.




*Recommended access subject to further revision

**Figure 4-22. Pump Station #14**
**All Existing Easements Access Map**

Driving access and current parking for crews, view upland from Pump Station 14

Pump Station 14 on shore of Lake WA

**Figure 4-23.**
**Pump Station #14 Existing Site Photos**

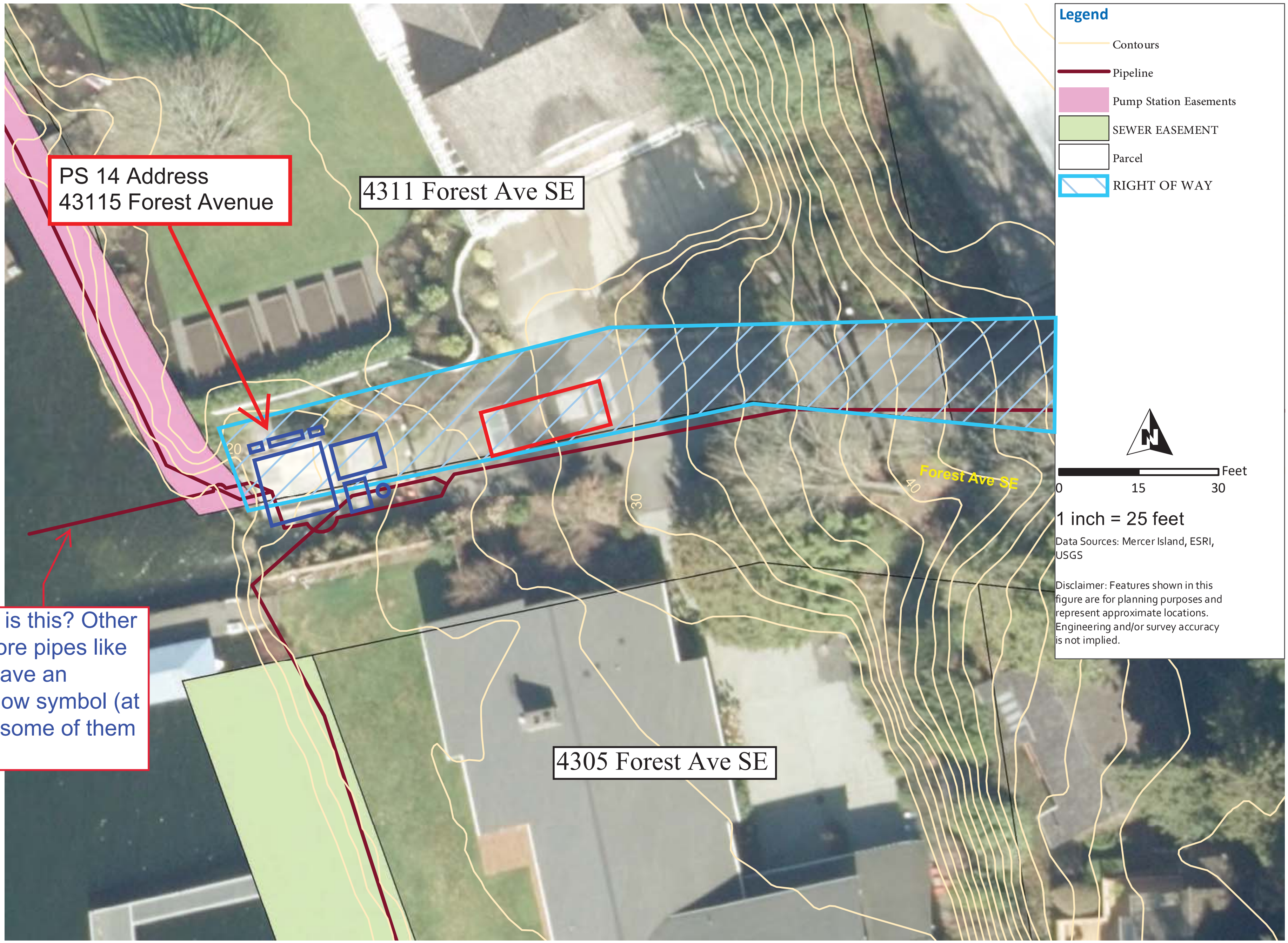





Figure 4-24. Pump Station #14 Layout Map

# 4.9 PUMP STATION #15

## 4.9.1 General Site Description

Pump Station #15 is on an upland site at 4765 Forest Avenue SE, within a street end park (Miller Landing) and along the Lake Washington shoreline. A steep concrete driveway within public right of way leads to a steep wooden staircase that begins just west of the residential driveway at 4753 Forest Avenue SE and that ends before the Lake Washington shoreline. A steep dirt trail starts at the foot of the stairs and ends at the Lake Washington shoreline adjacent to the pump station. A bulkhead that is visible at the interface of Miller Landing and Lake Washington is offset a few feet northwest of the site. The bulkhead has minor damage due to a barge collision. Dense vegetation along the length of the stairs covers the hydraulic grade structure and surrounds the pump station at the time of the site field investigation (August 8, 2018). A wooden sign in poor condition that reads, “Cable Crossing” is setback from the Lake Washington shoreline approximately 20 feet and is surrounded by vegetation. A city dock in good condition is at the site’s southern edge and a private dock at its northern edge. The city dock is inaccessible from the site. Figure 4-25 shows the overall site and vicinity.

## 4.9.2 Pump Station Equipment and Features

Table 4-22 summarizes equipment and features of the pump station.

**Table 4-22.** Pump Station #15 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 2 | Unknown | 5 hp | Diesel, above grade, 140 ft north east of pump station | 35 kW | Yes | Not Noted |

## 4.9.3 Existing Easements

Public right of way covers the existing pump station and access (see Figure 4-25). The pump station force main and inlet pipe are within pump station easements. Table 4-23 lists the recorded easements.

**Table 4-23.** Pump Station #15 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1943 | 5830122 | Sewer Easement |
| 1956 | 5783153 | Sewer Easement |
| 2018 | 5783152 | Sewer Easement |
| 2019 | 5867888 | Sewer Easement |
| 2020 | 5998359 | Sewer Easement |
| 2021 | 5778365 | Sewer Easement |
| 2022 | 5783151 | Sewer Easement |

## 4.9.4 Existing Access

Primary access to Pump Station #15 is water access. A barge will anchor between the two docks at the northerly and southerly ends of the site. Land access is not currently used but could be considered for improved access in the future. Table 4-24 summarizes access conditions. Photos are provided in Figure 4-26.

**Table 4-24.** Pump Station #15 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (stairs to dirt path) |
| Upland Driving Access/Barriers | Steep access along driveway and stairs |
| On-Street Parking | Yes, on shoulder of Forest Avenue SE |
| On-Site Parking | No |
| Vacuum Truck Accessible | No |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

### Land Access

Future land access—for cleaning or construction—is possible but limited to walking access. The wooden staircase that leads to the dirt path and the pump station is very steep, making hauling heavy equipment by hand impossible. Dense vegetation along the staircase and pump station could be a safety hazard if encroaching across stairs or dirt path. The dirt path from the foot of the stairs to the pump station is steep with poor traction. Vehicles will not be able to reach the site by land.

### Water Access

For current access by water, crews approach the site by barge. The barge anchors between the two docks that border the site. The city dock at the southerly end of the site is used for cleaning and construction purposes. The city dock does not have walking access to the pump station.

## 4.9.5 Challenges

The following are the key access challenges at Pump Station #15:

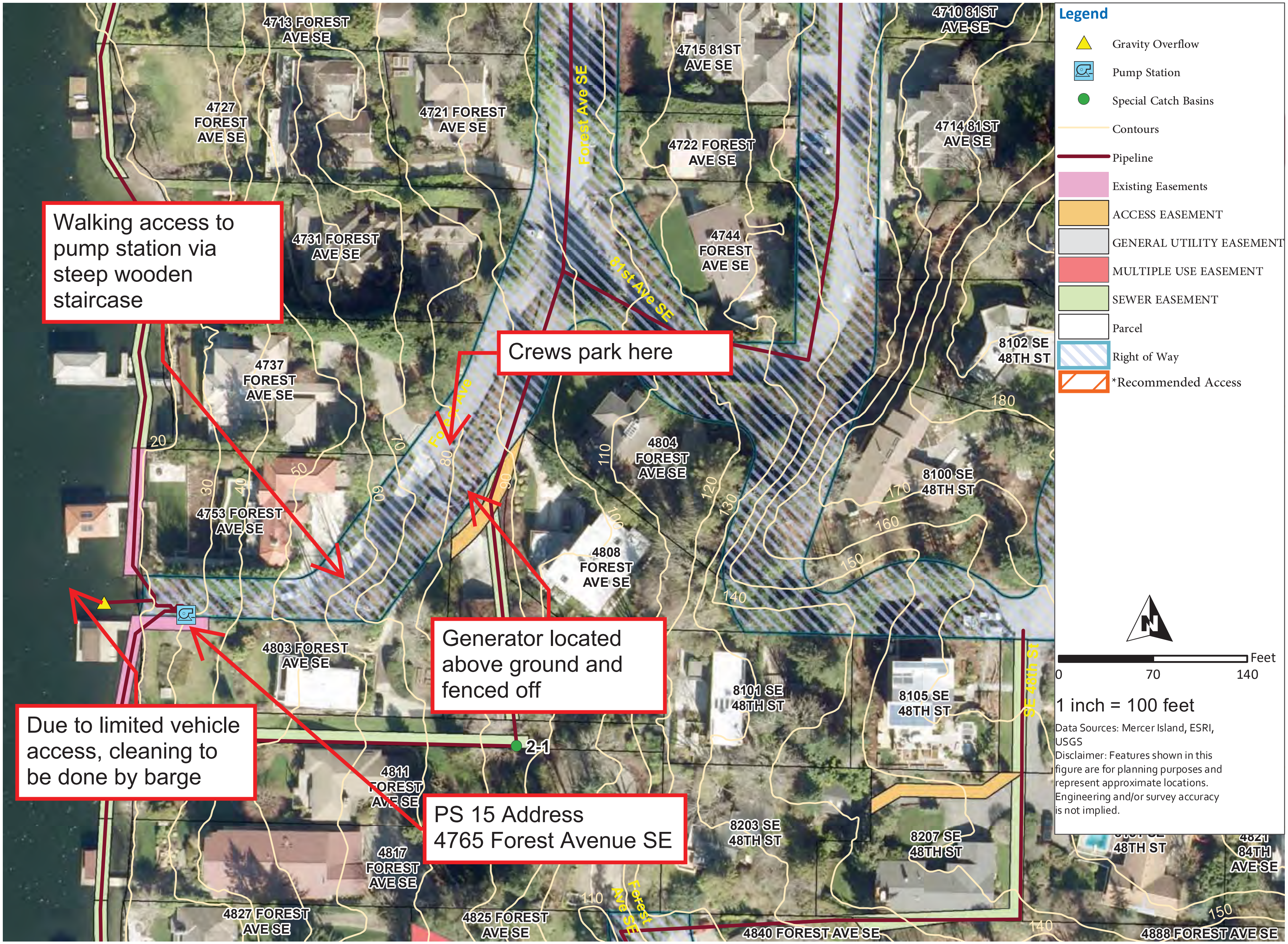
- Timber stairs steeply sloped
- Dense vegetation
- No walking access to city dock

Another challenge at Pump Station #15, unrelated to access, is that the location of the hydraulic grade structure is unknown.

## 4.9.6 Recommendations

The following are future upgrades for Pump Station #15 (see Figure 4-27):

- Maintenance of existing easement (removal of vegetation)
- Easement review and confirmation
- Stairway access (repairs/installation)
- Proposed easement acquisition
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)




*Recommended access subject to further revision

**Figure 4-25. Pump Station #15**
**All Existing Easements Access Map**

*Driving access and parking area for crews*

*Generator located upland of Pump Station 15, walking access using private driveway on right*

Wooden stairway access to Pump Station 15 from upland

Cable crossing located at pump station 15

**Figure 4-26.**
**Pump Station #15 Existing Site Photos**




**Figure 4-27. Pump Station #15 Layout Map**

# 4.10 PUMP STATION #16

## 4.10.1 General Site Description

Pump Station #16 is on an upland site at 5495 W. Mercer Way, within a street end park (SE 56th Street Landing) at the end of a gravel path that terminates at the Lake Washington shoreline. Removable wooden bollards mark the end of Brook Bay Road and the beginning of the gravel path, which is within public right of way. The area along the gravel path is large, relatively flat, and covered by tree canopy at the time of site field investigation (August 8, 2018). A city dock in good condition is north of the pump station, adjacent to a wooden gate at the end of the wooden fence that partitions the right of way from the property at the northern end of the site. Dense vegetation and a large tree obstruct the wooden gate. The dock is anchoring a privately-owned watercraft. A hydraulic grade structure and lake line inlet are at the site. Figure 4-28 shows the overall site and vicinity.

## 4.10.2 Pump Station Equipment and Features

Table 4-25 summarizes equipment and features of the pump station.

**Table 4-25.** Pump Station #16 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 3 | Unknown | 7.5 hp | Diesel, above grade, 100 ft east of pump station | 35 kW | Yes | Not Noted |

## 4.10.3 Existing Easements

Public right of way covers the pump station and access (see Figure 4-28). The pump station force main and the inlet pipe are within pump station easements. Table 4-26 summarizes recorded easements.

**Table 4-26.** Pump Station #15 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 2122 | 196710186251669 | Multiple Use Easement |
| 2123 | 196710186251669 | General Utility Easement |
| 2231 | 5835494 | Sewer Easement |
| 2232 | 5998358 | Sewer Easement |
| 2233 | 5770411 | Sewer Easement |

## 4.10.4 Existing Access

Primary access to Pump Station #16 is land access by gravel path that extends from the termination of Brook Bay Road. Water access is not currently used but could be considered for access for the future. Table 4-27 summarizes access conditions. Photos are provided in Figure 4-29.

### Land Access

For current access by land, crews approach the site by Brook Bay Road. After removing the wooden bollards, located at the end of the street, they park on the gravel path immediately adjacent to the pump station. Same means of land access for vacuum truck.

## Water Access

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline. A city dock in good condition is present and can be accessed from the pump station. From the pump station a gate at the end of the wooden fence, which partitions the pump station from the property at the northern edge of the site, provides access to an overgrown walkway to the city dock. Dense vegetation surrounds the wooden gate. There is sufficient space for a barge to anchor offshore and access the site.

**Table 4-27.** Pump Station #16 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | No (gravel) |
| Paved Walking Path | No (gravel) |
| Upland Driving Access/Barriers | Removable bollards at beginning of gravel path |
| On-Street Parking | Yes, at the end of Brook Bay Road and before the gravel path |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

## 4.10.5 Challenges

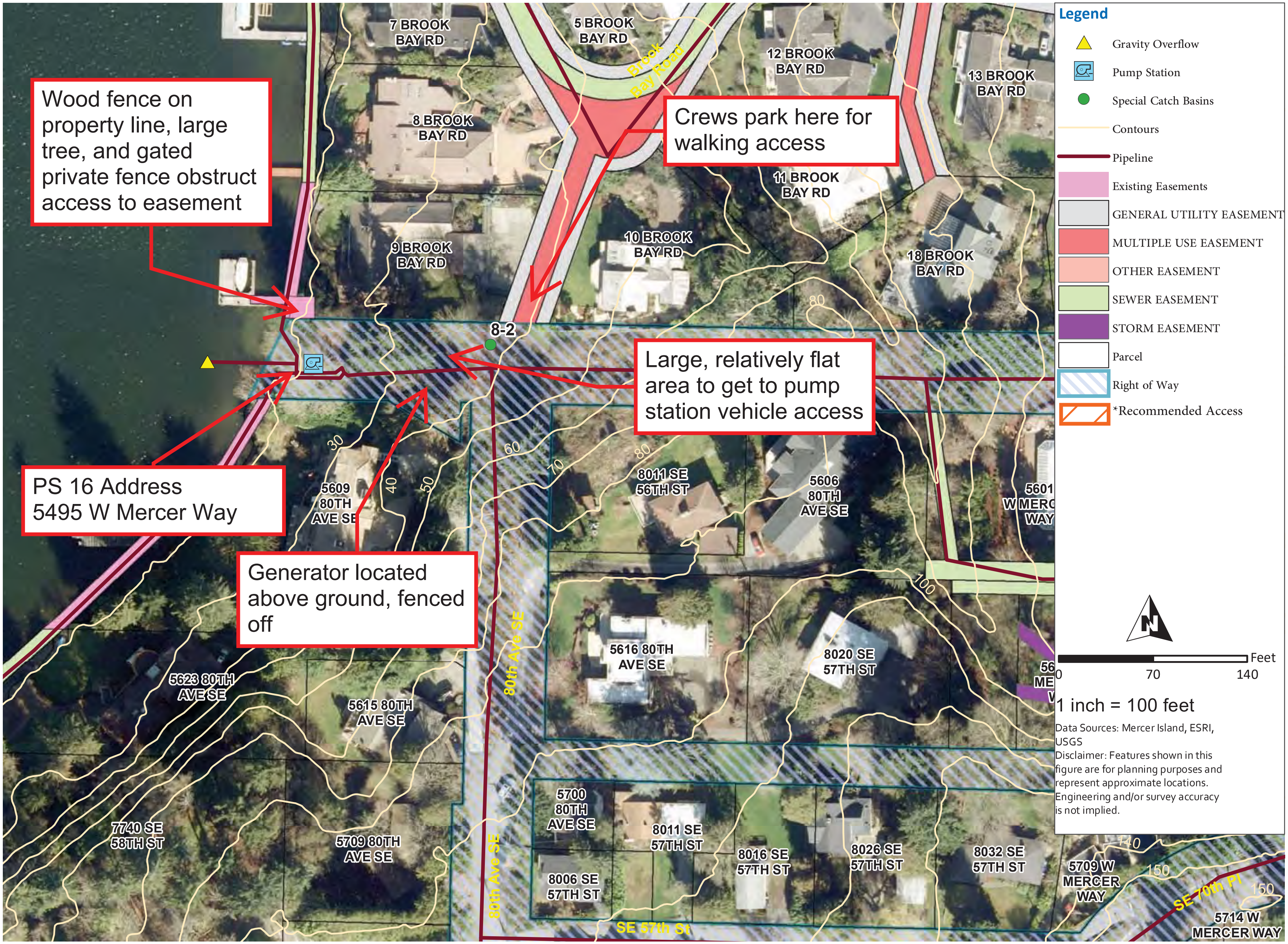
The following is the key access challenge at Pump Station #16:

- Dense vegetation and large tree surrounding wooden gate to city dock

## 4.10.6 Recommendations

For adequate future access, the pump station easement for Pump Station #16 should be as shown on Figure 4-30. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)
- Dock condition assessment (related to City boat access)





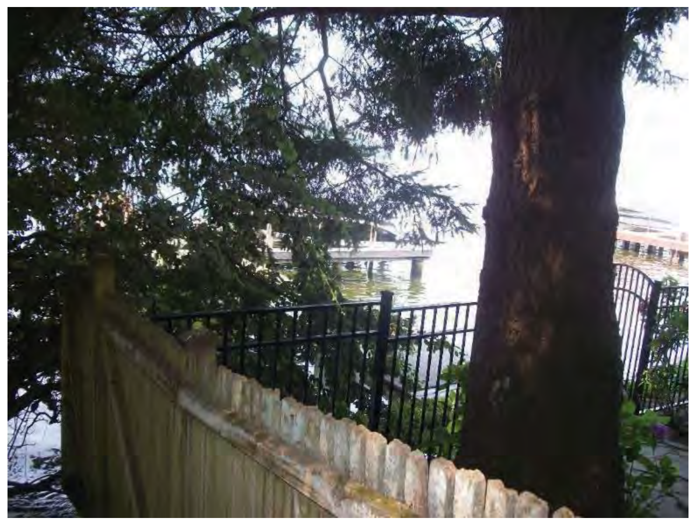

*Recommended access subject to further revision

**Figure 4-28. Pump Station #16 All Existing Easements Access Map**

*Parking area for crews entering the Pump Station area*

*Above ground generator on the left with access to pump station at the lake front*

*Pump Station exposed to Lake*



*Current pump station easement extends onto dock but gate, tree and fence preventing access*

**Figure 4-29.**
**Pump Station #16 Existing Site Photos**

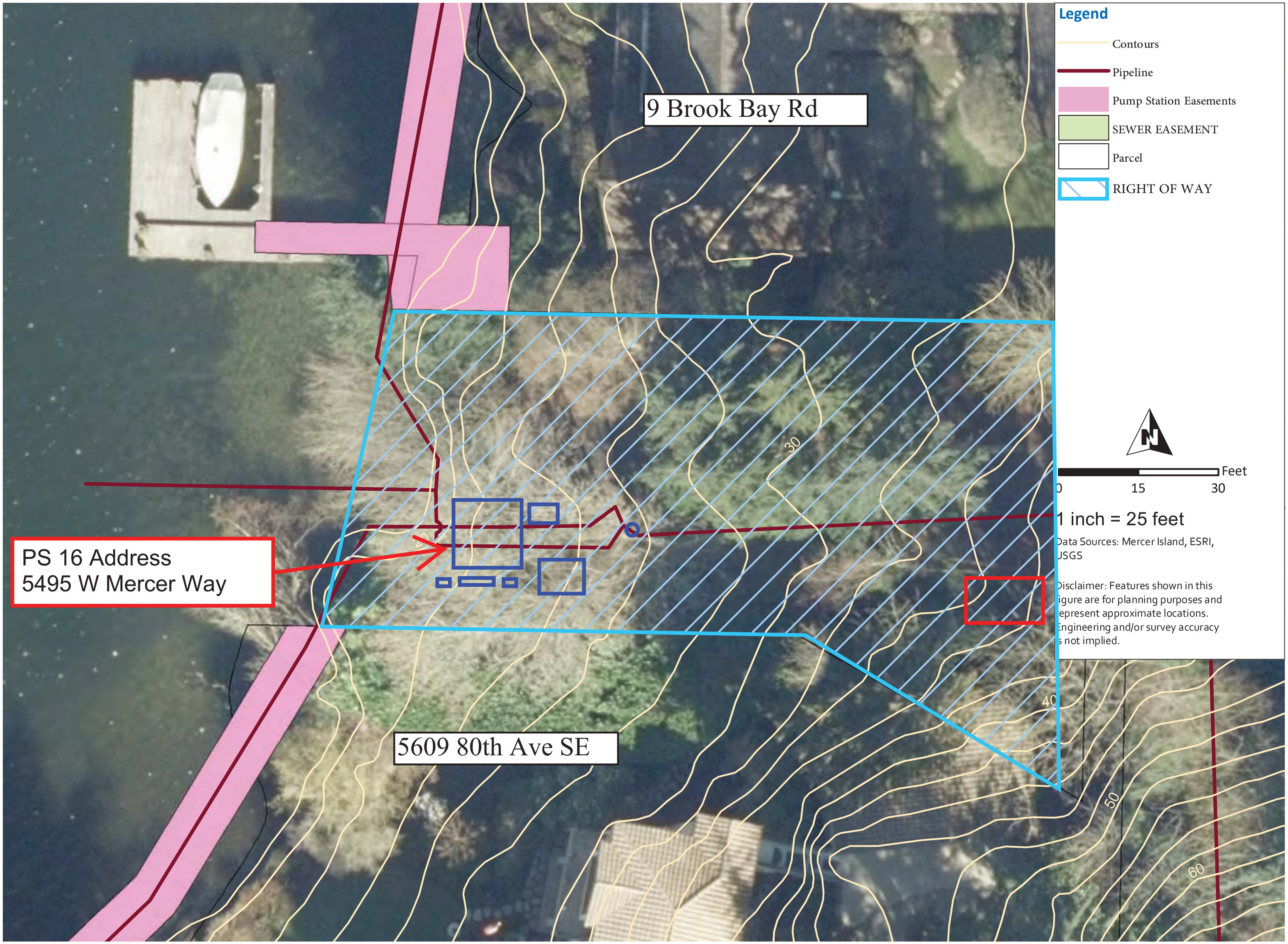





Figure 4-30. Pump Station #16 Layout Map

# 4.11 PUMP STATION #17

## 4.11.1 General Site Description

Pump Station #17 (address 6415 77th Avenue SE) is on an upland site in the backyard of the residential property at 6411 77th Avenue SE and adjacent to the Lake Washington shoreline. The pump station is surrounded by a flowerbed at the southern end of the grassy lawn approximately halfway between Lake Washington and the house. A privately owned dock runs from the southern edge of the residential property into Lake Washington. Concrete stairs lead to the water elevation from the western edge of the property. The southern edge of the property is overgrown with vegetation. A hydraulic grade structure is on-site. Figure 4-31 shows the overall site and vicinity.

## 4.11.2 Pump Station Equipment and Features

Table 4-28 summarizes equipment and features of the pump station.

**Table 4-28.** Pump Station #17 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control | Other |
|---|---|---|---|---|---|---|---|
| Number | Type | Power | | | | | |
| 3 | Unknown | 7.5 hp | Diesel, below grade, 190 ft east of pump station | 30 kW | Yes | Not noted | Water meter with shed cover |

## 4.11.3 Existing Easements

The pump station, force main, and inlet pipe are covered by pump station easements (see Figure 4-31). An additional pump station easement runs along the length of the southern edge of the residential property, but it is overgrown and inaccessible by foot. A storm easement runs the length of the northern edge of the property and provides walking access. Parking is within a pump station easement adjacent to 77$^{th}$ Avenue SE. Table 4-29 lists the recorded easements.

**Table 4-29.** Pump Station #17 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 2360 | 5840149 | Storm Easement |
| 2361 | 5844584 | Sewer Easement |
| 2362 | 5768644 | Sewer Easement |
| 2363 | 5750999 | Sewer Easement |
| 2417 | 5055302 | Water Easement |
| 2418 | 198605200400 | General Utility Easement |
| 2469 | SUB6209-003 | Sewer Easement |

## 4.11.4 Existing Access

Primary access to Pump Station #17 is land access by walking along storm and pump station easements that follow the northern perimeter of the residential property at 6411 77$^{th}$ Avenue SE and along the Lake Washington shoreline. Water access is not currently used but could be considered for access for the future. Table 4-30 summarizes access conditions. Photos are provided in Figure 4-32 and Figure 4-33.

**Table 4-30.** Pump Station #17 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| **Land Access** | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Private property, no vehicle access |
| On-Street Parking | Yes, on the shoulder of 77th Avenue SE |
| On-Site Parking | No |
| Vacuum Truck Accessible | Yes |
| **Water Access** | |
| Water Access | Yes |
| Dock Access | Yes |

### Land Access

For current access by land, crews approach the site by 77th Avenue SE, where they park on the shoulder. They walk down a steep private driveway and along the storm easement at the northern edge of the property. After reaching the Lake Washington shoreline they walk south along a pump station easement where they can reach the pump station. A vacuum truck can access the pump station with a 400-foot flex hose used from 77th Avenue SE. The hose is run through dense vegetation within the pump station easement that follows the length of the southern edge of the property.

### Water Access

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline. Adequate space is available between the docks at the north and south ends of the property for barge access.

## 4.11.5 Challenges

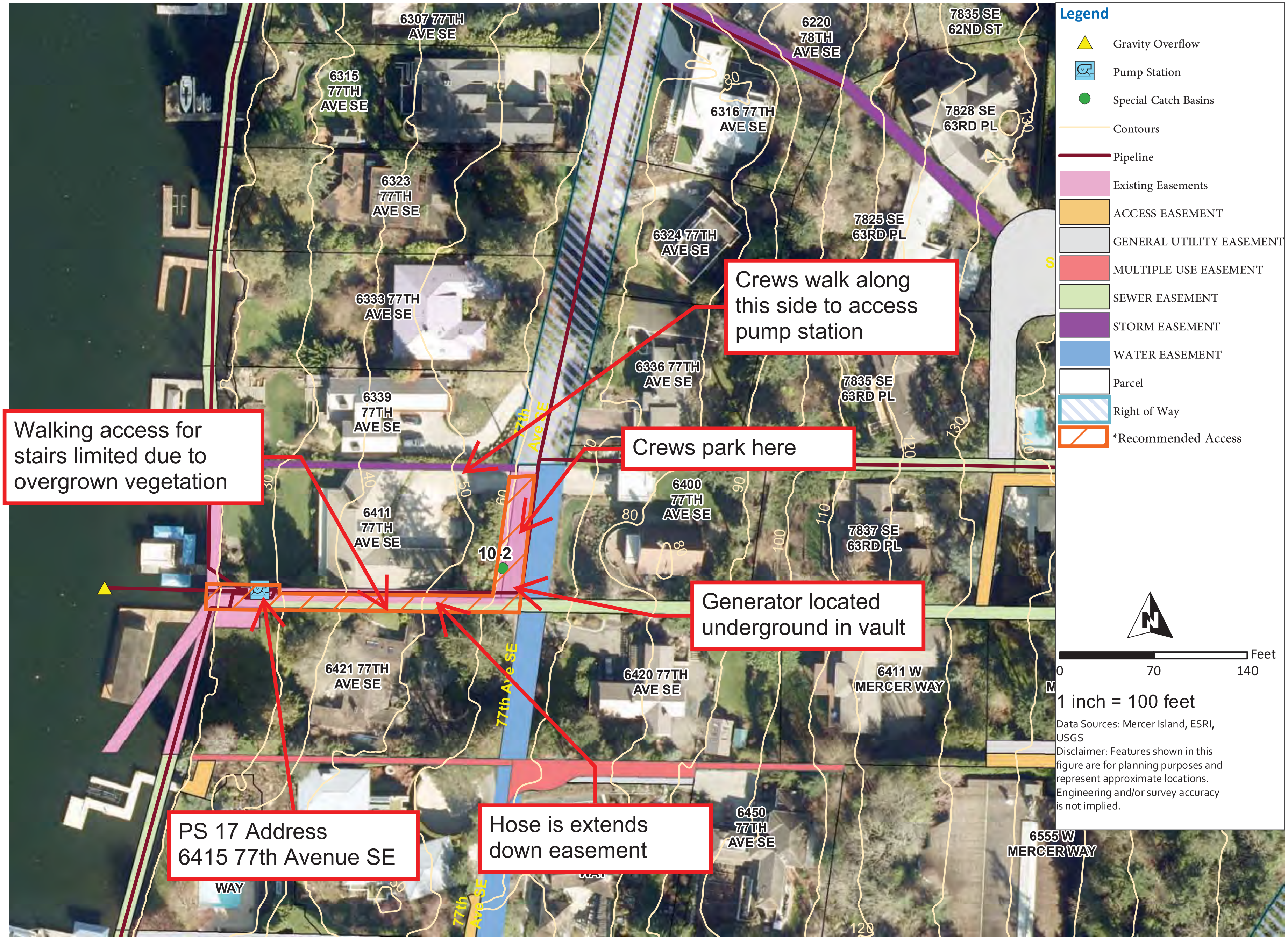
The following are the key access challenges at Pump Station #17:

- Docks and boat houses are close together, causing water access to be far from pump station
- Existing easement is overgrown with vegetation, making it inaccessible

## 4.11.6 Recommendations

For adequate future access, the pump station easement for Pump Station #17 should be as shown on Figure 4-34. The following are also recommended:

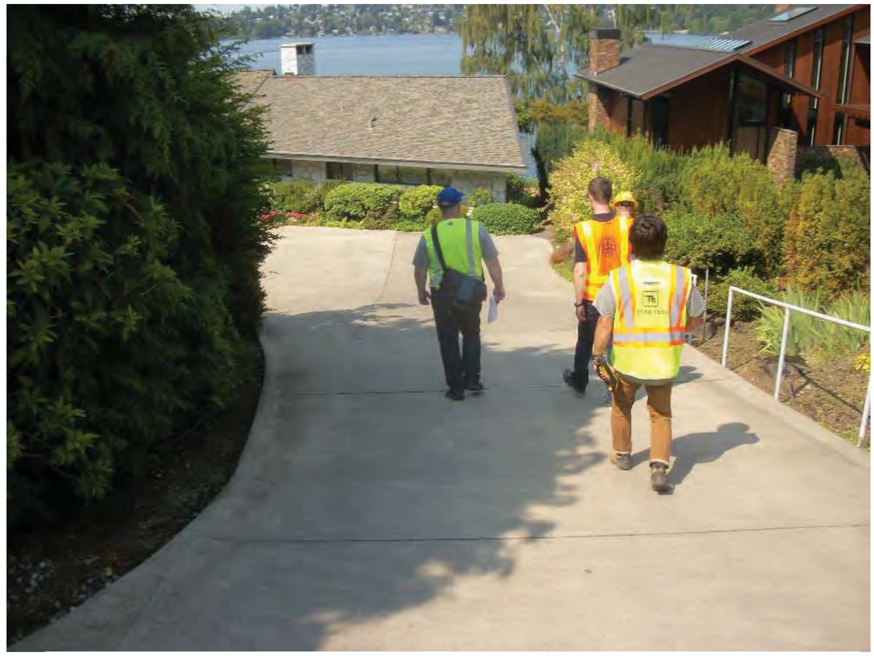
- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Generator upgrades/replacement (confirm location in existing easement)




*Recommended access subject to further revision

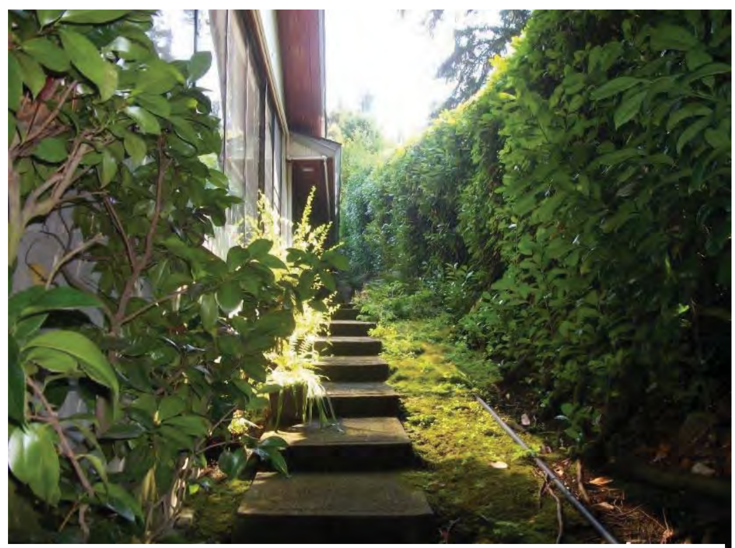
**Figure 4-31. Pump Station #17**
**All Existing Easements Access Map**


*Generator located below grade upland of pump station near parking area for crews*



*Walking access to pump station through private driveway*

*Limited water access for pump station repairs due to docks and boat lifts*



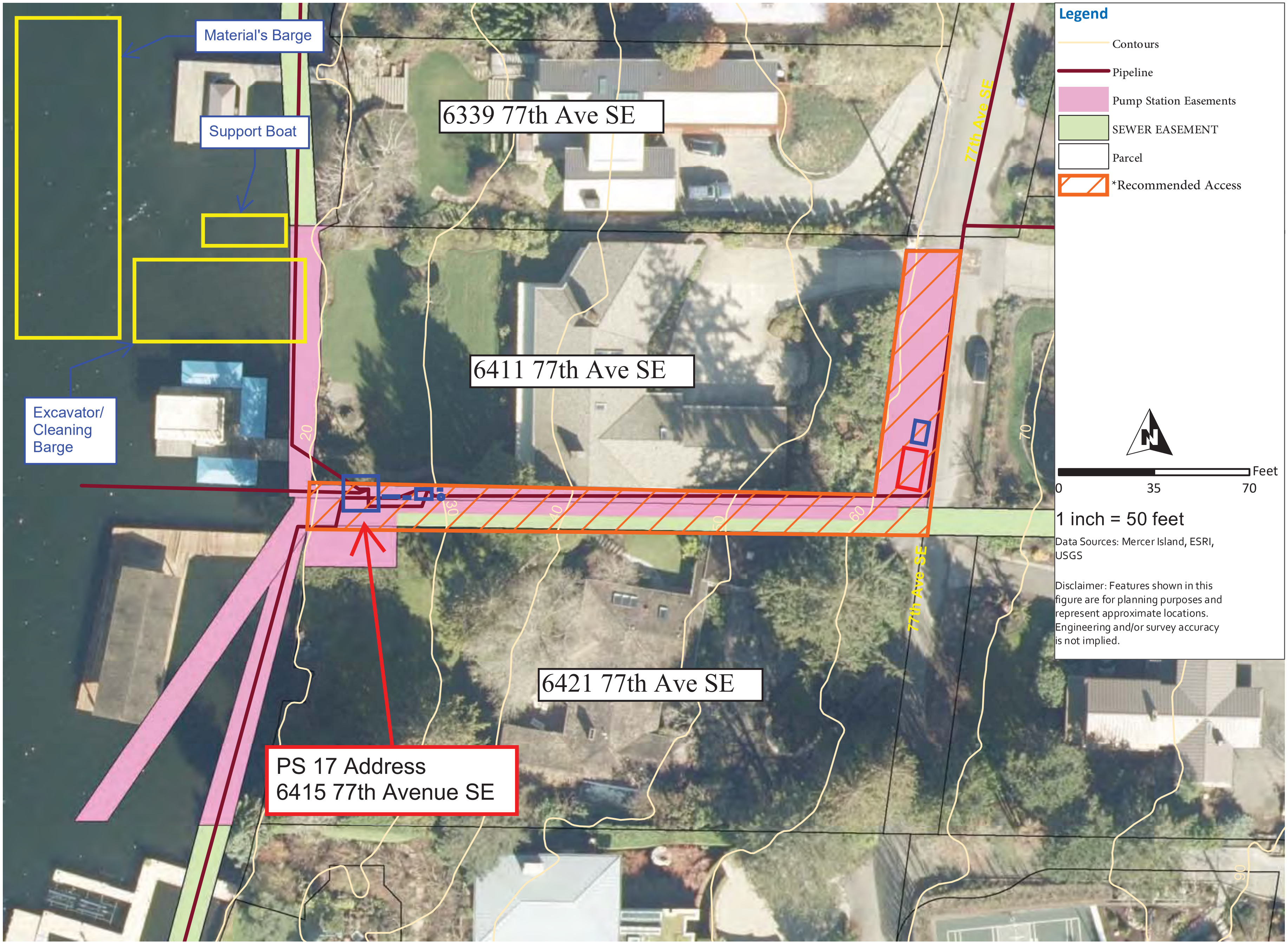
*Existing Pump station easement along south side of home, direct to pump station by water*

**Figure 4-32.**
**Pump Station #17 Existing Site Photos (1 of 2)**

*View upland from pump station along existing easement showing overgrown vegetation*

*Pump Station located within flowerbed*

**Figure 4-33.**
**Pump Station #17 Existing Site Photos (2 of 2)**




carollo TETRA TECH

*Recommended access subject to further revision

**Figure 4-34. Pump Station #17 Layout Map**

# 4.12 PUMP STATION #18

## 4.12.1 General Site Description

Pump Station #18 is on an upland site at 7220 Holly Hill Drive, surrounded by vegetation within a flat, marshy area. Holly Hill Drive is very steep, narrow, and winding private roadway. A paved, private, residential driveway marks the termination of Holly Hill Drive and the location where parking is easiest. A gravel path from the edge of the driveway leads to Lake Washington along the northern edge of the property. A small and narrow dirt path branches out of the gravel path and leads to the pump station. North of the pump station is a small creek that runs the length of the site and to the Lake Washington shoreline. Across the creek, on its northern bank, is a gravel road that is wide enough for a vehicle. A vegetated bank is beside the pump station's southern edge. Trees provide a canopy for the pump station. At the end of the gravel path, tree coverage stops and the area is covered in landscaping. Two private docks run into Lake Washington from the grassy area. Mooring space between docks is small. Figure 4-35 shows the overall site and vicinity.

## 4.12.2 Pump Station Equipment and Features

Table 4-31 summarizes equipment and features of the pump station.

**Table 4-31.** Pump Station #18 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor | |
|---|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control | Other |
| 3 | Unknown | 7.5 hp | Diesel, below grade, upland of the pump station along Holly Hill Drive | 40 kW | Yes | Not Noted | Not noted |

## 4.12.3 Existing Easements

The pump station is covered by a pump station easement (see Figure 4-35). Just outside of the pump station easement is a storm easement. The force main, inlet pipes, and access are within a pump station and vegetation easement. Table 4-32 lists the recorded easements.

## 4.12.4 Existing Access

Primary access to Pump Station #18 is land access by gravel and dirt paths. The gravel path begins at the driveway of the property. The dirt path branches out of the gravel path and leads to the pump station. Water access is not currently used and due to site conditions, should not be used for access for the future. Table 4-33 summarizes access conditions. Photos are provided in Figure 4-36.

### Land Access

For current access by land, crews approach the site by Holly Hill Drive. Crews park in the private driveway of 7201 Holly Hill Drive after driving down the narrow, steep, and winding road. They walk down a gravel path at the northeastern corner of the driveway. The gravel path is narrow and covered by a tree canopy. Vegetation is along its length on both sides. Following the gravel path for a few feet, crews then walk along a dirt path that branches out to the east. This dirt path provides access to the pump station, which is situated in a densely vegetated, marshy area. A vacuum truck can access the pump station with a 400-foot flex hose used upland on Holly Hill Drive.

**Table 4-32.** Pump Station #18 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 2383 | 5824577 | Sewer Easement |
| 2384 | 5915965 | Sewer Easement |
| 2385 | 5867882 | Sewer Easement |
| 2386 | 5758768 | Sewer Easement |
| 2396 | 5810618 | Sewer Easement |
| 2399 | 1998809140716 | Sewer Easement |
| 2401 | 5055309 | Water Easement |
| 2402 | 198205140793 | Storm Easement |
| 2405 | 5055293 | Water Easement |
| 2406 | 198208050608 | General Utility Easement |
| 2512 | 197802211006 | Vegetation Easement |
| 2517 | SUB6509-005 | Access Easement |
| 2589 | 5770418 | Sewer Easement |
| 2590 | 5758716 | Sewer Easement |
| 2591 | 5055294 | Water Easement |
| 2600 | SUB6208-006 | Access Easement |
| 2601 | 198208050607 | General Utility Easement |
| 3450 | 198202230536 | Storm Easement |
| 3451 | 198202230537 | Storm Easement |
| 3452 | 198202230538 | Storm Easement |
| 3453 | 198202230539 | Storm Easement |
| 3456 | 198202230543 | Storm Easement |
| 2457 | 198202230544 | Storm Easement |
| 3458 | 198205260486 | Storm Easement |
| 3460 | 198211040610 | Storm Easement |

**Table 4-33.** Pump Station #18 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| **Land Access** | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (gravel/dirt) |
| Upland Driving Access/Barriers | Steep, narrow, and winding driveway. Park in private property driveway that has access to pump station and Lake Washington shoreline. |
| On-Street Parking | Yes, private driveway |
| On-Site Parking | No |
| Vacuum Truck Accessible | Yes, from Holly Hill Road with a 400-foot flex hose |
| **Water Access** | |
| Water Access | No |
| Dock Access | No |

**Water Access**

Water access is not possible due to insufficient mooring space around the two private docks that run into Lake Washington from the properties surrounding the pump station. Additionally, landscaping, significant distance upland, wetland and dense vegetation pose significant obstacles to water access.

## 4.12.5 Challenges

The following are the key access challenges at Pump Station #18:

- Pump station can flood in severe storm event
- Inadequate odor control
- Land access is difficult due to steep slope of road

## 4.12.6 Recommendations

For adequate future access, the pump station easement for Pump Station #18 should be as shown on Figure 4-37. The following are also recommended:

- Easement review and confirmation
- Construct roadway to pump station
- Maintain easement/City property (remove vegetation)
- Proposed easement acquisition
- Wetland delineation (related to proposed easement acquisition)
- Generator upgrades/replacement (confirm location in existing easement)


*Recommended access subject to further revision

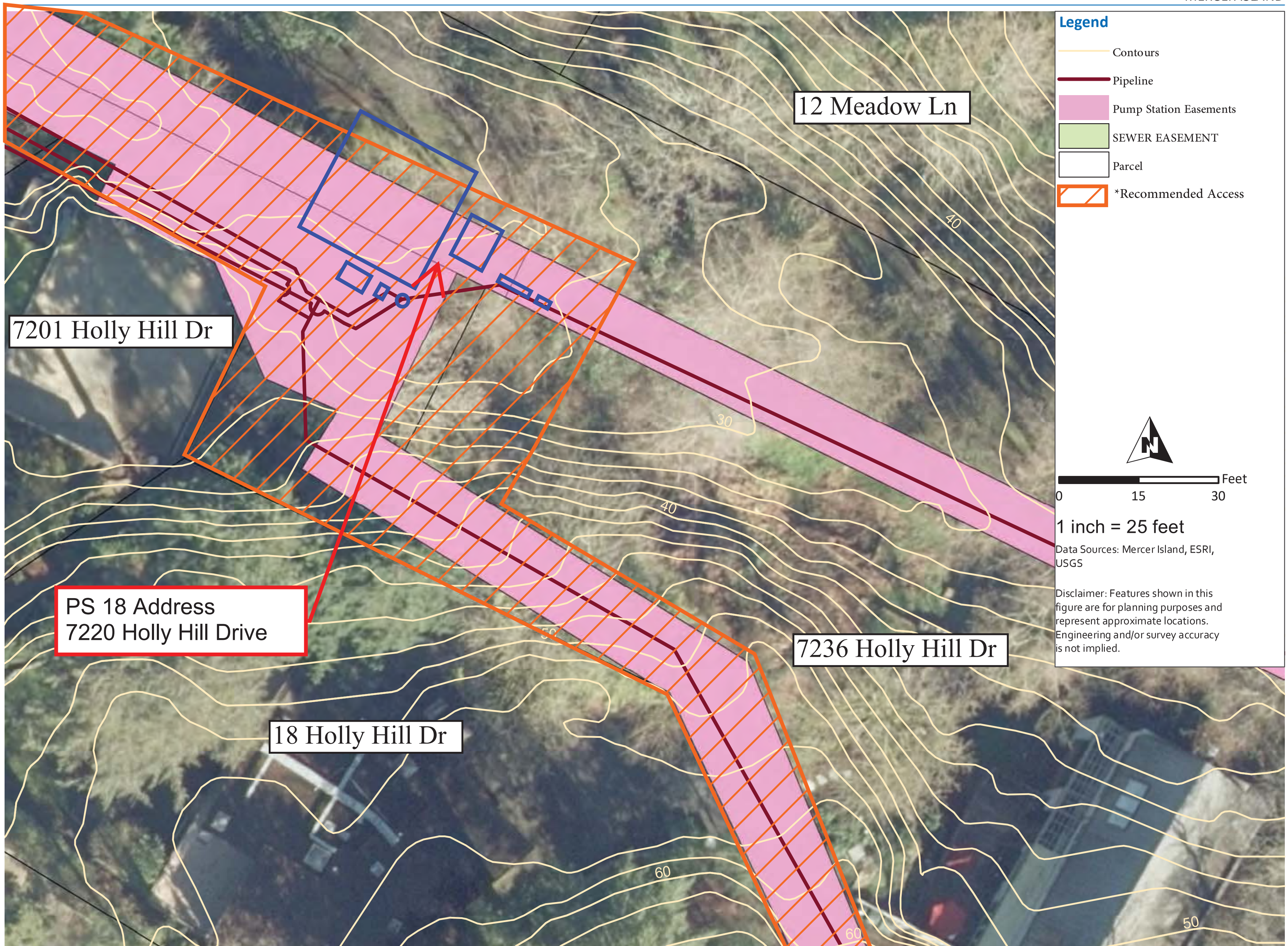
**Figure 4-35. Pump Station #18**
**All Existing Easements Access Map**

Pump Station located near marshy area, looking northeast

Pump Station located near marshy area, looking southeast

Gravel road upland of bollards, looking east from Lake WA

**Figure 4-36.**
**Pump Station #18 Existing Site Photos**




carollo TETRA TECH *Recommended access subject to further revision

**Figure 4-37. Pump Station #18 Layout Map**

# 4.13 PUMP STATION #19

## 4.13.1 General Site Description

Pump Station #19 is on an upland site at 7697 W. Mercer Way, adjacent to a residential property's backyard and along the Lake Washington shoreline. The public path is not used due to steep slope and dense vegetation. A steep residential driveway leads to a gravel path along the Lake Washington shoreline. The gravel path degrades to a wide, grass and dirt strip that continues along the Lake Washington shoreline. Branches from surrounding vegetation at eye level cross the footpath and must be pushed to the side when walking south along the grass and dirt strip of land. Portions of footpath were muddy from small stream and plumbing at time of site field investigation (August 8, 2018). Trees provide canopy along Lake Washington shoreline. Small "boathouse" with plumbing is midway between the end of the gravel path and the pump station. Concrete city dock with deteriorating wood deck runs into Lake Washington from the immediate pump station vicinity. Concrete steps from the dock to the pump station. Dense vegetation around pump station. Hydraulic grade structure on slope adjacent to the eastern edge of the pump station. Figure 4-38 shows the overall site and vicinity.

## 4.13.2 Pump Station Equipment and Features

Table 4-34 summarizes equipment and features of the pump station.

**Table 4-34.** Pump Station #19 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor |
|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control |
| 3 | Not Noted | 10 hp | Diesel, shoulder of W. Mercer Way, above grade | 50 kW | Yes | Not Noted |

## 4.13.3 Existing Easements

The pump station is not within an easement (see Figure 4-38). The inlet pipe and force main are covered by pump station easements. Public right of way covers a footpath that is unused due to dense vegetation and steep slope. Current land access is not within an easement. Table 4-35 lists the recorded easements.

**Table 4-35.** Pump Station #19 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 2626 | 198401259011 | Multiple Use Easement |

## 4.13.4 Existing Access

Primary access to Pump Station #19 is water access by barge. A city dock is situated adjacent to where the barge anchors. Land access is not currently used but could be considered for access for the future. Table 4-36 summarizes access conditions. Photos are provided in Figure 4-39.

### Land Access

Future land access—for cleaning or construction—is possible, with the procurement of an easement. This easement would allow crews to park in right of way near 7645 W. Mercer Way after driving down the steep and winding road. The easement would extend from the right of way at the previous parking location and travel along the shoreline crossing 7649 W. Mercer Way, 7671 W. Mercer Way and 7677 W. Mercer Way, ending at 7697 W. Mercer Way. Due to minimal access here, this easement would be for small sized maintenance and foot traffic only; the station is not vacuum truck accessible.

**Table 4-36.** Pump Station #19 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (gravel/dirt) |
| Upland Driving Access/Barriers | Public right of way is steep and covered with dense vegetation. Access outside of easement |
| On-Street Parking | Yes, on shoulder of W. Mercer Way |
| On-Site Parking | No |
| Vacuum Truck Accessible | No |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes, needs repair |

#### Water Access

For current access by water, crews approach the site by barge. The barge anchors adjacent to the city dock that is in the immediate vicinity of the pump station. The city dock has walking access to the pump station but needs to be repaired before use.

### 4.13.5 Challenges

The following are the key access challenges at Pump Station #19:

- No land access easements
- City dock wooden deck is deteriorating

### 4.13.6 Recommendations

For adequate future access, the pump station easement for Pump Station #19 should be as shown on Figure 4-40. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Maintain easement/City property (remove vegetation)
- Proposed easement acquisition
- Dock condition assessment (related to City boat access)

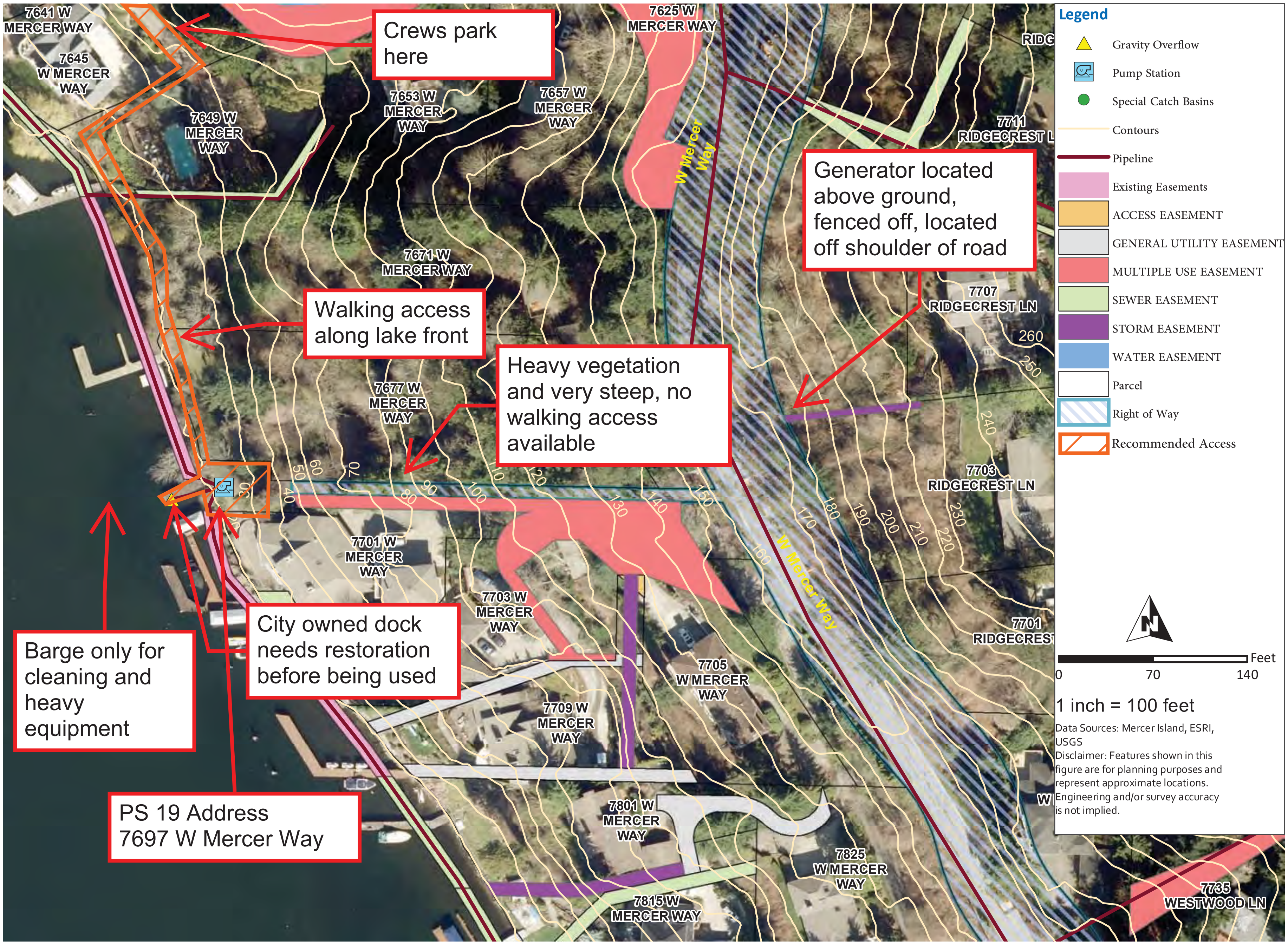





**Figure 4-38. Pump Station #19 All Existing Easements Access Map**

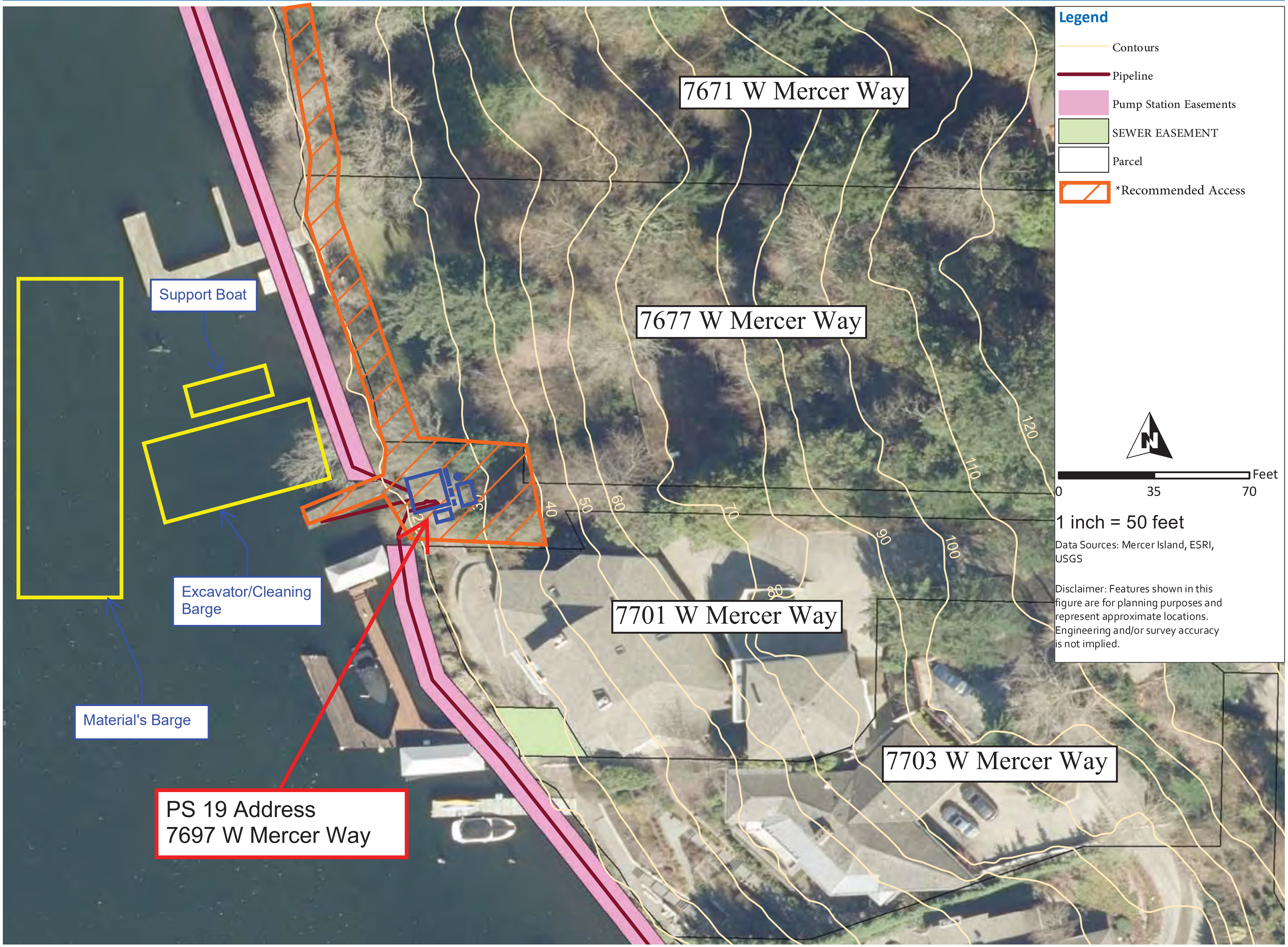
*Generator and crew parking for generator is on the road shoulder*

*Existing walking access through drive way, walking along water front*

*City owned dock needs work prior to use, existing pump station behind*

*Heavy vegetation through existing steep ROW preventing walking access*

**Figure 4-39.**
**Pump Station #19 Existing Site Photos**




*Recommended access subject to further revision

**Figure 4-40. Pump Station #19 Layout Map**

## 4.14 PUMP STATION #20

### 4.14.1 General Site Description

Pump Station #20 is on an upland site at 8790 85th Avenue SE, at a street end park (South Point Landing) and adjacent to the Lake Washington shoreline. 85th Avenue SE is narrow, steep, and terminates at a wooden guardrail without a turnaround. South of the guardrail, the ground surface steeply slopes and descends a few feet before meeting a level concrete surface. Dry grass covered the steep slope south of the guardrail at the time of site field investigation (August 8, 2018). The pump station is situated between the bottom of the grassy decline and the Lake Washington shoreline. There is a hydraulic grade structure on the steep decline to the pump station. A bulkhead rockery is on west boundary of site. Private docks in Lake Washington are at the east and west ends of the site. Figure 4-41 shows the overall site and vicinity.

### 4.14.2 Pump Station Equipment and Features

Table 4-37 summarizes equipment and features of the pump station.

**Table 4-37.** Pump Station #20 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor |
|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control |
| 3 | Not Noted | 10 hp | Diesel, uphill from pump station in the bank to south of right of way, below grade | 50 kW | Yes | Not Noted |

### 4.14.3 Existing Easements

Public right of way covers the pump station, force main, inlet pipe, and access (see Figure 4-41). Pump station access easements also cover the pump station inlet pipe and force main.

### 4.14.4 Existing Access

Primary access to Pump Station #20 is land access from 85th Avenue SE. Water access is not currently used but could be considered for the future. Table 4-38 summarizes the access conditions. Photos are provided in Figure 4-42.

#### Land Access

For current access by land, crews approach the site by 85th Avenue SE. Crews back their vehicles down 85$^{th}$ Avenue SE due to the lack of a turnaround at the termination of the right of way. They park at the wooden guardrail that marks the end of the road. They walk around the wooden guardrail and a few feet down the steep, grassy, downward slope to the pump station. A vacuum truck can access the pump station by parking in its immediate vicinity at the guardrail.

#### Water Access

Future water access—for cleaning or construction—is possible, as the pump station is near the Lake Washington shoreline. Adequate space is available between the docks at the east and west ends of the property for barge access.

**Table 4-38.** Pump Station #20 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | No turnaround. Back in and park at wooden guardrail. |
| On-Street Parking | Yes |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

## 4.14.5 Challenges

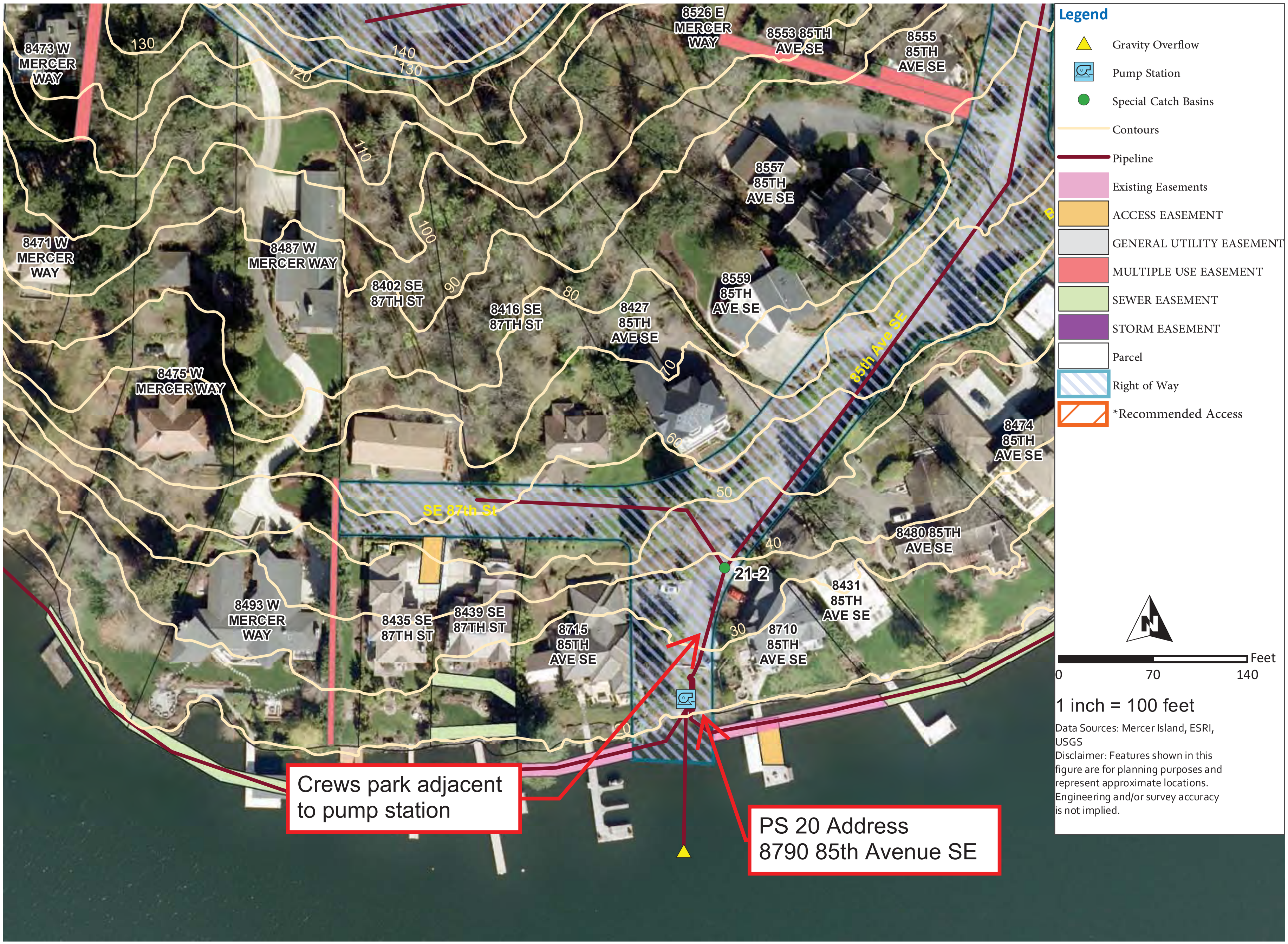
There are no access challenges at Pump Station #20. The following are other challenges at Pump Station #20, unrelated to access:

- Dry well has constant air exchange
- Inflection in wet well with rebar exposed

## 4.14.6 Recommendations

For adequate future access, the pump station easement for Pump Station #20 should be as shown on Figure 4-43. The following are also recommended:

- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)




Carollo TETRA TECH *Recommended access subject to further revision

**Figure 4-41. Pump Station #20**
**All Existing Easements Access Map**

*Driving and parking access for crew along end of ROW*

*Pump Station on lake front with hill for access to it*

*View from lake upland showing hill*

*Pump station exposed to lake, acting as a bulkhead*

**Figure 4-42.**
**Pump Station #20 Existing Site Photos**

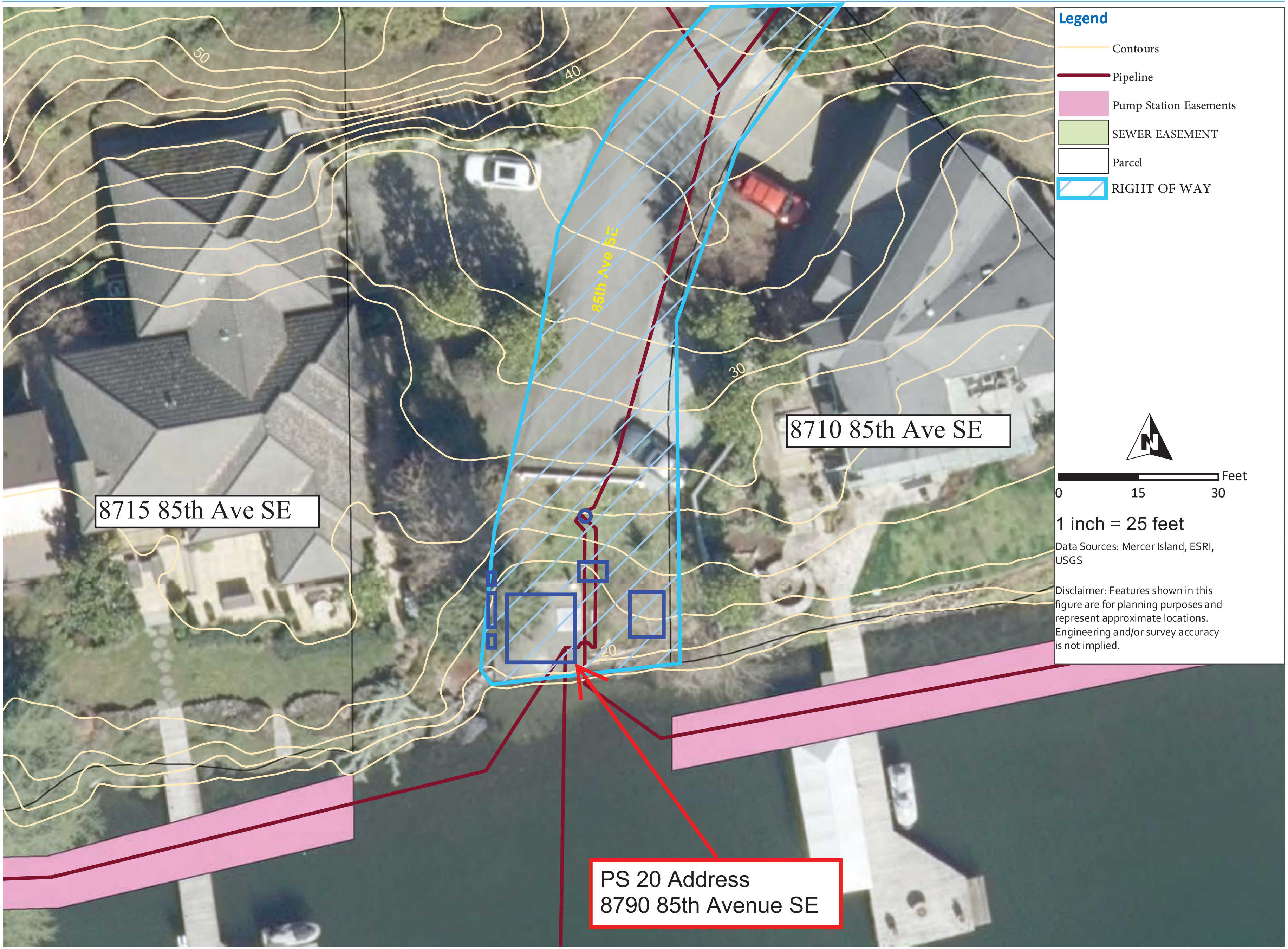





**Figure 4-43. Pump Station #20 Layout Map**

# 4.15 PUMP STATION #21

## 4.15.1 General Site Description

Pump Station #21 is at a partially submerged site at 8000 Avalon Drive, covered by a wooden dock in the backyard of the residential property at 8002 Avalon Place. A steep and narrow private road ends at 7964 E. Mercer Way. There is no easement within the private roadway. A narrow staircase is along the length of the northern edge of property at 8002 Avalon Place. Grassy lawn extends from the private driveway at 7964 E. Mercer Way to the wooden dock. The wooden dock is beginning to rot. The wet well has a hatch with panels in the wooden deck of the dock. Wasps or bees were present at the corner of the decking at the time of the site field investigation (August 8, 2018). Cell service is poor in this location because there is no space for telecom. A private wooden dock with watercraft holding bays is connected to the dock that covers the pump station. Northeast of the pump station is a circular concrete lid that is unidentified. This pump station is the last pump station upstream of King County's south pump station. Figure 4-44 shows the overall site and vicinity.

## 4.15.2 Pump Station Equipment and Features

Table 4-39 summarizes equipment and features of the pump station.

**Table 4-39.** Pump Station #21 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 3 | Cornell | 7.5 hp | Upland from pump station, fenced in and between driveway and property, below grade | Power through narrow path in easement on 8002 Avalon Place. Conduit is maxed out and galvanized. | Not Noted | Sand Filter |

## 4.15.3 Existing Easements

The pump station, force main, and inlet pipe are covered by a pump station easement (see Figure 4-44). A multiple use easement and access easement cover the length of road from 7936 E. Mercer Way to 7964 E. Mercer Way. Walking access to the site is within a pump station easement. Table 4-40 lists the recorded easements.

**Table 4-40.** Pump Station #21 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 2832 | 198205179005 | Multiple Use Easement |
| 3062 | 5751000 | Sewer Easement |
| 3063 | 5751021 | Sewer Easement |
| 3064 | 198310280873 | Water Easement |
| 3065 | 198310280874 | Water Easement |
| 3115 | 198808299046 | Access Easement |
| 3194 | 199001221011 | Access Easement |
| 3461 | 198304200502 | Sewer Easement |
| 3481 | 198903160917 | Water Easement |
| 3609 | 198306210890 | Sewer Easement |

## 4.15.4 Existing Access

Primary access to Pump Station #21 is land access from the steep and private road that turns off from E. Mercer Way and ends at 7964 E. Mercer Way. Water access by anchoring a barge on the northern side of the private dock belonging to 8002 Avalon Place is also used. Table 4-41 summarizes access conditions. Photos are provided in Figure 4-45 and Figure 4-46.

**Table 4-41.** Pump Station #21 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Down private driveway, steep, narrow, park in residential driveway at 7964 E. Mercer Way |
| On-Street Parking | No, parked in residential driveway |
| On-Site Parking | No |
| Vacuum Truck Accessible | Yes, difficult due to steep driveway grade |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

**Land Access**

For current access by land, crews approach the site by the private road that branches off E. Mercer Way and ends at the residential driveway of 7964 E. Mercer Way. The road is steep and narrow. Crews park at the bottom of the road within the residential driveway. They walk to the site by heading south, through vegetation that separates a grassy backyard and the driveway. Walking eastward across the backyard crews reach the wooden dock that covers the pump station. A steep and narrow set of stairs running along the northern edge of the property at 8002 Avalon Place also provides walking access to the pump station. Vacuum truck accessibility is possible but difficult due to steep driveway grade.

**Water Access**

For current access by water, a barge anchors immediately north of the private dock that belongs to the residents at 8002 Avalon Place.

### 4.15.5 Challenges

The following are the key access challenges at Pump Station #21:

- Wood dock starting to rot

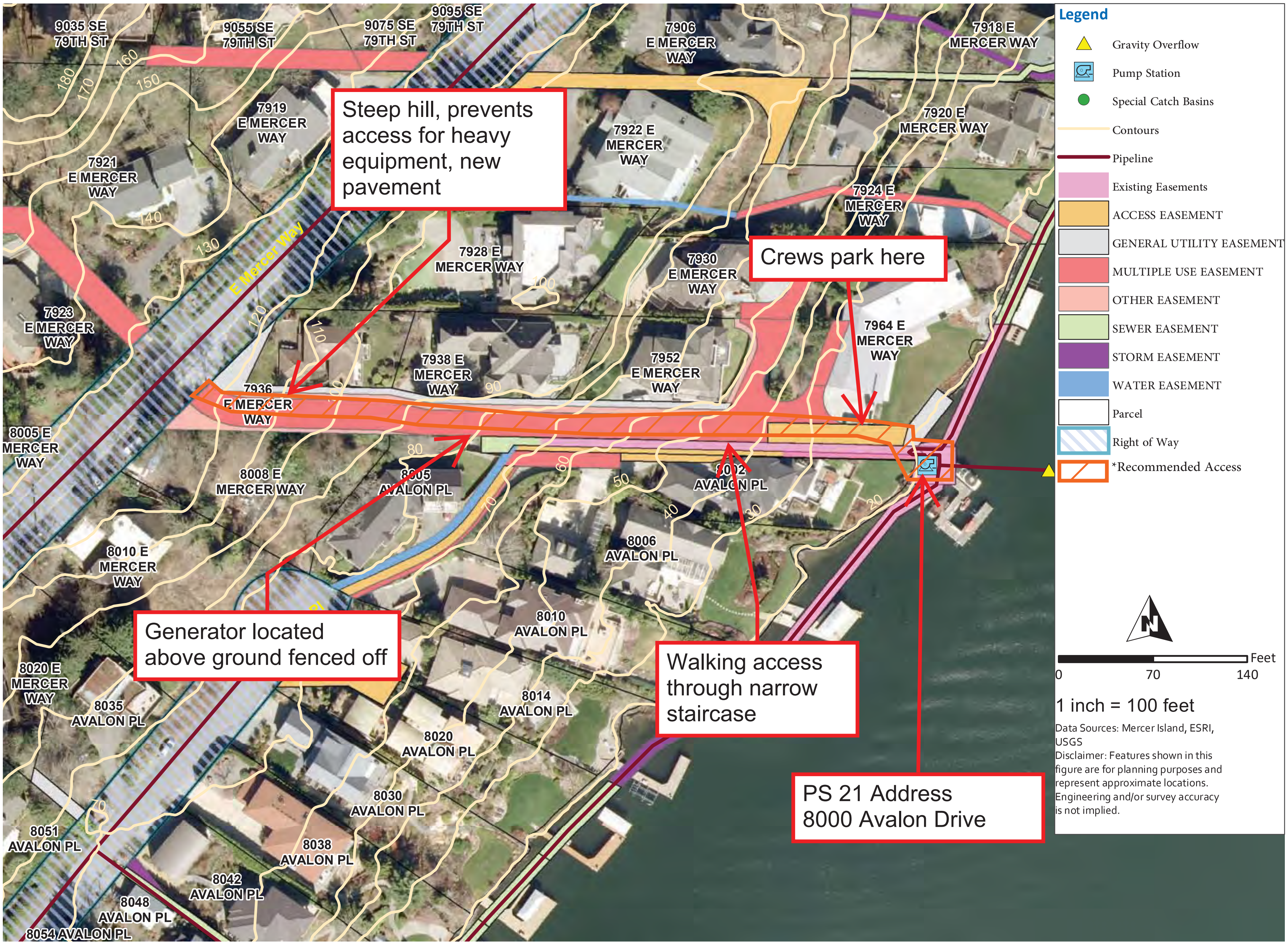
The following are the other challenges at Pump Station #20, unrelated to access:

- Sand filter issue
- Cell service drop

### 4.15.6 Recommendations

For adequate future access, the pump station easement for Pump Station #21 should be as shown on Figure 4-47. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Maintain easement/City property (remove vegetation)
- Generator upgrades/replacement (confirm location in existing easement)

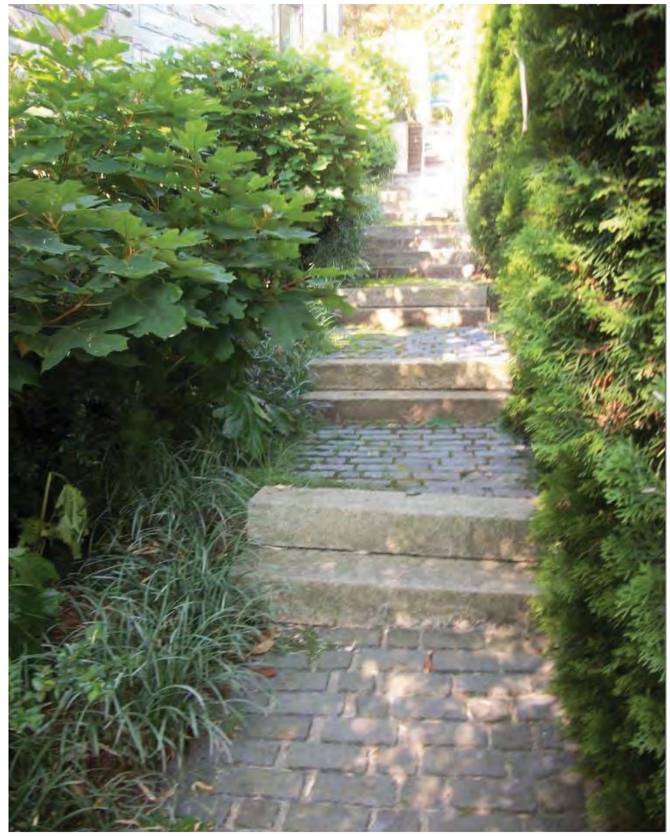



*Recommended access subject to further revision

carollo TETRA TECH

**Figure 4-44. Pump Station #21**
**All Existing Easements Access Map**

*Driving access for crews on left, generator fenced off on right*



*Walking access to pump station on existing easement with driveway behind bushes on right*

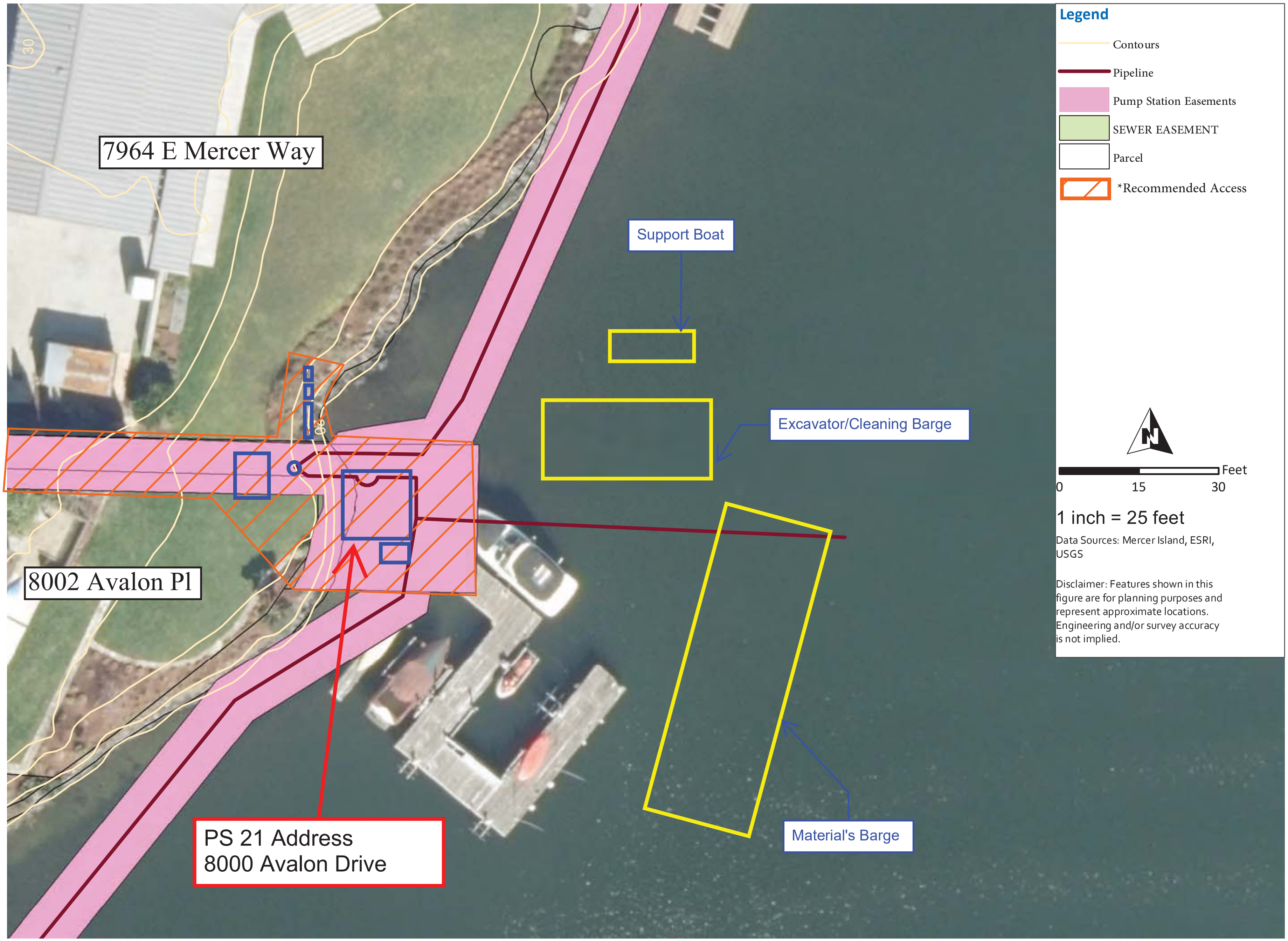
*Few of pump station access for crews when driving with concrete wall on left and vegetation below*

*Pump station located under dock, wood dock with hatches built over top*

**Figure 4-45.**
**Pump Station #21 Existing Site Photos (1 of 2)**

*View from crews parking upland, steep driveway for any heavy-duty equipment*

**Figure 4-46.**
**Pump Station #21 Existing Site**
**Photos (2 of 2)**




*Recommended access subject to further revision

**Figure 4-47. Pump Station #21 Layout Map**

# 4.16 PUMP STATION #22

## 4.16.1 General Site Description

Pump Station #22 is at an upland site at 6223 E. Mercer Way, on a steep grassy slope and adjacent to a paved boat launch at the Lake Washington shoreline. The steep private driveway has tight turns. The site is on a steep slope with dead grass and dirt at time of site field investigation (August 7, 2018). A gazebo is upland and in the immediate vicinity west of the pump station. There is a fish-friendly grating at the interface of the grassy slope and the Lake Washington shoreline. A City-owned dock is connected to the grating directly east of the pump station. The dock is being used as a holding bay for a private boat. Kayaks and canoes were being stored along the edge of the grassy slope and the Lake Washington shoreline at time of site field investigation. Water depth is shallow around the dock. A hydraulic grade structure is closed because of odor. Sand was observed in generator vents. Figure 4-48 shows the overall site and vicinity.

## 4.16.2 Pump Station Equipment and Features

Table 4-42 summarizes equipment and features of the pump station.

**Table 4-42.** Pump Station #22 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 3 | Not noted | 7.5 hp | Diesel, south of driveway beside small shed, hard to get to, below grade | 25 kW | Yes, closed because of odor | None |

## 4.16.3 Existing Easements

Pump station, inlet pipe, force main, and access are within a pump station easement (see Figure 4-48). Table 4-43 lists the recorded easements.

**Table 4-43.** Pump Station #22 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 173 | 5540361 | Water Easement |
| 175 | 197307180568 | Water Easement |
| 180 | 197801170910 | Water Easement |
| 278 | SUB6509-007 | General Utility Easement |
| 281 | SUB6509-007 | General Utility Easement |
| 282 | 5750998 | Sewer Easement |
| 285 | 198306210891 | General Utility Easement |
| 286 | 4227581 | Power Easement |
| 289 | 196808076388591 | Multiple Use Easement |
| 3383 | 5540360 | Water Easement |
| 3570 | 197601150421 | Water Easement |
| 281 | SUB6509-007 | General Utility easement |
| 282 | 5750998 | Sewer Easement |
| 289 | 196808076388591 | Multiple Use Easement |

## 4.16.4 Existing Access

Primary access to Pump Station #22 is land access from the steep driveway that terminates at the boat launch into Lake Washington. Future water access—for cleaning or construction—is possible, by barge and utilization of the city owned dock. Table 4-44 summarizes access conditions. Photos are provided in Figure 4-49.

**Table 4-44.** Pump Station #22 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Steep driveway |
| On-Street Parking | No |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

### Land Access

For current access by land, crews approach the site by the steep driveway that leads to the boat launch into Lake Washington. They park in the vicinity immediately north of the site, along the grassy slope, just before Lake Washington. Vacuum truck accessibility is possible at the same location where crews park.

### Water Access

Current access by water is difficult due to the shallow depth of water around the city owned dock. A barge will anchor at the city owned dock, water depth permitting.

## 4.16.5 Challenges

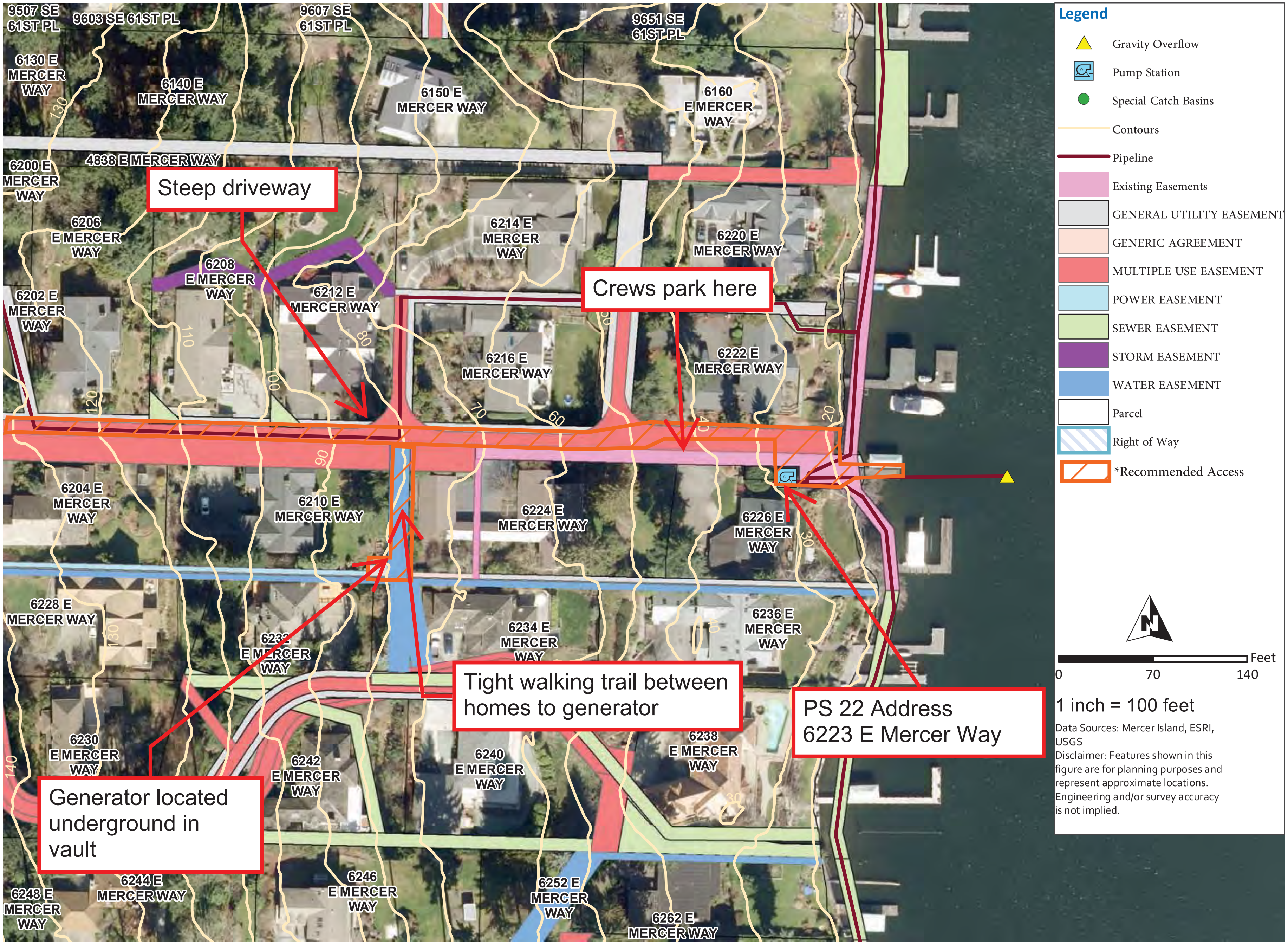
The following are the key access challenges at Pump Station #22:

- Hydraulic grade structure closed due to odor
- Shallow water depth around city owned dock

## 4.16.6 Recommendations

For adequate future access, the pump station easement for Pump Station #22 should be as shown on Figure 4-50. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Stairway access (repairs/installation)
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)




carollo TETRA TECH

*Recommended access subject to further revision

**Figure 4-48. Pump Station #22**
**All Existing Easements Access Map**

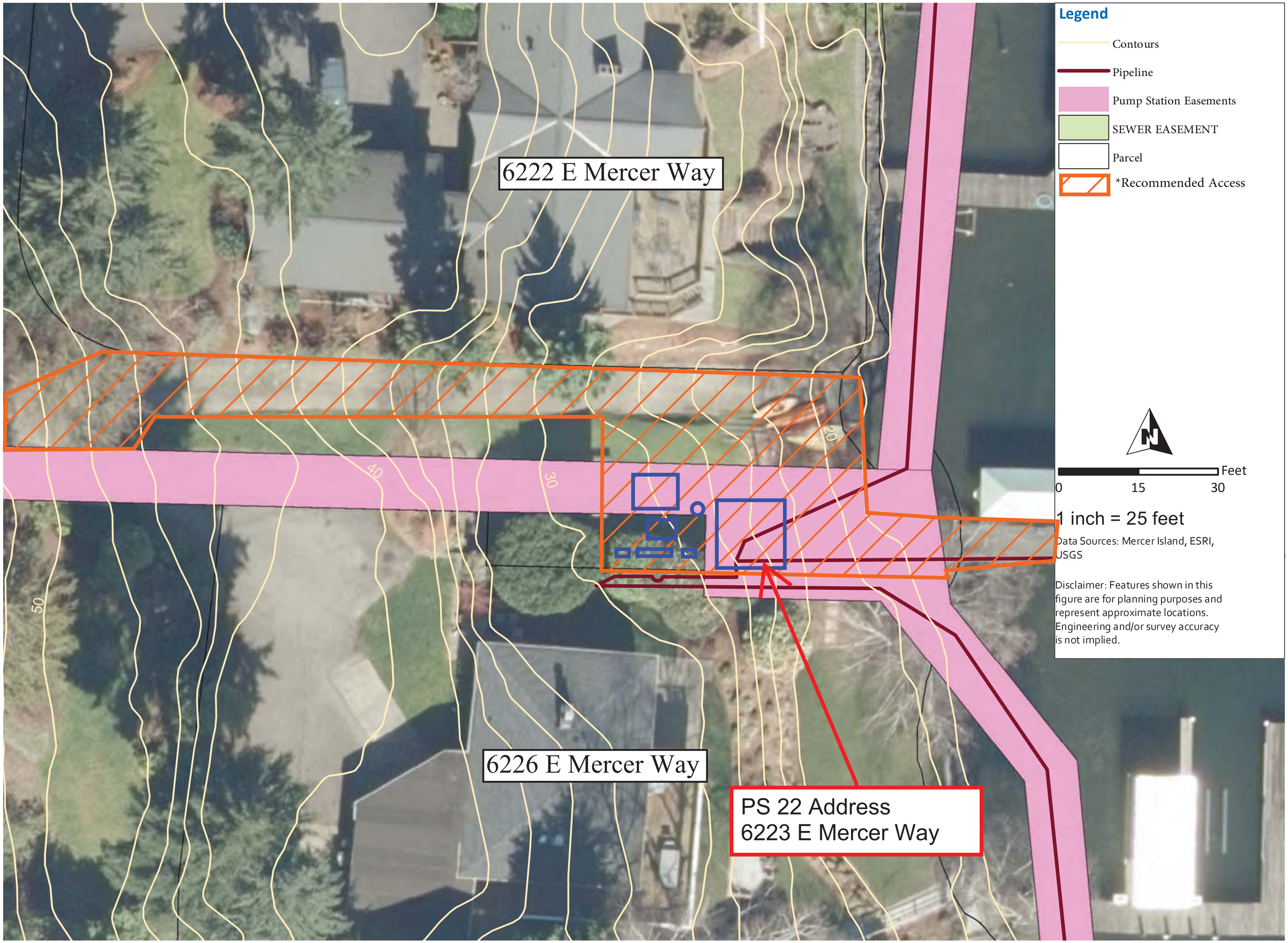
*Path to access generator behind and between homes*

*Generator sitting between homes*

*View of pump station from dock to upland*

*View of pump station from upland towards Lake WA*

**Figure 4-49.**
**Pump Station #22 Existing Site Photos**




*Recommended access subject to further revision

**Figure 4-50. Pump Station #22 Layout Map**

# 4.17 PUMP STATION #23

## 4.17.1 General Site Description

Pump Station #23 is at an upland site at 5406 96th Avenue SE, in an open grassy space within a private park. A paved walking path leads from the roadway, past the southern side of the pump station, and to the dock on the east end of the private park. It is understood that the City may have ownership or easement rights to the dock, although this would need verified. The dock is being used by multiple residents for watercraft docking. A picnic table, outdoor chairs, a fire pit, and small watercraft (kayaks, canoes, etc.) were observed within the park at the time of site field investigation (August 7, 2018). Immediately west of the pump station is a wooden retaining wall with a height of approximately one and a half feet. West of the retaining wall, grassy open space continues until the roadway. There is a large tree in the immediate vicinity east of the pump station. The shoreline on the north side of the dock is silt, mud, and wood debris. The shoreline on the south side of the dock is a bulkhead rockery. Dense vegetation is in the water surrounding the dock. Figure 4-51 shows the overall site and vicinity.

## 4.17.2 Pump Station Equipment and Features

Table 4-45 summarizes equipment and features of the pump station.

**Table 4-45.** Pump Station #23 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 3 | Not Noted | 7.5 hp | Diesel, in parking area upland of private park, below grade | 40 kW | Yes | Not Noted |

## 4.17.3 Existing Easements

A pump station easement covers the pump station, access, and force main (see Figure 4-51). A sewer easement covers additional access area within the park. A portion of the inlet pipe is within a sewer easement. Table 4-46 lists the recorded easements.

**Table 4-46.** Pump Station #23 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 181 | 5771868 | Sewer Easement |
| 371 | 5817566 | Sewer Easement |
| 439 | 5875584 | Sewer Easement |
| 440 | 5867889 | Sewer Easement |
| 441 | 5876718 | Sewer Easement |
| 515 | 5875585 | Sewer Easement |
| 516 | 5810522 | Sewer Easement |
| 517 | 5815833 | Sewer Easement |
| 3498 | 5771970 | Sewer Easement |

## 4.17.4 Existing Access

Primary access to Pump Station #23 is land access from the private park. Future water access—for cleaning or construction—is possible, by barge and utilization of the dock. Table 4-47 summarizes access conditions. Photos are provided in Figure 4-52.

**Table 4-47.** Pump Station #23 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Winding road |
| On-Street Parking | No |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes (difficult) |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

### Land Access

For current access by land, crews approach the site by 96th Avenue SE. They park at the entrance to the private park. Following the paved walking path that runs along the southern edge of the private park, the crews access the pump station. Vacuum truck accessibility is possible from the location where crews park.

### Water Access

Future water access—for cleaning or construction—is possible, by barge and utilization of the city-owned dock. Mooring space between the city-owned dock and the private dock directly south is small.

## 4.17.5 Challenges

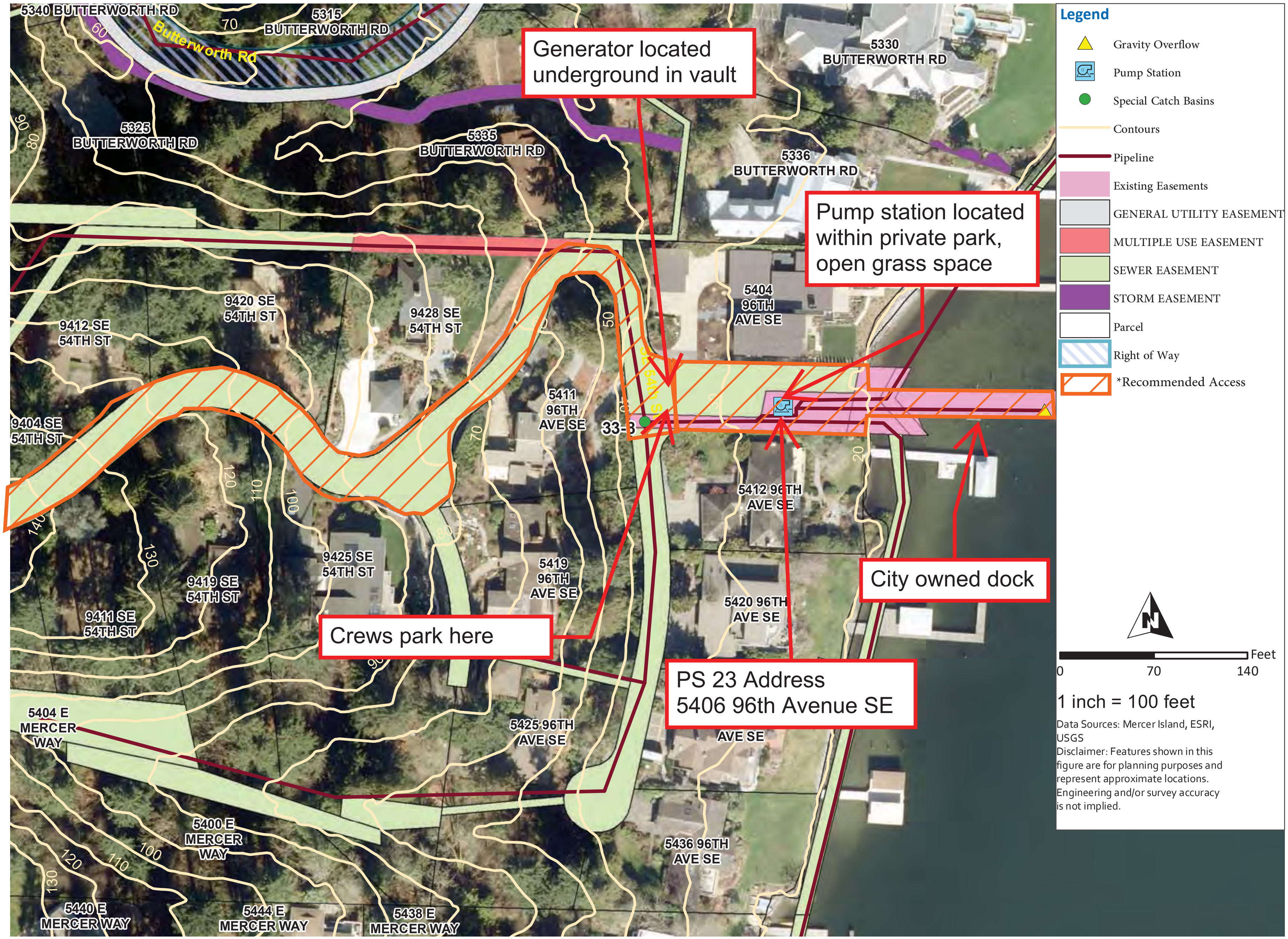
The following are the key access challenges at Pump Station #23:

- Large tree with roots beside pump station
- Water access is narrow

## 4.17.6 Recommendations

For adequate future access, the pump station easement for Pump Station #23 should be as shown on Figure 4-53. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Maintain easement/City property (remove vegetation)
- Coordinate with utilities (related access for upgrading electrical supply)




*Recommended access subject to further revision

**Figure 4-51. Pump Station #23**
**All Existing Easements Access Map**

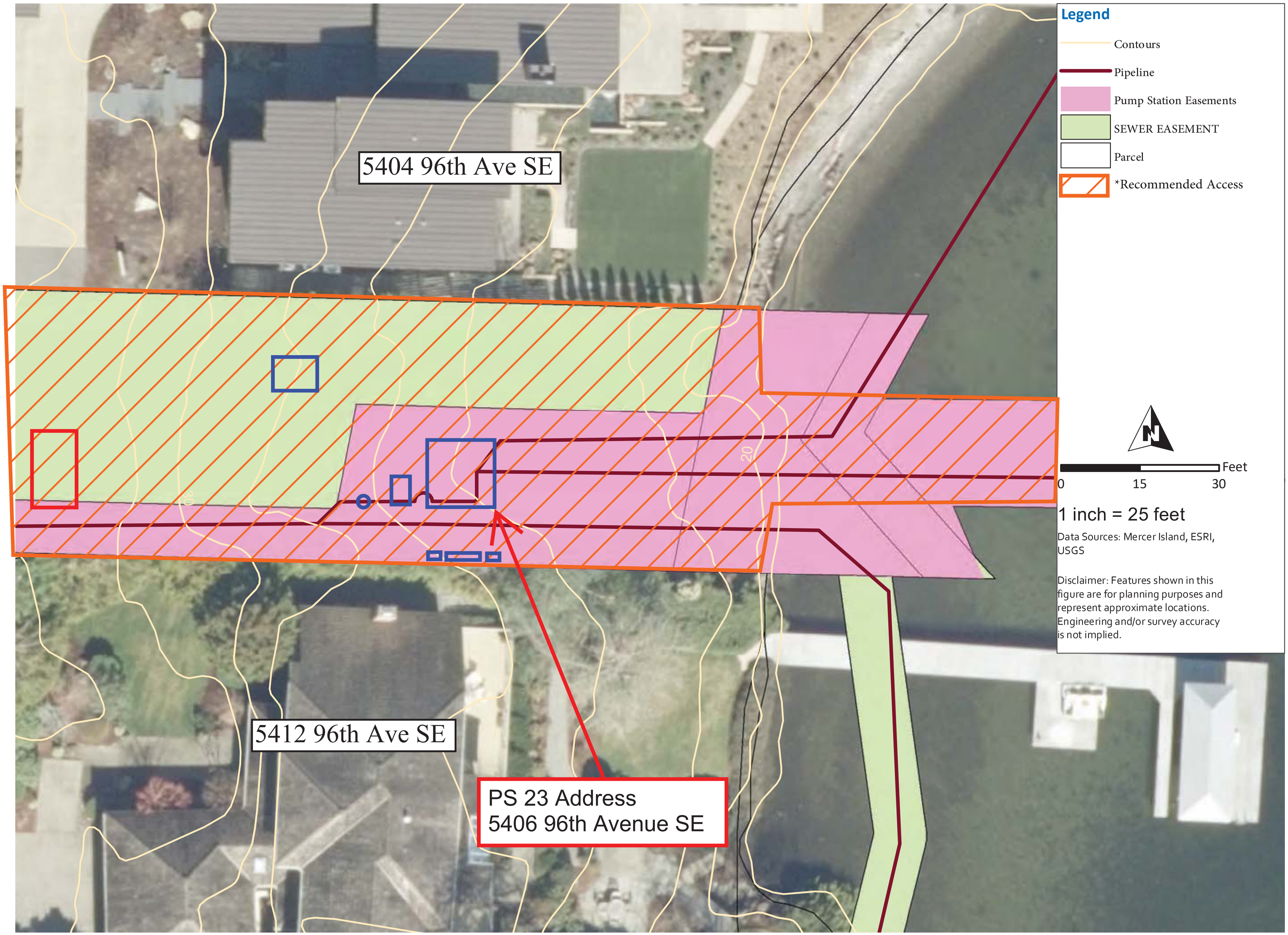
*Crews park their trucks in pull off space also used as the vault for below grade generator*

*Private park for community which includes green space, boat rack for canoes and access to Lake WA*

*Tree roots appear to be near wetwell which could cause damage*

*Concrete dock provides access for crews from water*

**Figure 4-52.**
**Pump Station #23 Existing Site Photos**




*Recommended access subject to further revision

**Figure 4-53. Pump Station #23 Layout Map**

# 4.18 PUMP STATION #24

## 4.18.1 General Site Description

Pump Station #24 (address 4606 E. Mercer Way) is in the backyard of the residential property at 4612 E. Mercer Way. The station is partially submerged, connected to the concrete city dock as a 16-foot by 16-foot concrete structure. A steep driveway to the residential property is followed by a steep foot path on the north side of the home. The foot path was loose soil and bark at the time of the site field investigation (August 7, 2018). The footpath transitions to steep switchback stairs that lead to the backyard of the property. Half of a basketball court is adjacent to the stairs and before an artificial grass area adjacent to the Lake Washington shoreline and the pump station. There is a boat lift adjacent to the city owned dock. A bulkhead rockery is on the shoreline north of the city dock. Concrete steps, beginning at the pump station and adjacent to the south side of the city dock, lead to Lake Washington. Figure 4-54 shows the overall site and vicinity.

## 4.18.2 Pump Station Equipment and Features

Table 4-48 summarizes equipment and features of the pump station.

**Table 4-48.** Pump Station #24 Equipment and Features Overview

| Pumps | | | | Electrical | Hydraulic | Odor | |
|---|---|---|---|---|---|---|---|
| Number | Type | Power | Generator | Service | Grade Structure | Control | Other |
| 1<br>2 | Vaughan Chopper<br>Cornell | 3 hp<br>3 hp | Upland of residential property at beginning of driveway | Runs along north side of home, along fence line | Yes | None | Pump station is wireless |

## 4.18.3 Existing Easements

Pump station easement covers the pump station, inlet pipe, and force main (see Figure 4-54). There is not an easement that covers access to the site. Table 4-49 lists the recorded easements.

**Table 4-49.** Pump Station #24 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 548 | 5810604 | Sewer Easement |
| 549 | 5758767 | Sewer Easement |
| 550 | 5802456 | Multiple Use Easement |
| 577 | 198811301366 | General Utility Easement |
| 578 | 198902271132 | Power Easement |

## 4.18.4 Existing Access

Primary access to Pump Station #24 is water access by work boat. Future land access—for cleaning or construction—is possible if carrying equipment by hand. Table 4-50 summarizes access conditions. Photos are provided in Figure 4-55.

### Land Access

For current access by land, crews park upland just before the steep driveway leading to the property at 4612 E. Mercer Way. They walk down the driveway to the steep footpath at the north end of the home. The path transitions to stone steps that switchback down and through the backyard of the property. Crews follow the path past the basketball court and onto the artificial grass where they can access the pump station. Access by land only allows equipment that can be hauled by hand. A vacuum truck cannot access the pump station.

**Table 4-50.** Pump Station #24 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Steep driveway and walking path, switchback stairs for access to backyard |
| On-Street Parking | No |
| On-Site Parking | Yes, private driveway |
| Vacuum Truck Accessible | No |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

### Water Access

For current access by water, crews use a work boat to reach the concrete city dock and the shoreline. Access is tight between docks and boat lifts. The pump station is accessed directly from these two locations.

## 4.18.5 Challenges

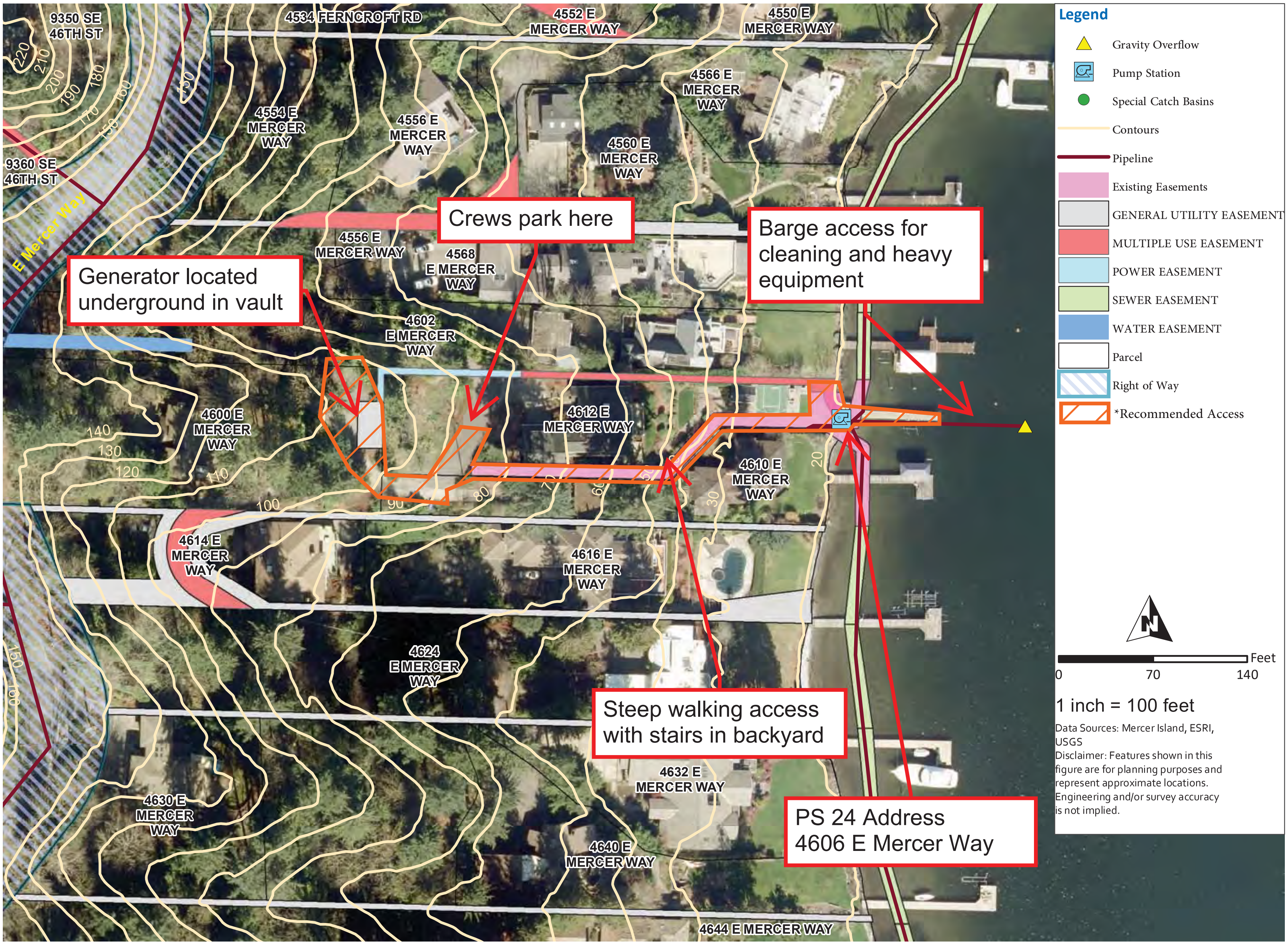
The following are the key access problems at Pump Station #24:

- Steep walking access
- Timber pillars in water near dock

## 4.18.6 Recommendations

For adequate future access, the pump station easement for Pump Station #24 should be as shown on Figure 4-56. The following are also recommended:

- Easement review and confirmation
- Review dock access and ownership
- Stairway access (repairs/installation)
- Maintain easement/City property (remove vegetation)
- Bulkhead/shoreline condition assessment (related to City boat access)




*Recommended access subject to further revision

**Figure 4-54. Pump Station #24**
**All Existing Easements Access Map**

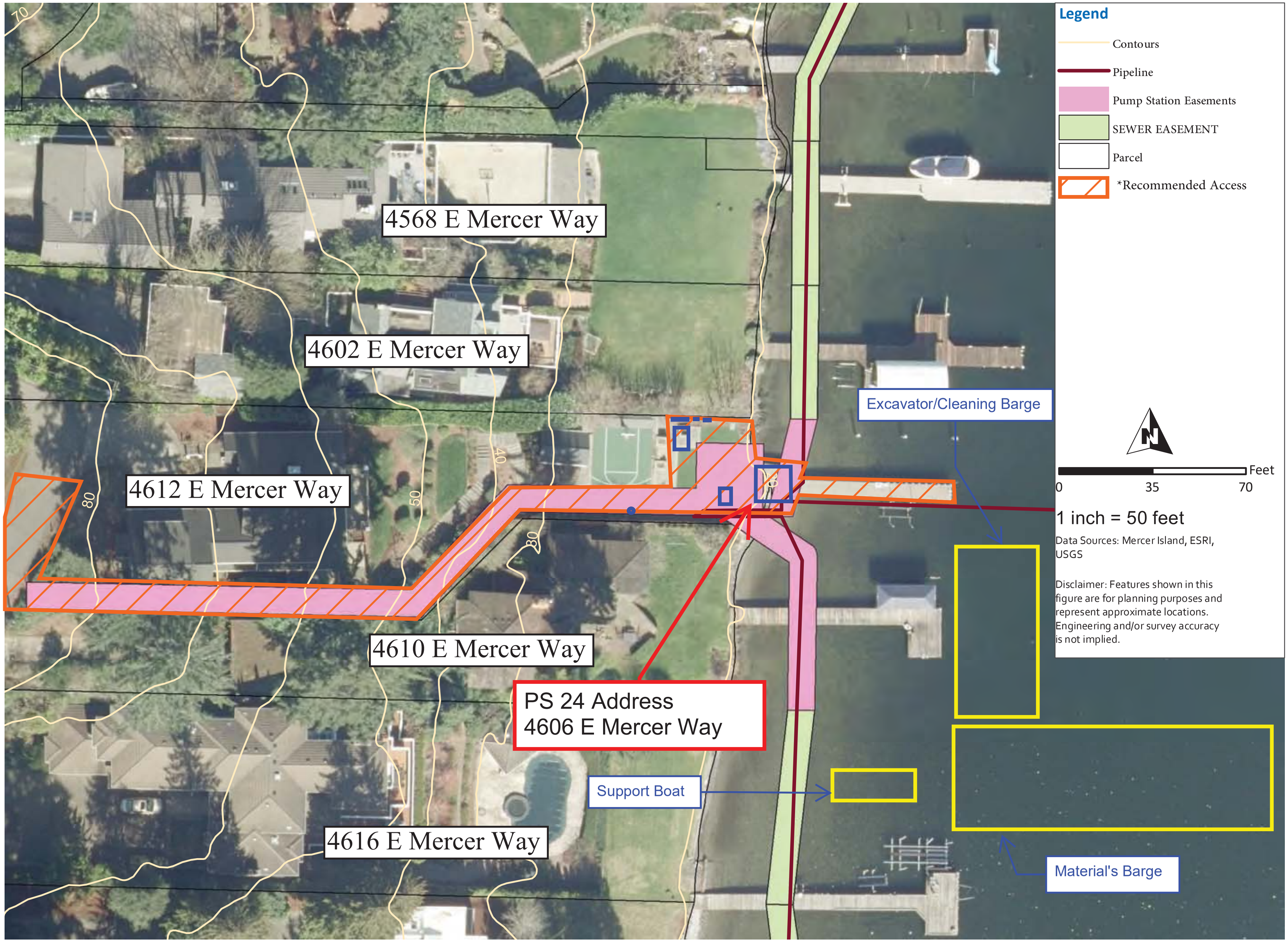
*Path to Pump Station 24 from back of the house*

*Backyard has astroturf and concrete dock connecting to Pump Station 24*

*Access for large equipment from concrete dock but foot access from back of house*

*Generator located west of the home at the top of the hill, below grade*

**Figure 4-55.**
**Pump Station #24 Existing Site Photos**




*Recommended access subject to further revision

**Figure 4-56. Pump Station #24 Layout Map**

# 4.19 PUMP STATION #25

## 4.19.1 General Site Description

Pump Station #25 (address 4266 E. Mercer Way) is located within the Mercerwood Shore Club on the southwest edge of the property. A steep driveway to the private club is followed by a flat parking lot then a grassy open space between the parking lot and the pump station. The grassy space includes a concrete basketball half court, club house, large play structure and numerous picnic tables as noted during a site field investigation (August 7, 2018). The pump station is separated from Lake Washington by several steps above the beach front. Figure 4-57 shows the overall site and vicinity.

## 4.19.2 Pump Station Equipment and Features

Table 4-51 summarizes equipment and features of the pump station.

**Table 4-51.** Pump Station #25 Equipment and Features Overview

| Pumps | | | Generator | Electrical Service | Hydraulic Grade Structure | Odor Control |
|---|---|---|---|---|---|---|
| Number | Type | Power | | | | |
| 2 | Vaughan Chopper | 7.5 | Diesel, located below grade adjacent to pump station | 25 kW | Not noted | Not Noted |

## 4.19.3 Existing Easements

Pump station easement covers the pump station, inlet pipe, and force main (see Figure 4-57). There is not an easement that covers access to the site. Table 4-52 lists the recorded easements.

**Table 4-52.** Pump Station #25 Recorded Easements

| GIS Object ID | Recording Number | Easement Type |
|---|---|---|
| 1 | 5750997 | Sewer Easement |
| 2 | 198805060765 | General Utility Easement |
| 759 | SUB6512-002 | Access Easement |
| 1367 | 20080303000775 | Access Easement |

## 4.19.4 Existing Access

Primary access to Pump Station #25 is land access by driving along the paved Mercerwood Shorewood Club driveway and parking in the lower parking lot. Table 4-53 summarizes access conditions. Photos are provided in Figure 4-58.

### Land Access

For current access by land, crews access the Mercerwood Shore Club (4150 E. Mercer Way) gate then continue along the driveway to the parking lot at the base of the hill on the shoreline. They park in the parking lot then walk west across the grassy area, past a concrete basketball court, club house, playground and numerous picnic tables to get to the pump station located along the southwest side of the property.

### Water Access

Although water access is possible, the pump station is located further upland making cleaning or construction from a barge difficult. Transporting equipment to and from site is possible by water.

**Table 4-53.** Pump Station #25 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | Yes |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Need gate code for access, steep driveway |
| On-Street Parking | Yes, too far from pump station |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | No, pump station too far upland away from water |
| Dock Access | No |

## 4.19.5 Challenges

The following are the key access problems at Pump Station #25:

- Requires gate key and coordination with club prior to entering
- No current easement to allow access
- Hand cart used to place pumps

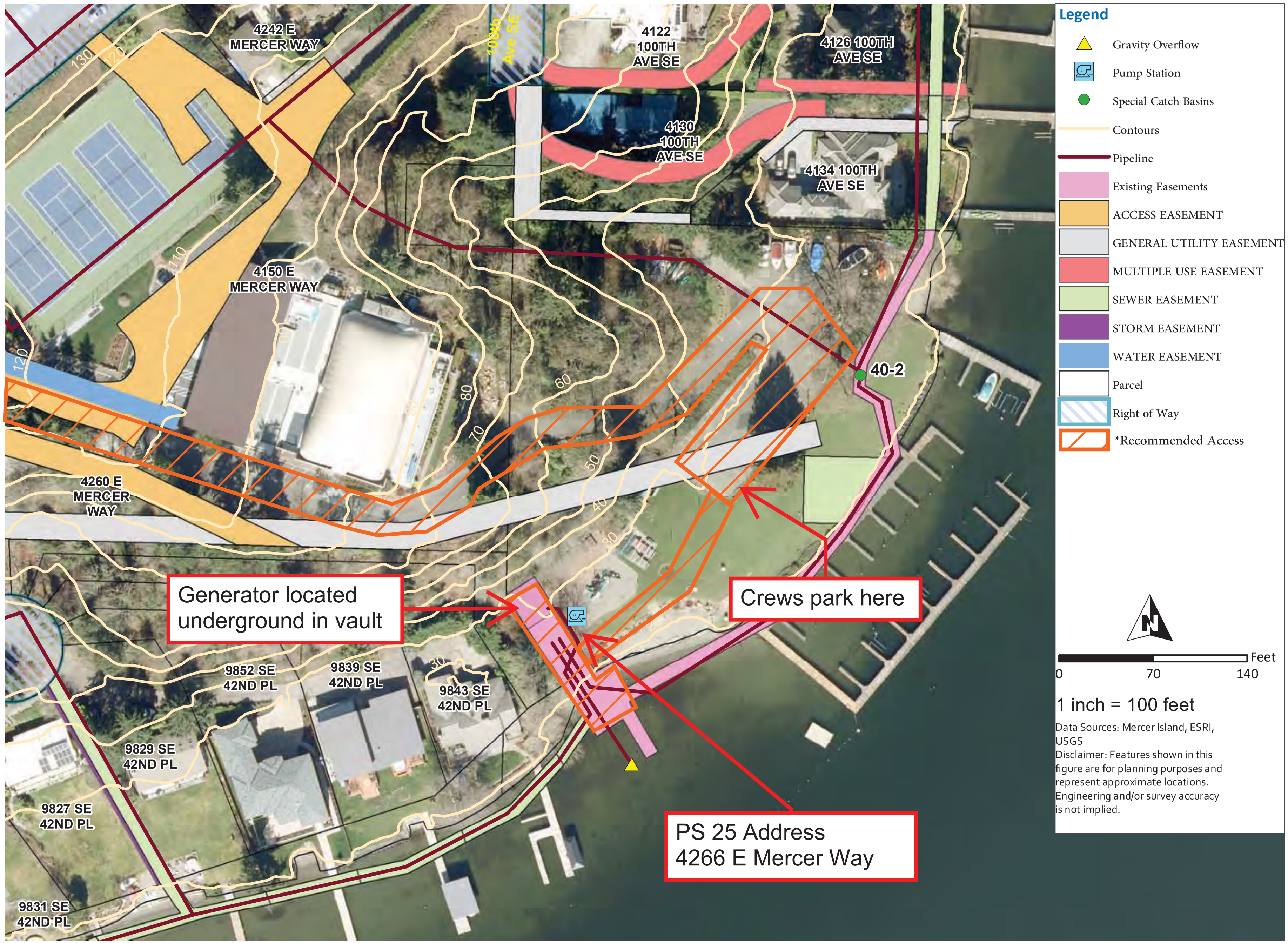
The following are the other challenges at Pump Station #25, unrelated to access:

- High amount of debris in line and cannot get flow to move

## 4.19.6 Recommendations

For adequate future access, the pump station easement for Pump Station #25 should be as shown on Figure 4-59. The following are also recommended:

- Easement review and confirmation
- Maintain easement/City property (remove vegetation)
- Proposed easement acquisition




carollo TETRA TECH *Recommended access subject to further revision

**Figure 4-57. Pump Station #25**
**All Existing Easements Access Map**

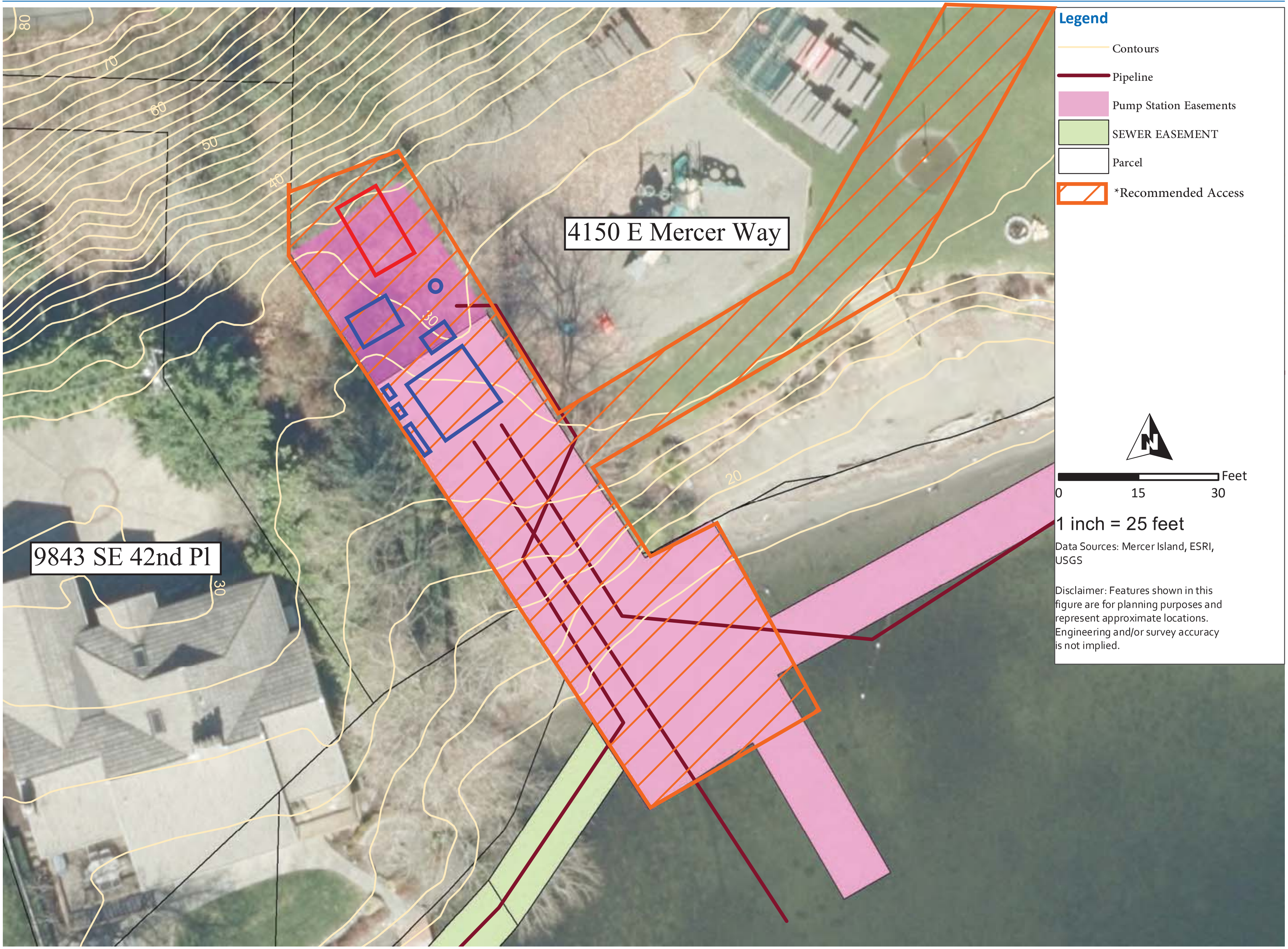
*Crews park in parking lot for Mercerwood Shore Club*

*Path to Pump Station 25 which is open but has a volleyball court, basketball court and playground*

*Basketball court and playground with Pump Station behind the playground*

*Pump Station 25 location near but above Lake Washington*

**Figure 4-58.**
**Pump Station #25 Existing Site Photos**




 *Recommended access subject to further revision

**Figure 4-59. Pump Station #25 Layout Map**

# 5. SPECIAL CATCH BASIN ACCESS EVALUATION

## 5.1 OVERVIEW

Selected special catch basins (SCBs) with limited access were investigated over a total of three days. The visited SCBs, chosen by City O&M staff, reflect only a portion of the City's SCBs. City staff accompanied consultants to each site, coordinated with property owners, and assisted with access to the site. Consultants noted on field work sheets the current cleaning and maintenance methods as described by City staff. Photos were taken as well as GPS points for significant obstacles such as trees, play structures, concrete sidewalks, or stairs. The following were noted:

- Access
  - Driving
  - Walking
  - Water
- Existing condition
  - Condition of ground surface
  - Grade
  - Location
  - Available space on grade
  - Dock
  - Odorous air
  - Obstacles

Documentation of each visited SCB below includes:

- General site description—Provides input from arriving on site, parking, getting to the pump station and the conditions surrounding the site
- Existing easements—Describes all existing easements that overlap with the pump station including:
  - Pump station easement
  - Access easement
  - General utility easement
  - Multiple use easement
  - Sewer easement
  - Storm easement
  - Vegetation easement
  - Water easement
  - Right of way
- Existing access
  - Land access—Describes available access for O&M staff
  - Water access—Describes available water access to SCBs
- Existing access challenges—Provides content for what access challenges are present including items such as parking, vegetation, grade, etc.
- Recommended access and easement improvements—Identifies actions to mitigate existing challenges.

## 5.2 SCB 2-1

### 5.2.1 General Site Description

The SCB is located East of 4811 and 4803 Forest Avenue SE, at 4808 Forest Avenue SE. There is thick vegetation and blackberry bushes surrounding the SCB. Forest Avenue, to the north of the SCB, is right of way.

### 5.2.2 Existing Easements

Primary access to the SCB is from Forest Avenue SE right of way. The sewer pipe and its easement extend south from Forest Avenue SE and through SCB 2-1. The pipe and its easement continue west to the shoreline, then run south along the shoreline. The City's GIS shows a short length of pipe without easement directly north of SCB 2-1. There is an additional access easement that runs for approximately 100 feet along the diagonal section of Forest Avenue SE. Figure 5-1 shows easements in the site vicinity.

### 5.2.3 Existing Access

Primary access to SCB 2-1 is from land requiring crews to walk to location. Water access is not currently used but could be considered for the future. Table 5-1 summarizes access conditions.

**Table 5-1.** SCB 2-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No (grass) |
| Upland Driving Access/Barriers | Garage at the end of the driveway |
| On-Street Parking | Maybe |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes (with flex hose 250 feet from street) |
| Water Access | |
| Water Access | Yes, limited by private docks. |
| Dock Access | No |

#### Land Access

For current access by land, crews park on the driveway of 4808 Forest Avenue SE. They walk south along the left side of the house and through the backyard to access the SCB, which is surrounded by thick vegetation and blackberry bushes. From the vacuum truck, a 250-foot hose is needed to reach the site.

#### Water Access

Future water access is possible, where the SCB is 300 feet from the Lake Washington. Between the shoreline and the SCB is private property with a grassy hill with some vegetation. Due to it being private property, an easement or right-of-way would be required. Water access will likely be heavily constrained by existing private docks.

### 5.2.4 Challenges

The following are the key access challenges at SCB 2-1:

- Parking for crews is in the private driveway, not next to the SCB

- The property is overgrown with vegetation around the SCB (see Figure 5-2).
- Water access is limited by private docks.

### 5.2.5 Recommendations

The following are future upgrades for SCB 2-1:

- Provide access along access/sewer easement. Expand the easement to facilitate access as shown on Figure 5-4.
- A new easement is recommended directly north of the SCB where no easement is currently shown in City GIS.
- Alternatively, the City recommends moving SCB to end of driveway (4803 Forest Avenue) within the existing Forest Avenue SE right of way, as shown in Figure 5-3 and Figure 5-4.

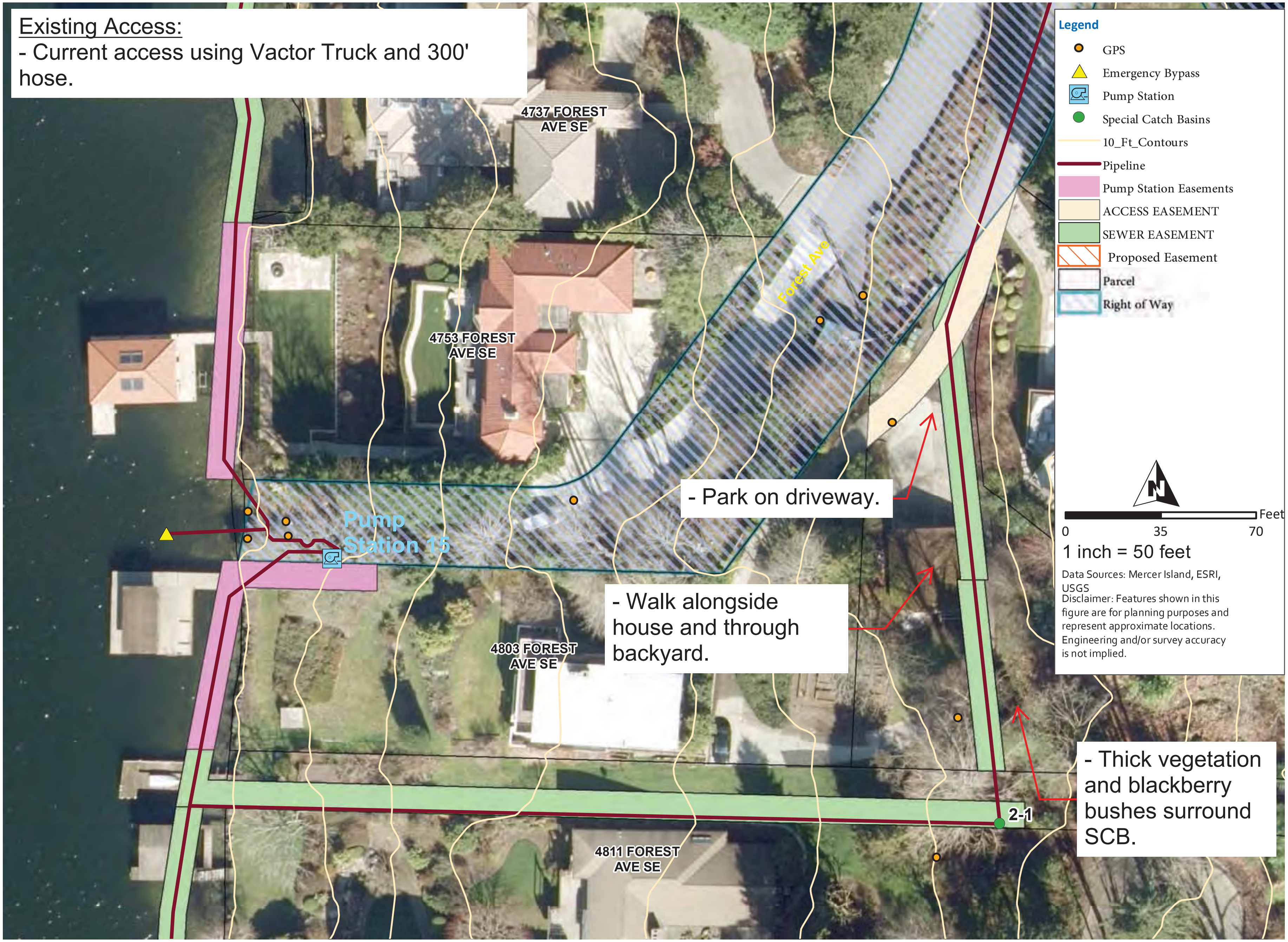



Figure 5-1.
SCB 2-1 Existing Easement Access


CB 2-1: Driveway where truck parks. Walk along left side of house to backyard.

CB 2-1: Path to Special Catch Basin contains vegetation and blackberry bushes.

**Figure 5-2. SCB 2-1 Existing Site Photos (1 of 2)**

CB 2-1: Special Catch Basin is 300 feet from the water.


CB 2-1: City recommends to move Special Catch Basin to the manhole at the top of the driveway.

**Figure 5-3. SCB 2-1 Existing Site Photos (2 of 2)**

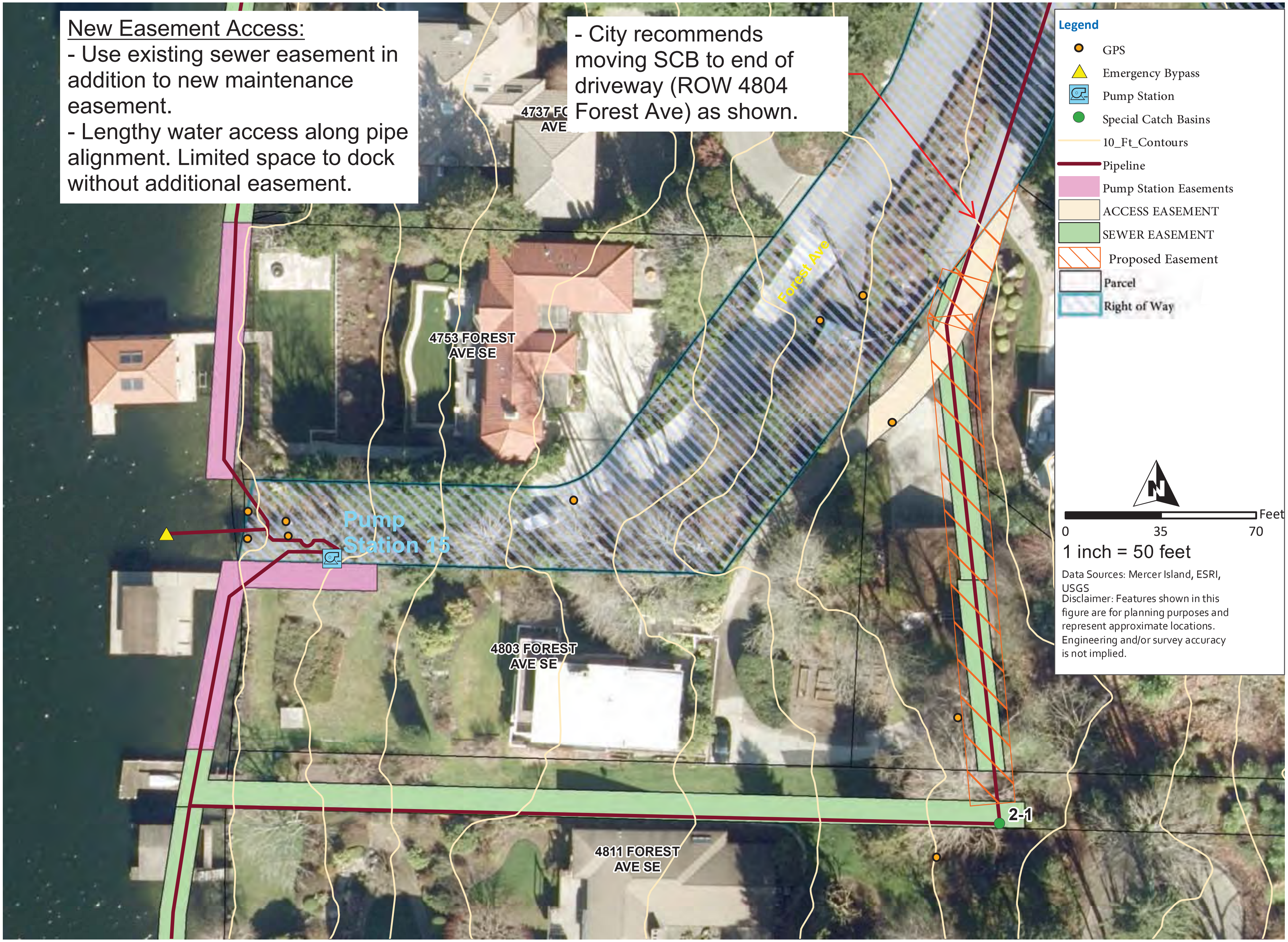





**Figure 5-4.**
**SCB 2-1 New Easement Access**

# 5.3 SCB 13-3

## 5.3.1 General Site Description

SCB 13-1 is buried in the backyard on the southeastern border of 7520 SE 71$^{st}$ Street. Between the SCB and SE 71st Street, there is a private playground. There is heavy vegetation around the SCB. Please reference Figure 5-5.

## 5.3.2 Existing Easements

Primary access to the site is via SE 71st Street right of way. There is no easement between the SCB and SE 71st Street. The SCB 13-3 upstream pipe and easement travels northeast toward 6851 W. Mercer Way and its shared private drive off W. Mercer Way. This private drive has an access easement. Downstream of the SCB, the pipe and its easement travel northwest until reaching the shoreline.

## 5.3.3 Existing Access

Primary access is by land, with the potential for water access in the future. Vacuum trucks enter from SE 71st Street. Table 5-2 summarizes access conditions.

**Table 5-2.** SCB 13-3 Field Investigation Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | None |
| On-Street Parking | No |
| On-Site Parking | Yes; within easement on private driveway |
| Vacuum Truck Accessible | Yes (with 250-foot hose) |
| Water Access | |
| Water Access | No |
| Dock Access | No |

### Land Access

Crews park in the driveway of 7520 SE 71st Street and walk around the house, past the playground, to reach SCB 13-3. From a vacuum truck parked on the end of the driveway, a 250-foot hose is needed to reach the SCB. Heavy vegetation and other obstacles block access to the SCB via the sewer easement.

### Water Access

There is no water access at this time.

## 5.3.4 Challenges

The following are access challenges presented at SCB 13-3:

- No easement for preferred access route.
- There is a private playground that blocks vehicle access to the SCB in the preferred access route (see Figure 5-7).
- Restoration would be required if access is used for vehicle / machinery.
- Easement would require major improvements to be of use.

### 5.3.5 Recommendations

The recommended new easement is likely to span two properties (7520 and 7530 SE 71st Street), as shown on Figure 5-6. Restoration would be required if the easement is used for vehicles or heavy equipment.

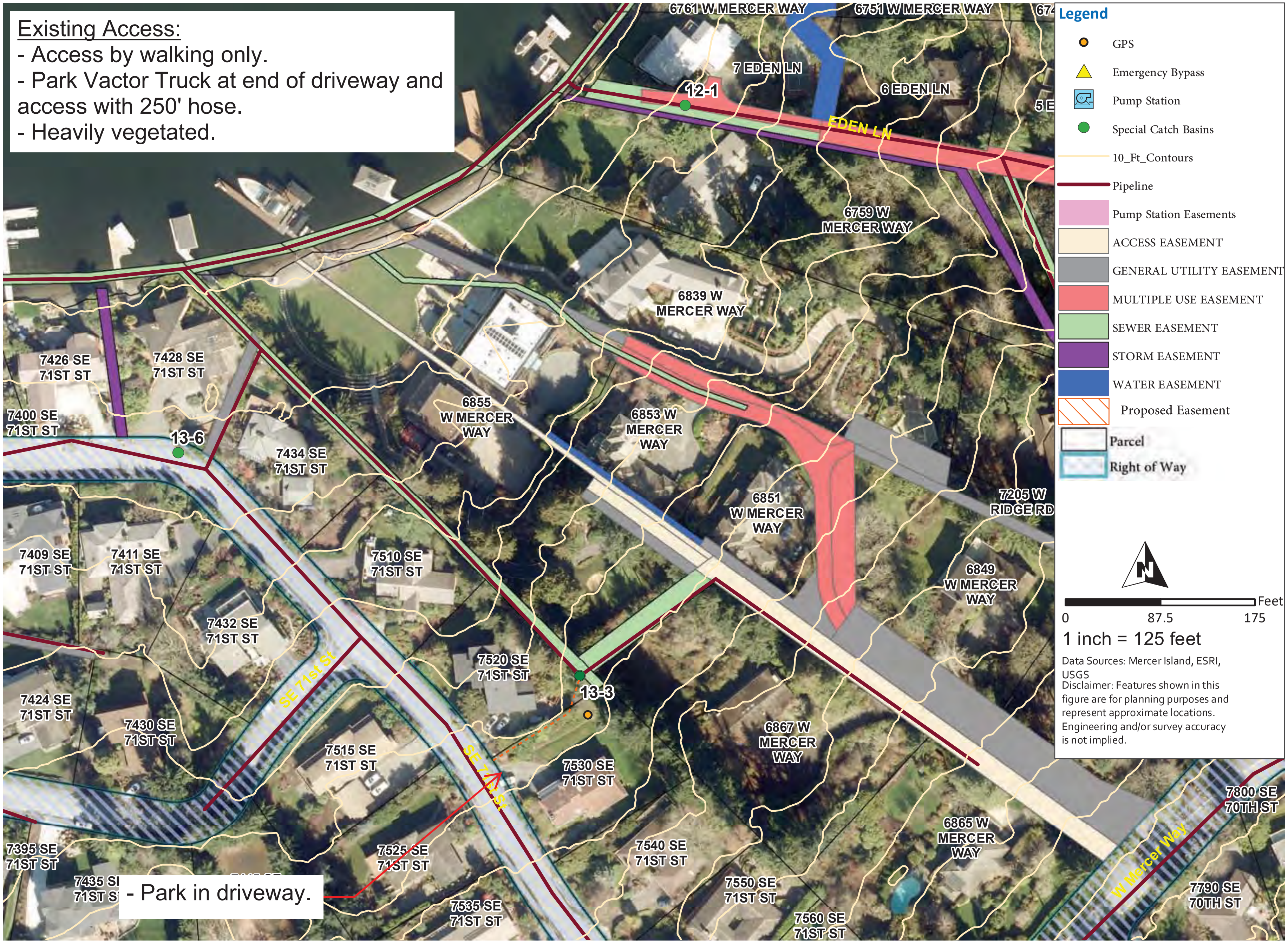



Figure 5-5.
SCB 13-3 Existing Easement Access

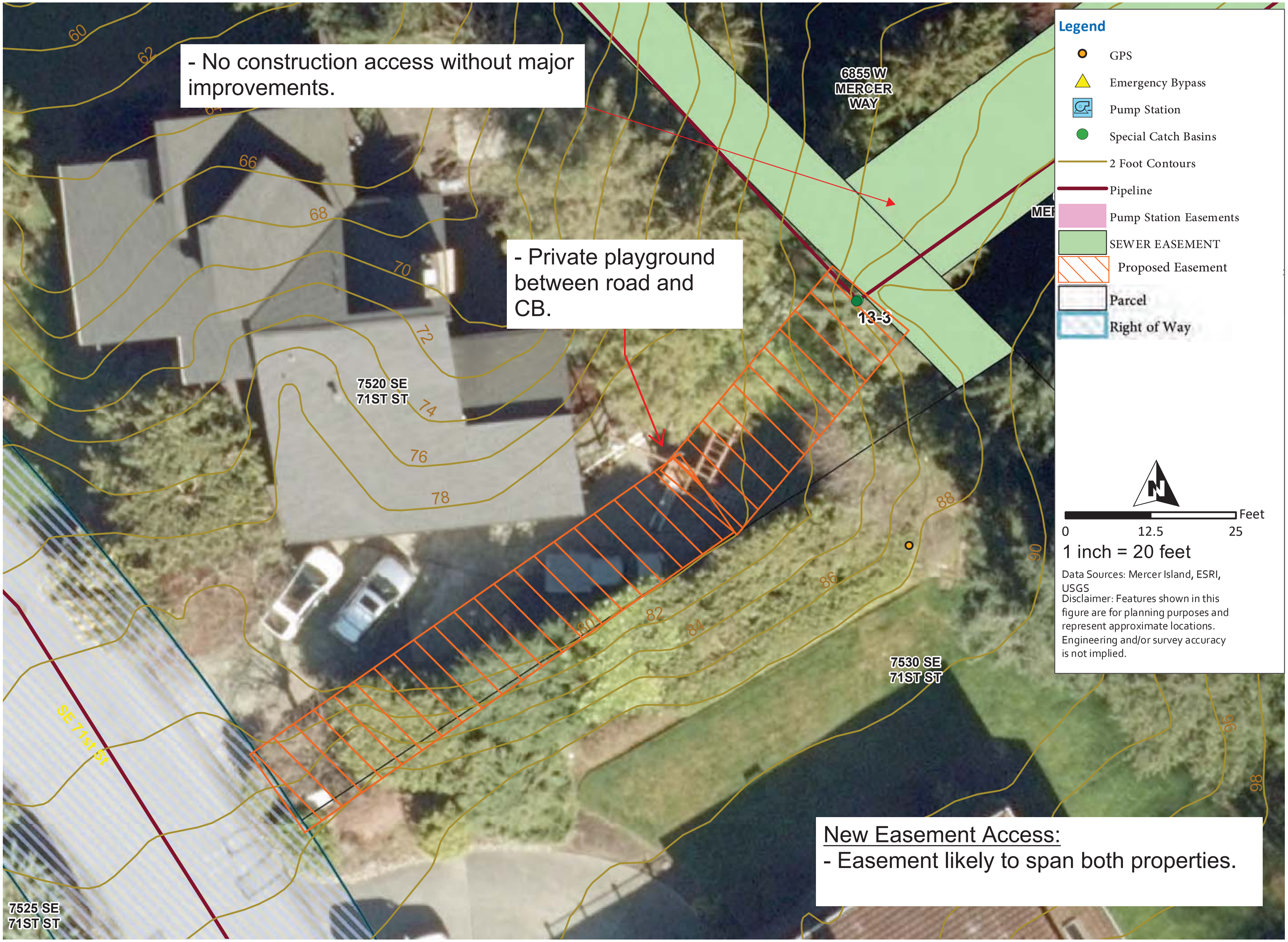





**Figure 5-6.**
**SCB 13-3 New Easement Access**

CB 13-3: Location of Special Catch Basin, which is buried in backyard.

CB 13-3: Private playground between road and Special Catch Basin.

**Figure 5-7. SCB 13-3 Existing Site Photos**

## 5.4 SCB 42-1

### 5.4.1 General Site Description

The site is located next to 17 El Dorado Beach Club Drive, adjacent to a community park and down a steep and narrow driveway. A vacuum truck is unable to access the driveway. The SCB is within 20 feet of the water in an open community park setting, in a grassy field.

### 5.4.2 Existing Easements

There is a multiple use easement that runs along El Dorado Beach Club Drive. From El Dorado Beach Club Drive the pipe and its easement travel on the south end of 17 El Dorado Beach Club Drive then wrap around the left side of the property toward the shore, where it continues to the shoreline (Figure 5-8).

### 5.4.3 Existing Access

Primary access to SCB 42-1 could be by land or water. The SCB is within 20 feet of the water, in an open community park (see Figure 5-10). The SCB could be accessed by land, off of El Dorado Beach Club Drive. Table 5-3 summarizes access conditions.

**Table 5-3.** SCB 42-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Steep and narrow driveway |
| On-Street Parking | No |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes (with a 300- to 400-foot hose) |
| Water Access | |
| Water Access | Yes |
| Dock Access | No |

#### Land Access

For current access by land, crews approach the site by El Dorado Beach Club Drive. A vacuum truck is unable to continue down the driveway past 13 and 14 El Dorado Beach Club Drive, as the road gets steep and narrow. Cleaning is performed using a 300- to 400-foot hose on easements next to 17 El Dorado Beach Club Drive to reach the SCB.

#### Water Access

Water access is possible as the SCB is 20 feet from the water, in a private park setting.

### 5.4.4 Challenges

The following are the key access challenges at SCB 42-1:

- The steep and narrow road does not allow close access for a vacuum truck (see Figure 5-10).
- Easement is likely too narrow for large vehicles.

## 5.4.5 Recommendations

The following are future upgrades for SCB 42-1 (see Figure 5-9):

- Driveway improvements required for heavy machinery access
- Recommended access spanning multiple properties, including a shared ownership park
- Boat ramp and/or bulkheads may need improvements if accessed by water.
- Alternatively, relocating the SCB to El Dorado Beach Club Dr. may mitigate access issues.

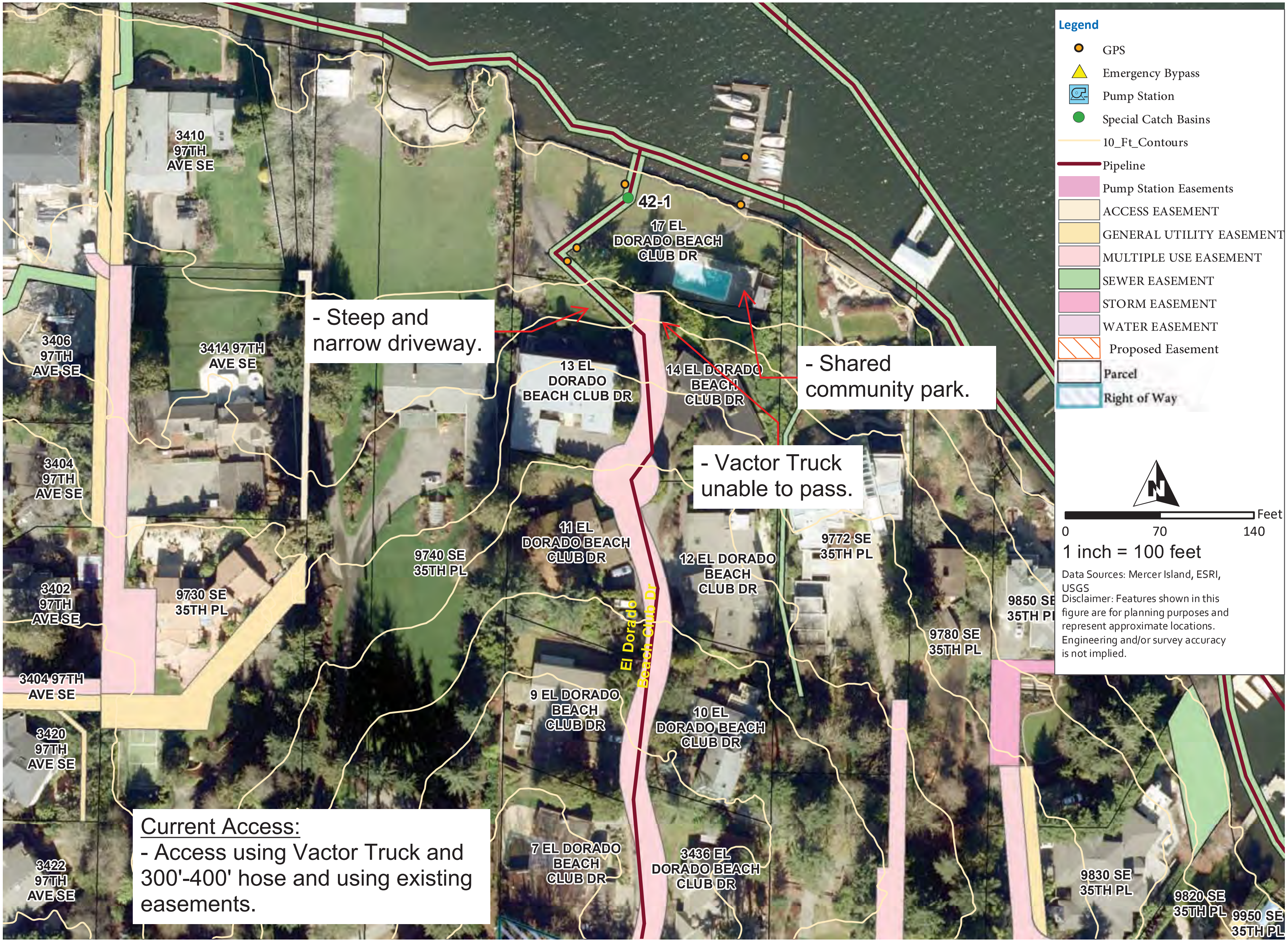





**Figure 5-8.**
**SCB 42-1 Existing Easement Access**

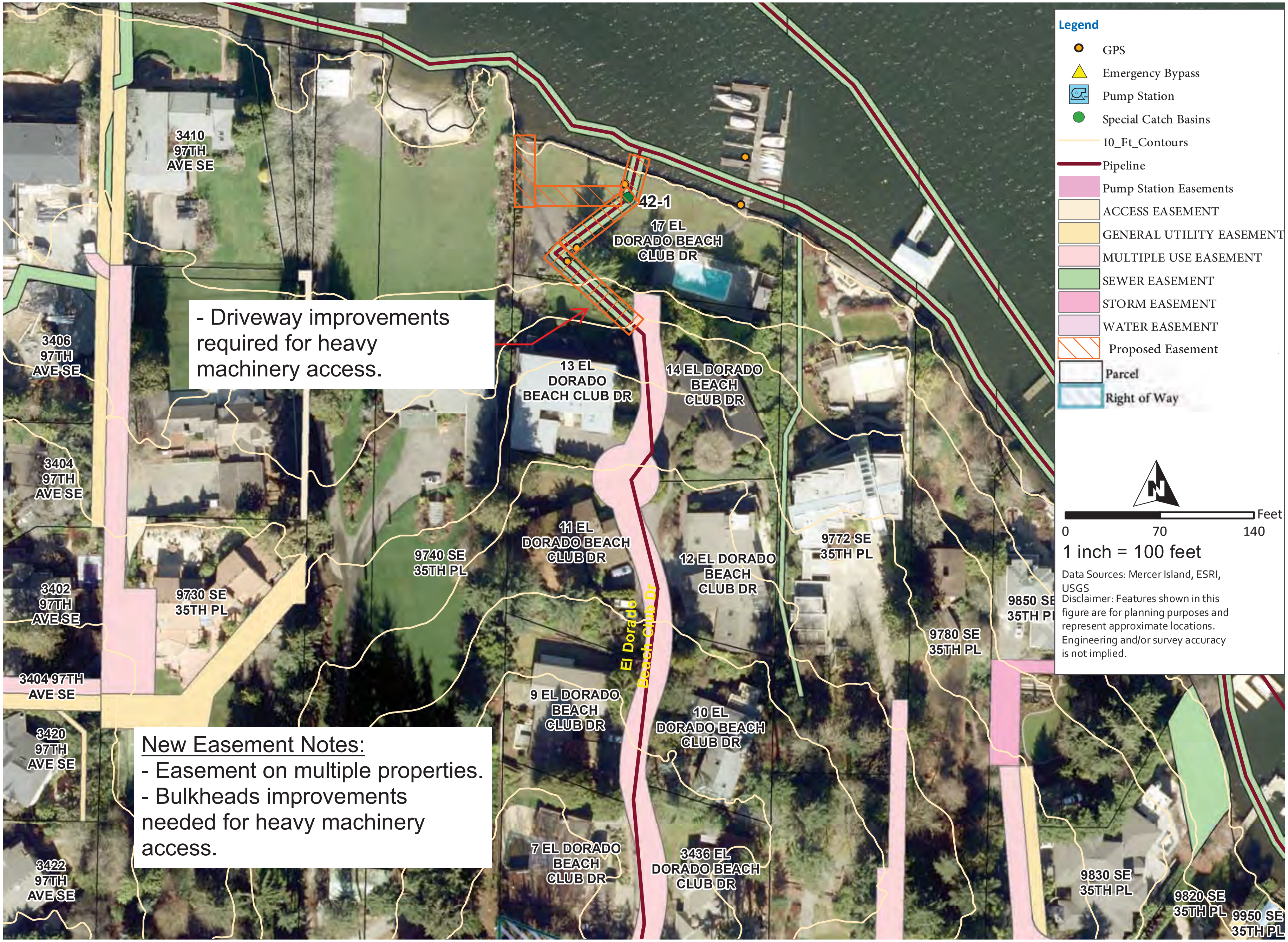
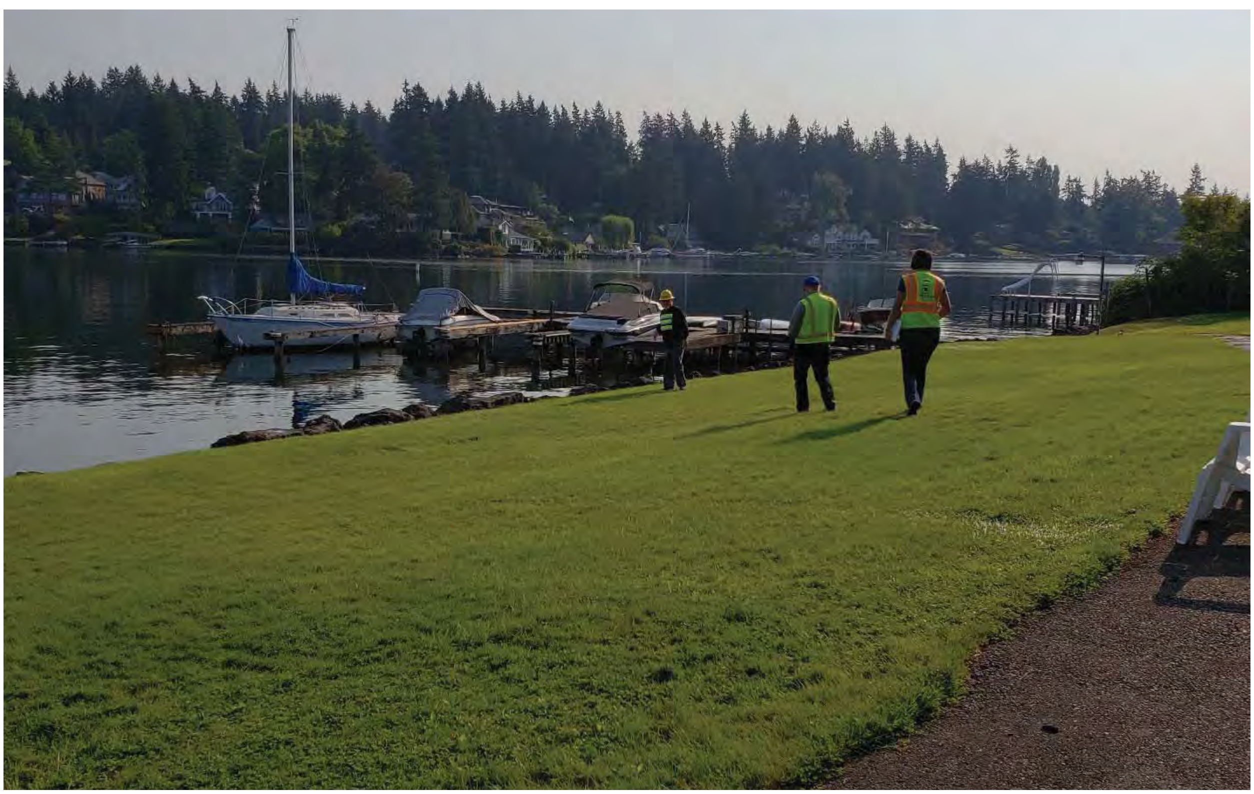





**Figure 5-9.**
**SCB 42-1 New Easement Access**

CB 42-1: Steep and narrow driveway.  Vactor truck unable to access.



CB 42-1: Special Catch Basin is 20’ from water in open community park setting

**Figure 5-10. SCB 42-1 Existing Site Photos**

## 5.5 SCB 40-2

### 5.5.1 General Site Description

SCB 40-2 is located south of 4134 100th Avenue SE, near an abandoned settling basin, at the Mercerwood Shore Club. Water access is blocked due to the large quantity of docks near the SCB. Please reference Figure 5-11.

### 5.5.2 Existing Easements

A pump station easement runs along the pipeline through the SCB, and has a sewer easement just southwest of it, in the grassy area near the shoreline. A water easement extends from E. Mercer Way and runs south for approximately 300 feet. Extending from E. Mercer Way is an access easement that wraps around 4150 E. Mercer Way property. A public utility easement runs south of this, past 9826 and 9843 SE 42nd Place, traveling east, and stopping just short of the shoreline. Please see Figure 5-11 for more details.

### 5.5.3 Existing Access

Primary access is through walking and driving. Water access is not used due to the large quantity of boats and docks present. Table 5-4 summarizes access conditions.

**Table 5-4.** SCB 40-2 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | No |
| Paved Walking Path | No |
| Upland Driving Access/Barriers | Yes, access with 50-foot flex duct |
| On-Street Parking | No |
| On-Site Parking | Park in parking lot |
| Vacuum Truck Accessible | Yes, with 50-foot flex duct |
| Water Access | |
| Water Access | No |
| Dock Access | No |

#### Land Access

For current access by land, crews park in the lower parking lot of the Mercerwood Shore Club, off of E. Mercer Way. Crews can then walk from this spot toward the shoreline to access the SCB, which is located just south of 4134 100th Avenue SE. The SCB is on a private beach (see Figure 5-13), and cleaning can be done with 50 feet of flex duct extended from the truck.

#### Water Access

Water access is not considered at this time due to the large quantity of docks.

### 5.5.4 Challenges

The following are the key access challenges at SCB 40-2:

- Many docks block water access
- Vacuum trucks need to park in a parking lot not directly on site and use 50-foot flex duct to reach SCB

### 5.5.5 Recommendations

The following are future upgrades for SCB 40-2 (see Figure 5-12):

- Possible relocation to right of way on E. Mercer Way
- Possible shared access with Pump Station 25

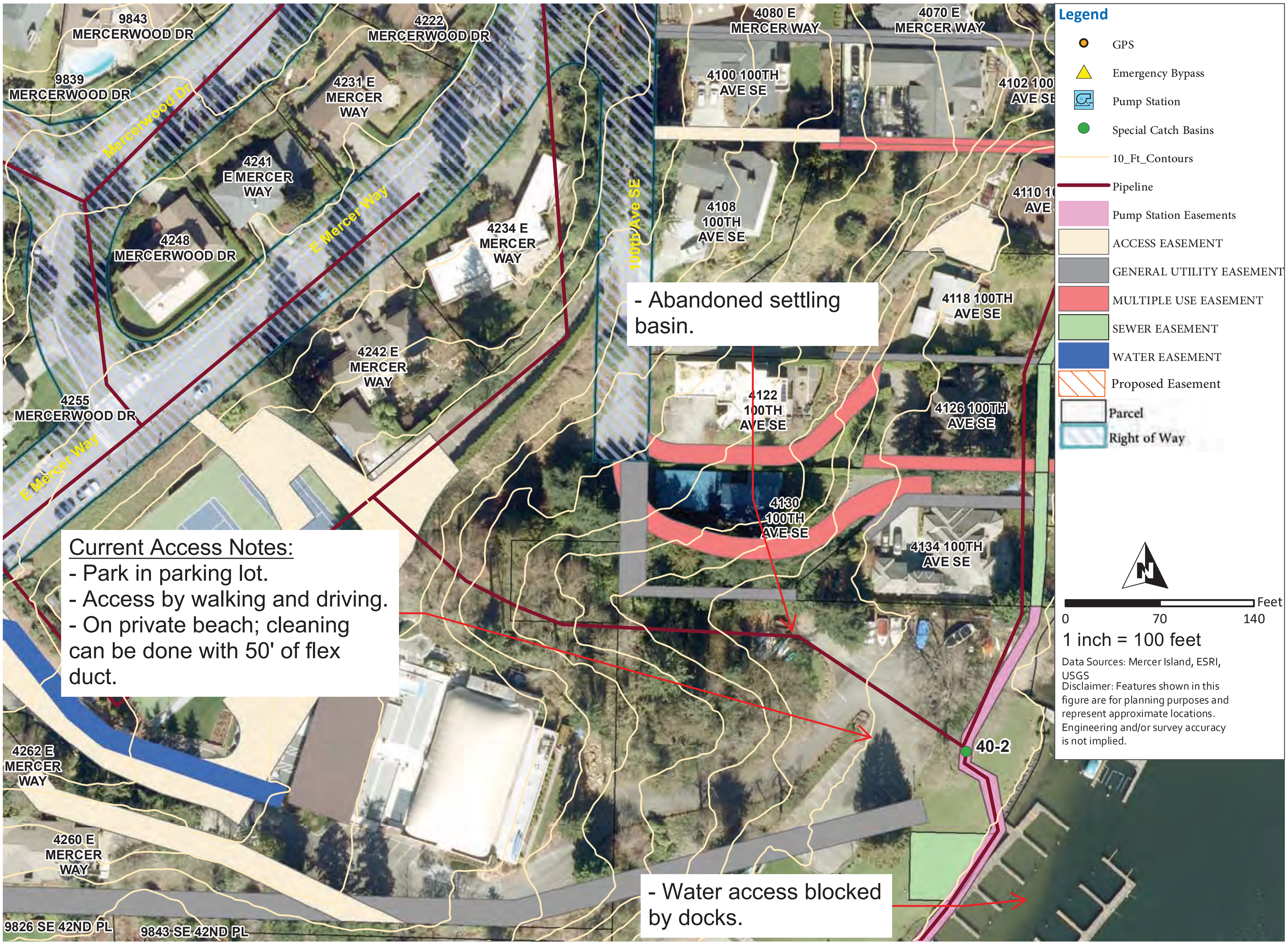





**Figure 5-11.**
**SCB 40-2 Existing Easement Access**

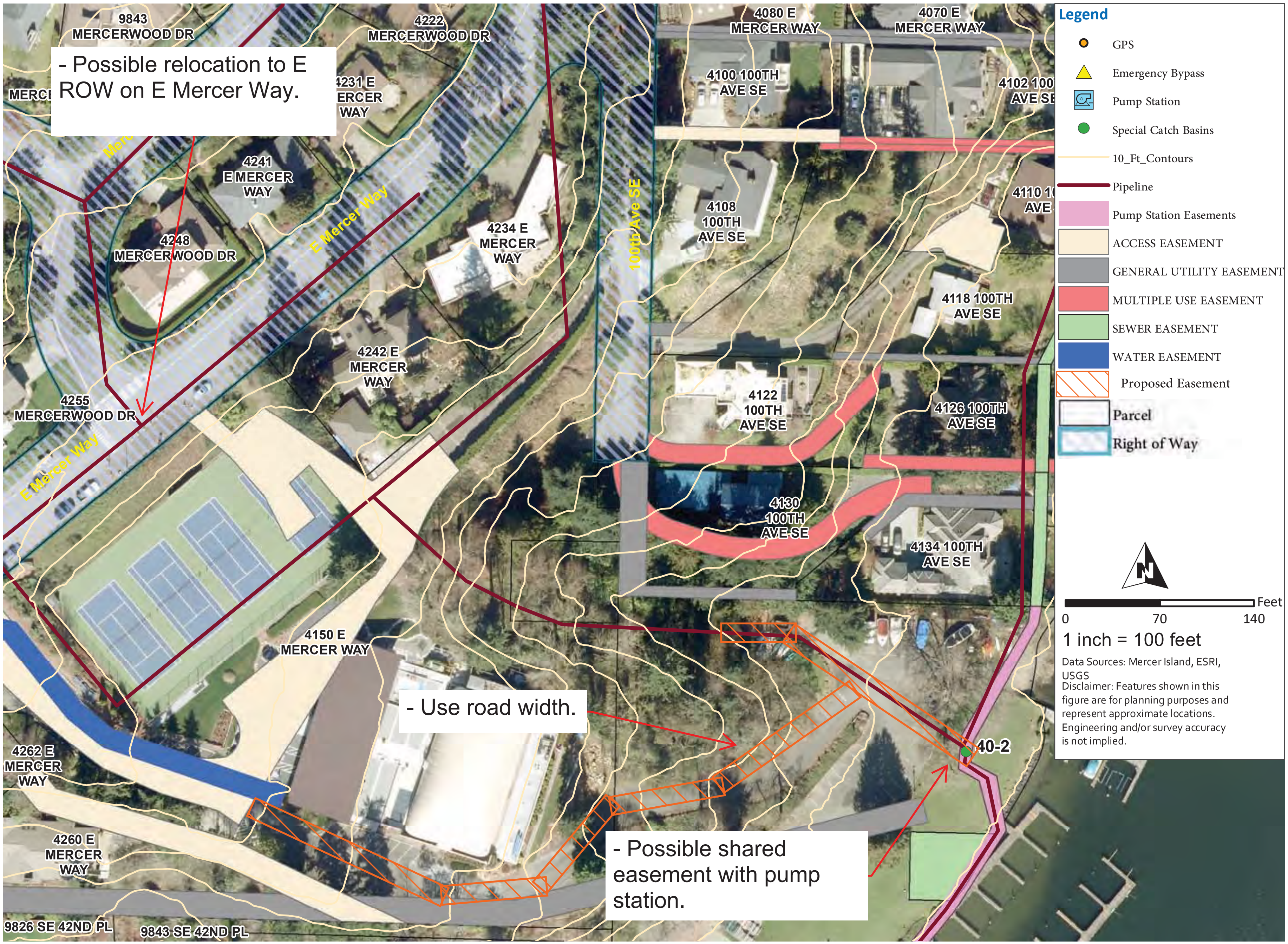



Figure 5-12.
SCB 40-2 New Easement Access

CB 40-2: SCB located on beach, near water.

**Figure 5-13. SCB 40-2 Existing Site Photos**

## 5.6 SCB 44-1

### 5.6.1 General Site Description

SCB 44-1 lies on 9400 SE 33rd Place property, down a private paved driveway with lots of vegetation. A vacuum truck is able to park on the right-of-way on 94th Avenue SE, near 3312 94th Avenue SE. Please reference Figure 5-14.

### 5.6.2 Existing Easements

Public right-of-way and a multiple use easement both extend along 94th Avenue SE up to SE 33rd Place and then extend west. From 94th Avenue SE heading toward 9400 SE 33rd Place, there is a water easement as well as a multiple use easement. Just northeast of SCB 44-1 there is a sewer easement, right next to 9400 SE 33rd Place.

### 5.6.3 Existing Access

Primary access to SCB 44-1 is by land off of 94th Avenue SE. Crews park on the asphalt adjacent to the roadway and walk up the paved driveway to the SCB (see Figure 5-16). There is no water access. Table 5-5 summarizes access conditions.

**Table 5-5.** SCB 44-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Property owner has requested no vehicles on cobbled / tree lined driveway |
| On-Street Parking | Yes |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes, with 150-foot hose |
| Water Access | |
| Water Access | No |
| Dock Access | No |

#### Land Access

For current access by land, crews park on the shoulder of 94th Avenue SE, and walk north up the driveway past 3312 94th Avenue SE, to the SCB located on the property of 9400 SE 33rd Place. A 150-foot hose run from a vacuum truck is needed to reach the SCB from the roadway. The driveway is cobbled and tree lined and the property owner has requested no vehicle access due to potential to damage the cobbles and vegetation.

#### Water Access

There is no water access to this site.

### 5.6.4 Challenges

The following are the key access challenges at SCB 44-1:

- Property owner has requested no vehicles on the private driveway due to potential damage to vegetation and stone cobbles by heavy vehicles. It is recommended the City review its easement to determine the access available at this site.

### 5.6.5 Recommendations

The following are future upgrades for access to SCB 44-1 (see Figure 5-15):

- The City has requested the SCB be relocated to the right of way on 94th Avenue SE

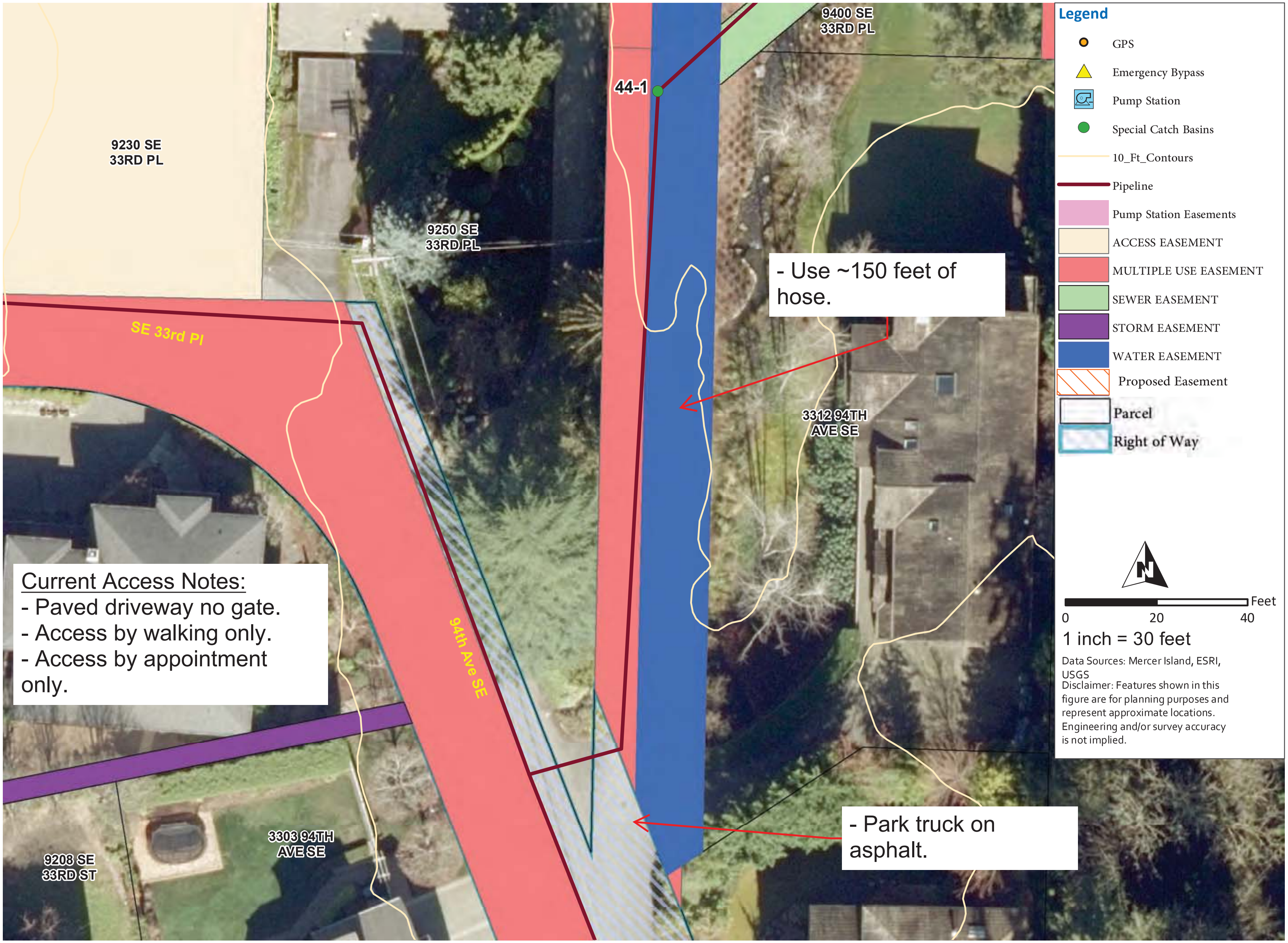



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**Figure 5-14.**
**SCB 44-1 Existing Easement Access**

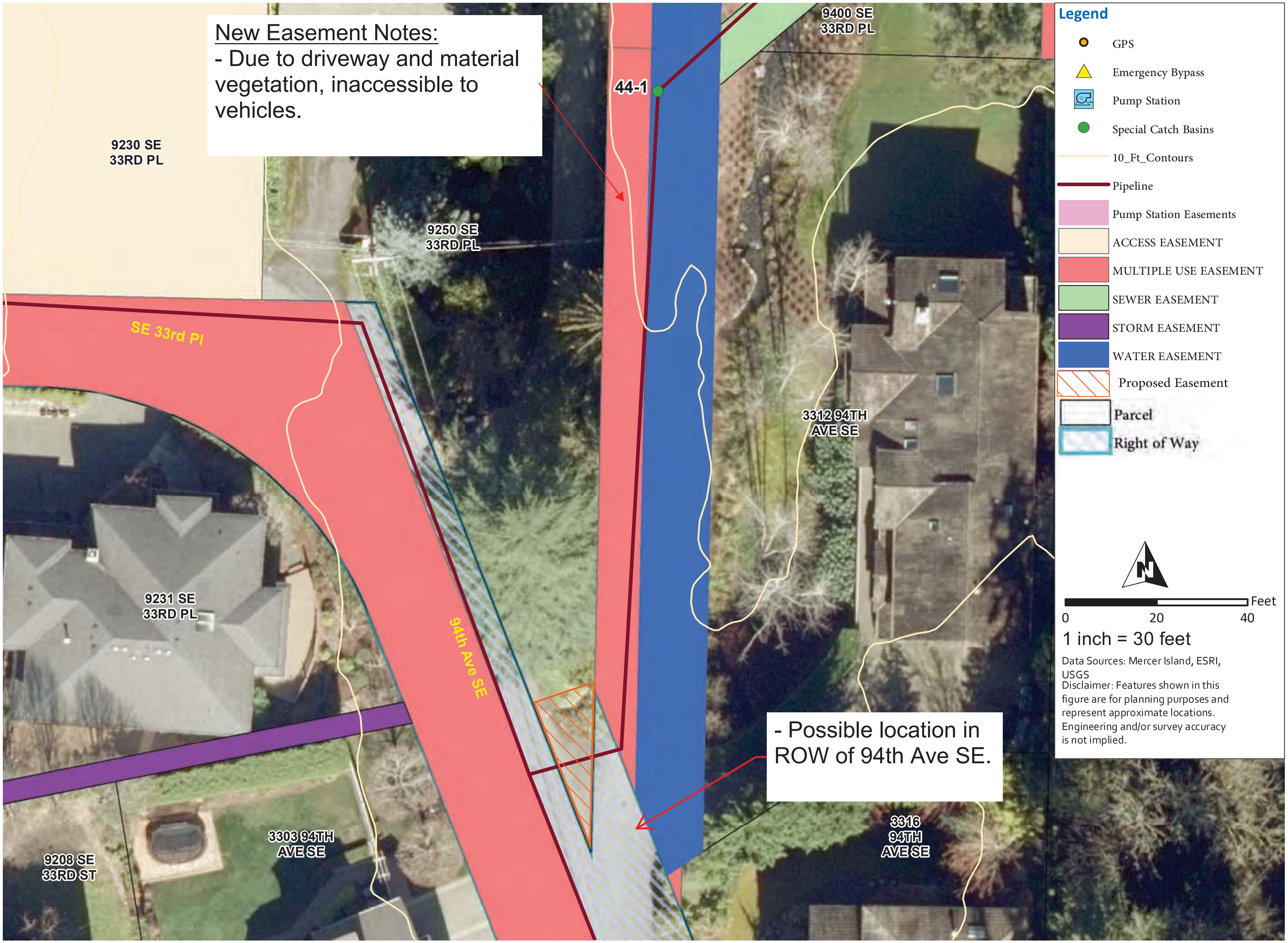


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**Figure 5-15.**
**SCB 44-1 New Easement Access**


CB 44-1: Location of SCB lies on 9400 SE 33rd Pl property.

CB 44-1: Private driveway; access by walking only.

**Figure 5-16. SCB 44-1 Existing Site Photos**

## 5.7 SCB 14-1

### 5.7.1 General Site Description

SCB 14-1 is on the southwest side of the 16 Meadow Lane residence, next to a cinderblock wall. At the time of the inspection, the homeowner was raising honey bees directly adjacent to the SCB (see Figure 5-20).

### 5.7.2 Existing Easements

There are several sewer easements surrounding SCB 14-1 (see Figure 5-17). One runs north and south along the pipeline on the shoreline, another extends down the eastern property line of 16 Meadow Lane, and two more run along and east and the west property lines of 16 Meadow Lane. To the east of 14 Meadow Lane is a multiple use easement, and then extending to the shoreline is a pump station easement.

The alignment of the sewer easement does not match the existing pipe. Further investigation is recommended to confirm the easements on the property.

### 5.7.3 Existing Access

Primary access to SCB 14-1 is by land through Meadow Lane. There is possible water access to SCB 14-1. Table 5-6 summarizes access conditions.

**Table 5-6.** SCB 14-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Narrow driveways with vegetation |
| On-Street Parking | Yes |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | No |
| Water Access | |
| Water Access | Yes, new easement required. |
| Dock Access | No |

#### Land Access

For current access by land, crews approach SCB 14-1 by Meadow Lane. Vacuum truck parking is available on the northeastern end of 14 Meadow Lane. From there, crews can use a 450-foot hose to reach SCB 14-1. Crews head south from the parking spot, toward 16 Meadow Lane. SCB 14-1 is located along the southern end of this property, near the shoreline.

It is recommended the City review its records concerning easements for the SCB 14-1, as the GIS does not show an easement.

#### Water Access

Future water access is possible for SCB 14-1 (see Figure 5-19), however there are several docks that could cause issues for a barge.

### 5.7.4 Challenges

The following are the key access challenges at SCB 14-1:

- Land access by walking only.
- Honey bee hive next to the SCB.

### 5.7.5 Recommendations

The following are future upgrades for SCB 14-1 (see Figure 5-18):

- Possible water access with new easement that spans two properties
- City recommends relocation to updated access south of Meadow Lane. SCB 14-5 is in the vicinity of this location, so more investigation is needed to understand if the relocated SCB would be redundant.

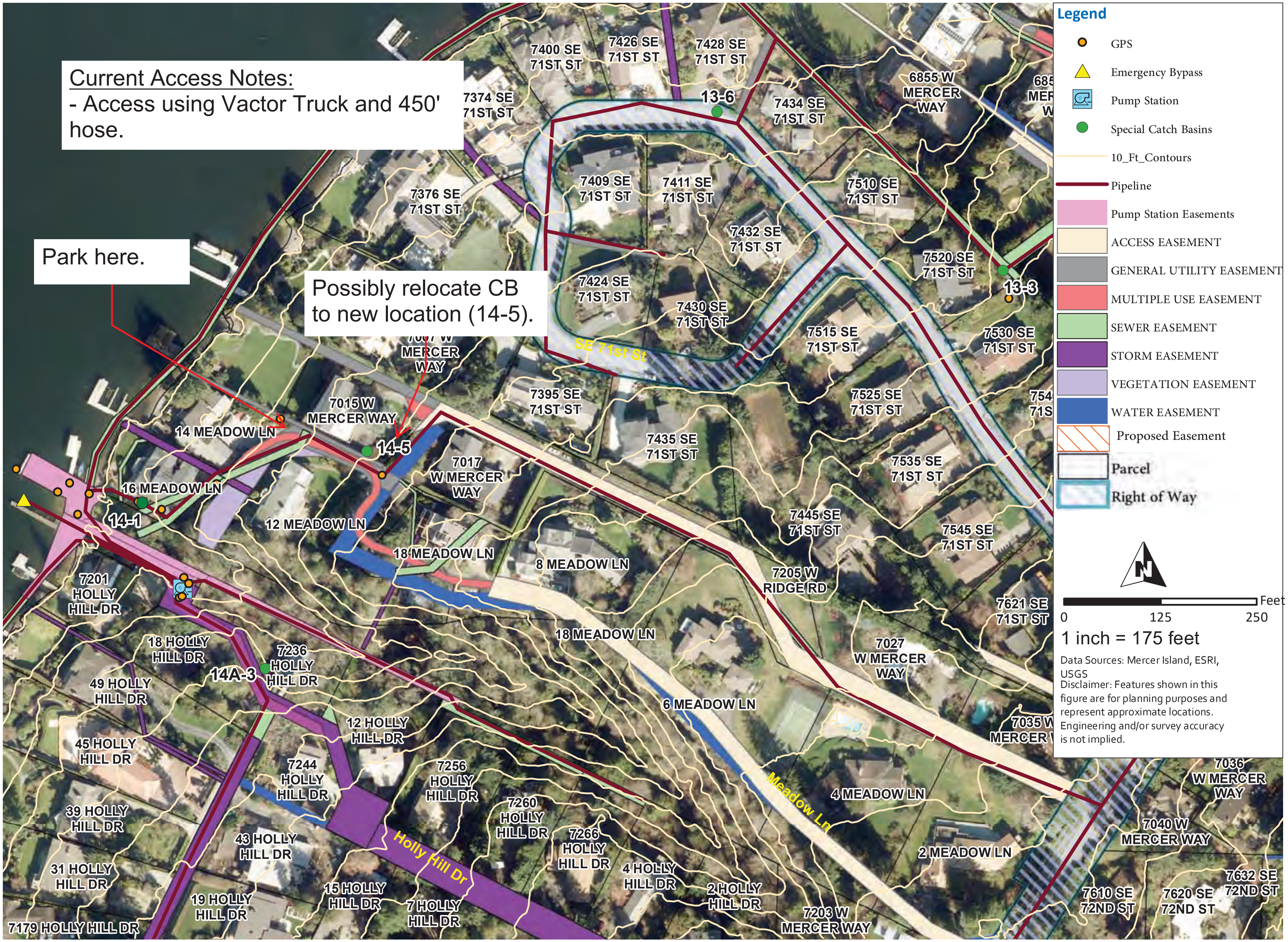




**Figure 5-17.**
**SCB 14-1 Existing Easement Access**

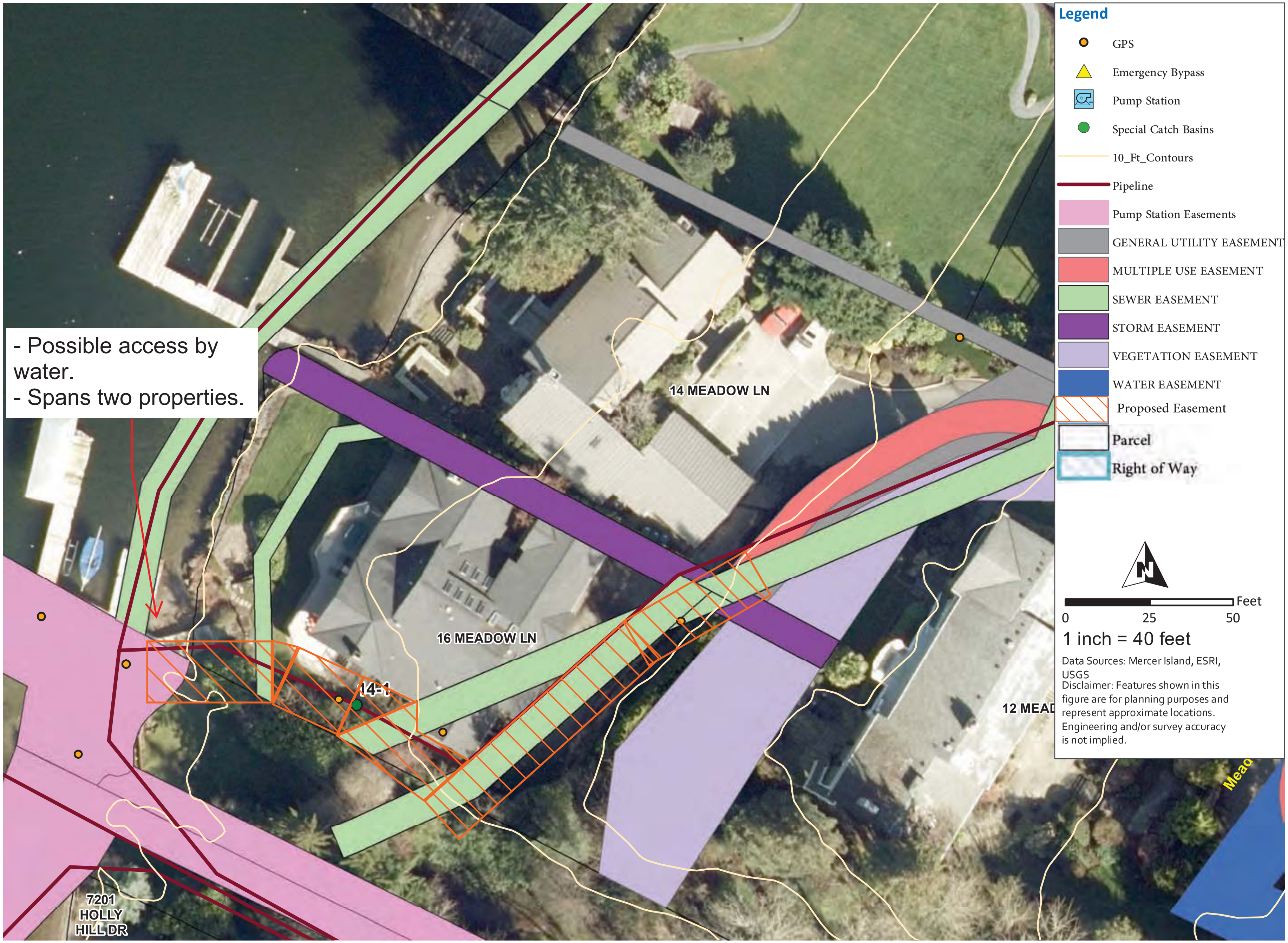


**Figure 5-18.**
**SCB 14-1 New Easement Access**

CB 14-1: Must park on road here (at the top of the hill); access by walking only

CB 14-1: Possible water access

**Figure 5-19. SCB 14-1 Existing Site Photos (1 of 2)**

CB 14-1: Location of SCB 14-1

CB 14-1: Homeowners raise bees next to CB

**Figure 5-20. SCB 14-1 Existing Site Photos (2 of 2)**

## 5.8 SCB 16A-1

### 5.8.1 General Site Description

SCB 16A-1 is located west of 7301 W. Mercer Way on the Lake shore and at the bottom of a steep uphill grade. There is a vertical drop just below the SCB. A steep road with curves leads up to the site, and parking is on the uphill section. The site is near the shoreline, several docks are present, as well as a deck from the nearby property. A structure with a decorative fountain has been placed on top of the SCB. Please reference Figure 5-24.

### 5.8.2 Existing Easements

There is a sewer easement that runs along the shoreline on the pipeline next to SCB 16A-1, and a multiple use easement that travels southeast from the southern end of 7301 W. Mercer Way (see Figure 5-21). It is suggested to utilize this multiple use easement.

### 5.8.3 Existing Access

Primary access to SCB 16A-1 is through land, with the potential for water access in the future. A vacuum truck or pumper tank with support truck could be used; both would enter from W. Mercer Way. Table 5-7 summarizes access conditions.

**Table 5-7.** SCB 16A-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | Yes, with some grassy sections |
| Upland Driving Access/Barriers | Steep access along driveway, rock outcroppings |
| On-Street Parking | Yes |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes, with a 600-foot hose |
| Water Access | |
| Water Access | Yes, limited by existing docks. |
| Dock Access | No |

#### Land Access

Current access is with a pumper tank and support truck, with parking in the driveway of 7301 W. Mercer Way. There are rock outcroppings near 7341 W. Mercer Way that a vacuum truck cannot pass; however, a vacuum truck can be used with 600 feet of hose. Due to a steep slope, land access is from the south of the SCB.

#### Water Access

Water access is possible for SCB 16A-1 but may be limited by docks along the shoreline (see Figure 5-23).

### 5.8.4 Challenges

The following are the key access challenges at SCB 16A-1:

- Rock outcroppings do not let a full-size vacuum truck reach the site without 600 feet of hose.
- A pumper tank and support truck can reach the site; this is the only site the pump truck is used.

- Access to the SCB is down a steep grade.
- A decorative fountain potentially blocks access

## 5.8.5 Recommendations

The following are future upgrades for SCB 16A-1 (see Figure 5-22):

- City requested considering possible relocation of the SCB.
- Recommended access from 7301 W. Mercer Way driveway to the SCB on the western border of the property
- Homeowner remove decorative fountain that is on top of the SCB

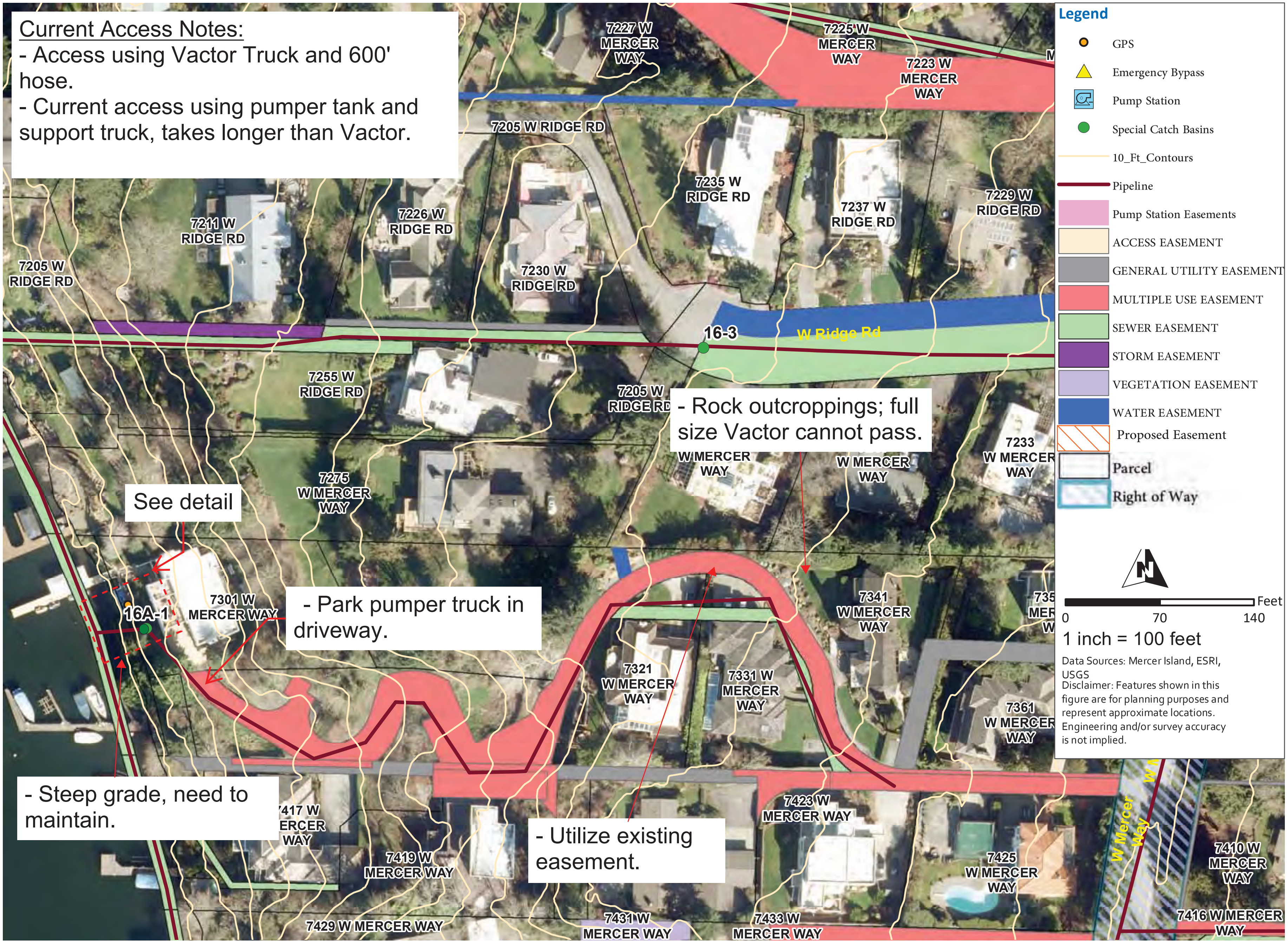




**Figure 5-21.**
**SCB 16A-1 Existing Easement Access**

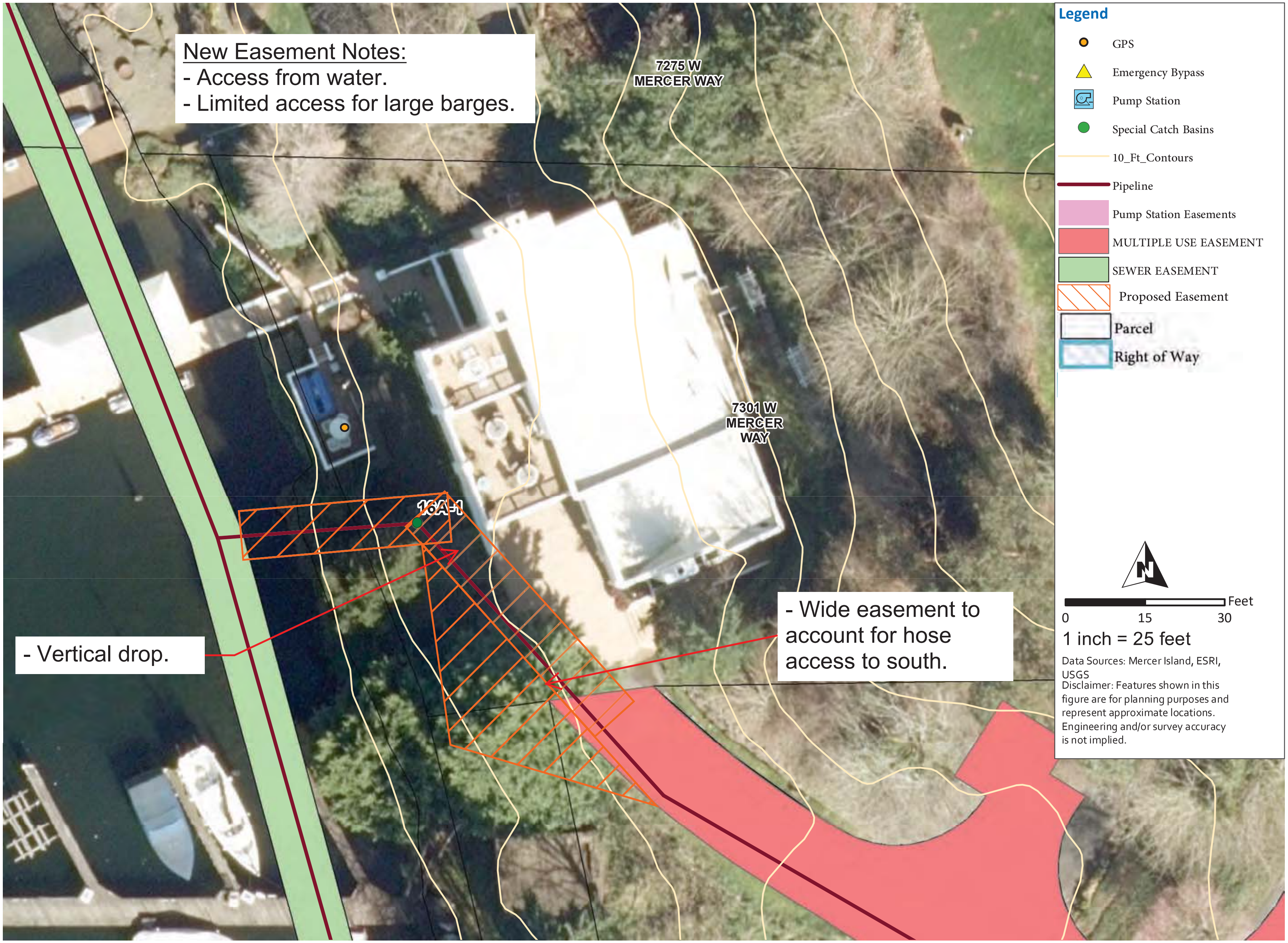


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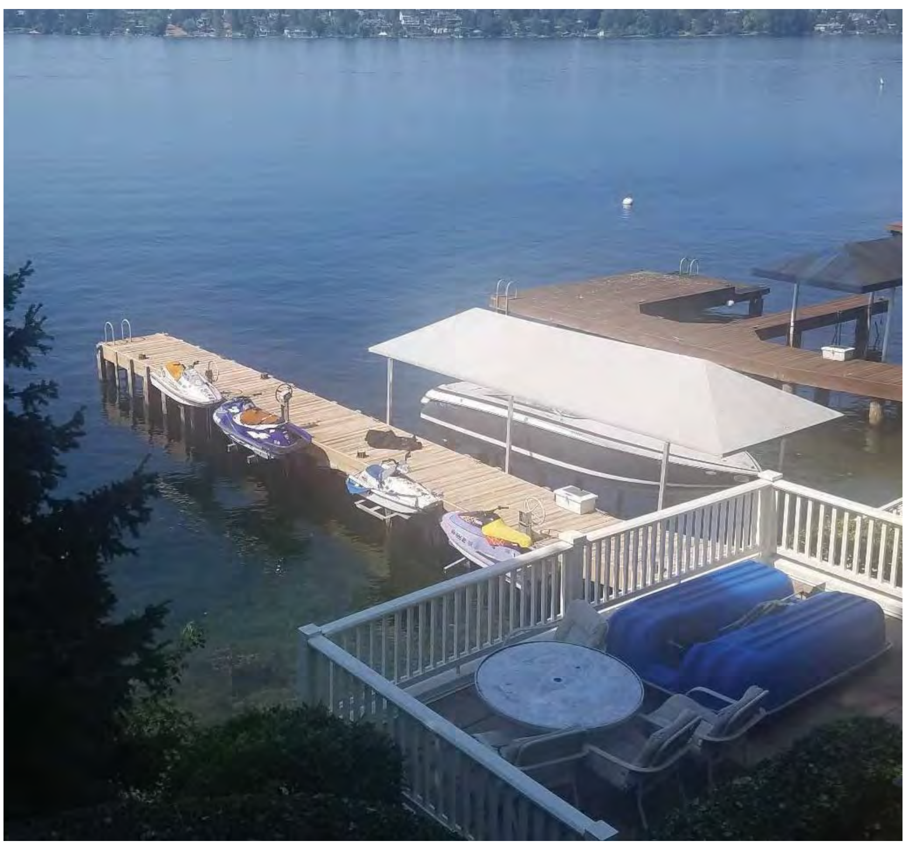
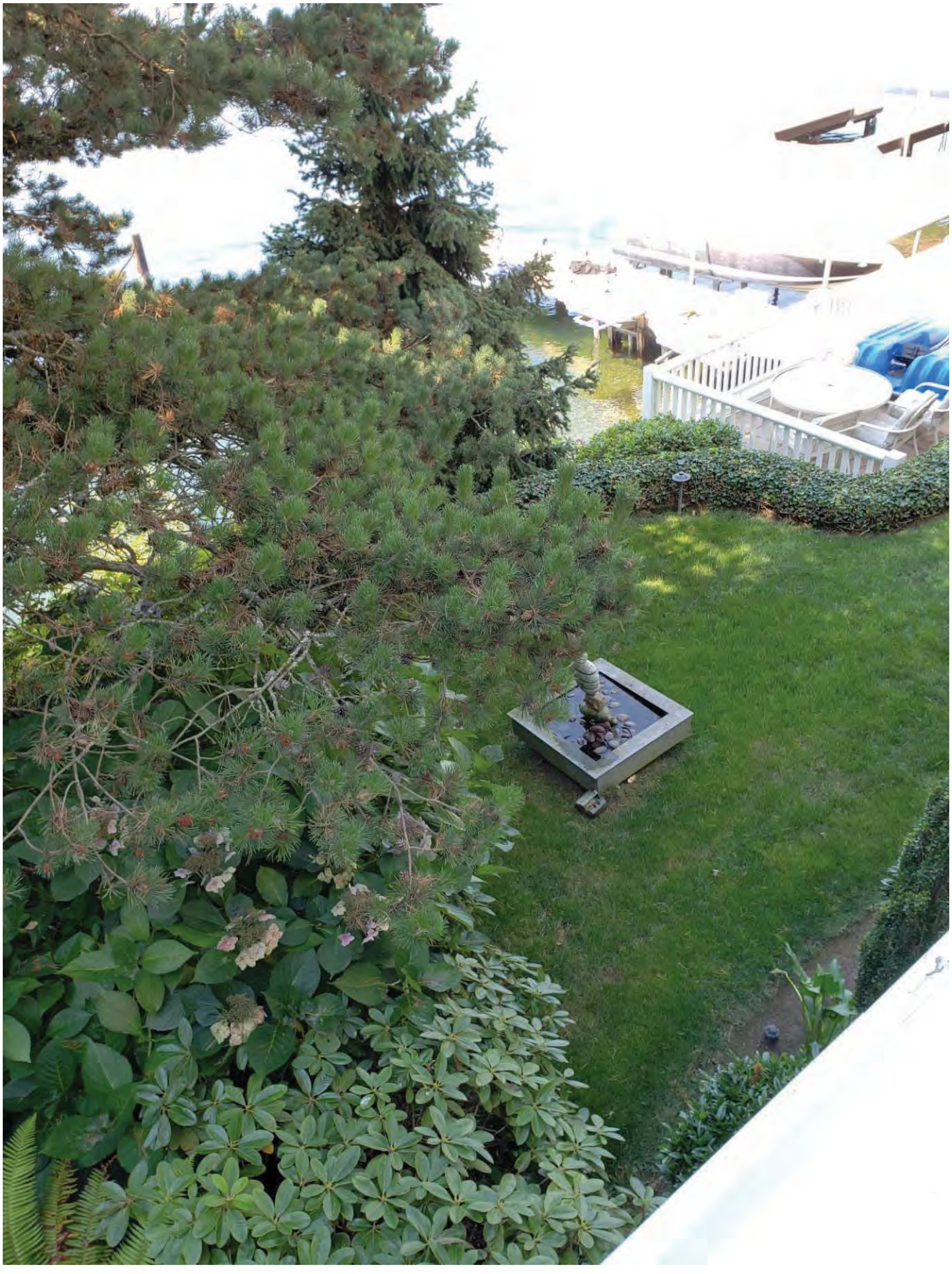
**Figure 5-22.**
**SCB 16A-1 New Easement Access**

CB 16A-1: Steep road with curves; must park on road uphill



CB 16A-1: Possible access from water

**Figure 5-23. SCB 16A-1 Existing Site Photos (1 of 2)**



CB 16A-1: Decorative fountain on structure

**Figure 5-24. SCB 16A-1 Existing Site Photos (2 of 2)**

## 5.9 SCB 17-1

### 5.9.1 General Site Description

SCB 17-1 is buried underneath a gravel driveway at the end of a private road off of W. Mercer Way. The SCB is located around the southeast corner of 7441 W. Mercer Way. A steep curvy road limits vacuum truck access to the site. Behind the gravel driveway is a steep drop-off to the shoreline.

### 5.9.2 Existing Easements

There is a storm easement, sewer easement, and pipeline running through SCB 17-1 and extending both east and west of it (see Figure 5-25). A multiple use easement begins just east of the SCB and continues east toward W. Mercer Way.

### 5.9.3 Existing Access

Primary access to SCB 17-1 is by land. Vacuum trucks enter off of W. Mercer Way. There is no water access at this time. Table 5-8 summarizes access conditions.

**Table 5-8. SCB 17-1** Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | No (gravel) |
| Paved Walking Path | Yes |
| Upland Driving Access/Barriers | Narrow and steep private road |
| On-Street Parking | Yes, on uphill road by 7423 W. Mercer Way |
| On-Site Parking | No |
| Vacuum Truck Accessible | Yes, with 300-foot hose |
| Water Access | |
| Water Access | No |
| Dock Access | No |

#### Land Access

For current access by land, crews approach the site from W. Mercer Way, and park a vacuum truck to the northwest of 7433 W. Mercer Way, on the uphill road. Access is then available with a 300-foot hose. From the parking spot, crews head south to 7445 W. Mercer Way, then continue west until reaching the SCB in the gravel driveway of 7441 W. Mercer Way. The private road leading to SCB 17-1 does not provide access for heavy equipment and needs improvement.

#### Water Access

Water access is not available at this time due to the steep grade between the shoreline and the SCB.

### 5.9.4 Challenges

The following are the key access challenges at SCB 17-1 (see Figure 5-27):

- SCB is buried under a gravel driveway
- Private roadway does not provide access for heavy equipment

### 5.9.5 Recommendations

For adequate future access, the pump station easement for SCB 17-1 (see Figure 5-26):

- Improve access to allow for future use of heavy equipment (width, road material type/condition).
- Consider raising the manhole lid to unbury the SCB.

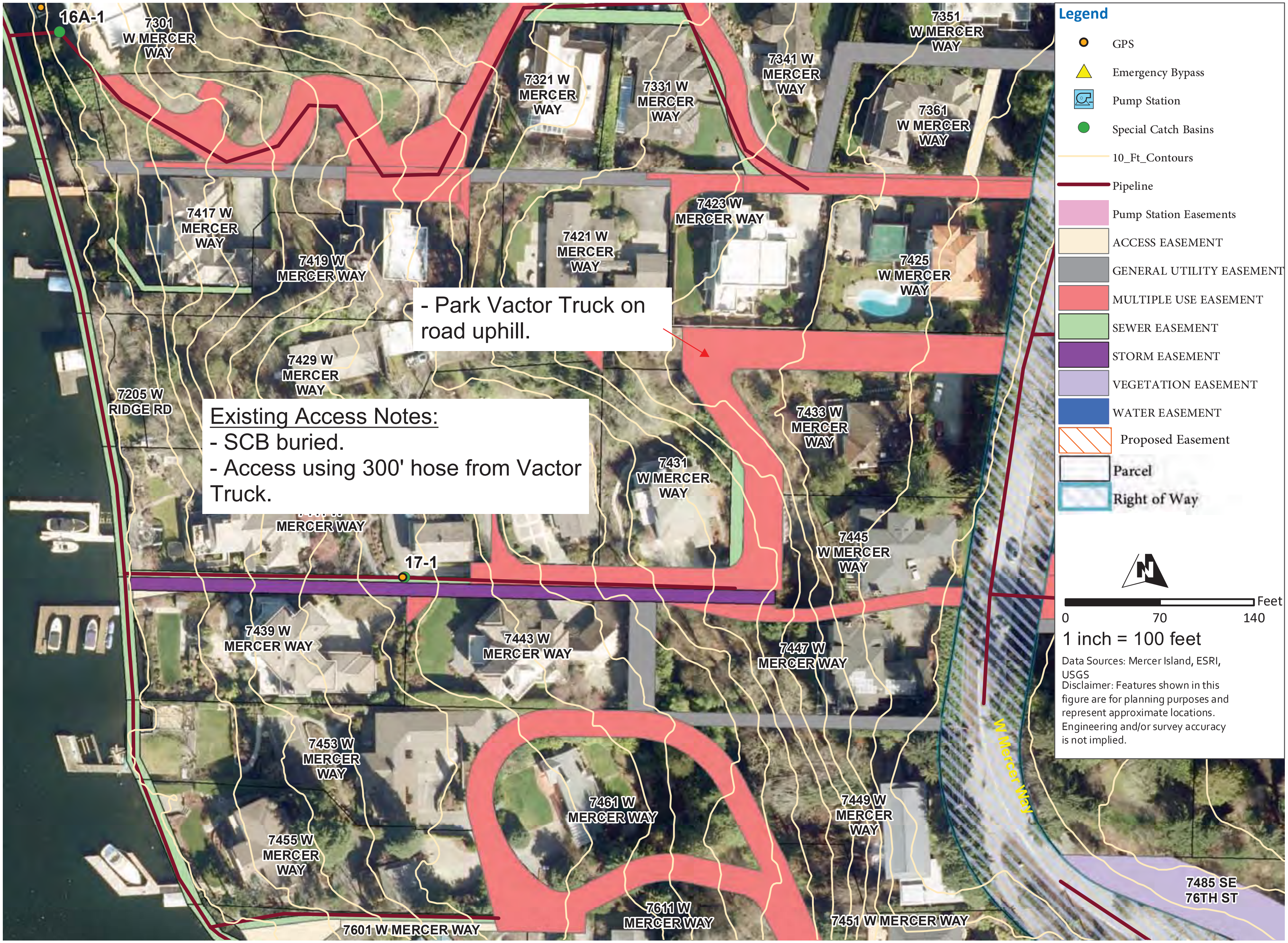



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**Figure 5-25.**
**SCB 17-1 Existing Easement Access**

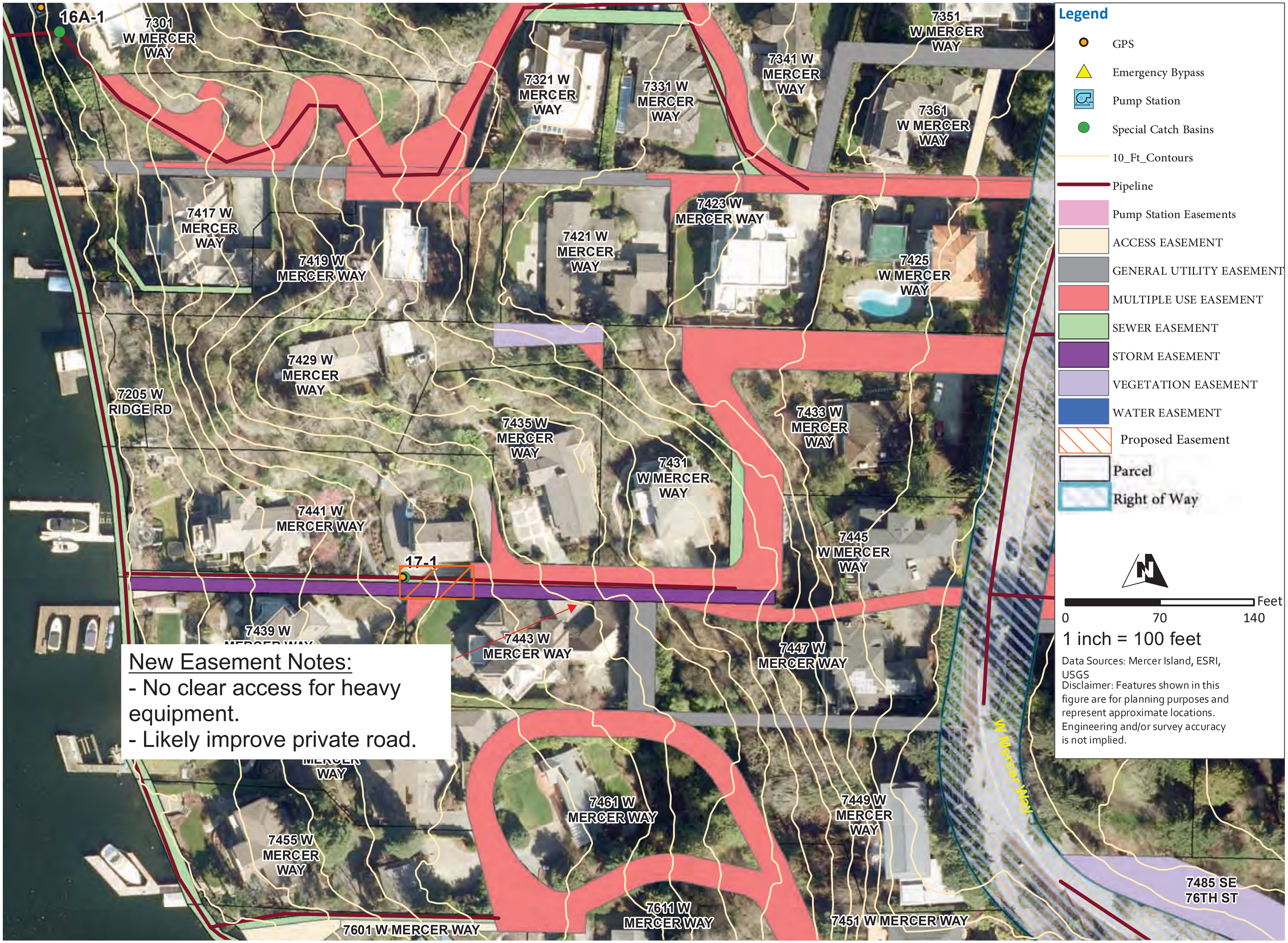


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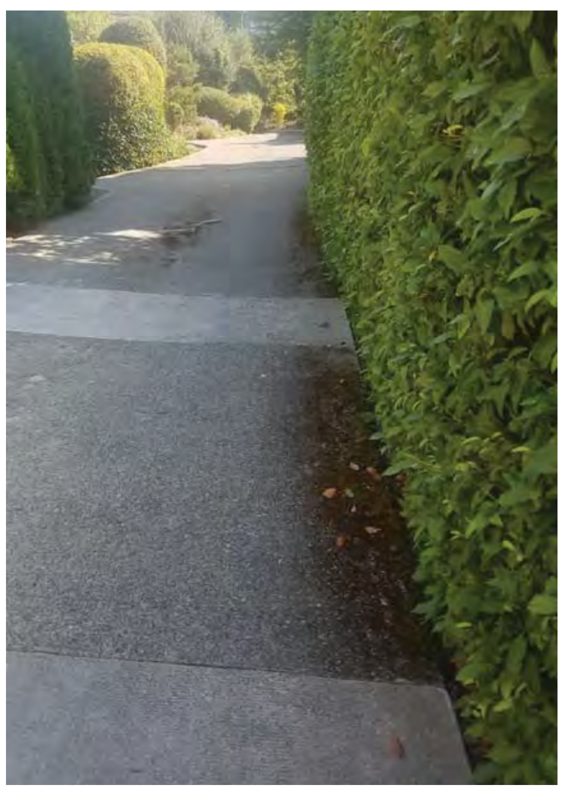
**Figure 5-26. SCB 17-1 New Easement Access**

CB 17-1: CB located underneath gravel; Background shows no access to water due to slope.



CB 17-1: Steep, curvy road that limits vacuum truck access.

**Figure 5-27. SCB 17-1 Existing Site Photos**

## 5.10 SCB 23-1

### 5.10.1 General Site Description

SCB 23-1 is located between properties 8048 and 8042 Avalon Place, on the southeastern end near the shoreline. The land here is very steep and does not allow for heavy maintenance access. Crews descend steep rock stairs from the street to access the SCB. There is access from the water, between two private docks. There is some vegetation along the shoreline, and grassy areas around the SCB.

### 5.10.2 Existing Easements

There is a sewer easement that runs along a pipeline between properties 8048 and 8042 Avalon Place, then continues along the shoreline (see Figure 5-28).

### 5.10.3 Existing Access

Primary access to SCB 23-1 could be from land or water. If entering from land, vacuum trucks should enter from Avalon Place. From the water, there is limited room to access between the two docks present. Table 5-9 summarizes access conditions.

**Table 5-9.** SCB 23-1 Field Investigation Access Summary

| Feature | Presence |
|---|---|
| Land Access | |
| Gate | No |
| Paved Driveway | Yes |
| Paved Walking Path | No, grass |
| Upland Driving Access/Barriers | Houses |
| On-Street Parking | Yes, on Avalon Place |
| On-Site Parking | Yes |
| Vacuum Truck Accessible | Yes |
| Water Access | |
| Water Access | Yes |
| Dock Access | Yes |

#### Land Access

For current access by land, crews park vacuum trucks on Avalon Place, which is right of way, in front of 8048 Avalon Place. From the parking spot, crews walk along the northeastern side of the house, toward the shoreline and down steep rock stairs (see Figure 5-30) to a grassy landing that contains the SCB. From the vacuum truck, a 400- to 500-foot hose is needed. Large amounts of debris are typically collected from the SCB.

#### Water Access

Access to SCB 23-1 from water is possible. There are two docks extending from properties 8048 and 8042 Avalon Place that constrain water access (see Figure 5-30). The SCB is located uphill of the shoreline that is accessible by steep rock stairs.

### 5.10.4 Challenges

The following are key access challenges at SCB 23-1:

- Steep walkway/stairs leading down to the SCB from Avalon Place, does not allow for heavy maintenance access
- Access from water is via steep stairs.

### 5.10.5 Recommendations

For adequate future access for SCB 23-1 the following should be addressed (see Figure 5-29):

- Access primarily should be considered from water, as land access pathway is very steep




**Figure 5-28.**
**SCB 23-1 Existing Easement Access**


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**Figure 5-29.**
**SCB 23-1 New Easement Access**

CB 23-1: Accessible from water.

CB 23-1: Staff must climb down steep switchbacks from street.

**Figure 5-30. SCB 23-1 Existing Site Photos**

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# 6. EMERGENCY BYPASS ACCESS EVALUATION

The emergency bypass structures or mid-line relief overflows were constructed away from pump stations to prevent sanitary sewer overflows from the lake line. The bypasses discharge excessive flows that could otherwise overflow into homes. City staff will conduct regular maintenance and monitoring on these structures via SCADA. To do so, staff are currently accessing the structures by foot. The GIS data does not show easements associated with constructed emergency bypass structures; therefore, it is recommended that the City explore additional easements.

The emergency bypass structures were not visited, so no specific access recommendations are provided. We anticipate that the access requirements for the emergency bypass should be similar to those for the special catch basins. Unlike the special catch basins, the City does not have the option to relocate the structures. However, given their location, it is anticipated that the City will be able to access the structures by water if land access is not available.

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# 7. LAKE LINE PROGRAM

This chapter presents a lake line program based on the evaluations performed for this report. The lake line program consists of the following major elements:

- Recommendations for new or modified capital projects in the City's wastewater system Capital Improvement Program (CIP) to address needs identified in the access evaluation.
- Estimates of costs and implementation periods for the new and modified recommended projects
- A plan for establishing priorities for implementation of the recommended projects.

## 7.1 CAPITAL PROJECT OVERVIEW

### 7.1.1 Categories

Capital projects are categorized by the nature of the infrastructure they apply to, as follows:

- General (G)—General projects are those that are not related to specific infrastructure, such as updating the General Sewer Plan or conducting an easement review.
- Pipe (P)—Pipe projects are those that would improve the gravity collection system.
- Pump Station (PS)—Pump station projects are those that would improve the City's pump stations.
- Lake Line (L)—Lake line projects are those that would improve the lake line, hydraulic structures, and special catch basins.

### 7.1.2 Capital Planning Periods

CIP projects were allocated into three planning periods:

- Short-term—2019 through 2028 (this includes the periods that are designated short-term and mid-term in the General Sewer Plan)
- Long-term—2029 through 2037
- Extended-term—Beyond 2037.

### 7.1.3 Project Cost Estimating

Project cost estimates presented in this chapter are Association for the Advancement of Cost Engineering Class 5 estimates. Class 5 estimates are budget-level estimates. Actual costs may vary from these estimates by -50 percent to +100 percent. All costs are in January 2017 dollars to be consistent with the General Sewer Plan. The Engineering News Report (ENR) U.S. 20-City Construction Cost Index for January 2017 is 10,532. The estimates are subject to change as project designs mature. Cost of labor, materials, equipment may vary in the future.

The CIP cost estimates were based on construction costs that are inflated using cost factors to account for non-construction project elements. Cost factors used by the City for wastewater planning and consistent with the City's General Sewer Plan are shown in Table 7-1. For a typical project, the cost factors would increase the construction costs by 85 percent to represent total project costs. However, cost factors have been removed when not applicable in some cases.

**Table 7-1.** Cost Factors; General Sewer Plan, City of Mercer Island

| Adjustment Factors | Description | Factor |
|---|---|---|
| Contingency | Costs that may occur due to uncertainty in project scope and conditions. | 30% |
| General Conditions & Overhead | Contractor costs indirectly related to construction. | 25% |
| Engineering/Planning | Cost for planning and design of project | 30% |
| City Administration | Costs for City Staff Involvement and Management | 10% |

## 7.2 RECOMMENDED PROJECTS AND ESTIMATED COSTS

Brief descriptions and cost summaries are provided below for each CIP project that is new or modified based on the findings of this report. To the extent possible, the new or modified projects developed for this lake line program maintained the numbering system from the General Sewer Plan. In some cases, a single CIP project (for example L-4) was divided into multiple projects differentiated by a letter (for example, L-4a). New projects were added to reflect new activities recommended in this report.

Individual project cost sheets generated for each project are provided in the appendix to this report. Each sheet provides project identifiers, description, costs, project type, and comments to aid in future implementation. A location map is included for projects that are located in a specific area, where applicable.

### 7.2.1 G-5 Access Code and Standards Review

Implement code / standard changes to support utility maintenance, including the sewer system.

This is a new project developed for the lake line program. It calls for a comprehensive review of codes and standards relating to utility access. Several considerations were identified in the lake line access evaluation:

- City operators have authority to access utilities for maintenance without an easement.
- Correcting improperly recorded easements for all public utilities by prior property owners.
- Property owner maintenance requirements for private lake line laterals and special catch basins.
- Development standards for construction of special catch basins on private lake line laterals, dock configuration over the lake line, and infrastructure in easements, etc.

The estimated cost for the planning consultant services is $27,500, and for internal city staff effort is $25,000. The total estimated cost is $52,500. Consultant services is a budget estimate for planning consultant to assist. Legal assistance and public outreach costs are not included.

### 7.2.2 G-6 Easement Review and Confirmation

Review and confirm easements to be used for lake line system access including easement language and rights of use for existing docks. Identify additional easement language needed to conduct full spectrum of operation and maintenance activities on the lake line system.

This is a new project developed for the lake line program.

The estimated cost for the planning consultant services is $25,000, and for internal city staff effort is $25,000. The total estimated cost is $50,000. Consultant services is a budget estimate for planning consultant to assist. Legal assistance and public outreach costs are not included.

### 7.2.3 PS-1 Pump Station Accessibility Improvements

Address priority pump station accessibility issues to support pump station repair, rehabilitation, and capacity improvements. Evaluate access at all stations, identify conditions/concerns and needs, prioritize future work. Consider long term contracting with a vendor to rent a boat or purchasing a boat to access pump stations that have limited land access.

This is a modification of a project included in the General Sewer Plan. Pump station access may include:

- New or improved walking path / stairs for additional access and safety
- Improvements to existing roads for condition, increased, and safety
- New or improved docks and/or bulkheads to facilitate access from the Lake

A budgetary estimate of $20,000 (without cost factors) of construction costs was made for each pump station. This is based on medium construction boat dock (4-inch decking) with average piling ~$80 per square foot per Marshall Valuation Service (inflated from 2009 to 2018 using ENR 20-City Index). For 30-by-8-foot dock, costs would be ~$20,000. Alternatively, metal stairs are $600/riser (10 feet) in a built environment per Marshall & Swift Valuation Service; Assume 100 vertical feet (total of $6,000), $10,000 for vegetation management, and $4,000 for additional geotechnical in non-built environment. Major improvements to road are not budgeted. The project plans on rehabilitating 12 pump stations at a cost of $37,000 per pump station. The total planned cost is $592,000.

### 7.2.4 PS-7a Capacity Analysis

At each pump station assessed, conduct a detailed capacity study that considers existing pump station flows and the future increase in flows from additional customers and increased I/I.

This is a new project developed for the lake line program. It is intended to identify future pump station capacity improvements. It is recommended that several years of monitoring be available before an evaluation. The pump station capacity study assumes analysis of available information. Note that the analyses for Pump Stations #23, #24 and #25 have been addressed as part of the Project PS-4, so additional capacity analysis is not included for these pump stations. In addition, Pump Station #4 was recently constructed and is assumed to have adequate capacity for future needs.

There are 13 pump stations where capacity studies are recommended, at an estimated cost of $39,000 each, giving a total cost estimate of $546,000.

### 7.2.5 PS-7b Pump Station Alternative Analysis

For identified capacity deficiencies (determined from PS-7a), conduct a follow-on alternatives analysis to determine next steps. Alternatives may consider increase in pump station capacity or reduction in the I/I of the tributary basins. Analysis shall evaluate system I/I and pump flows so that cost effective solutions can be selected.

This is a new project developed for the lake line program. While the PS-7a capacity studies assumes analysis of pre-existing available information, PS-7b anticipates collection of additional flow monitoring data for analysis. It is assumed that the project will take two years—flow monitoring in fall/winter of the first year (October through February) followed by analysis. Analysis of a single pump station will require monitoring of the upstream and downstream pipe segment and the corresponding pump stations.

An alternative analysis and capacity improvements for five pump station areas is assumed for budgetary purposes. For each pump station alternative analysis area unfactored costs assume: $100,000 for up to 12 flow meters or other field investigations; $120,000 for analyses; and $40,000 for reporting, project management, and miscellaneous costs. With cost contingency and City administration factors, the anticipated total project cost is $1,820,000.

### 7.2.6 PS-7c Future Capacity Improvements

Implement pump station improvements to address future capacity needs.

This is a new project developed for the lake line program. A budgetary placeholder was included for pump station improvements to address future capacity needs. However, the feasibility of station capacity increases is highly constrained by downstream capacity of the lake line. Additional hydraulic capacity improvements are included in the budget allocations for Project L-4 and Project P-5.

There are 5 pump station capacity improvements planned, with a budgetary place holder of $1,387,500 each. This gives a total estimated cost of $6,937,500.

### 7.2.7 L-1 Lake Access

Provide access points to the lake line for cleaning and other routine maintenance. In preparation for installation, evaluate potential locations, consider access feasibility, identify recommended locations, and prioritize their installation.

This is a modification of a project included in the General Sewer Plan. To effectively maintain the lake line, access points must be sufficient for inspection, insertion of cleaning equipment into the pipe, and retrieval of solids and other debris collected during cleaning activities. Access points may include manholes or clean outs in the water or on land. In-line manholes or cleanouts are recommended to provide the most effective access.

Installation will be split into phases. It is anticipated one access point will be constructed in the short term. Its location will be based on priority. Design, environmental review, permitting and easement discussions are anticipated part of that process. Additional access points will be prioritized for design and construction in the mid-term and long-term. Installation of new access points may require acquisition of new easements or property.

Access points should be spaced at a maximum of 1,400 feet to facilitate cleaning and at the bottom of known pipe sags. A minimum of 97 access points is anticipated. Additional access points may be required where the pipe alignment or defects restrict inspection or maintenance activities.

For the estimate it was assumed that manholes would be installed on the lake line with the following spacing depending on pipe diameter.

- 8-inch lake lines – 500 feet spacing
- 10-inch lake lines – 800 feet spacing
- 12-inch lake lines – 1,200 feet spacing
- > 12-inch lake lines – 1,400 feet spacing

In addition, it has been assumed that one additional manhole will be required upstream of each pump station. Also as access is anticipated close to lake line features that restrict cleaning, such as a pipe sag or bend, approximately one additional manhole has been assumed for each lake line section between pump stations.

Construction costs have been based on 2018 City of Renton temporary lake line manhole installation. It is anticipated for the initial installation that there will be one-time costs to develop a standard access structure that can used on subsequent phases. These one-time costs include feasibility and pre-design, as well as environmental permitting and final design ($185,000 per activity, $370,000 total). Using a standardized access structures approach, access points are anticipated to cost $131,000 (unfactored) per structure based on recent similar project costs.

The total cost estimate for regular access points on the entire lake line is $22,424,300. However, costs assume that access points will only be added to a portion of the lake line in the next 20 years.

## 7.2.8 L-2 Lake Line Condition Assessment

Conduct an initial condition assessment of the entire lake line system to identify segments of pipe for further detailed condition assessment. For subsequent condition assessment, obtain pipe thickness and lining conditions through a combination of pipe coupons and ultrasonic thickness (UT) testing. If conducted in conjunction with installation of access points and cleaning (Project L-4c), use CCTV video information in the condition assessment for this project.

### Description

This is a modification of a project included in the General Sewer Plan. It is intended that this project inform lake line repair and replacement (Project L-4e). The initial condition assessment of the entire lake line system is recommended to identify segments of pipe for further detailed condition assessment. This initial condition assessment should include a review of both historical project documentation from the lake line original construction and subsequent projects, as available, to determine the original pipe material, wall thickness, lining, coating, joint type, gasket material, and test pressure.

### Cost Estimate

The initial condition assessment has been estimated based on the lengths of lake line for Reaches 1, 2 and 5 (14,000 feet, 28,700 feet and 9,400 feet respectively) and assuming approximately $40 per foot (unfactored cost). Subsequent condition assessment is estimated at $3,700,000, giving a total project cost estimate of $7,555,400.

## 7.2.9 L-4a Lake Line Locating and Marking

Locate and mark the lake line system to aid asset management of the system.

This is a new project developed for the lake line program.

Location of the lake line piping should include verification of plan and profile of the lake line sewer and private laterals, as well as location of special catch basins, and emergency bypass locations. Overflow elevations in the lake line system should be measured to meet state regulations. At pump stations, confirmation of station piping configurations should be included in addition to general layout. In addition, the project includes location of the following key base map features: lateral cleanouts and valves; finished floor elevations of structures adjacent to lake line; bulkheads at private lateral crossing; docks, pilings, and boat cradles; near-shore bathymetry.

Locations should survey grade, to the extent possible, to provide horizontal and vertical geospatial information. Toning or other location technology is anticipated at pump stations to determine alignment of buried piping. For location of the lake line a diver will be required to assist with the lake line survey due to water depths. Advanced technology, such as toning, may also be required where the lake bed or aquatic vegetation does not allow probing for the lake line. If excavation is required to verify locates of the lake line then permitting will be needed.

Lake line locations could be included on lake bathymetry maps to reduce the risk of damage from boat anchors.

Durable survey-grade markers should be installed on docks or at other locations agreed with property owners to enable future location of the lake line, laterals, emergency bypass locations and other lake line system facilities. Marker locations should be recorded at the King County Recorder’s office.

There are 17 pump station surveys at an estimated cost of $24,000 each. In addition, a $30 per linear foot (unfactored cost) was allocated to the lengths of lake line for Reaches 1, 2 and 5 (14,000 feet, 28,700 feet and 9,400 feet respectively).

Marking is assumed to be every 50 feet for Reaches 1, 2 and 5, with 2 hours of effort at $75 per hour plus a $37 King County Recorder Fee (both unfactored).

The total estimated project cost of $3,220,600.

No locating and marking was assumed for Reach 3 or Reach 4. Reach 3 location is known from the 2011 replacement. Reach 4 will be replaced in the mid-term, and any location will be conducted as part of that project.

### 7.2.10 L-4b Lake Line Monitoring Evaluation

Evaluate the current hydraulic capacity and level of service of a given lake line segment using available information without having access to the pipe itself; and determine if further investigation is warranted, likely by installing in-lake access to the lake line (L-4b and L-4c) and/or conducting a condition assessment (L-3).

This is a new project developed for the lake line program. It is anticipated the evaluation will consider pipe hydraulic capacity, I/I, pumping pressures, known maintenance issues, and other pertinent information. Flow monitoring, dye testing, and other non-invasive testing may be conducted prior to the evaluation to provide information on the lake line and its inflows, which are not included in the project costs.

The estimate includes 12 sections between pump stations at a cost of $70,000 each, which gives a total estimated cost of $840,000. Project costs (unfactored) assume $25,000 for evaluation of pump station hydraulics, $15,000 for evaluation of other data, and $10,000 for reporting and project management.

### 7.2.11 L-4c Lake Line Cleaning and Evaluation

Clean settled debris from the lake line to help reduce the risk of overflows and prolong the useful life of the pipe.

This is a new project developed for the lake line program. New access points are required to clean the lake line. Hydro-jetting is anticipated to be the preferred cleaning method, requiring a vacuum truck to be floated on a barge to the access points installed in Project L-1. The effort involved in the lake line cleaning is greater than in a gravity sewer due to the nature of working on the water. Additionally, bypass pumping may be required in some segments of lake line. It is anticipated the cleaning effort will require multiple barges and crews. Permits may be required for cleaning activities.

Costs assume cleaning is performed every 10 years. It was estimated (from Project L-1) that cleaning would be from a total of 91 access points at an estimated cost of $210,800 each. This yields a cost estimate of $19,182,800.

### 7.2.12 L-4d Lake Line Alternatives Analysis

Perform an alternative analysis to determine preferred improvements to lake line reaches with confirmed deficiencies.

This is a new project developed for the lake line program. It is assumed that alternative analysis will use data collected in prior work to determine the deficiencies, including gravity sewer I/I evaluation, pump station evaluation, and condition assessment. The alternative analysis will develop conceptual level layouts on several alternatives. Based on the analysis, the City may choose to conduct repair and replacement of localized deficiencies or replace lake line sections between pump stations and upgrade the associated pump stations, as part of other CIP projects.

The estimated unit cost is $350,000 between pump stations (in Reaches 1, 2 and 5) with the total estimated cost is $4,200,000. Preliminary design and construction are placeholders for future work. Costs should be updated when evaluation is complete and option for replacement/rehabilitation is selected.

### 7.2.13 L-4e Lake Line Repair and Replacement Program

Implement repair and replacement improvements based on the initial and further lake line condition assessments associated with Project L-2, to continue to operate the lake line in a safe and effective manner.

This is a modification of a project included in the General Sewer Plan. It is labeled as project L-4 in the General Sewer Plan.

A budgetary unfactored cost of $1,500,000 per year has been assumed. It is assumed that there will be 20 lake line repair and replacement annual phases. This yields a total cost estimate of $55,500,000. Costs should be updated when evaluation is complete and option for repair/replacement is selected.

### 7.2.14 L-5b Special Catch Basin Access

Address priority special catch basin accessibility issues to support repair, rehabilitation, and other improvements.

This is a new project developed for the lake line program. Access may include:

- New or expanded easements.
- New or improved walking path / stairs for additional access and safety
- Improvements to existing roads for condition, increased, and safety

The total project cost estimate for SCB accessibility improvements is $740,000.

### 7.2.15 L-5c Special Catch Basin Effectiveness Evaluation

Evaluate the effectiveness of each special catch basin in removing debris from entering the downstream system, identify improvements where needed, and inform the frequency of cleaning.

This is a new project developed for the lake line program. It will evaluate the debris removal effectiveness of the SCBs using the City collection system hydraulic model to examine localized flow conditions and using a computational fluid dynamics model (3-D) for a representative SCB to establish the range of effective conditions.

The project will identify where minor or more significant improvements are needed. Minor improvements may include modification to manhole inlet/outlet, bottom, installation of baffles. Major improvements may consist of replacement of manhole with a larger structure to enable greater debris collection.

The study will identify the recommended frequency of cleaning based on the risk of debris being suspended in large flow events.

The estimated cost for the SCB effectiveness study is $315,000.

### 7.2.16 L-5d Special Catch Basin Preventive Maintenance

Perform preventative maintenance at special catch basins with limited accessibility to extend their function use and delay expensive repair and replacement projects.

This is a new project developed for the lake line program. Preventative maintenance activities may include sealing cracks, spray lining, venting, and installing new lids. It is anticipated that the use of heavy machinery will not be feasible in these activities due to the limited access at these sites. It is recommended to confirm the effectiveness of SCBs (Project L-5c) before preventive maintenance activities are implemented.

The estimate assumes 60 SCB preventative maintenance activities at an estimated cost of $46,250 each. The total estimated project cost is $277,800.

### 7.2.17 L-5e Special Catch Basin Repair and Replacement

Repair and replace special catch basins that reach the end of their useful life

This is a new project developed for the lake line program. A majority of SCBs have limited access, making repair and replacement difficult and more costly than repair and replacement of typical collection system projects. SCBs requiring repair and replacement should be identified through maintenance inspections and other SCB projects. It is recommended that the effectiveness of SCBs be verified before repair and replacement activities are implemented. Replacement is anticipated at 1 per year starting in the mid-term.

There will be 24 catch basin repair and replacement projects, at an estimated cost of $37,900 each, yielding a total estimated cost of $910,200 each. This assumes 1 SCB per year, and the following unfactored costs: 15-foot manhole installation - $5,000, settling plate - $5,500, site restoration - $5,000, and mobilization and demobilization - $5,000. The total project cost estimate is $910,200.

### 7.2.18 L-5f Special Catch Basin Relocation & Improvements

Relocate or improve Special Catch Basins (SCB) to improve access or increase effectiveness based on Project L-2b

This is a new project developed for the lake line program. Relocated SCBs will be located and sized to provide effective removal of debris and efficient periodic cleaning. Where relocation is not possible, existing SCBs may be improved to increase effectiveness beyond the scope of Projects L-5d. It is anticipated that construction of some SCB improvements will require major access improvements. New or enlarged SCB locations may require additional easements or property acquisition.

This project assumes one SCB will be relocated per year based on City staff prioritization. This will represent nine short-term and mid-term SCB relocations, at an estimated cost of $25,000 each. An additional 10 SCB relocations are assumed in the extended-term, which yields a total estimated cost of $699,600. The cost estimate assumes the following unfactored costs: 15-foot manhole installation - $5,000, settling plate - $5,500, site restoration - $2,000, and mobilization and demobilization - $1,000. The total project cost is estimated to be $699,600.

### 7.2.19 L-6 Lake Line Replacement

Replace longer sections of lake line that reach the end of their useful life.

This is a new project developed for the lake line program. The replacement of Reach 3 of the City lake line provides a template. That project constructed a new sloped (as opposed to undulating profile) gravity lake line further offshore. That gravity pipe is much deeper than the previous lake line and required a new, deep pump station.

Costs were estimated based on Reach 3 expenses of $25 million for 7,200 feet of lake line. Costs were escalated by 27% to account (ENR Seattle 2010 CCI 8805 to CCI 11185). Per unit linear foot costs were allocated to the lengths of lake line for Reaches 1, 2 and 5 (14,000 feet, 28,700 feet and 9,400 feet respectively). The total estimate of $425,131,801. Preliminary design and construction are placeholders for future work. Revisit costs when evaluation is complete and option for replacement is selected.

## 7.3 INCORPORATION INTO THE CIP

The CIP is the City's planning and budgeting guideline for its wastewater system. The capital projects identified for the lake line program will be incorporated into the existing CIP. They will be added to the following existing projects recommended in the City's General Sewer Plan, which were not changed based on the findings of this access evaluation; see the General Sewer Plan for details on these projects:

- G-1 Pipe Flow Monitoring
- G-2 Comprehensive Hydraulic Model Development
- G-3 Major Basin Inflow and Infiltration Evaluation
- G-4 General Sewer Plan Update
- P-1 to P-8 Town Center Pipe Upsize Projects
- P-9 Backyard Sewer System Improvements
- P-10 Comprehensive Pipeline Repair and Replace Program (Per General Sewer Plan)
- PS-2 Generator Replacement
- PS-3 Pump Station Monitoring
- PS-4, PS-23, PS-24, PS-25 Capacity Improvements
- PS-5 Pump Station Repair and Replacement Improvements
- PS-6 Telemetry/SCADA Upgrades and Maintenance
- L-3 Reach 4 Lake Line Replacement
- L-5a Special Catch Basin Improvements

Complete costs and schedule for CIP projects, including those developed for the lake line program, are presented in Table 7-2**Error! Reference source not found.**. Costs and schedules for projects that are not new or modified in the lake line program were taken from the City's existing CIP without update for this report. All costs shown are considered to be in the category of repair and replacement.

Spending on short-term planning projects is allocated to individual years to assist the City in CIP planning. Projects in the long-term and extended-term planning horizons do not provide the same level of specificity, reflecting that additional information, collected over time, will inform City needs, resources and direction. The project timing in this chapter is subject to change as the City regularly reviews and updates its CIP based on changing conditions and priorities.

Lake line program costs shown on **Error! Reference source not found.** were allocated to specific years with input from the City. It is anticipated that projects will generally be implemented for relatively short lake line segments or small number of pump stations to address a specific issue. Annual costs are intended to be budgetary place holders and not for a specific project area unless otherwise stated. These smaller project areas will allow the City to conduct a more comprehensive evaluation and perform the work in a reasonable timeframe.

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City of Mercer Island

General Sewer Plan

Capital Improvement Program

TETRA TECH

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**Capital Improvement Program Summary**

| Project No. | Project Name | | Total CIP Cost Estimate | CIP Phasing 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | Short-term (2018-2023) | Mid-term (2024-2028) | Long-term (2029-2037) | Extended | Project Type Capacity | Non-Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **General** | | | $ 1,857,050 | $ - | $ 418,550 | $ 77,500 | $ 104,000 | $ - | $ 104,000 | $ - | $ 300,500 | $ - | $ 520,000 | $ - | $ 704,050 | $ 820,500 | $ 332,500 | $ - | | |
| G-1 | Pipe Flow Monitoring | GSP | $ 1,040,000 | $ - | $ 104,000 | $ - | $ 104,000 | $ - | $ 104,000 | $ - | $ 208,000 | $ - | $ 520,000 | $ - | $ 312,000 | $ 728,000 | $ - | $ - | 0% | 0% |
| G-2 | Comprehensive Hydraulic Model Development | GSP | $ 360,800 | $ - | $ 175,800 | $ - | $ - | $ - | $ - | $ - | $ 92,500 | $ - | $ - | $ - | $ 175,800 | $ 92,500 | $ 92,500 | $ - | 0% | 0% |
| G-3 | Major Basin I/I Evaluation | GSP | $ 138,750 | $ - | $ 138,750 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 138,750 | $ - | $ - | $ - | 0% | 0% |
| G-4 | General Sewer Plan Update | GSP | $ 240,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 240,000 | $ - | 0% | 0% |
| G-5 | Access Code and Standards Review | New | $ 52,500 | $ - | $ - | $ 52,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 52,500 | $ - | $ - | $ - | 0% | 0% |
| G-6 | Easement Review and Confirmation | New | $ 25,000 | $ - | $ - | $ 25,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 25,000 | $ - | $ - | $ - | 0% | 0% |
| **Pipe** | | | $ 51,640,200 | $ 425,300 | $ 532,000 | $ 581,300 | $ 1,157,300 | $ 631,300 | $ 400,000 | $ 643,600 | $ 567,200 | $ 474,000 | $ 406,200 | $ - | $ 3,727,200 | $ 2,091,000 | $ 45,822,000 | $ - | | |
| P-1 to P-8 | Town Center Pipe Upsize Projects | GSP | $ 1,585,400 | $ - | $ 195,000 | $ - | $ 720,300 | $ - | $ - | $ 243,600 | $ 167,200 | $ 74,000 | $ 6,200 | $ - | $ 915,300 | $ 491,000 | $ 179,100 | $ - | 0% | 0% |
| P-9 | Backyard Sewer System Improvements | GSP | $ 711,900 | $ 175,300 | $ 37,000 | $ 231,300 | $ 37,000 | $ 231,300 | $ - | $ - | $ - | $ - | $ - | $ - | $ 711,900 | $ - | $ - | $ - | 0% | 0% |
| P-10 | Comprehensive Pipeline R&R Program | GSP | $ 49,342,900 | $ 250,000 | $ 300,000 | $ 350,000 | $ 400,000 | $ 400,000 | $ 400,000 | $ 400,000 | $ 400,000 | $ 400,000 | $ 400,000 | $ - | $ 2,100,000 | $ 1,600,000 | $ 45,642,900 | $ - | 0% | 0% |
| **Pump Station** | | | $ 21,802,400 | $ 769,500 | $ 852,500 | $ 723,000 | $ 2,193,300 | $ 1,464,800 | $ 1,335,300 | $ 1,955,000 | $ 2,417,500 | $ 1,925,500 | $ 1,942,500 | $ 1,387,500 | $ 7,338,400 | $ 9,628,000 | $ 4,836,000 | $ - | | |
| PS-1 | Pump Station Accessibility Improvements | Modified | $ 592,000 | $ - | $ - | $ - | $ 148,000 | $ 74,000 | $ 37,000 | $ 74,000 | $ 111,000 | $ 148,000 | $ - | $ - | $ 259,000 | $ 333,000 | $ - | $ - | 0% | 0% |
| PS-2 | Generator Replacement | GSP | $ 1,674,500 | $ 379,500 | $ 92,500 | $ 92,500 | $ 92,500 | $ 92,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ 749,500 | $ - | $ 925,000 | $ - | 0% | 0% |
| PS-3 | Pump Station Monitoring | GSP | $ 1,119,400 | $ - | $ - | $ 129,500 | $ 286,800 | $ 194,300 | $ 379,300 | $ 129,500 | $ - | $ - | $ - | $ - | $ 989,900 | $ 129,500 | $ - | $ - | 0% | 0% |
| PS-4 | PS 23, 24, 25 Capacity Improvements | GSP | $ 1,961,000 | $ - | $ 370,000 | $ 111,000 | $ 740,000 | $ 740,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,961,000 | $ - | $ - | $ - | 0% | 0% |
| PS-5 | Pump Station R&R Improvements | GSP | $ 5,735,000 | $ - | $ - | $ - | $ 185,000 | $ - | $ 555,000 | $ - | $ 555,000 | $ - | $ 555,000 | $ - | $ 740,000 | $ 1,110,000 | $ 3,885,000 | $ - | 0% | 0% |
| PS-6 | Telemetry/SCADA Upgrades and Maintenance | GSP | $ 1,417,000 | $ 390,000 | $ 390,000 | $ 390,000 | $ 195,000 | $ - | $ - | $ - | $ - | $ 26,000 | $ - | $ - | $ 1,365,000 | $ 26,000 | $ 26,000 | $ - | 0% | 0% |
| PS-7a | Capacity Analysis | New | $ 546,000 | $ - | $ - | $ - | $ 546,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 546,000 | $ - | $ - | $ - | 0% | 0% |
| PS-7b | Pump Station Alternative Analysis | New | $ 1,820,000 | $ - | $ - | $ - | $ - | $ 364,000 | $ 364,000 | $ 364,000 | $ 364,000 | $ 364,000 | $ - | $ - | $ 728,000 | $ 1,092,000 | $ - | $ - | 0% | 0% |
| PS-7c | Future Capacity Improvements | New | $ 6,937,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,387,500 | $ 1,387,500 | $ 1,387,500 | $ 1,387,500 | $ 1,387,500 | $ - | $ 6,937,500 | $ - | $ - | 0% | 0% |
| **Lakeline** | | | $ 544,628,001 | $ - | $ - | $ 1,298,300 | $ 2,079,600 | $ 2,956,600 | $ 619,300 | $ 2,868,100 | $ 2,163,900 | $ 412,900 | $ 1,124,800 | $ 4,214,100 | $ 6,953,800 | $ 10,783,800 | $ 47,273,300 | $ 479,617,101 | | |
| L-1 | Lakeline Access | Changed | $ 22,424,300 | $ - | $ - | $ 370,000 | $ 1,696,500 | $ 1,696,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ 3,763,000 | $ - | $ 7,513,000 | $ 11,148,300 | 0% | 0% |
| L-2 | Lakeline Condition Assessment | Changed | $ 7,555,400 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,036,000 | $ - | $ 1,061,900 | $ - | $ - | $ 2,097,900 | $ 5,457,500 | $ - | 0% | 0% |
| L-3 | Reach 4 Lakeline Replacement | Changed | $ 4,255,000 | $ - | $ - | $ 185,000 | $ - | $ 185,000 | $ - | $ - | $ 185,000 | $ - | $ - | $ 3,700,000 | $ 370,000 | $ 3,885,000 | $ - | $ - | 0% | 0% |
| L-4a | Lakeline Monitoring Evaluation | Changed | $ 3,220,600 | $ - | $ - | $ 672,000 | $ 311,800 | $ 688,800 | $ 408,000 | $ 688,800 | $ - | $ - | $ - | $ 451,200 | $ 2,080,600 | $ 1,140,000 | $ - | $ - | 0% | 0% |
| L-4b | Lakeline Monitoring Evaluation | New | $ 840,000 | $ - | $ - | $ - | $ - | $ - | $ 140,000 | $ - | $ 140,000 | $ - | $ - | $ - | $ 140,000 | $ 140,000 | $ - | $ 560,000 | 0% | 0% |
| L-4c | Lakeline Cleaning and Evaluation | Old | $ 19,182,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ 2,108,000 | $ - | $ - | $ - | $ - | $ - | $ 2,108,000 | $ 5,902,400 | $ 11,172,400 | 0% | 0% |
| L-4d | Lakeline Alternatives Analysis | Old | $ 350,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 350,000 | $ - | $ - | $ - | $ 350,000 | $ - | $ - | 0% | 0% |
| L-4e | Lakeline R&R Program | New | $ 55,500,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 27,750,000 | $ 27,750,000 | 0% | 0% |
| L-5a | Special Catch Basin Improvements | New | $ 3,225,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 3,225,500 | 0% | 0% |
| L-5b | Special Catch Basin Access | New | $ 740,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 740,000 | $ - | $ - | $ - | $ - | $ 740,000 | $ - | $ - | 0% | 0% |
| L-5c | Special Catch Basin Effectiveness Evaluation | New | $ 315,000 | $ - | $ - | $ - | $ - | $ 315,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 315,000 | $ - | $ - | $ - | 0% | 0% |
| L-5d | Special Catch Basin Preventive Maintenance | New | $ 277,800 | $ - | $ - | $ 46,300 | $ 46,300 | $ 46,300 | $ 46,300 | $ 46,300 | $ - | $ - | $ - | $ - | $ 185,200 | $ 46,300 | $ 46,300 | $ - | 0% | 0% |
| L-5e | Special Catch Basin R&R | New | $ 910,200 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 37,900 | $ 37,900 | $ 37,900 | $ 37,900 | $ - | $ 151,600 | $ 379,300 | $ 379,300 | 0% | 0% |
| L-5f | Special Catch Basin Relocation & Improvements | New | $ 699,600 | $ - | $ - | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 25,000 | $ 100,000 | $ 125,000 | $ 224,800 | $ 249,800 | 0% | 0% |
| L-6 | Lakeline Replacement | New | $ 425,131,801 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 425,131,801 | 0% | 0% |
| **CIP Total** | | | $ 619,927,651 | $ 1,194,800 | $ 1,803,050 | $ 2,680,100 | $ 5,534,200 | $ 5,052,700 | $ 2,458,600 | $ 5,466,700 | $ 5,449,100 | $ 2,812,400 | $ 3,993,500 | $ 5,601,600 | $ 18,723,450 | $ 23,323,300 | $ 98,263,800 | $ 479,617,101 | $ - | $ - |
| Annual Cost | | | $ 30,996,000 | $ 60,000 | $ 90,000 | $ 134,000 | $ 277,000 | $ 253,000 | $ 123,000 | $ 273,000 | $ 272,000 | $ 141,000 | $ 200,000 | $ 280,000 | $ 3,121,000 | $ 5,831,000 | $ 9,826,000 | $ 47,962,000 | $ - | $ - |

Further, permit limitations effectively constrain the amount of in-water work that can be completed in a given year. The City may gain efficiencies by implementing projects on a greater scale, which should be considered if sufficient resources are available. Costs not completed in the short-term or long-term are placed in the extended-term.

All capital projects in the City's General Sewer Plan and the lake line program are "non-capacity" in terms of development. That is, they are not required because of future growth associated with new development. Projects that would increase capacity to address future increases in inflow and infiltration due to aging infrastructure or other maintenance issues are considered non-capacity, as they are not associated with future development.

## 7.4 FACILITIES AFFECTED BY RECOMMENDATIONS

The updated CIP with the new lake line program elements incorporated addresses all the access recommendations presented in Chapters 4 and 5 based on the site visits of pump stations and special catch basins. Table 7-3 and Table 7-4 summarize the projects that address these recommendations.

**Table 7-3.** Applicability of Recommendations to Specific Pump Stations

| Project No.—Project Name | Access Recommendation | Pump Station No. | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 4 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| G-6—Easement Review and Confirmation | Easement Review & Confirmation | X | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Review dock access and ownership | X | | X | | | X | | | X | | | X | | X | X | X | X | |
| PS-1—Pump Station Accessibility Improvements | Construct roadway to PS | | | | | X | | | | | | X | | | | | | | |
| | Stairway access (repairs/installation) | | | | | | X | | X | | | | | | | X | | X | |
| | Maintain easement/City property (remove vegetation) | X | | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | X |
| | Proposed easement acquisition | | | X | | | | | X | | | X | X | | | | | | X |
| | Bulkhead/shoreline condition assessment (related to City boat access) | X | | X | X | | X | | X | X | | | X | X | | X | | X | |
| | Wetland delineation (related to proposed easement acquisition) | | | | | | | | | | | X | | | | | | | |
| | Dock condition assessment (related to City boat access) | X | | X | | | X | | | X | | | X | | | | | | |
| | Coordinate with utilities (related access for upgrading electrical supply) | | | | | | | | | | | | | | | | X | | |
| | Coordinate regarding exposed utilities (related to City boat access) | | | | | X | | | | | | | | | | | | | |
| PS-2—Generator Replacement | Generator upgrades/replacement (confirm location in existing easement) | | | | | | | | | | X | X | | | X | | | | |

**Table 7-4.** Applicability of Recommendations to Specific Special Catch Basins

| Project No.—Project Name | Access Recommendation | Special Catch Basin No. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2-1 | 13-3 | 42-1 | 40-2 | 44-1 | 14-1 | 16A-1 | 17-1 | 23-1 |
| G-6—Easement Review and Confirmation | Easement Review & Confirmation | X | X | X | X | X | X | X | X | X |
| L-5b—Special Catch Basin Access | New easement recommended | X | X | | | | | | | |
| | Expand easement recommended | X | | | | | | | | |
| | Shared access with pump station | | | | X | | | | | |
| | Potential water access | | | X | | | X | | | X |
| L-5c—Special Catch Basin Preventative Maintenance | Raise Manhole lid | | | | | | | | X | |
| L-5d—Special Catch Basin Repair and Replacement | Substantial restoration maybe required | | X | | | | | X | | |
| | Roadway/Driveway improvements required for heavy equipment | | | X | | | | | X | |
| L-5f—Special Catch Basin Relocation & Improvements | Moving SCB suggested by City Staff | X | | | X | X | X | X | | |

## 7.5 ESTABLISHING IMPLEMENTATION PRIORITY

The lake line program projects represent the largest capital investment in the sewer system since its creation. Given the scale of the effort, it is anticipated that projects will typically be implemented in portions of the lake line system based on need, rather than system-wide. This will present a challenge for City staff tracking and implementation. Some CIP projects will likely require (or at least benefit from) prior completion of related projects.

### 7.5.1 Early Priority Projects

Based on a preliminary review of the relationship between CIP projects, four of the projects that are new or modified for the lake line program have been identified as early priorities, as listed in Table 7-5. These priority projects must or should be done before other CIP projects can get underway. The projects that require or would benefit from the priority projects are listed as dependent projects in the table.

**Table 7-5.** Early Priority Projects

| Early Priority Project | Benefit | Dependent Projects |
|---|---|---|
| G-5 Access Code and Standards Review | Supports all Utility in clarifying authority for access and maintenance requirements. | • G-1 Pipe Flow Monitoring<br>• G-3 Major Basin I/I Evaluation<br>• L-4a Lake Line Locate/Marking |
| G-6 Easement Review and Confirmation | Support use of existing easements for Operations and Maintenance, as well as Capital projects. | • PS-2 Generator Replacement<br>• PS-6 Telemetry/SCADA Upgrades and Maintenance<br>• L-4a Lake Line Locate/Marking |
| PS-1 Pump Station Accessibility Improvements | Address access challenges to allow increased access for operations, maintenance, and capital projects. | • PS-2 Generator Replacement<br>• PS-6 Telemetry/SCADA Upgrades and Maintenance<br>• PS-4, PS-23, PS-24, PS-25 Capacity Improvements |
| L-1 Lake Access | Address access challenges to allow increased access for operations, maintenance, and capital projects. | • PS-3 Pump Station Monitoring<br>• PS-4: PS-23, PS-24, PS-25 Capacity Improvements |

The early priority projects may not need to be implemented completely at one time. For each project, work can be initially focused only the areas required for the dependent projects. For example, initial work for easement review and confirmation (Project G-6) could focus on easements needed where pump station access will be required to install telemetry/SCADA upgrades (Project PS-6). Similarly, initial lake access improvements under Project L-1 would focus on lake line segments needed to support the capacity improvements under Project PS-4. This approach would delay early expenditures and it would allow the City to work on a limited scale, gaining valuable institutional knowledge without the risk of a large-scale project.

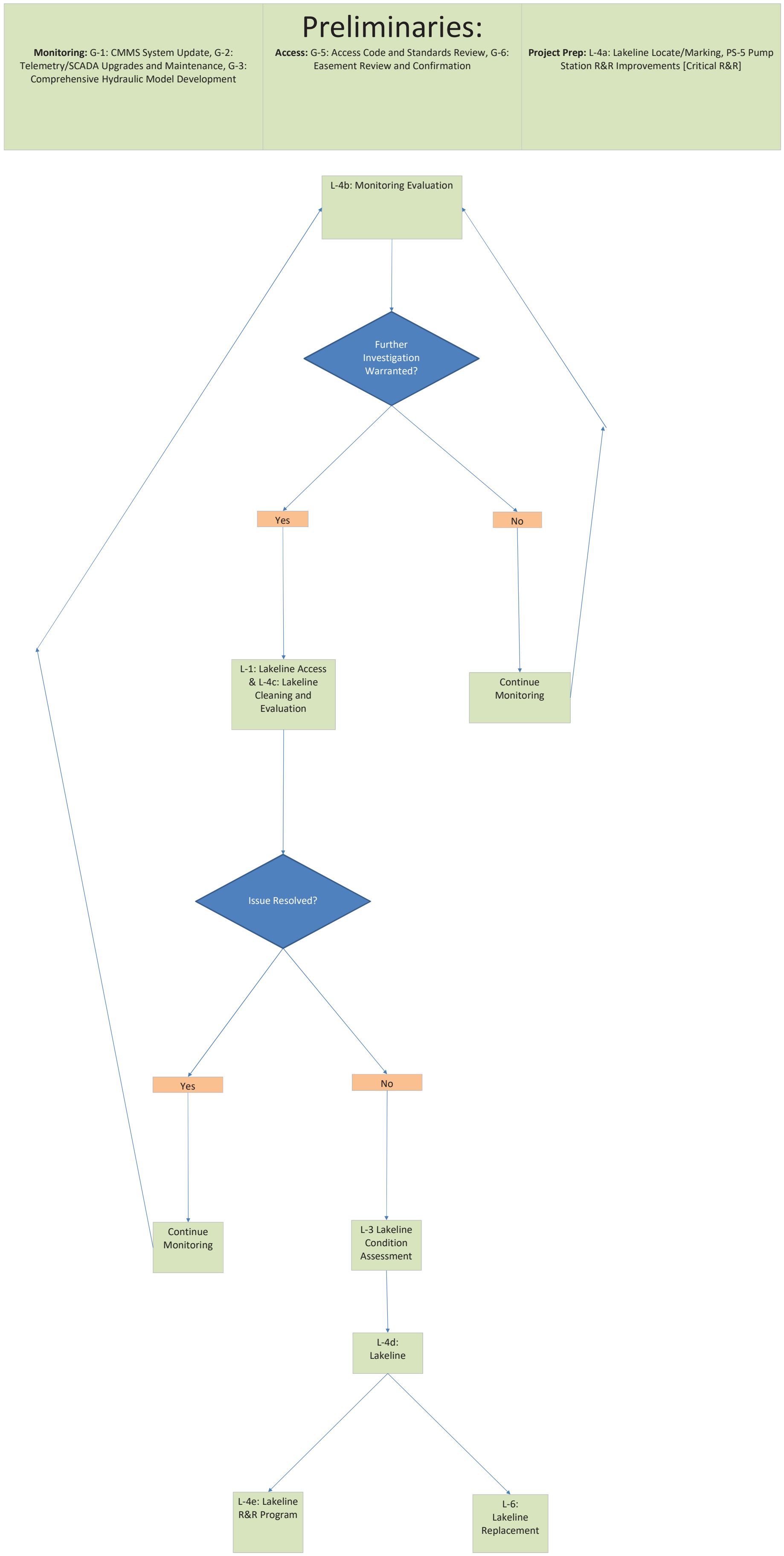
### 7.5.2 Decision Trees

Some projects within the lake line program are dependent on earlier completion of related projects. Decision trees were developed for the lake line, pump stations, and SCBs to provide a logical progression to implementing projects, as shown in Figure 7-1**Error! Reference source not found.**, Figure 7-2**Error! Reference source not found.**, and Figure 7-3**Error! Reference source not found.**. In addition to the specific projects, a number of preliminary projects are recommended to support the infrastructure/problem specific projects.

The decision trees were developed anticipating that projects will generally be implemented for relatively short lake line segments or small number of pump stations to address a specific issue. The City may gain efficiencies in implementing projects on a greater scale; however, this must be balanced by cost. Additionally, permit limitations may effectively limit the amount of in-water work that can be completed in a given year.

DRAFT

# Figure 7-1: Lakeline Decision Tree




February, 2019

Figure 7-2: Pump Station Decision Tree

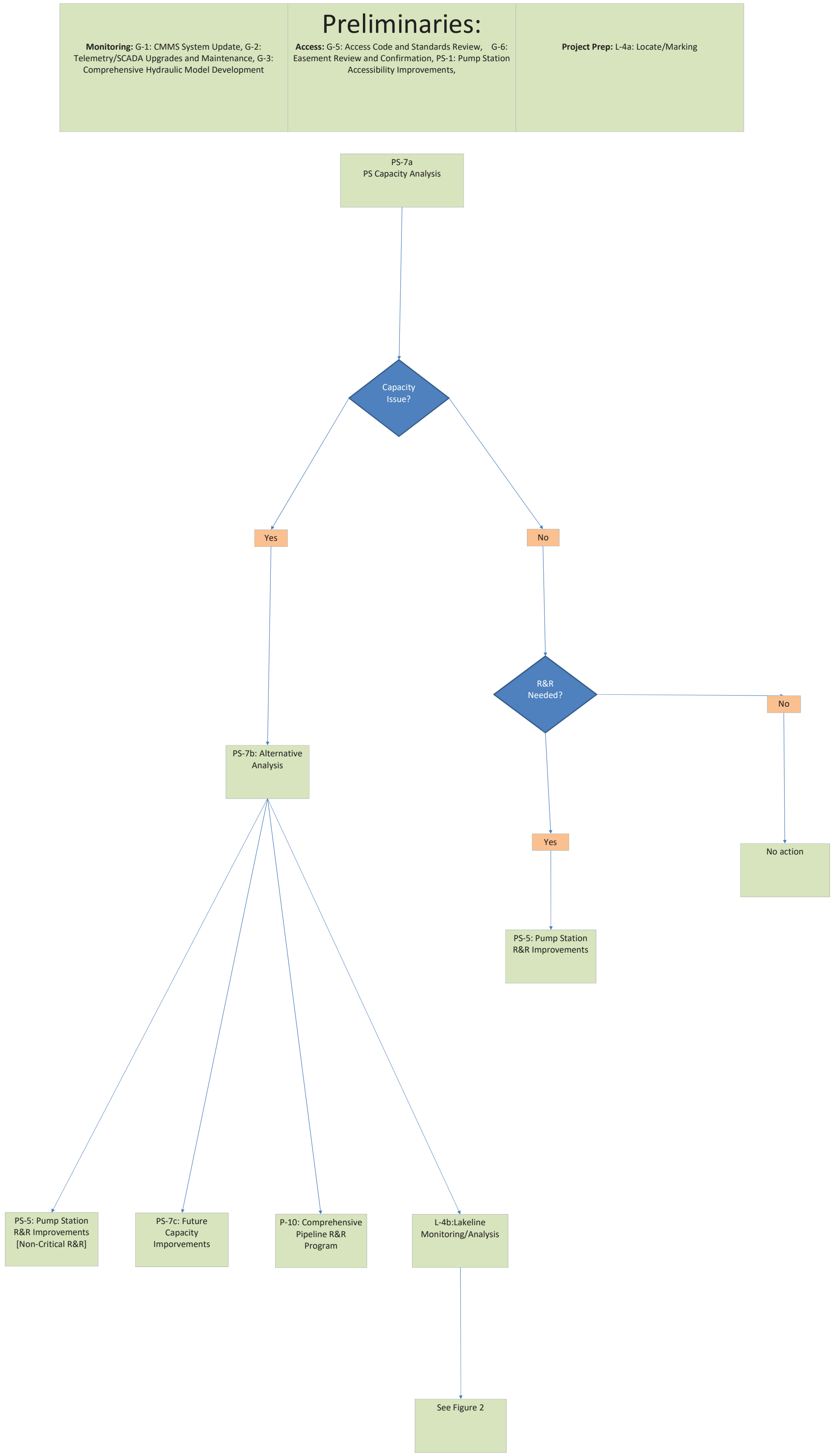
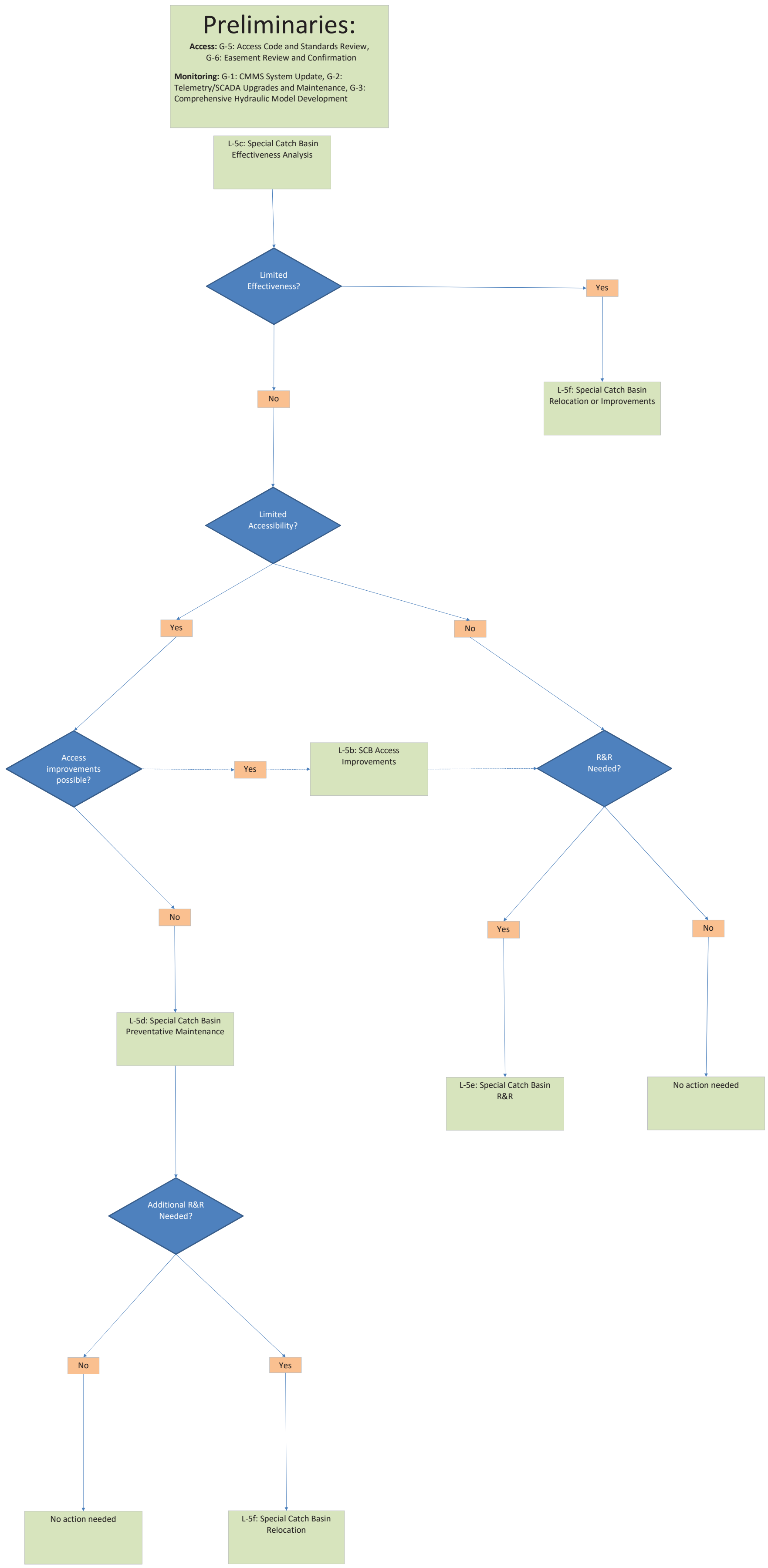


Figure 7-3: Special Catch Basin Decision Tree



## 7.6 EQUIPMENT CONSIDERATIONS

Specialized equipment could improve the efficiency of accessing the lake line system, especially pump stations and special catch basins. The City currently owns the following:

- **Easement machine-**—Attached to a vacuum truck, an easement machine supports hydro-jet cleaning by allowing staff to more easily reach areas with constrained access.
- **Small utility vehicle (e.g. Gator)**—Coordinate with Parks Department for use of a small utility vehicle to convey staff, tools, and parts to locations without improved roads.

As part of the access study, the consultant and City staff discussed the merits of long term contracting with a vendor to rent or purchase equipment such as the following:

- **Work boat**—A work boat that can work in shallow water and transfer heavy parts from the boat to the land could be used to access facilities by water.
- **Large vacuum truck**—A large vacuum truck would allow City staff to perform maintenance in both the gravity sewer system and lake line system. The City currently contracts with a vendor for vacuum truck services.
- **Small vacuum truck**—A small vacuum truck would allow City crews to access locations that may not allow a large vacuum truck. However, small vacuum trucks have less tankage and may have less powerful cleaning motors and pumps.
- **Small utility vehicle (e.g. Gator)**—If use of Parks Department vehicles is not feasible.

Beyond those equipment types a barge could be used to convey and stage heavy equipment and materials on the lake. The closest facility to load heavy equipment, such as a vacuum truck, onto a barge is currently on the Duwamish River. A new Marine equipment shop and facility would provide the ability to mobilize and demobilize heavy equipment and save mobilization time and effort. However, this should be weighed with the cost of such a facility. Portions of the facilities, such as a boat ramp, could be open to the public.

Any equipment to be purchased would be funded through the operations budgets and therefore is not included as a CIP project.

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Sewer System Lake Line Access Evaluation and Lake Line Program Development

# Appendix. Lake Line Program Project Cost Sheets

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City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | G-5 | **Budget Number:** | | **Facility Type:** | General |
| **Project Name:** | Access Code and Standards Review | | | | |
| | | **Project Timing:** | Short Term | | |
| **Project Cost (Current $):** | $52,500 | **Project Cost (Future $):** | $57,368 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Project to perform a comprehensive review of codes and standards relating the Utility access. Implement code / standard changes to support Utility maintenance, including the Sewer System. Several considerations were identified in the Lakeline Access Evaluation:

- City Operators have authority to access Utilities for maintenance without an easement.
- Correcting improperly recorded easements for all Public Utilities by prior property owners.
- Property owner maintenance requirements for private Lakeline laterals and Special Catch Basins.
- Standards for construction of Special Catch Basins on private Lakeline laterals, dock configuration over the Lakeline, and infrastructure in easements, etc.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0% | 0% | 0% | 10% | |
| Planning Consultant Services | 1 | LS | $ 25,000 | $ 25,000 | $ - | $ - | $ - | $ 2,500 | $ 27,500 |
| Internal City Staff Effort | | | | | | | | $ 25,000 | $ 25,000 |
| **Project Cost (Current $)** | | | | | | | | | $ 52,500 |

**Notes on Cost Estimation:**

Consultant services is a budget estimate for planning consultant to assist City staff in providing code language. Legal opinion and public outreach costs are not included.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 52,500 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 52,500 |

**Project Timing:**

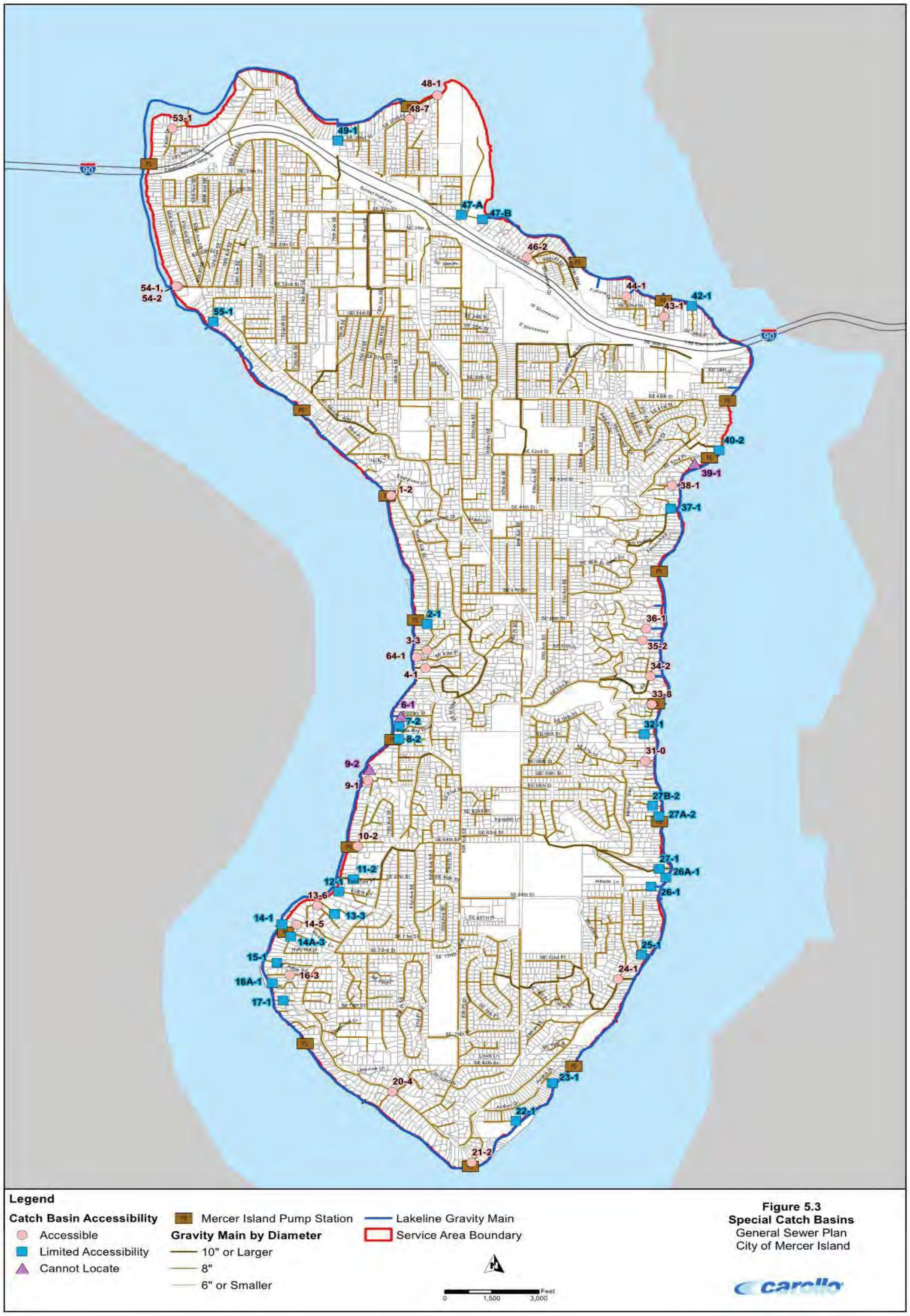
| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Planning Consultant Services | 2020 | $ 27,500 | $ 30,050 |
| Internal City Staff Effort | 2020 | $ 25,000 | $ 27,318 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 52,500 | $ 57,368 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** G-5 **Budget Number:** **Facility Type:** General
**Project Name:** Access Code and Standards Review

**Project Location:**



City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | |
|---|---|---|---|
| **Project ID:** | G-6 | **Budget Number:** | |
| **Project Name:** | Easement Review and Confirmation | **Facility Type:** | General |
| | | **Project Timing:** | $ 2,020 |
| **Project Cost (Current $):** | $50,000 | **Project Cost (Future $):** | $27,318 |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% |

Go to CIP Summary

**Project Description:**

Review and confirm easements to be used for Lakeline System access. Identify additional easement language needed to conduct full spectrum of operation and maintenance activities on the Lakeline System.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 0% | GC & Overhead 0% | Engineer/ Planning 0% | City Admin 0% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| Planning Consultant Services | 1 | LS | $ 25,000 | $ 25,000 | $ - | $ - | $ - | $ - | $ 25,000 |
| Internal City Staff Effort | | | | | | | | $ 25,000 | $ 25,000 |
| **Project Cost (Current $)** | | | | | | | | | $ 50,000 |

**Notes on Cost Estimation:**

Consultant services is a budget estimate for a consultant to assist City staff in identifying and sorting easements. Legal assistance costs for interperting easemetn language are not included.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 50,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 50,000 |

**Project Timing:**

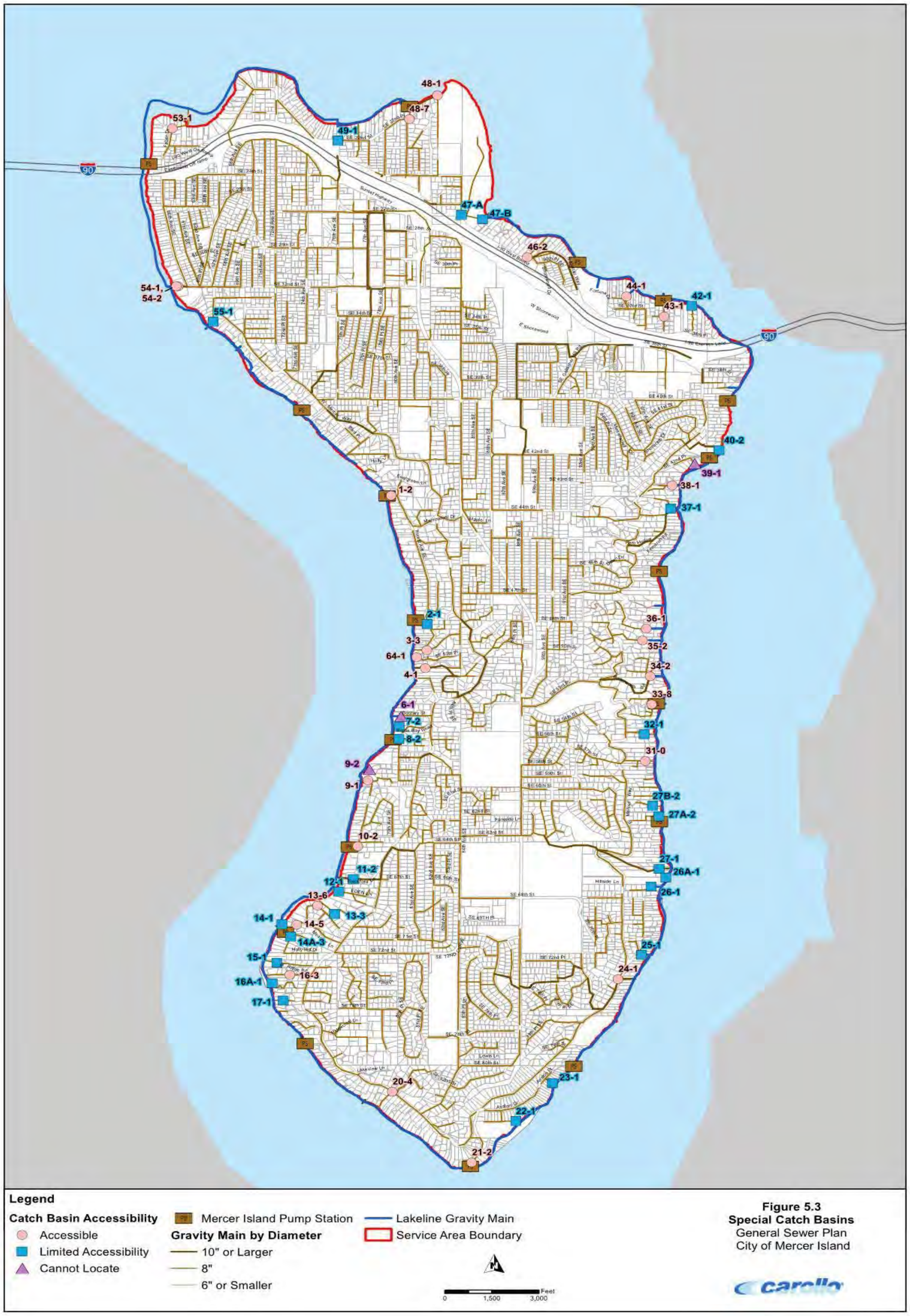
| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Internal City Staff Effort | 2020 | $ 25,000 | $ 27,318 |
| | | | |
| | | | |
| | | | |
| **Total Project Cost** | | $ 25,000 | $ 27,318 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** G-6 **Budget Number:** **Facility Type:** General
**Project Name:** Easement Review and Confirmation

**Project Location:**



City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | PS-1 | **Budget Number:** | WS712P | **Facility Type:** | Pump Stations |
| **Project Name:** | Pump Station Accessibility Improvements | | | | |
| | | **Project Timing:** | Short to Mid Term | | |
| **Project Cost (Current $):** | $592,000 | **Project Cost (Future $):** | $721,270 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Address priority pump station accessibility issues to support pump station repair, rehabilitation, and capacity improvements.
Pump Station access may include:
• New or improved walking path / stairs for additional access and safety
• Minor improvements to existing roads for condition, increased, and saftey
• New or improved docks and/or rockery bulkheads to facilitate access from the Lake

Evaluate access at all stations, identify conditions/concerns and needs, prioritize future work.
Consider long term contracting with a vendor to rent a boat or purchasing a boat to access pump stations that have limited land access.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 25% | Engineer/ Planning 20% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| Pump Station Access Evaluation | 1 | LS | $ 80,000 | $ 80,000 | $ 24,000 | $ 20,000 | $ 16,000 | $ 8,000 | $ 148,000 |
| PS Accessibility Improvements | 2 | PS | $ 20,000 | $ 40,000 | $ 12,000 | $ 10,000 | $ 8,000 | $ 4,000 | $ 74,000 |
| PS Accessibility Improvements | 1 | PS | $ 20,000 | $ 20,000 | $ 6,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 37,000 |
| PS Accessibility Improvements | 2 | PS | $ 20,000 | $ 40,000 | $ 12,000 | $ 10,000 | $ 8,000 | $ 4,000 | $ 74,000 |
| PS Accessibility Improvements | 1 | PS | $ 20,000 | $ 20,000 | $ 6,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 37,000 |
| PS Accessibility Improvements | 2 | PS | $ 20,000 | $ 40,000 | $ 12,000 | $ 10,000 | $ 8,000 | $ 4,000 | $ 74,000 |
| PS Accessibility Improvements | 4 | PS | $ 20,000 | $ 80,000 | $ 24,000 | $ 20,000 | $ 16,000 | $ 8,000 | $ 148,000 |
| **Project Cost (Current $)** | | | | | | | | | $ 592,000 |

**Notes on Cost Estimation:**

Medium construction boat dock (4" decking) with average piling ~$80 per square foot per Marshall Valuation Service (inflated from 2009 to 2018 using ENR 20-City Index). For 30 ' X 8' dock, costs would be ~$20,000. Metal stairs are $600/riser (10') in a built environment per Mashall Valuation Service; Assume 100' vertical feet (total of $6,000), $10k for vegetation management, and $4k for additional geotechnical in non-built environment. Costs will not support major improvements to roads.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 592,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 592,000 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Pump Station Access Evaluation | 2021 | $ 148,000 | $ 166,575 |
| PS Accessibility Improvements | 2022 | $ 74,000 | $ 85,786 |
| PS Accessibility Improvements | 2023 | $ 37,000 | $ 44,180 |
| PS Accessibility Improvements | 2024 | $ 74,000 | $ 91,011 |
| PS Accessibility Improvements | 2025 | $ 37,000 | $ 46,870 |
| PS Accessibility Improvements | 2025 | $ 74,000 | $ 93,741 |
| PS Accessibility Improvements | 2026 | $ 148,000 | $ 193,106 |
| | | | |
| **Total Project Cost** | | $ 592,000 | $ 721,270 |

**Timing Notes**

**Project ID:** PS-1 **Budget Number:** WS712P **Facility Type:** Pump Stations

**Project Name:** Pump Station Accessibility Improvements

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | PS-7a | **Budget Number:** | | **Facility Type:** | Pump Station |
| **Project Name:** | Capacity Analysis | | | | |
| | | **Project Timing:** | Mid-term | | |
| **Project Cost (Current $):** | $546,000 | **Project Cost (Future $):** | $614,528 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Identify future pump station capacity improvements. Conduct detailed pump station capacity study that considers existing pump station flows and future increase in flows from additional customers and increased I/I. It is recommended that several years of monitoring facilitated be available before an evaluation.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 0% | 0% | 10% | |
| Pump Station Capacity Study | 13 | PS | $ 30,000 | $ 390,000 | $ 117,000 | $ - | $ - | $ 39,000 | $ 546,000 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 546,000 |

**Notes on Cost Estimation:**

Pump station Capacity study assumes analysis of available information.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 546,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 546,000 |

**Project Timing:**

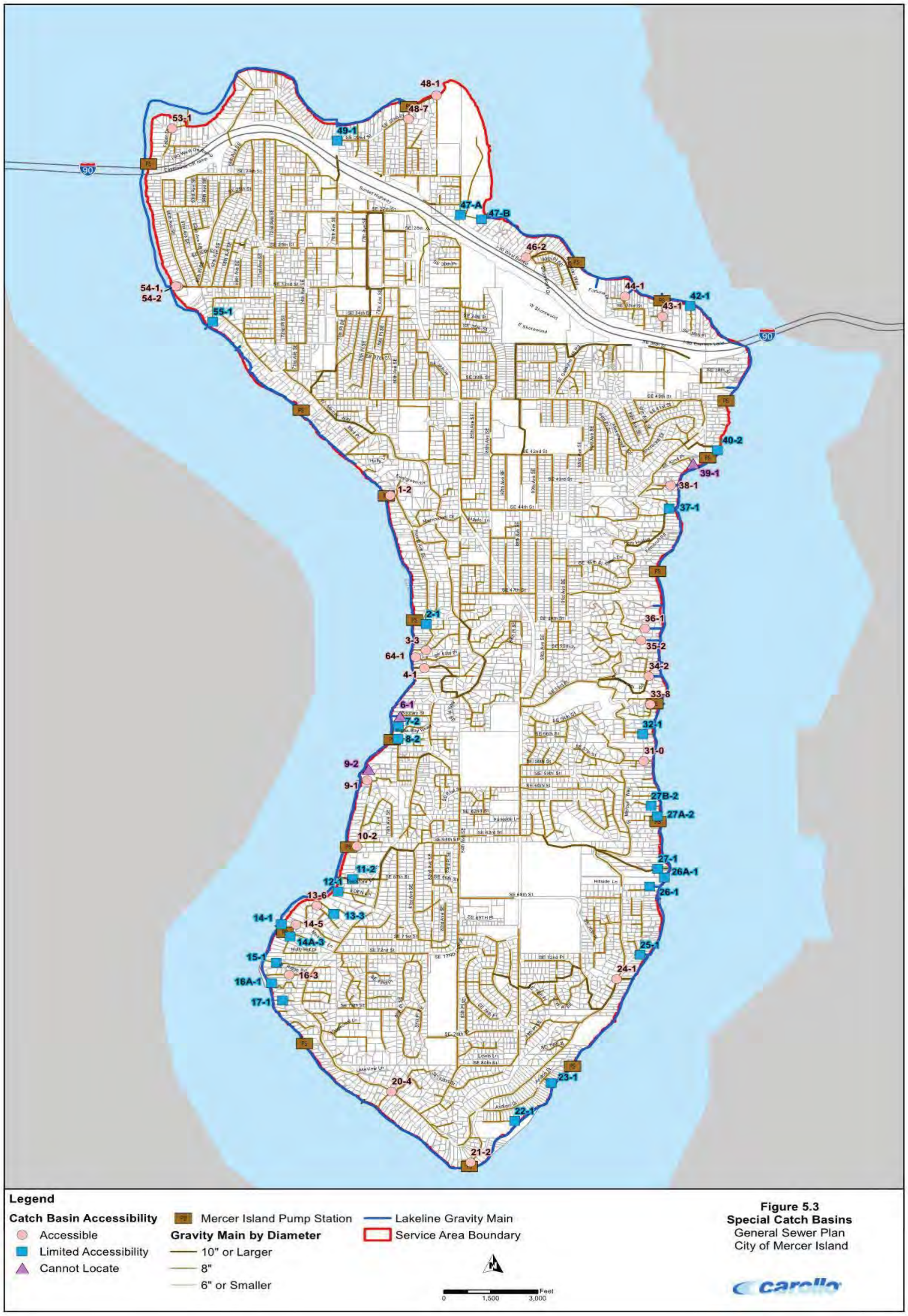
| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Pump Station Capacity Improvements | 2021 | $ 546,000 | $ 614,528 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 546,000 | $ 614,528 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** PS-7a **Budget Number:** **Facility Type:** Pump Station
**Project Name:** Capacity Analysis

**Project Location:**



City of Mercer Island
General Sewer Plan
Capital Improvement Program

carollo

**Project ID:** PS-7b
**Project Name:** Pump Station Alternative Analysis
**Budget Number:**
**Facility Type:** Pump Station
**Project Timing:** Long Term
**Project Cost (Current $):** $1,820,000
**Project Cost (Future $):** $2,240,327
**Project Status** Planned, Budgeted
**Inflation Rate:** 3%

Go to CIP Summary

**Project Description:**
For identified capacity deficiencies (PS-7a), conduct a follow on Alternatives Analysis to determine next steps. It may be necessary to increase the capacity of these pump stations or reduce the I/I of the tributary basins. I/I analysis and monitoring of pump flow is required to determine the best solutions to address capacity issues. An alternative analysis and capacity improvements for 5 pump stations is assumed for budgetary purposes. It is assumed the project will take 2 years – flow monitoring in fall/winter of the first year (October through Feb) followed by analysis. It is anticipated that analysis of a single pump station will require monitoring of the upstream and downstream pipe segment and the corresponding pump stations. For example, analysis of PS 24 likely will require monitoring pipe segments between PS 25 to PS 24 and from PS 24 to PS 23, with corresponding analysis using data from three pump stations.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 0% | Engineer/ Planning 0% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| Alternative Analysis | 1 | PS | $ 260,000 | $ 260,000 | $ 78,000 | $ - | $ - | $ 26,000 | $ 364,000 |
| Alternative Analysis | 1 | PS | $ 260,000 | $ 260,000 | $ 78,000 | $ - | $ - | $ 26,000 | $ 364,000 |
| Alternative Analysis | 1 | PS | $ 260,000 | $ 260,000 | $ 78,000 | $ - | $ - | $ 26,000 | $ 364,000 |
| Alternative Analysis | 1 | PS | $ 260,000 | $ 260,000 | $ 78,000 | $ - | $ - | $ 26,000 | $ 364,000 |
| Alternative Analysis | 1 | PS | $ 260,000 | $ 260,000 | $ 78,000 | $ - | $ - | $ 26,000 | $ 364,000 |
| **Project Cost (Current $)** | | | | | | | | | $ 1,820,000 |

**Notes on Cost Estimation:**
Pump station Capacity study includes flow monitoring costs of $100,000 for up to 12 flow meters or other field investigations, $120,000 for analyses, and $40,000 for reporting, PM, and misc costs.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 1,820,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 1,820,000 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Pump Station Alternatives Analysis 1 | 2022 | $ 364,000 | $ 421,976 |
| Pump Station Alternatives Analysis 2 | 2023 | $ 364,000 | $ 434,635 |
| Pump Station Alternatives Analysis 3 | 2024 | $ 364,000 | $ 447,674 |
| Pump Station Alternatives Analysis 4 | 2025 | $ 364,000 | $ 461,104 |
| Pump Station Alternatives Analysis 5 | 2026 | $ 364,000 | $ 474,937 |
| **Total Project Cost** | | $ 1,820,000 | $ 2,240,327 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** PS-7b
**Budget Number:**
**Facility Type:** Pump Station
**Project Name:** Pump Station Alternative Analysis

**Project Location:**


Figure 5.3
Special Catch Basins
General Sewer Plan
City of Mercer Island

May 2019

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** PS-7c
**Project Name:** Future Capacity Improvements
**Budget Number:**
**Facility Type:** Pump Station
**Project Timing:** Long Term
**Project Cost (Current $):** $6,937,500
**Project Cost (Future $):** $9,059,775
**Project Status** Planned, Budgeted
**Inflation Rate:** 3%

Go to CIP Summary

**Project Description:**
A budgetary place holder was included for Pump station improvements. Capacity improvements are highly constrained by downstream capacity of the Lakeline; therefore, it is anticipated additional capacity may be gained through improvements to the Lakeline (CIP ID L-4) or to the gravity collection system (CIP ID P-5).

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 25% | Engineer/ Planning 20% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| Pump Station Capacity Improvements | 1 | PS | $ 750,000 | $ 750,000 | $ 225,000 | $ 187,500 | $ 150,000 | $ 75,000 | $ 1,387,500 |
| Pump Station Capacity Improvements | 1 | PS | $ 750,000 | $ 750,000 | $ 225,000 | $ 187,500 | $ 150,000 | $ 75,000 | $ 1,387,500 |
| Pump Station Capacity Improvements | 1 | PS | $ 750,000 | $ 750,000 | $ 225,000 | $ 187,500 | $ 150,000 | $ 75,000 | $ 1,387,500 |
| Pump Station Capacity Improvements | 1 | PS | $ 750,000 | $ 750,000 | $ 225,000 | $ 187,500 | $ 150,000 | $ 75,000 | $ 1,387,500 |
| Pump Station Capacity Improvements | 1 | PS | $ 750,000 | $ 750,000 | $ 225,000 | $ 187,500 | $ 150,000 | $ 75,000 | $ 1,387,500 |
| Project Cost (Current $) | | | | | | | | | $ 6,937,500 |

**Notes on Cost Estimation:**
Pump station improvements are a budgetary place holder for capacity improvements to pump station improvements. It is anticiapted the existing pump station strucuture will continue to be used with changes to pumps, intlets/outlet, and adjacent structures.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 6,937,500 |
| Upgrade: | 0% | $ - |
| Total Project | 100% | $ 6,937,500 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Pump Station Capacity Improvements | 2024 | $ 1,387,500 | $ 1,706,450 |
| Pump Station Capacity Improvements | 2025 | $ 1,387,500 | $ 1,757,643 |
| Pump Station Capacity Improvements | 2026 | $ 1,387,500 | $ 1,810,373 |
| Pump Station Capacity Improvements | 2027 | $ 1,387,500 | $ 1,864,684 |
| Pump Station Capacity Improvements | 2028 | $ 1,387,500 | $ 1,920,624 |
| Total Project Cost | | $ 6,937,500 | $ 9,059,775 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** PS-7c **Budget Number:** **Facility Type:** Pump Station
**Project Name:** Future Capacity Improvements

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-1 | **Budget Number:** | WS711C | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Access | | | | |
| | | **Project Timing:** | Short to Extended Term | | |
| **Project Cost (Current $):** | $22,424,300 | **Project Cost (Future $):** | $64,858,552 | | Go to CIP Summary |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**
Provide access points to the Lakeline for cleaning and other routine maintenance. Access points may include manholes or clean outs in the water or on land. Evaluate feasibility of and confirm locations for access points into the Lakeline and prioritize locations for future installation. To effectively maintain the Lakeline, access point mush be able to allow inspection and cleaning equipment into the pipe and retrieve solids or other debris collected during cleaning activities. In-line access points, either manholes or cleanouts, are recommended to provide the most effective access.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 25% | Engineer/ Planning 20% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| Feasibility and Pre-Design | 1 | LS | $ 100,000 | $ 100,000 | $ 30,000 | $ 25,000 | $ 20,000 | $ 10,000 | $ 185,000 |
| Environmental and Final Design | 1 | LS | $ 100,000 | $ 100,000 | $ 30,000 | $ 25,000 | $ 20,000 | $ 10,000 | $ 185,000 |
| PS 14 - 15 | 11 | MH | $ 131,000 | $ 1,441,000 | $ 432,300 | $ 360,250 | $ 288,200 | $ 144,100 | $ 2,665,900 |
| PS 15 - 16 | 9 | MH | $ 131,000 | $ 1,179,000 | $ 353,700 | $ 294,750 | $ 235,800 | $ 117,900 | $ 2,181,200 |
| PS 16 - 17 | 6 | MH | $ 131,000 | $ 786,000 | $ 235,800 | $ 196,500 | $ 157,200 | $ 78,600 | $ 1,454,100 |
| PS 17 - 18 | 6 | MH | $ 131,000 | $ 786,000 | $ 235,800 | $ 196,500 | $ 157,200 | $ 78,600 | $ 1,454,100 |
| PS 18 - 19 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS 19 - 20 | 10 | MH | $ 131,000 | $ 1,310,000 | $ 393,000 | $ 327,500 | $ 262,000 | $ 131,000 | $ 2,423,500 |
| PS 20 - 21 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS 21 - KC | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS KC - 22 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS 22 - 23 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS 23 - 24 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| PS 24 - 25 | 7 | MH | $ 131,000 | $ 917,000 | $ 275,100 | $ 229,250 | $ 183,400 | $ 91,700 | $ 1,696,500 |
| **Project Cost (Current $)** | | | | | | | | | $ 22,424,300 |

**Notes on Cost Estimation:**
Based on manhole spacing assumptions vary depending on pipe diameter. 1 additional manhole for upstream of PS and 1 additional manhole for unidentified pipping features that restrict cleaning, like sag or bend. Costs based on 2018 Renton temporary manhole installation.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 22,424,300 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 22,424,300 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Evaluate Feasibility | 2020 | $ 185,000 | $ 202,154 |
| Access Pre-Design & Environmental Review | 2020 | $ 185,000 | $ 202,154 |
| Access Point Construction | 2021 | $ 1,696,500 | $ 1,909,426 |
| Access Point Construction | 2022 | $ 1,696,500 | $ 1,966,708 |
| Access Point Construction Long-Term | Long-term | $ 7,513,000 | $ 11,705,009 |
| Access Point Construction Extended-Term | Extended | $11,148,300 | $ 48,873,099 |
| **Total Project Cost** | | $22,424,300 | $ 64,858,552 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-1 | **Budget Number:** | WS711C | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Access | | | | |

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-2 | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Condition Assessment | | | | |
| | | **Project Timing:** | 2025 to Long-term | | |
| **Project Cost (Current $):** | $7,555,400 | **Project Cost (Future $):** | $11,242,086 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Initial condition assessment to complete a high level assessment of the entire Lakeline system and identify segments of pipe for further detailed condition assessment. Initially review historical project documentation from the Lakeline original construction and subsequent projects, as available, to determine the original pipe material, wall thickness, lining, coating, joint type, gasket material, and test pressure. IT is recommended the City obtain pipe thickness and lining conditions through a combination of pipe coupons and Ultrasonic Thickness (UT) testing. Use results of assessment and testing to inform Lakeline R&R. If conducted in conjunction to installation of access points and cleaning, it is recommended the City conduct a CCTV inspection of the Lakeline.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 25% | 20% | 10% | |
| Lakeline Survey Reach 1 | 14,000 | LF | $ 40 | $ 560,000 | $ 168,000 | $ 140,000 | $ 112,000 | $ 56,000 | $ 1,036,000 |
| Lakeline Survey Reach 2 | 14,350 | LF | $ 40 | $ 574,000 | $ 172,200 | $ 143,500 | $ 114,800 | $ 57,400 | $ 1,061,900 |
| Lakeline Survey Reach 2 | 14,350 | LF | $ 40 | $ 574,000 | $ 172,200 | $ 143,500 | $ 114,800 | $ 57,400 | $ 1,061,900 |
| Lakeline Survey Reach 5 | 9,400 | LF | $ 40 | $ 376,000 | $ 112,800 | $ 94,000 | $ 75,200 | $ 37,600 | $ 695,600 |
| Further Condition Assess | 1 | LS | $ 2,000,000 | $ 2,000,000 | $ 600,000 | $ 500,000 | $ 400,000 | $ 200,000 | $ 3,700,000 |
| **Project Cost (Current $)** | | | | | | | | | $ 7,555,400 |

**Notes on Cost Estimation:**

There are approximately 50,000 LF of Lakeline that needs to be assessed. Cost estimate assumes $40/LF.
It is recommended that non-contact technologies be considered for detailed assessment, such as ultrasonic thickness testing and radiology. Costs are from General Sewer Plan. Cost factors for construction have been added.

Go to Assumptions Tab

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4a | **Budget Number:** | | **Facility Type:** | General |
| **Project Name:** | Lakeline Monitoring Evaluation | | | | |
| | | **Project Timing:** | Short to Mid-term | | |
| **Project Cost (Current $):** | $3,220,600 | **Project Cost (Future $):** | $3,842,631 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

G-9

**Project Description:**

Locate and mark the Lakeline System, including pump stations, special catch basins, emergency bypass locations, and the Lakeline. Verify the plan and profile for the Lakeline system. In addition, locate key basemap features including: private Lakeline laterals and their cleanouts and valves; finished floor elevations of structures adjacent to Lakeline; bulkheads at private lateral crossing; docks, pilings, and boat cradles; near shore bathymetry.
Locations should be made survey grade, to extent possible, to provide horizontal and vertical geospatial information. It is anticipated a diver will be required to assist with the Lakeline survey due to water depths. Advanced technology, such as toning, may be required where the Lake bed or aquatic vegetation does not allow propping for the Lakeline. Permits will be required to pot-hole to verify locates of the Lakeline. Record survey data with King County Recorder's office and potentially include in Lake bathymetry maps.
Note, overflow elevations in the Lakeline System should be identified to meet state regulations.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 20% | 10% | |
| Pump Station Survey | 17 | LS | $ 15,000 | $ 255,000 | $ 76,500 | $ 51,000 | $ 25,500 | $ 408,000 |
| Lakeline Survey Reach 1 | 14,000 | LF | $ 30 | $ 420,000 | $ 126,000 | $ 84,000 | $ 42,000 | $ 672,000 |
| Lakeline Survey Reach 2 Part A | 14,350 | LF | $ 30 | $ 430,500 | $ 129,150 | $ 86,100 | $ 43,050 | $ 688,800 |
| Lakeline Survey Reach 2 Part B | 14,350 | LF | $ 30 | $ 430,500 | $ 129,150 | $ 86,100 | $ 43,050 | $ 688,800 |
| Lakeline Survey Reach 5 | 9,400 | LF | $ 30 | $ 282,000 | $ 84,600 | $ 56,400 | $ 28,200 | $ 451,200 |
| Marking | 1,042 | LS | $ 187 | $ 194,854 | $ 58,456 | $ 38,971 | $ 19,485 | $ 311,800 |
| **Project Cost** | | | | | | | | $ 3,220,600 |

**Notes on Cost Estimation:**

No locating and

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 3,220,600 |
| | | |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 3,220,600 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Pump Station Survey | 2023 | $ 408,000 | $ 487,173 |
| Lakeline Survey Reach 1 | 2020 | $ 672,000 | $ 734,313 |
| Lakeline Survey Reach 2 Part A | 2022 | $ 688,800 | $ 798,508 |
| Lakeline Survey Reach 2 Part B | 2024 | $ 688,800 | $ 847,137 |
| Lakeline Survey Reach 5 | 2028 | $ 451,200 | $ 624,566 |
| Marking | 2021 | $ 311,800 | $ 350,934 |
| **Total Project** | | $ 3,220,600 | $ 3,842,631 |

**Timing Notes**

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4a | **Budget Number:** | | **Facility Type:** | General |
| **Project Name:** | Lakeline Monitoring Evaluation | | | | |

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4b | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Monitoring Evaluation | | | | |
| | | **Project Timing:** | Medium- to Extended-term | | |
| **Project Cost (Current $):** | $280,000.00 | **Project Cost (Future $):** | $344,515.13 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Evaluate the current level of service of a given Lakeline segment using available information without having access to the pipe itself. Determine if further investigation is warranted, likely by installing in-lake access to the Lakeline (L-4b and L-4c) and/or conducting a condition assessment (L-3). It is anticipated the evaluation will consider pipe hydraulic capacity, I/I, pumping pressures, known maintenance issues, and other pertinent information. Flow monitoring, dye testing, and other non-invasive testing may be conducted prior to the evaluation to provide information on the Lakeline and it's inflows, which are not included in the project costs.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 0% | 10% | |
| PS 14 - 15 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 15 - 16 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 16 - 17 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 17 - 18 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 18 - 19 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 19 - 20 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 20 - 21 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 21 - KC | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS KC - 22 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 22 - 23 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 23 - 24 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| PS 24 - 25 | 1 | Evaluation | 50,000 | $ 50,000 | $ 15,000 | $ - | $ 5,000 | $ 70,000 |
| | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | $ 840,000 |

**Notes on Cost Estimation:**

Assumes study cost of $50,000: $25k for evaluation of pump station hydraulics, $15k for evaluation of other data, and $10k for reporting/PM.

Go to Assumptions Tab

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-4b **Budget Number:** **Facility Type:** Lakeline
**Project Name:** Lakeline Monitoring Evaluation

**Cost Allocation:**

| Project Type | Percent | Current Cost ($) |
|---|---|---|
| Capacity: | 0% | $ - |
| R&R | 100% | $ 280,000 |
| Upgrade: | 0% | $ - |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| 2 Segements | 2023 | $ 140,000 | $ 167,167 |
| 2 Segements | 2025 | $ 140,000 | $ 177,348 |
| 13 Segements | Extended | $ 560,000 | $ 2,454,987 |
| **Total Project Cost** | | $ 280,000 | $ 344,515 |

**Timing Notes**

Assume manhole installation will occur for different Pump Station reaches about every 3 years based on project planning and implementation timing.

**Project Location:**

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4c | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Cleaning and Evaluation | | | | |
| | | **Project Timing:** | 2024 to Long-term | | |
| **Project Cost (Current $):** | $19,182,800.00 | **Project Cost (Future $):** | $60,767,072.59 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Cleaning settled debris from the Lakeline may help reduce the risk of overflows and prolong the useful life of the pipe. New access points are required to clean the Lakeline. Hydro-jetting is anticipated to be the preferred cleaning method; requiring a Vactor truck be floated on a barge to the access points installed in Project L-8. The effort involved in the Lakeline cleaning is greater than in a gravity sewer due to the nature of working on the water. Additionally, bypass pumping may be required in some segments of Lakeline. It is anticipated the cleaning effort will requiring multiple barges and crews. Permits may be required for cleaning activities. Costs assume cleaning is performed every 30 years.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 30% | 10% | |
| PS 14 - 15 | 11 | MH | $ 124,000 | $ 1,364,000 | $ 409,200 | $ 409,200 | $ 136,400 | $ 2,318,800 |
| PS 15 - 16 | 9 | MH | $ 124,000 | $ 1,116,000 | $ 334,800 | $ 334,800 | $ 111,600 | $ 1,897,200 |
| PS 16 - 17 | 6 | MH | $ 124,000 | $ 744,000 | $ 223,200 | $ 223,200 | $ 74,400 | $ 1,264,800 |
| PS 17 - 18 | 6 | MH | $ 124,000 | $ 744,000 | $ 223,200 | $ 223,200 | $ 74,400 | $ 1,264,800 |
| PS 18 - 19 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS 19 - 20 | 10 | MH | $ 124,000 | $ 1,240,000 | $ 372,000 | $ 372,000 | $ 124,000 | $ 2,108,000 |
| PS 20 - 21 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS 21 - KC | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS KC - 22 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS 22 - 23 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS 23 - 24 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| PS 24 - 25 | 7 | MH | $ 124,000 | $ 868,000 | $ 260,400 | $ 260,400 | $ 86,800 | $ 1,475,600 |
| | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | $ 19,182,800 |

**Notes on Cost Estimation:**

Based on the number of manholes that were installed in Project L-1

Go to Assumptions Tab

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-4c **Budget Number:** **Facility Type:** Lakeline
**Project Name:** Lakeline Cleaning and Evaluation

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 19,182,800 |
| Upgrade: | 0% | $ - |
| Total Project Cost | 100% | $ 19,182,800 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| 10 Manholes | 2024 | $ 2,108,000 | $ 2,592,574 |
| 38 Manholes | Long-term | $ 5,902,400 | $ 9,195,747 |
| Remaining Manholes | Extended | $ 11,172,400 | $ 48,978,752 |
| | | | |
| | | | |
| Total Project Cost | | $ 19,182,800 | $ 60,767,073 |

**Timing Notes**

Assume manhole cleaning will happen for different Pump Station reaches about every 3 years.

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4d | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Alternatives Analysis | | | | |
| | | **Project Timing:** | 2026 to 2026 | | |
| **Project Cost (Current $):** | $350,000.00 | **Project Cost (Future $):** | $456,670.61 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Perform an alternative analysis to determine preferred improvements to Lakeline reaches with confirmed deficiencies. It is assumed the alternative analysis will use data collected in prior work used to determine the deficiencies, including gravity sewer I/I evaluation, pump station evaluation, condition assessment, etc. It is anticipated the Alternative Analysis will develop conceptual level layouts on several alternatives. Based on analysis, the City may choose to conduct R&R or replace the Lakeline and associated pump station.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 0% | 0% | 10% | |
| PS 14 - 15 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 15 - 16 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 16 - 17 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 17 - 18 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 18 - 19 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 19 - 20 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 20 - 21 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 21 - KC | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS KC - 22 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 22 - 23 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 23 - 24 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| PS 24 - 25 | 1 | LS | $ 250,000 | $ 250,000 | $ 75,000 | $ - | $ - | $ 25,000 | $ 350,000 |
| | | | | | | | | | |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 4,200,000 |

**Notes on Cost Estimation:**

Assumes $100,000

Go to Assumptions Tab

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

**Project ID:** L-4d **Budget Number:** **Facility Type:** Lakeline
**Project Name:** Lakeline Alternatives Analysis

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 4,200,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 4,200,000 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Reach 4 Evaluation | 2026 | $ 350,000 | $ 456,671 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 350,000 | $ 456,671 |

**Timing Notes**

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-4e | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline R&R Program | | | | |
| | | **Project Timing:** | Extended | | |
| **Project Cost (Current $):** | $55,500,000.00 | **Project Cost (Future $):** | $164,886,987.83 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Based on the initial and further Lakeline condition assessments, implement R&R improvements to continue to operate the Lakeline in a safe and effective manner. A budgetary value of $1.5M per year has been assumed.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 25% | 20% | 10% | |
| Lakeline R&R Program | 10 | Yrs | $ 1,500,000 | $ 15,000,000 | $ 4,500,000 | $ 3,750,000 | $ 3,000,000 | $1,500,000 | $ 27,750,000 |
| Lakeline R&R Program | 10 | Yrs | $ 1,500,000 | $ 15,000,000 | $ 4,500,000 | $ 3,750,000 | $ 3,000,000 | $1,500,000 | $ 27,750,000 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 55,500,000 |

**Notes on Cost Estimation:**

Preliminary desgin and construction are placeholders for future work. Revisit costs when evaluation is complete and option for replacement/rehabilitation is selected. Costs from the General Sewer Plan.

Go to Assumptions Tab

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

**Project ID:** L-4e
**Budget Number:**
**Facility Type:** Lakeline
**Project Name:** Lakeline R&R Program

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | ###### |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | ###### |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Lakeline R&R Program | Long-term | ######### | $ 43,233,596 |
| Lakeline R&R Program | Extended | ######### | ########### |
| | | | |
| **Total Project Cost** | | ######### | ########### |

**Timing Notes**

**Project Location:**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-5b | **Budget Number:** | WS511R | **Facility Type:** | Lakeline |
| **Project Name:** | Special Catch Basin Access | | | | |
| | | **Project Timing:** | Short Term | | |
| **Project Cost (Current $):** | $740,000 | **Project Cost (Future $):** | $937,410 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Address priority special catch basin accessibility issues to support repair, rehabilitation, and other improvements.

Access may include:

- New or expanded easements.
- New or improved walking path / stairs for additional access and safety
- Minor Improvements to existing roads for condition, increased, and safety

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 25% | Engineer/ Planning 20% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| SCB Accessibility Improvements | 20 | PS | $ 20,000 | $ 400,000 | $ 120,000 | $ 100,000 | $ 80,000 | $ 40,000 | $ 740,000 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 740,000 |

**Notes on Cost Estimation:**

Medium construction boat dock (4" decking) with average piling ~$80 per square foot per Marshall Valuation Service (inflated from 2009 to 2018 using ENR 20-City Index). For 30 ' X 8' dock, costs would be ~$20,000. Metal stairs are $600/riser (10') in a built environment per Mashall Valuation Service; Assume 100' vertical feet (total of $6,000), $10k for vegetation management, and $4k for additional geotechnical in non-built environment. Costs will not support major improvements to roads.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 740,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 740,000 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| SCB Improvements | 2025 | $ 740,000 | $ 937,410 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 740,000 | $ 937,410 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-5b **Budget Number:** WS511R **Facility Type:** Lakeline
**Project Name:** Special Catch Basin Access

**Project Location:**

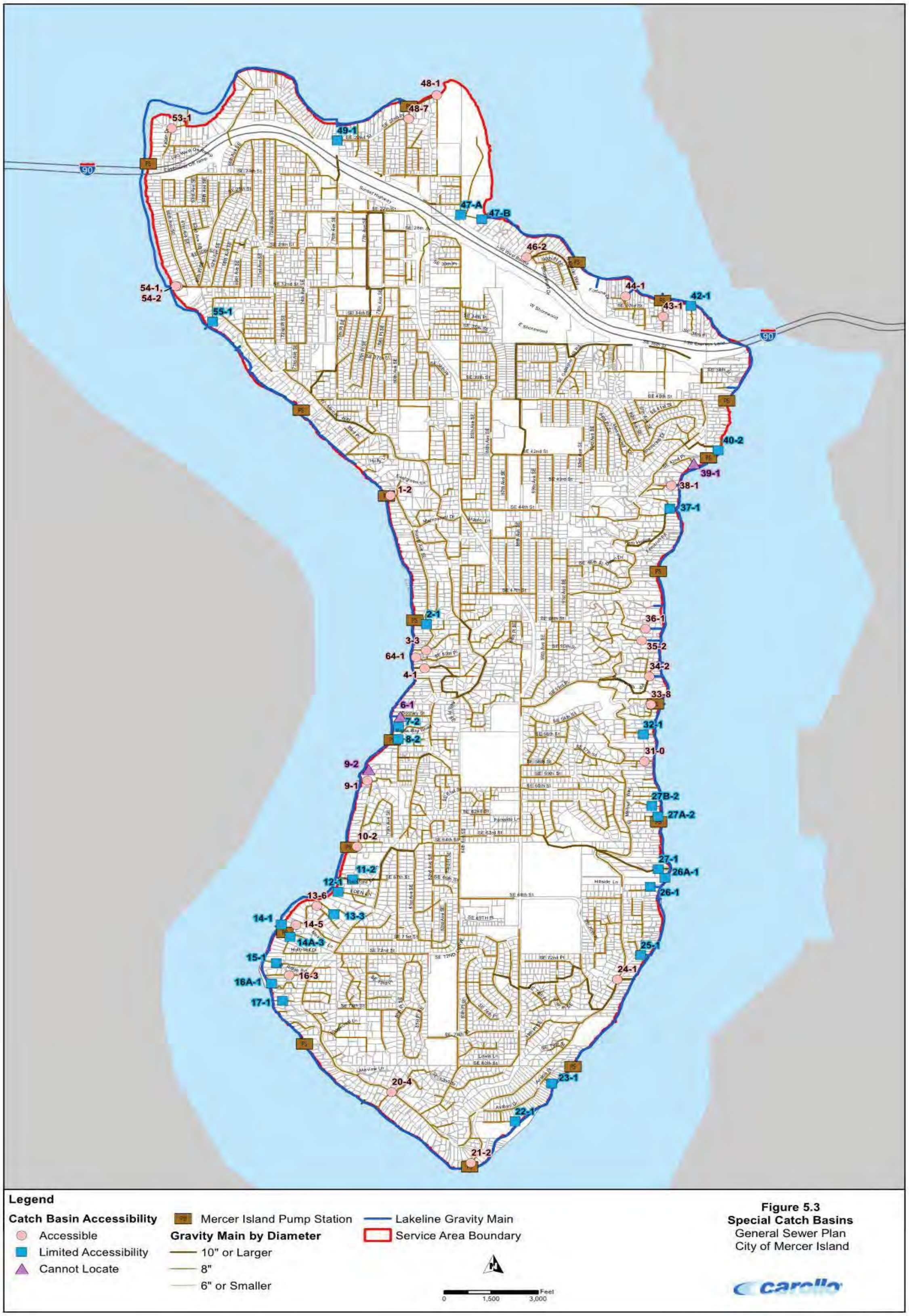



Figure 5.3
Special Catch Basins
General Sewer Plan
City of Mercer Island

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-5c | **Budget Number:** | WS511R | **Facility Type:** | Lakeline |
| **Project Name:** | Special Catch Basin Effectiveness Evaluation | | | | |
| | | **Project Timing:** | Short Term | | |
| **Project Cost (Current $):** | $315,000 | **Project Cost (Future $):** | $365,171 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Special Catch Basins (SCB) remove debris from entering the Lakeline and are cleaned up to two times a year by the City. The study will evaluate the effectiveness of each SCB at removing debris using the hydraulic model, recommending improvements where applicable. CFD (3-D) modeling will be performed on a representative SCB to establish the range of effective conditions. Minor improvements may require modification to manhole inlet/outlet, bottom, installation of baffles, etc. Major improvements may require replacement of manhole with a larger structure to enable greater debris collection. Additionally, the Study will identify the recommended frequency of cleaning based on the risk of debris being resuspended in large flow events.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 0% | 0% | 10% | |
| SCB Effectiveness Study | 1 | LS | $ 225,000 | $ 225,000 | $ 67,500 | $ - | $ - | $ 22,500 | $ 315,000 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 315,000 |

**Notes on Cost Estimation:**

Assumes 50 SCB's studied. Hydraulic modeling of $1,500 per SCB. Improvement identification of $2,000 per SCB. CFD modeling cost of $25k. PM and

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 315,000 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 315,000 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| SCB Effectiveness Study | 2022 | $ 315,000 | $ 365,171 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 315,000 | $ 365,171 |

**Timing Notes**

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-5c **Budget Number:** WS511R **Facility Type:** Lakeline
**Project Name:** Special Catch Basin Effectiveness Evaluation

**Project Location:**

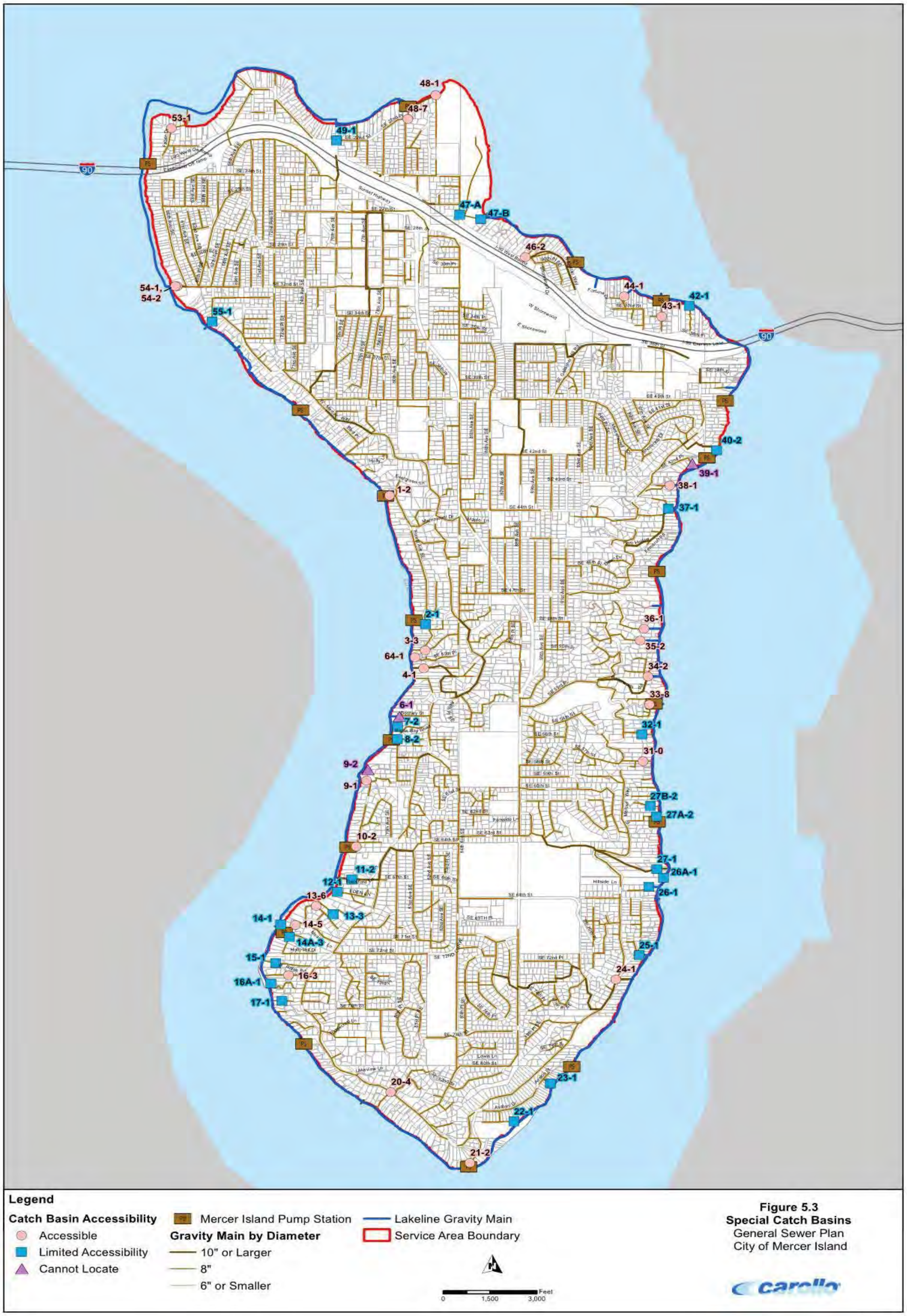



Figure 5.3
Special Catch Basins
General Sewer Plan
City of Mercer Island

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | |
|---|---|---|---|---|
| **Project ID:** | L-5d | **Budget Number:** | WS511R | **Facility Type:** Lakeline |
| **Project Name:** | Special Catch Basin Preventive Maintenance | | | |
| | | **Project Timing:** | 2020 to Long Term | |
| **Project Cost (Current $):** | $277,800 | **Project Cost (Future $):** | $340,740 | Go to CIP Summary |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | |

**Project Description:**

Perform preventative maintenance to extend the life of Special Catch Basins with limited accessibility and delay expensive R&R projects. Preventative maintenance activities will likely need to avoid use heavy machinery due to access limitations and may include sealing cracks, spray lining, venting, install new lids, etc. It is recommended to confirm the effectiveness of SCBs before preventative maintenance activities.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 25% | 20% | 10% | |
| 2020 SCBs | 10 | SCB | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| 2021 SCBs | 10 | SCB | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| 2022 SCBs | 10 | SCB | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| 2023 SCBs | 10 | LS | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| Mid-term SCBs | 10 | LS | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| Long-term SCBs | 10 | LS | $ 2,500 | $ 25,000 | $ 7,500 | $ 6,250 | $ 5,000 | $ 2,500 | 46300 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 277,800 |

**Notes on Cost Estimation:**

Cost of $2,500 per manhole assumes $1,000 for preparing manhole bottom and walls and spray on lining, $500 for general improvements, and $1,000 for mob/demo.

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 277,800 |
| Upgrade: | 0% | $ - |
| Total Project Cost | 100% | $ 277,800 |

**Project Timing:**

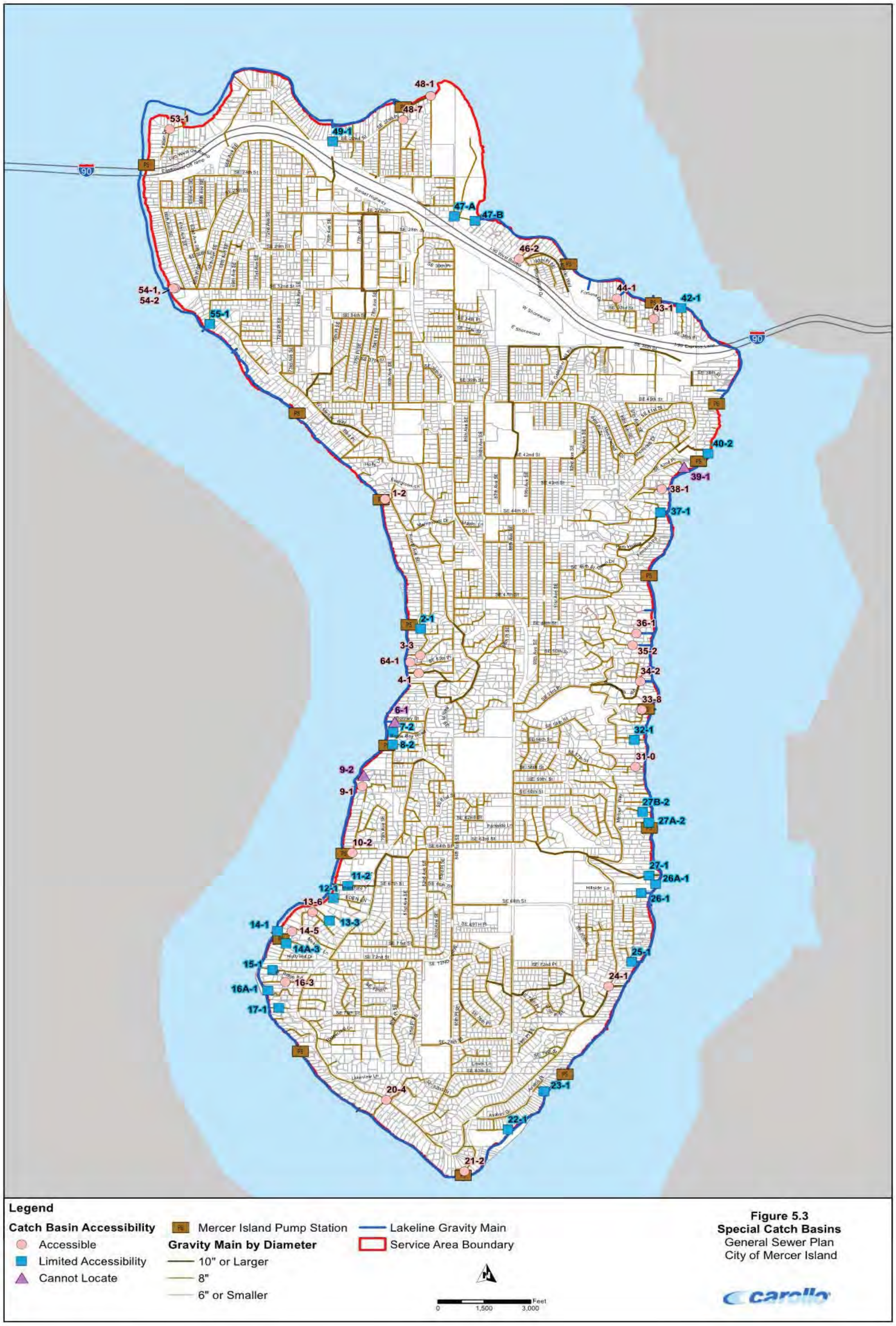
| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| 2020 SCBs | 2020 | $ 46,300 | $ 50,593 |
| 2021 SCBs | 2021 | $ 46,300 | $ 52,111 |
| 2022 SCBs | 2022 | $ 46,300 | $ 53,674 |
| 2023 SCBs | 2023 | $ 46,300 | $ 55,285 |
| Mid-term SCBs | 2024 | $ 46,300 | $ 56,943 |
| Long-term SCBs | Long-term | $ 46,300 | $ 72,134 |
| **Total Project Cost** | | $ 277,800 | $ 340,740 |

**Timing Notes**

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

**Project ID:** L-5d **Budget Number:** WS511R **Facility Type:** Lakeline
**Project Name:** Special Catch Basin Preventive Maintenance

**Project Location:**



City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-5e | **Budget Number:** | WS511R | **Facility Type:** | Lakeline |
| **Project Name:** | Special Catch Basin R&R | | | | |
| | | **Project Timing:** | 2025 to Long-term | | |
| **Project Cost (Current $):** | $910,200 | **Project Cost (Future $):** | $2,454,611 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Special Catch Basins that reach the end of their useful life will need to be repaired and replaced. A majority of SCB have limited access making R&R activities very difficult and more costly than typical collection system projects. SCBs requiring R&R should be located through maintenance inspections and other SCB projects. Effectiveness of SCBs will be verified before R&R activities. Replacement is anticipated at 1 per year starting in the mid-term.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 25% | 20% | 10% | |
| Catch Basin R&R | 1 | SCB | $ 20,500 | $ 20,500 | $ 6,150 | $ 5,125 | $ 4,100 | $ 2,050 | $ 37,900 |
| Catch Basin R&R | 1 | SCB | $ 20,500 | $ 20,500 | $ 6,150 | $ 5,125 | $ 4,100 | $ 2,050 | $ 37,900 |
| Catch Basin R&R | 1 | SCB | $ 20,500 | $ 20,500 | $ 6,150 | $ 5,125 | $ 4,100 | $ 2,050 | $ 37,900 |
| Catch Basin R&R | 1 | SCB | $ 20,500 | $ 20,500 | $ 6,150 | $ 5,125 | $ 4,100 | $ 2,050 | $ 37,900 |
| Catch Basin R&R | 10 | SCB | $ 20,500 | $ 205,000 | $ 61,500 | $ 51,250 | $ 41,000 | $ 20,500 | $ 379,300 |
| Catch Basin R&R | 10 | SCB | $ 20,500 | $ 205,000 | $ 61,500 | $ 51,250 | $ 41,000 | $ 20,500 | $ 379,300 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 910,200 |

**Notes on Cost Estimation:**

Assumes 1 SCB's per year. Assumes 15' manhole installation costs of $5000. Settling plate costs of $5500. Site restoration costs of $5000. Mob/demob costs of $5000.

Go to Assumptions Tab

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 910,200 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 910,200 |

**Project Timing:**

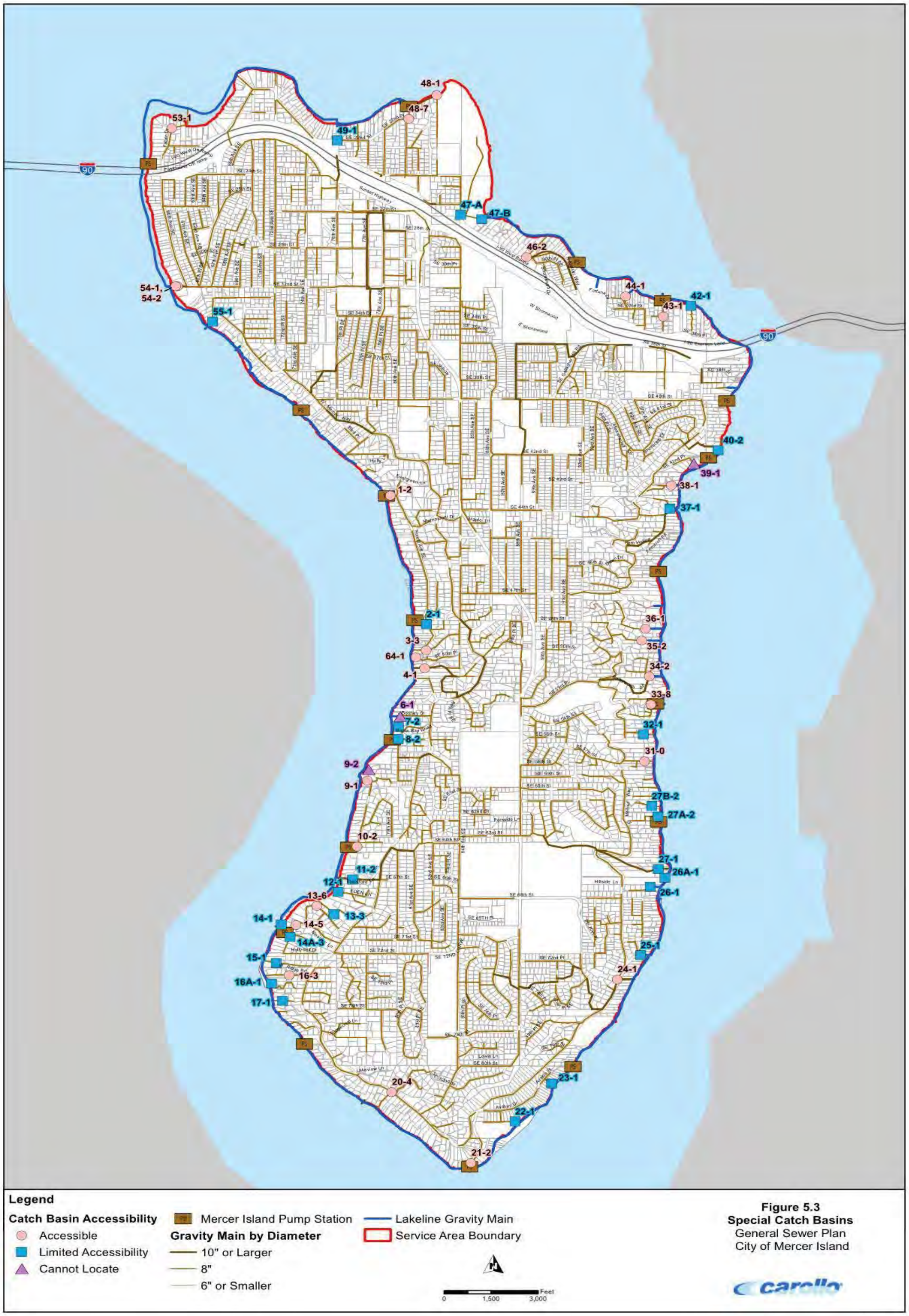
| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Catch Basin R&R | 2025 | $ 37,900 | $ 48,011 |
| Catch Basin R&R | 2026 | $ 37,900 | $ 49,451 |
| Catch Basin R&R | 2027 | $ 37,900 | $ 50,934 |
| Catch Basin R&R | 2028 | $ 37,900 | $ 52,462 |
| Catch Basin R&R | Long-term | $ 379,300 | $ 590,937 |
| Catch Basin R&R | Extended | $ 379,300 | $ 1,662,816 |
| **Total Project Cost** | | $ 910,200 | $ 2,454,611 |

**Timing Notes**

**City of Mercer Island**
**General Sewer Plan**
**Capital Improvement Program**

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-5e | **Budget Number:** | WS511R | **Facility Type:** | Lakeline |
| **Project Name:** | Special Catch Basin R&R | | | | |

**Project Location:**



City of Mercer Island
General Sewer Plan
Capital Improvement Program

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| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-5f | **Budget Number:** | WS511R | **Facility Type:** | Lakeline |
| **Project Name:** | Special Catch Basin Relocation & Improvements | | | | |
| | | **Project Timing:** | 2020 to Extended | | |
| **Project Cost (Current $):** | $699,600 | **Project Cost (Future $):** | $1,722,859 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

Relocate or improve Special Catch Basins (SCB) to improve access or increase effectiveness based on Project L-2b. Relocated SCBs will be located and sized to provide effective removal of debris and provide efficient periodic cleaning. Where relocation is not possible, existing SCBs may be improved to increase effectiveness. It is anticipated that construction of some SCB improvements will require major access improvements. New or enlarged SCBs locations may require additional easements or property acquisition. Project assumes one SCB will be relocated per year based on City staff prioritization.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency 30% | GC & Overhead 25% | Engineer/ Planning 20% | City Admin 10% | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| SCB Relocation 2020 | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation 2021 | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation 2022 | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation 2023 | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Mid | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Mid | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Mid | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Mid | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Mid | 1 | LS | $ 13,500 | $ 13,500 | $ 4,050 | $ 3,375 | $ 2,700 | $ 1,350 | $ 25,000 |
| SCB Relocation Long | 9 | LS | $ 13,500 | $ 121,500 | $ 36,450 | $ 30,375 | $ 24,300 | $ 12,150 | $ 224,800 |
| SCB Relocation Extended | 10 | LS | $ 13,500 | $ 135,000 | $ 40,500 | $ 33,750 | $ 27,000 | $ 13,500 | $ 249,800 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 699,600 |

**Notes on Cost Estimation:**

Assumes 1 SCB's per year. Assumes 15' manhole installation costs of $5000. Settling plate costs of $5500. Site restoration costs of $2000. Mob/demob costs of $1000.

Go to Assumptions Tab

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 699,600 |
| Upgrade: | 0% | $ - |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| SCB Relocation 2020 | 2020 | $ 25,000 | $ 27,318 |
| SCB Relocation 2021 | 2021 | $ 25,000 | $ 28,138 |
| SCB Relocation 2022 | 2022 | $ 25,000 | $ 28,982 |
| SCB Relocation 2023 | 2023 | $ 25,000 | $ 29,851 |
| SCB Relocation Mid | 2024 | $ 25,000 | $ 30,747 |
| SCB Relocation Mid | 2025 | $ 25,000 | $ 31,669 |
| SCB Relocation Mid | 2026 | $ 25,000 | $ 32,619 |
| SCB Relocation Mid | 2027 | $ 25,000 | $ 33,598 |
| SCB Relocation Mid | 2028 | $ 25,000 | $ 34,606 |
| SCB Relocation Long | Long-term | $ 224,800 | $ 350,231 |
| SCB Relocation Extended | Extended | $ 249,800 | $ 1,095,100 |

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-5f **Budget Number:** WS511R **Facility Type:** Lakeline
**Project Name:** Special Catch Basin Relocation & Improvements

**Project Location:**

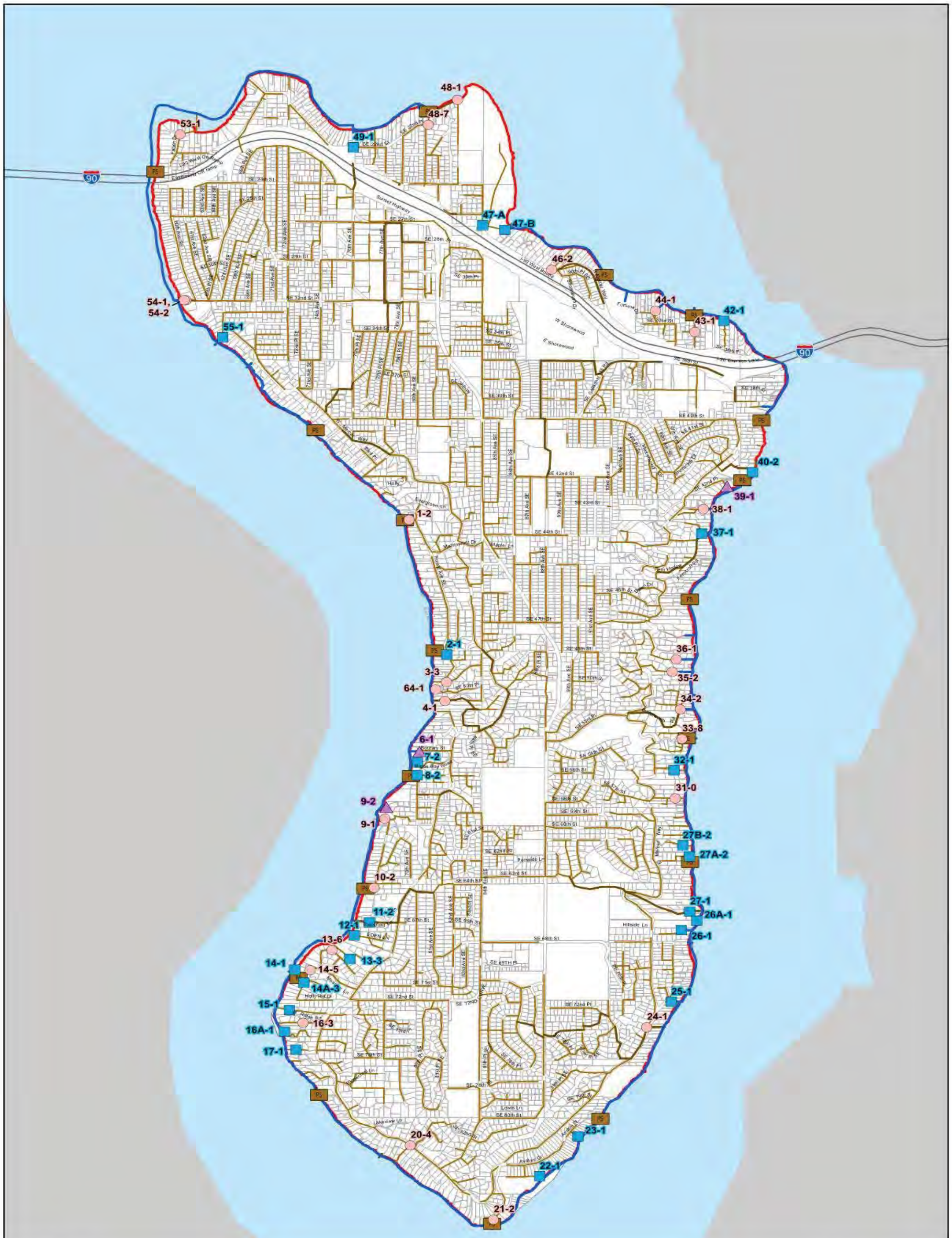


Figure 5.3
Special Catch Basins
General Sewer Plan
City of Mercer Island

City of Mercer Island
General Sewer Plan
Capital Improvement Program

| | | | | | |
|---|---|---|---|---|---|
| **Project ID:** | L-6 | **Budget Number:** | | **Facility Type:** | Lakeline |
| **Project Name:** | Lakeline Replacement | | | | |
| | | **Project Timing:** | Extended | | |
| **Project Cost (Current $):** | $425,131,800.51 | **Project Cost (Future $):** | $1,863,737,858.99 | Go to CIP Summary | |
| **Project Status** | Planned, Budgeted | **Inflation Rate:** | 3% | | |

**Project Description:**

For example purposes, the cost of replacing the remaining lakeline was calculated based on Reach 3 expenses of $25M for 7,200 feet of Lakeline. Costs were escalated by 27% to account (ENR Seattle 2010 CCI 8805 to CCI 11185). Reach 3 constructed a new gravity Lakeline reach into Lake Washington, extended beyond the near shore enviroment. The gravity pipe is much deeper than the previous Lakeline, requiring a new, deep pump station transfers flows to KC facilities.

**Project Cost Estimate (Current $):**

| Project Element | Quantity | Unit | Unit Cost ($/Unit) | Subtotal | Contingency | GC & Overhead | Engineer/ Planning | City Admin | Total Cost (Current $) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 30% | 25% | 20% | 10% | |
| Lakeline Survey Reach 1 | 14,000 | LF | $ 4,411 | $ 61,750,741 | $ 18,525,222 | $15,437,685 | $12,350,148 | $ 6,175,074 | $ 114,238,872 |
| Lakeline Survey Reach 2 | 28,700 | LF | $ 4,411 | $ 126,589,020 | $ 37,976,706 | $31,647,255 | $25,317,804 | $ 12,658,902 | $ 234,189,687 |
| Lakeline Survey Reach 5 | 9,400 | LF | $ 4,411 | $ 41,461,212 | $ 12,438,364 | $10,365,303 | $ 8,292,242 | $ 4,146,121 | $ 76,703,242 |
| | | | | | | | | | |
| **Project Cost (Current $)** | | | | | | | | | $ 425,131,801 |

**Notes on Cost Estimation:**

Preliminary desgin and construction are placeholders for future work. Revisit costs when evaluation is complete and option for replacement/rehabilitation is selected.

Go to Assumptions Tab

City of Mercer Island
General Sewer Plan
Capital Improvement Program

**Project ID:** L-6 **Budget Number:** **Facility Type:** Lakeline
**Project Name:** Lakeline Replacement

**Cost Allocation:**

| Project Type | Percent | Cost |
|---|---|---|
| Capacity: | | $ - |
| R&R: | 100% | $ 425,131,800.51 |
| Upgrade: | 0% | $ - |
| **Total Project** | 100% | $ 425,131,801 |

**Project Timing:**

| Project Element | Timing | Project Cost (Current $) | Project Cost (Future $) |
|---|---|---|---|
| Lakeline R&R Program | Extended | $ 425,131,801 | $ 1,863,737,859 |
| | | | |
| | | | |
| **Total Project Cost** | | $ 425,131,801 | $ 1,863,737,859 |

**Timing Notes**

**Project Location:**

May 2019

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SECTION 01 11 00_SUMMARY OF WORK

ATTACHMENT A

NFPA 820 ASSESSMENT

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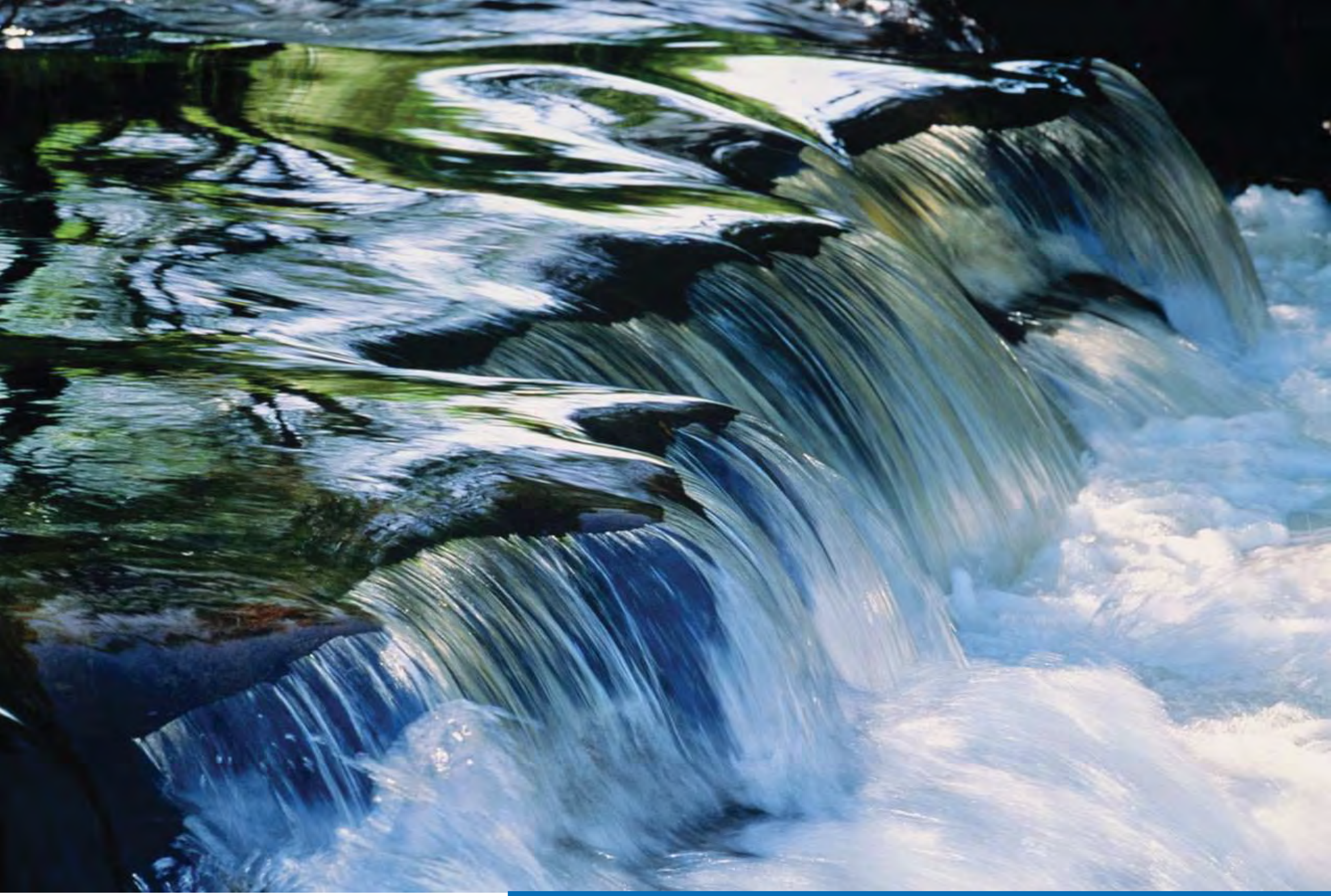

City of Mercer Island
Wastewater Pump Station Control and Monitoring

# NFPA 820 ASSESSMENT

FINAL | March 2021

City of Mercer Island
Wastewater Pump Station Control and Monitoring

# NFPA 820 ASSESSMENT

FINAL | March 2021

Digitally signed by Michael L. Zappone
Contact Info: Carollo Engineers, Inc.
Date: 2021.03.19 16:15:28-07'00'

MICHAEL L. ZAPPONE
STATE OF WASHINGTON
39052
REGISTERED
PROFESSIONAL ENGINEER

DocuSigned by:
Vincent Follett
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28947
REGISTERED
PROFESSIONAL ENGINEER

# Contents

## Appendices



## Tables

## Figures

# Abbreviations

| | |
|---|---|
| ACH | air changes per hour |
| AHJ | authorities having jurisdiction |
| Carollo | Carollo Engineers, Inc. |
| City | City of Mercer Island |
| cf | cubic feet |
| cfm | cubic feet per minute |
| CGD | combustible gas detection |
| Div. | Division |
| D/W | Dry Well/Wet Well |
| FE | fire extinguisher |
| gpm | gallons per minute |
| HVAC | heating, ventilation, and air conditioning |
| I/O | input and output |
| LC | limited combustible |
| LCP | local control panel |
| LFS | low flame spread |
| N/A | not applicable |
| NC | noncombustible |
| NEC | National Electric Code |
| NFPA | National Fire Protection Agency |
| NR | not required |
| OSHA | Occupational Safety and Health Administration |
| PS | pump station |
| S | Submersible |
| SCADA | supervisory control and data acquisition |
| SST | stainless steel |
| TAB | testing and balancing |
| WWPS | wastewater pump or pumping station |

# EXECUTIVE SUMMARY

## ES.1 Introduction

The National Fire Protection Agency (NFPA) 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities was established to mitigate fire and explosion hazards specific to wastewater treatment facilities and their associated collection systems. Wastewater pump stations (WWPS) are categorized by NFPA 820 as part of the collection systems category. Carollo Engineers, Inc. (Carollo) was tasked by the City of Mercer Island (City) to conduct an assessment of their existing WWPS and associated ancillary facilities for compliance to the NFPA 820 Standard. The purpose of this report is to document these findings and make recommended improvements for each pump station (PS) in order to comply with the NFPA 820 standard.

The information contained in this report has been developed for the sole use of the City of Mercer Island. The report is not an all-encompassing evaluation dealing with the pump stations in their entirety from every aspect. The recommended improvements identified rely on information provided by the City of Mercer Island in the form of Drawings, Testing and Balancing (TAB) report, and field visits for items solely relating to the NFPA 820 standard. The information provided is not intended for use beyond the contracted scope of services. Pump station field visits were a visual inspection only, limited to those areas and sections fully accessible and visible on the date of inspection.

## ES.2 Scope and Method

Carollo reviewed existing As-Built drawings, Conformed documents, performed field visits, and conducted NFPA 820 analyses for 18 existing PSs and their ancillary facilities for the City. Table ES.1 summarizes the 18 PSs that were evaluated as a part of this project.

Table ES.1 Pump Stations included in NFPA 820 Evaluation

| Pump Station Number | Pump Station Type | Ancillary Facilities | Public/Private Property |
|---|---|---|---|
| 1 | Dry Well / Wet Well | None | Right of Way |
| 4 | Submersible | Below grade vaults | Right of Way |
| 10 | Dry Well / Wet Well | None | Right of Way |
| 11 | Dry Well / Wet Well | None | Right of Way |
| 12 | Dry Well (Flushing) | None | Right of Way |
| 13 | Dry Well / Wet Well | None | Private |
| 14 | Submersible | Below grade vaults | Right of Way |
| 15 | Dry Well / Wet Well | None | Right of Way |
| 16 | Dry Well / Wet Well | None | Right of Way |
| 17 | Dry Well / Wet Well | None | Private |
| 18 | Dry Well / Wet Well | None | Private |
| 19 | Dry Well / Wet Well | None | Private |
| 20 | Dry Well / Wet Well | None | Right of Way |

| Pump Station Number | Pump Station Type | Ancillary Facilities | Public/Private Property |
|---|---|---|---|
| 21 | Dry Well / Wet Well | None | Private |
| 22 | Dry Well / Wet Well | None | Private |
| 23 | Dry Well / Wet Well | None | Private |
| 24 | Dry Well / Wet Well | None | Private |
| 25 | Dry Well / Wet Well | None | Private |

Each station was analyzed based on existing area classification of the physical space per NFPA 820, ventilation methods, electrical equipment rating, materials used for pump station construction, presence of fire protection measures, and audible and visual alarms. Ancillary facilities were also analyzed with compliance to NFPA 820 standards.

A map from the City of Mercer Island's 2018 General Sewer Plan is shown in Figure ES.1 identifying the location of all evaluated PSs

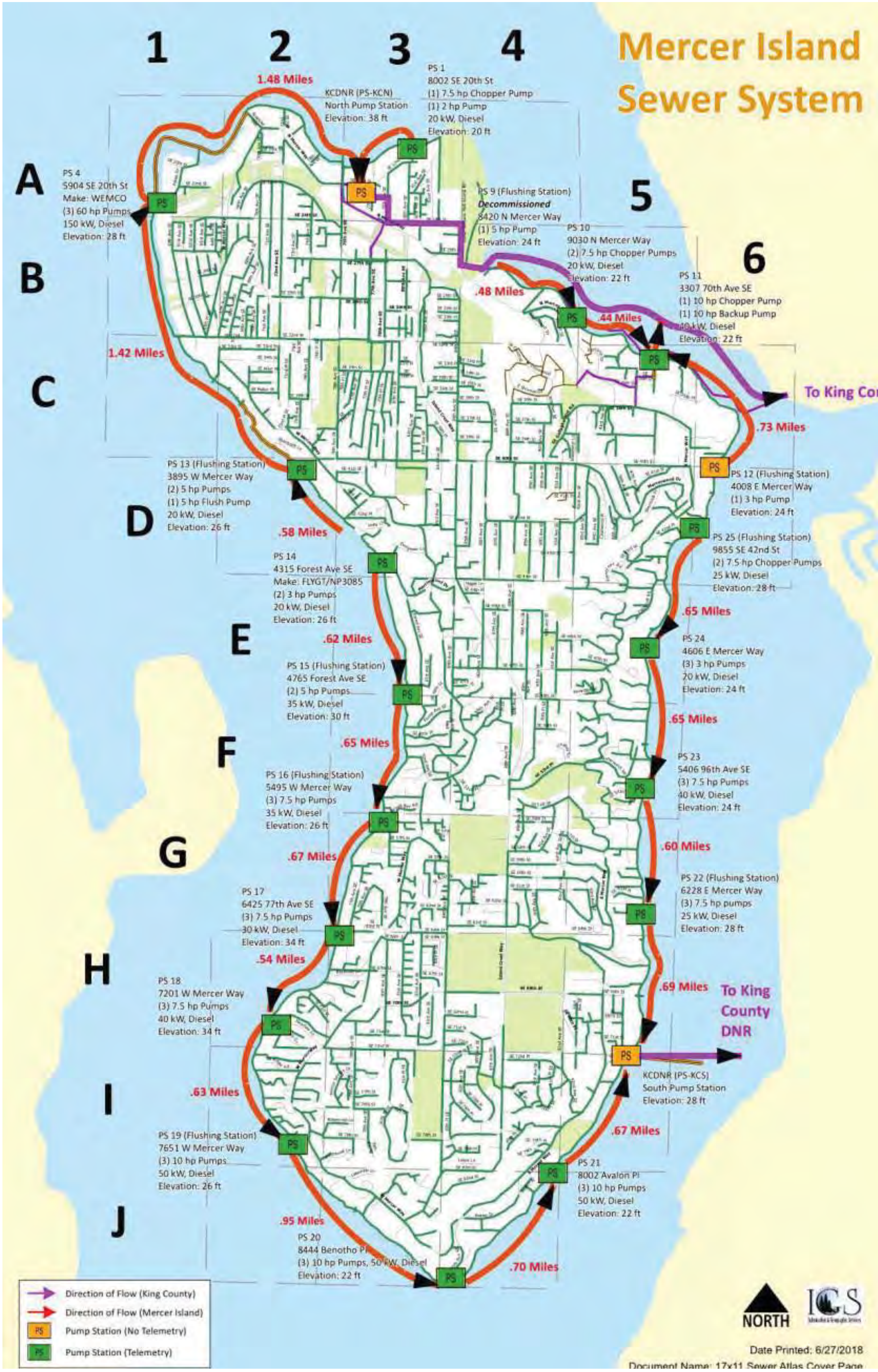


Figure ES.1 City of Mercer Island PS Locations and Sewer System

## ES.3 Findings and Recommended Improvements

Two types of WWPS, Dry Well / Wet Well and Submersible, were identified during the assessment of the existing PSs. Fifteen pump stations were identified to be a Dry Well / Wet Well type pump station and two pump stations were identified to be a Submersible type pump station. One existing PS was identified as a Flushing PS and is not covered under NFPA 820 standards. PSs that do not store or handle raw sewage and/or stormwater are not discussed in NFPA 820.

The main mitigation areas or means of achieving NFPA 820 compliance for WWPSs are as follows:

- **Ventilation** – providing sufficient ventilation measured as number of air changes per hour (ACH) to reduce risks of accumulation of explosive gases.
- **Electrical equipment** – installing explosion proof or appropriately protected electrical equipment and seal fittings rated for area classification (Class 1, Div. 1 or Class 1, Div. 2).
- **Materials of construction** – utilizing noncombustible or limited-combustible building materials.
- **Fire protection** – providing fire detection systems, combustible gas detection (CGD) systems, fire extinguishers to detect and/or protect from fires, and smoke detection systems that shutdown the ventilation system to prevent spread of smoke and fire.
- **Audible and visual alarms** – providing warnings to personnel when combustible gases or hazardous conditions are present.

Findings show that all pump stations require modifications to the existing facilities in order to comply with the current NFPA 820 standard. Pump station ancillary facilities (primarily below grade vaults) were either not present or do not require any improvements. The improvements proposed for each pump station in Section 3 of this report present solutions for multiple scenarios. The listed improvements provide the City with flexibility when deciding which mitigation measures to implement. It is important to note that different combinations of the listed improvements can impact the pump station's compliance to the standard. A summary of recommended improvements for each pump station evaluated is shown in Table ES.2 and summarized in the list below. Table ES.2 consolidates improvements presented in Section 3 and approved alternatives to the NFPA 820 standard, discussed in Section 4 of this report, into one preferred scenario. This scenario identifies the improvements required to provide a safe and practical solution consistent with current pump station design practices. Typical Dry Well / Wet Well pump station design establishes an unclassified dry well space and a physically separated wet well. The wet well is commonly classified as a Class I Division (Div.) 1 hazardous location because no or minimal (less than 12 ACH) ventilation is provided in the wet well. In order to achieve an unclassified dry well space and a physically separated wet well, all recommended improvements identified in Table ES.2 for Dry Well / Wet Well PSs must be implemented. Submersible pump stations are not specifically discussed in NFPA 820. However, the recommended improvements in Table ES.2 for these types of pump stations are aimed to provide a safe and practical solution consistent with wet well design and current pump station design practices.

The recommended improvements in Table ES.2 are summarized as follows:

- WWPS Nos. 1, 10, 16, and 17 require modifications to the existing structure to create a physically separated Wet Well.
- All pump station exhaust fans require a fan flow monitoring system to indicate fan failure.
- WWPS Nos. 13 and 18 require increased air flow to declassify the Dry Well space.
- Existing electrical equipment is adequately rated for the area classification for all WWPSs, except WWPS No. 14. WWPS No. 14 will require adequately rated electrical equipment.
- The materials of construction for all WWPSs are appropriate.

- Additional CGD systems are not required for any WWPS.
- Installation of audible and visual alarms inside all WWPS is required for all WWPS except WWPS No. 4 and 14:
  - Audible alarms shall be tied to the pump access hatch position and shall alarm in the open position only.
  - Remote fan failure will be sent to the City's SCADA system.
- Installation of a single NO-GO light outside all WWPS is required except for WWPS No. 4 and 14.

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Table ES.2 NFPA 820 Recommended Improvements Summary Table

| Waste Water Pump Station No. | Public/Private Property | Pump Station Type | Current Area Classification(3) | Mitigation Measures(4) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Area Separation | Ventilation | | | Recommended Electrical Equipment Rating Within the Pump Station | | | Materials of Construction | | Fire protection measures | | | Alarms | | |
| | | | | Physically Separate Dry Well and Wet Well | Increase or Improve Ventilation | Install Flow Monitoring | No Improvements Identified | Class I Div. 1 | Class I Div. 2 | Unclassified | No Improvements Identified | Provide NC, LC, or LFS Material | No Improvements Identified | Install CGD System | Provide Fire Extinguishers (On all levels) | No Improvements Identified | Install Inside Dry Well (audible & visual)(10) | Install Outside Dry Well (NO-GO visual)(10) |
| **1** | Right of Way | D/W | Class I Div. 1 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | ✓(8) | | | | ✓ | ✓ |
| **4(5)** | Right of Way | S | Class I Div. 1 | | | | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ | | |
| **10** | Right of Way | D/W | Class I Div. 1 | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ | | | | ✓ | ✓ |
| **11(6)** | Right of Way | D/W | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **12(7)** | Right of Way | N/A | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **13** | Private | D/W | Class I Div. 2 | | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **14** | Right of Way | S | Class I Div. 1 | ✓ | | | ✓ | ✓(9) | ✓(9) | | ✓ | | ✓ | | | ✓ | | |
| **15** | Right of Way | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **16** | Right of Way | D/W | Class I Div. 1 | ✓ | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **17** | Private | D/W | Class I Div. 1 | ✓ | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **18** | Private | D/W | Class I Div. 2 | | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **19** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **20** | Right of Way | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **21** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **22** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **23** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **24** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| **25** | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |

Notes:
Abbreviations: D/W = Dry Well / Wet Well, S = Submersible, NC = Noncombustible, LC = limited combustible, LFS = low flame spread.
(1) All checked recommendations in this table must be implemented or satisfied in order to achieve an unclassified dry well space with a physically separated wet well.
(2) WWPS NFPA 820 Assessments were performed on July 14, 2020 and October 20, 2020.
(3) For D/W type pump stations, current Area Classification listed is only for the Dry Well space of the pump station. The wet well space for all D/W and S type pump stations are Class I Div. 1.
(4) See Section 3 of this report for specific recommendations.
(5) Only a high-level assessment was performed on WWPS No. 4.
(6) The existing WWPS No. 11 was not assessed as part of this report. WWPS No. 11 will be converted to a submersible pump station within the immediate future.
(7) Flushing Pump Station No. 12 was not assessed as part of this report since it is not considered a WWPS.
(8) See Section 3 for recommendations on fire extinguisher location.
(9) See Section 3 for recommendations on existing electrical equipment rating.
(10) See Section 4 for installation details on audible and/or visual alarms.

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Section 1

# INTRODUCTION AND BACKGROUND

The City owns and operates seventeen (17) WWPS and one flushing pump station as part of their lake line sewer system and is seeking increased control and monitoring of these pump stations with its new supervisory control and data acquisition (SCADA) system. The City has commissioned Carollo to complete a NFPA 820 assessment to assist with establishing the number and type of input and output (I/O) points to support the City's design of the new SCADA system.

The purpose of this report is to document the existing conditions of seventeen (17) WWPS and one flushing pump station along the City's lake line sewer system and its compliance to NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities. Figure 1.1 presents the general layout of the City's lake line sewer system and associated wastewater and flushing pump stations.

Combustible gases resulting from wastewater conveyance and treatment are fire and explosion hazards that can create an occupational health and safety hazard if not handled properly. NFPA 820 provides guidance for construction and fire protection measures to enhance safety when working with wastewater. WWPSs convey wastewater and are classified as Collection Systems components under NFPA 820. The standard establishes minimum criteria for protection against fire and explosion hazards for these facilities.

This report reviews the hazardous area classifications and mitigation measures present at the existing WWPSs. Since construction of these WWPSs pre-dates the establishment of the NFPA 820 standard, these facilities may not have been designed to meet current NFPA 820 requirements. The objective of this report is to provide the City with a summary of existing conditions relative to requirements identified in the current NFPA 820 standard and to make recommendations for future improvements to satisfy requirements of the standard and improve fire safety at each WWPS.

The information contained in this report has been developed for the sole use of the City of Mercer Island. The report is not an all-encompassing evaluation dealing with the pump stations in their entirety from every aspect. The recommended improvements identified rely on information provided by the City of Mercer Island in the form of Drawings, TAB report, and field visits for items solely relating to the NFPA 820 standard. The information provided is not intended for use beyond the contracted scope of services. Pump station field visits were a visual inspection only, limited to those areas and sections fully accessible and visible on the date of inspection.

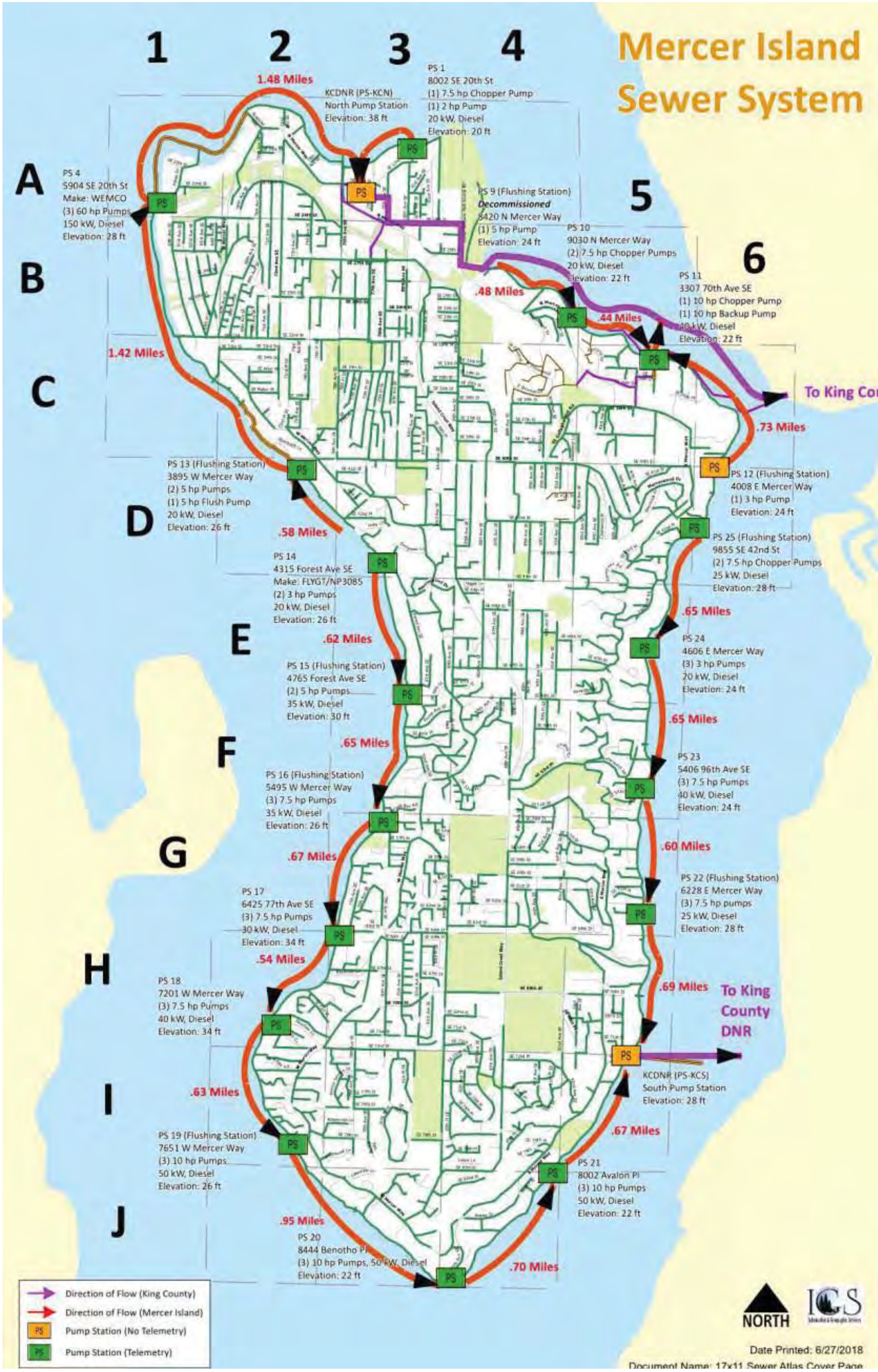



Figure 1.1 Existing Lake Line Sewer System

This report includes the following four sections:

- **Section 1 - Introduction and Background.** This section provides background on the NFPA 820 standard, definitions, classifications, and mitigation measures.
- **Section 2 - WWPS NFPA 820 Scope and Methods.** This section describes the scope of this study as well as the methods employed for the NFPA 820 assessment of the City's WWPSs.
- **Section 3 - WWPS NFPA 820 Assessment.** This section summarizes the results of the NFPA 820 assessment. Key observations, assessment results, and improvements are included for each WWPS.
- **Section 4 - Summary.** This section consolidates all the improvements in Section 3 of this report into one comprehensive recommended improvements table highlighting one preferred scenario.

## 1.1 NFPA 820 Background

NFPA 820 is a standard that establishes minimum requirements for protection against fire and explosion hazards in collection systems. This includes hazard classification of specific areas and types of collection systems. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, can be severe when they do occur. The first edition of NFPA 820 was issued in 1990 and was released as a recommended practice. In 1995, the document was changed to a standard, which contains mandatory requirements. Although the NFPA develops and revises the standard, it has no power to enforce it. As a result, the standard is enforced by local authorities having jurisdiction (AHJ) such as fire marshals, building inspectors, or federal, state, or local agencies. The complete NFPA 820 reference can be found at the following website:

> http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=820

While this standard does not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard, agencies often review and comply with this standard wherever possible to reduce risk of safety hazards. NFPA 820 states that:

> *"…in those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portion of this standard deemed appropriate."*

Conversely, NFPA 820 also states that:

> *"…the retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgement of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided."*

As improvements to existing pumping stations are considered, NFPA classifications must be understood to determine the appropriate modifications to improve fire safety and decrease fire hazards. This analysis of the City's WWPSs was performed using the 2020 edition of NFPA 820. The next planned version of NFPA 820 will be released in 2024. Depending upon the timing of the planned improvements, the results of the NFPA 820 assessment included in this report may need to be revisited.

The following sections provide additional background on the NFPA classification and mitigation measures, and NFPA classifications as related to the City's WWPSs.

### 1.1.1 Understanding NFPA Classification and Mitigation Measures

NFPA 820 undertakes the assessment of wastewater collection facilities by breaking down each facility by National Electric Code (NEC) hazardous location classification, herein referred to as area classification, and establishes their minimum criteria for protection against fire and explosion hazards, herein referred to as mitigation measures. The initial assessment of a wastewater collection facility requires the determination of its area classification. Once area classification has been determined, measures to mitigate hazards can be identified. This section provides a summary of the area classifications and associated mitigation measures.

#### 1.1.1.1 Area Classification

NFPA 820 is used to determine the area classification of an area, while the NEC (or NFPA 70) describes the requirements for the electrical installation within the classified area. According to the Occupational Safety and Health Administration (OSHA):

> *"Locations are classified depending on the properties of the flammable vapors, liquids, or gases, or combustible dusts or fibers that may be present, and the likelihood that a flammable or combustible concentration or quantity is present."*

Area Classification is described by Class and Division. A "Class" denotes what type of combustible hazard is present:

- Class I refers to gases or vapors.
- Class II refers to dust.
- Class III refers to fibers.

Class I locations are more frequently found in collection facilities as a result of gases and vapors such as methane and hydrogen sulfide, which naturally form in sewage.

Class II and Class III areas are not typically found in collection facilities but are more common in manufacturing or agricultural facilities.

A "Division (Div.)" refers to the probability of a combustion hazard being present. Div. 1 areas are more likely to experience combustible conditions than Div. 2 and may even exhibit combustible conditions under normal operation:

- A Class I Div. 1 area is a location where ignitable concentrations of flammable gases or vapors:
  - Can exist under normal operating conditions.
  - May exist frequently because of maintenance operations.
  - Can exist due to a breakdown or faulty operation of equipment or processes with simultaneous failure of electrical equipment that could cause ignition.

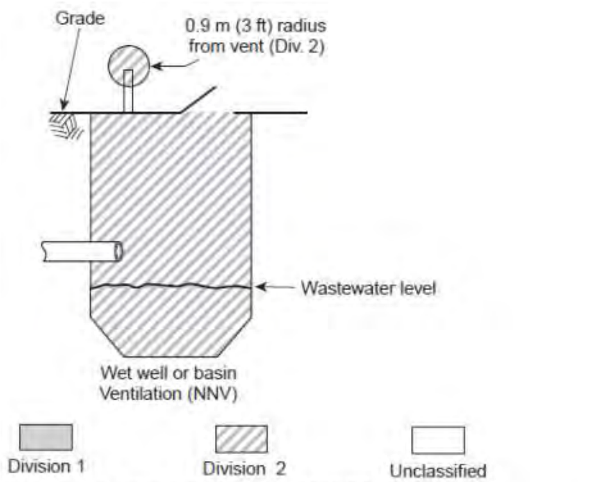
  An example of a Class I Div. 1 location within a collection system is an enclosed wet well without sufficient ventilation.

- A Class I Div. 2 area is a location where volatile flammable liquids or flammable gases:
  - Are handled, processed, or used, but will normally be confined within closed containers or closed systems.
  - Can only escape containers or closed systems in cases of accidental rupture or breakdown in case of abnormal operation of equipment.
  - Are normally removed by positive mechanical ventilation but might become hazardous through failure or abnormal operation of the ventilation equipment.

- Are normally prevented from being communicated from an adjacent Class I Div. 1 location but might occur as a result of failure or abnormal operation of ventilation equipment.

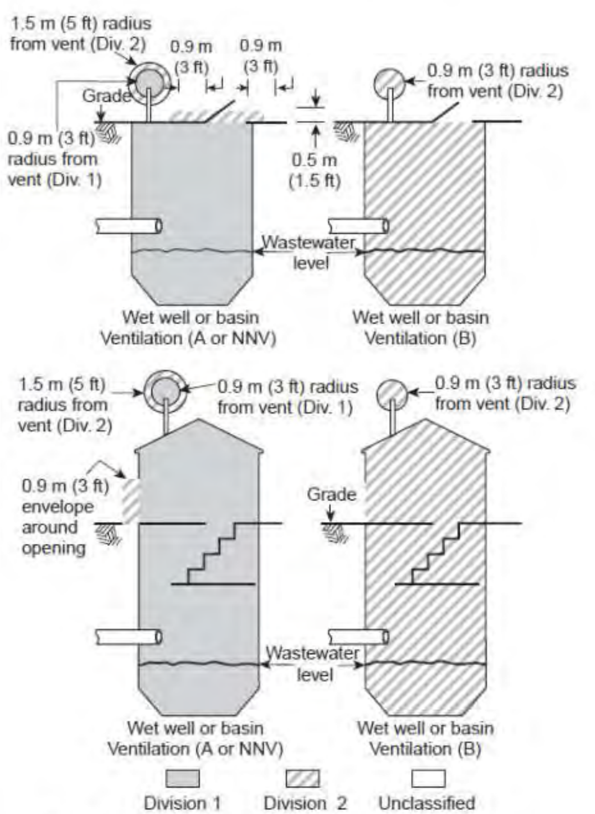
Examples of a Class I Div. 2 location within a collection system is the dry well side of a WWPS or below grade wastewater valve vault with a closed piping system and insufficient ventilation, or an enclosed wet well with sufficient ventilation.

Structure openings such as doors, hatches, and vents that connect a classified structure to atmosphere can also hold area classification within a given radius and volume. Figures 1.2 and 1.3 show the extent of area classification for structure openings that serve different area classifications.



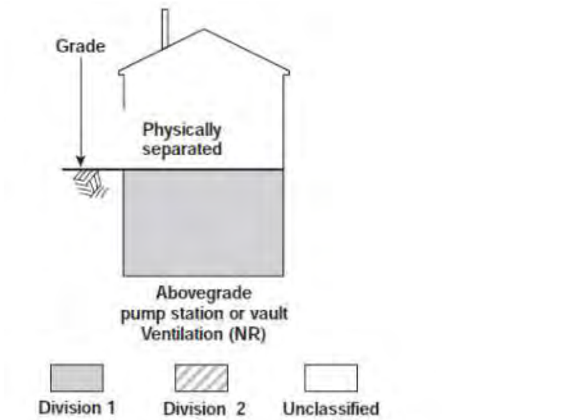

Note: Ventilation codes defined in Table 4.2.2 notes.

**FIGURE A.4.2(a) Wet Well or Basin Serving a Storm Sewer; Illustration of Table 4.2.2, Row 4.**



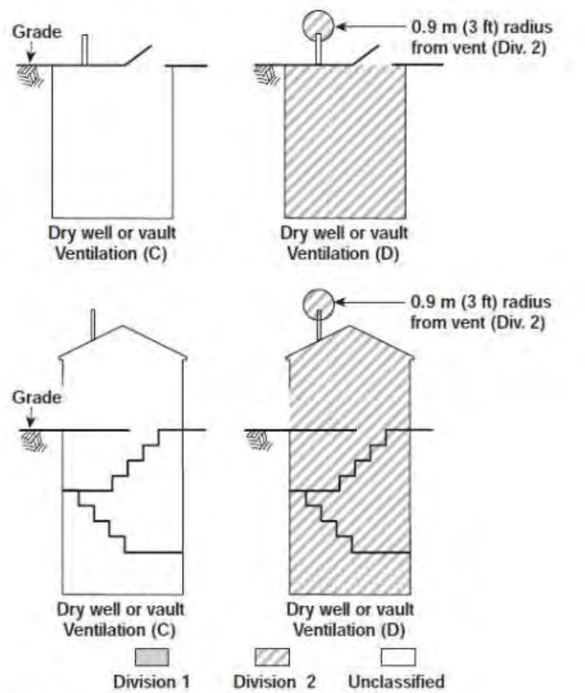

Note: Ventilation codes defined in Table 4.2.2 notes.

**FIGURE A.4.2(b) Wet Well or Basin Serving Separate or Combined Sanitary Sewer; Illustration of Table 4.2.2, Rows 14 and 32.**




Note: Ventilation codes defined in Table 4.2.2 notes.

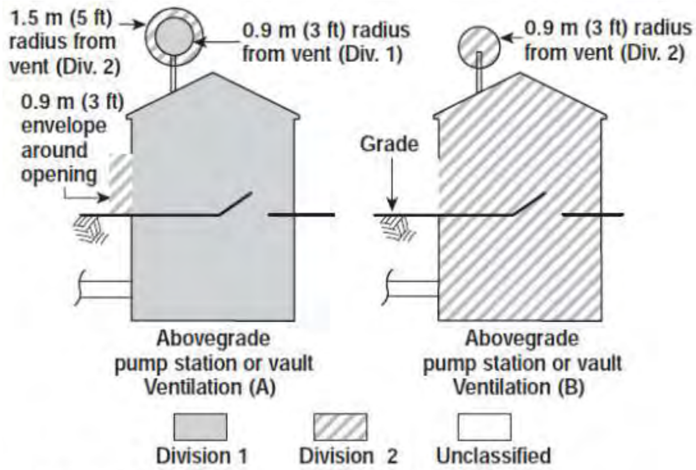
**FIGURE A.4.2(c) Abovegrade Equipment Housing or Vault Physically Separated from Wet Well or Basin; Illustration of Table 4.2.2, Rows 16 and 28.**




Note: Ventilation codes defined in Table 4.2.2 notes.

**FIGURE A.4.2(d) Belowgrade or Partially Belowgrade Equipment Housing or Vault Physically Separated from Wet Well or Basin; Illustration of Table 4.2.2, Rows 5, 15, 29, and 34.**

Figure 1.2 Area Classification of Openings Serving Classified Spaces - Part 1




Note: Ventilation codes defined in Table 4.2.2 notes.

**FIGURE A.4.2(e) Abovegrade Equipment Housing or Vault not Physically Separated from Wet Well or Basin; Illustration of Table 4.2.2, Row 17.**

Figure 1.3 Area Classification of Openings Serving Classified Spaces - Part 2

The extent of classified areas when evaluating hazardous spaces can play a significant role when applying NFPA 820 to a given structure.

Ventilation also plays a key role in determining the area classification of a given structure. Ventilation of an area is measured in NFPA 820 by the number of ACH. Providing ventilation rates above six (6) or twelve (12) ACH, as specified for each type of area in NFPA 820, can reduce, or declassify, the classification of certain areas from Div. 1 to Div. 2 or from Div. 2 to unclassified. An air change is defined as the exhaust and supply of one full enclosure volume of air over a given period of time. For example, a 10,000 cubic foot (cf) enclosure with a ventilation rate of 1,000 cubic feet per minute (cfm) would yield 6 ACH.

NFPA 820 notes that all mechanically ventilated spaces need to be served by both supply and exhaust fans. However, the standard provides exceptions to this requirement. One exception states:

> *"For covered process facilities that are not routinely entered by personnel and where mechanically ventilated, the space shall be permitted to be ventilated by exhaust fans only, and the induced supply (outside) air shall meet the ventilation rate specified in the applicable chapter when determining the area classification."*

An example of a "not routinely" entered structure is the dry well of a pump station that is only occupied to accommodate periodic operations and/or maintenance. Other exceptions and ventilation requirements are listed in Chapter 9 of NFPA 820.

#### 1.1.1.2 Mitigation Measures

Outside of area classifications, NFPA 820 discusses different methods to reduce hazardous risks. NFPA 820 provides information on ventilation (and ventilation monitoring), electrical equipment requirements, materials of construction, fire protection measures, and audible and visual alarms as ways to address (and/or reduce) risk and comply with area classification. This report categorizes these items as mitigation measures as a function of area classification. This section reviews each measure and explains its significance when assessing a structure for compliance to the NFPA 820 standard.

### *Electrical Equipment*

The classification of an area affects which components of electrical equipment are permitted to be used and installation methods per the NEC. As a means to mitigate risk, certain components are required to be explosion proof or otherwise rated or installed for the appropriate environment. An outline of these electrical equipment requirements is shown in Table 1.1.

Table 1.1 Equipment Requirements for Classified Areas

| Component | Class I Div. 1 Requirements | Class I Div. 2 Requirements |
|---|---|---|
| Wiring Methods | • All must be rated for Class I Div. 1 (usually must be threaded rigid metal conduit), concerned primarily with preventing combustion within the raceway from migrating or causing ignition elsewhere. | • Less stringent, concerned primarily with preventing gases from migrating between areas with different classifications. |
| Flexible Connections | • All must be rated for Class I Div. 1 (explosion proof or intrinsically safe circuits) | • Requirements are less stringent, and typical liquid tight flexible metal conduit is allowed in most cases. |
| Boxes | • Explosion Proof | • Explosion proof only if contacts, switches, or arc creating components contained. |
| Motors | • Explosion Proof | • Explosion proof or Class I Div. 2 rated only if contacts, switches, arc creating components, or high-temperature components (such as winding heaters) contained. |
| Fittings | • Explosion Proof | • Explosion proof only if contacts, switches, or arc creating components contained. |
| Conduit Bodies | • Explosion Proof | • Explosion proof only if contacts, switches, or arc creating components contained. |
| Seals | • Required entering all explosion proof enclosures containing components that may produce sparks, arcs, or high temperature.<br>• Required when conduit 2 inches or larger and enclosure contains terminals, splices, or taps.<br>• Required in every conduit crossing a Class I Div. 1 boundary, within 10 feet of the boundary. | • Required entering all explosion proof enclosures that may produce sparks, arcs, or high temperature.<br>• Required in every conduit crossing a Class I Div. 2 boundary, within 10 feet of the boundary. |
| Lighting | • Entire assembly rated for Class I Div. 1 | • Fixtures listed for the environment with operating temperature class (T code) consistent with explosive gases that may be present. . |

### *Ventilation*

Ventilation serves as one of the mitigation measures indicated by NFPA 820. Ventilation rates can reduce risk by controlling the amount of air changes within a structure and help determine the area classification of a facility. Chapter 9 of NFPA 820 provides a list of requirements for installation of mechanical ventilation within structures.

Because ventilation rates play such a significant role in determining area classification and mitigation measures, NFPA 820 requires ventilation monitoring of all ventilation systems that declassify a given structure. NFPA 820 states:

> *"All continuous ventilation systems that are used to reduce the classification of a space shall be fitted with flow detection devices connected to alarm signaling systems to indicate inadequate ventilation and ventilation system failure."*

Due to this requirement, ventilation monitoring systems have been identified by this report as a mitigation measure.

### *Materials of Construction*

Materials of construction also serves as a mitigation measure required by NFPA 820. Proper selection of construction material can reduce explosion and fire hazards within collection facilities. NFPA 820 breaks down materials of construction into four basic categories:

- Combustible.
- Noncombustible.
- Limited-combustible.
- Low flame spread index.

Chapter 8 of NFPA 820 further explains the requirements of each material category. Each collection facility has a requirement for its material of construction that must be considered. This material of construction is also tied to the facility's area of classification.

### *Fire Protection*

NFPA 820 also considers fire protection measures as a mitigation measure when assessing collection systems. Fire protection measures provide methods for fire control or fire extinguishment. For collection systems, four different fire protection measures are observed:

- Fire Detection Systems.
- Combustible Gas Detection (CGD) Systems.
- Fire Extinguishers.
- Smoke detection systems.

Chapter 7 of NFPA 820 explains the requirements that govern the first three fire protection measures. Chapter 8 Section 8.3.8.2 defines the requirements for smoke detection systems. Essentially, smoke detection systems must be designed to shut down ventilation systems exceeding 2,000 cfm upon detection of smoke. NFPA 820 requires the presence of these fire protection measures within the facility based on its type, area classification, and ventilation capacity.

### *Audible and Visual Alarms*

Audible and visual alarms are required by NFPA 820 for structures that observe a reduction in area classification through ventilation with the exception that dual visual alarms are allowed at the entrance to facilities that are not normally occupied. Auxiliary power supply must also be provided to ensure continuous operation of alarms during failure of normal power supply. These alarms serve as a mitigation measure and aid in determining the type of environment of a collection facility. They serve as warnings to collection facility personnel when combustible gas or hazardous risk is present within each facility. NFPA 820 provides requirements for location and type of these alarms as shown in Table 1.2. Additional requirements for audible and visual alarms can be observed in Chapter 7.6 of NFPA 820.

Table 1.2 Audible and Visual Alarms Location and Type

| Location | Alarm Notification Appliances |
|---|---|
| Entrance(s) to spaces in occupied facilities | Visual and audible alarms |
| Entrances to remote spaces that are not constantly attended | Visual and audible alarms or a dual light(1) warning system |
| Within spaces | Visual and audible alarms |
| Constantly attended location (local or remote) | Visual and audible alarms |

Notes:
(1) Alarm panels that indicate safe entry into remote spaces via go/no-go lights.
(2) Table 1.2 is a direct copy of NFPA 820 (2020) Table 7.6.1.

#### 1.1.1.3 NFPA Classification of Pumping Stations

NFPA 820 categorizes facilities into three major groups: Collection Systems, Liquid Stream Treatment Processes, and Solids Treatment Processes.

Collection systems are described as buildings and structures involved in the collection and transportation of municipal wastewater. Pumping stations, also referred to as pump stations, fall under the category of collection systems. Under chapter four of the NFPA 820 standard, different types of pumping stations are defined. Typically, pump stations are composed of three areas that pertain to NFPA 820: the pump station structure, which consists of 2 areas, the dry well and wet well, and ancillary facilities such as below-grade meter or valve vaults. As such, each pump station type, component, and physical layout/orientation must be taken into consideration when being assessed for compliance to NFPA 820. Improper categorization of the pump station could lead to reduced fire safety and increased fire hazards. The pump stations that are discussed in this report generally fall under the WWPS category and consist mainly of partially below grade stations with a few exceptions.

*Pump Station Structure*

The pump station structure consists of two physically separated structures, a dry well and a wet well.

NFPA 820 defines a dry well as:

> *"The portion of a pumping station designed to provide isolation and shelter or accommodations for controls or equipment associated with pumping of wastewater and designed to completely and permanently exclude wastewater or wastewater-derived atmospheres."*

NFPA 820 also defines a wet well as:

> *"The portion of the pumping station that receives and temporarily stores wastewater for the purpose of pumping."*

It is important to note that pump stations can exist without the existence of a dry well and only have a wet well with submersible pumps. For the purposes of this report, and the pump stations assessed for this project, the definition provided by the standard is maintained with the exception of two pump stations (Pump Stations No. 4 and No. 14).

NFPA 820 further differentiates pump station types by indicating differences between storm water and wastewater pump stations. The pump stations evaluated in this report are under the wastewater pump stations category.

The standard further breaks down each type of pump station into physical construction of the station: below grade or partially below grade, above grade, and above grade with no physical separation from the wet well.

NFPA 820 defines physical separated structures as:

> *"Structures that have a gas tight partition between two adjacent spaces, or two nonadjacent spaces, with no means of gas communication between the spaces and where personnel entry into the spaces is by individual, exterior access ports with no physical connection, or an airlock."*

### *Area Classification*

Area classifications consists of class and division. It is a function of combustible hazard present, physical space, and ventilation rates. All pump stations are categorized as a Class I facility due to the presence of combustible gases and vapors.

WWPS wet wells are classified as Div. 1 if the structure is not ventilated or ventilated at less than 12 ACH. Wet wells are classified as Div. 2 if continuously mechanically ventilated at 12 ACH or more.

**Below Grade Pump Stations**

Below grade or partially below grade WWPS dry wells that are physically separated from their wet wells are classified as Div. 2 if the structure is not ventilated or ventilated at less than 6 ACH. These dry wells are unclassified if continuously mechanically ventilated at 6 ACH or more.

**Above Grade Pump Stations**

Above grade WWPSs that are physically separated from their wet well are unclassified regardless of ventilation rates.

Above grade WWPSs that are not physically separated from their wet well are Div. 1 if the structure is not ventilated or ventilated at less than 12 ACH. These pumping stations are Div. 2 if continuously mechanically ventilated at 12 ACH or more.

**Exemptions**

Some pump stations can be exempt from having the presence of both supply and exhaust fans in order to declassify a space depending on their occupancy. As indicated previously, NFPA 820 can take exception for covered structures that are not routinely occupied. These non-routinely occupied spaces can utilize exhaust fans with passive supply in lieu of a supply fan to declassify their space.

Note that any vents, doors, or hatches that service these pump station structures contain an additional classification for a given envelope. The extent of classification for all pump stations extends to the entire closed space if not physically separated.

Table 1.3 summarizes the information described above.

Table 1.3 Pump Station Area Classifications

| Pump Station Type | Class | Ventilation Rate (ACH) | Division | Extent of Classified Area |
|---|---|---|---|---|
| Wastewater pump station wet well | I | <12 | 1 | Enclosed Space |
| | | ≥12 | 2 | Enclosed Space |
| Below grade or partially below grade wastewater pump station dry well | I | <6 | 2 | Enclosed Space |
| | | ≥6 | Unclassified | Enclosed Space |
| Above grade wastewater pump station - Physically separated from wet well | I | N/A | Unclassified | Enclosed Space |
| Above grade wastewater pump station - Not Physically separated from wet well | I | <12 | 1 | Enclosed Space |
| | | ≥12 | 2 | Enclosed Space |

### *Mitigation Measures*

NFPA 820 provides specific mitigation measures for the different types of pump stations.

#### Ventilation

As indicated by Table 1.3, pump stations can be operated at higher ventilation rates to declassify their area classification to mitigate risk. Flow monitoring devices must be provided in pump stations that use ventilation to reduce their classification. Installed electrical equipment must comply with the area classification of the pump station structure.

#### Materials of Construction

Pump station dry well and wet well construction materials must be noncombustible, limited-combustible, or have a low flame spread index. An exception must be taken for above grade WWPSs - not physically separated from a wet well that is Div. 1. In this scenario, only noncombustible materials are allowed.

#### Fire Protection

For fire protection measures, WWPS wet wells require the use of CGD systems only when it is mechanically ventilated or opens into a building interior. The remaining pump station structures only require the presence of a fire extinguisher. If the pump station structures are mechanically ventilated at rates higher than 2000 cfm a smoke detection system that shuts down the ventilation system upon detection of smoke must be installed.

#### Audible and Visual Alarms

Audible and visual alarms must be installed in WWPS wet wells that are mechanically ventilated. Below grade or partially below grade WWPS dry wells and above grade WWPSs that are not physically separated require audible and visual alarms if mechanically vented. Above grade WWPSs that are physically separated from their wet well do not require audible and visual alarms under any scenario.

Mitigation measures for each pump station are summarized in Table 1.4.

Table 1.4 Pump Station Mitigation Measures

| Pump Station Type | Materials of Construction | Fire Protection Measures | Alarms |
|---|---|---|---|
| Wastewater pump station wet well | NC, LC, or LFS | CGD, if mechanically ventilated or opens to a building interior | Yes, if mechanically ventilated or opens to a building interior |
| Below grade or partially below grade wastewater pump station dry well | NC, LC, or LFS | FE | Yes, if mechanically ventilated to declassify space |
| Above grade wastewater pump station - Physically separated from wet well | NC, LC, or LFS | FE | No |
| Above grade wastewater pump station - Not Physically separated from wet well | NC (if Div. 1)<br>NC, LC, or LFS (if Div. 2) | FE | Yes, if mechanically ventilated to declassify space |

Note:
Abbreviation: FE – fire extinguisher.

### *Pump Station Ancillary Facilities*

Pump station ancillary facilities are structures that are constructed alongside (or in the general vicinity of) pump stations to aid in the conveyance of water and wastewater. Below grade vaults are the most common type of pump station ancillary facility.

NFPA 820 defines vaults as:

> *"An enclosed structure, usually underground, used to permit personnel access to various types of equipment and instrumentation."*

These vaults may contain pipes, valves, and/or flow measuring elements/devices that measures the flow capacity of the pump stations. These structures can accumulate vapors from flammable or combustible liquids, and therefore need to be considered in an NFPA 820 assessment.

### *Area Classification*

NFPA 820 defines two types of below grade valve vaults and two types of metering vaults. However, the suggested mitigation measures within NFPA 820 for below grade valve and metering vaults are identical, so for the purposes of this report, below grade valve vaults and below grade metering vaults will be treated simply as below grade vaults for simplicity. The two types of below grade vaults are generally defined as:

- Below grade vaults that are physically separated from the wet well with a closed piping system.
- Below grade vaults with an exposed wastewater surface.

Both types of vaults fall under the collection facilities category and are categorized as Class I due to the presence of vapors and gases.

Below grade vaults that are physically separated from the wet well with a closed piping system are Div. 2 if not normally ventilated and unclassified if continuously ventilated at 6 ACH.

Below grade vaults with an exposed wastewater surface are Div. 1 if not normally ventilated and Div. 2 if continuously ventilated at 12 ACH.

It is important to note that some below grade vaults are exempt from having both a supply and exhaust fan to declassify a space depending on their occupancy. As indicated previously, NFPA 820 takes exception for covered structures that are not routinely occupied. These non-routinely occupied spaces can utilize only exhaust fans with passive supply to declassify their space.

Note that any vents, doors, or hatches that service these below grade vault structures contain an additional classification for a given envelope. The extent of classification for all below grade vaults extends to the entire closed space if not physically separated.

Below grade vault area classification is summarized in Table 1.5.

Table 1.5 Below Grade Vault Area Classifications

| Vault Type | Class | Ventilation Rate | Division | Extent of Classified Area |
|---|---|---|---|---|
| Below grade vault - Physically separated from the wet well and with closed piping system | I | Not normally Ventilated | 2 | Enclosed Space |
| | | ≥6 | Unclassified | Enclosed Space |
| Below grade vault with an exposed wastewater surface | I | Not Normally Ventilated | 1 | Enclosed Space |
| | | ≥12 | 2 | Enclosed Space |

### *Mitigation Measures*

NFPA 820 provides specific mitigation measures for the two different types of below grade vaults.

**Ventilation**

As indicated by Table 5, below grade vaults can be operated at higher ventilation rates to declassify their area classification to mitigate risk. Flow monitoring devices must be provided in below grade vaults that use ventilation to reduce their classification. Installed electrical equipment must comply with the area classification of the below grade vault.

**Materials of Construction**

Materials of construction for below grade vaults must be noncombustible, limited-combustible, or have a low flame spread index. An exception must be taken for below grade vaults with exposed wastewater surface that is not normally ventilated. In this scenario, only noncombustible materials of construction are allowed.

**Fire Protection**

CGD or fire extinguishers are not required for either type of below grade vaults. If the vaults are ventilated at rates greater 2,000 cfm then a smoke detection system must be installed that shuts down the ventilation system upon detection of smoke.

**Audible and Visual Alarms**

Audible and visual alarms must be installed in below grade vaults that are mechanically ventilated and observe a declassification in space.

Table 1.6 summarizes the information discussed above.

Table 1.6 Below Grade Vault Mitigation Measures

| Vault Type | Materials of Construction | Fire Protection Measures | Audible and Visual Alarms |
|---|---|---|---|
| Below grade vault – Physically separated from the wet well and with closed piping system | NC, LC, or LFS | NR | Yes, if ventilated to declassify space |
| Below grade vault with an exposed wastewater surface | NC (if Div. 1)<br>NC, LC, or LFS (if Div. 2) | NR | Yes, if ventilated to declassify space |

Note:
Abbreviation: NR - not required.

## 1.2 City Pumping Stations

Pumping stations are crucial to the transportation of wastewater. They provide the ability to collect and convey wastewater to treatment facilities from locations unserviceable by a sewer gravity pipe. However, WWPS structures can accumulate combustible gases and become susceptible to hazardous conditions. Therefore, pump stations must provide provisions such as ventilation systems and alarm systems in order to maintain function and reduce hazardous risk. NFPA 820 provides design standards that can be validated when assessing existing pump stations with regards to these hazardous environments. Eighteen (18) existing pump stations were reviewed, observed, and assessed for the City with respect to NFPA 820. During these assessments, two different types of pump stations were essentially observed: 1) Dry Well / Wet Well pump stations; and 2) Submersible pump stations.

The following sections provide background information on the observed pump station types and ancillary facilities.

### 1.2.1 Dry Well / Wet Well Pump Stations

Dry Well / Wet Well pump stations are pump station facilities that consist of a WWPS wet well and a below grade or partially below grade WWPS dry well. In these pump stations, the dry well and the wet well are physically separated, and the pumps reside within the dry well. The wet well area classification is Class I Div. 1 when ventilation rates are less than 12 ACH and Class I Div. 2 when ventilation rates are 12 ACH or more. The dry well area classification is Class I Div. 2 when ventilation rates are less than 6 ACH and unclassified when ventilation rates are 6 ACH or more. Dry Well / Wet Well pump stations observed for these assessments are not routinely occupied, therefore, are exempt from being serviced by both supply and exhaust fans. These non-routinely occupied spaces can utilize only exhaust fans with passive supply to declassify their space. The extent of their area of classification is throughout the entire closed space. See Figure 1.4 for a section view of a typical City Dry Well / Wet Well installation and Table 1.7 for a summary of area classifications.

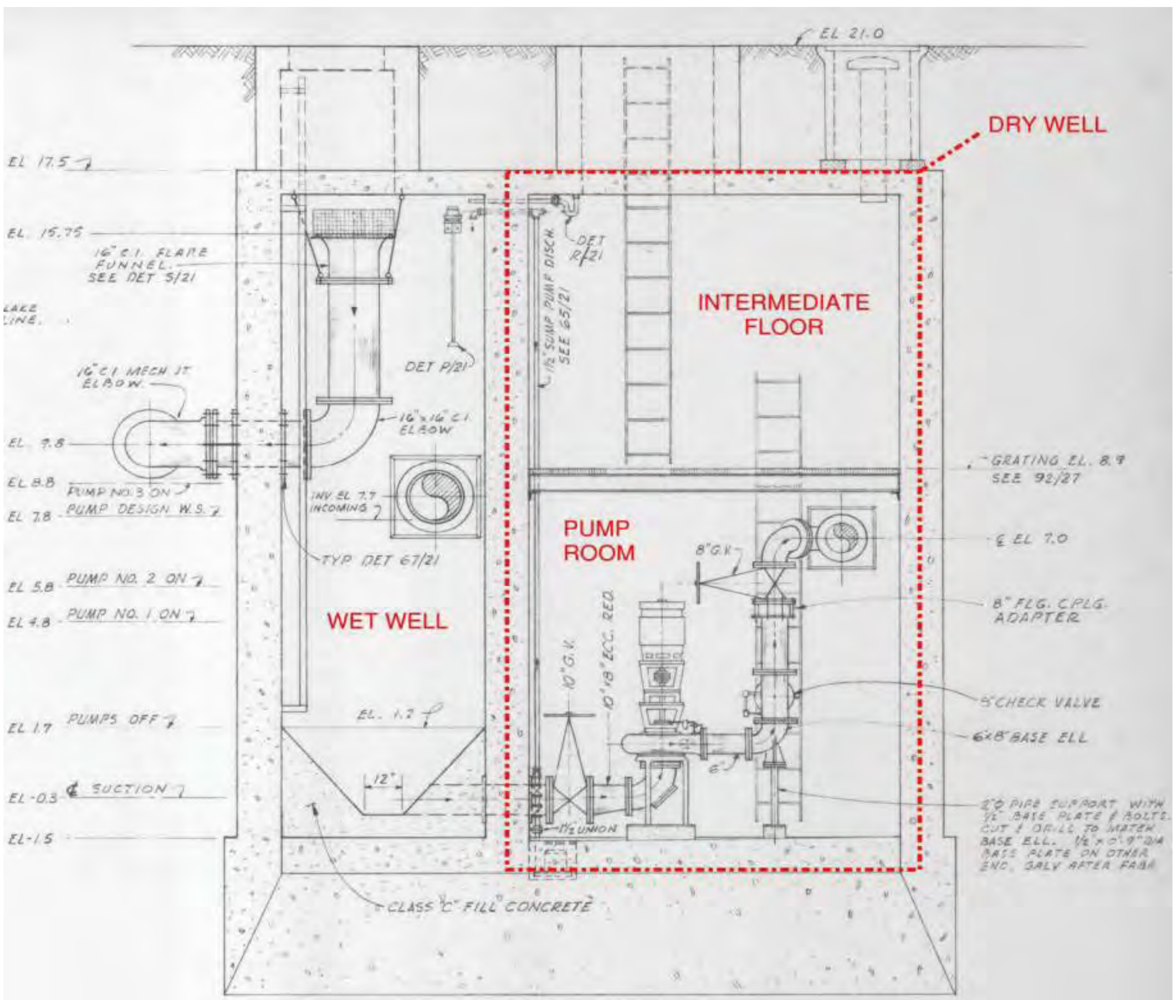



Figure 1.4 Typical Dry Well / Wet Well Pump Installation - Existing WWPS No. 18

Table 1.7 Dry Well / Wet Well Pump Station Area Classifications

| Dry Well / Wet Well Pump Station Structures | NFPA Location/Function | NFPA Table Reference | Ventilation Requirements | Extent of Classified Area |
|---|---|---|---|---|
| Dry well | Below grade or Partially below grade pumping station dry well | Table 4.2.2 Row 15 | <6 ACH (Class I Div. 2)<br>≥6 (Unclassified) | Enclosed Space |
| Wet well | Wastewater pumping station wet wells | Table 4.2.2 Row 14 | <12 ACH (Class I Div. 1)<br>≥12 (Class I Div. 2) | Enclosed Space |

### 1.2.2 Submersible Pump Stations

Submersible pump stations are pump station facilities that only consist of a WWPS wet well. These stations contain centrifugal pumps that can be submerged under wastewater inside the wet well and pump out of the wet well through closed piping systems. In submersible pump stations, the wet well is classified as Class I Div. 1 when ventilation rates are less than 12 ACH and Class I Div. 2 when ventilation rates are 12 ACH or more. Submersible pump stations observed for these assessments are not routinely occupied, therefore, are exempt from being serviced by both supply and exhaust fans. These non-routinely occupied spaces can utilize only exhaust fans with passive supply to declassify their space. The extent of their area of classification is throughout the entire closed space. See Figure 1.5 for a section view of a typical City Submersible Pump Station installation and Table 1.8 for a summary of area classifications.

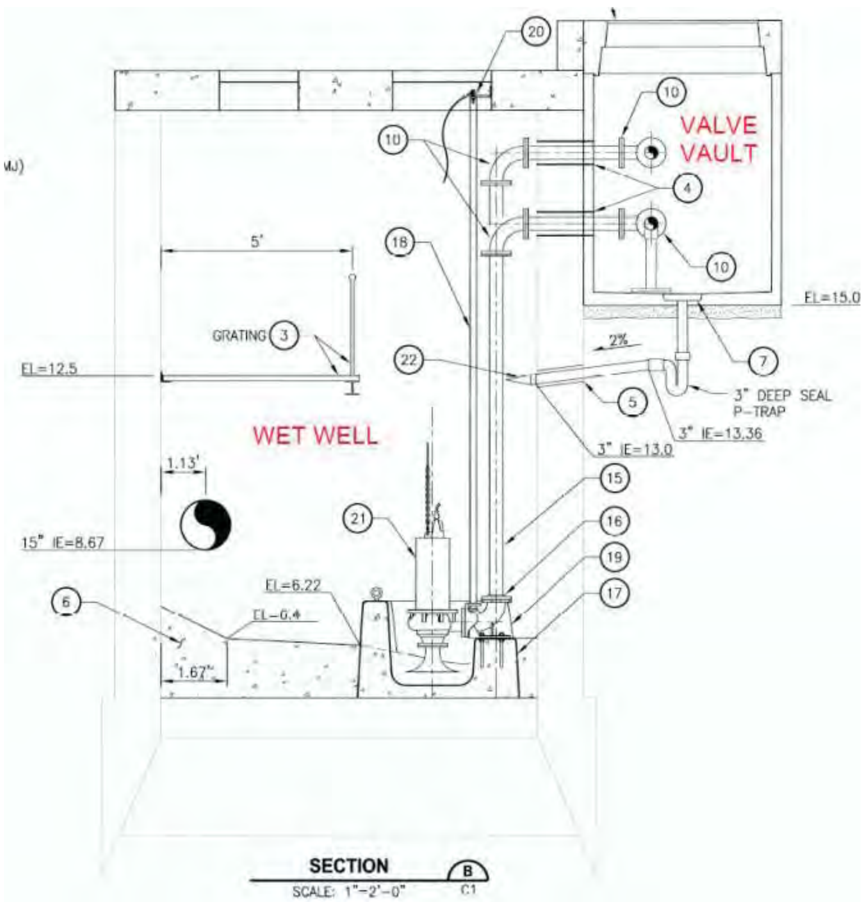



Figure 1.5 Typical Submersible Pump Station Installation - Existing WWPS No. 14

Table 1.8 Submersible Pump Station Area Classifications

| Submersible Pump Station Structure | NFPA Location/Function | NFPA Table Reference | Ventilation Requirements | Extent of Classified Area |
|---|---|---|---|---|
| Wet well | Wastewater pumping station wet wells | Table 4.2.2 Row 14 | <12 ACH (Class I Div. 1)<br>≥12 (Class I Div. 2) | Enclosed Space |

### 1.2.3 Ancillary Facilities

As previously mentioned, and shown in Figure 1.5, pump stations typically contain ancillary facilities that aid in the collection and conveyance of wastewater. The existing pump stations observed included below grade valve or metering vaults adjacent to the pump stations. These below grade vaults were physically separated from the wet well and contained closed piping systems. These ancillary facilities are classified as Class I Div. 2 if not normally ventilated and unclassified if ventilated at rates of 6 ACH or more. Below grade vaults observed for these assessments are not routinely occupied, therefore, are exempt from being serviced by both supply and exhaust fans. These non-routinely occupied spaces can utilize exhaust fans with passive supply to declassify their space. The extent of their area of classification is throughout the entire closed space. See Table 1.9 for a summary of below grade vault classifications and requirements.

Table 1.9 Below Grade Vaults Area Classifications

| Metering Vault Structure | NFPA Location / Function | NFPA Table Reference | Ventilation Requirements | Extent of Classified Area |
|---|---|---|---|---|
| Below grade valve vault | Below grade valve vault - physically separated from the wet well and with closed piping system | Table 4.2.2 Row 29 | Not normally ventilated (Class I Div. 2)<br>≥6 (Unclassified) | Enclosed Space |
| Below grade metering vault | Below grade metering vault - physically separated from wet well and with closed piping system | Table 4.2.2 Row 34 | Not normally ventilated (Class I Div. 2)<br>≥6 (Unclassified) | Enclosed Space |

Each pump station assessed was categorized by pump station type and presence of ancillary facilities.

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Section 2

# WWPS NFPA 820 ASSESSMENT SCOPE AND METHODS

Eighteen (18) existing PSs were included in this NFPA 820 assessment for the City. Carollo reviewed existing documents, conducted field visits, and performed an analysis to determine the appropriate improvements necessary to comply with the current NFPA 820 standards.

## 2.1 Review Existing Documents

Existing drawings, ventilation systems, TAB report, building layout and dimensions, mechanical and electrical equipment, and pump station types were all reviewed and discussed prior to conducting field visits.

## 2.2 Conduct Pump Station Field Visit

Carollo performed two days of on-site assessment of each pump station. Assessments were performed on July 14th and October 20th, 2020. The assessment team included Carollo, Follett Engineering, and City staff. The assessment team performed assessments on eighteen (18) pump stations noting items that are noncompliant to the NFPA 820 standard. Photos and notes were taken to document conditions at the time of the field visits. Items noted during the NFPA 820 assessment related to NFPA compliance included:

- For area classification:
  - Physical space of the pump station and its ancillary facilities:
    - Presence of a dry well, wet well, and below grade vaults.
    - Enclosure of dry well, wet well, and below grade vaults.
    - Extent of area classification.
    - Structure openings - presence of vents, doors, hatches, etc...
  - Ventilation:
    - Physical separation of dry well, wet well, and below grade vaults.
    - Sources of combustible gases.
- For mitigation measures:
  - Ventilation:
    - Methods of ventilation:
      - Exhaust vs. Supply.
      - Passive, Mechanical, or None.
    - Flow monitoring devices:
      - Presence of flow monitoring device.
      - Condition of device.
  - Electrical equipment:
    - Compliance to area classification on all electrical equipment.
  - Materials of construction:
    - Noncombustible, limited combustible, or low flame spread index materials.
    - Presence of combustible materials inside the pump station.

- Fire protection measures:
  - Presence of CGD systems.
  - Presence of fire extinguishers.
  - Presence of smoke detection systems.
- Audible and visual alarms:
  - Presence of alarms outside and within each pump station.

## 2.3 Conduct Pump Station NFPA 820 Analysis

Information (photos, notes, and existing drawings) collected during field visits was analyzed and reviewed against NFPA 820. Pump station structure and ancillary facilities were reviewed to determine existing area classification and presence of mitigation measures. Air change calculations for each space were conducted based on As-Built drawings, field obtained measurements, and an existing TAB report to determine area classification with regards to the existing ventilation system. These calculations are included in Appendix A. Each pump station was evaluated for upgrades and/or modifications for compliance with the NFPA 820 standard. Improvements are presented for each pump station in Section 3 of this report.

Section 3

# WWPS NFPA 820 ASSESSMENT

The seventeen (17) WWPSs and one (1) flushing pump station included in the NFPA 820 assessment surround the island and are located along the City's lake line sewer system.

Table 3.1 summarizes the pump station types, associated ancillary facilities, and right of way at each pump station. The improvements highlighted in this section reflect the current conditions of each pump station at the time of the visit.

The following sections summarize the NFPA 820 assessment results for each of the 17 WWPSs and one flushing pump station.

Table 3.1 Pump Station NFPA 820 Classification

| Pump Station Number | Pump Station Type | Ancillary Facilities | Public/Private Property |
|---|---|---|---|
| 1 | Dry Well / Wet Well | None | Right of Way |
| 4 | Submersible | Below grade vaults | Right of Way |
| 10 | Dry Well / Wet Well | None | Right of Way |
| 11 | Dry Well / Wet Well | None | Right of Way |
| 12 | Dry Well (Flushing) | None | Right of Way |
| 13 | Dry Well / Wet Well | None | Private |
| 14 | Submersible | Below grade vaults | Right of Way |
| 15 | Dry Well / Wet Well | None | Right of Way |
| 16 | Dry Well / Wet Well | None | Right of Way |
| 17 | Dry Well / Wet Well | None | Private |
| 18 | Dry Well / Wet Well | None | Private |
| 19 | Dry Well / Wet Well | None | Private |
| 20 | Dry Well / Wet Well | None | Right of Way |
| 21 | Dry Well / Wet Well | None | Private |
| 22 | Dry Well / Wet Well | None | Private |
| 23 | Dry Well / Wet Well | None | Private |
| 24 | Dry Well / Wet Well | None | Private |
| 25 | Dry Well / Wet Well | None | Private |

## 3.1 Wastewater Pump Station No. 1

WWPS No. 1 is located on an upland site at 8004 SE 20th Street, in the grassy backyard of an adjoining residential property. The site is currently accessible by vehicle followed by a short walk around the side of a residential home. The pump station was placed in service in 1955 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a single level structure with a mezzanine platform that houses pumps and ancillary equipment. Figure 3.1 shows a location map of WWPS No. 1. The location maps presented within this report for all assessed PSs are small screenshots from the City of Mercer Island's 2018 General Sewer Plan.

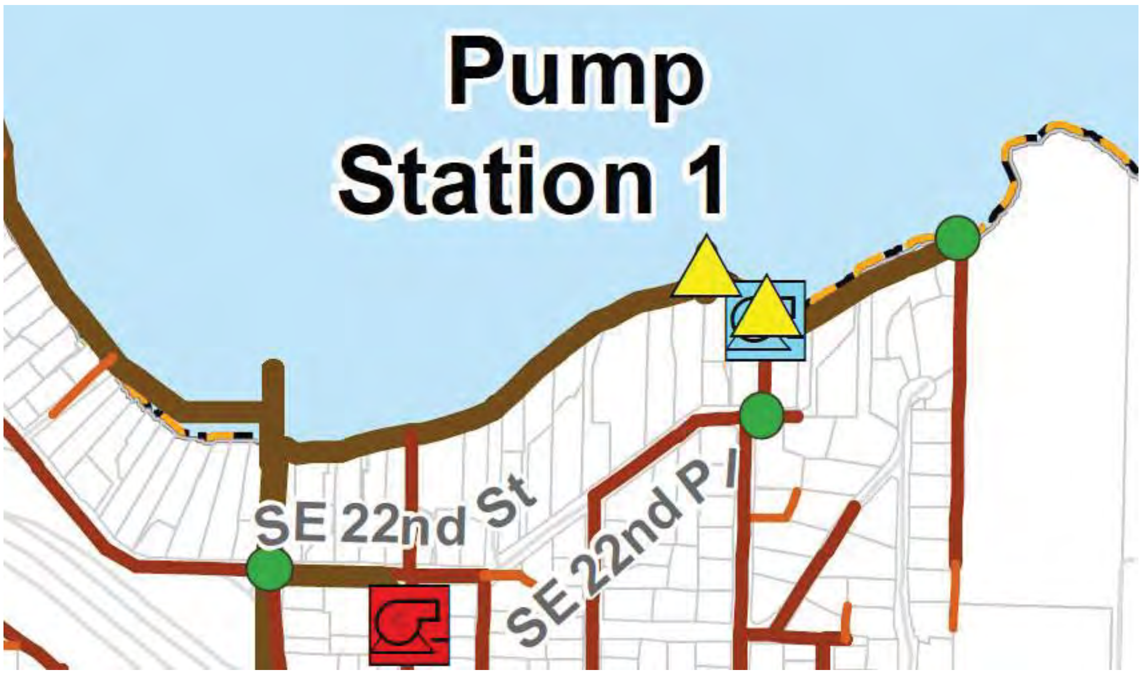


Figure 3.1 WWPS No. 1 Location Map

### 3.1.1 Observations

#### 3.1.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains a single pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.1.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust directly into the wet well. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment. The wet well does not contain any form of mechanical ventilation aside from the exhaust fan discharge ducting from the dry well. Supply air enters the dry well space through small cracks at the hatch at grade (i.e., there is no dedicated supply air duct).

#### 3.1.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and local control panels (LCPs).

#### 3.1.1.4 Materials of Construction

The station is constructed of concrete walls, floors and roof, and a metal hatch.

#### 3.1.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. A fire extinguisher is located on the mezzanine platform behind a valve actuator. No smoke detectors were installed at the time of the assessment.

#### 3.1.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.1.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 1.

### 3.1.2 Assessment Results

#### 3.1.2.1 Area Classification

WWPS No. 1 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall. However, the dry well is not physically separated as defined by the NFPA 820 standard. The existing exhaust fan duct discharge inside the wet well provides a conduit for gas to travel from the wet well back to the dry well in the event of a fan failure. Therefore, the area classification of the dry well is Class I Div. 1.

#### 3.1.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 220 cfm; however, the actual airflow capacity is 160 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 11.6 ACH within the dry well. The ventilation system operates continuously; however, a minimum of 12 ACH is required to declassify the current dry well from Class I Div. 1 to Class I Div. 2. In addition, the existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.1.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 1 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 1 space.

#### 3.1.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.1.2.5 Fire Protection Measures

A fire extinguisher is provided in the dry well on the mezzanine platform behind a valve actuator. No smoke detectors were observed but are not required by NFPA 820 standards. No CGD systems have been installed and are required due to the station's current NFPA 820 area classification.

#### 3.1.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.1.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.1.3 Improvements

For WWPS No. 1 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.1.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 1 to Class I Div. 2 by establishing a physically separated dry well. The existing exhaust duct that terminates inside the wet well should be rerouted to terminate outside of the pump station at grade and its existing penetration into the wet well should be sealed completely.

#### 3.1.3.2 Ventilation

The dry well exhaust fan actual airflow capacity is sufficient to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space provided that the wet well is physically separated from the wet well. If a physically separated pump room cannot be achieved, fan flow capacity must be increased to provide a minimum of 12 ACH to declassify the space from Class I Div. 1 to Class I Div. 2. See Appendix A for more information on airflow calculations. A fan flow monitoring system must also be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected. Supply air duct must be provided to facilitate air flow through the dry well.

#### 3.1.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. An unclassified area classification will require the least number of electrical upgrades.

#### 3.1.3.4 Materials of Construction

No improvements were identified for pump station materials of construction.

#### 3.1.3.5 Fire Protection Measures

The existing fire extinguisher should be in a more easily accessible location. A CGD system must be installed if a physical separation between the dry well and wet well is not achieved.

#### 3.1.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.1.3.7 Below Grade Vault

No below grade vaults were constructed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.2 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 1.

Table 3.2 Summary of NFPA 820 Assessment and Improvements for WWPS No. 1

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Existing fan exhaust duct terminates inside the wet well.<br>• Dry Well / Wet Well not physically separated.<br>• Class I Div. 1 Space. | • Reroute fan exhaust duct and terminate outside of pump station.<br>• Seal existing exhaust duct penetration into wet well. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 11.6 ACH(1).<br>• No HVAC ducts to facilitate air supply into WWPS.<br>• No flow monitoring present. | • Increase ventilation rate to 12 ACH minimum for Dry Well / Wet Well if no physical separation.<br>• Provide fan flow monitoring and alarm system.<br>• Install supply duct to facilitate air flow inside dry well. |
| Electrical equipment | N/A | • Not rated for Class I Div. 1 or Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present at the mezzanine. | • Locate fire extinguisher in a more accessible location.<br>• Install CGD system in Dry Well if not physically separated from Wet Well. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Notes:
Abbreviation: HVAC - heating, ventilation, and air conditioning.
(1) See Appendix A for more information on airflow calculations.

## 3.2 Wastewater Pump Station No. 4

WWPS No. 4 is located on an upland site at 2237 60th Avenue SE below the I-90 bridge. A parking lot and asphalt driveway / walking path provide access to the pump station. The pump station was constructed in 2008 and is understood to have a firm pumping capacity of 2000 gallons per minute (gpm) per discussions with the City. The pump station is a below grade structure consisting of only a wet well, some ancillary below grade vaults, and a below grade odor control vault. The wet well structure is used to contain sewage and includes submersible pumps to convey raw sewage from the wet well into the lake line sewer system.

It is understood that per previous conversations with the City, WWPS No. 4 will not require extensive SCADA upgrades and therefore only a high-level assessment was performed. This high-level assessment did not produce any recommended improvements.


Figure 3.2 WWPS No. 4 Location Map

## 3.3 Wastewater Pump Station No. 10

WWPS No. 10 is on City-owned property at 9036 N. Mercer Way located on the shoreline. The site is currently accessible only by foot through a steep and slick road surrounded by overgrown vegetation. The pump station was placed in service in 1961, and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.3 shows a location map of WWPS No. 10.

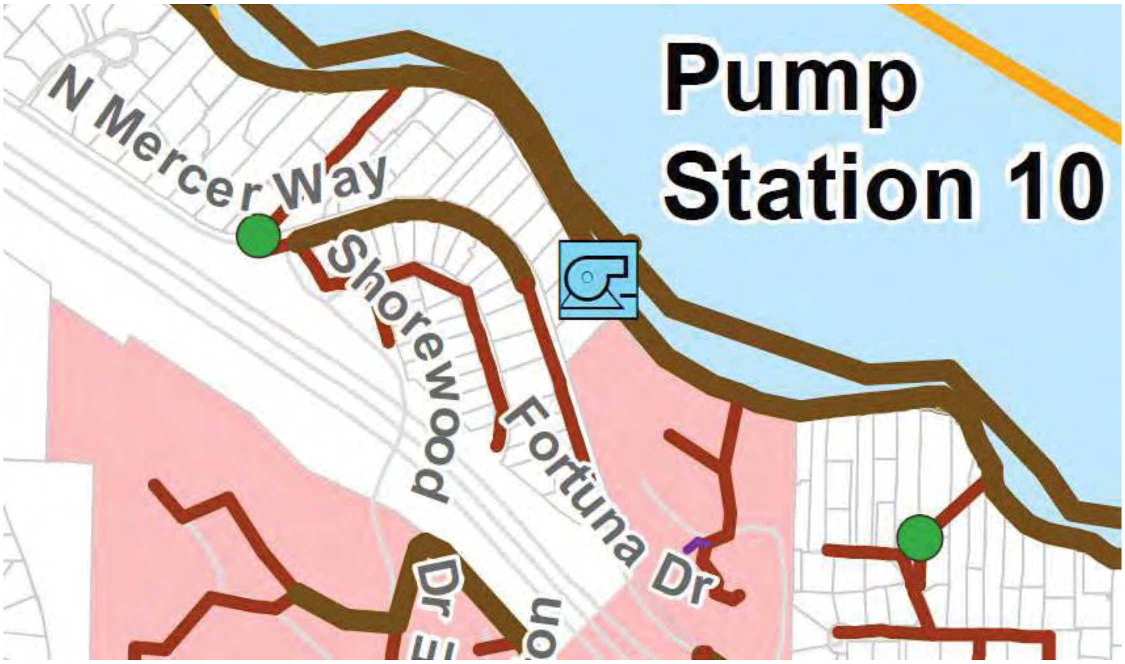


Figure 3.3 WWPS No. 10 Location Map

### 3.3.1 Observations

#### 3.3.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.3.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment. Supply air enters the dry well space via infiltration only i.e., there is no dedicated supply air duct and air infiltrates through the small cracks at the hatch at grade.

#### 3.3.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.3.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.3.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment

#### 3.3.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.3.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 10.

### 3.3.2 Assessment Results

#### 3.3.2.1 Area Classification

WWPS No. 10 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall. However, the dry well is not physically separated as defined by the NFPA 820 standard. The existing exhaust duct above grade is less than 3 feet away and less than 1.5 feet above from the wet well manhole which provides a conduit for gas to travel from the wet well back to the dry well in the event of a fan failure. In addition, some of the abandoned conduit penetrations into the wet well are not gas tight i.e. fully sealed, therefore, the area classification of the dry well is Class I Div. 1.

#### 3.3.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 220 cfm, however, the actual airflow capacity is 210 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in 9.4 ACH within the dry well. The ventilation system operates continuously; however, a minimum of 12 ACH is required to declassify the current dry well from Class I Div.1 to Class I Div. 2. In addition, the existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.3.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 1 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 1 space.

#### 3.3.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.3.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are required due to its current NFPA 820 area classification.

#### 3.3.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.3.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.3.3 Improvements

For WWPS No. 10 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.3.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 1 to Class I Div. 2 by establishing a physically separated dry well. The existing exhaust duct at grade should be rerouted to terminate, at a minimum, 3 feet away from the existing wet well manhole or extended to terminate 1.5 feet minimum above the manhole lid. Existing conduit penetrations into the wet well that are not fully sealed should be sealed completely.

#### 3.3.3.2 Ventilation

The dry well exhaust fan actual airflow capacity is sufficient to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space provided that the dry well is physically separated from the pump room. If a physically separated pump room cannot be achieved, fan flow capacity must be increased to provide a minimum of 12 ACH to declassify the space from Class I Div. 1 to Class I Div. 2. See Appendix A for more information on airflow calculations. A fan flow monitoring system must also be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected. Supply air duct must be provided to facilitate air flow through the dry well.

#### 3.3.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.3.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.3.3.5 Fire Protection Measures

A CGD system should be installed if a physical separation between the dry well and wet well is not achieved.

#### 3.3.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.3.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.3 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 10.

Table 3.3 Summary of NFPA 820 Assessment and Improvements for WWPS No. 10

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2 Rows 14 & 15 | • Existing exhaust duct terminates less than 3 feet away and less than 1.5 feet above wet well manhole.<br>• Existing conduit penetrations are not fully sealed.<br>• Dry Well / Wet Well not physically separated.<br>• Class I Div. 1 Space. | • Reroute exhaust duct and terminate 3 feet away or 1.5 feet above from wet well manhole at a minimum.<br>• Seal existing conduit penetrations. |

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 9.4 ACH(1).<br>• No HVAC ducts to facilitate air supply into WWPS.<br>• No flow monitoring present. | • Increase ventilation rate to 12 ACH minimum for Dry Well if no physical separation between Dry Well / Wet Well.<br>• Provide fan flow monitoring and alarm system.<br>• Install supply duct to facilitate air flow inside dry well. |
| Electrical equipment | N/A | • Not rated for Class I Div. 1 or Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • Install CGD system in Dry Well if not physically separated from Wet Well. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.4 Wastewater Pump Station No. 11

WWPS No. 11 is on an upland site at 3309 97th Avenue SE, within a street end park (Fruitland Landing). The site is accessible by vehicle followed by a short walk through a gravel path. The pump station was placed in service in 1961, and its current firm pumping capacity is unknown due to a lack of existing information. It is understood that WWPS No. 11 is in the process of being converted from a Dry Well / Wet Well Pump Station to a submersible style pump station, therefore, an NFPA assessment of the existing pump station was not performed. The design engineer responsible for the conversion of WWPS No. 11 should review the pump station design with regards to the NFPA 820 standard. Figure 3.4 shows a location map of WWPS No. 11.

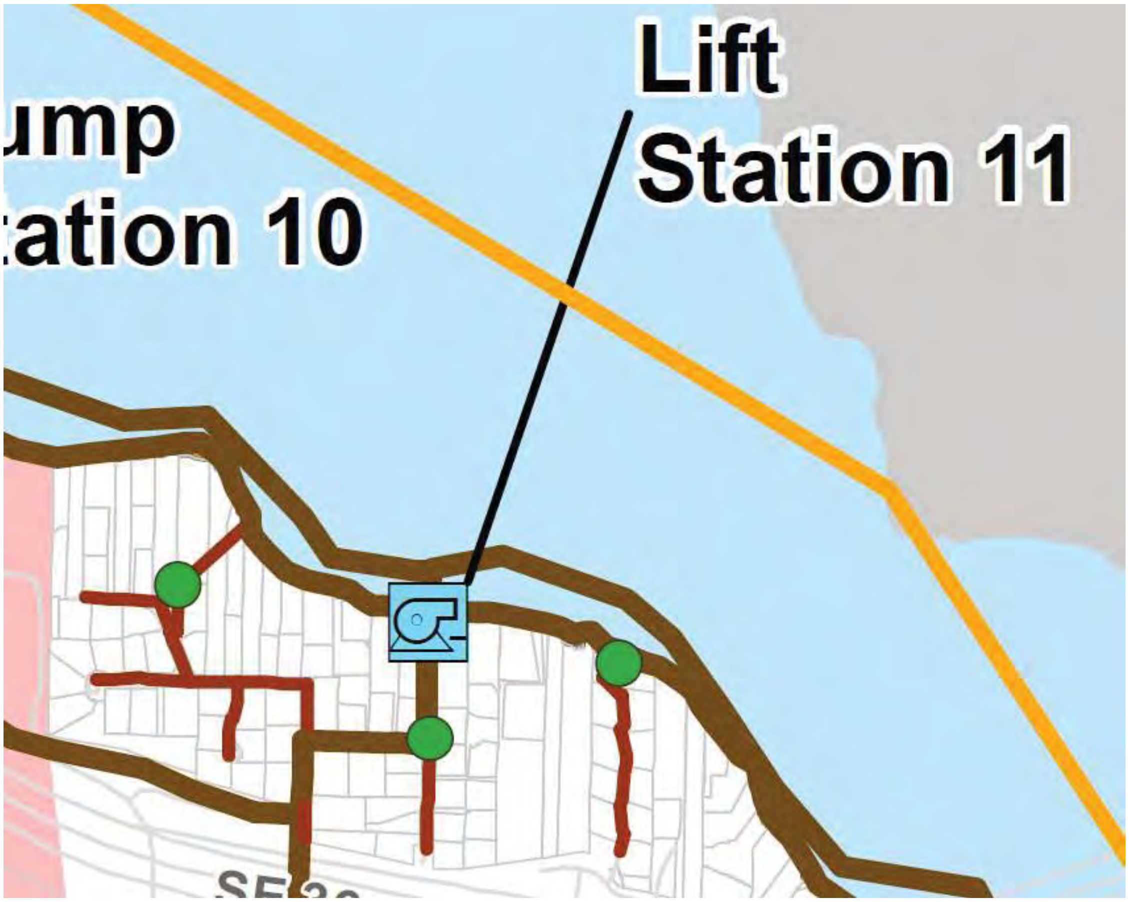


Figure 3.4 WWPS No. 11 Location Map

## 3.5 Flushing Pump Station No. 12

Flushing Pump Station No. 12 is on an upland site at 4006 E. Mercer Way, in the grassy backyard of the adjoining residential property and within public right of way. The site is accessible by vehicle followed by a short walk through a residential backyard. The pump station was placed in service in 1961 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of only a dry well structure with a single pump that pulls water from the lake structure and discharges to the lake line system. Since the flushing pump station does not handle and/or store raw sewage or storm water, Flushing PS No. 12 does not need to be assessed per NFPA 820 standards and no recommended improvements have been identified for this pump station. Figure 3.5 shows a location map of Flushing PS No. 12.


Figure 3.5 Flushing PS No. 12 Location Map

## 3.6 Wastewater Pump Station No. 13

WWPS No. 13 is located on an upland site at 3897 W. Mercer Way in the middle of two grassy backyards of 4003 W. Mercer Way and 3887 W. Mercer Way. The site is currently accessible through a set of wooden access platforms and stairs that connect to a resident's back patio. The pump station was placed in service in 1961 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.6 shows a location map of WWPS No. 13.


Figure 3.6 WWPS No. 13 Location Map

### 3.6.1 Observations

#### 3.6.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.6.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade. The existing exhaust fan does not produce enough airflow. No fan flow monitoring devices were installed at the time of the assessment. Supply air enters the dry well space via infiltration only i.e., there is no dedicated supply air duct and air infiltrates through the small cracks at the hatch at grade.

#### 3.6.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.6.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.6.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.6.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.6.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 13.

### 3.6.2 Assessment Results

#### 3.6.2.1 Area Classification

WWPS No. 13 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.6.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown, and no supporting documents provide this information, however, the actual airflow capacity is 75 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 3 ACH within the dry well which is not enough to declassify the space from Class I Div. 2 to unclassified (6 ACH minimum). The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.6.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.6.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.6.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.6.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.6.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.6.3 Improvements

For WWPS No. 13 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure improvements are recommended as summarized below.

#### 3.6.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 2 to unclassified by improving dry well ventilation.

#### 3.6.3.2 Ventilation

The dry well exhaust fan actual airflow capacity must be increased to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space. See Appendix A for more information on airflow calculations. Supply air duct must be provided to facilitate air flow through the dry well. A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.6.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.6.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.6.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.6.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.6.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.4 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 13.

Table 3.4 Summary of NFPA 820 Assessment and Improvements for WWPS No. 13

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • Declassify space from Class I Div. 2 to Unclassified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 3.03 ACH[(1)].<br>• No HVAC ducts to facilitate air supply into WWPS.<br>• No flow monitoring present. | • Increase ventilation rate to 6 ACH minimum for Dry Well<br>• Provide fan flow monitoring and alarm system.<br>• Install supply duct to facilitate air flow inside dry well. |
| Electrical equipment | N/A | • Not rated for Class I Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Fire Protection Measures | Table 4.2.2 Rows 14 & 15 Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6 Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.7 Wastewater Pump Station No. 14

WWPS No. 14 is on an upland site at 4315 Forest Avenue, within a street end park (Forest Landing) and along the Lake Washington shoreline. The site is accessible by vehicle via Forest Avenue. The pump station was converted into a submersible pump station and placed into service in 2014. It's designed firm pumping capacity is 200 gpm as indicated in the provided As-Builts. The pump station is a below grade structure consisting of a wet well and two below grade vaults. The wet well structure contains submersible pumps and ancillary equipment. The below grade vaults contain various valves and piping. Figure 3.7 shows a location map of WWPS No. 14.

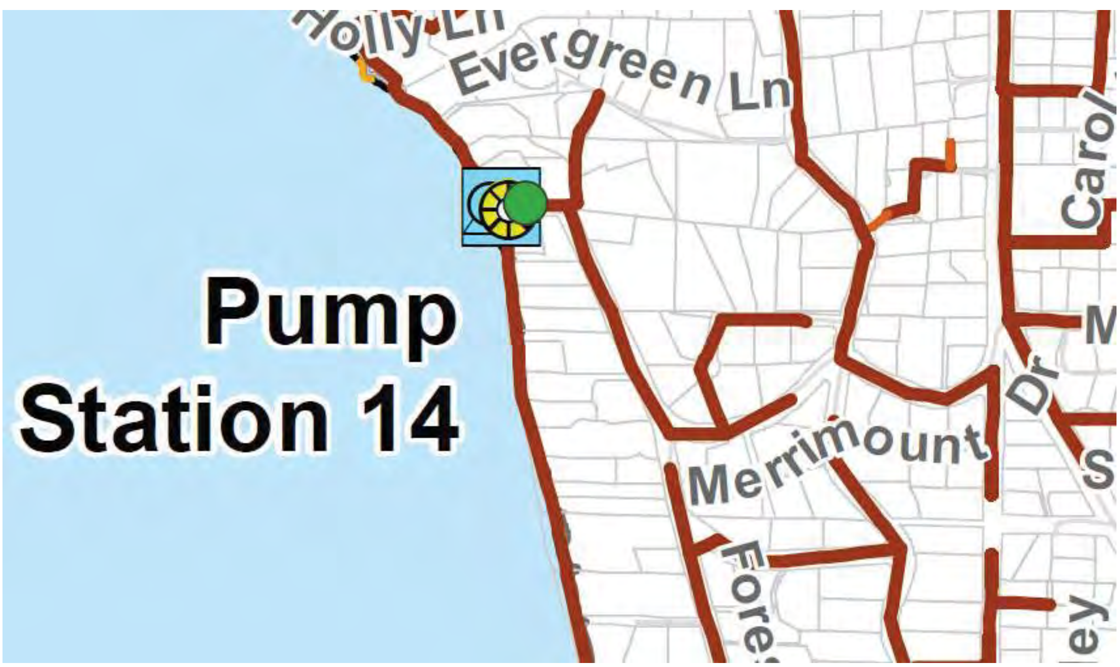


Figure 3.7 WWPS No. 14 Location Map

### 3.7.1 Observations

#### 3.7.1.1 Area Classification

The pump station is a submersible pump station and does not contain a separate dry well. All pumping equipment, piping, and ancillary equipment are housed inside the wet well and below grade vaults. The wet well and below grade vaults are physically separated and can only be accessed through an access hatch and ladder located at finished grade. The ladder within the wet well terminates to an intermediate floor with metal grating. The site contains two separate below grade valve vaults; one below grade valve vault with closed piping and one below grade valve vault with an exposed wastewater surface.

#### 3.7.1.2 Ventilation

The wet well is passively ventilated by a gooseneck vent that terminates above grade. The below grade vaults do not contain any form of ventilation.

#### 3.7.1.3 Electrical Equipment

The wet well and below grade vaults contain various electrical equipment such as submersible motors, lighting, and various instrumentation. The pump station LCPs are located inside a stainless steel (SST) enclosure outdoors and adjacent to the pump station wet well.

#### 3.7.1.4 Materials of Construction

The wet well and below grade vaults are constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.7.1.5 Fire Protection Measures

The wet well does not contain any CGD sensors. No fire extinguishers and smoke detectors were observed at either the wet well or below grade vaults. A fire extinguisher is located inside the LCP.

#### 3.7.1.6 Audible and Visual Alarms

No audible and visual alarms were installed at the pump station.

### 3.7.2 Assessment Results

#### 3.7.2.1 Area Classification

WWPS No. 14 is categorized as a submersible pump station. The pump station does not have a dry well and all pumps, piping, and instrumentation are housed inside the wet well or below grade vaults.

- Wet well:
  - Since the wet well is not mechanically ventilated, the area classification of the wet well is Class I Div. 1.
- Below grade vaults:
  - Since both below grade vaults are not ventilated, the below grade vault with a closed piping system is Class I Div. 2 and the below grade vault with an exposed wastewater surface is Class I Div. 1.

#### 3.7.2.2 Ventilation

Since the wet well is not mechanically ventilated and below grade vaults are not ventilated, no ventilation assessments were performed.

#### 3.7.2.3 Electrical Equipment

The existing intrusion and limit switches are not rated for either Class I Div. 1 space or Class I Div. 2 space and require further investigation for presence of intrinsically safe circuits. The submersible pump motors and lighting inside the wet well are assumed to be Class I Div. 1 rated per the existing drawings provided by the City. The existing LCP SST enclosure intake air vent is both less than 3 feet away and 1.5 feet above the wet well hatch opening and is not rated for Class I Div. 2 space. The electrical conduits that run to and from the wet well appear to be unsealed and terminate less than 3 feet away. These unsealed conduits provide an avenue for hazardous gas to travel from the wet well to the LCP.

#### 3.7.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.7.2.5 Fire Protection Measures

A fire extinguisher is located inside the LCP. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.7.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment and are not required per NFPA 820 standards. Audible and visual alarms are only required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

### 3.7.3 Improvements

For WWPS No. 14 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.7.3.1 Area Classification

No improvements were identified on pump station area classification. Current pump station design practice typically maintains submersible pump stations as Class I Div. 1, below grade vaults with closed piping systems as Class I Div. 2 and below grade vaults with exposed wastewater surfaces as Class I Div. 1.

#### 3.7.3.2 Ventilation

Since no mechanical ventilation is present at the pump station, no ventilation improvements were identified.

#### 3.7.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. The existing conduit that runs to and from the wet well must be completely sealed. The LCP SST enclosure vent must be relocated 3 feet away or 1.5 feet above the existing wet well hatch minimum or replaced with a Class I Div. 2 rated LCPs. All mechanical equipment and ancillary items receiving power such as intrusion and limit switches must also be rated for the appropriate area of classification.

#### 3.7.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.7.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.7.3.6 Audible and Visual Alarms

No improvements were identified on pump station audible and visual alarms.

Table 3.5 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 14.

Table 3.5 Summary of NFPA 820 Assessment and Improvements for WWPS No. 14

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Wet Well | Table 4.2.2<br>Row 14<br>Figure A.4.2(a) | • Submersible type pump station.<br>• Class I Div. 1 Space. | • No improvements identified. |
| Below grade valve vaults | Table 4.2.2.<br>Row 29 &<br>Row 30 | • Class I Div. 1 or Div. 2 space. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Row 14<br>Section 7.5<br>Chapter 9 | • Passive ventilation on Wet Well.<br>• No ventilation on below grade vaults. | • No improvements identified. |
| Electrical equipment | N/A | • Intrusion and limit switches are not rated for either Class I Div. 1 or Div. 2 space.<br>• Unsealed conduits are less than 5 feet away from enclosure vent.<br>• Wet well hatch is less than 3 feet away and 1.5 feet above enclosure vent. | • Provide equipment rated for area classification.<br>• Seal existing conduits.<br>• Relocate enclosure vent 3 feet away or 1.5 feet above minimum from wet well hatch or rated for Class I Div. 2 environment. |
| Materials of Construction | Table 4.2.2<br>Row 14<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Row 14<br>Section 7.4 | • No CGD system.<br>• Fire extinguisher inside LCP. | • No improvements identified. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible and visual alarms observed. | • No improvements identified. |

## 3.8 Wastewater Pump Station No. 15

WWPS No. 15 is on an upland site at 4765 Forest Avenue SE, within a street end park (Miller Landing) and along the Lake Washington shoreline. The site is currently accessible by a set of wooden stairs that leads down to the pump station. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.8 shows a location map of WWPS No. 15.

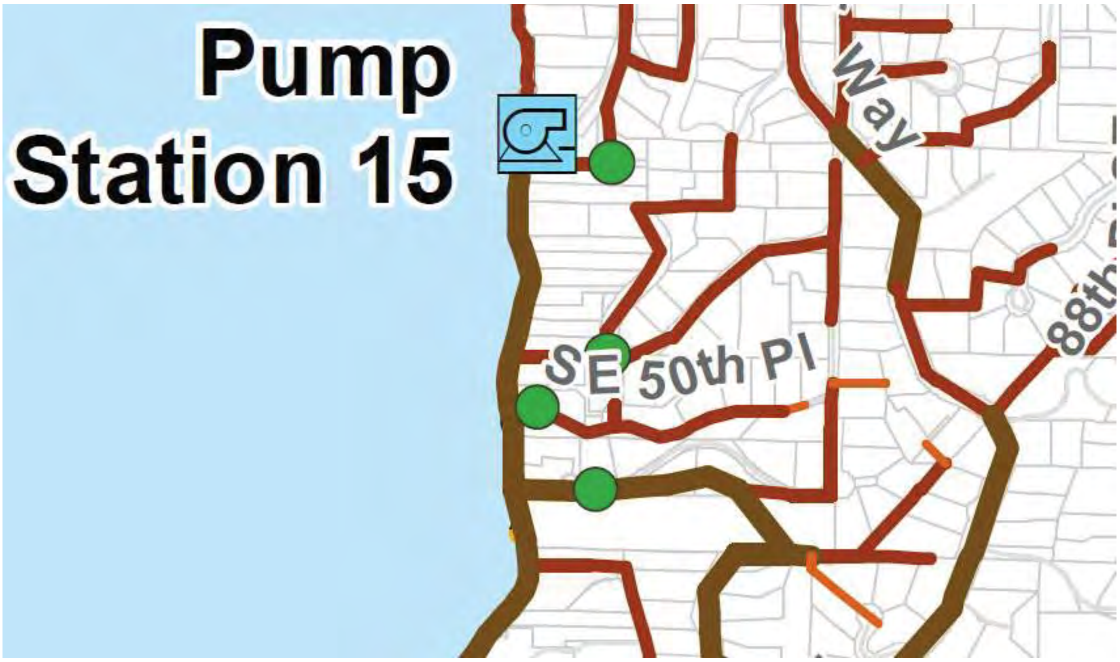


Figure 3.8 WWPS No. 15 Location Map

### 3.8.1 Observations

#### 3.8.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.8.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.8.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.8.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.8.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.8.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.8.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 15.

### 3.8.2 Assessment Results

#### 3.8.2.1 Area Classification

WWPS No. 15 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.8.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 400 cfm, however, the actual airflow capacity is 310 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 16.9 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.8.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.8.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.8.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.8.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.8.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.8.3 Improvements

For WWPS No. 15 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.8.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.8.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.8.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The Dry Well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards.

#### 3.8.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.8.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.8.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.8.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.6 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 15.

Table 3.6 Summary of NFPA 820 Assessment and Improvements for WWPS No. 15

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 16.9 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified. | • No improvements identified. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.9 Wastewater Pump Station No. 16

WWPS No. 16 is on an upland site at 5495 W. Mercer Way, within a street end park (SE 56th Street Landing) at the end of a gravel path that terminates at the Lake Washington shoreline. Removable wooden bollards at the end of Brook Bay Road provide vehicle access to the gravel path that leads to the pump station. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.9 shows a location map of WWPS No. 16.

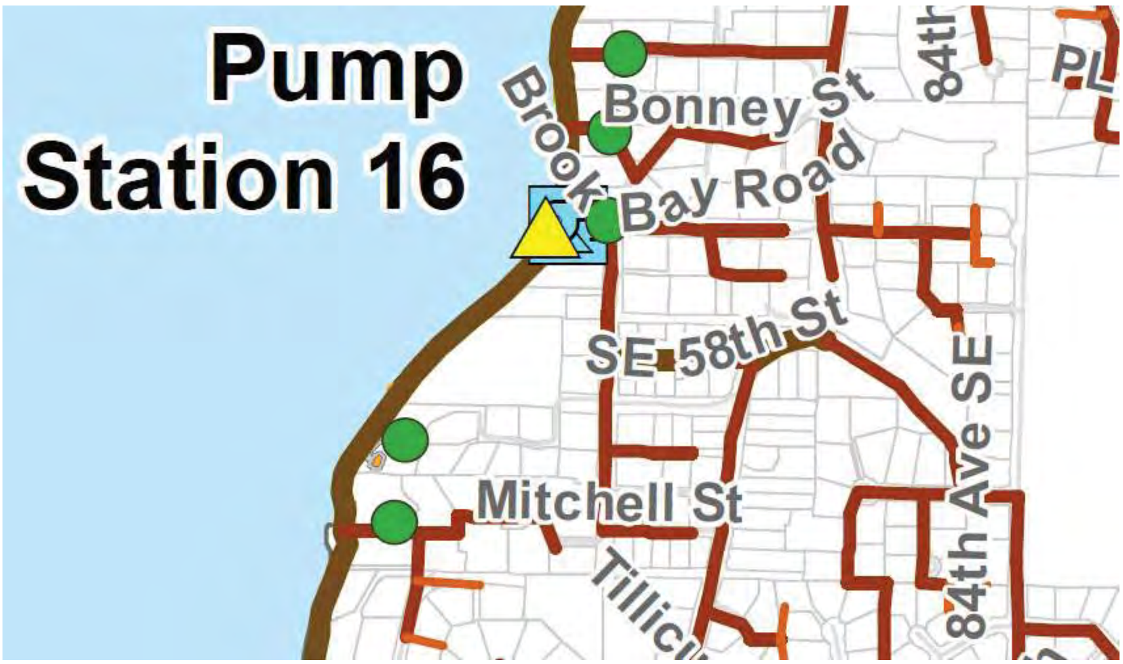


Figure 3.9 WWPS No. 16 Location Map

### 3.9.1 Observations

#### 3.9.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.9.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.9.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.9.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.9.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.9.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.9.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 16.

### 3.9.2 Assessment Results

#### 3.9.2.1 Area Classification

WWPS No. 16 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall. However, the dry well is not physically separated as defined by the NFPA 820 standard. The existing Bioxide dosing location is not completely sealed and gas tight which provides a path for gas to travel from the wet well back to the dry well. Therefore, the area classification of the dry well is Class I Div. 1.

#### 3.9.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 400 cfm, however, the actual airflow capacity is 365 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 11.3 ACH within the dry well. The ventilation system operates continuously; however, a minimum of 12 ACH is required to declassify the current dry well from Class I Div.1 to Class I Div. 2. In addition, the existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.9.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 1 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 1 space.

#### 3.9.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.9.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are required due to its current NFPA 820 area classification.

#### 3.9.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.9.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.9.3 Improvements

For WWPS No. 16 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.9.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 1 to Class I Div. 2 by establishing a physically separated dry well. The existing Bioxide dosing location needs to be completely sealed to prevent wet well gas from traveling back into the dry well.

#### 3.9.3.2 Ventilation

The dry well exhaust fan actual airflow capacity is sufficient to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space provided that the dry well is physically separated from the pump room. If a physically separated pump room cannot be achieved, fan flow capacity must be increased to provide a minimum of 12 ACH to declassify the space from Class I Div. 1 to Class I Div. 2. See Appendix A for more information on airflow calculations. A fan flow monitoring system must also be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.9.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.9.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.9.3.5 Fire Protection Measures

A CGD system should be installed if a physical separation between the dry well and wet well is not achieved.

#### 3.9.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.9.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.7 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 16.

Table 3.7 Summary of NFPA 820 Assessment and Improvements for WWPS No. 16

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well / Wet Well not physically separated.<br>• Class I Div. 1 Space. | • Completely seal off Bioxide dosing location to reduce area classification. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 11.3 ACH(1).<br>• No flow monitoring present. | • Increase ventilation rate to 12 ACH minimum for Dry Well / Wet Well if no physical separation.<br>• Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Not rated for Class I Div. 1 or Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system.<br>• Fire extinguisher is present at all levels of the pump station. | • Install CGD system in Dry Well if not physically separated from Wet Well. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible and visual alarms observed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.10 Wastewater Pump Station No. 17

WWPS No. 17 is on an upland site at 6415 77th Avenue SE in the backyard of the residential property at 6411 77th Avenue SE and adjacent to the Lake Washington shoreline. The site is currently accessible by foot through a stone pathway. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.10 shows a location map of WWPS No. 17.

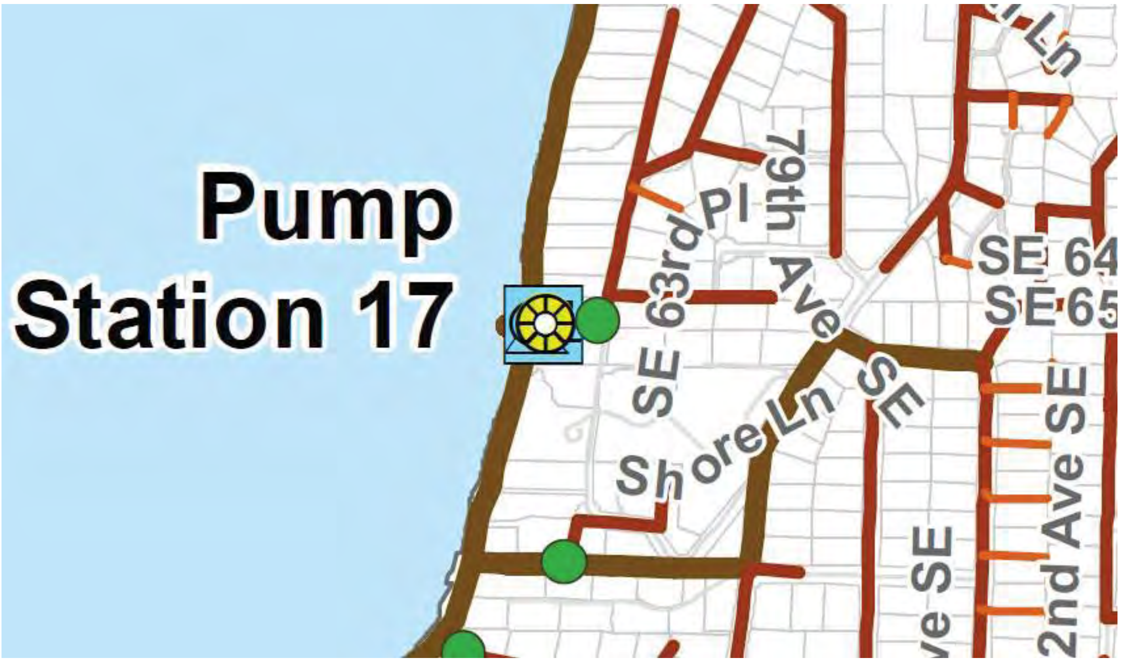


Figure 3.10 WWPS No. 17 Location Map

### 3.10.1 Observations

#### 3.10.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.10.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.10.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.10.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.10.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.10.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.10.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 17.

### 3.10.2 Assessment Results

#### 3.10.2.1 Area Classification

WWPS No. 17 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall. However, the dry well is not physically separated as defined by the NFPA 820 standard. The existing supply air duct at grade is less than 3 feet away and less than 1.5 feet above the wet well manhole lid which provides a conduit for gas to travel from the wet well back to the dry well. In addition, some of the existing conduit penetrations into the wet well are not gas tight i.e. fully sealed, therefore, the area classification of the dry well is Class I Div. 1.

#### 3.10.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 400 cfm, however, the actual airflow capacity is 260 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 7.1 ACH within the dry well. The ventilation system operates continuously; however, a minimum of 12 ACH is required to declassify the current dry well from Class I Div.1 to Class I Div. 2. In addition, the existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.10.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 1 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 1 space.

#### 3.10.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.10.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are required due to its current NFPA 820 area classification.

#### 3.10.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.10.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.10.3 Improvements

For WWPS No. 17 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.10.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 1 to Class I Div. 2 by establishing a physically separated dry well. The existing conduits penetrating the wet well needs to be completely sealed to prevent wet well gas from traveling back into the dry well. The existing supply duct at grade should be rerouted to terminate, at a minimum, 3 feet away from or 1.5 feet above the existing wet well manhole.

#### 3.10.3.2 Ventilation

The dry well exhaust fan actual airflow capacity is sufficient to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space provided that the dry well is physically separated from the pump room. If a physically separated pump room cannot be achieved, fan flow capacity must be increased to provide a minimum of 12 ACH to declassify the space from Class I Div. 1 to Class I Div. 2. See Appendix A for more information on airflow calculations. A fan flow monitoring system must also be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.10.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.10.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.10.3.5 Fire Protection Measures

A CGD system should be installed if a physical separation between the dry well and wet well is not achieved.

#### 3.10.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.10.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.8 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 17.

Table 3.8 Summary of NFPA 820 Assessment and Improvements for WWPS No. 17

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2 Rows 14 & 15 | • Existing supply duct terminates less than 3 feet away and less than 1.5 feet above wet well manhole.<br>• Existing conduit penetrations are not fully sealed.<br>• Dry Well / Wet Well not physically separated.<br>• Class I Div. 1 Space. | • Reroute supply duct and terminate 3 feet away from or 1.5 feet above the wet well manhole at a minimum.<br>• Seal existing conduit penetrations. |
| Ventilation | Table 4.2.2 Rows 14 & 15 Section 7.5 Chapter 9 | • Ventilates continuously at 7.1 ACH(1).<br>• No flow monitoring present. | • Increase ventilation rate to 12 ACH minimum for Dry Well / Wet Well if no physical separation.<br>• Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Not rated for Class I Div. 1 or Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2 Rows 14 & 15 Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2 Rows 14 & 15 Section 7.2.5, 7.4 | • No CGD system.<br>• Fire extinguisher is present at all levels of the pump station. | • Install CGD system in Dry Well if not physically separated from Wet Well. |
| Audible and visual alarms | Section 7.6 Table 7.6.1 | • No audible and visual alarms observed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.11 Wastewater Pump Station No. 18

WWPS No. 18 is on an upland site at 7220 Holly Hill Drive, surrounded by vegetation within a flat, marshy area. The site is currently accessible by foot through a combination of gravel and dirt paths. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.11 shows a location map of WWPS No. 18.

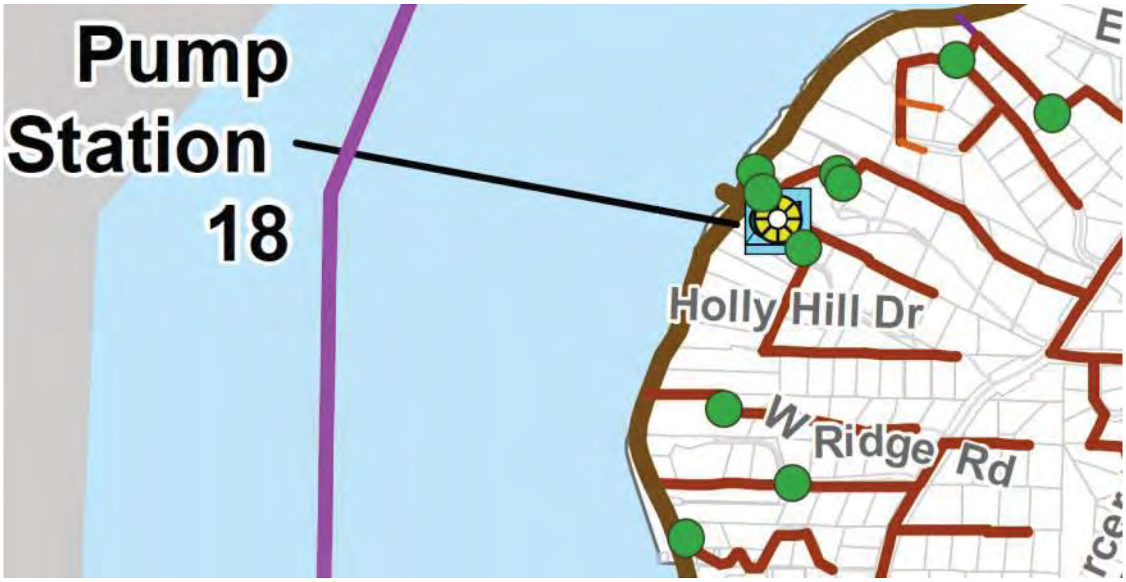


Figure 3.11 WWPS No. 18 Location Map

### 3.11.1 Observations

#### 3.11.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.11.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan does not produce enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.11.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.11.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.11.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.11.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.11.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 18.

### 3.11.2 Assessment Results

#### 3.11.2.1 Area Classification

WWPS No. 18 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.11.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 400 cfm, however, the actual airflow capacity is 270 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 5.9 ACH within the dry well. The ventilation system operates continuously; however, a minimum of 6 ACH is required to declassify the current dry well from Class I Div.2 to an Unclassified space. In addition, the existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.11.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power is not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.11.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.11.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are required due to its current NFPA 820 area classification.

#### 3.11.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.11.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.11.3 Improvements

For WWPS No. 18 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.11.3.1 Area Classification

The current dry well classification must be reduced from Class I Div. 2 to Unclassified by improving ventilation rates.

#### 3.11.3.2 Ventilation

The dry well exhaust fan actual airflow capacity must be increased to provide a minimum of 6 ACH and declassify the space from Class I Div. 2 to an unclassified space. See Appendix A for more information on airflow calculations. A fan flow monitoring system must also be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.11.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.11.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.11.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.11.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.11.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.9 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 16.

Table 3.9 Summary of NFPA 820 Assessment and Improvements for WWPS No. 18

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 5.9 ACH(1).<br>• No flow monitoring present. | • Increase ventilation rate to 6 ACH minimum.<br>• Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Not rated for Class I Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system.<br>• Fire extinguisher is present at all levels of the pump station. | • No improvements identified. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible and visual alarms observed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.12 Wastewater Pump Station No. 19

WWPS No. 19 is on an upland site at 7697 W. Mercer Way, adjacent to a residential property's backyard and along the Lake Washington shoreline. The site is currently accessible by foot through a gravel and dirt path. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.12 shows a location map of WWPS No. 19.


Figure 3.12 WWPS No. 19 Location Map

### 3.12.1 Observations

#### 3.12.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.12.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.12.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.12.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.12.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.12.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.12.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 19.

### 3.12.2 Assessment Results

#### 3.12.2.1 Area Classification

WWPS No. 19 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.12.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is currently unknown due to a lack of existing information; however, the actual airflow capacity is 380 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 8.5 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.12.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.12.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.12.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are required due to its current NFPA 820 area classification.

#### 3.12.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.12.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.12.3 Improvements

For WWPS No. 19 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.12.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an Unclassified space.

#### 3.12.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.12.3.3 Electrical Equipment

All electrical equipment must be rated for the appropriate area of classification. All mechanical equipment and ancillary items receiving power must also be rated for the appropriate area of classification. Unclassified area classifications will require the least number of electrical upgrades.

#### 3.12.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.12.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.12.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.12.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.10 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 19.

Table 3.10 Summary of NFPA 820 Assessment and Improvements for WWPS No. 19

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 8.5 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Not rated for Class I Div. 2 space. | • Provide equipment rated for area classification. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system.<br>• Fire extinguisher is present at all levels of the pump station. | • No improvements identified. |

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible and visual alarms observed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

### 3.13 Wastewater Pump Station No. 20

WWPS No. 20 is on an upland site at 8790 85th Avenue SE, at a street end park (South Point Landing) and adjacent to the Lake Washington shoreline. The site is currently accessible by vehicle with a short walk to the site. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.13 shows a location map of WWPS No. 20.

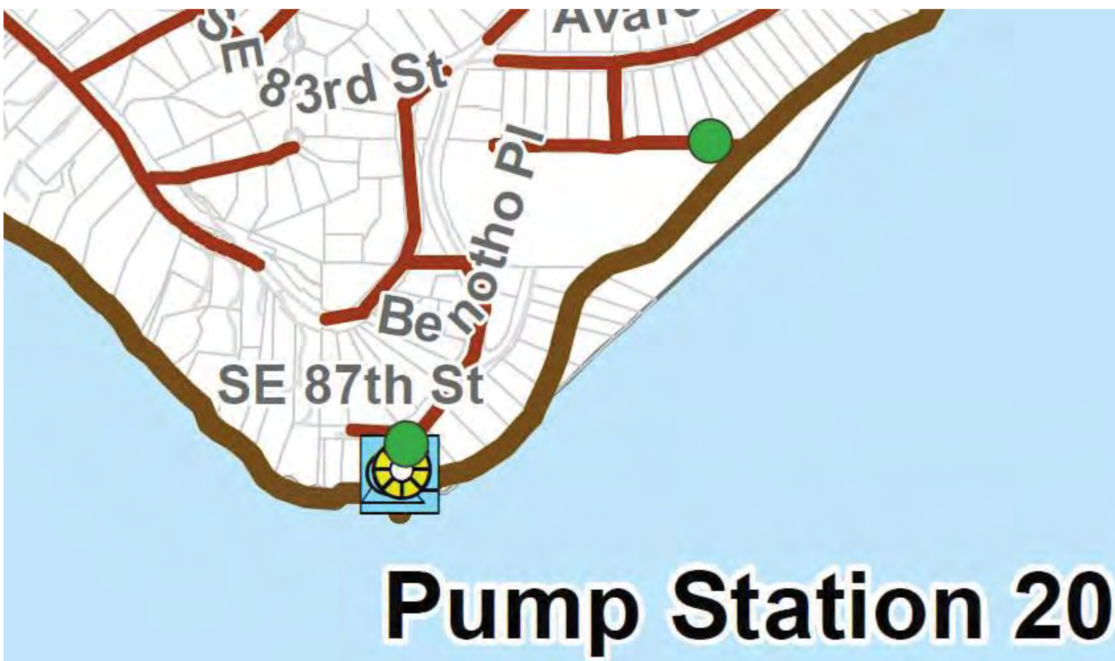


Figure 3.13 WWPS No. 20 Location Map

#### 3.13.1 Observations

##### 3.13.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.13.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust above grade and a passive supply air duct that terminates above grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.13.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.13.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.13.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.13.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.13.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 20.

### 3.13.2 Assessment Results

#### 3.13.2.1 Area Classification

WWPS No. 20 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.13.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is 400 cfm, however, the actual airflow capacity is 410 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 8.6 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.13.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.13.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.13.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.13.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.13.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.13.3 Improvements

For WWPS No.20 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.13.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.13.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.13.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The Dry Well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards.

#### 3.13.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.13.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.13.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.13.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.11 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 20.

Table 3.11 Summary of NFPA 820 Assessment and Improvements for WWPS No. 20

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2 Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2 Rows 14 & 15 Section 7.5 Chapter 9 | • Ventilates continuously at 8.6 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified. | • No improvements identified |
| Materials of Construction | Table 4.2.2 Rows 14 & 15 Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2 Rows 14 & 15 Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6 Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.14 Wastewater Pump Station No. 21

WWPS No. 21 is a partially submerged site located at 8000 Avalon Drive, covered by a wooden dock in the backyard of the residential property at 8002 Avalon Place. The site is currently accessible by vehicle with a short walk through a narrow staircase. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.14 shows a location map of WWPS No. 21.

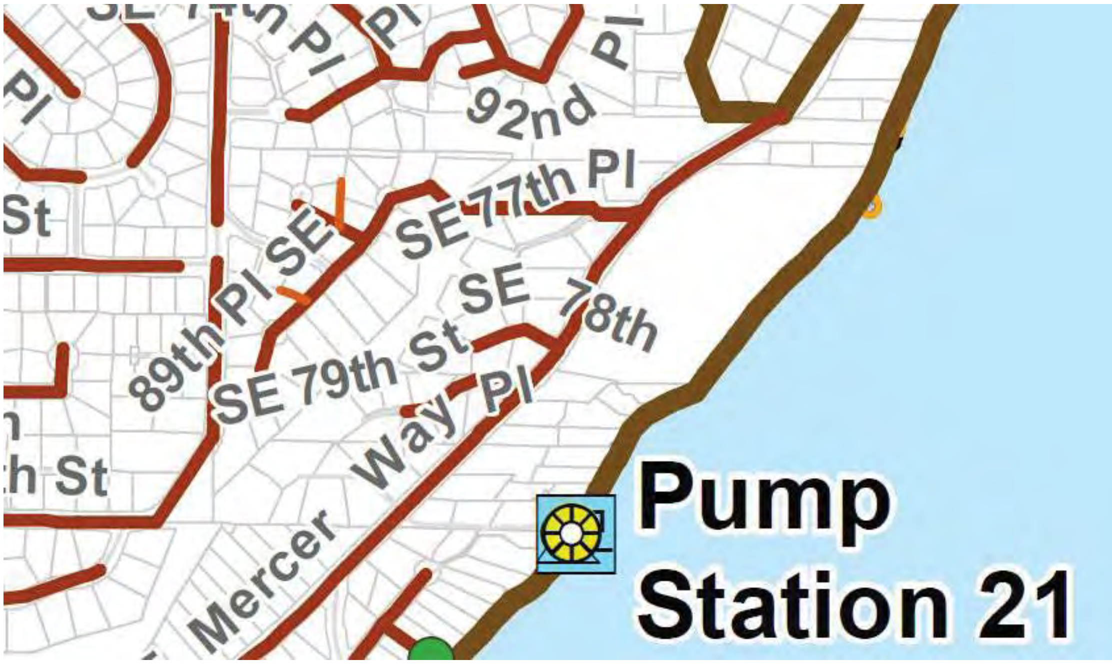


Figure 3.14 WWPS No. 21 Location Map

### 3.14.1 Observations

#### 3.14.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.14.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade and a passive supply air duct that terminates at grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.14.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.14.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.14.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.14.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.14.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 21.

### 3.14.2 Assessment Results

#### 3.14.2.1 Area Classification

WWPS No. 21 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.14.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown due to a lack of existing information; however, the actual airflow capacity is 325 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 7.4 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.14.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power is not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.14.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.14.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.14.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.14.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.14.3 Improvements

For WWPS No. 21 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.14.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.14.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.14.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The dry well is considered an unclassified space and will not require any electrical improvements per NFPA 820 standards.

#### 3.14.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.14.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.14.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.14.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.12 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 21.

Table 3.12 Summary of NFPA 820 Assessment and Improvements for WWPS No. 21

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2 Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2 Rows 14 & 15 Section 7.5 Chapter 9 | • Ventilates continuously at 7.4 ACH[(1)].<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified | • No improvements identified |
| Materials of Construction | Table 4.2.2 Rows 14 & 15 Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2 Rows 14 & 15 Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6 Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.15 Wastewater Pump Station No. 22

WWPS No. 22 is at an upland site at 6223 E. Mercer Way, on a steep grassy slope and adjacent to a paved boat launch at the Lake Washington shoreline. The site is currently accessible by vehicle via a steep driveway. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.15 shows a location map of WWPS No. 22.

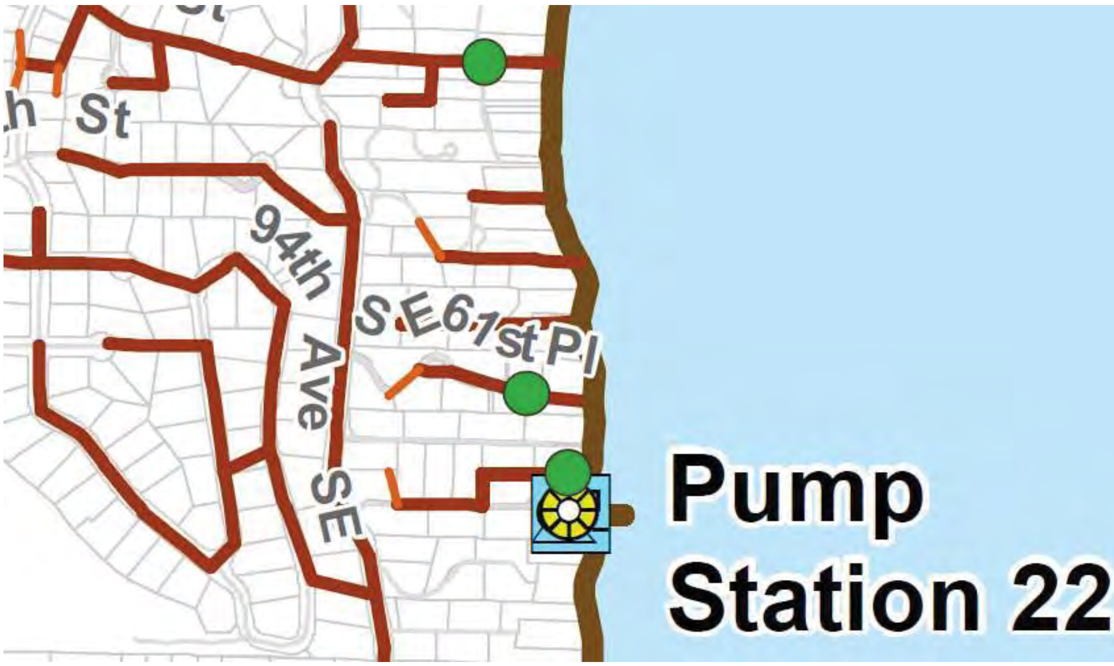


Figure 3.15 WWPS No. 22 Location Map

### 3.15.1 Observations

#### 3.15.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at finished grade.

#### 3.15.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade and a passive supply air duct that terminates at grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.15.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels. An unused existing electrical outlet is located near the wet well manhole lid.

#### 3.15.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.15.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.15.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.15.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 22.

### 3.15.2 Assessment Results

#### 3.15.2.1 Area Classification

WWPS No. 22 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.15.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown due to a lack of existing information; however, the actual airflow capacity is 380 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 12.6 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.15.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space. The existing outlet near the wet well is less than 3 feet away from and 1.5 feet above the wet well manhole lid; therefore, it needs to be rated for Class I Div. 2 space.

#### 3.15.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.15.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.15.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.15.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.15.3 Improvements

For WWPS No.22 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.15.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.15.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.15.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment within the dry well. The dry well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards. The existing electrical outlet near the wet well manhole lid needs to be upgraded to be rated as a Class I Div. 2 compliant electrical outlet, decommissioned and removed, or relocated at a minimum of 3 feet away from or 1.5 above the wet well manhole lid.

#### 3.15.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.15.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.15.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.15.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.13 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 22.

Table 3.13 Summary of NFPA 820 Assessment and Improvements for WWPS No. 22

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 12.6 ACH[(1)].<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Electrical equipment | N/A | • Dry Well is Unclassified.<br>• Existing electrical outlet near wet well manhole. | • No improvements identified for the Dry Well.<br>• Existing electrical outlet rated for Class I Div. 2, relocated to be 3 feet away or 1.5 feet above Wet Well lid, or decommissioned and removed |
| Materials of Construction | Table 4.2.2 Rows 14 & 15 Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2 Rows 14 & 15 Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6 Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.16 Wastewater Pump Station No. 23

WWPS No. 23 is at an upland site at 5406 96th Avenue SE, in an open grassy space within a private park. The site is currently accessible by vehicle with a short walk along a paved walking path. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.16 shows a location map of WWPS No. 23.


Figure 3.16 WWPS No. 23 Location Map

### 3.16.1 Observations

#### 3.16.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at grade.

#### 3.16.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade and a passive supply air duct that terminates at grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.16.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.16.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.16.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.16.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.16.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 23.

### 3.16.2 Assessment Results

#### 3.16.2.1 Area Classification

WWPS No. 23 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.16.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown due to a lack of existing information; however, the actual airflow capacity is 470 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 15.7 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.16.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.16.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.16.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.16.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.16.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.16.3 Improvements

For WWPS No.23 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.16.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.16.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.16.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The dry well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards.

#### 3.16.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.16.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.16.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.16.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.14 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 23.

Table 3.14 Summary of NFPA 820 Assessment and Improvements for WWPS No. 23

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 15.7 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified. | • No improvements identified. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.17 Wastewater Pump Station No. 24

WWPS No. 24 is located at 4606 E. Mercer Way, in the backyard of the residential property at 4612 E. Mercer Way. The station is partially submerged, connected to the concrete city dock as a 16-foot by 16-foot concrete structure. The site is currently accessible by vehicle with a short walk through a steep walking path into a residential backyard. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.17 shows a location map of WWPS No. 24.

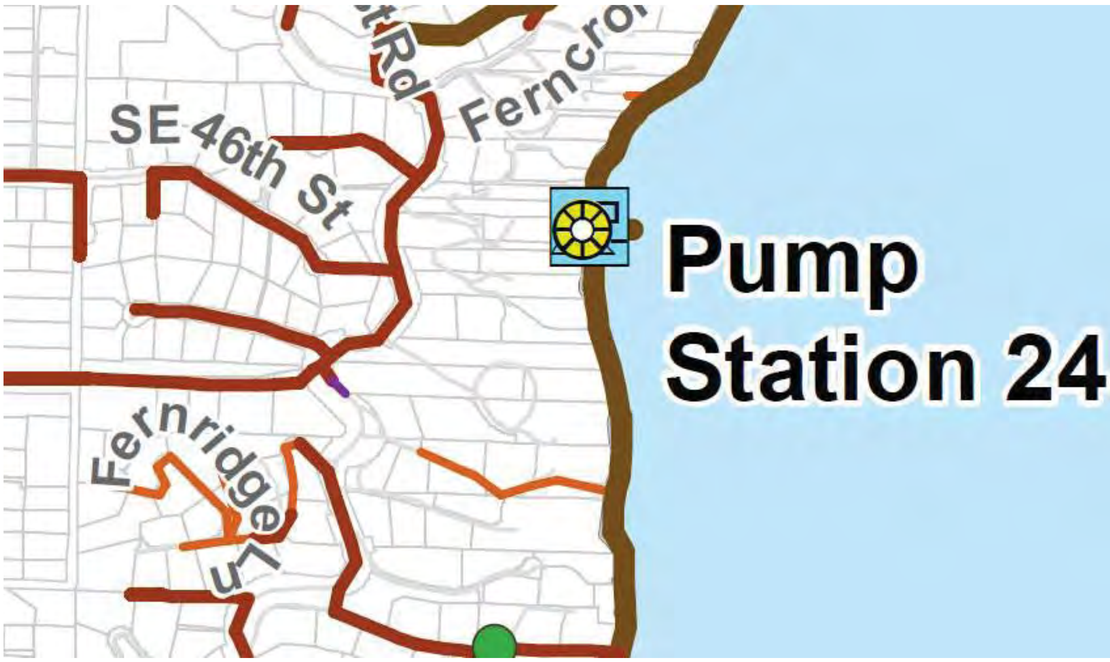


Figure 3.17 WWPS No. 24 Location Map

### 3.17.1 Observations

#### 3.17.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at grade.

#### 3.17.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade and a passive supply air duct that terminates at grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.17.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.17.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.17.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.17.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.17.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 24.

### 3.17.2 Assessment Results

#### 3.17.2.1 Area Classification

WWPS No. 24 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.17.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown due to a lack of existing information; however, the actual airflow capacity is 355 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 11.8 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.17.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.17.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.17.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.17.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.17.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.17.3 Improvements

For WWPS No.24 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.17.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.17.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.17.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The Dry Well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards.

#### 3.17.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.17.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.17.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.17.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.15 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 24.

Table 3.15 Summary of NFPA 820 Assessment and Improvements for WWPS No. 24

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 11.8 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified. | • No improvements identified. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2. Rows 29, 30, 34, & 35 | • No below grade vaults observed. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

## 3.18 Wastewater Pump Station No. 25

WWPS No. 25 is located at 4266 E. Mercer Way within the Mercerwood Shore Club on the southwest edge of the property. The site is currently accessible by vehicle with a short walk from the club parking lot through a small park. The pump station was designed in 1964 and its current firm pumping capacity is unknown due to a lack of existing information. The pump station is a below grade structure consisting of a wet well and dry well. The wet well structure is used to contain raw sewage and the dry well structure is a two-level structure that houses pumps and ancillary equipment. Figure 3.18 shows a location map of WWPS No. 25.

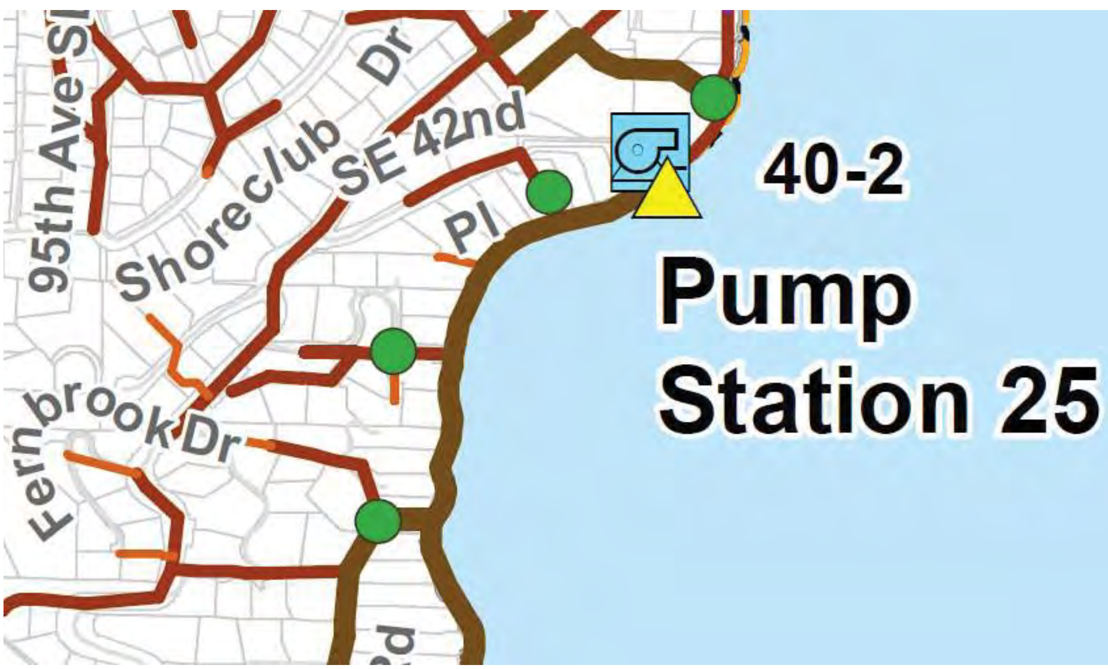


Figure 3.18 WWPS No. 25 Location Map

### 3.18.1 Observations

#### 3.18.1.1 Area Classification

The dry well is separated from the wet well by a concrete wall and contains an intermediate floor and pump room. The dry well can be accessed through an access hatch and ladder located at grade.

#### 3.18.1.2 Ventilation

The dry well is ventilated by a continuous ventilation system consisting of an exhaust fan that is ducted to exhaust at grade and a passive supply air duct that terminates at grade. The existing exhaust fan produces enough airflow. No fan flow monitoring devices were installed at the time of the assessment.

#### 3.18.1.3 Electrical Equipment

The dry well contains various electrical equipment such as instrumentation, lighting fixtures, fan and pump motors, and LCP panels.

#### 3.18.1.4 Materials of Construction

The station is constructed of concrete walls, floors, and roof, and a metal hatch.

#### 3.18.1.5 Fire Protection Measures

The pump station does not contain any CGD sensors. Fire extinguishers are located on all levels of the pump station. No smoke detectors were installed at the time of the assessment.

#### 3.18.1.6 Audible and Visual Alarms

No audible and visual alarms were installed inside and/or outside of the pump station at the time of the assessment.

#### 3.18.1.7 Below Grade Vault

No below grade vaults were constructed at WWPS No. 25.

### 3.18.2 Assessment Results

#### 3.18.2.1 Area Classification

WWPS No. 25 is categorized as a Dry Well / Wet Well pump station. The dry well is separated from the wet well by a concrete wall and is physically separated per NFPA 820 standards. Therefore, the area classification of the dry well is Class I Div. 2.

#### 3.18.2.2 Ventilation

The design airflow capacity of the existing exhaust fan is unknown due to a lack of existing information; however, the actual airflow capacity is 290 cfm as identified in the TAB report in Appendix B. The actual airflow capacity results in approximately 13.6 ACH within the dry well which is sufficient to declassify the dry well from Class I Div. 2 to unclassified. The existing exhaust fan does not have a flow monitoring and alarm system to monitor fan run status which does not comply with NFPA 820 standards.

#### 3.18.2.3 Electrical Equipment

Existing electrical equipment and mechanical equipment receiving power are not rated for Class I Div. 2 space. Lighting fixtures, instrumentation, and other ancillary items receiving power are also not rated for Class I Div. 2 space.

#### 3.18.2.4 Materials of Construction

Overall pump station construction is noncombustible which complies with NFPA 820 standards.

#### 3.18.2.5 Fire Protection Measures

Fire extinguishers are provided in all levels of the dry well near the access ladders. No smoke detectors were observed but are not required per NFPA 820 standards. No CGD systems have been installed but are not required per current NFPA 820 area classification.

#### 3.18.2.6 Audible and Visual Alarms

Audible and visual alarms were not present within the dry well at the time of assessment which does not comply with NFPA 820 standards. Audible and visual alarms are required for spaces that use ventilation to declassify a space per the NFPA 820 standard.

#### 3.18.2.7 Below Grade Vaults

No below grade vaults were assessed at the time of the visit.

### 3.18.3 Improvements

For WWPS No.25 to be NFPA 820 compliant and reduce the risk for fire and explosion hazards within the structure, improvements are recommended as summarized below.

#### 3.18.3.1 Area Classification

No improvements were identified on pump station area classification. The dry well is currently declassified to the lowest area classification possible which is an unclassified space.

#### 3.18.3.2 Ventilation

A fan flow monitoring system must be provided and installed to monitor fan run status. The fan flow monitoring system shall be designed to send an alarm when no fan flow is detected.

#### 3.18.3.3 Electrical Equipment

No improvements were identified for the existing electrical equipment. The dry well is considered an unclassified area space and will not require any electrical improvements per NFPA 820 standards.

#### 3.18.3.4 Materials of Construction

No improvements were identified for pump station material of construction.

#### 3.18.3.5 Fire Protection Measures

No improvements were identified on pump station fire protection measures.

#### 3.18.3.6 Audible and Visual Alarms

Provide a dual light warning system for the entrance to the pump station. Dual light warning systems are permitted in lieu of audible and visual alarms in remote spaces that are not constantly attended. An audible and visual alarm must also be provided within the dry well.

#### 3.18.3.7 Below Grade Vault

No below grade vaults were observed at the pump station, therefore, there are no recommended improvements for this ancillary facility.

Table 3.16 summarizes the NFPA classifications, key observations, and improvements for WWPS No. 25.

Table 3.16 Summary of NFPA 820 Assessment and Improvements for WWPS No. 25

| Pump Station Component | NFPA 820 Reference | Key Observations | Improvements |
|---|---|---|---|
| Dry Well / Wet Well | Table 4.2.2<br>Rows 14 & 15 | • Dry Well is physically separated from Wet Well. | • No improvements identified. |
| Ventilation | Table 4.2.2<br>Rows 14 & 15<br>Section 7.5<br>Chapter 9 | • Ventilates continuously at 13.6 ACH(1).<br>• No flow monitoring present. | • Provide fan flow monitoring and alarm system. |
| Electrical equipment | N/A | • Dry Well is Unclassified. | • No improvements identified. |
| Materials of Construction | Table 4.2.2<br>Rows 14 & 15<br>Section 8.2.3 | • Full Concrete Structure. | • No improvements identified. |
| Fire Protection Measures | Table 4.2.2<br>Rows 14 & 15<br>Section 7.2.5, 7.4 | • No CGD system installed.<br>• Fire extinguisher is present on all levels. | • No improvements identified. |
| Audible and visual alarms | Section 7.6<br>Table 7.6.1 | • No audible or visual alarm systems installed. | • Install dual light warning system at entrance to WWPS.<br>• Install audible and visual alarms inside WWPS. |
| Below grade valve/metering vault | Table 4.2.2.<br>Rows 29, 30, 34, & 35 | • No below grade vaults exist. | • No improvements identified. |

Note:
(1) See Appendix A for more information on airflow calculations.

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## Section 4

# NFPA 820 STANDARD ALTERNATE REQUEST

Audible and visual alarm recommendations highlighted in Section 3 of this report required modifications to the existing WWPS that the City identified as potentially problematic to maintaining peace with their surrounding neighbors. A meeting was held on February 18, 2021 with the City, the Fire Marshal (AHJ), and Carollo to discuss potential alternatives to these recommendations.

Per NFPA 820 Section 1.4.3:

> *"The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgement of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided."*

An alternate request document highlighting the discussed alternatives was submitted and approved by the Fire Marshal and the City of Mercer Island Fire Department. See Appendix C for details of the alternate request document.

The approved alternatives to the audible and visual recommendations highlighted in Section 3 are summarized below:

- In lieu of a dual light warning system at the entrance to each pump station, provide a single no-go light outside each wastewater pump station coupled with a remote fan failure signal to the City's SCADA system.
- In lieu of providing an audible alarm that continuously sounds within each pump station, the installed audible alarm will be programmed to activate only when the pump access hatch is open.

These approved alternatives will serve as replacements to the audible and visual recommendations highlighted in Section 3 of this report and will be reflected in Table 5.1.

Section 5

# SUMMARY

Carollo was tasked by the City of Mercer Island to assess eighteen (18) existing pump stations for compliance to the NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities. This report summarizes the results of this assessment and lists improvements to each of the eighteen (18) existing pump stations for compliance with current NFPA 820 standards. The individual improvements summarized for each pump station in Section 3 of this report present solutions for multiple scenarios. These scenarios provide the City with flexibility when deciding which mitigation measures to implement. However, different combinations of the listed improvements can impact the pump station's compliance to the standard. Table 5.1 consolidates the listed improvements presented in Section 3 of this report and approved alternatives indicated in Section 4 of this report into one preferred scenario. This scenario provides recommendations on the proposed improvements in order to achieve a safe and practical solution consistent with current pump station design practices. Typical Dry Well / Wet Well design and construction establishes an unclassified dry well space and a physically separated wet well. All the recommended improvements highlighted in Table 5.1 must be implemented or satisfied in order to achieve an unclassified dry well space and a physically separated wet well. Submersible pump stations are not specifically discussed in NFPA 820. However, the recommended improvements in Table 5.1 for submersible pump stations are aimed to provide a safe and practical solution consistent with wet well design and current pump station design practices.

Table 5.1 NFPA 820 Recommended Improvements Summary Table

| Waste Water Pump Station No. | Public/Private Property | Pump Station Type | Current Area Classification[3] | Mitigation Measures[4] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Area Separation | Ventilation | | | Recommended Electrical Equipment Rating Within the Pump Station | | | Materials of Construction | | Fire protection measures | | | Alarms | | |
| | | | | Physically Separate Dry Well and Wet Well | Increase or Improve Ventilation | Install Flow Monitoring | No Improvements Identified | Class I Div. 1 | Class I Div. 2 | Unclassified | No Improvements Identified | Provide NC, LC, or LFS Material | No Improvements Identified | Install CGD System | Provide Fire Extinguishers (On all levels) | No Improvements Identified | Install Inside Dry Well (audible & visual)[10] | Install Outside Dry Well (NO-GO visual)[10] |
| 1 | Right of Way | D/W | Class I Div. 1 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | ✓[8] | | | | ✓ | ✓ |
| 4[5] | Right of Way | S | Class I Div. 1 | | | | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ | | |
| 10 | Right of Way | D/W | Class I Div. 1 | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ | | | | ✓ | ✓ |
| 11[6] | Right of Way | D/W | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12[7] | Right of Way | N/A | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 13 | Private | D/W | Class I Div. 2 | | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 14 | Right of Way | S | Class I Div. 1 | ✓ | | | ✓ | ✓[9] | ✓[9] | | ✓ | | ✓ | | | ✓ | | |
| 15 | Right of Way | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 16 | Right of Way | D/W | Class I Div. 1 | ✓ | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 17 | Private | D/W | Class I Div. 1 | ✓ | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 18 | Private | D/W | Class I Div. 2 | | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 19 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 20 | Right of Way | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 21 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 22 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 23 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 24 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| 25 | Private | D/W | Unclassified | | | ✓ | | | | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |

Notes:
Abbreviations: D/W = Dry Well / Wet Well, S = Submersible, NC = Noncombustible, LC = limited combustible, LFS = low flame spread.
(1) All checked recommendations in this table must be implemented or satisfied in order to achieve an unclassified dry well space with a physically separated wet well.
(2) WWPS NFPA 820 Assessments were performed on July 14, 2020 and October 20, 2020.
(3) For D/W type pump stations, current Area Classification listed is only for the Dry Well space of the pump station. The wet well space for all D/W and S type pump stations are Class I Div. 1.
(4) See Section 3 of this report for specific recommendations.
(5) Only a high-level assessment was performed on WWPS No. 4.
(6) The existing WWPS No. 11 was not assessed as part of this report. WWPS No. 11 will be converted to a submersible pump station within the immediate future.
(7) Flushing Pump Station No. 12 was not assessed as part of this report since it is not considered a WWPS.
(8) See Section 3 for recommendations on fire extinguisher location.
(9) See Section 3 for recommendations on existing electrical equipment rating.
(10) See Section 4 for installation details on audible and/or visual alarms.

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Appendix A

# AIR CHANGE CALCULATIONS

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## Appendix A: Air Change Calculations, City of Mercer Island

| Pump Station No. | Top to Platform (ft) | Bottom to Platform (ft) | Height (ft) | Width (ft) | Length (ft) | Volume (cf) | Design Fan Rating (CFM) | Actual Fan Rating (CFM) | Minutes/air change | Air change/hour |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | | | 10.54 | 8.02 | 9.75 | 824.28 | 220 | 160 | 5.15 | 11.6 |
| **10** | 7.32 | 8.50 | 15.82 | 9.13 | 9.31 | 1344.96 | 220 | 210 | 6.40 | 9.4 |
| **12** | 9.17 | 2.58 | 11.74 | 5.27 | 7.53 | 465.75 | Not on Fan | 85 | 5.48 | 11.0 |
| **13** | 6.65 | 9.30 | 15.95 | 9.16 | 10.17 | 1485.09 | Not on Fan | 75 | 19.80 | 3.0 |
| **15** | 7.88 | 7.58 | 15.46 | 7.51 | 9.48 | 1099.33 | 400 | 310 | 3.55 | 16.9 |
| **16** | 7.67 | 9.81 | 17.47 | 8.50 | 12.99 | 1929.88 | 400 | 365 | 5.29 | 11.3 |
| **17** | 7.87 | 11.92 | 19.78 | 8.50 | 12.99 | 2184.90 | 400 | 260 | 8.40 | 7.1 |
| **18** | 8.00 | 10.42 | 18.42 | 9.75 | 15.01 | 2736.73 | 400 | 270 | 10.14 | 5.9 |
| **19** | 8.05 | 10.45 | 18.50 | 9.67 | 14.97 | 2677.94 | Not on Fan | 380 | 7.05 | 8.5 |
| **20** | 10.40 | 7.96 | 18.35 | 9.81 | 15.85 | 2855.28 | 400 | 410 | 6.96 | 8.6 |
| **21** | 7.80 | 10.33 | 18.13 | 14.96 | 9.76 | 2646.51 | Not on Fan | 325 | 8.14 | 7.4 |
| **22** | 8.04 | 8.39 | 16.43 | 8.52 | 12.99 | 1816.95 | Not on Fan | 380 | 4.78 | 12.5 |
| **23** | 8.08 | 8.33 | 16.41 | 8.50 | 12.92 | 1801.84 | Not on Fan | 470 | 3.83 | 15.7 |
| **24** | 7.93 | 8.46 | 16.39 | 8.51 | 12.98 | 1810.44 | Not on Fan | 355 | 5.10 | 11.8 |
| **25** | 9.08 | 8.85 | 17.93 | 7.50 | 9.51 | 1277.55 | Not on Fan | 290 | 4.41 | 13.6 |

Notes:
(1) Design fan rating based on manufacture plate.
(2) Actual fan rating based on Neudorfer Engineer 12/17/19 report.

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Appendix B

# TEST, ADJUST, AND BALANCE REPORTS

# NEUDORFER ENGINEERS INC.

## TEST, ADJUST & BALANCE
## BALANCE REPORT

**Mercer Island Pump Station**
**Mercer Island, Washington**

**2019-1162**

**Project Completion Date:** **12/17/19**

**Revision Date:** **Revision Number:**

Neudorfer Engineers, Inc.
NEBB
WILLIAM C. NEUDORFER
CERTIFICATION
2465
Exp. 3/31/21
Air and Hydronic Testing


5516 1st Ave S
Seattle, WA 98108
Phone (206) 621-1810
Fax (206) 343-9820

2501 SE Columbia Way, Ste. #230
Vancouver, WA 98661
Phone (503) 235-8924
Fax (503) 235-8925

# TABLE OF CONTENTS

## *Report Title*

**CERTIFIED TEST: BALANCE REPORT**

---

**Project:** Mercer Island Pump Station
Mercer Island, Washington
--

**NEI Job#:** 2019-1162

**Engineer:** --

**Contractor:** Mercer Island Maintenance Facility

**TAB Firm:** Neudorfer Engineers Inc
5516 1st Avenue South
Seattle, WA 98108
**Test Engineer:** Andy Eaden
**Architect:** --


5516 1st Ave S
Seattle, WA 98108
Phone (206) 621-1810
Fax (206) 343-9820

2501 SE Columbia Way, Ste. #230
Vancouver, WA 98661
Phone (503) 235-8924
Fax (503) 235-8925

# CERTIFICATION

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems. Any variances from design quantities which exceed NEBB tolerances are noted in the Test-Adjust-Balance Report Project Summary.

Significant / Noteworthy Remarks are noted on the General Remarks and General Field Notes pages. Other remarks are noted on individual test sheets.

Noted deficiencies are not Neudorfer Engineers responsibility to repair. Prior to issuance of this report, Deficiency Reports are forwarded to our contracted agent.

Warranty is limited to one year from the date of substantial completion. Within that time, any discrepancies, ambiguities, or omissions found in this report will be retested, adjusted, or balanced as needed. A written notification will be required.

**Submitted and Certified by:**

| | |
|---|---|
| NEBB TAB Firm: | **Neudorfer Engineers Inc** |
| Certification No: | **2465** |
| Expiration Date: | **March 31, 2021** |
| Certification Date: *(Date completed)* | **December 17, 2019** |
| | *Signed and Sealed by:* |
| NEBB Supervisor: | **William C. Neudorfer** |

## *Warranty*

**Project:** Mercer Island Pump Station

---

**Warranty of Services:**

Neudorfer Engineers, Inc. warrants that the air balancing, evaluated during this performance evaluation are operating at the specified levels as documented within this report. At and only this time, and makes no other warranties, stated or implied, concerning the continued performance, operation or safety in the use of this equipment past this time. Neudorfer Engineers warrants the air and hydronic balancing for 1 year from the date of substantial completion. Neudorfer Engineers reserves the right to correct errors or omissions in the collections of data.

**Warranty Procedures:**

For all warranty items, Neudorfer Engineers requires written request. The written request should be specific on the areas of concern, such rooms, or equipment, and the type of issue the occupants are experiencing. Once written notification is received, Neudorfer Engineers will schedule a Technician. It is recommended that an Owner or A/E Representative be on site at that time.

**Voided Warranty and Additional Charges:**

If a complaint issue is due to a mechanical equipment failure, control or maintenance related, the return trip maybe subject to a service charge, not covered under warranty. Neudorfer Engineers reserves the right to resolve any TAB issue. If a third party or competing Test & Balance Commissioning firm test or adjust any equipment, all project warranty is voided. (This is typical standard for the Mechanical industry, as Manufacture, Mechanical and Control Contractor voids all warranty when a competing firm tests or manipulates their systems.) Any return trips to the job site are subject to a service charge and a purchase order will be required before returning to the job site.

**Document Archiving**

An electronic file of all test documents will be kept on file until the end of the Warranty period. During that time an electronic copy of the test data will be provided a no charge. Any additional hard / bound copies requested will be subject to a fee.

## *Terms and Abbreviations*

**Project:** Mercer Island Pump Station

---

| | |
|---|---|
| **AC or ACU** | Air Conditioner or Air Conditioning Unit |
| **Act.** | Actual |
| **ACCU** | Air Cooled Condensing Unit |
| **Address** | Equipment designation number given on the Control Program |
| **AH or AHU** | Air Handler or Air Handling Unit |
| **Amps** | Amperage |
| **AP** | Access Point |
| **APP.** | Application |
| **Arr** | Arrangement |
| **AVG** | Average |
| **BHP** | Brake Horsepower |
| **BTU** | British Thermal Units |
| **BTUH** | British Thermal Units per Hour |
| **CAV** | Constant Air Volume |
| **CBV** | Calbirated Balancing Valve (Circuit Setter) |
| **CC** | Cooling Coil |
| **CD** | Ceiling Diffuser |
| **CFLA** | Correct Full Load Amperage |
| **CFM** | Cubic Feet per Minute |
| **CH** | Chiller |
| **CHWS** | Chilled Water Supply |
| **CHWR** | Chilled Water Return |
| **Coeff.** | Coefficient |
| **CP** | Circulating Pump |
| **CR** | Ceiling Register |
| **CRAC** | Computer Room Air Conditioner |
| **CRU** | Computer Room Unit |
| **CT** | Cooling Tower |
| **CU** | Condenser Unit |
| **CUH** | Cabinet Unit Heater |
| **CWS** | Condenser Water Supply |
| **CWR** | Condenser Water Return |
| **DAT** | Discharge Air Temperature |
| **DB** | Dry Bulb |
| **DD** | Direct Drive |
| **DDC** | Direct Digital Controls: EMS Control System for the HVAC |
| **Delta** | Difference, net decrease or increase |
| **Des.** | Design |
| **Dia.** | Diameter |
| **Disch.** | Discharge |
| **DNL** | Data Not Listed |
| **EA** | Exhaust Air |
| **EAT** | Entering Air Temperature |
| **Economizer** | Controls and components that allow an air handler to logically utilize outdoor air for cooling as opposed to the use of mechanical cooling. |
| **EDC** | Electric Duct Coil |
| **EDH** | Electric Duct Heater |
| **EF** | Exhaust Fan |
| **EG** | Exhaust Grille |
| **EMCS** | Energy Management Control System |
| **ERU** | Energy Recovery Unit |
| **E.S.P.** | External Static Pressure |
| **Evap.** | Evaporator |
| **EWT** | Entering Water Temperature |
| **FCU** | Fan Coil Unit |
| **FD** | Fire Damper |
| **FH** | Fume Hood |
| **FLA** | Full Load Amperage: Maximum amperage a motor can draw. |
| **Flow Hood** | Instrument that captures air and converts the reading to CFM. |
| **FPB** | Fan Powered Box |
| **FPM** | Feet per Minute |
| **FR** | Field Report |
| **FT** | Foot, Feet |
| **FTU** | Fan Terminal Unit |
| **GPM** | Gallons per Minute |
| **HC** | Heating Coil |
| **HD** | Pressure Difference across the entering and leaving side of a pump. |
| **Heater O.L.** | Thermal overload protection for motors located at the motor starter (starter heaters) |
| **HEPA** | High Efficiency Particulate Arrestance |
| **HOA** | Hand / Off / Auto Switch |
| **HP** | Horsepower |

## *Terms and Abbreviations*

**Project:** Mercer Island Pump Station

---

**HRC** Heat Recovery Coil
**HUH** Hydronic Unit Heater
**HVAC** Heating Ventilation and Air Conditioning
**HWS** Heating Water Supply
**HWR** Heating Water Return
**HX** Heat Exchanger
**HZ** Hertz, cycle per second
**I.D.** Inside Diameter
**in.** inches
**in.w.g.** inches of water gauge
**Kfactor** Correction factor to the free area need to calculate CFM.
**KW** Kilowatts
**LAT** Leaving Air Temperature
**LWG** Low Wall Grille
**LWR** Low Wall Register
**LWT** Leaving Water Temperature
**MAU** Make-up Air Hangling Unit
**MBH** 1,000 BTUH
**MAX.** Maximum Flow Requirements for DDC
**MBH** Mega BTUs per hour (1MBH=1,000BTUH)
**MIN** Minimum Flow Requirements for DDC
**N/A** Not Available
**N/S** Not Shown or Specified
**OA** Outside Air
**OBD** Opposed Blade Damper
**O.D.** Outside Diameter
**PD** Pressure Drop.
**PH** Phase
**PHC** Preheat Coil
**Prim.** Primary
**PSI** Pounds per Square Inch
**RA** Return Air
**RAT** Return Air Temperature
**RF** Return Fan
**RH** Relative Humidity
**RHC** Reheat Coil
**RPM** Revolutions per Minute
**RTU** Roof Top Unit

**RVA** Rotating Vane Anemometer -reads air velocity in feet per minute
**SA** Supply Air
**SAT** Supply Air Temperature
**S.F.** Service Factor
**Schedule (sched)** Design data obtained from the mechanical prints' schedule of equipment.
**SCR** Silcon Controlled Rectifier Speed Controller
**SF** Supply Fan
**SFD** Smoke/Fire Damper
**SP** Static Pressure
**Spec(s)** Specifications
**sq.ft.** square feet
**Submittals (subs)** Submitted data on equipment capabilities.
**Suct.** Suction
**SWG** Sidewall Grille
**SWR** Sidewall Register
**TAB** Test; Adjust; and Balance
**Tach** Tachometer
**Tech** Technician
**TSP** Total Static Pressure: Difference between the entering and leaving static pressure of a fan.
**TP** Traverse or Test Point
**UH** Unit Heater
**VAV** Variable Air Volume; box that contains a motorized damper that modulates airflow.
**VD** Volume Damper
**VFD** Variable Frequency Drive
**Velgrid** Instrument that reads used to read velocity in feet per minute.
**VP** Velocity Pressure
**VVT** Variable Volume Terminal
**WC** Water Column
**W.G.** Water Gauge
**WB** Wet Bulb

| | |
|---|---|
| PROJECT | Mercer Island Pump Station |
| LOCATION | Seattle, Washington |

## EXECUTIVE SUMMARY

This project has been balanced per plans and specifications using the National Environmental Balancing Bureau (NEBB) standards and procedures.

Neudorfer Engineers performed the air balancing on the following: (16) Existing Exhaust Fans.

These fans have been checked for unit data, operating amperage, voltage, rotation, and operating static pressure.

**Exhaust Fan for Pump Station #1**

The existing exhaust fan serves Pump Station #1. Design is 220 CFM and actual is 160 CFM (72% of design total). This is a direct drive with no speed controller.

**Exhaust Fan for Pump Station #10**

The existing exhaust fan serves Pump Station #10. Design is 220 CFM and actual is 210 CFM (95% of design total).

**Exhaust Fan for Pump Station #12**

The existing exhaust fan serves Pump Station #12. No design located on the actual fan, the actual is 85 CFM.

**Exhaust Fan for Pump Station #13**

The existing exhaust fan serves Pump Station #13. No design located on the actual fan, the actual is 75 CFM.

**Exhaust Fan for Pump Station #15**

The existing exhaust fan serves Pump Station #15. Design is 400 CFM and actual is 310 CFM (77% of design total). This is a direct drive motor and no speed controller was installed.

## EXECUTIVE SUMMARY (CONTD.)

**Exhaust Fan for Pump Station #16**

The existing exhaust fan serves Pump Station #16. Design is 400 CFM and actual is 365 CFM (91% of design total).

**Exhaust Fan for Pump Station #17**

The existing exhaust fan serves Pump Station #17. Design is 400 CFM and actual is 260 CFM (65% of design total). This is a direct drive motor and no speed controller was installed.

**Exhaust Fan for Pump Station #18**

The existing exhaust fan serves Pump Station #18. Design is 400 CFM and actual is 270 CFM (67% of design total). This is a direct drive motor and no speed controller was installed.

**Exhaust Fan for Pump Station #19**

The existing exhaust fan serves Pump Station #19. No design located on the actual fan, the actual is 380 CFM.

**Exhaust Fan for Pump Station #20**

The existing exhaust fan serves Pump Station #20. Design is 400 CFM and actual is 410 CFM (102% of design total).

**Exhaust Fan for Pump Station #21**

The existing exhaust fan serves Pump Station #21. No design located on the actual fan, the actual is 325 CFM.

**Exhaust Fan for Pump Station #22**

The existing exhaust fan serves Pump Station #22. No design located on the actual fan, the actual is 380 CFM.

PROJECT Mercer Island Pump Station
LOCATION Seattle, Washington

## EXECUTIVE SUMMARY (CONTD.)

**Exhaust Fan for Pump Station #23**

The existing exhaust fan serves Pump Station #23. No design located on the actual fan, the actual is 470 CFM.

**Exhaust Fan for Pump Station #24**

The existing exhaust fan serves Pump Station #24. No design located on the actual fan, the actual is 355 CFM.

**Exhaust Fan for Pump Station #25**

The existing exhaust fan serves Pump Station #25. No design located on the actual fan, the actual is 290 CFM.

**Exhaust Fan for Pump Station First Hill**

There is no pit exhaust fan for this station. There were exhaust fans for the generator.

No balancing diagrams are attached to this report.

# Fan Unit

| | | | |
|---|---|---|---|
| **PROJECT:** | Mercer Island Pump Station | **DATE:** | 12/17/2019 |
| **LOCATION:** | SEATTLE, WA | **CONTACT:** | Andy Eaden |
| **PROJECT #:** | 2019-1162 | | |

**SYSTEM/UNIT: EF (Pump Station #1)**
**AREA: 8002 SE 20th St.**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR150 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 90 Watts HP |
| Motor RPM | 2500 RPM |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |

| Test Data | |
|---|---|
| Total Design Flow | 220 CFM |
| Total Actual Flow | 160 CFM |
| Motor Volts T1-T2 | 120 Volts |
| Motor Amps T1 | 0.75 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.07 in. wc |
| Fan Discharge SP | 0.65 in. wc |
| Actual Total SP | 0.72 in. wc |
| Actual External SP | 0.72 in. wc |

# Fan Unit

| | | | |
|---|---|---|---|
| **PROJECT:** | Mercer Island Pump Station | **DATE:** | 12/17/2019 |
| **LOCATION:** | SEATTLE, WA | **CONTACT:** | Andy Eaden |
| **PROJECT #:** | 2019-1162 | | |

**SYSTEM/UNIT: EF (Pump Station #1)/Duct-01**
**AREA: 8002 SE 20th St.**

Tested By: Andy Eaden
Date: 12/16/2019

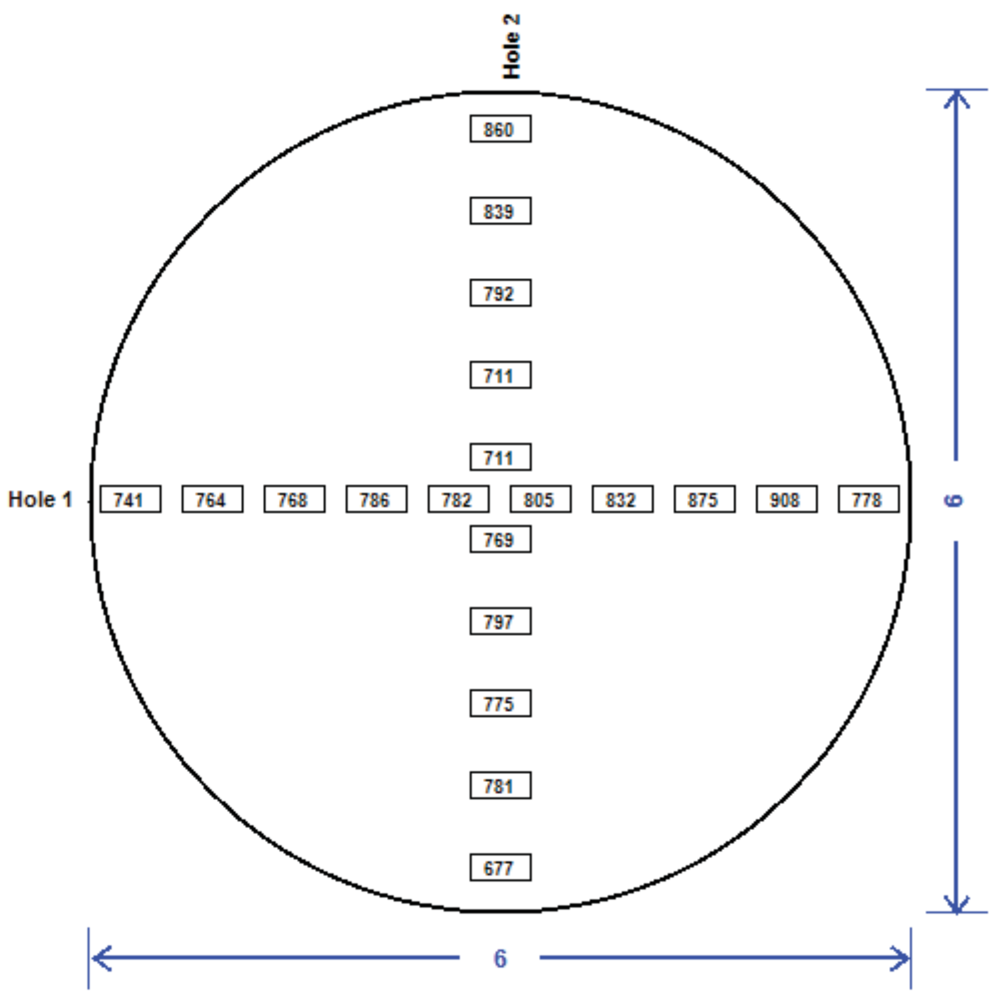
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 6 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.20 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 15751 |
| Average Reading | 788 FPM |
| Design Total Flow | 220 CFM |
| Actual Total Flow | 158 CFM |
| Static Pressure | -0.07 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #1)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



Neudorfer Engineers. Inc.
Consulting Engineers Seattle Portland
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# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #10)**
**AREA: 9030 N Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR150 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 90 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 0.77 Amps |

| Test Data | |
|---|---|
| Total Design Flow | 220 CFM |
| Total Actual Flow | 210 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 0.71 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.16 in. wc |
| Fan Discharge SP | 0.29 in. wc |
| Actual Total SP | 0.45 in. wc |
| Actual External SP | 0.45 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #10)/Duct-01**
**AREA: 9030 N Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

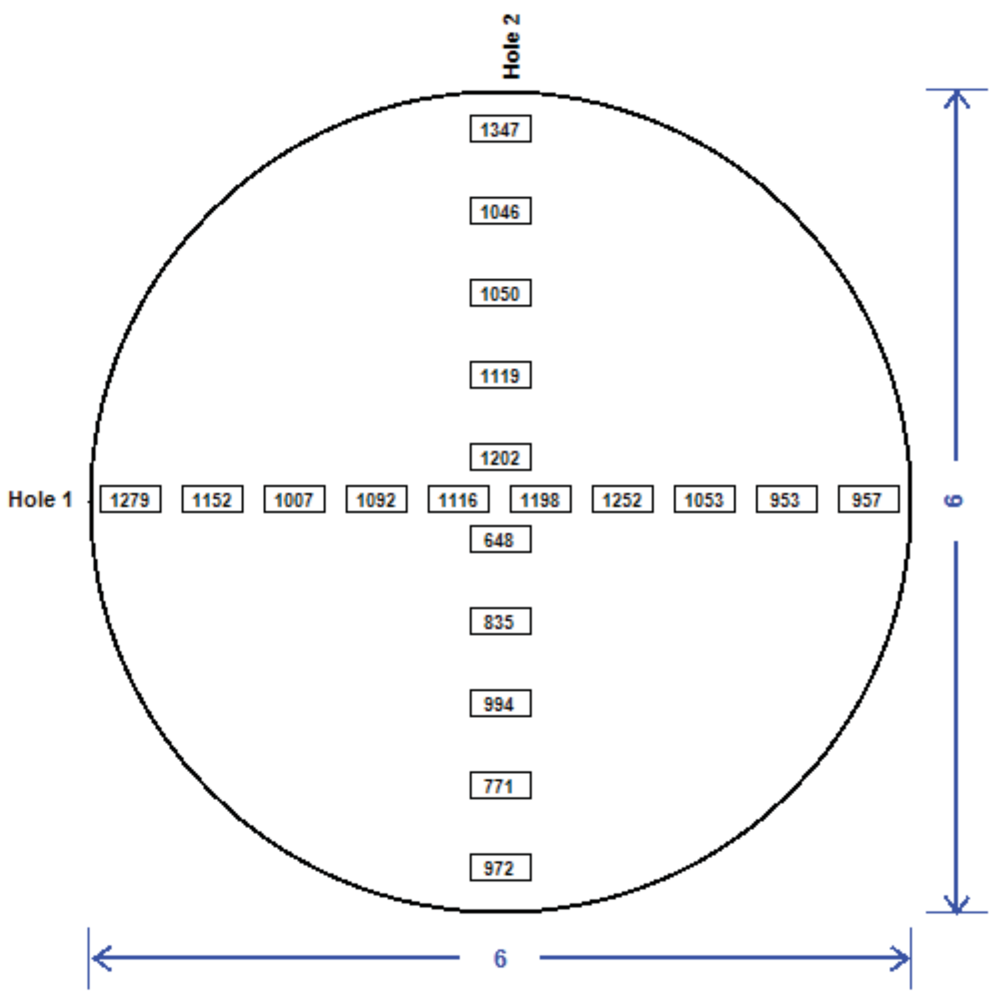
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 6 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.20 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 21043 |
| Average Reading | 1052 FPM |
| Design Total Flow | 220 CFM |
| Actual Total Flow | 210 CFM |
| Static Pressure | 0.29 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #10)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #12)**
**AREA: 4008 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | KANALFLANKT |
| Fan Model Number | Turbo T1 |
| Fan Serial Number | 0013371 03187 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 85 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 0.05 Amps |

| Motor Data | |
|---|---|
| Motor HP | 42 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 0.50 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.12 in. wc |
| Fan Discharge SP | 0.04 in. wc |
| Actual Total SP | 0.16 in. wc |
| Actual External SP | 0.16 in. wc |

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# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #12)/Duct-01**
**AREA: 4008 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

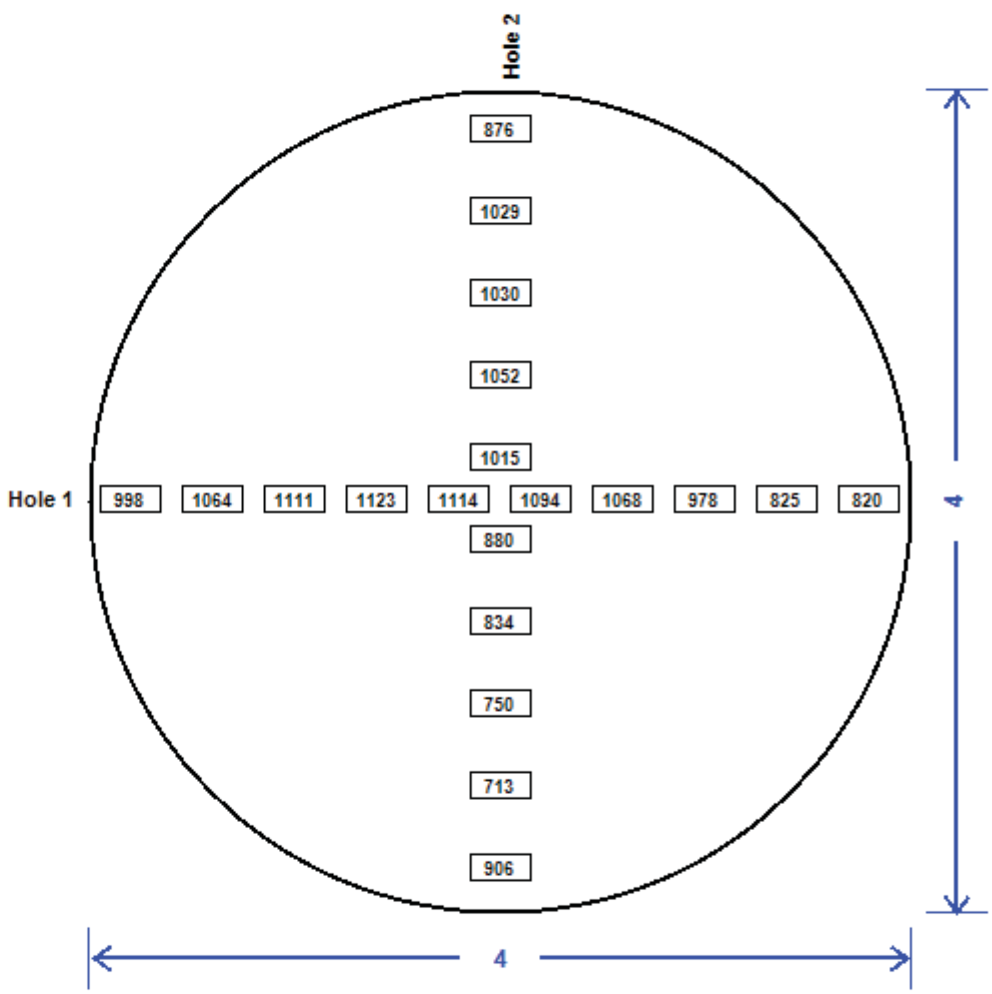
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 4 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.09 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 19280 |
| Average Reading | 964 FPM |
| Actual Total Flow | 87 CFM |
| Static Pressure | -0.12 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #12)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #13)**
**AREA: 3895 W Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Kanaflakt |
| Fan Model Number | K6 |
| Fan Serial Number | 0034374 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Vertical |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 75 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 0.53 Amps |

| Motor Data | |
|---|---|
| Motor HP | 81 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 0.73 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.02 in. wc |
| Fan Discharge SP | 0.05 in. wc |
| Actual Total SP | 0.07 in. wc |
| Actual External SP | 0.07 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #13)/T-01**
**AREA: 3895 W Mercer Way**

Tested By: Andy Eaden
Date: 12/11/2019

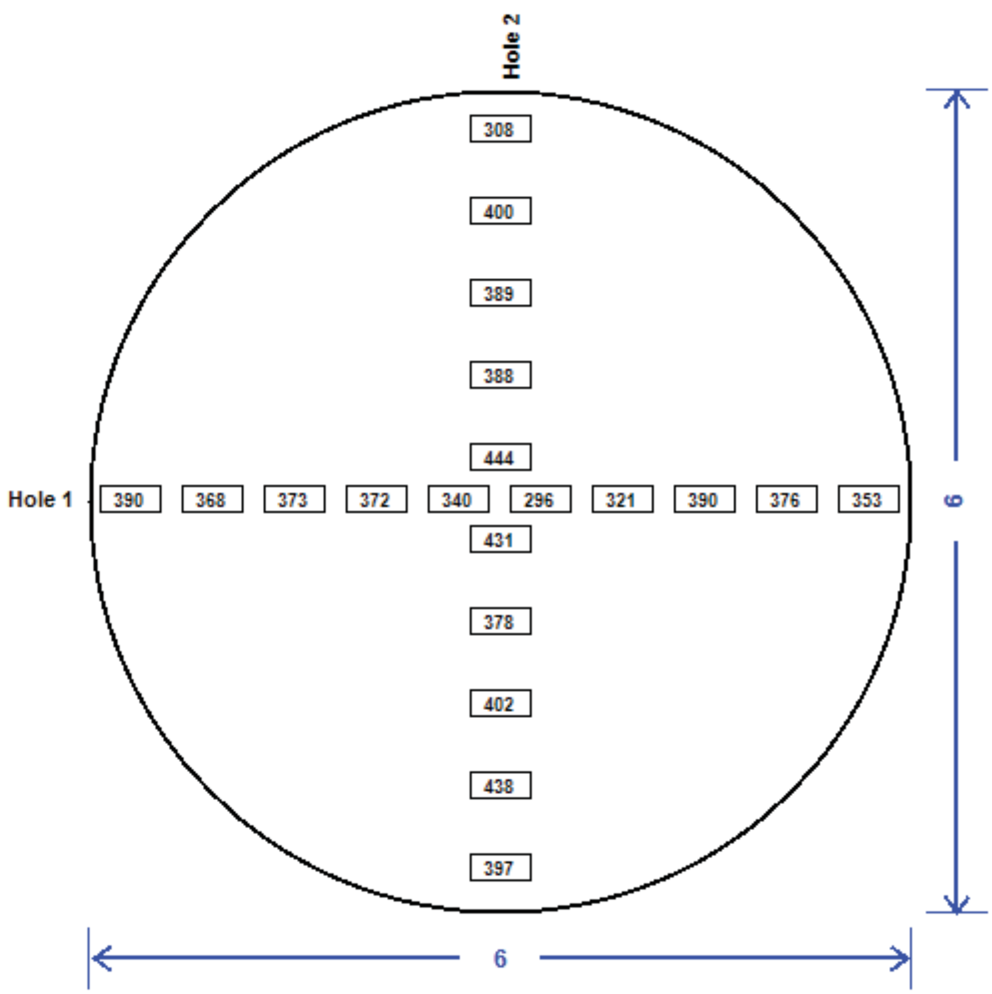
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 6 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.20 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 7554 |
| Average Reading | 378 FPM |
| Actual Total Flow | 76 CFM |
| Static Pressure | -0.02 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #13)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



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# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #15)**
**AREA: 4765 Forest Ave SE**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Kanaflakt |
| Fan Model Number | 0034571 |
| Fan Serial Number | 00392 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Design Flow | 400 CFM |
| Total Actual Flow | 310 CFM |
| Motor Volts T1-T2 | 120 Volts |
| Motor Amps T1 | 1.30 Amps |

| Motor Data | |
|---|---|
| Motor HP | 150 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.30 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.08 in. wc |
| Fan Discharge SP | 0.17 in. wc |
| Actual Total SP | 0.25 in. wc |
| Actual External SP | 0.25 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #15)/T-01**
**AREA: 4765 Forest Ave SE**

Tested By: Andy Eaden
Date: 12/11/2019

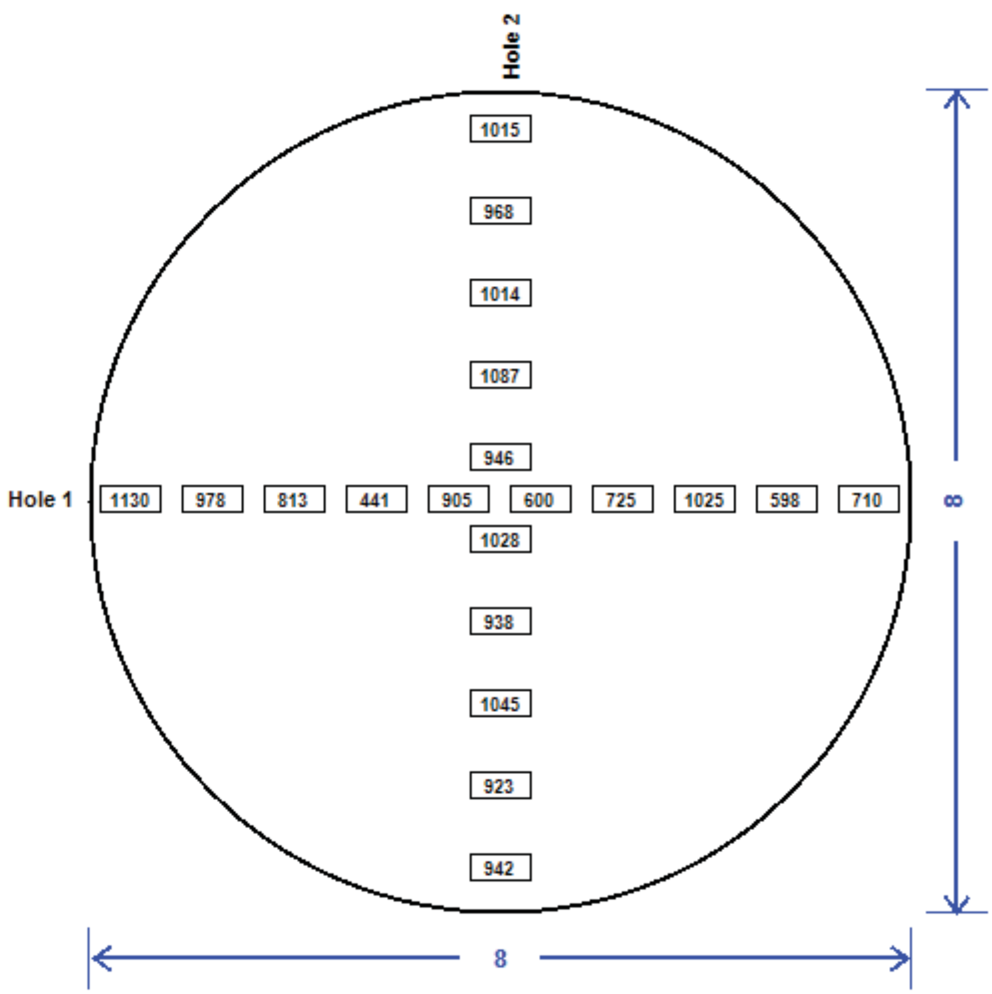
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 17831 |
| Average Reading | 892 FPM |
| Design Total Flow | 400 CFM |
| Actual Total Flow | 312 CFM |
| Static Pressure | 0.20 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #15)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #16)**
**AREA: 5495 W Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR225 |
| Fan Serial Number | 2169933 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Design Flow | 400 CFM |
| Total Actual Flow | 365 CFM |
| Motor Volts T1-T2 | 120 Volts |
| Motor Amps T1 | 1.10 Amps |

| Motor Data | |
|---|---|
| Motor HP | 150 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.30 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.19 in. wc |
| Fan Discharge SP | 0.53 in. wc |
| Actual Total SP | 0.72 in. wc |
| Actual External SP | 0.72 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #16)/T-01**
**AREA: 5495 W Mercer Way**

Tested By: Andy Eaden
Date: 12/11/2019

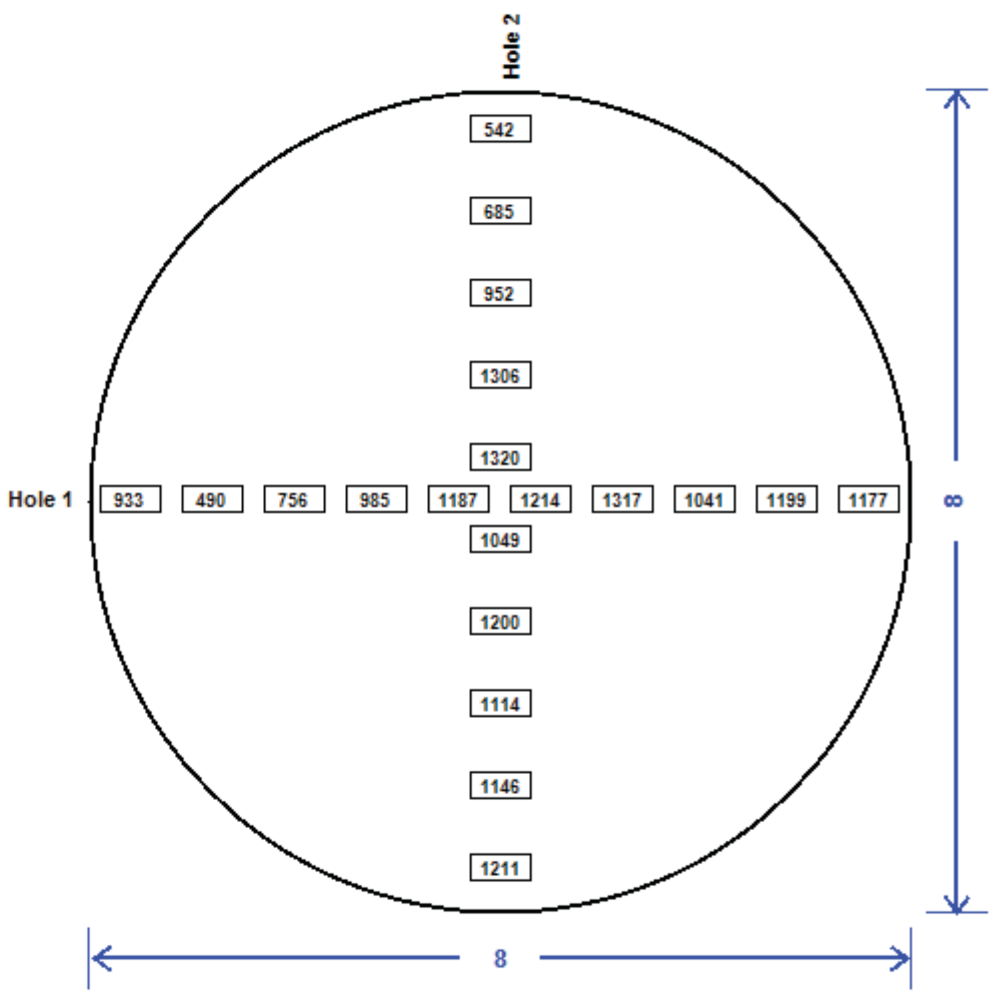
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 20824 |
| Average Reading | 1041 FPM |
| Design Total Flow | 400 CFM |
| Actual Total Flow | 364 CFM |
| Static Pressure | 0.53 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #16)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #17)**
**AREA: 6425 77th Ave SE**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR225 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 137 Watts HP |
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.35 Amps |

| Test Data | |
|---|---|
| Total Design Flow | 400 CFM |
| Total Actual Flow | 260 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 1.31 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.18 in. wc |
| Fan Discharge SP | 0.49 in. wc |
| Actual Total SP | 0.67 in. wc |
| Actual External SP | 0.67 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162
**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #17)/T-01**
**AREA: 6425 77th Ave SE**

Tested By: Andy Eaden
Date: 12/11/2019

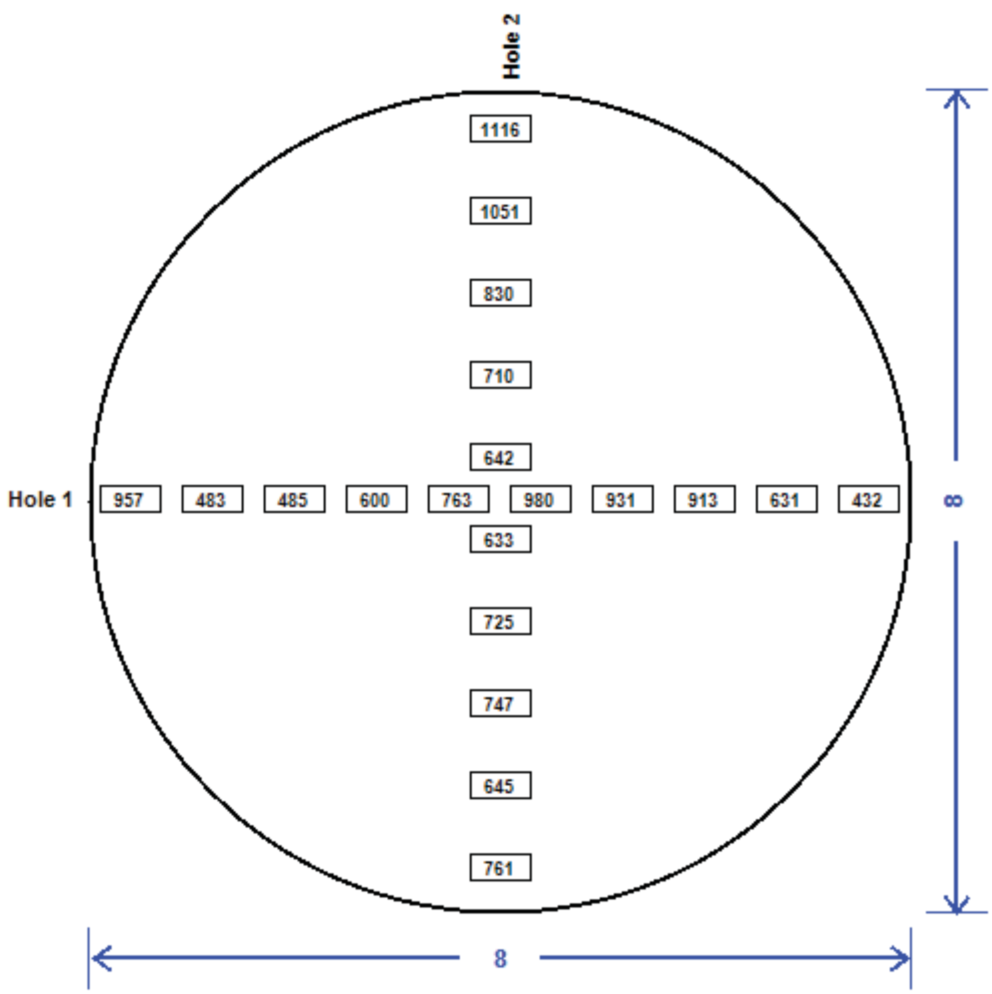
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 15035 |
| Average Reading | 752 FPM |
| Design Total Flow | 400 CFM |
| Actual Total Flow | 263 CFM |
| Static Pressure | 0.49 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #17)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #18)**
**AREA: 7201 W Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Kanaflakt |
| Fan Model Number | 0034571 |
| Fan Serial Number | 00392 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 150 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.30 Amps |

| Test Data | |
|---|---|
| Total Design Flow | 400 CFM |
| Total Actual Flow | 270 CFM |
| Motor Volts T1-T2 | 120 Volts |
| Motor Amps T1 | 1.30 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.08 in. wc |
| Fan Discharge SP | 0.17 in. wc |
| Actual Total SP | 0.25 in. wc |
| Actual External SP | 0.25 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #18)/T-01**
**AREA: 7201 W Mercer Way**

Tested By: Andy Eaden
Date: 12/11/2019

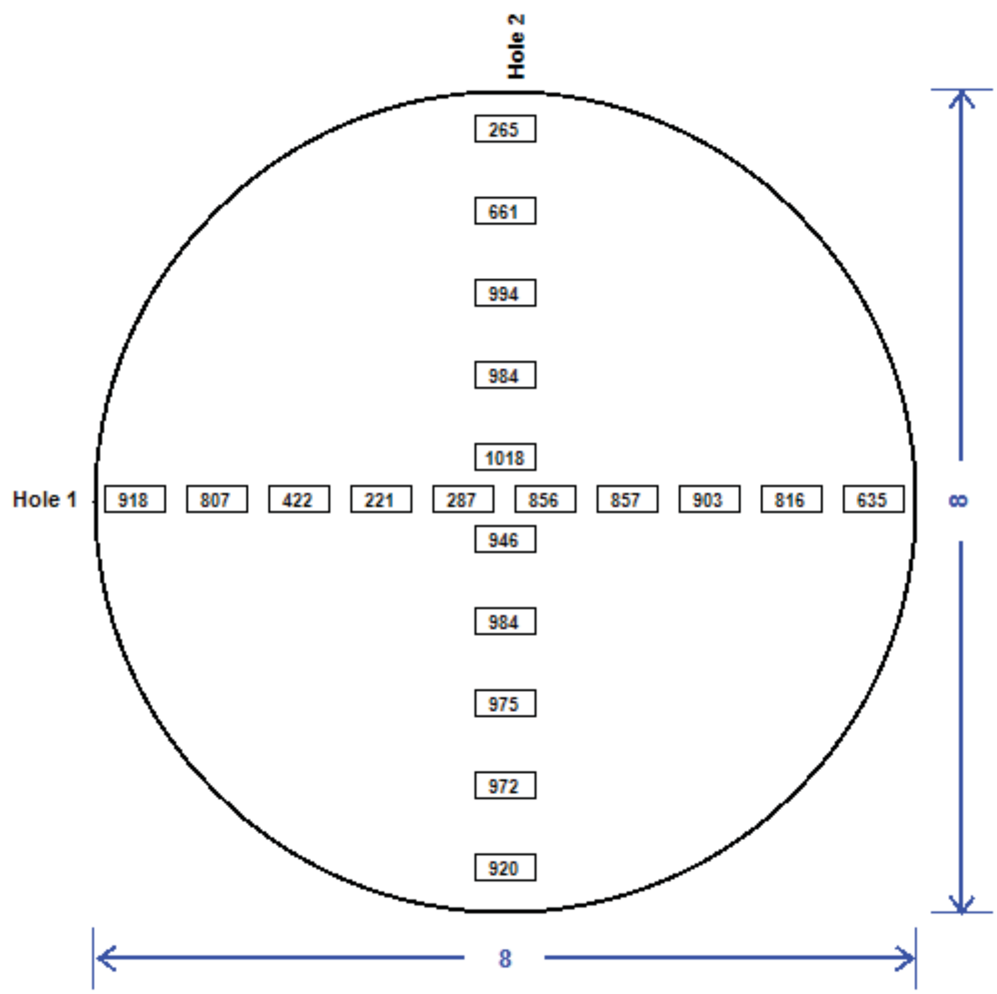
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 15441 |
| Average Reading | 772 FPM |
| Design Total Flow | 400 CFM |
| Actual Total Flow | 270 CFM |
| Static Pressure | 0.17 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #18)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

| | | | |
|---|---|---|---|
| **PROJECT:** | Mercer Island Pump Station | **DATE:** | 12/17/2019 |
| **LOCATION:** | SEATTLE, WA | **CONTACT:** | Andy Eaden |
| **PROJECT #:** | 2019-1162 | | |

**SYSTEM/UNIT: EF (Pump Station #19)**
**AREA: 7651 W Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR225 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 137 Watts HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.35 Amps |

| Test Data | |
|---|---|
| Total Actual Flow | 380 CFM |
| Motor Volts T1-T2 | 120 Volts |
| Motor Amps T1 | 1.00 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.16 in. wc |
| Fan Discharge SP | 0.30 in. wc |
| Actual Total SP | 0.46 in. wc |
| Actual External SP | 0.46 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #19)/T-01**
**AREA: 7651 W Mercer Way**

Tested By: Andy Eaden
Date: 12/11/2019

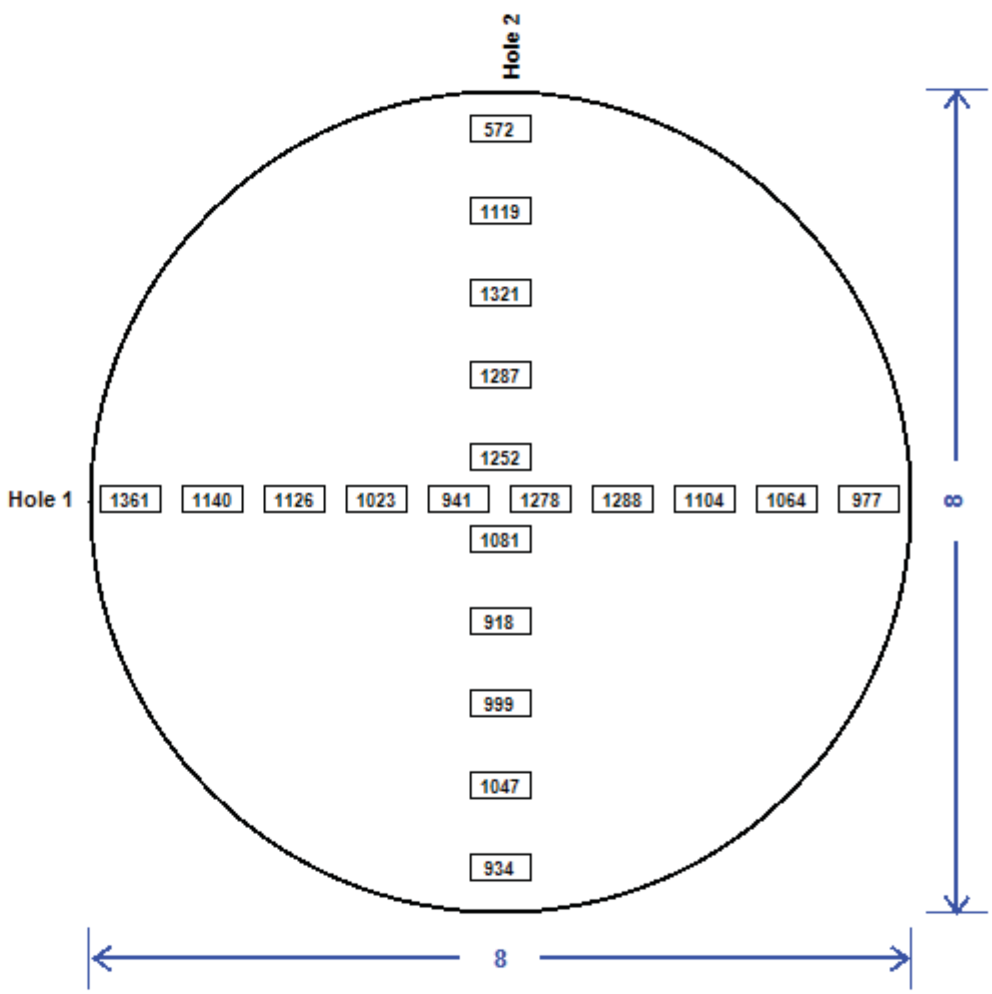
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 21832 |
| Average Reading | 1092 FPM |
| Actual Total Flow | 382 CFM |
| Static Pressure | 0.30 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #19)/T-01 | 12/11/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #20)**
**AREA: 8444 Benotho Pl**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FR225 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Design Flow | 400 CFM |
| Total Actual Flow | 410 CFM |
| Motor Volts T1-T2 | 122 Volts |
| Motor Amps T1 | 1.10 Amps |

| Motor Data | |
|---|---|
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.35 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.19 in. wc |
| Fan Discharge SP | 0.28 in. wc |
| Actual Total SP | 0.47 in. wc |
| Actual External SP | 0.47 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #20)/Duct-01**
**AREA: 8444 Benotho Pl**

Tested By: Andy Eaden
Date: 12/16/2019

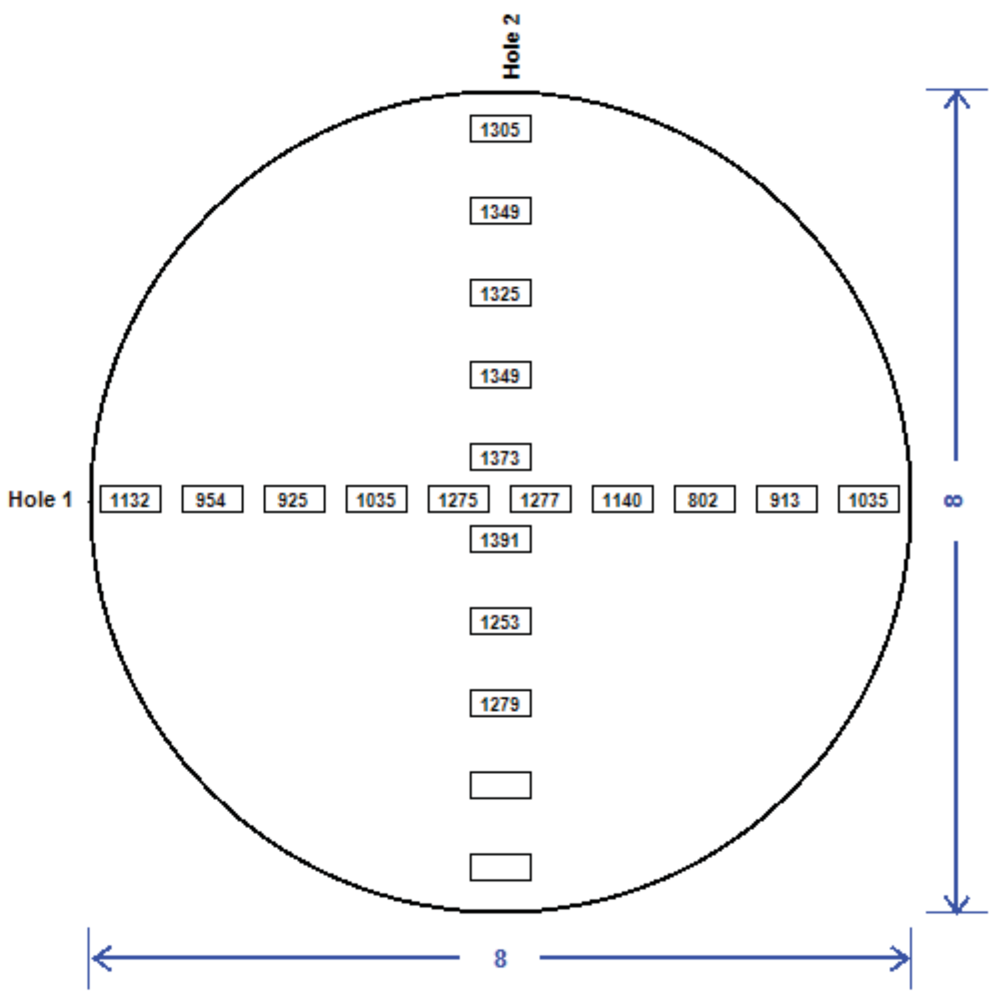
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 21112 |
| Average Reading | 1173 FPM |
| Design Total Flow | 400 CFM |
| Actual Total Flow | 411 CFM |
| Static Pressure | 0.28 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #20)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #21)**
**AREA: 8002 Avalon Pl**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Soler & Palau |
| Fan Model Number | TD-200 |
| Fan Serial Number | 5211371300 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 325 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 0.86 Amps |

| Motor Data | |
|---|---|
| Motor HP | 100 Watts HP |
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.00 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.16 in. wc |
| Fan Discharge SP | 0.43 in. wc |
| Actual Total SP | 0.59 in. wc |
| Actual External SP | 0.59 in. wc |

# Fan Unit

| | | | |
|---|---|---|---|
| **PROJECT:** | Mercer Island Pump Station | **DATE:** | 12/17/2019 |
| **LOCATION:** | SEATTLE, WA | **CONTACT:** | Andy Eaden |
| **PROJECT #:** | 2019-1162 | | |

**SYSTEM/UNIT: EF (Pump Station #21)/Duct-01**
**AREA: 8002 Avalon Pl**

Tested By: Andy Eaden
Date: 12/16/2019

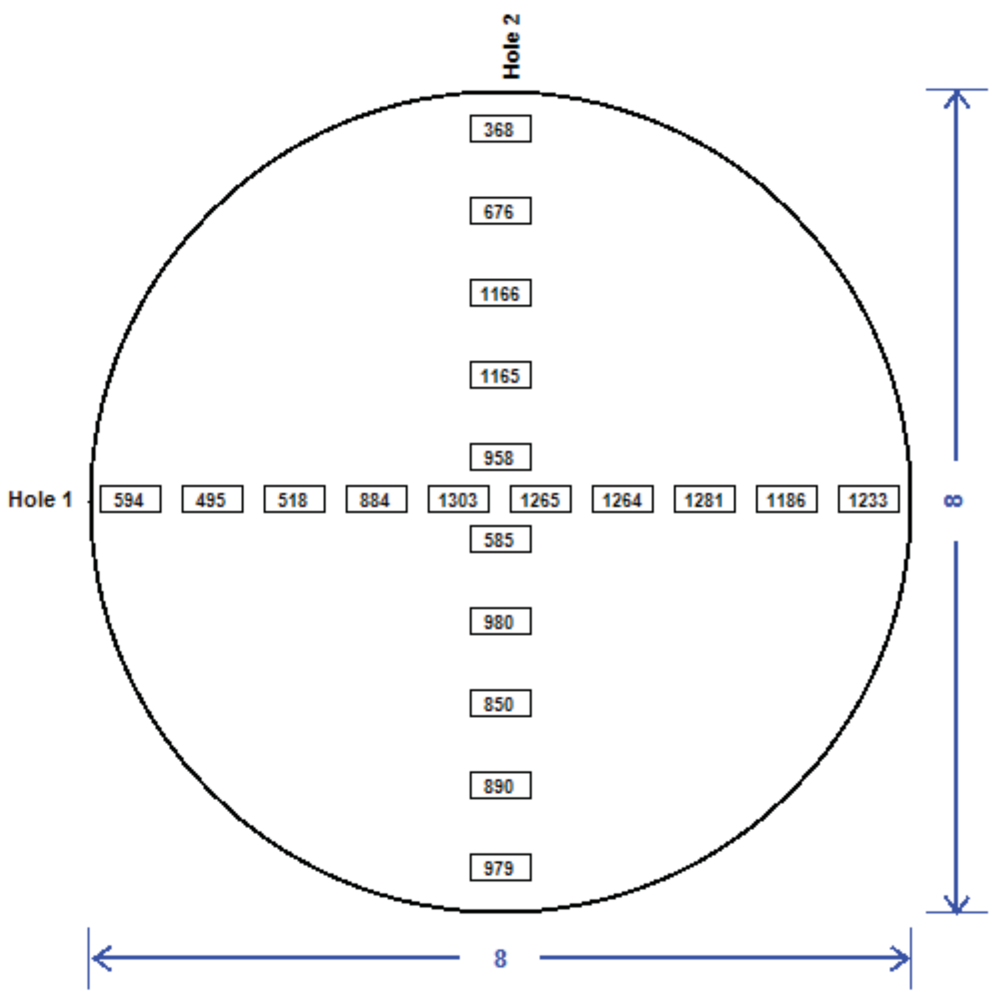
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 18640 |
| Average Reading | 932 FPM |
| Actual Total Flow | 326 CFM |
| Static Pressure | 0.43 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #21)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

| | | | |
|---|---|---|---|
| **PROJECT:** | Mercer Island Pump Station | **DATE:** | 12/17/2019 |
| **LOCATION:** | SEATTLE, WA | **CONTACT:** | Andy Eaden |
| **PROJECT #:** | 2019-1162 | | |

**SYSTEM/UNIT: EF (Pump Station #22)**
**AREA: 6228 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Soler & Palau |
| Fan Model Number | TD-200 |
| Fan Serial Number | 5211371300 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 380 CFM |
| Motor Volts T1-T2 | 121 Volts |
| Motor Amps T1 | 1.06 Amps |

| Motor Data | |
|---|---|
| Motor HP | 100 Watts HP |
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.00 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.02 in. wc |
| Fan Discharge SP | 0.33 in. wc |
| Actual Total SP | 0.35 in. wc |
| Actual External SP | 0.35 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #22)/Duct-01**
**AREA: 6228 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

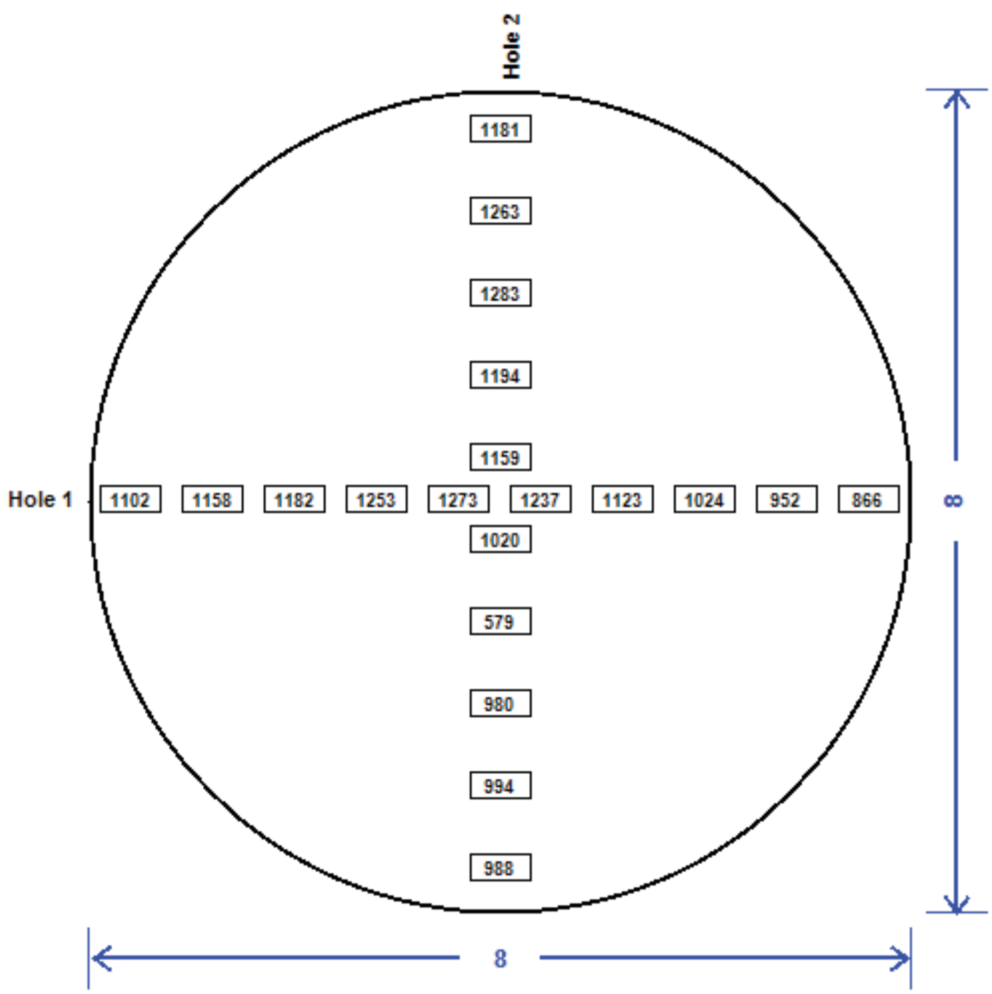
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 21811 |
| Average Reading | 1091 FPM |
| Actual Total Flow | 382 CFM |
| Static Pressure | 0.33 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #22)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #23)**
**AREA: 5406 96th Ave SE**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Fantech |
| Fan Model Number | FG 8XL (4YM44A) |
| Fan Serial Number | 45018 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 470 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 1.30 Amps |

| Motor Data | |
|---|---|
| Motor HP | 150 Watts HP |
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.32 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.22 in. wc |
| Fan Discharge SP | 0.43 in. wc |
| Actual Total SP | 0.65 in. wc |
| Actual External SP | 0.65 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #23)/Duct-01**
**AREA: 5406 96th Ave SE**

Tested By: Andy Eaden
Date: 12/16/2019

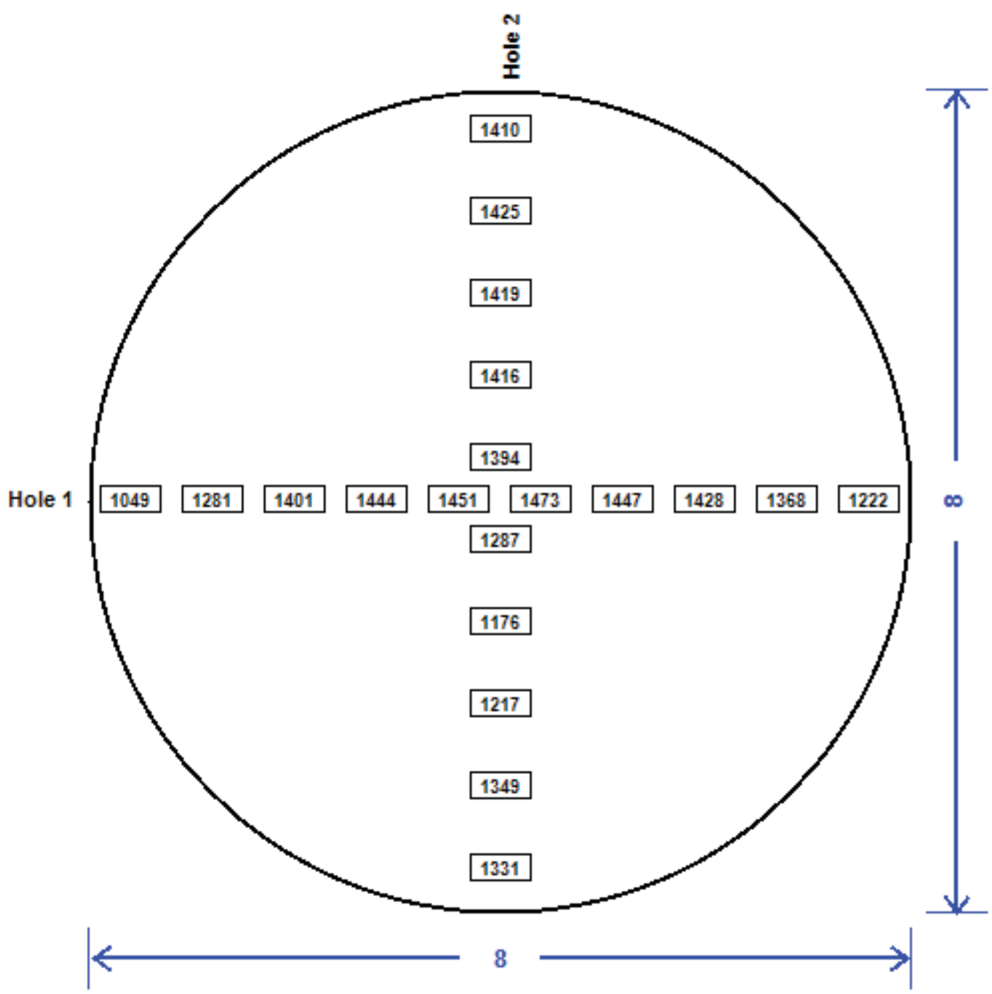
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 26988 |
| Average Reading | 1349 FPM |
| Actual Total Flow | 472 CFM |
| Static Pressure | 0.43 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #23)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #24)**
**AREA: 4606 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | KANALFLANKT |
| Fan Model Number | Turbo T3 |
| Fan Serial Number | 0034571 00390 |
| Fan Rotation | Counterclockwise |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Test Data | |
|---|---|
| Total Actual Flow | 355 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 1.44 Amps |

| Motor Data | |
|---|---|
| Motor HP | 150 Watt HP |
| Motor Rated Volts | 115 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.30 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.11 in. wc |
| Fan Discharge SP | 0.30 in. wc |
| Actual Total SP | 0.41 in. wc |
| Actual External SP | 0.41 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #24)/Duct-01**
**AREA: 4606 E Mercer Way**

Tested By: Andy Eaden
Date: 12/16/2019

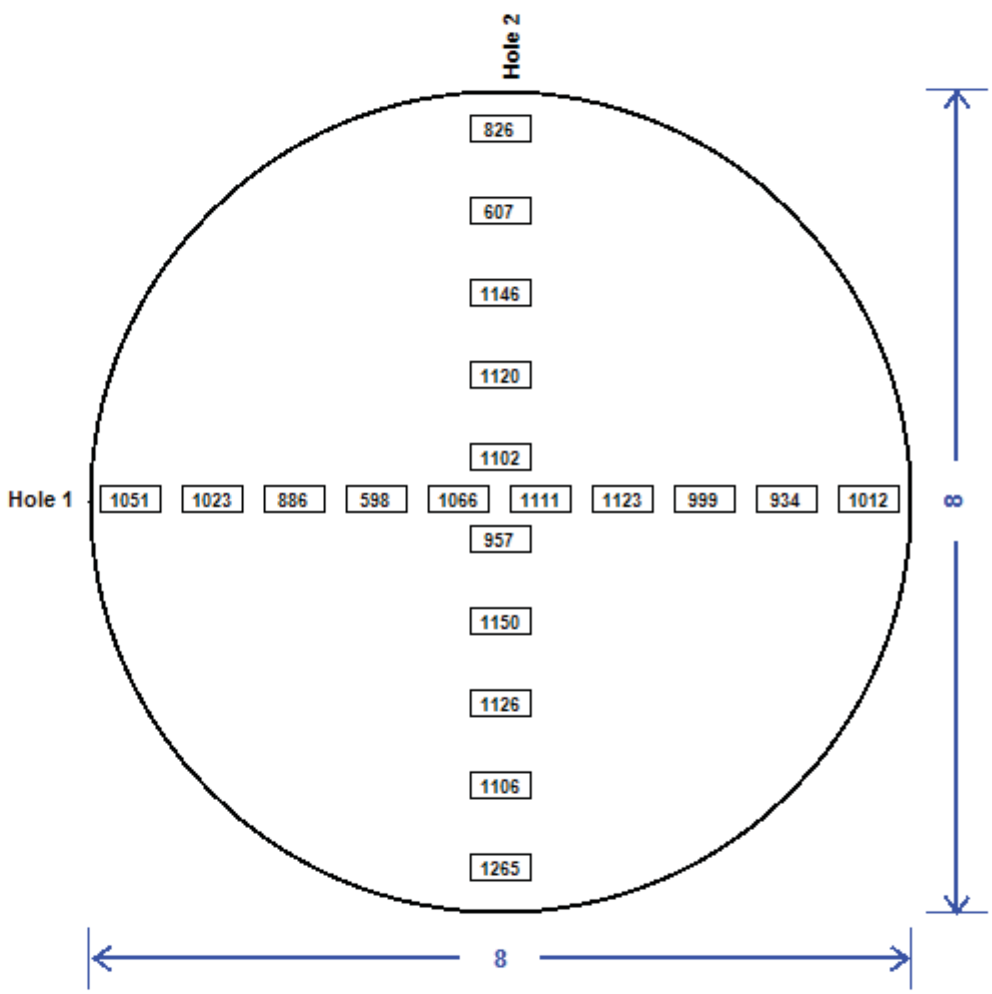
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 20208 |
| Average Reading | 1010 FPM |
| Actual Total Flow | 354 CFM |
| Static Pressure | 0.30 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #24)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #25)**
**AREA: 9855 SE 42nd St**

Tested By: Andy Eaden
Date: 12/16/2019

| Unit Data | |
|---|---|
| Fan Manufacturer | Soler & Palau |
| Fan Model Number | TD-200 |
| Fan Serial Number | 5211371300 |
| Fan Discharge | Inline |
| Drive Type | Direct Drive |

| Motor Data | |
|---|---|
| Motor HP | 100W HP |
| Motor Rated Volts | 120 Volts |
| Motor Phase | 1 |
| Motor Hertz | 60 Hz |
| Motor Full Load Amps | 1.00 Amps |

| Test Data | |
|---|---|
| Total Actual Flow | 290 CFM |
| Motor Volts T1-T2 | 119 Volts |
| Motor Amps T1 | 0.96 Amps |

| Test Pressures | |
|---|---|
| Fan Suction SP | -0.15 in. wc |
| Fan Discharge SP | -0.71 in. wc |
| Actual Total SP | 0.83 in. wc |
| Actual External SP | 0.83 in. wc |

# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF (Pump Station #25)/Duct-01**
**AREA: 9855 SE 42nd St**

Tested By: Andy Eaden
Date: 12/16/2019

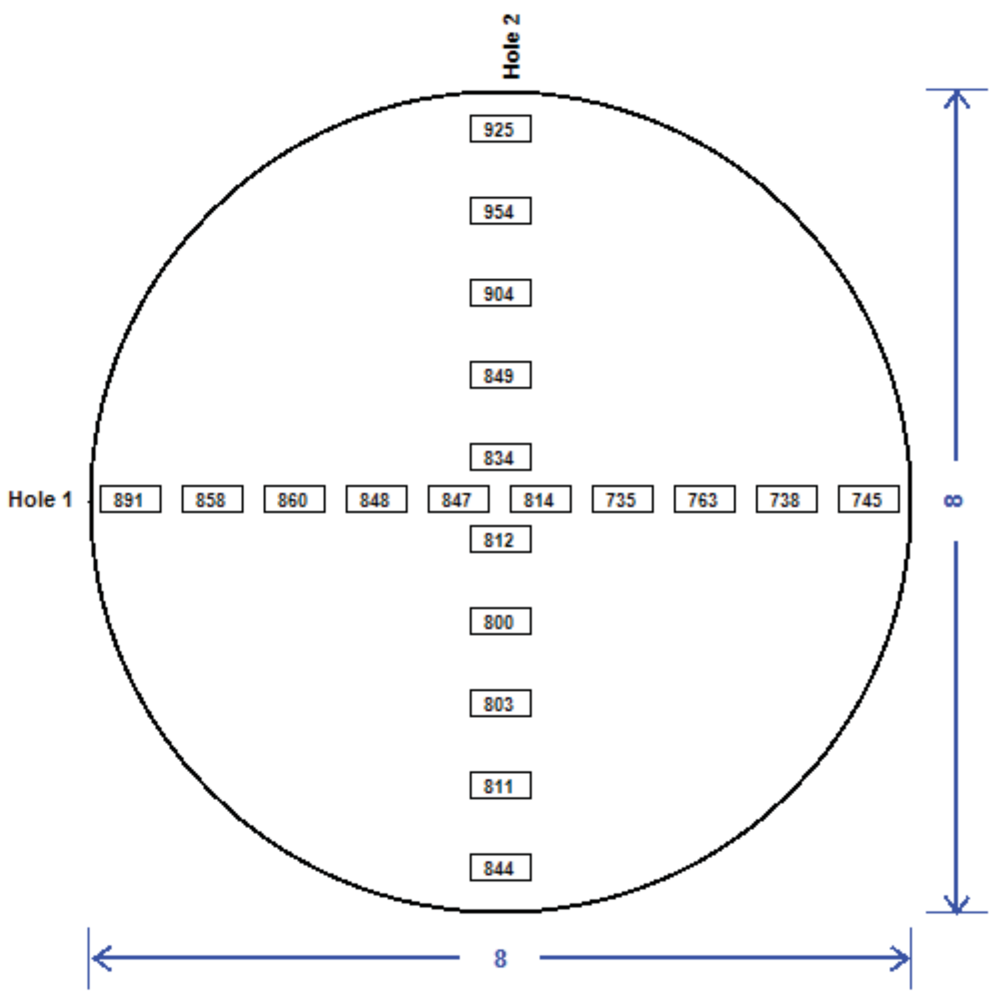
| Unit Data | |
|---|---|
| Type of Traverse | Round |
| Diameter | 8 in. |
| Insulation Width | 0 in. |
| Air Flow Area | 0.35 sq. ft. |
| Number Of Rows | 2 |
| Readings Per Row | 10 |
| Total Readings | 20 |

| Final Data | |
|---|---|
| Sum of Readings | 16635 |
| Average Reading | 832 FPM |
| Actual Total Flow | 291 CFM |
| Static Pressure | 0.71 in. |

**Log:**

| | | | |
|---|---|---|---|
| EF (Pump Station #25)/Duct-01 | 12/2/2019 | Andy Eaden | A Shortridge Multimeter with a Pitot Tube was used to obtain velocity readings. |

**Traverse Data Points**



# Fan Unit

**PROJECT:** Mercer Island Pump Station
**LOCATION:** SEATTLE, WA
**PROJECT #:** 2019-1162

**DATE:** 12/17/2019
**CONTACT:** Andy Eaden

**SYSTEM/UNIT: EF-First Hill**

Tested By: Andy Eaden
Date: 12/11/2019

**Log:**

| | | | |
|---|---|---|---|
| EF-First Hill | 12/11/2019 | Andy Eaden | There is no pit exhaust, only generator exhaust. |

## Instrument Calibrations

| | |
|---|---|
| Instrument Type | Air Data Meter with Flowhood |
| Instrument Manufacturer | Shortridge |
| Instrument Model Number | ADM 860 |
| Instrument Serial # | M92595 |
| Calibration Due Date | 2/6/2020 |
| | |
| | |
| Instrument Type | Tachometer |
| Instrument Manufacturer | Shimpo |
| Instrument Model Number | DT-207L |
| Instrument Serial # | C1CB0033 |
| Calibration Due Date | 10/18/2020 |
| | |
| | |
| Instrument Type | Amp Probe |
| Instrument Manufacturer | Fluke |
| Instrument Model Number | 32 |
| Instrument Serial # | 02926-1 |
| Calibration Due Date | 10/18/2020 |
| | |
| | |
| Instrument Type | Temperature Probe |
| Instrument Manufacturer | Shortridge |
| Instrument Model Number | ADM 860 |
| Instrument Serial # | M92595 |
| Calibration Due Date | 2/6/2020 |
| | |
| | |
| Instrument Type | Air Foil |
| Instrument Manufacturer | Shortridge |
| Instrument Model Number | ADM 860 |
| Instrument Serial # | M92595 |
| Calibration Due Date | 2/6/2020 |
| | |
| Instrument Type | Hydrometer |
| Instrument Manufacturer | Shortridge |
| Instrument Model Number | HDM-250 |
| Instrument Serial # | W11007 |
| Calibration Due Date | 9/24/2020 |

# Appendix C
# NFPA 820 STANDARD ALTERNATE REQUEST

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Engineers...Working Wonders With Water®

1200 Fifth Avenue, Suite 900, Seattle, Washington 98101
P. 206.684.6532 F. 206.903.0419

February 24, 2021

Jeromy Hicks
Mercer Island Fire Department
3030 78th Avenue SE
Mercer Island, WA 98040

Subject: National Fire Protection Agency (NFPA) 820 Standard Alternate Request

## Scope of Work

The purpose of this work is to assess the City of Mercer Island's Lakeline Pump Stations with regards to the NFPA 820 standard. The effort involved the observation, assessment, and development of recommended improvements for seventeen (17) wastewater pump stations and one (1) flushing pump station.

## Standard Deficiencies

The results of this work have identified that the City of Mercer Island's Lakeline Pump Stations will need to make audible and visual alarm improvements to adhere to the NFPA 820 Standard. The City is requesting variance to the audible and visual alarm requirements highlighted in Section 7.6 and Table 7.6.1 of the NFPA 820 standard in order to preserve peace with its surrounding neighbors while trying to maintain the intent of the standard. See below for specific references to the NFPA 820 standard.

**7.6 Alarm Signaling Systems.**

**7.6.1*** Distinct local and remote alarms shall be displayed in accordance with Table 7.6.1.

**7.6.2*** Local and remote alarms required in Table 7.6.1 shall be located to be readily heard and seen by responsible personnel.

**Table 7.6.1 Location and Type of Alarm Signaling Notification Appliances Required in 7.6.1**

| Location | Alarm Notification Appliances |
|---|---|
| Entrance(s) to spaces in occupied facilities | Visual and audible alarms |
| Entrances to remote spaces that are not constantly attended | Visual and audible alarms or a dual light warning system |
| Within spaces | Visual and audible alarms |
| Constantly attended location (local or remote) | Visual and audible alarms |

## Proposed Alternative

Below is a list of items that are being proposed as alternatives to the audible and visual alarm requirements highlighted in Section 7.6 and Table 7.6.1 of the NFPA 820 Standard:

- In lieu of a dual light warning system at the entrance to each pump station, the proposed alternative will provide a single no-go light outside each wastewater pump station coupled with a remote fan failure signal to the City's SCADA system.
  - It is believed that this alternative still meets the intent of Sections 7.6.1 and 7.6.2 and Table 7.6.1, as it still maintains both remote and local alarms to warn and prevent operations staff from entering a hazardous area.
- In lieu of providing an audible alarm that continuously sounds within each pump station, the installed audible alarm will be programmed to activate only when the pump access hatch is open.
  - It is believed that this alternative still meets the intent of Sections 7.6.1 and 7.6.2 and Table 7.6.1 as it still maintains the audible alarm requirement to warn and prevent operations staff from entering a hazardous area.

## Summary Statement

We believe the proposed alternatives will meet the intent of the NFPA 820 standard which is to provide a degree of fire and explosion protection for life, property, continuity of mission, and protection of the environment.

Sincerely,

CAROLLO ENGINEERS, INC.

John Sagun, PE
Lead Mechanical Engineer.

SECTION 01 12 16

WORK SEQUENCE AND CONSTRAINTS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section specifies project milestones, construction sequencing requirements, work restrictions, and constraints for the Work.

B. The Contractor shall coordinate all work hours, shutdowns, and closures during the construction period with the Owner and all utility service companies.

### 1.02 CONTINUITY OF OPERATIONS

A. The existing sewer pump stations are currently and continuously in operation, and those functions shall not be interrupted except as specified herein. The Contractor shall coordinate the work to avoid any interference with normal operation of equipment and processes.

B. If an electrical shutdown is required at a sewer pump station site, a maximum of 15 minutes of downtime is allowed. Coordinate with the Owner to initiate a wetwell drawdown prior to electrical shutdown.

### 1.03 SUBMITTAL

A. Procedures: Section 01 33 00.

B. Action Submittal:

1. The Contractor shall submit a detailed outage plan and time schedule for operations which will make it necessary to remove an item from service. The schedule shall be coordinated with the construction schedule specified in the General Conditions of the Contract Documents and shall meet the restrictions and conditions specified in this section. The detailed plan shall describe the length of time required to complete said operation. The plan shall minimize the amount of downtime required for the system.
2. Contractor shall submit an outline of the cutover approach on a per site basis, which satisfies the restrictions and constraints outlined in this section.

C. The Contractor shall observe the following restrictions:

1. Systems or individual equipment items shall be isolated, decommissioned, or deenergized, in accordance with the detailed outage plan and schedule.
2. The Owner shall be notified in writing at least three weeks in advance of the planned operation.
3. Onsite construction activities shall be performed within working hours: 7am-6pm. No work shall be performed on weekends.
4. PLC panel cutovers shall occur only on Mondays through Thursdays.

## 1.04 SEQUENCE AND SCHEDULE OF CONSTRUCTION

A. It is the Contractor's responsibility to coordinate and plan the construction activities to integrate each schedule constraint into performance of the overall work.

B. Contractor shall develop a construction schedule that supports the implementation, testing and commissioning requirements as defined by the contract documents and in Attachment A at the end of this Section. Coordinate with Owner on the construction schedule and pump station order for cutover.

C. For sites with intrinsically safe (IS) panels, prior to PLC panel cutover, install, test, and commission FogRod level instrument. In addition, install, test, and commission IS panels, such that the station can operate off the local hardwired level control system during PLC panel cutover. Applicable sites with IS panels are noted in Attachment A. In coordination with the Owner, test operation of Local Hardwired (level) Control via IS Panel and Local Manual Control via local Hand-Off-Auto at the sewer pump stations prior to PLC panel cutover.

D. Level instrumentation is critical to sewer pump station operations. Contractor shall coordinate construction sequencing to limit downtime of level instrumentation. Either the primary or secondary (FogRod) wetwell level instrument shall remain in operation at any given time.

E. Unless approved by the Owner, Contractor shall complete work at one pump station prior to beginning work at the next pump station.

## 1.05 OTHER CONTRACTS

A. Sequence, schedule, and coordinate work in and around the activities of other contractors or operations staff on the site to avoid obstruction of work access and interference with, or delay of, the work of other contractors on the site.

B. Other construction contracts underway at the sewer pump station sites include the following:
   1. Pump Stations 23 and 25 Generator Replacement Project.

## 1.06 MILESTONES

A. The Contractor shall meet the following submittal milestones. The submittal list below is not inclusive of all submittals required by the specifications.
   1. Section 40 63 43 and 40 61 13 Submittals
      a. Submit Section 40 63 43 Action Submittal and Section 40 61 13 Quality Assurance Submittal within 21 days after the effective date of the Notice to Proceed.
      b. In the event of the need to "revise and resubmit," address all review comments to the initial submittal, and submit a resubmittal within 7 days after receiving review comments.
      c. Provide a first resubmittal which results in a Review Action of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED," as specified in Section 01 33 00.

2. Section 40 67 00 and 26 05 00 Submittals
    a. Submit Section 40 67 00 Action Submittal and Section 26 05 00 Action Submittal within 30 days after the effective date of the Notice to Proceed.
    b. In the event of the need to "revise and resubmit," address all review comments to the initial submittal, and submit a resubmittal within 14 days after receiving review comments.
    c. Provide a first resubmittal which results in a Review Action of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED," as specified in Section 01 33 00.
3. Section 40 70 00 Submittal
    a. Submit Section 40 70 00 Action Submittal within 60 days after the effective date of the Notice to Proceed.
    b. In the event of the need to "revise and resubmit," address all review comments to the initial submittal, and submit a resubmittal within 21 days after receiving review comments.
    c. Provide a first resubmittal which results in a Review Action of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED," as specified in Section 01 33 00.

## PART 2 NOT USED

## PART 3 EXECUTION

### 3.01 ATTACHMENTS

A. 01 12 16 Attachment A: Work Sequence

| Field or Heading | Comment or Description |
|---|---|
| Work Package Sequence | The order in which a work package shall be constructed unless mutually agreed upon by the Owner, Engineer, and Contractor. |
| Site | Location of the work. |
| Work Period Performed | Identifies when the work is constrained to. If Anytime, work can be constructed, tested, and commissioned any season of the year provided the identified constraints are met. |
| Estimate I/O Point Quantity per Site | Estimate I/O point quantity at the site, as an indicator of size of work for cutover. |
| Allowed Cutover Time | Any limitation on the amount of time the control system can be down at a site. |
| Construction Constraints | Any limitation for doing work at the specific site. |
| Flexibility to Move Construction of Package within Sequence | Identifies if a specific Work Package has flexibility to be moved in the overall sequence. If there is only one site in the work package sequence, not applicable (N/A) is listed. |
| Comments | Identifies additional considerations for the site. |

**END OF SECTION**

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# SECTION 01 12 16_WORK SEQUENCE AND CONSTRAINTS

## ATTACHMENT A

## WORK SEQUENCE

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## SECTION 01 12 16 ATTACHMENT A

## WORK SEQUENCE

| Work Package Sequence | Site | Work Period Performed | Estimate I/O Point Quantity per Site | Allowed Cutover Time (Control System Downtime) | Construction Constraints | Flexibility to Move Construction of Package within Sequence | Comments |
|---|---|---|---|---|---|---|---|
| 1 | FLUSH STATION 12 | Anytime | 32 | 6 Hours | None. | N/A | |
| 2 | PUMP STATION 15 | Anytime | 92 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 16 | Anytime | 96 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 17 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 18 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 19 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 20 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 2 | PUMP STATION 21 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 3 | PUMP STATION 22 | Anytime | 96 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 3 | PUMP STATION 23 | Anytime | 96 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. Coordinate with other Construction at site per Section 01 12 16. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 3 | PUMP STATION 24 | Anytime | 96 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 3 | PUMP STATION 25 | Conducted between October 1st to April 1st. Coordinate with Owner on timing to perform cutover during a dry week. | 92 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. Coordinate with other Construction at site per Section 01 12 16. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 4 | PUMP STATION 10 | Anytime | 92 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 4 | PUMP STATION 1 | Anytime | 92 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 4 | PUMP STATION 13 | Anytime | 92 (PLC), 36 (RIO) | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 5 | PUMP STATION 4 | Anytime | 112 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel prior to cutover. |
| 5 | PUMP STATION 14 | Anytime | 92 | 6 Hours | Site must remain in operation (hardwired level control) during PLC panel cutover. | Flexibility within Work Period | Install IS panel and level control panel prior to cutover. |

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SECTION 01 14 19

USE OF SITE

## PART 1 GENERAL

### 1.01 SUMMARY

A. The Owner's operating personnel will be responsible for operating the existing sewer pump stations throughout the execution of this contract. Equipment presently installed at remote pump station sites must be available to operating personnel at all times for use, maintenance, and repair. If it is necessary in the course of operating a site, for the Contractor to move their equipment, materials, or any material included in the work, Contractor shall do so promptly and place that equipment or material in an area which does not interfere with the site operation. The Contractor shall not adjust or operate serviceable or functioning equipment or systems except as specifically required by this contract.

B. The existing sewer pump stations will remain in operation throughout the execution of this contract. The Contractor shall schedule and conduct work to minimize necessary shutdowns and interference with normal pump station operations and maintenance.

C. The Contractor shall notify the Owner, in accordance with Section 01 12 16, three weeks in advance of the time it is necessary to take out of service any existing electrical circuit, panel, equipment or structure. The Contractor shall be responsible for providing whatever temporary piping, pumping, power, and control facilities as are required to maintain continuous site operation except as otherwise specified. The integrity of existing site utilities shall be maintained by the Contractor at all times.

## PART 2 NOT USED

## PART 3 NOT USED

**END OF SECTION**

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SECTION 01 22 00

MEASUREMENT AND PAYMENT

# PART 1 MEASUREMENT AND PAYMENT

## 1.01 GENERAL

A. This section generally describes the scope of work included in the bid items listed in the Bidding Schedule and specifies the basis for measurement and payment for work completed under each item. Detailed requirements and extent of work are stated in the applicable specification sections and shown on the drawings. All work required under the Contract shall be included for payment within the bid items listed in accordance with the General Terms and Conditions whether or not each and every required element of work is included in the description.

B. Progress payments and payment for materials on hand shall be in conformance with the General Terms and Conditions Article 7.

C. All progress payments must include this statement: [enter Contractor name] certifies that the prevailing wages have been paid in accordance with the pre-file statement of intent to pay prevailing wages on file with the City of Mercer Island.

D. Contractor shall submit properly completed invoice(s) electronically to the Owner's Project Manager or designated representative and also to the Public Works Mailbox at publicworks@mercerisland.gov. Copies of the work order or request form with complete information shall be attached to invoices submitted for payment. The Contractor shall be paid upon submission of a properly itemized invoice, including sales tax. The Invoice will be reviewed by the Owner before payment is made, and the Owner's designated representative shall not authorize payment until, in their opinion, the work has been satisfactorily completed.

## 1.02 OPERATIONS AND MAINTENANCE MANUALS

A. For items of equipment, acceptable operating and maintenance information shall be delivered to the Engineer before the Contractor will be paid for more than 90 percent of the purchase value of that equipment. Purchase value shall be the net price for the equipment as given on the invoice. Acceptable operating and maintenance information will be that for which the preliminary O&M manual submittal has been returned as No Exceptions Taken or Make Corrections Noted.

B. Complete final operating and maintenance manuals per Section 01 78 23 must be delivered to the Engineer prior to the Project being 90 percent complete. Progress payments for work in excess of 90 percent completion will not be made until the specified final operating and maintenance information has been delivered to the Engineer.

## PART 2 BID ITEMS

### 2.01 BID ITEMS 1 THROUGH 17 – LUMP SUM BID PER SITE

A. Bid Items 1 through 17 are lump sum bids per site. Each lump sum bid per site shall include the following:
   1. General conditions and administrative work of the Contract, including, but not limited to the following:
      a. Project meetings.
      b. Construction progress schedule.
      c. Progress pay estimates.
      d. Project safety requirements.
      e. Construction facilities and temporary controls.
      f. Traffic control.
   2. Work of the Electrical Contractor specified in Section 26 05 00.
   3. Work of the Systems Integrator specified in the Sections in Division 40.

B. Measurement and payment for these items are subject to the percentage of work completed.

C. Payments will be made monthly on a pro-rata basis for these items as a lump sum.

### 2.02 BID ITEM 18 – UNEXPECTED SITE CHANGES – ALLOWANCE

A. The price for any work paid for under this Bid Item will be negotiated prior to commencing such work and shall be for work to remedy unforeseen conditions or conflicts, not identified in the Contract Documents. Payment or credits for changes amounting to $40,000 or less may be made under the Bid Item.

B. At the discretion of the Owner, the following procedure for Unexpected Site Changes may be used in lieu of the more formal procedure outlined in General Terms and Conditions Article 5. The Contractor will be provided a copy of the completed order for Unexpected Site Changes. The agreement for the Unexpected Site Changes will be documented by signature of the Contractor.

C. If the Contractor is in disagreement with anything required by the order for Unexpected Site Changes, the Contractor may protest the order as provided in the General Terms and Conditions. Payments or credits will be determined in accordance with the General Terms and Conditions. For the purpose of providing a common Proposal for all Bidders, the Owner has entered the amount of $40,000 for Unexpected Site Changes in the Proposal to become part of the total Bid by the Contractor.

## PART 3 NOT USED

**END OF SECTION**

SECTION 01 31 19

PROJECT MEETINGS

## **ERROR! BOOKMARK NOT DEFINED.**GENERAL

### 1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for meetings during construction.

B. Contractor and Subcontractor representatives attending meetings must be qualified and authorized to act on behalf of their firms.

### 1.02 PRECONSTRUCTION MEETING

A. The Engineer will schedule a meeting to be held prior to the Contractor mobilizing and beginning any work. This meeting is to review Construction Documents administration requirements and mobilization procedures.

B. Meeting Location: City of Mercer Island Public Works Maintenance and Engineering Building, or as mutually agreed.

C. Participants shall include:
1. Contractor's Project Manager, Superintendent, Safety and Health Officer.
2. Owner, Project Manager.
3. Engineer.
4. Owner’s Maintenance and Operation Staff, as appropriate.
5. Others, including major Subcontractors, as appropriate.

D. Engineer will:
1. Administer the meeting.
2. Record and distribute copies of minutes within seven days of meeting to all meeting participants.

E. Agenda: Discussion will pertain to detailed information, for example:
1. The Work – including, but not limited to:
    a. Scheduling and phasing requirements.
    b. Contractor’s use of premises.
    c. Special conditions and coordination.
    d. Security.
    e. Permits.
2. Communications – including, but not limited to:
    a. Change and persons authorized to direct changes.
    b. Requests for Information (RFI), field decisions, and clarifications.
    c. Project meetings.
3. Contractor’s Site Specific Safety Plan.

4. Administrative and procedural requirements including, but not limited to:
   a. Contract modification.
   b. Progress payment.
   c. Submittals - including Contractor’s Construction Progress Schedule.
5. Owner testing and inspection.
6. Temporary Facilities and Controls including, but not limited to:
   a. Deliveries and storage.
   b. Temporary utilities and enclosures.
   c. Noise and vibration control.
   d. Utility process shutdowns.
   e. Contractor parking.
   f. Housekeeping and waste management.
7. Closeout Procedures – including Project Record documents.

## 1.03 CONSTRUCTION PROGRESS MEETINGS

A. Frequency: Monthly, unless otherwise agreed to by the Owner and Contractor.

B. Meeting Location: City of Mercer Island Public Works Maintenance and Engineering Building, or as mutually agreed.

C. Participants shall include:
1. Contractor's Project Manager, Superintendent.
2. Owner.
3. Engineer.
4. Owner’s Operation and Maintenance Staff, as appropriate.
5. Others, as appropriate.

D. Contractor shall:
1. Administer the meetings.
2. Provide schedules, logs and other construction activity data in support of the issues discussed and recorded in meeting minutes.
3. Record and distribute copies of minutes prior to the next meeting.

E. Engineer and Owner will:
1. Review meeting minutes and provide comments as appropriate.

F. Agenda: Discussion will pertain to items, such as:
1. Review and approve minutes of previous meeting noting exceptions, if any.
2. Review progress since previous meeting.
3. Review plans for progress during subsequent four-week look ahead schedule work period.
   a. Identify pending meetings.
   b. Discuss safety activities and any job hazards
4. Discuss field observations, problems, and conflicts.

5. Review the comprehensive progress schedule, identify problems and discuss mitigation.
6. Review submittal schedule and RFIs.
7. Review proposed changes in the Work and substitution requests.

## 1.04 DRAFT PROGRESS PAYMENT ESTIMATE REVIEW MEETINGS

A. Frequency: Monthly (Meeting may be combined with Construction Progress Meetings in Paragraph 1.03)

B. Meeting Locations: City of Mercer Island Public Works Maintenance and Engineering Building, or as mutually agreed.

C. Participants shall include:
   1. Contractor's Project Manager.
   2. Owner.
   3. Engineer.
   4. Others as appropriate.

D. The Contractor shall:
   1. Administer the meeting.
   2. Present the draft monthly Progress Payment Estimate together with required back up information for review and approval by the Owner and Engineer.
   3. Revise and submit the monthly Application for Payment in accordance with the findings and agreements of the meeting.

E. The Engineer will:
   1. Review the Contractor's draft Progress Payment Estimate in accordance with the progress of the Work and requirements of General Terms and Conditions Article 7.

F. Agenda: Discussion will pertain to items such as:
   1. Percent of work complete.
   2. Off-site storage.
   3. Bill of quantities.
   4. Percentage of subcontract payment allocations.
   5. Other items required to be submitted prior to payment, including but not limited to the schedule update, construction photographs, and review of as-built drawings.

## PART 2 NOT USED

## PART 3 NOT USED

**END OF SECTION**

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SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

## PART 1 GENERAL

### 1.01 SCOPE

A. This section specifies the procedures for preparing and revising the critical path method construction schedule used for planning and managing construction activities. The schedule provides a basis for determining the progress status of the project relative to specific dates and completion time.

### 1.02 DESCRIPTION

A. The Contractor shall provide a graphic construction schedule prepared by the critical path method (CPM) of analysis. The critical path schedule shall be prepared from estimates of the required duration and sequence for each item of work and function to be performed. A general guide for preparing such a schedule is contained in "The Use of CPM in Construction, A Manual for Contractors," published by the Associated General Contractors of America. Tabulation and analysis of the work schedule shall be performed by computer using a commercially available critical path software program. In addition to the capability to produce tabular reports, the computer software shall plot the construction schedule after the Contractor has produced it in a draft form as required by paragraph 1.03 Submittal Procedures.

B. The schedule shall depict all significant construction activities, procurement of major materials, including buy-out/issuance of purchase orders, and all items of work listed in the breakdown of contract prices submitted by the Contractor in accordance with the General Conditions of the Contract Documents. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule.

C. Time for completion and all specific dates as specified in the Contract Documents and sequencing requirements described in Section 01 12 16 shall be shown on the schedule. Activities making up the critical path shall be identified.

D. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $100,000, except activities comprising only fabrication, and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The schedule duration of each activity shall be based on the work being performed during the normal 40-hour workweek with allowances made for legal holidays and normal weather conditions.

### 1.03 SUBMITTAL PROCEDURES

A. Within 20 days after the date of Notice to Proceed, the Contractor shall complete a construction schedule conforming to paragraph 1.02 Description and representing in detail all planned procurement and on-site construction activities. The schedule shall be prepared on reproducible paper and may be in draft form with legible freehand lines and lettering. Upon completion of the schedule, the Contractor shall submit the original and two copies to the Engineer in accordance with Section 01 33 00.

B. Within 7 days after receipt of the submittal, the Engineer shall review the submitted schedule and return one copy of the marked-up original to the Contractor. If the Engineer finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy, returned to the Contractor for corrections and resubmitted as specified in Section 01 33 00.

## 1.04 SCHEDULE REVISIONS

A. Revisions to the accepted critical path construction schedule may be made only with written approval of the Contractor and Owner. Changes in timing for activities which are not on the critical path may be modified with written agreement of the Contractor and Owner. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates as specified in the Contract Documents, and work sequencing (Section 01 12 16) may be made only in accordance with applicable provisions of the General Conditions of the Contract Documents.

## 1.05 PROJECT STATUS UPDATE

A. Project status review and update shall be provided each month as specified in the General Conditions of the Contract Documents.

# PART 2 NOT USED

# PART 3 NOT USED

END OF SECTION

SECTION 01 32 20

SCHEDULE OF VALUES

## PART 1 GENERAL

### 1.01 SUMMARY

A. The work specified in this Section establishes the procedures for preparing the schedule of values to be used for preparation of the Contractor's progress pay estimates. Requirements for the submittal of a comprehensive construction schedule and schedule updates are specified in Section 01 32 16.

### 1.02 REQUIREMENTS

A. Within 14 calendar days following receipt of Notice to Proceed, the Contractor shall submit to the Engineer, for review and approval, a complete breakdown of components of all bid items showing the value assigned to each portion of the work, prepared in such form, and supported by data that substantiates its accuracy as may be required by the Engineer. This schedule of values shall, once approved by Engineer, be used as the basis for reviewing and determining each monthly progress payment estimate and as such shall be subject to periodic review by the Engineer to assure that the schedule of values reasonably represents, in the opinion of the Engineer, the actual value of the individual items of work to be performed. No payments shall be made until the schedule of values has been approved.

B. The Schedule of Values must be reviewed and accepted by the Engineer as the basis of calculating progress payment. If, in the opinion of the Engineer, the Schedule of Values is unbalanced, the Contractor will be required to present documentation substantiating the proposed values. If, in the opinion of the Engineer, the Schedule of Values lacks sufficient detail to calculate progress payments, the Contractor will be required to submit additional detail. Progress payments subsequent to the required submission date for the construction schedule will be withheld until the Schedule of Values has been accepted by the Engineer.

C. Unless otherwise approved by the Engineer include each cost category listed below and the total cost assigned to each activity in the Schedule of Values for each line item.

1. Labor
2. Equipment
3. Material
4. Subcontractor
5. Overhead and Profit

D. The value to be allocated to the mobilization activity(ies) shall not exceed a total of 3 percent of Contract cost. Payment for this item will be made in equal portions in the first three progress payments following start of on-site construction; provided the Engineer is satisfied the Contractor is making a reasonable effort to mobilize for construction in a timely manner. Untimely delays in mobilization, as determined by the judgment of the Engineer, will be cause for postponement of payment for this item. In the event of default of the Contract, no further payments will be made to the Contractor for this item.

E. If the Contractor intends to propose a construction schedule where there will be more than one substantial completion date, the schedule of values shall be structured to group the activities associated with each substantial completion date together.

F. For each activity listed below, the associated cost in the Schedule of Values shall be at least the percentage of the Contract cost shown.
   1. Operation and Maintenance Data (see Section 01 78 23), 1 percent of the Contact cost upon acceptance of all submittals.
   2. Project Record Documents (see Section 01 78 39), 1 percent of the Contract cost upon acceptance of all submittals.
   3. Warranties (see Section 01 78 36), 0.25 percent of the Contract cost upon acceptance of all submittals.

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section includes administrative and procedural requirements for submittals.

### 1.02 ADMINISTRATIVE REQUIREMENTS

A. General:

1. Furnish submittal items as specified in the contract documents.
2. Review submittal information to verify it is accurate and fulfills specified submittal requirements before submitting for review and comment.
3. Edit submittal content to clearly indicate only those items, models, or series of equipment, which are being submitted for review. Cross out or otherwise obliterate extraneous materials.
4. Ensure there is no conflict with other submittals and notify the Engineer in each case where the submittal may affect the work of another contractor or the Owner.
5. Coordinate submittals among subcontractors and suppliers including those submittals complying with unit responsibility requirements specified in the contract documents.
6. For each submittal, certify field conditions, compliance with the Contract Documents, and review of the submittal prior to submitting for review.
7. Designate the installation location within the facility, application, or intended purpose for each submittal item. Review comments are solely applicable to the circumstances designated in the submittal.
8. Coordinate submittals with the work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with others.
9. No extension of time will be allowed because of failure to properly schedule, coordinate or compile submittals.
10. Submittals will be rejected for lack of legibility, lack of coordination, ambiguity, or are incomplete. Incomplete submittals will be returned without review.
11. Do not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."
12. If desired, authorize material or equipment suppliers to deal directly with the Engineer regarding a submittal. Such dealings require written authorization from the Contractor and are limited to contract interpretations to clarify and expedite the work.

### 1.03 DEFINITIONS

A. Action Submittals:

1. Action Submittals content require review and response by the Engineer before proceeding with incorporating the subject equipment, materials, or procedure into the work.

2. Review comments on Action Submittals, and perform subsequent actions based on the REVIEW ACTION requirements specified below.

B. Informational Submittals:

1. Informational Submittals are examined to verify that the specified submittal contents have been furnished as specified.
2. The Contractor's actions are not contingent on the disposition of review comments on Informational Submittals.
3. Review comments on Informational Submittals, and perform subsequent actions based on the REVIEW ACTION requirements specified below.

C. Closeout Submittals:

1. Closeout Submittals consist of documentation that is not available for review at the time Action Submittals are submitted for review or documentation that is typically generated or furnished following incorporation of the equipment, materials, or procedure into the work. Closeout submittals include spare parts inventory listing, spare parts, extra stock materials, special tools and other materials or components that are furnished separate from the installed and completed work.
2. Review comments on Closeout Submittals, and perform the subsequent actions based on the REVIEW ACTION requirements specified below.

D. Samples:

1. Samples include partial sections of components, cuts, or containers of materials, color range sets, and swatches showing color, texture and pattern.
2. Samples may be Action or Informational submittals.

E. Mock-ups:

1. Mock-ups are scale representations of items to be constructed as part of the work as required in the Contract Documents.
2. Mock-ups are Action Submittals.

F. Review Actions:

1. The following definitions and actions are associated with the REVIEW ACTIONS DEFINED below:
   a. <u>NO EXCEPTIONS TAKEN</u>: If the review indicates that the material, equipment or work method complies with the Contract Documents, submittal will be marked "NO EXCEPTIONS TAKEN." Implement the work method or incorporate the material or equipment covered by the submittal.
   b. <u>MAKE CORRECTIONS NOTED</u>: If the review indicates limited corrections are required, submittals will be marked "MAKE CORRECTIONS NOTED." Implement the work method or incorporate the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, provide a corrected copy.
   c. <u>AMEND AND RESUBMIT</u>: If the review reveals that the submittal is insufficient or contains incorrect data, submittals will be marked "AMEND AND RESUBMIT." Do not undertake work until the submittal has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

d. REJECTED – SEE REMARKS: If the review indicates that the material, equipment, or work method does not comply with Contract Documents, the submittal will be marked "REJECTED - SEE REMARKS." Do not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" except at your own risk.

e. RECEIPT ACKNOWLEDGED: This code is assigned to acknowledge receipt of an informational submittal. No further submittal activity is required by the Contractor for the submitted items if the submittal is marked “RECEIPT ACKNOWLEDGED”.

### 1.04 MASTER SUBMITTAL LIST

A. General: Immediately following the acceptance of the CPM Schedule by the Engineer, prepare a complete master submittal list of all submittals required by the specifications. Submit this schedule no later than fifteen (15) calendar days after Notice to Proceed. Organize the submittal schedule by principal subcontractor.

B. Prepare schedule in chronological order. Show category of submittal, generic description of work covered, corresponding specification section number, and scheduled date for first submission.

C. Maintain the list over the course of construction, and update the list as submittals are completed and transmitted to the Engineer. Provide updated list to Engineer monthly.

D. Include the following as a minimum in the updated list:
1. Submittal number.
2. Date submitted.
3. Requested time for return of comments.
4. Special requests, if any, for that particular submittal.

## PART 2 NOT USED

## PART 3 EXECUTION

### 3.01 SUBMITTAL PROCEDURES

A. General
1. Engineer will review submittal information and indicate a REVIEW ACTION. Review of submittals does not relieve the Contractor of responsibility for performance of the work according to the Contract Documents.
2. Coordinate submittal transmittal for related elements of work to ensure the submittals are processed as needed to meet the intent of the work and that delays are minimized.
3. See General Terms and Conditions Article 4.9 for product substitutions.
4. A review duration of 28 calendar days is allotted for each submittal, from the date of receipt by the Engineer to the date of return to the Contractor. Submittal review activity will be prioritized based on the order received unless otherwise requested by the Contractor.

B. Submittal Preparation:

1. Excepting, mock-ups, spare parts, physical samples, and other items that cannot be converted to electronic media, furnish submittal contents electronically in a searchable PDF format.
   a. Include a table of contents and labeled divider sheets that are coordinated with the table of contents. Provide submittals in searchable PDF format with bookmarks to match the table of contents of each submittal.
   b. Limit PDF size to 200 pages. Provide multiple volumes if necessary.
   c. Diagrams, drawings, pictures, and illustrations presented with a consistent orientation.
2. If electronic submittals are not possible, place a permanent label or title block on each hard copy submittal for identification and submit the following:
   a. Action and Closeout Submittals: Three copies of submitted information plus one reproducible original.
   b. Informational Submittals: Three copies of submitted information.
3. Shop Drawings, Samples and Mock-ups:
   a. Submit one electronic copy per the requirements described above and the following:
      1) Shop Drawings: One reproducible and two prints. One marked up print will be returned to the Contractor when the review is complete.
      2) Samples: Two samples.
      3) Mock-up: As required by individual specification.
      4) Demonstrations: As required to facilitate installation and inspection.
   b. Reference applicable specifications for additional requirements.

C. Submittal Completeness:

1. Submittals without all required information are not acceptable and may be marked “REJECTED” and returned without review.
2. For a submittal to be deemed complete, provide the information required below and specified in specification sections, including those elements in the special transmittal procedures where required.

D. In the event of the need to “revise and resubmit”, provide a complete stand-alone submittal with corrections, revisions, and new information clearly identified.

E. Resubmit changes to submittals that require a stamp and signature by a licensed engineer or other certification with the requisite stamp and signature or certifications.

## 3.02 TRANSMITTAL PROCEDURE

A. General:

1. Unless otherwise specified, complete the Transmittal Form 01 33 00-A specified in Section 01 99 90.
2. For operation and maintenance manuals, information and data submittals, complete the Transmittal Form 01 78 23-A specified in Section 01 99 90.

3. Use a separate form for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which a submittal is required. Identify the appropriate equipment numbers for submittal documents common to more than one piece of equipment. Submit a single form for multiple items, if the items taken together constitute a manufacturer's package or are functionally related, to facilitate checking or reviewing the group or package as a whole.
4. Assign a unique sequential number to each transmittal form accompanying each item submitted.
   a. Format submittal numbers as follows: "XXX"; where "XXX" is the sequential number assigned to the original submittal.
   b. Format resubmittals as follows: "XX XX XX - YYYZ"; where "XX XX XX" is the applicable specification section, "YYY" is the originally assigned submittal number and "Z" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 40 67 00 - 3B, for example, is the second resubmittal of submittal 3 related to specification section 40 67 00.
5. Deviation from contract: If deviations from the material, equipment or method of work are proposed, describe the proposed deviation and explain the reason for proposing the deviation under "deviations" on the transmittal form accompanying the submittal copies.

B. Check Marked Specification Transmittal Procedures
1. When submittal requirements require a "marked" copy of the specification, provide a copy of the specification marked as indicated below. Provide the following when transmitting the submittal:
   a. Provide a copy of the specification section(s) that specifies a marked copy of the specification. Include addendum updates and referenced specification sections, with addendum updates. Complete the following:
      1) Check-mark each paragraph to indicate submittal compliance with that specification requirement. Check marks (✓) shall denote full compliance with that paragraph as a whole.
      2) Mark paragraphs where deviations are proposed by underlining text that is the subject of the proposed deviation. Denoting each proposed deviation with a number in the margin to the right of the identified paragraph and provide a detailed written explanation for each numbered deviation. The remaining portions of the paragraph not underlined signify compliance with specified requirements.
      3) The Engineer is the final authority for determining acceptability of requested deviations.
   b. For equipment specifications, provide a copy of the control diagrams and process and instrumentation diagrams relating to the submitted equipment, with addendum updates that apply to the subject equipment. Complete the following:
      1) Mark drawings or diagrams to show specific changes necessary for the equipment proposed in the submittal.
      2) If no changes are required, mark the drawings or diagrams with "no changes required".

C. Provide a Certificate of Unit Responsibility assigning unit responsibility in accordance with the requirements of the specification Section. No other submittal material will be reviewed until the certificate has been received and found to be in conformance with the Specifications.

D. Samples and Mock-ups:
   1. Submit samples and mock-ups in accordance with the Contract Documents. Package samples to facilitate review. Include the following with the Submittal Transmittal Form:
      a. Generic description of the sample
      b. Sample source
      c. Product name and name of manufacturer
      d. Compliance with recognized standards
      e. Submittal Number
      f. Availability and delivery time
      g. Specification Section
   2. Submit samples and mock-ups before installation. Where variation in color, pattern, texture or other characteristics are inherent in the material, submit four units to show variation range.
   3. Where samples are for selection of appearance characteristics from a range of standard choices, submit a full set of choices for the material or products.
   4. Maintain sets of approved samples and mock-ups at the Project Site, for quality comparisons throughout the course of construction.
   5. Demolish and remove all samples and mock-ups prior to substantial completion.

## 3.03 REVIEW PROCEDURE

A. General:
   1. Engineer will review each submittal, indicate a REVIEW ACTION, and return to the Contractor.
   2. Returned submittals indicate one of the following REVIEW ACTIONS: NO EXCEPTIONS TAKEN, MAKE CORRECTIONS NOTED, AMEND AND RESUBMIT, REJECTED – SEE REMARKS, or RECEIPT ACKNOWLEDGED.

## 3.04 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

A. General:
   1. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, does not relieve the Contractor of responsibility for errors therein and is not regarded as an assumption of risks or liability by the Engineer or the Owner, or by any officer or employee thereof, and the Contractor has no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment reviewed. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" means that the Owner has no objection to the Contractor, upon their own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

**END OF SECTION**

SECTION 01 35 23

PROJECT SAFETY REQUIREMENTS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section specifies minimum requirements for safety on the construction site including, but not limited to, Contractor responsibility for creating and maintaining a safe jobsite, Contractor safety program submittals, Contractor safety requirements, Contractor safety reporting, fire safety requirements, and hazard communication.

B. The Contractor is responsible for compliance with all applicable laws and regulations regarding safety whether noted in this section or not. Furthermore, the Contractor is responsible for creating and maintaining a safe working environment on the Project Site whether the requirements of this Section address a particular situation or not.

### 1.02 CONTRACTOR RESPONSIBILITY

A. The Contractor shall be solely and completely responsible for conditions of the construction site, including safety of all persons and property, during performance of the Work. The Contractor shall maintain the site and perform the Work in a manner which meets or exceeds statutory and regulatory requirements for the provision of a safe place to work and which minimizes safety risks to personnel of the Contractor, Subcontractors, Owner, Engineer, general public or other parties. This obligation shall apply continuously and not be limited to normal working hours.

B. The Contractor shall ensure that all Contractor and Subcontractor personnel are provided sufficient training, and shall take such actions as are necessary to maintain a safe environment on the construction site. Such training and actions shall include but not be limited to ensuring that such employees are familiar with governing construction safety requirements and the requirements for compliance with applicable regulations. The Contractor shall monitor the jobsite to ensure that employees do not create unsafe conditions for others, and shall notify employees of the requirement to alert the Contractor to any potential health or safety hazard affecting themselves or others, and to comply with the provisions of the Site Specific Safety Plan.

C. Safety Violations: In the event of Washington Industrial Safety and Health Act (WISHA) violations, by the Contractor or any of its suppliers or Subcontractors of any tier, or unsafe practices involving imminent danger to personnel of the Owner, Engineer, Contractor, Subcontractors, or others, the Contractor shall immediately correct the hazardous situation causing the violation prior to any Work continuing in the affected area. If such violations exist and corrective actions have not been taken by the Contractor, Owner may order the Contractor to stop work, to be followed up in writing the same day, until satisfactory corrective action has been taken.

## 1.03 CONTRACTOR SAFETY PROGRAM AND SAFETY PLAN SUBMITTALS

A. Company Safety Program: Prior to performing any work on the site, the Contractor shall submit a copy of its Company Safety Program as an Informational Submittal per Section 01 33 00. The Company Safety Program shall contain, at a minimum, the following elements:

1. Organizational Structure: Include names of individuals who will perform safety duties, titles, work assignments, authority and reporting relationships.
2. Training Program: Who, how and when training is provided; method of employee training concerning safety rules and procedures; training in use of protective equipment.
3. Protective Equipment: List of personal protective equipment to be provided to employees.
4. Accident Prevention and Loss Control Plan: Work site inspection and hazard correction procedures; disciplinary procedures for safety infractions; accident response, investigation and reporting procedures.

B. Site Specific Safety Plan: Prior to performing any work on the site the Contractor shall develop and submit a copy of a Site Specific Safety Plan as an Informational Submittal per Section 01 33 00. The Site Specific Safety Plan shall be tailored to the unique issues of the Project and the specific types of hazards likely to be encountered, be in compliance with WISHA and all other regulatory requirements, and contain, at a minimum, the following elements.

1. Application of Company Safety Program: The Site Specific Safety Plan shall address how the following elements from the Company Safety Program will be specifically applied and modified in addressing unique issues related to the Project: organizational structure, training program, protective equipment.
2. Specific Hazards: The Site Specific Safety Plan shall address, as applicable, the following, and other specific hazards for the Project:
    a. Overhead hazards/flying objects
    b. Open flame/Hot Work
    c. Hazardous materials and chemical exposure (asbestos, lead, PCB, mercury, mold, etc.)
    d. Hazardous gas exposure (LEL, H2S, CO, etc.)
    e. Rigging/Aerial lifts and forklifts
    f. Electrical safety
    g. Scaffolding and personnel lifts
    h. Noise and dust
    i. Lockout/Tagout and control of hazardous energy
    j. Work in confined spaces
    k. Housekeeping and safe access
    l. Fall prevention
    m. COVID-19 Plan

## 1.04 CONTRACTOR SAFETY REQUIREMENTS

A. Personal Protective Equipment: Contractor shall ensure all construction personnel to be equipped with and utilize Contractor-provided Personal Protective Equipment in accordance with Labor and Industries standards. As a minimum requirement, all personnel working on the construction site shall be required to use approved hardhats, high visibility clothing, safety glasses, gloves, appropriate work footwear, and hazardous gas detection devices.

B. First Aid: The Contractor shall maintain at its field office, or other well known place at the site, all materials necessary for giving first aid to the injured (e.g., a first aid kit), and shall establish, publish, and make known to all employees procedures for ensuring immediate removal to a hospital or a doctor's care, persons, who may have been injured on the construction site.

C. Job Hazards Analysis: The Contractor shall plan daily work considering procedures with the potential for personnel injury and implement appropriate practices to avoid injuries with focus on engineering controls, personal protective equipment needs, and mitigation for exposure to cuts and lacerations. At each construction progress meeting, the Contractor shall present its plan for addressing hazards likely to be encountered in the next week.

## 1.05 CONTRACTOR SAFETY REPORTING

A. Reporting Injuries and Incidents: Contractor shall immediately notify the Owner and Engineer of any injury or incident to personnel on the construction site. Contractor shall conduct an immediate investigation with an emphasis on preventative actions and lessons learned. The Contractor shall document the investigation and submit a copy to the Owner within 24 hours of the incident.

B. Reporting Potentially Serious Hazards: Contractor shall immediately notify the Owner and Engineer of any potentially serious hazard to personnel on the construction site. Contractor shall conduct an immediate investigation and submit a report to the Owner within 24 hours of becoming aware of the potentially serious hazard. The report shall describe the potentially serious hazard, the results of the Contractor's investigation, and any steps the Contractor has taken to prevent an injury or incident from occurring based on the potentially serious hazard.

C. Emergency Procedures:
   1. In the event of emergencies requiring ambulance, fire department, or police assistance call 9-1-1.
   2. Should the Contractor find it necessary to call for non-emergency police assistance or protection in the exercise of its responsibilities of the Project, call the City of Mercer Island Police Department at (206) 275-7610.

## 1.06 CONSTRUCTION FIRE SAFETY

A. “Hot Work” Procedures:

1. Contractor shall establish a system for documentation and control of "hot work" activities which include the use of portable gas, grinding, or arc welding equipment, the storage of flammable materials (e.g., propane, butane, compressed gasses), cutting and welding activities, roofing/hot tar kettle work. Post Hot Work Permits in an accessible and conspicuous location.
2. Conduct operations in a manner that is fire-safe for the work area and adjacent areas.
3. Maintain the premise clear of rubbish, debris, or other materials constituting a potential fire hazard. The local fire code is incorporated herein by reference; adhere to all applicable provisions as determined by the authority having jurisdiction.
4. Whenever practical, perform cutting and welding operations off-site.
5. Prior to conducting "hot work" activities, ensure all of the following fire safety precautions have been taken.
6. Cutting and/or welding equipment must be thoroughly inspected and found to be in good repair, free of damage or defects.
7. A multi-purpose dry chemical, portable fire extinguisher must be located such that it is immediately available to the Work and is fully charged and ready for use.
8. At least one fire alarm pull station or means of contacting the fire department (i.e. site telephone) must be immediately available and accessible to person(s) conducting the cutting/welding operation.
9. Floor areas under and at least 35 feet around the cutting/welding operation must be swept clean of combustible and flammable materials.
10. All construction equipment fueling activities and fuel storage must be located at least 35 feet away from cutting/welding operations.
11. Fire resistant shields (fire retardant plywood, flameproof tarpaulin, metal, etc.), must cover combustible floors.
12. Provide combustible and finished surfaces, equipment, electrical cables, and personnel with protection to prevent damage or injury from molten metal, falling sparks, and welding arcs.
13. Spark/slag catchers (fire retardant plywood, flameproof tarpaulin, metal, etc.), must be suspended below any elevated cutting/welding operation.
14. All floor and wall openings must be covered to prevent sparks/slag from traveling to other unprotected area.
15. Containers in or on which cutting/welding will take place must be purged of flammable vapors.

B. Occupant Egress in Existing Buildings: The Contractor shall not block active exits, exit hallways, exit corridors, and the exit access to a public way, and they are to remain free of construction materials, equipment, and rubbish at all times, unless approved by Owner.

C. Emergency Access: Outdoor storage and staging operations and construction fencing shall not impede, restrict or narrow fire fighting access, including roads or lanes, or present a fire exposure to existing buildings. Provide adequate separation between buildings and construction trailers and sheds. Coordinate emergency access changes with emergency services.

1. Access to emergency services including, but not limited to, fire hydrants, fire department connections, fire command centers, fire alarm panels, valves and similar equipment and systems for emergency vehicles and emergency response personnel must be kept free and unobstructed at all times, unless specifically approved by the Owner.
2. Temporary obstruction of emergency access may be allowed for special cases (e.g., crane hoist, etc.) on a short-term basis. A written plan must be submitted to the Owner for approval at least two weeks prior to the scheduled date of obstruction.

## 1.07 HAZARD COMMUNICATION

A. Responsibilities: The Contractor shall provide chemical hazard information (SDS), for all chemical products on the site, including but not limited to all paints, glues, mastics, epoxies and cleaning products. Maintain a 3-ring binder on-site of all SDS for materials used on the Project and indicate where they are used.

## PART 2 NOT USED

## PART 3 NOT USED

**END OF SECTION**

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SECTION 01 41 26

PERMITS

## PART 1 GENERAL

### 1.01 PERMITS

A. General:
1. Contractor shall obtain, at Contractor’s expense, all permits and licenses necessary for the construction of the Work in accordance with the General Terms and Conditions Section 3.12.
2. If, after the bid submittal date, the Owner obtains permits which require changes to the Work, thereby causing an increase or decrease in the Contractor's cost of, or the time required for, the performance of the work under this Contract, the Contractor shall submit information sufficient for the Engineer to determine the extent of the effects on the Contractor's cost and/or schedule. If the Engineer agrees that the Contractor's cost and/or schedule will be affected by such changes, such effects will be handled in accordance with General Terms and Conditions Article 5. The Engineer will provide a copy of such permits to the Contractor. The Contractor shall comply with applicable terms and conditions contained in such permits.

B. Permits to be Obtained by Contractor:
1. Permits obtained by the Owner are identified in this Section; the Contractor shall obtain all other permits required to perform the Work. The Contractor shall prepare and submit to the proper authority information required for the issuance of such permits and pay costs thereof, including agency inspections unless specifically provided otherwise in the Contract Documents.
2. Except as noted below, the Contractor shall be responsible for paying all fees associated with all the necessary permits, licenses, approvals, and construction permits necessary for the execution of this Contract, whether they be City, County, State, or federal permits.
3. Permits to be obtained by the Contractor include, but are not limited to, the following.
   a. City of Mercer Island Right of Way Use permits.
   b. City of Mercer Island electrical permits.

C. Permits to be Obtained by the Owner:
1. The Owner will obtain the following permits and provide to Contractor during construction:
   a. City of Mercer Island Shoreline Exemption Permit.

### 1.02 RESTORATION OF PROPERTY

A. The Contractor shall comply with property restoration requirements contained in the permits identified in this section.

## 1.03 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Action Submittal Items: Contractor obtained permits.

# PART 2 PRODUCTS (NOT USED)

# PART 3 EXECUTION

## 3.01 PERMITS TO BE OBTAINED BY CONTRACTOR

A. Selected draft permit applications for completion by the Contractor are appended to this Section. Contractor shall submit the completed applications to the authority having jurisdiction.

B. Submit a copy of the issued permit prior to performing any work covered by the permit.

C. When required, Work covered by the permit shall be inspected by the issuing agency.

**END OF SECTION**

SECTION 01 45 00

CONTRACTOR QUALITY CONTROL

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services, field inspections and field testing.

B. The Contractor is responsible for the quality assurance and quality control of their respective work for the construction of this project in accordance with the Contract Documents.

### 1.02 RELATED SECTIONS (NOT USED)

### 1.03 DEFINITIONS

A. Factory Test: Tests made on various materials, products and component parts prior to shipment to the job site.

B. Field Tests: Tests and analyses made at or in the vicinity of the job site in connection with the actual construction.

C. Certified Inspection Report: Reports signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report.

D. Certificate of Compliance: Certificate from the manufacturer of the material or equipment identifying said manufacturer, product and stating that the material or equipment meet specified standards, and shall be signed by a designated officer of the manufacturer.

E. Standard Compliance: Condition whereby specified materials or equipment must conform to the standards of organizations such as the American National Standard Institute (ANSI), American Society for Testing and Materials (ASTM), Underwriters Laboratories (UL) or similar organization.

F. Quality Assurance: The day-to-day, in-process supervisory observations of work and materials conducted by the Contractor to assure that the proper methods and materials are being used and installed by tradesmen.

G. Source Quality Control: The in-process testing and inspections conducted by the Contractor to verify that the materials, equipment; workmanship and shop manufactured constructs are in compliance with the Contract Documents, applicable Codes and standards.

H. Field Quality Control: The testing and inspections conducted by the Contractor in the field during and at the completion of each construct to verify that the in-process and completed construction is in compliance with the Contract Documents, applicable Codes and standards.

## 1.04 SUBMITTALS

A. Action Submittals:

1. Procedures: Section 01 33 00.
2. A copy of this specification section with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
3. Check-marks (✓) denote full compliance with a paragraph as a whole. Deviations shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined signify compliance with the specification. Include a detailed, written justification for each deviation. Failure to include a copy of this marked-up specification section, along with justification(s) for requested deviations, with the submittal, is cause for rejection of the entire submittal with no further consideration.
4. If requested by the Engineer during the work, manufacturer's field services and reports.

A. Informational Submittals:

1. Procedures: Section 01 33 00.
2. Manufacturers' field services and reports unless requested by Engineer to be submitted for review.
3. Inspection reports when inspection by the Contractor is specified in the Contract Documents.

## 1.05 REGULATORY REQUIREMENTS

A. General: Comply with all Federal, State, and local Codes as referenced herein. Such regulations apply to activities including, but not limited to, site work and zoning, building practices and quality, on and offsite disposal, safety, sanitation, nuisance, and environmental quality.

## 1.06 CONTRACTOR'S RESPONSIBILITIES

A. Monitor quality assurance over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Coordinate the schedule for all specified inspections.

C. Comply fully with manufacturers' instructions, including each step in sequence.

D. Should manufacturers' instructions conflict with Contract Documents, request clarification before proceeding from Engineer.

E. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. The Contractor shall take all necessary measurements in the field to verify pertinent data and dimensions shown on the Drawings or to determine the exact dimensions of the Work.

## 1.07 FIELD SAMPLE PROCEDURES (NOT USED)

## 1.08 CONTRACTOR DESIGNED STRUCTURAL SYSTEMS (NOT USED)

## 1.09 JOB SITE CONDITIONS

A. Schedule to ensure all preparatory work has been accomplished prior to proceeding with current work. Proceeding with the work constitutes acceptance of conditions. Allow adequate time for materials susceptible to temperature and humidity to “stabilize” prior to installation. Establish and maintain environmental conditions (i.e., temperature, humidity, lighting) as recommended by the various material manufacturers for the duration of the work.

# PART 2 PRODUCTS

## 2.01 SOURCE QUALITY CONTROL

A. Contractor Responsibilities: Provide source quality control according to paragraph 1.06 herein. Timely prepare and submit submittals, and revise as indicated by review comments. Comply with technical requirements in each specification Section that applies to the work.

B. Engineer Reponsibilities: Facilitate completion of submittal review per Section 01 33 00.

C. Acceptance Criteria: Acceptable characteristics and quality of a particular item or construct is defined in that item’s or construct’s specification Section.

# PART 3 EXECUTION

## 3.01 FIELD QUALITY CONTROL

A. Field quality control responsibilities of the Contractor and Engineer are substantially the same as described in paragraph 2.01, with the exception that this work occurs primarily on the jobsite as the work progresses.

B. Acceptable characteristics and quality of a particular item or construct is defined in that item’s or construct’s specification Section.

## 3.02 REGULATORY COMPLIANCE – SPECIAL INSPECTIONS (NOT USED)

## 3.03 CORRECTION OF DEFECTIVE WORK

A. Any defective or imperfect Work, equipment, or materials furnished by the Contractor which is discovered before the Final Acceptance of the Work, or during a warranty period, shall be removed immediately even though it may have been overlooked by the Engineer and approved for payment. The Contractor shall repair such defect, without compensation, in a manner satisfactory to the Engineer.

B. Unsuitable materials and equipment may be rejected, notwithstanding that such defective Work, materials and equipment may have been previously overlooked by the Engineer and accepted or approved for payment.

C. If any workmanship, materials or equipment shall be rejected by the Engineer as unsuitable or not in conformity with the Specifications or Drawings, the Contractor shall promptly replace such materials and equipment with acceptable materials and equipment at no additional cost to Owner. Equipment or materials rejected by the Engineer shall be tagged as such and shall be immediately removed from the site.

D. The Engineer may order tests of imperfect or damaged Work equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor, and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the Work, equipment, or material was not impaired, the Work, equipment or materials may be deemed acceptable, in the discretion of the Engineer. If the results of such tests reveal that the required functional capability of the questionable Work, equipment or materials has been impaired, then such Work, equipment or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect Work, equipment or material in lieu of performing the tests.

**END OF SECTION**

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section includes the following:
   1. Temporary utilities: electricity, lighting, heating, ventilation, telephone service, water, and sanitation facilities.
   2. Temporary controls: barriers, fencing, protection of work, and security.
   3. Construction facilities: parking, progress cleaning, project signage, and staging areas.

### 1.02 TEMPORARY POWER

A. The Contractor shall connect to existing power service where feasible. Owner will pay cost of energy used. Contractor shall exercise measures to conserve energy.

B. Contractor shall make arrangements for additional power requirements, as needed, either with portable generators or with the electrical utility for power takeoff points, voltage and phasing requirements, transformers and metering and pay resulting costs and fees. The Contractor shall provide any special connections that are required.

C. All costs for installing, maintaining, and removing temporary power facilities are the responsibility of the Contractor.

### 1.03 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Action Submittals:
   1. Submit a site plan for each site defining the limits of the proposed staging areas and the proposed temporary facilities required to support the work operations. Identify the location of any relocated facilities such as Owner employee parking.

### 1.04 TEMPORARY HEATING

A. The Contractor shall provide temporary heating of buildings and enclosures as necessary to protect work and material against damage by humidity, dampness, and cold and to facilitate completion of the work. The Contractor shall supply the fuel, equipment and materials required for temporary heating.

### 1.05 TEMPORARY VENTILATION

A. The Contractor shall ventilate enclosed areas to maintain a safe work environment, to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

## 1.06 TELEPHONE SERVICE

A. Provide, for Contractor's own use, telephone service at the construction site. These telephone costs shall be paid by the Contractor.

## 1.07 TEMPORARY WATER SERVICE

A. The Contractor shall provide for all workers on the project, an adequate and reasonably convenient, uncontaminated drinking water supply. All facilities shall comply with the regulations of the local and State Department of Health.

## 1.08 TEMPORARY SANITARY FACILITIES

A. Contractor shall provide, for Contractor's and Engineer's use, toilet and wash-up facilities for the work force at the site. Comply with applicable laws, ordinances and regulations pertaining to the public health and sanitation of dwellings and camps.

## 1.09 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities from damage during construction and demolition operations.

## 1.10 FENCING

A. Maintain, at all times during the construction period, fences which shall, to the satisfaction of the Engineer, enclose the areas of the site where the Work is being performed.

## 1.11 CONSTRUCTION SIGNS

A. Commercial or advertising signs for the Contractor, subcontractors, or trade unions are not allowed on the site or site entrance other than a sign to direction for site deliveries.

## 1.12 CONTRACTOR'S SECURITY

A. Where the Contractor's work or facilities modify or impact existing fencing at the site, provide security and facilities to protect the work and existing facilities from unauthorized entry, vandalism, or theft.

## 1.13 PROTECTION OF NEW WORK AND EXISTING PROPERTY

A. Protect existing structures, property, cultivated or planted areas and other surface improvements from damage and provide bracing, shoring or other work necessary for such protection.

B. Protect installed work and provide special protection where specified in the Specifications.

C. Repair or replace damaged structures, work, materials or equipment to a condition equal to or better than prior to the damage at no additional cost to the Owner. Repair and/or replacement shall be approved by the Owner.

## 1.14 MAINTENANCE OF TRAFFIC

A. Contractor shall conduct its work to interfere as little as possible with public travel, whether vehicular or pedestrian.

B. Whenever it is necessary to cross, obstruct or close roads, driveways and walks, whether public or private, provide and maintain suitable and safe bridges, detours or other temporary expedients for the accommodation of public and private travel, and give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

C. Traffic control shall be provided, in accordance with Section 01 55 00.

## 1.15 PARKING AND STAGING

A. The Contractor shall prepare the designated staging area at the start of construction and establish designated areas for employee parking and material and equipment laydown. The Contractor is responsible for preparing and maintaining this staging area throughout the construction period. The Owner will identify an option for the staging area in the Shoreline Exemption Permit.

B. Owner will not provide a designated storage area for the Contractor. The Contractor shall be responsible for any necessary offsite storage.

## 1.16 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Clean the exposed surfaces of piping, ductwork or equipment which has become soiled with dirt, mortar, or other materials before covering with insulation, painting, or enclosing in the building structure.

E. Remove waste materials, debris and rubbish from the site immediately upon such materials becoming unfit for use in the work. In the event that this material is not removed, the Owner reserves the right to have the material removed and the expense charged to the Contractor.

F. Provide a legal, off-site debris disposal site.

G. Contractor shall not burn or bury rubbish or waste materials within the limits of the Project.

H. Replace air-handling filters if units were operated during construction. Clean ducts, blowers, and coils, if necessary.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 55 00

TRAFFIC CONTROL

# PART 1 GENERAL

## 1.01 WORK INCLUDED

A. Work specified in this section includes providing for the safe and expeditious movement of vehicular traffic on the project site, public roads, and rights-of-way.

## 1.02 REFERENCES

A. This section contains references to the following documents. They are a part of this section insofar as specified and modified herein. In case of conflict between the requirements of this section and the listed documents, the requirements of this section shall prevail.

| Reference | Title |
|---|---|
| ANSI | American National Standards Institute, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) |

## 1.03 SUBMITTALS

A. General:
   1. Procedures: Section 01 33 00.
   2. The Vehicular Traffic Control Plans shall be updated and submitted to the Engineer whenever significant changes in traffic control measures are necessary.

B. Action Submittals
   1. Vehicular Traffic Control Plan:
      a. Submit a Vehicular Traffic Control Plan, as described herein. No vehicular traffic disruptions or revisions shall be made before receiving approval of the Vehicular Traffic Control Plan from the Engineer.
      b. The Vehicular Traffic Control Plan shall consist of drawings and narrative sufficient to describe the methods to be used for control of vehicular traffic on all roads on or adjacent to the construction site. The plan shall include:
         1) Drawings showing vehicular routing during each phase of the work, including permanent and temporary routing of all roadways.
         2) Drawings showing the location of barricades, lighting, signing, and any other vehicular traffic control devices anticipated to be used during each phase of the work.
         3) Arrangements for vehicular access to buildings on the site.
         4) Arrangements for emergency access to buildings on the site.
         5) Anticipated traffic blockages resulting from construction activities.
         6) Anticipated locations where temporary pipes, cables, or hoses will be placed across or parallel to roadways. Drawing details of ramps over utilities or shallow burial placement and protection cover.

7) Projected volumes of truck traffic for each phase of the work. Projections shall be expressed as the average daily (one-way) truck trips on a monthly basis.
8) Areas within Contractor's staging area designated for parking shall be identified on drawings.

## 1.04 GENERAL MAINTENANCE OF TRAFFIC REQUIREMENTS

A. Maintain vehicular traffic within public rights-of-way in accordance with the current edition of the Manual of Uniform Traffic Control Devices and as supplemented by these specifications.

B. Maintain emergency access to and from buildings within the construction site. There shall be no delay to medical, fire, police, or other emergency vehicles with flashing lights or sirens. Alert all flaggers and personnel of this requirement.

C. Adhere to all traffic regulations of the City of Mercer Island and other local jurisdictions as applicable. Notify the Owner, Engineer, and the local Police, Fire and Public Works Departments with jurisdiction over the Work, daily of each work activity related to the Project and at least 48 hours prior to full roadway closures, re-openings, or partial obstruction of public rights of way.

D. Maintain vehicular traffic at all locations to the greatest extent possible and reduce and reroute traffic only for the shortest time possible, consistent with effective construction operations. The required travel lanes shall not be blocked by the Contractor's activities, including trucks delivering materials. Material deliveries and other related trucking activities shall occur in the Contractor's protected work area.

E. Provide signs and other devices, and erect and maintain barricades, standard construction signs, warning signs, and detour signs as necessary to alert and forewarn the public at all times. Do no work on or adjacent to roads or trails until all necessary signs and traffic control devices are in place. Standard roadway warning construction signage used on this project shall be a minimum 30 inches by 30 inches.

F. The legal speed limits in the vicinity of the project site are posted. The maximum allowable speed limit on the plant site is 10 miles per hour. The Contractor shall inform its subcontractors of these limits and the importance of strict adherence to all traffic regulations and shall repeat this information at regular safety and subcontractor coordination meetings throughout the life of the Contract.

G. Interference or delay to the Contractor's operations resulting from safeguarding traffic will not be a basis for extra compensation.

## 1.05 REGULATION OF TRUCK TRAFFIC

A. For the purposes of this section, a truck shall be a motor vehicle defined as a truck, truck tractor, tractor, or semi-trailer in RCW 46.04, used for transporting materials, equipment, or other property, and having a gross vehicle weight of 10,000 pounds or more.

B. The Contractor shall restrict truck traffic to and from the construction site to the hours between 7:00 a.m. and 6:00 p.m. on weekdays. No truck traffic shall be allowed at other times or during weekends or holidays, except with the written authorization of the Owner. In the event that construction activities require truck traffic outside the hours listed in this paragraph, the Contractor shall request approval from the Owner at least fourteen (14) calendar days prior to the date of such construction activities. This request shall include the anticipated time and duration of the activities and the reasons why the activities cannot be undertaken within the hours listed in this paragraph.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

## PART 1 GENERAL

### 1.01 DAMAGE

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired and are acceptable to the Owner.

### 1.02 PIPE (NOT USED)

## PART 2 EQUIPMENT

### 2.01 PACKAGE AND MARKING

A. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.

B. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or subassembled units where possible.

### 2.02 IDENTIFICATION

A. Each item of equipment and valve shall have permanently affixed to it a label or tag with its equipment or valve number designated in this contract. Marker shall be of stainless steel. Location of label will be easily visible.

### 2.03 SHIPPING

A. Bearing housings, vents and other types of openings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt.

B. Damage shall be corrected to conform to the requirements of the contract before the assembly is incorporated into the work. The Contractor shall bear the costs arising out of dismantling, inspection, repair and reassembly.

### 2.04 FACTORY APPLIED COATINGS

A. Unless otherwise specified, each item of equipment shall be shipped to the site of the work with the manufacturer's shop applied epoxy prime coating. The prime coating shall be applied over clean dry surfaces in accordance with the coating manufacturer's recommendations. The prime coating will serve as a base for field-applied finish coats..

## 2.05 STORAGE

A. During the interval between the delivery of equipment to the site and installation, all equipment, unless otherwise specified, shall be stored in an enclosed space affording protection from weather, dust and mechanical damage and providing favorable temperature, humidity and ventilation conditions to ensure against equipment deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

B. Equipment and materials to be located outdoors may be stored outdoors if protected against moisture condensation. Equipment shall be stored at least 6 inches above ground. Temporary power shall be provided to energize space heaters or other heat sources for control of moisture condensation. Space heaters or other heat sources shall be energized without disturbing the sealed enclosure.

## 2.06 PROTECTION OF EQUIPMENT AFTER INSTALLATION

A. After installation, all equipment shall be protected from damage from, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo and metal; and from the fumes, particulate matter, and splatter from welding, brazing and painting of new or existing piping and equipment. As a minimum, vacuum cleaning, blowers with filters, protective shieldings, and other dust suppression methods will be required at all times to adequately protect all equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sandblasting in those areas have been completed and accepted and the ventilation systems installed.

# PART 3 EXECUTION (NOT USED)

**END OF SECTION**

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section includes administrative and procedural requirements for salvaging recycling, and disposal of nonhazardous construction waste.

### 1.02 PERFORMANCE REQUIREMENTS

A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.

B. Packaging: Salvage or recycle 100 percent of the following uncontaminated packaging materials:
1. Paper
2. Cardboard
3. Boxes
4. Plastic sheet and film
5. Polystyrene packaging
6. Wood crates
7. Plastic pails

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 WASTE MANAGEMENT PRACTICES

A. Provide containers, storage, signage, transportation, and other items as required.

B. Train workers, subcontractors, and suppliers on proper waste management practices.

C. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

D. Control runoff from waste management areas to prevent pollution of surface waters and groundwater.

### 3.02 RECYCLING DEMOLITION AND CONSTRUCTION WASTE

A. General: Recycle paper and beverage containers used by on-site workers.

B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   2. Stockpile processed materials on-site without intermixing with other materials. Stockpile materials away from construction area. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Do not store within the drip line of trees.
   3. Remove recyclable waste and transport to recycling receiver or processor.

## 3.03 DISPOSAL OF CONSTRUCTION AND DEMOLITION WASTE

A. Remove waste materials and legally dispose of them in a location acceptable to authorities having jurisdiction.

B. Do not allow waste materials to accumulate on-site.

C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

D. Do not burn waste materials.

**END OF SECTION**

SECTION 01 74 23

FINAL CLEANUP

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies administrative and procedural requirements for final cleaning.

### 1.02 CLEANING

A. General cleaning and maintenance of the site during construction is required by General Terms and Conditions Section 3.10; cleaning required for specific trades of work is specified in sections pertaining to that trade of work.

1. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so, and the cost thereof shall be back charged to Contractor.

B. Final Cleaning: Perform the following cleaning operations as a prerequisite for Owner's final inspection. The following are examples, but not by way of limitation, of cleaning levels required:

1. Remove labels that are not permanent labels.
2. Remove protective coatings from all accessories.
3. Remove and clean glazing compound, and other substances that are noticeable vision-obscuring materials, from transparent and reflective materials including mirrors and glass in doors and windows inside and out.
4. Clean exposed exterior and interior hard-surfaced finishes, including cabinet interiors, to a dust-free condition, free of stains, films and similar foreign substances.
5. Leave floors broom-clean. Vacuum carpeted surfaces and clean consistent with manufacturer's recommendations for installation.
6. Clean plumbing fixtures to a sanitary condition.
7. Clean light fixtures and lamps.
8. Remove and clean all construction debris and refuse from: a) roofs, mechanical and electrical rooms, tunnels and equipment vaults; b) limited access spaces including above ceiling areas and shafts, and; c) physically inaccessible components of the Work including gutters, downspouts, floor drains and other drainage systems.
9. Wipe surfaces of mechanical and electrical equipment including elevator equipment and similar equipment. Remove excess lubrication and other substances.
10. Clean the Project Site of rubbish, litter and other foreign substances. Sweep paved areas broom clean, remove stains, spills, and other foreign deposits.
11. Leave entire Project Site clean and ready for occupancy. All interior and exterior building and fixture surfaces shall be turned over to the Owner in a new condition, free of all damage, dust, dirt, spots, stains, encrustations, and other blemishes.
12. Vacuum debris from completed control panels and cabinets.

C. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner per Section 01 74 19 – Construction Waste Management and Disposal. Do not use Owner's containers for trash generated by cleaning or construction, unless approved by Owner.

1. Where extra materials of value remain after completion, or associated work has become Owner's property, arrange for disposition of these materials as directed.
2. Use low toxic cleaning supplies for surfaces, equipment and personnel use. Submit products for Owner's information.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

**END OF SECTION**

SECTION 01 75 00

TESTING AND COMMISSIONING

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section specifies the requirements for testing and commissioning of the equipment constructed as part of the Work. Testing and commissioning include documentation and procedures, preoperational testing, component testing, functional testing, operational testing, commissioning, and transfer to the Owner.

### 1.02 DEFINITIONS

A. Site: A facility within the sewer collection system with a common process goal including all associated structures, equipment, and materials (e.g., Pump Station 1).

B. Equipment: All mechanical, electrical, and instrumentation equipment and devices specified in the Contract Documents to provide a completed operational site.

C. System:
   1. An arrangement of items, such as equipment, structures, components, piping, wiring, materials, or incidentals, so related or connected to form an identifiable, unified, functional, operational, safe, and independent part of the process system.

D. Preoperational Test Phase:
   1. Factory testing as specified in the individual equipment specifications.
   2. Manufacturer's standard factory and recognized industry practice tests.

E. Component Test Phase:
   1. Conducted by Contractor to verify operation and performance of equipment and components adheres to the Contract Documents.
   2. Includes:
      a. Equipment and Component Checkout: Testing to verity that equipment and components have been installed correctly (e.g., is the electrical wiring properly connected?).
      b. Equipment Performance Testing: Following completion of equipment and component checkout, performance testing of equipment, if specified in the individual equipment specification.

F. Functional Test Phase:
   1. Follows completion of Component Test Phase for all equipment included within the system.
   2. Overall test of system control and operation demonstrating interlocks, alarms, data acquisition, and control, over entire range of operation, including, but not limited to, the following:
      a. Changes in operating parameters (e.g., does the system respond correctly to a change in influent flow rate?).
      b. Alarm conditions (e.g., does the system respond correctly to a high level alarm?).

c. Sequences (e.g., does the system correctly start/stop/control equipment for an automatic startup or shutdown sequence?).

d. Operator interface (e.g., does the system respond correctly to set point and/or discrete changes made at the operator interface?).

G. Operational Test Phase: Testing the system in full operation and to demonstrate that all functional requirements of the Contract Documents have been met.

H. Commissioning: The initiation of full site operation by the Owner's personnel under actual conditions. During this period, complete Operational Testing of systems that could not be completed during the Operational Test Phase.

I. Owner's Programmer: Brown and Caldwell, Seattle, Washington, providing the SCADA/PLC/OIT application programming described in Section 40 61 96.

## 1.03 QUALITY ASSURANCE

A. Reference Standards:

1. This Section incorporates by reference the latest revisions of the following documents. They are part of this Section insofar as specified and modified herein. In the event of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect on the effective date of the Agreement. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

| Reference | Title |
|---|---|
| ASTM | ASTM International |
| IEEE | Institute of Electrical and Electronics Engineers |
| ISA | International Society of Automation |
| NEMA | National Electrical Manufacturer's Association |

B. Install testing equipment and apparatus with personnel trained in the trades and professions required to assure competent workmanship.

C. Supervise the installation of specific equipment testing items specified to be accomplished by factory-trained installation specialists furnished or certified by the equipment manufacturers.

## 1.04 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Refer to Sections 40 61 21 and 26 05 00.

## 1.05 CONTRACTOR'S TESTING MANAGER

A. Minimum Qualifications:
   1. Refer to Section 40 61 21.

B. The Contractor's Testing Manager shall be responsible for the following:
   1. Review and approve all functional and performance tests, results, and documentation for all equipment and systems.
   2. Develop schedules for all testing, integrate testing into the master construction activity schedule, and coordinate all required testing.
   3. Develop test procedures and forms for documentation of all equipment tests, system functional tests, and cross system functional tests, unless otherwise noted in individual sections. Test procedures shall be in accordance with equipment manufacturer's recommendations, where applicable. Test procedures shall fully describe system configuration and steps required for each test. The test procedures reflect actual procedures used. The test procedures shall be appropriately documented so that another party can repeat the test to verify results.
   4. Complete test procedure schedule, procedures, forms, and other documentation.
   5. Coordinate directly with all subcontractors, manufacturer's representatives, the Owner's Programmer, and the Engineer specific to their responsibilities.
   6. Observe the startup and initial testing of equipment and then all final testing of equipment and systems.
   7. Note and document any inconsistencies or deficiencies in system operations and ensure system compliance or recommend modifications to system design which will enhance system performance.
   8. Coordinate testing participation and approve procedures, after verifying that previous test phases have been satisfactorily conducted and the systems are ready for the next test phase.
   9. Document all test results and assemble a final report.
   10. Participate in commissioning activities.

## 1.06 SEQUENCE AND COORDINATION

A. Testing shall be performed on a per pump station basis in accordance with Section 01 12 16.

B. Test Phases and Sequence:
   1. Preoperational Test Phase: Factory Tests.
   2. Component Test Phase: Field testing of installed equipment, including component checkout and performance testing.
   3. Functional Test Phase: Operation and control strategy testing for complete systems.
   4. Operational Test Phase: Operation of systems comprising a complete site using process fluids present during normal operation of the site. During this phase, the site is operated by Owner's personnel, with assistance from the Contractor. During this phase, complete any testing activities that cannot be completed during the Functional Test Phase due to testing limitations.
   5. Commissioning: Operation of related systems comprising a complete site, demonstrating performance of all functions for which it was designed.

C. If, during testing, a portion of the Work fails to comply with the Construction Documents and is adjusted, altered, renewed, or replaced, tests on that portion, and other affected portions shall be repeated within a reasonable time.

D. Test results shall be within the tolerances set forth in the Contract Documents. If no tolerances are specified, conform to tolerances established by recognized industry practice.

E. Where, in the case of an otherwise satisfactory installed test, doubt or dispute arises between the Owner and the Contractor regarding the results, methods, or test equipment, the Owner may request the test be repeated. The repeat test using modified methods or equipment will be paid per the following:
   1. If the test results confirm the satisfactory installed test results, costs for the repeat test will be paid by the Owner through the change order process, in accordance with General Terms and Conditions Article 5.
   2. If the results of test fail to comply with the Contract Documents, all costs associated with the repeat tests and equipment necessary to comply with the Contract Documents are at the Contractor's expense.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 TEST MATERIALS AND EQUIPMENT

A. Provide test gauges, meters, recorders and monitors, as required, to supplement or augment the instrumentation system specified in the Contract Documents. Select devices designed to measure the performance of the specific equipment and systems. Instruments to be recently calibrated.

### 3.02 INSTALLATION

A. Install all equipment in accordance with manufacturer's requirements and the Contract Documents. Notify the Engineer of any conflict between a manufacturer's installation recommendations and the Contract Documents.

### 3.03 TESTING

A. General Requirements:
   1. Test and inspect equipment, partially completed, or fully completed portions of the work to demonstrate compliance with the Contract Documents.
   2. Pay all testing costs, including temporary facilities and connections.
   3. Test the following:
      a. Electrical devices in accordance with Division 26.
      b. Process control system devices in accordance with Division 40.
   4. Obtain Owner's approval for testing only after Engineer's inspection of equipment for conformance with the Contract Documents.
   5. Tests and inspections shall be in accordance with recognized standards of the industry.

B. Procedures:
   1. To prevent equipment damage, design testing procedures to duplicate, as nearly as possible, conditions of operation. Once the testing procedures have been reviewed and approved by the Engineer, organize into system test packages and include the proper checkout, alignment, adjustment, and calibration signoff forms for each item of equipment.
   2. Jointly use forms with the Engineer to ensure that documentation for each electrical and instrumentation equipment item has been properly recorded for installation and testing. Failure to follow the Owner approved procedure will result in non-acceptance of the equipment.
   3. Fulfillment of the test and inspection requirements are by either of the following:
      a. Tests and inspections performed in Engineer's presence, or
      b. Certificates or reports of tests and inspections performed by persons or organizations approved by Owner.
   4. Maintain the systems test packages, which contain tests and sign-off forms including, but not limited to, equipment, electrical, and instrumentation on-site. Submit test packages to the Engineer for inspection upon request.

C. Preoperational Test Phase:
   1. Test items at the place of manufacture during or upon completion of manufacture, as specified. Tests shall be comprised of, but not limited to, electric and instrumentation tests, performance and operating tests, recognized industry practice tests, and tests specified in the individual equipment specifications.

D. Component Test Phase:
   1. General:
      a. Equipment to be tested to the specified requirements before a system is placed into operation.
      b. Incorporate Contract Document requirements into the installed tests and inspection procedures and proceed in a logical, step-wise sequence to ensure that the installed equipment has been properly assembled, serviced, aligned, adjusted, connected, and calibrated prior to operation.
      c. Perform all changes, adjustments, or replacements required to make the equipment operate.
   2. Equipment and component checkout procedures include, but are not limited to:
      a. Testing specified in the individual equipment specifications.
      b. Electrical system testing as specified in Division 26.
      c. Process control system testing as specified in Division 40.
      d. Testing, checking and correcting deficiencies of:
         1) Power, control and monitoring circuits for continuity prior to connection to power source.
         2) Voltage of all circuits.
         3) Phase sequence.
         4) Instrumentation and control signal generation, transmission, reception and response.

5) Tagging and identification systems.
6) Proper connections, alignment, calibration and adjustment.

e. Calibrate all instrumentation, alarms, and safety equipment.
f. Perform other tests, checks, and activities required to make component ready for Functional Test Phase.

E. Functional Test Phase:

1. General:
   a. Once the Owner approves the Component Test Phase results and finds no deficiencies in that portion of the work, test and operate all individual Systems under specified operating conditions to determine as comprehensively as possible whether the equipment and System meet the functional requirements of the Contract Documents.
   b. Following Functional Testing:
      1) Check equipment for loose connections, unusual movement or other indications of improper operating characteristics.
      2) Correct deficiencies to the Owner's satisfaction.
      3) Disassemble and inspect equipment which exhibits unusual or unacceptable operating characteristics. Repair or remove from the site and replace with new. Test until equipment complies with the Contract Documents.
2. Functional test procedures include, but are not limited to, the following:
   a. Demonstrate discrete and analog points are displayed on graphics screens.
   b. Demonstrate operator entries via operator interface are communicated to the control system.
   c. Demonstrate entries via the control system for the equipment and systems as described in Division 40.
   d. Verify discrete and analog inputs from field devices update operator interface panel.
   e. Demonstrate operator entries via interface panel control as described in Division 40.
   f. Whenever possible actuate all alarms from field devices by physically changing actual operating condition so that field device causes alarm. Perform similar exercising of instruments across their range of operation. Electronically simulate conditions only when physical initiation is not possible. Provide and complete a checklist to demonstrate that all alarms are received on operator interface.
   g. Test to the Owner's satisfaction prior to proceeding to Operational Test Phase.

F. Operational Test Phase:

1. General:
   a. Operational testing shall be performed after Functional Testing has been completed. Operational testing is a demonstration period with the system in full operation. During this time, the Owner operates the system over a continuous twenty-one (21) day period.
   b. Coordinate to ensure site operations are not compromised.
   c. Prior to start of Operational Test Phase, configure all systems for complete automatic operation as specified in Division 40.

2. Refer to Section 40 61 21 for Operational Test procedures and requirements.

## 3.04 COMMISSIONING

A. After successful completion of the Operational Test Phase, completion of specified training, and submission of all specified documentation, the Commissioning Period begins.

B. The Contractor shall be available at all times during commissioning periods to provide immediate assistance in case of failure of any portion of the system being constructed.

C. The Owner's personnel will be responsible for operation of the site. The site shall be fully operational and capable of providing normal flows.

D. The Owner will be responsible for costs of continuous normal operational and routine maintenance during Commissioning.

E. The Contractor shall be responsible for all costs of necessary repairs or replacements required to keep the site operational. Failures of equipment will require restart of Commissioning Period.

F. Provide required skilled labor to support the Owner around the clock to ensure the site maintains its fully operational mode and to address any warranty or performance issues in a timely manner that prevents adverse impact to the performance of the site.

G. The Commissioning Period is 4 weeks without equipment failures for all sites being commissioned. Failure of equipment or facilities where, in the opinion of the Owner, a significant interruption or impact to performance occurs will be grounds for restarting the Commissioning Period.

## 3.05 SCHEDULING

A. Identify time frames for testing and commissioning activities in the Construction Progress Schedule specified in Section 01 32 16.

B. Update schedule as the testing process occurs.

C. Use daily and hourly scheduling when required by the tasks to be completed and coordinated.

**END OF SECTION**

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SECTION 01 77 00

CLOSEOUT PROCEDURES

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies the following sequence and procedures for Project closeout:

1. Final Inspection.
2. Substantial Completion (per General Terms and Conditions Section 7.5).
3. Final Completion (per General Terms and Conditions Section 7.8)
4. Contract Completion.

### 1.02 FINAL INSPECTION

A. Request for Final Inspection: complete the following actions prior to the Engineer's Final Inspection.

1. Final Cleaning per Section 01 74 23.

B. Final Inspection: Upon receipt of the Request for Final Inspection, the Engineer will commence Final Inspection and, as necessary, provide a Corrective Work Items List. If a list of Corrective Work Items List is issued, make the required corrections and/or identify items that, in the opinion of the Contractor, are not required by the Construction Documents; resolve these items with the Engineer.

C. Re-Inspection: After completing the Corrective Work Items List and noting completion of each item, request a re-inspection. Items whose completion is delayed due to circumstances acceptable to the Owner will be exceptions. Engineer will confirm completion of the Corrective Work Items List. If Engineer is required to perform more than one re-inspection, costs for additional inspections shall be borne by the Contractor.

### 1.03 SUBSTANTIAL COMPLETION

A. Prior to Substantial Completion: Substantial Completion is achieved when the Work, or portion of the Work, other than incidental Corrective Work Items (punch list), is complete. Tasks to complete prior to Substantial Completion include, but are not limited to, the following:

1. Removal of temporary facilities and controls not required in other areas.
2. Waste properly disposed per Section 01 74 19.
3. Final cleaning complete per Section 01 74 23.
4. Completion of all testing, training, and commissioning per Sections 01 75 00 and 40 61 21 and demonstration and training per Section 01 79 00.
5. Spare parts delivery and acceptance per Divisions 26 and 40.
6. Accepted preliminary O&M manuals, per Section 01 78 23.

## 1.04 FINAL COMPLETION

A. Prior To Final Completion: Final Completion is achieved when all Work is fully complete in accordance with the Construction Documents. Task to complete include, but are not limited to, the following:

1. All Work is complete and correct to the satisfaction of the Owner.
2. All temporary facilities and controls removed.
3. All waste properly disposed per Section 01 74 19.
4. All cleaning complete per Section 01 74 23.
5. Final Operation and Maintenance Manuals provided per Section 01 78 23.
6. Warranties and Bond Manual submitted per Section 01 78 36.
7. Submittal of the Project Record Documents per Section 01 78 39.
8. All final permits submitted.
9. All Change Orders are approved and signed by both parties.

## 1.05 CONTRACT COMPLETION

A. Refer to General Terms and Conditions Section 7.8.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

**END OF SECTION**

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

## PART 1 GENERAL

### 1.01 MI S S AR2

A. This section specifies Operation and Maintenance (O&M) manuals.

B. Refer to Section 01 22 00 – Measurement and Payment for requirements related to when O&M information shall be provided in relation to payment for individual pieces of equipment and in relation to overall project payment.

### 1.00 MI FS YTTALM

A. Action Submittals
1. Procedures: Section 01 33 00
2. Provide completed Operational and Maintenance Transmittal Form (Form 01 78 23-A). Form is located in Section 01 99 90.
3. Preliminary O&M Manuals
    a. At least thirty (30) days prior to the Operational Test Phase specified in Section 01 75 00, submit one hard copy and one electronic copy of the Preliminary Operation and Maintenance manuals. Identify copies as “Preliminary.”
    b. Engineer will complete review of preliminary O&M manuals and deliver review comments within twenty (20) days of receipt.
    c. Preliminary O&M manuals must be accepted prior to the on-site training specified in 01 79 00. Acceptable operating and maintenance information will be that for which the submittal has been returned as No Exceptions Taken or Make Corrections Noted.
4. Final O&M Manuals
    a. Final O&M Manuals are a requirement for achieving Physical Completion, as specified in 01 77 00 – Closeout Procedures.
    b. Submit Final O&M manuals addressing all of Engineer’s review comments made on Preliminary O&M Manuals submittal.
    c. Provide one electronic copy of the final O&M Manual for review. When final O&M manual submittal review is returned as No Exceptions Taken, submit two hard copies.

### 1.03 UPERATYUN ANB S AYNTENANDE S ANI AL

A. Operation and Maintenance Manuals shall contain all the information needed to operate, maintain and repair all systems and equipment and material provided.

B. Group equipment and components by equipment/component type. Match testing, training and commissioning systems as much as possible. The information provided shall include, but not be limited to, the following:

1. General: The names, addresses, and telephone numbers of the manufacturer, the nearest manufacturer's representative, and the manufacturer's nearest supplier of equipment and parts. Include the manufacturer's web site information.
2. Operating Instructions:
   a. Safety Precautions: List personnel hazards for equipment and list safety precautions for all operating conditions.
   b. Service Requirements: Provide instructions for services to be performed by the operator such as adjustments, maintenance, and inspection.
   c. Environmental Conditions: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product and describe conditions under which product should not be allowed to operate.
3. Preventive Maintenance:
   a. Provide manufacturer's preventative maintenance schedule for routine inspections, tests, and adjustments required to ensure proper and economical operation and minimize repairs. Provide manufacturer's projection of preventive maintenance man-hours, by type of craft, on a daily, weekly, monthly, and annual basis.
4. Corrective Maintenance:
   a. Troubleshooting Guides and Diagnostic Techniques: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.
   b. Wiring and Control Diagrams: Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring terminals identically to actual installation.
   c. Maintenance and Repair Procedures: Provide instructions and list tools required to restore equipment to proper operational condition.
   d. Removal and Replacement Instructions: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, subcomponents, and accessories. Provide tolerances, dimensions, settings, and adjustments required. Include a combination of text and illustrations.
   e. Spare Parts and Supply Lists: Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Identify spare parts and supplies that require a long lead time. Provide list prices.
   f. Corrective Maintenance: Provide manufacturer's projection of corrective maintenance man-hours by type of craft. Separately identify and tabulate corrective maintenance requiring equipment manufacturer's participation.

5. Appendices:
   a. Parts Identification and Assembly Drawings: Identify each component, subcomponent, and accessory subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification. When illustrations omit the part numbers and description, cross reference the illustrated part to the listed part. Group parts by components, subcomponents, and accessories.
   b. Training Requirements: Provide manufacturer's information for use in Owner training.
   c. Testing Equipment and Special Tool Information: Provide information on required test equipment; provide information on special tools needed for the operation, maintenance, and repair.

C. Following the acceptable installation and operation of an equipment item, the item's instructions, procedures and wiring diagrams shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data. As-constructed wiring diagrams shall be included in the final O&M manual submittal.

D. Hard copies shall be bound in slant-D, 3 ring 4" capacity ring view binders with insertable clear vinyl overlay on the front cover and spine. The binders shall have heavy duty nylon reinforced hinges.
   1. Provide typed cover slip sheet identifying Project name, equipment name, equipment number(s), Contractor, and date. Provide typed spine slip sheet identifying equipment name, equipment number(s), and date. For the final Operation and Maintenance Manual leave the date blank.
   2. Each copy shall have a typed index and tabbed dividers corresponding to the index numbering between equipment categories or specification sections.
   3. Each volume shall not exceed 3-1/2 inch thickness of paper contents.

E. Deliver electronic copies via USB flash drive.
   1. Electronic O&M manuals shall be in searchable Adobe Acrobat PDF format. Include a table of contents and labeled divider sheets that are coordinated with the table of contents. Provide manuals in searchable PDF format with bookmarks to match the table of contents.
   2. Organize electronic O&M manuals by volume to match hard copy requirements in Paragraph 1.03.D.
   3. Where scanned pages are used, each scanned page shall be provided with a bookmark and identified in the index. In addition, annotate each scanned page identifying the content. For example, for a scan of a Special Warranty, insert an annotation in the file stating "Special Warranty Documentation, Page 1."
   4. Index each manual with hyperlinks and bookmarks to each section.
   5. Consistently orient all diagrams, drawings, pictures and illustrations.

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SECTION 01 78 36

WARRANTIES

## PART 1 GENERAL

### 1.01 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's Standard Product Warranties and Special Warranties.

B. Refer to General Terms and Conditions Section 7.9 for the required terms of the Contractor's warranty.

C. If there is any discrepancy in the Contract Documents regarding the warranty period or its date of commencement, the passage granting the Owner the longest warranty period ending on the latest date shall govern.

D. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors that are required to countersign Special Warranties with the Contractor.

### 1.02 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by Standard Product Warranties or to provide greater rights to the Owner. Refer to individual sections of the Specifications for Special Warranty requirements.

### 1.03 WARRANTY REQUIREMENTS

A. All warranties begin at the date of Substantial Completion for the site, portion of the Work, or piece(s) of equipment for which Substantial Completion has been issued.

B. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to access the failed, warranted Work.

C. Upon determination that Work covered by a warranty has failed, correct or replace the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of correcting, replacing, retesting, and recommissioning defective Work regardless of whether the Owner has benefited from use of the Work.

D. When Work covered by a warranty has failed and been corrected, replaced, retested, and recommissioned, reinstate the warranty by written endorsement. The reinstated warranty duration shall be the equivalent of that for the original warranty.

E. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

F. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

G. The Owner reserves the right to refuse to accept Work for the Project where a Special Warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

H. Owner acceptance of warranties does not relieve the Contractor of the warranty requirements specified in General Terms and Conditions Section 7.9.

I. Ensure all Standard Product Warranties and Special Warranties are transferrable to Owner.

## 1.04 SUBMITTALS

A. Action Submittals
   1. Procedures: Section 01 33 00.
   2. Preliminary and Final Warranties and Bonds Manuals: Assemble executed licenses, certificates, warranties, special warranties, bonds, and any required service and maintenance contracts from the respective manufacturers, suppliers, and Subcontractors. Provide two (2) preliminary review copies, identified “Preliminary.” Provide two (2) final signed copies of the Warranties and Bonds Manual following review and acceptance of the preliminary manual by the Owner.
   3. Provide electronic copies preliminary and final Warranties and Bonds Manual in scanned Adobe Acrobat (.pdf) file format.
   4. Include complete information for each of the following with the preliminary and final Warranties and Bonds Manual:
      a. Table of Contents arranged by specification section.
      b. Product or work item, including applicable specification section number(s) per the Contract Documents.
      c. Firm, with name of principal, address, telephone number, email address, and web site address.
      d. Scope of warranty.
      e. Start date of warranty or service and maintenance contract.
      f. Duration of warranty or service and maintenance contract.
      g. Notification procedures.
      h. Instances which might affect validity of warranty or bond.

i. Contractor, name of responsible principal, address, and telephone number.

j. For Special Warranties, prepare a written document containing all pertinent. information and ready for execution by the required parties.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 78 39

PROJECT RECORD DOCUMENTS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies requirements for project Record Drawings.

### 1.02 DEFINITIONS

A. Contract Drawings: Drawings that are part of this Contract. Contract drawings include drawings distributed by Addenda and modified or added by Change Order.

B. Record Drawings: Record Drawings shall include updated Contract Drawings and Contractor-Prepared Drawings depicting actual work as installed by the Contractor. Record Drawings shall include changes from RFIs, Change Orders, field conditions, and shall depict to actual number and dimension the as-constructed work shown and specified in the Contract with isometric drawings, schematic drawings, or with instructions to “field route” or “homerun” the installation. Record drawings shall include updated working drawings to depict actual work as installed by the Contractor and submitted under Division 40. Record Drawings shall include Record Circuit and Panel Schedules and Conduit and Cable Lists.

C. Working Drawings: Shop drawings, shop plans, or any other supplementary plans or similar data that the Contractor submits to the Engineer for approval.

### 1.03 SUBMITTALS

A. Procedures: 01 33 00

B. Action Submittals:

1. Final Record Drawings, Record Circuit and Panel Schedules, and Conduit and Cable Lists shall be submitted as specified. The Contractor shall submit red-line mark-ups of all Contract Drawings depicting work that deviates from the Contract Drawings. Drawings shall depict as-constructed equipment and raceway lay-out conditions. These drawings shall be identified as Final Record Drawings. The drawings shall be prepared in conjunction with all of the Contractor’s subcontractors and suppliers in accordance with Paragraph 2.01 below. The redline mark-ups shall utilize standard engineering drafting methods and inclusion of NOTES and KEY NOTES where notes are applicable. References to other documentation such as RFIs are not acceptable; the changes described in that documentation shall be depicted on the drawings. Record Drawings shall be organized by pump station.
2. The Contractor shall submit Record Drawings of all Circuit and Panel Schedules and Conduit and Cable Lists depicting as-built conditions. Drawings shall be prepared in conjunction with all of the Contractor’s subcontractors and suppliers.

3. Contractor-Prepared Drawings: The Contractor shall submit AutoCAD *.dwg files and .pdf plots of all drawings prepared by the Contractor and all of its subcontractors and suppliers depicting work in all disciplines in accordance with this and other Sections. The Contractor shall submit the AutoCAD files for Contractor-Prepared Drawings on CDs or DVDs along with the Final Record Drawings and Record Schedules and Lists specified.
   a. Contractor shall submit the final Contractor-Prepared Drawings as AutoCAD files and .pdf plots at the end of the project. Upon completion of the project Work, the Contractor shall provide the final Record Drawings to the Engineer as a condition of Physical Completion.
4. All drawings provided in electronic format shall be provided in the latest release of AutoCAD at the time of the submittal. Contractor shall update and maintain drawings in the latest version of AutoCAD throughout this project. Drawing format shall include borders and title blocks clearly identifying Contract, equipment, and the scope of the drawing. Drawings shall include revision block completed for Final Record Drawings with date of issue. Drawings shall be legible at a 50 percent reduction; reduced drawings will be used for insertion in operations and maintenance manuals. Text size shall be 0.125 inch for 22 x 34 inch drawings and 0.063 inch for 11 x 17 inch drawings.

## PART 2 PRODUCTS

### 2.01 GENERAL

A. The marked-up Record Drawings shall be available for review by the Owner and Engineer at all times. The Record Drawings shall be maintained on full-size drawings 22-inch by 34-inch bond paper, reproduced from the most recent version of the appropriate drawings, stamped “Record Drawings” and marked up to reflect the “as-built” and “as-constructed” conditions of the Contract Drawings and Contractor-Prepared Drawings. Contractor provided equipment, junction boxes, panels, cabinets, etc. shall be shown, including conduit specified in the Contract Drawings as isometrics drawings, schematic drawings, or with instructions to “field route” or “homerun” the installation.

B. The Record Drawings shall be marked up with all of the Contractor’s subcontractors and suppliers using the methods and devices described below. Record Drawings shall be prepared for all disciplines and mark-ups shall be shown on all affected drawings.

C. The Record Drawings and the Record Circuit and Panel Schedules and Conduit and Cable Lists shall, as a minimum, include the following:
   1. All Contract drawings and Contractor-Prepared drawings, via submittal, of the electrical and instrumentation work required to perform the Contract.
   2. All Contract schematics and Contractor-Prepared schematics, via submittal, of internal wiring of supplied equipment. The Contractor shall utilize the equipment supplier’s drawings when preparing Record Drawings for connection of said equipment.
   3. All Contract circuit and panel schedules and conduit and cable lists.

D. Record Drawings and the Record Circuit and Panel Schedules and Conduit and Cable Lists shall show all of the Contractor’s work.

## 2.02 MARKING DEVICES

A. The Contractor shall utilize standard drawing and drafting tools to draw straight and neat lines depicting elements added to and changed on the drawings. The Contractor shall cloud all areas on the drawings where additions or changes occur. All clouded areas shall be dated to indicate the date the change is being recorded. The drawing markings shall, unless directed otherwise, use the following color coding:

1. Additions – Red.
2. Deletions – Green.
3. Comments – Blue.
4. Dimensions – Graphite.

# PART 3 EXECUTION

## 3.01 RECORDING

A. In addition to the items above, the following additional construction items shall be recorded on the Record Drawings:

1. Electrical schedules and diagrams: Raceway, conduit, and cable schedules and lists listing actual raceway and conductor sizes and routing along with the quantity of the actual cables carried in each. Information is to be based on field cable pulling records.
2. Field changes of dimensions and details.
3. Changes made by Change Order.

## 3.02 RECORD DRAWING REVIEW AND ACCEPTANCE

A. Record Drawings and Raceway, Conduit, and Cable Schedules and Lists will be used to verify and document progress. The Engineer will not field verify all drawing additions and changes but rather will conduct random spot checks of the drawings by field verifying the accuracy of additions and changes. The Engineer will initial all clouded drawing changes that were field verified. Where the Engineer finds greater than 10% errors in the accuracy of the drawing additions and changes in any month's drawing set review, the Contractor shall be responsible for engineering fees to conduct a detailed review of the drawing set.

B. All inaccuracies in the Record Drawings, Schedules, and Lists uncovered through random spot checks or in a subsequent detailed review shall be corrected prior to acceptance.

C. The Contractor shall submit a Transmittal of Final Project Record Documents. The Transmittal of Final Project Record Documents shall be submitted and accepted by the Engineer prior to the Engineer signing off on the portion of the work as being complete. The transmittal of the Final Record Drawings shall include the electronic version of the Record Drawings and Record Conduit, and Cable Schedules and Lists.

## 3.03 RECORD DRAWING PAYMENT

A. Payment for Project Record Documents shall be as specified in Section 01 32 16.

**END OF SECTION**

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SECTION 01 79 00

DEMONSTRATION AND TRAINING

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. This section contains requirements for training the Owner's personnel, by persons retained by the Contractor specifically for the purpose, in the proper operation and maintenance of the equipment and systems installed under this contract.

### 1.02 QUALITY ASSURANCE

A. Where required by the detailed specifications, the Contractor shall provide on-the-job training of the Owner's personnel. The training sessions shall be conducted by qualified, experienced, factory-trained representatives of the various equipment manufacturers. Training shall include instruction in both operation and maintenance of the subject equipment.

### 1.03 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Action Submittals:
1. Lessons plans for each training session to be conducted by the manufacturer's representatives. In addition, training manuals, handouts, visual aids, and other reference materials that are used during the training shall be included.
2. Subject of each training session, identity and qualifications of individuals to be conducting the training, and tentative date and time of each training session.
3. Submittals shall be made not less than 30 days prior to provision of the training.

## PART 2 PRODUCTS

### 2.01 GENERAL

A. Where specified, the Contractor shall conduct training sessions for the Owner's personnel to instruct the staff on the proper operation, care, and maintenance of the equipment and systems installed under this contract. Training shall take place at the site of the work and under the conditions specified in the following paragraphs. Approved operation and maintenance manuals shall be available to the Owner at least 30 days prior to the date scheduled for the individual training session.

### 2.02 LOCATION

A. Training sessions shall take place at the site of the work at Pump Station 16, or as mutually agreed.

## 2.03 LESSON PLANS

A. Formal written lesson plans shall be prepared for each training session. Lesson plans shall contain an outline of the material to be presented along with a description of visual aids to be utilized during the session. Each plan shall contain a time allocation for each subject.

B. One complete set of originals of the lesson plans, training manuals, handouts, visual aids, and reference material shall be the property of the Owner and shall be suitably bound for proper organization and easy reproduction.

C. Identify in the training materials which pump stations the information applies.

## 2.04 FORMAT AND CONTENT

A. Each training session shall be comprised of time spent both in the classroom and at the specific location of the subject equipment or system. As a minimum, training session shall cover the following subjects for each item of equipment or system:

1. Familiarization
    a. Review catalog, parts lists, drawings, etc., which have been previously provided for the utility files and operation and maintenance manuals.
    b. Check out the installation of the specific equipment items.
    c. Demonstrate the unit and indicate how all parts of the specifications are met.
    d. Answer questions.
2. Safety
    a. Using material previously provided, review safety references.
    b. Discuss proper precautions around equipment.
3. Operation
    a. Using material previously provided, review reference literature.
    b. Explain all modes of operation (including emergency).
    c. Check out Owner's personnel on proper use of the equipment.
4. Preventive Maintenance
    a. Using material previously provided, review preventive maintenance (PM) lists including:
        1) Reference material.
        2) Daily, weekly, monthly, quarterly, semiannual, and annual jobs.
    b. Show how to perform PM jobs.
    c. Show Owner's personnel what to look for as indicators of equipment problems.
5. Corrective Maintenance
    a. List possible problems.
    b. Discuss repairs--point out special problems.
    c. Open up equipment and demonstrate procedures, where practical.
6. Parts
    a. Show how to use previously provided parts list and order parts.
    b. Check over spare parts on hand. Make recommendations regarding additional parts that should be available.

7. Local Representatives
    a. Where to order parts: name, address, telephone.
    b. Service problems:
        1) Who to call.
        2) How to get emergency help.
8. Operation and Maintenance Manuals
    a. Review any other material submitted.
    b. Update material, as required.

## 2.05 VIDEO RECORDING

A. The Owner may elect to record each training session. In which case, the Owner will retain the services of a commercial video taping service or record on personal devices. The Contractor shall advise all manufacturers providing training sessions that the material will be video taped.

# PART 3 EXECUTION

## 3.01 SUMMARY

A. Training shall not be performed until the submittals specified above have been reviewed and accepted by the Engineer.

B. Preliminary operation and maintenance manuals shall be approved, as specified in 01 78 23, prior to the individual training session for the associated equipment.

C. The Contractor shall furnish ten copies of necessary training manuals, handouts, visual aids and reference materials at least 2 weeks prior to each training session.

D. The following services shall be provided for each item of equipment or system as required in individual specification sections. Additional services shall be provided, where specifically required in individual specification sections.
1. As a minimum classroom equipment training for operations personnel will include:
    a. Using slides and drawings, discuss the equipment's specific location and an overview.
    b. Purpose and function of the equipment.
    c. Identify and discuss safety items and procedures.
    d. Routine preventative maintenance, including specific details on ancillary components.
    e. Operator detection, without test instruments, of specific equipment trouble symptoms.
    f. Routine disassembly and assembly of equipment if applicable (as judged by the Owner on a case-by-case basis) for purposes such as operator inspection of equipment.

2. As a minimum, hands-on equipment training for operations personnel will include:
   a. Identify location of equipment and review the purpose.
   b. Discuss and perform the preventative maintenance activities.
   c. Perform routine disassembly and assembly of equipment if applicable.
   d. Identify and review safety items and perform safety procedures, if feasible.
3. Classroom equipment training for the maintenance and repair personnel will include:
   a. Theory of operation.
   b. Description and function of equipment.
   c. Normal and major repair procedures.
   d. Equipment inspection and troubleshooting procedures including the use of applicable test instruments and the "pass" and "no pass" test instrument readings.
   e. Routine and long-term calibration procedures.
   f. Safety procedures.
   g. Preventative maintenance such as battery replacement.
4. Hands-on equipment training for maintenance and repair personnel shall include:
   a. Locate and identify equipment components.
   b. Review the equipment function and theory of operation.
   c. Review normal repair procedures.
   d. Review and perform the safety procedures.
   e. Perform Owner approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and troubleshooting equipment problems.

**END OF SECTION**

SECTION 01 99 90

REFERENCE FORMS

## PART 1 FORMS

### 1.01 DESCRIPTION

A. The forms listed below and included in this section are referenced from other sections of the project manual:

| Form No. | Title |
|---|---|
| 01 33 00-A | Submittal Transmittal Form |
| 01 78 23-A | Operation and Maintenance Transmittal Form |
| 01 78 23-B | Equipment Record Form |
| 26 05 00-A | Wire and Cable Resistance Test Data Form |
| 40 61 13-A | Loop Wiring and Insulation Resistance Test Data Form |
| 40 61 13-D | Panel Indicator Calibration Test Data Form |
| 40 61 13-G | Field Switch Calibration Test Data Form |
| 40 61 13-H | Transmitter Calibration Test Data Form |
| 40 61 13-I | Miscellaneous Instrument Calibration Test Data Form |
| 40 61 13-J | Individual Loop Test Data Form |

## 01 33 00-A. SUBMITTAL TRANSMITTAL FORM

### Submittal Transmittal

| Submittal Description: | Submittal No:[1] | Spec Section: |
|---|---|---|

| | Routing | Sent | Received |
|---|---|---|---|
| Owner: | Contractor/CM | | |
| Project: | CM/Engineer | | |
| | Engineer/CM | | |
| Contractor: | CM/Contractor | | |

We are sending you:
☐ Attached
☐ Under separate cover via _________
☐ Submittals for review and comment
☐ Product data for information only

Remarks: ______________________________

| Item | Copies | Date | Section No. | Description | Review action[a] | Reviewer initials | Review comments attached |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
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*[a]Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected*
*Attach additional sheets if necessary.*

### Contractor

Certify either a or b:

a. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

b. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

| No. | Deviation |
|---|---|
| | |
| | |

Certified by:

Contractor's Signature:

[1]See *Section 01 33 00-3.02.A, Transmittal Procedure.*

## 01 78 23-A. OPERATION AND MAINTENANCE TRANSMITTAL FORM

| | |
|---|---|
| Date: | Submittal No:[2] |
| To: | Contract No: |
| | Spec. Section: |
| | Submittal Description: |
| Attention: | From: |

| Checklist | Contractor | | Engineer | |
|---|---|---|---|---|
| | Satisfactory | N/A | Accept | Deficient |
| 1. Table of contents | | | | |
| 2. Equipment record forms | | | | |
| 3. Manufacturer information | | | | |
| 4. Vendor information | | | | |
| 5. Safety precautions | | | | |
| 6. Operator prestart | | | | |
| 7. Start-up, shutdown, and postshutdown procedures | | | | |
| 8. Normal operations | | | | |
| 9. Emergency operations | | | | |
| 10. Operator service requirements | | | | |
| 11. Environmental conditions | | | | |
| 12. Lubrication data | | | | |
| 13. Preventive maintenance plan and schedule | | | | |
| 14. Troubleshooting guides and diagnostic techniques | | | | |
| 15. Wiring diagrams and control diagrams | | | | |
| 16. Maintenance and repair procedures | | | | |
| 17. Removal and replacement instructions | | | | |
| 18. Spare parts and supply list | | | | |
| 19. Corrective maintenance man-hours | | | | |
| 20. Parts identification | | | | |
| 21. Warranty information | | | | |
| 22. Personnel training requirements | | | | |
| 23. Testing equipment and special tool information | | | | |

Remarks:

Contractor's Signature :

[2] See Section 01 33 00-3.02.A, Transmittal Procedure.

## 01 78 23-B. EQUIPMENT RECORD FORM

| | | | |
|---|---|---|---|
| Equip Descrip | | Equip Loc | |
| Equip No. | Shop Dwg No. | Date Inst | Cost |
| Mfgr | | Mfgr Contact | |
| Mfgr Address | | | Phone |
| Vendor | | Vendor Contact | |
| Vendor Address | | | Phone |

| Maintenance Requirements | D | W | M | Q | S | A | Hours |
|---|---|---|---|---|---|---|---|
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## 26 05 00-A. WIRE AND CABLE RESISTANCE TEST DATA FORM

Wire or Cable No.:________________________________ Temperature, °F: _________________________

| Location of Test | Insulation resistance, megohms |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |

CERTIFIED ____________________________________________ Date ____________________________

Contractor's Representative

WITNESSED ___________________________________________ Date ____________________________

Owner's Representative

## 40 61 13-A. LOOP WIRING AND INSULATION RESISTANCE TEST DATA FORM

Loop No.: ________________________

List all wiring associated with a loop in table below. Make applicable measurements as indicated after disconnecting wiring.

| Wire No. | Panel Tie | Field TB | Continuity Resistance[a] | | Insulation Resistance[b] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Cond./ Cond. | Cond./ Shield | Shield/ Gnd. | Shield/ Cond. | Cond./ Gnd. | Shield/ Shield |
| A | | | -- | (A/SH) | | | | |
| B | | | (A/B) | -- | | | | |
| C | | | (A/C) | -- | | | | |
| D | | | (A/D) | -- | | | | |
| etc. | | | | | | | | |

NOTES:

a. Continuity Test. Connect ohmmeter leads between wires A and B and jumper opposite ends together. Record resistance in table. Repeat procedure between A and C, A and D, etc. Any deviation of ±2 ohms between any reading and the average of a particular run indicates a poor conductor, and corrective action shall be taken before continuing with the loop test.

b. Insulation Test. Connect one end of a 500 volt megger to the panel ground bus and the other sequentially to each completely disconnected wire and shield. Test the insulation resistance and record each reading.

CERTIFIED ______________________________________ Date ________________________

Contractor's Representative

WITNESSED ______________________________________ Date ________________________

Owner's Representative

**40 61 13-D. PANEL INDICATOR CALIBRATION TEST DATA FORM**

Tag No. and Description: ______________________________________________

Make & Model No.:______________________ Serial No.:______________________

Input: ______________________________

Scale: ______________________________ Range: ________________________

PV Scale Calibration

| % of Range | Input | Expected Reading | Actual Reading | % Deviation |
|---|---|---|---|---|
| 0 | | | | |
| 50 | | | | |
| 100 | | | | |
| | | | % Deviation Allowed: | |

CERTIFIED ________________________________ Date ____________________

Contractor's Representative

WITNESSED _______________________________ Date ____________________

Owner's Representative

## 40 61 13-G. FIELD SWITCH CALIBRATION TEST DATA FORM

Tag No. and Description: ______________________________________________

Make & Model No.: ______________________ Serial No: ______________________

Input: ______________________________

Range: ______________________________

Set Point(s): ___________________________

Simulate process variable (flow, pressure, temperature, etc.) and set desired set point(s). Run through entire range of switch and calculate deadband.

| Set Point | Incr. Input Trip Point | Decr. Input Trip Point | Calc. Deadband | Required Deadband |
|---|---|---|---|---|
| | | | | |
| | | | | |
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CERTIFIED ________________________________ Date ____________________

Contractor's Representative

WITNESSED ________________________________ Date ____________________

Owner's Representative

## 40 61 13-H. TRANSMITTER CALIBRATION TEST DATA FORM

Tag No. and Description: ______________________________________________

Make & Model No.: ______________________ Serial No.: ______________________

Input: ______________________________

Output: ______________________________

Range: ______________________________ Scale: ____________________

Simulate process variable (flow, pressure, temperature, etc.) and measure output with appropriate meter.

| % of Range* | Input | Expected Reading | Actual Reading | % Deviation |
|---|---|---|---|---|
| 0 | | | | |
| 50 | | | | |
| 100 | | | | |
| | | | % Deviation Allowed: | |

*For FogRod level instrument, match level relay output contacts for testing.

CERTIFIED ________________________________ Date ____________________

Contractor's Representative

WITNESSED ________________________________ Date ____________________

Owner's Representative

## 40 61 13-I. MISCELLANEOUS INSTRUMENT CALIBRATION TEST DATA FORM

(For instruments not covered by any of the preceding test forms, the Contractor shall create a form containing all necessary information and calibration procedures.)

CERTIFIED ______________________________________________ Date ______________________________

Contractor's Representative

WITNESSED ____________________________________________ Date ______________________________

Owner's Representative

## 40 61 13-J. INDIVIDUAL LOOP TEST DATA FORM

Loop No.: ________________________________

Description: (Give complete description of loop's function using tag numbers where appropriate.)

a. Wiring tested:

(Attach test form 40 61 13-A)

b. List step-by-step procedures for testing loop parameters. Test loop with instruments, including transmitters, pumps, and control valves, connected and functioning. If it is not possible to produce a real process variable, then a simulated signal may be used with the Engineer's approval.

CERTIFIED ____________________________________________ Date ____________________________

Contractor's Representative

WITNESSED ___________________________________________ Date ____________________________

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# TECHNICAL SPECIFICATIONS

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. Scope:

1. This section specifies general requirements for electrical work. Detailed requirements for specific electrical items are specified in Division 40 sections but are subject to the general requirements of this section. The electrical drawings included in this project manual are functional in nature and do not specify exact locations of equipment or equipment terminations.
2. Electrical work consists of the following:
    a. Trace existing electrical circuits interconnected to the existing PLC panels to document to/from locations prior to replacing the process control system equipment specified in Division 40. A list of the remote sites is located in Section 40 67 00, Attachment A. A list of the inputs/outputs associated with each PLC panel is specified in Section 40 61 93, Attachment A. Provide documentation of the electrical wire trace in a form of circuit & raceway schedule showing to/from location and the circuit/raceway label.
    b. Provide auxiliary relay boards to existing generator/ATS systems. Install and configure generator/ATS monitoring improvements at pump station generator sites.
    c. Label or re-labeling external circuits terminating in the existing PLC panels prior to replacing and/or modifying the existing PLC panels.
    d. Adding industrial enclosure nameplate and warning signage as required by NEC 409.110 to the face of the existing PLC panel enclosures or new PLC panel enclosures as specified in Section 40 67 00, Attachment A.
    e. Provide temporary power and control circuits as required to maintain critical sites as indicated in Division 01.
    f. Add to circuit & raceway schedule developed for existing circuits - all new electrical cables and raceways to fully document electrical construction.
    g. Adding conduit seal-offs to conduits entering classified areas.
    h. Demolition of obsolete raceway/wiring.
    i. Work on existing motor control panel to add and remove hardware.
3. All electrical work shall be executed in accordance with the following:
    a. National Electrical Code (NEC) edition in force at time of permitting.
    b. State of Washington local rules and regulations.
4. If there is any conflict between these drawings and specifications and the applicable codes, rules, and regulations; the codes, rules, and regulations shall apply.
5. Furnish labor, equipment, tools, materials, supplies, and perform operations necessary to install a complete and operable electrical system. Furnish incidental material and perform work shown on the Drawings and in the Specifications.

6. Obtain electrical permits, arrange for required inspections, correct deficiencies resulting from inspections, and pay permit fees and inspections charges. Pay fines and the cost of extra work incurred by action or inaction of the Contractor, at no additional cost to the Owner or Engineer.
7. Test the electrical system to assure:
   a. New circuits are wired as specified on the drawings and Division 40's sections and match the developed circuit and raceway schedule.
   b. The existing circuits have been reterminated and match the developed circuit and raceway schedule.
   c. The system grounding and short circuit protection is present and properly working.
8. Furnish properly executed certificates of final electrical inspection and approval from the Code Authority Having Jurisdiction (AHJ) at the conclusion of the work, before final acceptance.
9. All electrical equipment and material supplied and installed shall be listed for the purpose intended by a third party testing agency acceptable to the AHJ per paragraph 1.02 B.
10. During the course of construction, Contractor shall provide storage for materials and assume complete responsibility for losses due to any cause whatsoever. Storage shall not interfere with traffic conditions in any public thoroughfare. Protect completed work, underway, and materials against loss or damage. Close circuit openings with caps or plugs during installation. Cover fixtures and equipment and protect against dirt or damage caused by water, chemicals, or mechanical accident.
11. Provide a construction set of electrical cable and raceway schedule for the remote sites. Some of the existing panels have drawings available for reference but the material may not be completely accurate.
12. Coordinate all work under this section with the Owner to assure that any power outages are carefully planned.
13. Coordinate the work under this Section with the work being done under Division 40's sections. The Contractor shall promptly notify the Engineer of any conflicts within the Plans and Specifications. All changes required in the work of the Contractor as a result of his failure to notify the Engineer shall be made by the Contractor at his own expense.

## 1.02 QUALITY ASSURANCE

A. References:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

| Reference | Title |
|---|---|
| ANSI Z535.1 | American National Standard for Safety – Color Code |
| ASTM A123 | Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| IEEE Std 803A | IEEE Recommended Practice for Unique Identification in Power Plants and Related Facilities – Component Function Identifiers |
| NECA-1 | National Electrical Contractors Association – Standard Practices for Good Workmanship in Electrical Contracting |
| NFPA-70 | National Electrical Code (NEC) |
| NFPA-70E | Standard for Electrical Safety in the Workplace |
| ACI 318 | Building Code Requirements for Structural Concrete |

B. Listed and Labeled Products:

1. Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. Three such organizations are Underwriters Laboratories (UL), Canadian Standards Association (CSA), and Electrical Testing Laboratories (ETL). Independent testing laboratory shall be acceptable to the inspection authority having jurisdiction.
2. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority, to undergo inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.

C. Factory Tests:

1. Perform factory tests at the place of fabrication and on completion of manufacture or assembly where specified in the individual product specification section.
    a. Include the costs of factory tests in the contract price.

## 1.03 SUBMITTALS

A. Procedure: Section 01 33 00.

B. Submittals - Shop Drawings:

1. Package 1:
    a. Conformance with Contract Documents:
        1) Provide a copy of this section with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
            a) Check-marks (✓) denote full compliance with a paragraph as a whole. Underline deviations and denote them with a number in the margin to the right of the identified paragraph. Paragraph portions not underlined signify specification compliance. Include a detailed, written justification for each deviation. Show conformance with all paragraphs. Failure to include a copy of the marked-up specification section and justification(s) for requested deviations is cause for rejection of the entire submittal with no further consideration.
        2) Show conformance across suppliers and vendors in one submittal. Partial submittals from multiple vendors showing contractor’s division of labor or portions of the work are not acceptable.
    b. Submittal information shall be manufacturer's catalog descriptive literature with identifying arrows pointing to the specific equipment, devices, and materials to be supplied for the individual specification sections. Catalog information shall include technical specifications and application information, including NEMA and electrical ratings, range, weight, accuracy, etc. Catalog cuts shall be edited to show only the items, model numbers, and information which apply.
    c. Submittal information including but not limited to catalog cuts and other such formatted materials shall be assembled in a three-ring binder(s) for the submittal. Binders shall contain a cover sheet, indexed by product. Products shall contain an index sheet with equipment listed and cross-referenced to the appropriate specification paragraph.
    d. Proof of Certification: Raceway installer trained and certified per PVC -coated conduit system manufacturer.
    e. Submittal card options for generator and ATS monitoring. Provide list of points available for alarm and monitoring for generator and ATS.
2. Package 2:
    a. Operating and maintenance information with construction drawings as two sets. Provide construction drawings in 11” x 17” format. One set in a protective covering and shipped with the equipment in the internal equipment pocket at the time of equipment delivery to the project site. Second set provided in the operating and maintenance manual.
    b. Certificates of final electrical inspection and approval from the Code Authority Having Jurisdiction (AHJ) as specified in paragraph 26 05 00-1.01 A.8.
    c. Provide circuit and raceway schedule that has been developed for existing circuits and new electrical cables and raceways.

C. Final Submittals:

1. Provide the material as specified in Section 01 33 00.

## 1.04 DRAWINGS

A. Prepare specified drawings on 11-inch by 17-inch drafting media complete with borders and title blocks clearly identifying project name, equipment and the scope of the drawing.

B. Prepare drawings to reflect the final constructed state of the project installation or supplied equipment. Provide drawing quality, clarity, and size of presentation to permit insertion in operation and maintenance manuals.

## 1.05 PROJECT/SITE CONDITIONS

A. General:

1. Unless otherwise specified, equipment and materials shall be sized and derated for the site ambient conditions, but not less than an ambient temperature of 40 degrees C at an elevation ranging from sea level to 500 feet without exceeding the manufacturer's stated tolerances.

B. The following areas are designated as corrosive:

1. Outdoor areas shall be considered corrosive. Any pump vaults or electrical vaults or manholes or handholes or cable trench/utilidor in the ground shall be considered corrosive locations.

C. Hazardous (Classified) Areas:

1. The following areas are designated as hazardous (classified) in accordance with the NEC:

| Area | Hazardous Classification |
|---|---|
| Pump Station 1 Wetwell | Class I Div 1 |
| Pump Station 4 Wetwell | Class I Div 1 |
| Pump Station 4 Valve Vault | Class I Div 2 |
| Pump Station 10 Wetwell | Class I Div 1 |
| Pump Station 13 Wetwell | Class I Div 1 |
| Pump Station 14 Wetwell | Class I Div 1 |
| Pump Station 14 Valve Vault | Class I Div 2 |
| Pump Station 15 Wetwell | Class I Div 1 |
| Pump Station 16 Wetwell | Class I Div 1 |
| Pump Station 17 Wetwell | Class I Div 1 |
| Pump Station 18 Wetwell | Class I Div 1 |
| Pump Station 19 Wetwell | Class I Div 1 |
| Pump Station 20 Wetwell | Class I Div 1 |
| Pump Station 21 Wetwell | Class I Div 1 |
| Pump Station 22 Wetwell | Class I Div 1 |
| Pump Station 23 Wetwell | Class I Div 1 |
| Pump Station 24 Wetwell | Class I Div 1 |
| Pump Station 25 Wetwell | Class I Div 1 |

D. Not used.

E. Seismic:
   1. Electrical equipment and supports shall be braced in accordance with all applicable building codes.

F. Construction Materials:
   1. General:
      a. All electrical and instrumentation materials shall conform to all applicable local, state, and federal codes, standards, and requirements. Where specifications listed herein conflict with any local, state or federal codes, standard or requirement, the applicable code, standard, or requirement shall take precedent.
      b. Refer to the individual specification section for each component for material composition and installation practices.
   2. Conduit:
      a. All indoor conduit shall be rigid steel conduit, unless specified otherwise.
      b. All systems of conduit must be installed completely before any conductors are pulled in.
      c. Raceway ends shall be capped during construction. Conduits in which water or foreign matter have accumulated shall be thoroughly cleaned to the satisfaction of the Engineer or be replaced.
      d. A tagged 200 lb rated nylon pull cord shall be provided in all empty conduits with at least twenty four (24) inches coiled free at each end. Only tags with a metal rim, made for this purpose, shall be used.
      e. Conduit shall be installed in accordance with the requirements of the NEC. All conduit joints shall be cut square, threaded, reamed smooth and made up tight. Bends or offsets shall be made with standard conduit ells.
      f. Provide liquid-tight flexible steel conduit at all motor and instrument connections.
      g. Provide rigid metal conduit at all stub-ups to boxes and equipment for raceways leaving the ground.
      h. Provide plastic bushings at all raceway terminations to prevent conductor damage as conductors exit raceway.
   3. Conductors:
      a. All conductors shall be copper unless otherwise specified.
      b. The insulation for power and control conductors shall be type XHHW-2.
      c. Conductors shall be sized according to the drawings. Wire size #8 and larger shall be stranded. Minimum wire size shall be #12 except where specified otherwise for signal and pilot control conductors.
      d. Conductors shall not be pulled into conduit until the cabinets and outlet boxes are free of foreign matter and moisture.
      e. Conductors shall be continuous from termination to termination.
      f. All conductors shall be installed in conduit.

g. Internal panel wiring shall be color-coded and any wiring leaving the panel shall pass through properly numbered or coded terminal strips. Every switch, control relay, circuit breaker, and other component, either inside or outside the control panel shall be visibly identified by permanently attached phenolic plates or other approved labeling method.

4. Grounding:
   a. All electrical equipment and panels shall be grounded in accordance with the requirements of the NEC.
   b. No portion of the electrical system shall be energized until the service ground has been connected.
   c. Provide green equipment grounding conductor in each raceway.

## 1.06 STORAGE OF MATERIALS AND EQUIPMENT

A. Store equipment and materials in the factory-sealed container and protect with additional covering and materials to avoid physical damage or weather damage.

## 1.07 ELECTRICAL NUMBERING SYSTEMS

A. Raceway Numbers:
   1. Tag raceways with brass or aluminum tags at the access locations including handholes, pull boxes, junction boxes, and at the terminations. Contractor shall propose a raceway numbering scheme and use the scheme consistently at each facility.

B. Wire and Cable Circuit Numbers:
   1. Identify wire and cable circuit numbers at both ends. Contractor shall propose a circuit numbering scheme which integrates the raceway number. Use alphabetized suffix as necessary to provide unique circuit numbers for a common device.
   2. Include copies of schematic diagrams, wiring connection diagrams, and interconnection diagrams inside of the equipment enclosure, laminated in the equipment print holder.

# PART 2 PRODUCTS

## 2.01 EQUIPMENT AND MATERIALS

A. General:
   1. Provide new equipment and materials free from defects. Provide material and equipment of the same or a similar type of the same manufacturer throughout the work. Use standard production materials wherever possible.

## 2.02 RACEWAYS, BOXES, AND SUPPORTS

A. Enclosures:
   1. Panel enclosures shall comply with the requirements of NEMA 250.
   2. Manufacturer:
      a. Hoffmann Enclosures, Inc.
      b. Rittal.
      c. Or Approved Equal.

B. Raceways and Boxes:
   1. Pullboxes, handholes, and device boxes are generally called boxes herein. Size boxes, manholes, and handholes in accordance with the National Electrical Code. Provide separate raceways for lighting, receptacles, power, control, instrumentation, and signaling systems.

C. Boxes and Wireways:
   1. Provide indoor boxes, larger than FD boxes, constructed of stainless steel.
   2. Provide boxes constructed of Grade 316L stainless steel rated NEMA-4X for corrosive areas and for outdoor locations.
   3. Size and provide wireways at locations above and below boxes, panels and groups of devices. Comply with the NEC sizing for conductor fill requirements. Wireway NEMA type shall match the location and area classification and equipment NEMA enclosure ratings.

D. Terminal Cabinets:
   1. Provide cabinets located indoors-conditioned space with NEMA-12 rating. Provide cabinets located outdoors, in corrosive areas with NEMA-4X, stainless steel. Provide cabinets with hinged doors and 2 or 3-point stainless steel quick release latches with locking features via handle or latching clasps with provisions for padlocks.
   2. Provide adjustable terminal strip mounting accessories and with channel mounted terminal blocks rated 30 amperes, 600 volt AC. Provide No. 8 minimum strap-screw type terminal strip, suitable for ring tongue, locking spade terminals. Provide Phoenix Contact products with capture feature and terminal identification method per terminal, as specified.

E. Raceway and Box Supports:
   1. Provide stainless steel framing channel with end caps to support groups of conduits. Steel conduit shall be supported away from the structures using hot-dip galvanized malleable iron straps with nesting backs or framing channel.
   2. Provide stainless steel supports, channel, fittings, all-thread, and fasteners in outdoor locations, in corrosive areas, and as shown. Provide factory end-caps for supports and channels.
   3. Independently support boxes by stainless steel brackets, expansion bolts, toggle bolts, or machine or wood screws as appropriate. Wooden or plastic plugs inserted in masonry or concrete shall not be used as a base to secure boxes, nor shall welding or brazing be used for attachment.

F. Nameplates:
   1. Provide nameplates for all boxes and enclosures with nameplate wording as shown on the drawings. Provide the tag number or box number with device functional description on device nameplate. Nameplate wording may be changed without additional cost where changes are made during the submittal process or prior to commencement of engraving.
   2. Provide machine engraved laminated white phenolic nameplates with black lettering for panel-mounted equipment with the instrument tag number/description in 3/32-inch minimum size lettering and attach to the panel or enclosure with a minimum of two self-tapping 316 stainless steel screws. Provide nameplates for power sources indicating the power loads and nameplates for power loads that indicate the power sources, in accordance with these specifications and the NEC.

G. Raceway Markers:
   1. Provide raceway markers: 0.036-inch minimum thickness, solid brass tags or aluminum tags with raceway number or the circuit number, stamped in 3/16-inch minimum height characters and attach tags to the raceway with 316 stainless steel wire. Install raceway markers inside of pull boxes, handholes, manholes, and where entering electrical equipment enclosures.

H. Identification Tags:
   1. Provide the following:
      a. Equipment: Typical size 1-inch x 3-inch wide, white with black engraved equipment number and equipment description.
      b. Raceway/Conduit: Tags with raceway or conduit number or circuit shown.
      c. Instrument: 1.5-inch wide, aluminum tag with instrument number and description.
      d. Conductor: Power, control, or instrument cable with the circuit identified as shown; power source or power/control panel identified; power load, equipment, instrument, or device identified; purpose of the conductors identified.
      e. Fastener: nylon-coated 48-mil stainless steel wire. Manufacturer: Brady catalog number 23310 or approved equal with double ferrule type brass wire clamps. Manufacturer: Brady number 23312.

I. General Raceway Requirements:
   1. Provide additional pullboxes for conduit runs with greater than 360 degrees in any run between pull boxes. Limit maximum conduit runs without additional pullboxes to 400 feet, less 100 feet for every 90 degrees for the conduit run change in direction.
   2. Determine conduit routing that conforms to the installation requirements set forth herein and in accordance with the NEC requirements for size and number of pullboxes. The RACESPEC sheets with specified requirements begin on the next page.

J. Electrical Enclosure Hole Seals:
   1. Provide conduit hole seals to seal unused conduit holes. Conduit hole seal shall be made of stainless steel with grey coating, water tight gaskets, and mounting hardware only accessible from inside of enclosure.
   2. Seal shall match and maintain enclosure’s designed NEMA enclosure type.

## 2.03 RACEWAY SPECIFICATION SHEETS (RACESPEC) - RMC-STEEL

A. Materials:

1. Table A specifies the type of raceway supports required for each location and application.

TABLE A

| Location | Framing channel | Threaded rod, hardware, and fittings |
|---|---|---|
| Indoor, architecturally finished area | Stainless Steel | Stainless Steel |
| Indoor, Electrical Room | Stainless Steel | Stainless Steel |
| Outdoor areas, process areas, wet wells | Stainless Steel | Stainless Steel |

2. Table B specifies the type of raceway required for each location and application by RACESPEC sheet. Unscheduled conduit shall be galvanized, rigid steel, RACESPEC type GRS.

TABLE B

| Location | Application/Condition | RACESPEC |
|---|---|---|
| Indoor noncorrosive | Exposed | GRS |
| Outdoor corrosive | Exposed | PGRS |
| Nonhazardous | Final connection to equipment and light fixtures | LFS |

B. General Raceway Requirements:

1. Provide additional pullboxes for conduit runs with greater than 360-degrees in any run between pull boxes. Limit maximum conduit runs without additional pullboxes to 400-feet, less 100 feet for every 90 degrees for the conduit run change in direction.
2. Determine conduit routing that conforms to the installation requirements set forth herein and in accordance with the NEC requirements for size and number of pullboxes. The RACESPEC sheets with specified requirements begin on the next page.

C. Classified Location Conduit Seals:

1. Provide conduit seal fittings where required by NEC Article 500 and the AHJ. They shall be of the EYS or EZS type with male and female hubs.
2. The sealing compound shall be as prescribed by the manufacturer of the sealing conduit body.
3. Conduit seals, including the fittings and filling compounds, shall comply with NEC Article 500 and the AHJ.

D. RACESPECS:

1. RACESPECS start on the next page.

| | |
|---|---|
| Raceway Identification: | GRS-Steel |
| Description: | Galvanized Rigid Steel Conduit |
| Compliance: | ANSI C80.1, UL 6 NEC Type RMC |
| Finish: | Hot-dip galvanized after fabrication, inside and outside. Smooth finished surfaces. |
| Manufacturers: | Allied Tube and Conduit Corp., Wheatland Tube Co., or approved equal. |
| Minimum size: | Unless otherwise shown: 3/4-inch for exposed; 1-inch for concealed or embedded; 2-inch for duct bank encased. |
| Fittings: | |
| Hubs, Rings, Hubs: | Insulated throat with bonding locknut, hot-dip galvanized. The hubs shall utilize a neoprene "O" ring and shall provide a watertight connection. O-Z Gedney, CHM-XXT, or approved equal. |
| Unions: | Electro-galvanized ferrous alloy type Appleton UNF or UNY, Crouse-Hinds UNF or UNY, or approved equal. Threadless fittings are not acceptable. |
| Conduit Bodies: | Oversized conduit bodies: Ferrous alloy type with screw taps for fastening covers to match the conduit system. Gaskets shall be made of neoprene.<br>3/4" thru 4" – Malleable iron, hot-dip galvanized, unless otherwise noted. Neoprene gaskets for all access plates. Tapered threads for conduit entrances.<br>5" and 6" – Electro-galvanized iron or cast-iron box. |
| Boxes: | |
| Indoor: | Type FD cast ferrous for all device boxes and for junction boxes less than 6 inches square. |
| Outdoor: | Type FD cast ferrous for all device boxes and for junction boxes less than 6 inches square. |
| Corrosive: | NEMA 4X stainless steel or nonmetallic. |

| | |
|---|---|
| Raceway Identification: | **GRS-Steel** (continued) |
| Elbows: | |
| (3/4" thru 1.5") | Factory fabricated or field bent. |
| (2" thru 6") | Factory fabricated. |
| Expansion Fittings: | Expansion fittings in embedded runs shall be watertight and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for 3/4-inch movement in any direction. Appleton, Crouse-Hinds, Hubbell, O. Z. Gedney, or approved equal. |
| Manufacturers: | Allied Tube and Conduit Corp., Wheatland Tube Co., or approved equal. |
| Installation: | Rigid steel conduit shall be made up tight and without thread compound. Joints shall be made with standard couplings or threaded unions. Steel conduit shall be supported away from the structures using hot-dip galvanized malleable iron straps with nesting backs.<br><br>Conduit entering boxes shall be terminated with a threaded hub as specified or standard fittings with grounding bushing.<br><br>Exposed male threads on rigid steel conduit shall be coated with zinc-rich paint. |

| | |
|---|---|
| Raceway Identification: | **LFS** |
| Description: | Liquid-Tight Flexible Steel Conduit |
| Application: | Final connection to motors and equipment subject to vibration or adjustment. |
| Compliance: | UL 360 |
| Construction: | Spirally wound galvanized steel strip with successive convolutions securely interlocked and jacketed with liquid-tight plastic cover. |
| Minimum size: | 3/4 inch |
| Fittings: | Cadmium-plated malleable iron body and gland nut with cast-in lug, brass grounding ferrule threaded to engage conduit spiral and O-ring seals around the conduit and box connection and insulated throat. Forty-five and 90-degree fittings shall be used where applicable. |
| Manufacturers: | AFC Cable Systems |
| Installation: | Final connection to equipment subject to vibration or adjustment. Length of flexible liquid tight conduit shall not exceed 15 times the trade diameter of the conduit and not exceed 36 inches in length. Use conductive thread compound. |

| | |
|---|---|
| Raceway Identification: | PGRS |
| Description: | Rigid Steel Conduit, Corrosion-Resistant, Polyvinyl Chloride (PVC) Coated.<br>Provide factory made and coated elbows. |
| Compliance: | ANSI, ETL and UL. The PVC coated rigid galvanized steel conduit shall be stamped with the ETL Verification Mark "ETL Verified to PVC-001". |
| Construction: | PGRS shall be hot-dip galvanized rigid steel conduit as specified in RACESPEC GRS, with a PVC Coating. |
| Finish: | PGRS shall be hot-dip galvanized rigid steel conduit with a PVC Coating. The PVC coating shall be gray, minimum 40 mils thick, bonded to the outside and continuous over the entire length of the conduit except at the threads, and be free of blisters, bubbles, or pinholes. Thread protectors shall be used on the exposed threads of the PVC coated conduit.<br><br>A 2-mil coat of urethane enamel coating shall be bonded to the inside. Coating shall be free of pinholes. Bond strength shall exceed the tensile strength of the PVC coat. |
| Minimum size: | 3/4 inch |
| Fittings: | Similarly coated to the same thickness as the conduit and provided with Type 316 stainless steel hardware. Conduit and fittings shall be manufactured by the same company. Male threads on elbows and nipples, and female threads on fittings or conduit couplings shall be protected by application of urethane coating. |
| Covers: | PVC coated covers shall have V-groove seal and stainless steel hardware. |
| Hubs: | Hubs for connection of conduit to junction, device, or terminal boxes shall be threaded cast ferrous alloy.<br>Hubs shall have the same PVC coating as the conduit and insulating grounding bushings.<br><br>Hubs shall utilize a neoprene "O" ring and shall provide a watertight connection. |

Raceway Identification: **PGRS** (continued)

Boxes:

Nonhazardous: NEMA Class 4X stainless steel or nonmetallic.

Manufacturers: Robroy Industries, Plasti-Bond, Perma-Cote, KorKap or approved equal.

Installation: Plastic coated conduit shall be made up tight, threaded, and installed using tools approved by the PVC-coated conduit manufacturer.

Exposed conduit threads shall be covered by a plastic overlap coated and sealed per manufacturer's recommendations.

Pipe wrenches and channel locks shall not be used for tightening plastic coated conduits. Damaged areas shall be patched, using manufacturer's recommended material. The area to be patched shall be built up to the full thickness of the coating. Painted fittings are not acceptable.

PVC coated conduit shall be supported away from the structure using PVC coated conduit wall hangers or PVC coated conduit mounting hardware.

Damaged work shall be replaced

Training: Installers shall be trained and certified in the proper installation techniques provided by the PVC-coated conduit system manufacture. Proof of certification shall be provided under paragraph 26 05 00-1.03.

## 2.04 CONDUCTORS, WIRE, AND CABLE

A. Provide products specified.

B. Unscheduled Conductor Sizing:

1. Size conductors, wire, and cables in accordance with the National Electrical Code where not specified on the Drawings, and install in the minimum size raceway as specified in the RaceSpecs herein.

C. Control Wire Color Coding: Provide control wires with the following colors for the shown voltage:

| Voltage | Color |
|---|---|
| 120 VAC Power, line and load | Black |
| 120 VAC Control | Red |
| 24 VAC | Orange |
| 12 VAC | Brown |
| Foreign Voltage (AC) (Interlock) | Yellow |
| AC Neutrals | White |
| Ground | Green |
| 24 VDC (+ & -) | Violet |
| 12 VDC (+ & -) | Blue |
| Foreign Voltage (DC) | Violet/white or Blue/White |

D. Power Conductors:

1. Provide power conductors with following colors for the shown voltage:

| Wire | 480Y/277V, 3Ø | 208Y/120V, 3Ø | 240/120V, 3Ø |
|---|---|---|---|
| Phase A | Brown | Black | Black |
| Phase B | Orange | Red | Orange per NEC 408.3(E) and 215.8 |
| Phase C | Yellow | Blue | Blue |
| Ground | Green | Green | Green |
| Neutral | White or Gray per NEC 210.4(D) | White | White |

2. Provide black insulation conductors larger than #10 AWG with colored 3/4 inch vinyl plastic tape to identify the phase color at each cable termination. Tape wrap with 25 percent overlay to provide minimum of 3-inches of coverage.

E. Unscheduled Wire And Cable:

1. Provide the insulation and jacket material specified in the CABLESPEC sheets for scheduled and unscheduled (not shown) conductors. Provide stranded copper conductors for all wire and cable #8 and larger.

F. Electrical Enclosure Conductor Ratings:

1. Provide conductors with 600-volt insulation ratings in panels and other electrical enclosures. Conductors with less than 600-volt insulation ratings are prohibited, unless specifically identified.
2. Bundle and lace conductors in panels and electrical equipment at intervals not greater than 6 inches, spread into trees and connected to their respective terminals. Provide lacing using plastic cable ties that are tensioned and cut off using a tool specifically designed for the purpose such as a Panduit GS2B. Other methods of cutting cable ties are prohibited.
3. Bundle conductors crossing hinges into groups not exceeding 10 to 15 conductors and protected using nylon spiral flexible covers to protect conductors and provide oversized plastic panel wiring duct within panels.
4. Provide slack in junction boxes, pull boxes, handholes and manholes sufficient to allow cables or conductors to be routed along the walls with the amount of slack equal to largest dimension of the enclosure.
5. Provide dedicated electrical wireways and insulated cable holders mounted and secured on stainless steel unistrut in manholes and handholes.

G. Instrument Signal Cable:

1. Provide terminal blocks at instrument cable junctions within dedicated terminal boxes provided by the installer. Provide twisted shielded cable with individual shield for each pair. Provide twisted shielded cable multi-pair with overall shield and jacket. Provide triads wherever 3 wire circuits are required. Circuits shall not be made using conductors from different pairs or triads.
2. Install instrument, signal, and data communication circuits without splices between instruments, terminal boxes, or panels. Shields as a signal path, except for circuits operating at radio frequencies and utilizing coaxial cables are not acceptable. Common ground return conductors for two or more circuits are not acceptable.
3. Bond shields to the signal ground bus at the control panel. Isolate shields from ground and other shields at other locations by cutting short or taping. Provide terminal strips for signal leads and shield drain wires.
4. Terminate spare circuits and the shield drain wire on terminal blocks at both ends of the cable run. Shields or drain wires for spare circuit cables shall be bonded at control panel only with the other end insulated by tape cover.

H. Terminating Materials:

1. Use an UL listed tool for the applied compression type of connectors with the correct size and type. Provide tin-plated high conductivity copper connectors. Mechanical clamp, dimple, screw-type connectors are prohibited.
2. Provide polymeric insulating material over motor terminations with high dielectric strength mastic or material to seal the ends against ingress of moisture and contamination.
3. Cover splices with electrical products designed for the application, and insulate with a heat-shrinkable sleeve or boot.

I. Seals and Sealant Materials:

1. Corrosive Area Conduit Seals:
   a. Corrosive area seals: Sealing compound shall be non-hardening type for corrosive areas.
   b. Sealing compound shall be hard type installed in UL listed for explosion-proof sealing fittings after the conductors are installed, tested, and accepted.
2. Fire Stop Sealant Materials:
   a. Provide non-combustible silicone sealant for sealing apertures and cable through-penetrations for electrical conductors meeting UL 263 4-hour time-temperature requirements.
   b. Manufacturer: STI Inc., Pensil Silicone Sealants PEN300 SpecSeal Firestop, or approved equal.
3. Conduit Seal Bushing:
   a. Collar shall be hot-dip galvanized cast ferrous alloy or aluminum alloy. Sealing ring shall be one-piece neoprene. Hardware shall be stainless steel. Seal shall prevent gases and liquids from exiting the conduit. Manufacturer: O-Z/Gedney, CSBI, or approved equal.

J. Circuit Numbering Marking System:

1. Identify each power, control, and signal conductor at each terminal connection. Machine print the letters and numbers with black on white alphanumeric characters representing the circuit numbering system as follows:

| Circuit Prefix | Type of Function |
|---|---|
| C | Control or power |
| P | Power |
| S | Signal - data communication or instrumentation |
| X | Spare |

   Provide 4-digit number after the prefixes. Example: Circuit number = P-0105 where:
   a. P = conduit contains power
   b. 01 = pump station 01
   c. 05 = unique 5-digit number
2. Identify conductors, including spares. Provide cable markers and wire markers for distribution and utilization equipment circuits identifying the power source and circuit source from which it is served.
3. Provide the identification system of vinyl power cable strap-on cable markers, vinyl multi-conductor control cable strap-on cable markers, and vinyl or polyolefin wire slip-on sleeves and encircle the conductor.
4. Provide conductor marker used in outdoor, damp, or wet locations on heat-shrinkable polyolefin shrinkable marking sleeves covered with clear heat-shrink sleeve or clear tape cover.
5. Print conductor markers using the Brady Marker “XC PLUS”, the Brady LS2000 printer with the Bradysleeve wire marking system, or approved equal.

K. Terminal Blocks: Refer to Section 40 67 00.

L. CABLESPEC SHEETS

1. The following CABLESPEC sheets are included in this section:

| Type | Volt | Product | Purpose |
|---|---|---|---|
| XHHW-2 | 600 | SINGLE CONDUCTOR, XLP INSULATED INDUSTRIAL GRADE CONDUCTOR | POWER, CONTROL, LIGHTING, & RECEPTACLES |
| P-OS | 600 | SINGLE TWISTED, SHIELDED PAIR OR TRIAD, INSTRUMENTATION CABLE | SIGNAL |
| EN | 600 | 250 MHZ ENHANCED CATEGORY 6 ETHERNET CABLE, 4 PAIRS, SHIELDED | GIGABIT ETHERNET CABLE, PANEL INTERIOR |
| PN | 600 | PROFINET CATEGORY 5e CABLE, 4 CONDUCTORS | PROFINET CABLE, PANEL INTERIOR |
| CORD | 600 | SYNTHETIC RUBBER INSULATION WITH OIL-RESISTANT THERMOSET JACKET | FLEXIBLE PORTABLE CABLE |

| | |
|---|---|
| Cable System Identification: | XHHW-2 |
| Description: | Single conductor cross-linked polyethylene power and control cable for sizes no. 14 AWG and larger |
| Voltage: | 600V |
| Conductor Material: | Bare annealed copper; stranded in accordance with ASTM B8 |
| Insulation: | XHHW-2, 90 degree C dry, 75 degree C wet, cross-linked polyethylene in accordance with with ICEA S-95-658/NEMA WC70 |
| Flame Resistance: | UL 1685, IEEE 1202 |
| Manufacturer(s): | Okonite, Southwire, General Cable or approved equal |
| Uses Permitted: | Conduit |
| Execution: | |
| Installation: | Install in accordance with this Section. |
| Testing: | Megger Test: Test in accordance with this section. |

| | |
|---|---|
| Cable System Identification: | P-OS |
| Description: | Type TC single twisted, shielded cable 90 degree C Dry/75 degree C Dry. Pair or triad, 18 or 16 AWG as specified for instrumentation 4-20 mA analog signal. |
| Voltage: | 600V |
| Conductor Material: | Bare annealed copper; stranded in accordance with ASTM B8 |
| Insulation: | 15 mil, 90 degree C, polyvinylchloride (PVC) per UL Standard 1277 |
| Jacket: | Polyvinylchloride (PVC) per UL Standard 1277 |
| Lay: | Twisted on a 2-inch lay |
| Shield: | 100 percent, 1.35 mil aluminum-Mylar tape with 18 AWG 7-strand tinned copper drain wire |
| Manufacturer(s): | Okonite, Okoseal-N type P-OS, or approved equal. |
| Uses Permitted: | Instrumentation cable tray, conduit |
| Execution: | |
| Installation: | Install in accordance with this Section. |
| Testing: | Megger Test: Test in accordance with this section. |

| | |
|---|---|
| Cable System Identification: | EN |
| Description: | DataTuff 600 MHz Enhanced Category 6, Gigabit Ethernet, 4 pair cable. |
| Voltage: | 600V |
| Conductor Material: | Solid bare copper 23 AWG |
| Insulation: | Polyolefin (PO) |
| Jacket: | Polyvinyl chloride (PVC), 0.304-inch diameter |
| Shield: | Shielded, 100% coverage |
| Flame Resistance: | UL 1666 Riser |
| Manufacturer(s): | Belden 7953A, or approved substitute. |
| Uses Permitted: | Instrumentation cable tray, conduit |
| Execution: | |
| Installation: | Install in accordance with this Section. |
| Testing: | Megger Test: Test in accordance with this section. |

| | |
|---|---|
| Cable System Identification: | **CORD** |
| Description: | Industrial Grade Flexible Portable Cord: Synthetic Rubber Insulation with Oil-Resistant Thermoset Jacket construction Type SOOW |
| Voltage: | 600V |
| Conductor Material: | Flexible rope stranded annealed copper per ASTM B189 and B33 |
| Insulation: | Ethylene propylene (EPR) per ICEA S-68-516 and rated for continuous operation at 90 degrees C. |
| Jacket: | Heavy-duty Neoprene per ICEA S-68-516. Color: Black |
| Manufacturer(s): | Okonite: Okocord; American Insulated Wire Cord, or approved substitute. |
| Uses Permitted: | Cable used on vault hatch lids |
| Execution: | |
| Installation: | Install in accordance with this Section. |
| Testing: | Megger Test: Test in accordance with this section. |

| | |
|---|---|
| Cable System Identification: | PN |
| Description: | DataTuff Category 5e, 1 Quad (2 pair) #22 TC cable. |
| Voltage: | 600V |
| Conductor Material: | Tinned Copper stranded 22 AWG |
| Insulation: | Polyolefin (PO) |
| Jacket: | Industrial Grade Thermoplastic Elastomer (TPE), 0.272-inch diameter. Jacket Color Green (RAL 6018) |
| Shield: | 100 percent, aluminum-Polyester tape. 85 percent stranded tinned copper drain wire |
| Flame Resistance: | UL 1685 Vertical Tray Flame Test |
| Manufacturer(s): | Belden 7962A, or approved substitute. |
| Uses Permitted: | Instrumentation cable tray, conduit |
| Execution: | |
| Installation: | Install in accordance with this Section. |
| Testing: | Megger Test: Test in accordance with this section. |

## 2.05 WIRING DEVICES

A. Unless specified otherwise, provide UL approved wiring ivory devices for the current and voltage ratings specified and comply with NEMA WD-1 with provisions for back wiring and side wiring with captive held binding screws.

B. Heavy Duty 120v Receptacles:

1. Single Phase: Duplex 20-amp, NEMA 5-20R accepting NEMA 5-15P and 5-20P plugs. Cooper 5362, Hubbell 5362, or approved equal.
2. Ground Fault Interrupting: Ground fault interrupting (GFI) receptacles: duplex, 20 amp, NEMA 5-20R, specification grade that accepts NEMA 5-15P and 5-20P plugs. Provide GFI receptacles outdoors and as shown, UL listed with provisions for testing and resetting. Manufacturer: Hubbell GF-5352-I, or approved equal.

C. Pilot Devices:

1. Provide heavy-duty push buttons, selector switches and indicating lights: 30mm, oil-tight, NEMA 4X. Indicating lights shall be light emitting diode (LED) type lamps. Unless otherwise shown, provide push-to-test type indicating lights. Provide diode isolating type pilot indicating lights specified for remote-test. Provide red indicating lamps for “RUN” indication and green indicating lamps for “STOP”.
2. Coordinate with Drawings for power requirements. For 120VAC control units: heavy-duty type Allen-Bradley 800H, or approved equal. For 24VDC: Allen-Bradley 800T, Square-D Class 9001 Type J, or approved equal.

## 2.06 GROUNDING SYSTEM

A. Provide electrical system grounding electrode conductors, equipment grounding conductors for equipment grounding and raceways, grounding electrodes, grounding electrode conductors, connections, and bonding in compliance with the National Electrical Code-Article 250 and the National Electrical Safety Code.

B. Provide annealed bare copper, concentric stranded grounding conductors. Provide the minimum sizes per NEC Article 250 for grounding conductors or service entrance conductors, if not sized on the drawings.

C. Bond grounding conductors entering enclosures together to metallic enclosure and to metallic raceways terminating at the enclosure. Clean the conductor and enclosure metal surface at the point of connection prior to making equipment grounding connections or bond connections.

## 2.07 RACEWAY GROUND

A. Install metallic conduits to provide a continuous ground path. Use insulated grounding bushings and bonded to the ground grid system in compliance with Article 250 of the National Electrical Code.

B. Provide an equipment-grounding conductor with green insulation in all metallic and nonmetallic conduit, raceway, wireway, gutter, or duct banks.

C. Provide an equipment grounding conductor with green insulation for size up to #6 AWG and provide green color insulation tape band for conductor size #4 AWG and larger.

## 2.08 POWER, CONTROL, AND METERING EQUIPMENT

A. Coordinate demolition of existing equipment and installation of new equipment with electric power utility company.

B. Comply with the power utility service entrance section standards that includes the power utility metering equipment. Coordinate the correct meter socket requirements. Submit proposed equipment to power utility for acceptance prior to submitting to the Engineer. Provide and install equipment according to power utility requirements.

C. Panelboards:
   1. Provide panelboards: circuit breaker, dead front type with bus bar construction composed of individually mounted circuit breakers with screw-connection, designed to be removed without disturbing other breakers. Provide lockable, hinged door-in-door construction for flush mounted panels and hinged-trim covers for surface mounted panels.
   2. Provide tin-plated copper buss and with the current rating as shown on the panel schedules sized in accordance with UL 67 and withstand rating equal to the interrupting rating of the smallest circuit breaker in the panel. Series rated products are prohibited. Silver plated equipment is prohibited.
   3. Provide panelboards with a separate ground bus and a full capacity neutral bus. Mount neutral bus on insulated standoffs. Provide removable link connector from the neutral bus to the ground bus. Provide listed and labeled panelboard for service entrance disconnect as shown.

D. Circuit Breakers:
   1. Provide circuit breakers: molded-case type provided for the current ratings and pole configurations as shown or as specified on the panelboard schedule and with a minimum interrupting current rating as shown on drawings or schedules, but not less than 10,000 AIC for 240 volt rated devices. Series rated branch, main, or other devices are prohibited.
   2. Provide circuit breakers listed in accordance with UL 489 for the service specified and load terminals with solderless connectors. Provide bolt-on type circuit breakers. Provide circuit breakers with machine-printed, circuit number labels indicting the load served.

## 2.09 PRODUCT DATA

A. The following information shall be provided in accordance with Section 01 33 00:
   1. Operating and maintenance information as specified in Section 01 78 23.
   2. One 11” x 17” set of drawings in a protective covering and shipped with the equipment in the internal equipment pocket at the time of equipment delivery to the project site.
   3. Record documents as specified in Section 01 78 39.
   4. Certificates of final electrical inspection and approval from the Code Authority Having Jurisdiction (AHJ) as specified in paragraph 26 05 00.01-1.01 A 4.

## 2.10 GENERATOR AND ATS MONITORING

A. Generator:
   1. Provide the following auxiliary relay board for expansion of generator monitoring at existing Cummins generators, where indicated on the Drawings:
      a. Cummins Auxiliary Relay Board 101, digital input/output module, with eight (8) Form C relay outputs and four (4) digital inputs, rated 2 A at 30 VDC.
         1) Part Number 0541-0771, no equal.
   2. Refer to Paragraph 3.01.G for installation and configuration requirements.

B. Automatic Transfer Switch:
   1. Provide the following auxiliary relay board for expansion of ATS monitoring at existing Cummins ATS, where indicated on the Drawings:
      a. Cummins M023 Relay Module, digital output module, with nine (9) Form C relay outputs, rated 2 A at 30 VDC.
         1) M023 Relay Module, no equal.
   2. Refer to Paragraph 3.01.G for installation and configuration requirements.

C. Accessories:
   1. Provide any accessories with the relay boards for a complete monitoring system.

## 2.11 HAZARDOUS AREA AND CORROSIVE AREA CONDUIT SEALS

A. Sealing compound shall be non-hardening type for corrosive areas. Seal fittings for conduit systems in hazardous atmosphere locations shall be hot-dip galvanized cast ferrous alloy or aluminum alloy. Seal fittings shall be 40-percent fill type.

B. Sealing compound shall be hard type installed in UL listed for explosion-proof sealing fittings after the conductors are installed, tested, and accepted.

C. Provide PVC-coated seal fittings used for PVC-coated conduit with 40-mil factory coating. Seal fitting and sealing compound manufacture: Appleton, Crouse-Hinds, or equal.

# PART 3 EXECUTION

## 3.01 GENERAL

A. Construction:
   1. Perform the work specified by Contract Documents in accordance with these specifications.
   2. Coordinate the location of electrical material or equipment with the work and adjust conduit location to accommodate equipment in accordance with the accepted submittal drawings from the manufacturer.

B. Housekeeping:
   1. Protect electrical equipment from dust, water and damage. Cover the exterior to keep dry. Electrical distribution equipment such as motor control centers, switchgear, switchboards, panelboards, and other power source buses shall be clean and free of dust and dirt.

2. Protect electrical equipment temporarily exposed to weather, debris, liquids, or damage during construction as specified in Shipment, Protection, and Storage section. Touch up scratches on equipment as specified in Coating Systems section before final acceptance.
3. Wipe clean and vacuum equipment on the inside prior to acceptance testing and energization and again prior to detailed inspection and acceptance of the work.

C. Installation:
   1. Perform the installation work specified in accordance with these specifications.
      a. Lighting and receptacle circuits may be in the same conduit in accordance with derating requirements of the NEC. Lighting and receptacle circuits in conduits with power or control conductors is prohibited.
      b. Install power conductors derived from uninterruptible power supply systems in separate raceways.
      c. Adjust motor circuit protectors in accordance with manufacturer’s instructions and NEC requirements.
      d. Adjust motor overload device in accordance with manufacturer’s instructions and NEC requirements.

D. Conductors, Wire, and Cable Installation:
   1. Splices are not allowed except by permission. Submit proposed splice locations to the Engineer and Owner for review prior to installation. Splices and terminations are subject to inspection prior to and after insulating and may require re-termination after inspection. Underground splices will not be allowed.
   2. Identify conductors at each connection terminal and at splice points with the identification marking system specified.
   3. Install wire and cable into raceways, conduit, cable trays, or wireways without damaging or putting undue stress on the insulation or jacket. Provide manufacture’s recommended and UL Listed pulling compounds lubricants for pulling wire and cable. Grease is prohibited.
   4. Raceway construction shall be complete, cleaned, and protected from the weather before cable is installed. Provide wire or cable support where wire or cable exits a raceway. Provide reusable stainless steel Kellums grips or equal product where cable support is required and where loads are removable.
   5. Scratch-brush the contact areas and tinplate the connection where flat bus bar connections are made with tinplated or unplated flat bus bar. Provide non-oxide material approved for the function. Torque bolts to the bus manufacturer's recommendations.
   6. Adhere to raceway fill limitations defined by NEC and the following: Lighting and receptacle circuits may be in the same conduit in accordance with de-rating requirements of the NEC. Lighting and receptacle circuits shall not be in conduits with power or control conductors. Signal conductors shall be in separate conduits.
   7. Splices and tees only allowed with pre-approval. Install pre-approved in-line splices and tees with tubular compression connectors and insulate. Splices and tees in underground handholes or pull boxes shall be insulated using Scotch-cast epoxy resin splicing kits.

8. Provide self-insulating tubular butt-splice type of compression connectors for terminations at solenoid valves, 120-volt motors, and other devices furnished with pigtail leads.
9. Conductors in all handholes and manholes shall have adequate slack to be tied up around the perimeter of the vault and will be suspended by insulators around the vault's perimeter as needed to support the cable.

E. Raceway Installation:

1. Provide additional pullboxes for conduit runs with greater than 360 degrees in any run between pull boxes. Limit maximum conduit runs without additional pullboxes to 400 feet, less 100 feet for every 90 degrees for the conduit run change in direction.
2. Determine conduit routing that conforms to the installation requirements set forth herein and in accordance with the NEC requirements for size and number of pullboxes.
    a. Install exposed conduit either parallel or perpendicular to structural members and surfaces.
    b. Route two or more exposed conduits in the same general routing parallel with symmetrical bends.
    c. Install exposed conduit on supports spaced not more than 10 feet apart.
    d. Install conduits out from the wall using framing channel where three or more conduits are located in parallel run.
    e. Install conduits between the reinforcing steel in walls or slabs that have reinforcing in both faces. Verify installation method for conduits larger than 2-inch with Engineer prior to installation.
    f. Install conduit in slabs that have only a single layer of reinforcing steel, under the reinforcement.
    g. Install conduits with large radii under the slab in a one-sack concrete slurry.
    h. Route conduit clear of structural openings and shown future openings.
    i. Provide conduit roofs or wall penetrations with flashing sealed watertight and fire-stop, as required to maintain the structural rating.
    j. Grout conduit into any openings cut into concrete and masonry structures.
    k. Cap conduits during construction to prevent entrance of dirt, trash, and water.
    l. Terminate exposed conduit stubs for future use with pipe-caps and provide couplings and pipe-plugs where flush with the slab.
    m. Determine concealed conduit stub-up locations from the manufacturer's shop drawings.
    n. Terminate conduit in equipment with conduit couplings with pipe-plugs flush with structural surfaces for empty conduit.
    o. Install conduit horizontally with at least 7-feet headroom clearance.
    p. Terminate conduit with fittings that ensure that the NEMA rating of the enclosure and provide conduit hubs, as required heretofore.
    q. Connect underground metallic or nonmetallic conduit that turns out of concrete, masonry, or earth to a 90-degree elbow of PVC-coated rigid steel conduit before emergence. Taped or painted RMC-Steel or RNC is prohibited.

r. Provide conduit crossing structural joints with structural movement with O-Z "Type DX" or Crouse-Hinds "Type XJG-SA," aluminum, bonded, weather-tight expansion fitting of the same size and type as the conduit.

s. Seal conduits in corrosive areas using removable mastic material.

t. Seals conduits for classified areas as required per NEC Article 500 and the AHJ.

1) The sealing compound shall be as prescribed by the manufacturer of the sealing conduit body.

2) Conduit seals, including the fittings and filling compounds, shall comply with NEC Article 500 and the AHJ.

u. VFD motor feeder circuits shall be routed a minimum of 12 inches from any control conduits. Should they cross they shall cross at 90 degrees.

F. Electrical Equipment Labeling – Arc Flash

1. Electrical equipment shall have field marked signs and labeling to warn qualified persons of the potential electric arc flash hazards per NEC Article 110.16 Flash Protection.

2. Electrical distribution equipment and utilization equipment shall be field labeled to identify the power source and the load as specified. Refer to NEC Article 110.22 for Identification of Disconnecting Means installation criteria. Specific information is required such as the equipment tag number and equipment description of both the power source and the load equipment.

G. Generator and ATS Monitoring – Installation and Configuration

1. Installation and configuration of the relay outputs boards shall be provided by a manufacturer’s representative for the existing generator and ATS (Cummins).

a. Install relay output boards per manufacturer recommendations.

b. Configure relay output boards for the parameters shown on the Contract Drawings using manufacturer’s software.

## 3.02 TESTING

A. Provide electrical equipment acceptance tests in accordance with the latest version of NETA Acceptance Testing Specification for electrical distribution and utilization equipment to demonstrate that all electrical equipment is functioning as designed.

B. Pre-test conductors prior to installation, as appropriate. Replace damaged conductors. Test all power and control conductors after installation per test forms included in Section 01 99 90. Provide completed test forms.

1. Prior to energizing the electrical circuits, insulation resistance measurements tests shall be performed using a 1000-volt megohmmeter to verify the conductor is acceptable for use on the project. The test measurements shall be recorded on the specified forms and provided in accordance with paragraph 1.03.

C. Insulation Resistance Measurements:

1. General:
   a. Insulation resistance measurements shall be made on conductors and energized parts of electrical equipment. Minimum acceptable values of insulation resistance shall be in accordance with the applicable ICEA, NEMA or ANSI standards for the equipment or material being tested, unless otherwise specified. The ambient temperature at which insulation resistance is measured shall be recorded on the test form.
2. Insulation resistance measurements shall be recorded in a format similar to Form 26 05 00-A, included in Section 01 99 90. Insulation with resistance of less than 10 megohms is not acceptable.
3. Conductor And Cable Tests:
   a. The phase-to-ground insulation resistance shall be measured for all circuits rated 120 volts and above except lighting circuits. Measurements may be made with motors and other equipment connected. Solid state equipment shall be disconnected, unless the equipment is normally tested by the manufacturer at voltages in excess of 1000 volts DC.

D. Testing:

1. Test per Section 40 61 21 requirements in the following sequence:
   a. Performance testing
   b. Functional testing
   c. Operational testing
2. Prior to testing, all protective devices shall be adjusted and made operative.

**END OF SECTION**

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SECTION 40 06 70

SCHEDULES FOR INSTRUMENTATION OF PROCESS SYSTEMS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes:
   1. Instrument Index for instruments furnished or installed under Sections 40 70 00 and 40 67 00.

B. Related sections:
   1. Section 40 61 13 – Process Control System General Provisions.
   2. Section 40 61 21 – Process Control System Testing.
   3. Section 40 67 00 – Control System Equipment Panels and Racks.
   4. Section 40 70 00 – Instrumentation for Process Systems.

### 1.02 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittal:
   1. Submit updated schedule with field instrumentation submittal to match equipment being provided.

D. Informational Submittal:
   1. Provide an electronic copy of the latest version of the Instrument Index to the Engineer upon request.

E. Closeout Submittal:
   1. Provide record drawing print of Instrument Index 40 06 70A following project startup, but prior to acceptance of the work, showing the final constructed state of the process instrumentation and control systems.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 NOT USED

### 3.02 INSTALLATION

A. Refer to Section 40 61 13 for requirements.

### 3.03 FIELD QUALITY CONTROL

A. Refer to Section 40 61 21 for requirements.

B. Maintain a copy of the complete Instrument Index with modifications during construction in Excel format.

## 3.04 ATTACHMENTS

A. 40 06 70 Attachment A: INSTRUMENT INDEX

1. Description of headings in Instrument Index.

| Instrument Field or Heading | Example | Comment or Description |
|---|---|---|
| Item | 1 | Row number reference. |
| Utility | Sewer | Utility identification. |
| Site | Pump Station 16 | Site location of the instrument. |
| Instrument Tag | SS_RH2_PS16_FSL1661 | Unique tag identification. |
| Division ID | SS | Operational division or department. |
| Process Area ID | RH2 | Process area or reach. |
| Process Code | PS16 | Process or site code. |
| ISA Prefix | FSL | Instrument functional identification. Refer to Instrumentation legend sheets. |
| Loop Number | 1661 | Sequential number that is part of a functional "loop". |
| Suffix | A | Alpha identifier used to differentiate elements that would otherwise share the name tag, as required. |
| Description | Exhaust Fan Low Flow Switch | Provides the functional description of the instrument, analyzer, or device. |
| Size or Connection | 1/2" MNPT | Provides the application data relative to sizing the instrument; flow tube diameter, probe length, associated pipe sizes, etc. 4-inch, 6-inch flange, 3/4-inch tap. |
| Operating Range or Setpoint | 180 | 25 to 65, -10 to 90, etc. |
| Units | cfm | mgd, kW, psi, etc. |
| Signal Type | Discrete contact | 4-20 mA, Ethernet, DeviceNet, etc., discrete contact, etc. |
| Power Requirements | 24 VDC | None, loop, 120 VAC, 24 VDC, internal battery, via transmitter, etc. |
| Comments | Located in existing exhaust fan duct. | Provides the features, interlocks, and information applicable to the instrument, analyzer, or device.<br>Describes special installation instructions, area classifications, modifiers to standard instrument specs, Owner-supplied, existing, accessories, signal surge protection, options, etc. |
| Instrument or INSTRUSPEC Type | FTS | Type of instrument. |
| Specification Number | 40 70 00 | Specification under which device is provided or specified. |
| Location Drawing | I-16701 | Location sheet number |
| Installation Detail Number | I-00004, Detail C | Installation detail number if provided. |

**END OF SECTION**

SECTION 40 06 70_ SCHEDULES FOR INSTRUMENTATION OF PROCESS SYSTEMS

ATTACHMENT A

INSTRUMENT INDEX

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| Item | Utility | Site | Instrument Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | Size or Connection | Operating Range or Setpoint | Units | Signal Type | Power Req. | Comments | Instrument or INSTRUSPEC Type | Specification Number | Location Drawing | Installation Detail Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SEWER | PUMP STATION 1 | SS_RH4_PS01_YA0108A | SS | RH4 | PS01 | YA | 0108 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-01701 | I-00003 DETAIL C, PER MFR |
| 2 | SEWER | PUMP STATION 1 | SS_RH4_PS01_YA0108B | SS | RH4 | PS01 | YA | 0108 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-01701 | I-00003 DETAIL C, PER MFR |
| 3 | SEWER | PUMP STATION 1 | SS_RH4_PS01_LI0141 | SS | RH4 | PS01 | LI | 0141 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-01011 DETAIL A | PER MFR |
| 4 | SEWER | PUMP STATION 1 | SS_RH4_PS01_LIT0142 | SS | RH4 | PS01 | LIT | 0142 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-01011 DETAIL B | -- |
| 5 | SEWER | PUMP STATION 1 | SS_RH4_PS01_LI0142 | SS | RH4 | PS01 | LI | 0142 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-01011 DETAIL A | PER MFR |
| 6 | SEWER | PUMP STATION 1 | SS_RH4_PS01_FSL0161 | SS | RH4 | PS01 | FSL | 0161 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 136 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 6 IN. INSTALL SWITCH 7 FT FROM DRY WELL FLOOR. | FTS | 40 70 00 | I-01701 | I-00004 DETAIL C, PER MFR |
| 7 | SEWER | PUMP STATION 4 | SS_RH3_PS04_LI0441 | SS | RH3 | PS04 | LI | 0441 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-04011 DETAIL A | PER MFR |
| 8 | SEWER | PUMP STATION 4 | SS_RH3_PS04_FSL0461 | SS | RH3 | PS04 | FSL | 0461 | | VENTILATION FAN LOW FLOW SWITCH | 1/2" MNPT | 400 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 18 IN. INSTALL SWITCH 6 FT FROM VAULT FLOOR. CLASS I DIV 1, EXPLOSION PROOF RATED HOUSING. | FTS | 40 70 00 | I-04701 | I-00004 DETAIL C, PER MFR |
| 9 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1008A | SS | RH5 | PS10 | YA | 1008 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-10701 | I-00003 DETAIL C, PER MFR |
| 10 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1008B | SS | RH5 | PS10 | YA | 1008 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-10701 | I-00003 DETAIL C, PER MFR |
| 11 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LI1041 | SS | RH5 | PS10 | LI | 1041 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-10011 DETAIL A | PER MFR |
| 12 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LIT1042 | SS | RH5 | PS10 | LIT | 1042 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-10011 DETAIL B | -- |
| 13 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LI1042 | SS | RH5 | PS10 | LI | 1042 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-10011 DETAIL A | PER MFR |
| 14 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FSL1061 | SS | RH5 | PS10 | FSL | 1061 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 160 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 6 IN. INSTALL SWITCH 5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-10701 | I-00004 DETAIL C, PER MFR |
| 15 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1308A | SS | RH3 | PS13 | YA | 1308 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-13701 | I-00003 DETAIL C, PER MFR |
| 16 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1308B | SS | RH3 | PS13 | YA | 1308 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-13701 | I-00003 DETAIL C, PER MFR |
| 17 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LI1341 | SS | RH3 | PS13 | LI | 1341 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-13011 DETAIL A | PER MFR |
| 18 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LE1342 | SS | RH3 | PS13 | LE | 1342 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-13701 | I-00004 DETAIL B; PER MFR |
| 19 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LIT1342 | SS | RH3 | PS13 | LIT | 1342 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-13011 DETAIL B | -- |
| 20 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LI1342 | SS | RH3 | PS13 | LI | 1342 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-13011 DETAIL A | PER MFR |
| 21 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FSL1361 | SS | RH3 | PS13 | FSL | 1361 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 160 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 6 IN. INSTALL SWITCH 1 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-13701 | I-00004 DETAIL C, PER MFR |
| 22 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LE1442 | SS | RH2 | PS14 | LE | 1442 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-14701 | I-00004 DETAIL B; PER MFR |
| 23 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LIT1442 | SS | RH2 | PS14 | LIT | 1442 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN LEVEL CONTROL PANEL | LDT1 | 40 70 00 | I-14011 DETAIL B | -- |
| 24 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LI1442 | SS | RH2 | PS14 | LI | 1442 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON LEVEL CONTROL PANEL DOOR | PANEL METER | 40 70 00 | I-14011 DETAIL A | PER MFR |
| 25 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1508A | SS | RH2 | PS15 | YA | 1508 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-15701 | I-00003 DETAIL C, PER MFR |
| 26 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1508B | SS | RH2 | PS15 | YA | 1508 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-15701 | I-00003 DETAIL C, PER MFR |
| 27 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LI1541 | SS | RH2 | PS15 | LI | 1541 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-15011 DETAIL A | PER MFR |
| 28 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LE1542 | SS | RH2 | PS15 | LE | 1542 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-15701 | I-00004 DETAIL B; PER MFR |
| 29 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LIT1542 | SS | RH2 | PS15 | LIT | 1542 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-15011 DETAIL B | -- |
| 30 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LI1542 | SS | RH2 | PS15 | LI | 1542 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-15011 DETAIL A | PER MFR |
| 31 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FSL1561 | SS | RH2 | PS15 | FSL | 1561 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 155 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-15701 | I-00004 DETAIL C, PER MFR |
| 32 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1608A | SS | RH2 | PS16 | YA | 1608 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-16701 | I-00003 DETAIL C, PER MFR |
| 33 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1608B | SS | RH2 | PS16 | YA | 1608 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-16701 | I-00003 DETAIL C, PER MFR |
| 34 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LI1641 | SS | RH2 | PS16 | LI | 1641 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-16011 DETAIL A | PER MFR |
| 35 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LE1642 | SS | RH2 | PS16 | LE | 1642 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-16701 | I-00004 DETAIL B; PER MFR |
| 36 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LIT1642 | SS | RH2 | PS16 | LIT | 1642 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-16011 DETAIL B | -- |
| 37 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LI1642 | SS | RH2 | PS16 | LI | 1642 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-16011 DETAIL A | PER MFR |
| 38 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FSL1661 | SS | RH2 | PS16 | FSL | 1661 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 182 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-16701 | I-00004 DETAIL C, PER MFR |
| 39 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1708A | SS | RH2 | PS17 | YA | 1708 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-17701 | I-00003 DETAIL C, PER MFR |
| 40 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1708B | SS | RH2 | PS17 | YA | 1708 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-17701 | I-00003 DETAIL C, PER MFR |
| 41 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LI1741 | SS | RH2 | PS17 | LI | 1741 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-17011 DETAIL A | PER MFR |

| Item | Utility | Site | Instrument Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | Size or Connection | Operating Range or Setpoint | Units | Signal Type | Power Req. | Comments | Instrument or INSTRUSPEC Type | Specification Number | Location Drawing | Installation Detail Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LE1742 | SS | RH2 | PS17 | LE | 1742 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-17701 | I-00004 DETAIL B; PER MFR |
| 43 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LIT1742 | SS | RH2 | PS17 | LIT | 1742 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-17011 DETAIL B | -- |
| 44 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LI1742 | SS | RH2 | PS17 | LI | 1742 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-17011 DETAIL A | PER MFR |
| 45 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FSL1761 | SS | RH2 | PS17 | FSL | 1761 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 130 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 1 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-17701 | I-00004 DETAIL C, PER MFR |
| 46 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1808A | SS | RH2 | PS18 | YA | 1808 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-18701 | I-00003 DETAIL C, PER MFR |
| 47 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1808B | SS | RH2 | PS18 | YA | 1808 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-18701 | I-00003 DETAIL C, PER MFR |
| 48 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LI1841 | SS | RH2 | PS18 | LI | 1841 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-18011 DETAIL A | PER MFR |
| 49 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LE1842 | SS | RH2 | PS18 | LE | 1842 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-18701 | I-00004 DETAIL B; PER MFR |
| 50 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LIT1842 | SS | RH2 | PS18 | LIT | 1842 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-18011 DETAIL B | -- |
| 51 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LI1842 | SS | RH2 | PS18 | LI | 1842 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-18011 DETAIL A | PER MFR |
| 52 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FSL1861 | SS | RH2 | PS18 | FSL | 1861 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 210 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-18701 | I-00004 DETAIL C, PER MFR |
| 53 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1908A | SS | RH2 | PS19 | YA | 1908 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-19701 | I-00003 DETAIL C, PER MFR |
| 54 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1908B | SS | RH2 | PS19 | YA | 1908 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-19701 | I-00003 DETAIL C, PER MFR |
| 55 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LI1941 | SS | RH2 | PS19 | LI | 1941 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-19011 DETAIL A | PER MFR |
| 56 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LIT1942 | SS | RH2 | PS19 | LIT | 1942 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-19011 DETAIL B | -- |
| 57 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LI1942 | SS | RH2 | PS19 | LI | 1942 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-19011 DETAIL A | PER MFR |
| 58 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FSL1961 | SS | RH2 | PS19 | FSL | 1961 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 190 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-19701 | I-00004 DETAIL C, PER MFR |
| 59 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2008A | SS | RH2 | PS20 | YA | 2008 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-20701 | I-00003 DETAIL C, PER MFR |
| 60 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2008B | SS | RH2 | PS20 | YA | 2008 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-20701 | I-00003 DETAIL C, PER MFR |
| 61 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LI2041 | SS | RH2 | PS20 | LI | 2041 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-20011 DETAIL A | PER MFR |
| 62 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LIT2042 | SS | RH2 | PS20 | LIT | 2042 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-20011 DETAIL B | -- |
| 63 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LI2042 | SS | RH2 | PS20 | LI | 2042 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-20011 DETAIL A | PER MFR |
| 64 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FSL2061 | SS | RH2 | PS20 | FSL | 2061 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 205 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-20701 | I-00004 DETAIL C, PER MFR |
| 65 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2108A | SS | RH2 | PS21 | YA | 2108 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-21701 | I-00003 DETAIL C, PER MFR |
| 66 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2108B | SS | RH2 | PS21 | YA | 2108 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-21701 | I-00003 DETAIL C, PER MFR |
| 67 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LI2141 | SS | RH2 | PS21 | LI | 2141 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-21011 DETAIL A | PER MFR |
| 68 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LE2142 | SS | RH2 | PS21 | LE | 2142 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-21701 | I-00004 DETAIL B; PER MFR |
| 69 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LIT2142 | SS | RH2 | PS21 | LIT | 2142 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-21011 DETAIL B | -- |
| 70 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LI2142 | SS | RH2 | PS21 | LI | 2142 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-21011 DETAIL A | PER MFR |
| 71 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FSL2161 | SS | RH2 | PS21 | FSL | 2161 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 163 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-21701 | I-00004 DETAIL C, PER MFR |
| 72 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2208A | SS | RH1 | PS22 | YA | 2208 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-22701 | I-00003 DETAIL C, PER MFR |
| 73 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2208B | SS | RH1 | PS22 | YA | 2208 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-22701 | I-00003 DETAIL C, PER MFR |
| 74 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LI2241 | SS | RH1 | PS22 | LI | 2241 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-22011 DETAIL A | PER MFR |
| 75 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LE2242 | SS | RH1 | PS22 | LE | 2242 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-22701 | I-00004 DETAIL B; PER MFR |
| 76 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LIT2242 | SS | RH1 | PS22 | LIT | 2242 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-22011 DETAIL B | -- |
| 77 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LI2242 | SS | RH1 | PS22 | LI | 2242 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-22011 DETAIL A | PER MFR |
| 78 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FSL2261 | SS | RH1 | PS22 | FSL | 2261 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 190 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-22701 | I-00004 DETAIL C, PER MFR |
| 79 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2308A | SS | RH1 | PS23 | YA | 2308 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-23701 | I-00003 DETAIL C, PER MFR |
| 80 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2308B | SS | RH1 | PS23 | YA | 2308 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-23701 | I-00003 DETAIL C, PER MFR |
| 81 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LI2341 | SS | RH1 | PS23 | LI | 2341 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-23011 DETAIL A | PER MFR |
| 82 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LE2342 | SS | RH1 | PS23 | LE | 2342 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-23701 | I-00004 DETAIL B; PER MFR |
| 83 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LIT2342 | SS | RH1 | PS23 | LIT | 2342 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-23011 DETAIL B | -- |

| Item | Utility | Site | Instrument Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | Size or Connection | Operating Range or Setpoint | Units | Signal Type | Power Req. | Comments | Instrument or INSTRUSPEC Type | Specification Number | Location Drawing | Installation Detail Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 84 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LI2342 | SS | RH1 | PS23 | LI | 2342 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-23011 DETAIL A | PER MFR |
| 85 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FSL2361 | SS | RH1 | PS23 | FSL | 2361 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 235 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 1 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-23701 | I-00004 DETAIL C, PER MFR |
| 86 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2408A | SS | RH1 | PS24 | YA | 2408 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-24701 | I-00003 DETAIL C, PER MFR |
| 87 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2408B | SS | RH1 | PS24 | YA | 2408 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-24701 | I-00003 DETAIL C, PER MFR |
| 88 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LI2441 | SS | RH1 | PS24 | LI | 2441 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-24011 DETAIL A | PER MFR |
| 89 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LE2442 | SS | RH1 | PS24 | LE | 2442 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-24701 | I-00004 DETAIL B; PER MFR |
| 90 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LIT2442 | SS | RH1 | PS24 | LIT | 2442 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-24011 DETAIL B | -- |
| 91 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LI2442 | SS | RH1 | PS24 | LI | 2442 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-24011 DETAIL A | PER MFR |
| 92 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FSL2461 | SS | RH1 | PS24 | FSL | 2461 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 178 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 1 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-24701 | I-00004 DETAIL C, PER MFR |
| 93 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2508A | SS | RH1 | PS25 | YA | 2508 | A | BEACON | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | BEACON | 40 67 00 | I-25701 | I-00003 DETAIL C, PER MFR |
| 94 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2508B | SS | RH1 | PS25 | YA | 2508 | B | HORN | PANEL MOUNT | -- | -- | -- | NONE | LOCATED NEAR PLC PANEL | HORN | 40 67 00 | I-25701 | I-00003 DETAIL C, PER MFR |
| 95 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LI2541 | SS | RH1 | PS25 | LI | 2541 | | LEVEL INDICATOR (PRIMARY) | PANEL MOUNT | 0-10 | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-25011 DETAIL A | PER MFR |
| 96 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LE2542 | SS | RH1 | PS25 | LE | 2542 | | FOGROD LEVEL SENSOR (SECONDARY) | MOUNTING BRACKET | SEE TRANSMITTER | FT | MFR | VIA TRANSMITTER | CLASS I DIV 1 AREA, MFR CABLE TO IS PANEL | LDT1 | 40 70 00 | I-25701 | I-00004 DETAIL B; PER MFR |
| 97 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LIT2542 | SS | RH1 | PS25 | LIT | 2542 | | FOGROD LEVEL TRANSMITTER (SECONDARY) | DIN RAIL | 0-7.5; IN 0.75 INCREMENTS | FT | 4-20 mA, 10 DISCRETE CONTACTS | 24 VDC | LOCATED IN INTRINSICALLY SAFE PANEL IN SAFE AREA | LDT1 | 40 70 00 | I-25011 DETAIL B | -- |
| 98 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LI2542 | SS | RH1 | PS25 | LI | 2542 | | FOGROD LEVEL INDICATOR (SECONDARY) | PANEL MOUNT | 0-7.5 SPAN; CALIBRATE TO MATCH PRIMARY LEVEL TRANSMITTER | FT | 4-20 mA | 24 VDC | LOCATED ON INTRINSICALLY SAFE PANEL DOOR | PANEL METER | 40 70 00 | I-25011 DETAIL A | PER MFR |
| 99 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FSL2561 | SS | RH1 | PS25 | FSL | 2561 | | EXHAUST FAN LOW FLOW SWITCH | 1/2" MNPT | 145 | CFM | DISCRETE CONTACT | 24 VDC | EXISTING DUCT DIAMETER IS 8 IN. INSTALL SWITCH 3.5 FT FROM GRATING LEVEL FLOOR. | FTS | 40 70 00 | I-25701 | I-00004 DETAIL C, PER MFR |

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SECTION 40 61 13

PROCESS CONTROL SYSTEM GENERAL PROVISIONS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies general requirements applicable to all work on the drawings and in Sections 40 06 70 through 40 70 00 of these specifications for the process control, instrumentation, communication, network, and signal systems. This work will be referenced as the Process Control System (PCS) to be provided by a single Systems Integrator (SI) meeting the qualifications section of this specification.

B. Electrical requirements applicable to this work are specified in Section 26 05 00.

C. Description of Work

1. This section covers general work requirements for the Process and Instrumentation and Control System. Detailed requirements are in individual related specification sections.
2. Systems Integrator: The scope of the work to be performed by the Systems Integrator in general, is as follows. Refer to the individual Division 40 specifications for the detailed scope of work assigned to the Systems Integrator.
    a. Provide new field instrumentation.
    b. Provide new control system hardware including programmable logic controllers (PLCs), input/output (I/O) modules, operator interface terminals (OIT) or panel-mounted PCs, network switches, and uninterruptible power supplies (UPS).
    c. Provide and test custom fabricated back panels to be installed in existing PLC panel enclosures.
    d. Provide and test custom fabricated enclosure assembly where the size of the existing PLC panel enclosure is insufficient size for the new control system equipment.
    e. Provide and test custom fabricated enclosure assembly for new intrinsically safe panels, go/no-go panels, and remote I/O (RIO) panels.
    f. Demolition of existing control system equipment to be replaced and demolition of obsolete equipment/wiring within existing panels.
    g. Collaborate with the Owner’s Programmer to provide a fully integrated PLC-based SCADA system.
    h. Provide testing, start up, and commissioning services in coordination with the Owner’s Programmer.
3. Programming: The PCS programming work shall be provided by the Owner’s Programmer and consists of the following:
    a. Perform process control system programming, including programmable logic controller (PLC), Remote I/O (RIO), operator interface terminal (OIT), and SCADA system programming, to implement the specified process control descriptions.
    b. Develop Functional Testing procedures and forms, as described in Section 40 61 21.
    c. Assist with testing and commissioning of the revised control system in coordination with Systems Integrator.

d. Refer to the individual Division 40 specifications for the detailed scope of work assigned to the Owner's Programmer.

e. All other work specified in the applicable sections not specifically assigned to the Owner's Programmer shall be the responsibility of the Contractor and Systems Integrator.

## 1.02 RELATED SECTIONS

A. The requirements of this section are applicable to work specified in Sections 40 06 70 through 40 70 00 of these specifications.

## 1.03 REFERENCES

A. Reference Standards:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section prevail.
2. Unless otherwise specified, references to documents mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
3. If referenced documents have been discontinued by the issuing organization, references to those documents mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
4. Where document dates are given in the following listing, references to those documents mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

| Reference | Title |
|---|---|
| IEEE 100 | Standard Dictionary of Electrical and Electronics Terms |
| ISA 5.1-2009 | Instrumentation Symbols and Identification |
| ISA 5.4 | Instrument Loop Diagrams |
| ISA 20 | Specification Forms for Process Measurement and Control Instrumentation, Primary Elements, and Control Valves |
| ISA 51.1 | Process Instrumentation Terminology |
| ISA TR20.00.01 | Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations |
| NEMA ICS 1 | General Standards for Industrial Control and Systems |
| NFPA 70 (NEC) | National Electric Code |
| NFPA 79 | Electrical Standards for Industrial Machinery |

## 1.04 DEFINITIONS

A. Abbreviations:

1. A: ampere(s)
2. HIM: human interface module
3. HMI: human-machine interface
4. I/O: input/output
5. IS: Intrinsically Safe
6. mA: milli-ampere(s)
7. OIT: operator interface terminal
8. PC: personal computer
9. PCS: process control system
10. PICS: process and instrumentation control system
11. PLC: programmable logic controller
12. RIO: remote input/output
13. SCADA: supervisory control and data acquisition
14. SI: Systems Integrator
15. STP: shielded twisted pair
16. VAC/Vac: volt(s) alternating current
17. VDC/Vdc: volt(s) direct current
18. VFD: variable frequency drive
19. W: watt(s)

B. Definitions General:

1. General: Definitions of terminology related to Instrumentation and Industrial Electronic Systems used in the specifications as defined in IEEE 100, ISA 51.1, and NEMA ICS 1.
2. Data sheets: Refer to ANSI/ISA-20-1981 or ISA-TR20.00.01-2007.
3. Two-wire transmitter: A transducer that derives operating power supply from the signal transmission circuit and requires no separate power supply connections. A two-wire transmitter produces a 4- to 20-milliampere current regulated signal in a series circuit with a 24-volt direct current (VDC) driving potential and a maximum circuit resistance of 600 ohms.
4. Four-wire transmitter: A transducer that derives operating power from separate power supply connections. A four-wire transmitter produces a 4- to 20-milliampere current regulated signal in a series circuit with a maximum circuit resistance of 600 ohms. Four-wire transmitters typically require 120-volt alternating current (VAC) or 24 VDC input power supply.
5. Galvanic isolation: An electrical node having no direct current path to another electrical node. Galvanic isolation refers to a device with electrical inputs and/or outputs that are isolated from ground, the device case, the process fluid, and separate power supply terminals. Inputs and/or outputs may be externally grounded without affecting the characteristics of the devices or providing a path for circulation of ground currents.

6. Panel: An instrument support system that may be a flat surface, partial enclosure, or complete enclosure for instruments and other devices used in process control systems including consoles, cabinets, and racks. Panels provide mechanical protection, electrical isolation, and environmental protection from dust, dirt, moisture, and chemical contaminants that may be present in the atmosphere.
7. Systems Integrator: A firm engaged in the business of detailed control system design and engineering, instrumentation component purchase, system and panel assembly, control device programming, and implementing of the specified process control and industrial automation systems.
8. Owner's Programmer: Brown and Caldwell, Seattle, Washington, providing the SCADA/PLC/RIO/OIT application programming described in Section 40 61 96.

C. Definitions—Signal Types:

1. Analog, low level: Signal with full output level of 100 millivolts or less including thermocouples and resistance temperature detectors.
2. Analog, high level: Signals with full output level greater than 100 millivolts but less than 30 volts, including 4 to 20 mA transmission.
3. Digital code: Coded information from the output of an analog-to-digital converter or digital transmission terminal.
4. Discrete control or events: Dry contact closures and signals monitored by solid-state equipment, relays, or control circuits.
5. Discrete control or events, low voltage: Dry contact closures and signals monitored by solid-state equipment, relays, or control circuits operating at less than 30 volts and 250 milliamperes.
6. Modulated signals: Signals from modems or low-level audio signals. Normal signal level: plus 4 dBm to minus 22 dBm. Frequency range is 300 to 10,000 hertz.
7. Pulse frequency: Counting pulses emitted from speed or flow transmitters.
8. Radio frequency (RF) signals: Continuous wave alternating current signals with fundamental frequency greater in a range of 310 kilohertz to 300 gigahertz.

D. Definition—Drawing Types:

1. Elementary or schematic diagram:
   a. Use graphic symbols to indicate the electrical connections and functions of a specific circuit arrangement. The schematic diagram facilitates tracing of the circuit and its functions without regard to the actual physical size, shape, or location of the component devices or parts.
   b. Indicate connections to internal and external components connected to the panel. Note which devices are external to the panel.
   c. Depicted in ladder logic format.
   d. Indicates contact arrangement of internal and external devices such that circuits are complete and match equipment furnished.
   e. Indicates equipment designations/tag numbers to match contract drawings.
2. Block diagram: A diagram of a system, instrument, computer, or program in which selected portions are represented by annotated boxes and interconnecting lines.

3. Network block diagram:
   a. A diagram of the overall control system, containing annotated boxes showing the primary network components (controllers, routers, switches, computers, displays).
   b. Include annotated interconnecting lines showing the system communication media and communication protocols.
   c. Indicate manufacturer and model of the primary network components and software.
   d. Indicates functions performed by each device (e.g., Historical Data Server, Field controller, Database Server, Operator workstation, etc.)
4. Connection diagram:
   a. Purpose is to show wiring requirements between internal panel components.
   b. Show components of a control panel in an arrangement similar to the actual panel layout.
   c. Indicate internal wiring between components.
   d. Show terminal blocks used for internal wiring and field wiring, with identification as such.
   e. Indicate insulation color code, signal polarities, wire numbers, and terminal block numbers.
5. Interconnection diagram:
   a. Purpose is to show wiring requirements between panels, standalone devices, components, and instruments.
   b. Indicate wire numbers, cable numbers, raceway numbers, terminal box numbers, terminal block numbers, panel numbers, and field device tag numbers.
   c. Show external connections between terminals of equipment and outside points, such as motors and auxiliary devices.
   d. Indicate references to connection diagrams that interface to the interconnection diagrams.
   e. Interconnection diagrams are to be of the continuous line type. Show bundled wires as a single line with the direction of entry/exit of the individual wires clearly shown. Wireless diagrams and wire lists are not acceptable.
   f. Show termination of each cable. Clearly mark each termination point. Show each wire’s identification as actually installed. The wire identification for each end of the same wire shall be identical. Identify devices and equipment.
   g. Depict terminal blocks as actually installed and identified in the equipment with individual terminal identification.
   h. Indicate external jumpers, shielding, and grounding terminations.
   i. Indicate polarities for signal and DC circuit.
   j. Depict spare wires and cables installed or slated for installation.
6. Arrangement, layout, or outline drawings:
   a. Show the physical space and mounting requirements of a piece of equipment.
   b. Indicate ventilation requirements and space provided for connections or the location to which connections are to be made.

c. Indicate clearance requirements for ventilation and access.
d. Show the dimensioned external and interior control panel views with components and Bill of Material.

7. Loop diagrams:
   a. Prepared per ISA 5.4 – Loop Diagrams.
   b. Show device element wiring of the system. Indicate device terminations, with terminal numbers.
   c. Show circuits for hardwired device interlocks.
   d. Show circuit cable and wire cable numbers, signal polarities, and terminal block numbers.
   e. Show connection to power supplies. Include alternating current (AC) and direct current (DC) power supplies and circuit information for instruments furnished under this contract.
   f. Indicate controller or I/O card address/node, rack, slot, and point wiring terminals.
   g. Show power supplies for signal loops. Indicate in which panel components reside and power originates with circuit numbering/name. Where new/modified loops connect to an existing power supply, show the existing power supply name, location, and circuit.
   h. Indicate surge protection type, manufacturer, and model number (i.e., types include floating ground reference or grounded reference).
   i. Show new and modified terminal blocks with numbering in new and existing panels.
   j. Indicate signal loop grounding terminations.
   k. Indicate loop numbers, wire numbers, and cable numbers used in field wiring and panel wiring.
   l. Indicate field element being controlled or monitored (i.e., normally open contact from relay CR17, or FIT 365).

## 1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the process and instrumentation control system for proper operation with related equipment and systems specified in other Divisions.
   2. Coordinate with Owner’s Programmer to fully integrate the control system components into the PCS SCADA system.
   3. Integrate equipment in conformance with the drawings, specifications, and recommendations of the equipment manufacturer and the related processes equipment manufacturers.
   4. Obtain manufacturer’s technical information for items of equipment not provided with, but connected to, the control system. Provide the necessary coordination and components for correct signal interfaces between equipment and the control system.
   5. Coordinate interface requirements and schedule with other project subcontractors and equipment suppliers.
   6. Present to the Engineer conflicts between the plans, specifications, manufacturer/vendor drawings, and installation instructions, etc. for resolution before proceeding.

7. Provide instrument field calibration adjustment requirements to the Engineer and Owner's Programmer to coordinate with SCADA testing.

B. Pre-submittal conference:

1. Schedule a pre-submittal conference with the Contractor, Systems Integrator, Owner, and Engineer within 20 calendar days after Contract award to discuss the work, equipment, and submittal format, and to establish the framework for project coordination and communication.
2. Provide the following materials 10 days prior to the conference:
   a. Proposed Systems Integrator that will meet the qualifications requirements of this section.
   b. Indicate full conformance with the specification sections covered by this section with a contract deviations request. Requested contract deviations to reference and to be attached to the applicable contract specifications and drawings. Provide justification for requested deviations.
   c. Proposed "equal" products that differ from specified manufacturers/models with comparative listing of the published specifications for the specified item and the proposed item.
   d. Project schedule with deliverables and milestones through project completion.
   e. Sample submittal drawings, as specified to be provided for this project. Samples can be a copy from a previous project provided that represents the format being proposed for this project.
      1) Control system block diagram.
      2) Documented controller and operator interface program.
      3) Control panel schematic diagram.
      4) Interconnection diagram.
      5) Control panel arrangement drawing.
3. The pre-submittal conference will not replace the Product and Shop Drawing Submittal review process.

## 1.06 SUBMITTALS

A. General:

1. Procedures: Section 01 33 00.
2. This article indicates general requirements applicable to all PCS submittals. Additional information to be submitted with each section will be listed under Action Submittals or Closeout Submittals in this and each related section.
   a. Submit all information for sections covered by a submittal as a complete package in one submittal. Partial submittals of a section from multiple vendors showing contractor's division of equipment, labor, or portions of the work are not acceptable.
   b. Include a table of contents in each submittal divided by specification section and content of each section such as drawings and components. Clearly indicate the article or paragraph to which each table of content item applies.
   c. Related sections indicate additional detail for each submittal.

d. Provide submittals in searchable PDF format with bookmarks to match the table of contents of each submittal. Limit PDF size to 200 pages. Provide multiple volumes if necessary.
e. Submitted information is to conform to the following:
f. Shop Drawings: Prepare drawings in AutoCAD with borders and title blocks identifying the project, system, revisions to the drawing, and type of drawing. Include a date and description for each revision of a drawing including the date and description of the revisions. Drawing prints shall be 11" by 17" with a minimum lettering size of 1/8".
g. Product Literature: Provide manufacturer’s specifications, data sheets, and catalog literature for the equipment and components that clearly and unambiguously show what is being provided and that it meets the requirements specified. Indicate provided and available options, materials of construction, environmental characteristics, electrical characteristics, and connection requirements. Include only applicable information.
h. Conformance with Contract Documents:
    1) Provide a copy of sections applicable to the submittal group with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
    2) Check-marks (✓) denote full compliance with a paragraph as a whole. Underline deviations and denote them with a number in the margin to the right of the identified paragraph. Paragraph portions not underlined signify specification compliance. Include a detailed, written justification for each deviation. Show conformance with all paragraphs in a section. Failure to include a copy of the marked-up specification sections and justification(s) for requested deviations is cause for rejection of the entire submittal with no further consideration.
    3) Provide a marked up copy of the contract document instrumentation drawings relating to the submitted equipment, with addendum updates that apply to the equipment in this section, to show specific changes necessary for the equipment proposed in the submittal. If no changes are required, mark the drawing(s) “no changes required” on the drawing index. Drawings marked “no changes required” on the drawing index do not need to be included in the submittal. Failure to include copies of the relevant drawings with the submittal is cause for rejection of the entire submittal with no further review. Contract drawings include the following:
        a) Panel layout and arrangement drawings
        b) Panel power distribution drawings
        c) I/O card drawings
        d) Network block diagrams
        e) Demolition drawings
        f) Equipment installation details
    4) Show conformance across suppliers and vendors in one submittal. Partial submittals from multiple vendors showing contractor’s division of labor or portions of the work are not acceptable.

5) Provide a detailed written request and explanation for each deviation. Failure to include a copy of the marked-up specification sections and drawings, along with justification(s) for requested deviations to the contract requirements, with the submittal, is cause for rejection of the entire submittal with no further consideration.

B. Action Submittals.
1. Procedures: Section 01 33 00.
2. Quality Assurance (within 14 days of contract Notice to Proceed):
   a. Systems Integrator qualifications per paragraph 1.07, Quality Assurance.
   b. Project personnel qualifications per paragraph 1.07, Quality Assurance.
3. Provide Action Submittal packages specified in individual Division 40 specifications.

C. Closeout Submittals.
1. Procedures: Section 01 78 23.
2. Provide Closeout Submittal packages specified in individual Division 40 specifications.
3. Provide record drawing prints of drawings and schedules following project startup, but prior to acceptance of the work, showing the final constructed state of the process instrumentation and control systems.
4. Include the following in each operation and maintenance manual:
   a. Final reviewed submittals, including revised as-built record drawings.
   b. Manufacturer's operation and maintenance instructions, edited for this project.
   c. Written record of menu configuration, jumpers, switch settings, and other configurable parameters for control system devices.
   d. Final network equipment software configurations.
5. Maintenance Material Submittals
   a. Provide one listing of spare parts that is divided by specification section.
   b. Include list prices for spare parts, expendable supplies, and tools.
   c. Indicate spare parts packaging and storage methods.
   d. Indicate spare parts or components that could be deleted or reduced based on manufacturer's recommendations.
   e. Indicate where manufacturer's recommendations exceed the spare parts specified.
   f. Obtain spare parts from the equipment manufacturer. Do not provide third-party equivalent replacements.
   g. Packaging, Testing, and Storage:
      1) Provide protective toolboxes for special tools.
      2) Test spare boards, circuit cards, power supplies, and similar spare electronic assemblies on site prior to acceptance.
      3) Carefully repackage operable parts. Immediately remove inoperable parts from the site and order replacement parts. Test replacement parts prior to acceptance.

4) Package spare parts for protection against dirt and moisture. Label each package as to its contents with a description and part number.
5) Do not place spare parts for different equipment items in the same package.

## 1.07 QUALITY ASSURANCE

A. All work covered by Sections 40 06 70 through 40 70 00 shall be the responsibility of a single Systems Integrator as defined within this article.

B. The instrumentation and control system functions are shown on the drawings and specified in subsequent sections of Division 40. The Systems Integrator drawings and integration practices shall be as defined in IEEE 100, ISA 51.1, and NEMA ICS 1.

C. Demonstrate the overall system performance to the Engineer for acceptance.

D. Systems Integrator qualifications:
1. Evidence of Experience—Company specializing in the products and work of this section and related sections:
    a. Minimum of 5 years of documented company experience with control systems for wastewater or sewer collection systems, the equipment specified, as well as overall systems responsibility for systems of similar size and complexity.
    b. Experience in performing three similar successful projects (equipment type, software type, Systems Integrator responsibilities, complexity, and dollar value of work performed by Systems Integrator) in the last 10 years. At least one project currently in progress or completed within the last 2 years.
    c. Three (3) years' experience with Siemens SIMATIC ET200SP PLC platform installation and configuration.
    d. End-user satisfaction of projects in the past 3 to 5 years based on end-user interviews by the Owner or Engineer. Submit project descriptions of projects completed within the past 5 years with contact names, addresses, and telephone numbers from the project Owner, General Contractor, and Principal Design Firm.
    e. Proven track record of completed projects without unresolved, unrealistic, and unnecessary claims.
    f. At the time of bid, hold a current Washington contractor's license in a classification appropriate to this work.
    g. Panel fabrication and staging facilities within the Continental United States and adequate to provide services for this project. Demonstrate by including the following:
        1) Minimum 5,000 square feet of dedicated space for panel fabrication and testing.
        2) Panel shop shall be UL 508A recognized to produce panels to UL 508A and UL 698A standards and labeling.
    h. Financial resources available and projected for successful completion of this project. Submit financial data for Systems Integrator division when subsidiary to a parent corporation. Include 2 years of financial data:
        1) Financial statement.
        2) Balance sheet.
        3) Dun & Bradstreet Report.

i. Identify which major trade work (i.e., electrical, instrumentation) will be completed by the contractor's forces and which will be performed by sub-contractors. Provide previous project experience for all sub-contractors proposed.

E. Systems Integrator Personnel Qualifications: Provide qualified personnel to complete the work specified for this project. Present information to identify key personnel who will be assigned to this work. List the experience in the last 10 years of the proposed project team for this project, with emphasis on the construction of projects that include live control system migration and implementation projects for wastewater and/or sewer pump station and collection systems. Demonstrate by including the following:
   1. Organization chart and resumes for proposed project personnel showing experience for the proposed roles on this project, including the following:
      a. Project manager: An engineer or qualified specialist to manage, coordinate, and supervise the system integration work and testing. Manager shall have a minimum of 5 years of experience, or experience on at least five separate projects, in managing the system integration and startup of similar electrical and process control systems for wastewater SCADA control system PLC replacement.
      b. Systems engineer: Control System Engineer (CSE) registration, Professional Engineer (PE) registration, or completion of the relevant core courses in the Engineering Skills Training program as certified by ISA.
      c. Startup engineer: Experience on at least five separate projects, in managing the testing and startup of similar electrical and instrumentation control systems.

## 1.08 ENVIRONMENTAL CONDITIONS

A. Ambient conditions: Per Section 01 11 00.

B. Corrosive locations: Per Division 26.

C. Hazardous (classified) areas: Per Division 26.

D. Seismic:
   1. Brace equipment and supports per installation detail drawings.

# PART 2 PRODUCTS

## 2.01 EQUIPMENT/MATERIALS

A. General requirements:
   1. New.
   2. Free from defects.
   3. Rated for the installed environment.

B. Similar control system components, instrument, instrument accessory, and devices used throughout the work shall be manufactured by one firm, where possible.

C. The components, modules, devices, and control system equipment shall be recognized industrial-quality products. Recognized commercial- or office-grade products are prohibited.

D. Use electronic equipment of solid-state construction with printed or etched circuit boards of glass epoxy of sufficient thickness to prevent warping.

## 2.02 SOFTWARE

A. Software packages are to be latest versions available or compatible with software currently in use. All licenses shall be transferred to the Owner.

## 2.03 ENCLOSURES

A. Table A specifies the instrument and control panel enclosure material and minimum NEMA rating for the location and application.

**TABLE A**

| Location | Enclosure Material and NEMA Rating |
|---|---|
| Indoor: architecturally finished area | NEMA 12: mild steel |
| Indoor: electrical room | NEMA 12: mild steel |
| Indoor: process areas | NEMA 4X: 316 stainless steel, or as specified |
| Indoor: corrosive area | NEMA 4X: 316 stainless steel, or as specified |
| Outdoor: corrosive area | NEMA 4X: 316 stainless steel |
| Outdoor: non-corrosive areas | NEMA 4X: 316 stainless steel |
| Corrosive area (hypochlorite) | NEMA 4X: non-metallic |

## 2.04 NAMEPLATES

A. Provide nameplates for field-mounted equipment covered by this section with the following requirements:
   1. Include the equipment description and the equipment tag number, where nameplate engraving is not specified or shown.
   2. Machine engraved black phenolic with white stamped 5/32-inch-high lettering, as minimum, unless otherwise specified or shown.

B. Nameplate wording may be changed without additional cost or time, if changes are made prior to commencement of engraving.

C. Attach nameplates to support hardware with a minimum of two self-tapping type 316 stainless steel screws unless the panel has a NEMA 4 or NEMA 4X rating. Provide room-temperature-vulcanizing (RTV) sealant to adhere nameplates for NEMA 4 or NEMA 4X panels. Nameplates shall be located in a readily visible location so the nameplate will remain to identify the service when the device is removed. Attach field instrument nameplates with braided stainless steel straps where not stand-mounted.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify field measurements prior to fabrication.

## 3.02 INSTALLATION

A. General:
   1. Install equipment in locations that are accessible for operation and maintenance services. Equipment not accessible shall be reinstalled at no cost to the Owner.
   2. Installation, settings, and testing procedures are specified in this Section, Section 40 67 00, and subsequent sections of Divisions 26 and 40.

B. Field Equipment:
   1. Equipment shall be provided with ports and adjustable items accessible for in-place testing. Install equipment between 48 inches and 60 inches above the floor or permanent work platform. Equipment shall be mounted to avoid shock or vibration that may impair operation. Equipment shall be mounted for unobstructed access and walkways. Equipment support systems shall not be attached to handrails, process piping or mechanical equipment
   2. Space instruments and cabinets from concrete walls by 5/8 inch with framing channel between instrument or cabinet and wall. Add supports to block wall to avoid damage to the wall.
   3. Design support systems, including panels, in accordance with installation detail drawings to prevent deformation greater than 1/8 inch in any direction under the attached equipment load and under an external load of 200 pounds.
   4. In wet or outdoor areas, make conduit penetrations into instrument housing or panels through the bottom (preferred) or side of enclosures to minimize water entry from around or from inside of conduits. Provide conduit hubs for connections and waterproof mastic for moisture sealant.
   5. Provide nameplates for field-mounted equipment. Attach nameplates in a readily visible location, but such that if the field device is replaced, the nameplate will remain to identify the service.

## 3.03 FIELD QUALITY CONTROL

A. Delivery Inspection:
   1. Notify the Engineer upon arrival of material or equipment to be incorporated into the work. Remove protective covers or otherwise provide access in order that the Engineer may inspect such items.

B. Inspection and Installed Tests:
   1. Refer to Section 40 61 21.

## 3.04 CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean surfaces exposed to view, remove temporary labels, stains, and foreign substances.

C. Replace filters of operating equipment.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

## 3.05 TESTING AND COMMISSIONING

A. Refer to Section 40 61 21.

**END OF SECTION**

SECTION 40 61 21

PROCESS CONTROL SYSTEM TESTING

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies testing requirements applicable to Division 40 specification sections for the process control system.

B. Systems Integrator shall coordinate process control system testing. Except where the role of the Owner's Programmer is specifically identified, the work specified in this section shall be performed by the Systems Integrator.

C. Provide the labor, tools, documentation, material, power, and services necessary to provide the process instrumentation and control system inspection and testing specified herein. Coordinate all testing with Section 01 75 00:

1. Pre-Operational Testing:
    a. Factory Acceptance Testing (FAT).
2. Component Testing Sequence:
    a. Wiring Testing.
    b. Network and Bus Cable System Inspection and Testing.
    c. Loop Testing.
3. Functional Testing Sequence:
    a. Process Control Strategy/Functional Testing.
    b. Control System Closed Loop Testing.
    c. Functional Checkout.
4. Operational Testing.
5. Commissioning.

D. Related sections:

1. Section 01 75 00 – Testing and Commissioning
2. Section 40 06 70 – Schedules for Instrumentation of Process Systems
3. Section 40 61 13 – Process Control System General Provisions
4. Section 40 61 93 – Process Control System Input/Output List
5. Section 40 61 96 – Process Control Descriptions

### 1.02 REFERENCES

A. Definitions:

1. The term "instrumentation" covers field and panel instruments, analyzers, primary sensing elements, transmitters, power supplies, and monitoring devices.

B. Reference Standards:

1. This section contains references to the following documents with additional references listed in Section 40 61 13.
   a. References are part of this section as specified and modified. In case of conflict between the requirements of this section and those of the referenced documents, the requirements of this section prevail.
   b. Version: Latest documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no bids) unless noted otherwise.
   c. If referenced documents have been discontinued by the issuing organization, use the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
   d. Where document dates are given in the following listing, reference to those documents means the specific document version associated with that date, whether the document has been superseded by a version with a later date, discontinued, or replaced.

| Reference | Title |
|---|---|
| ISA 51.1 | Process Instrumentation Terminology |

## 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate testing with Section 01 75 00.
2. Coordinate with Owner's Programmer as described in this Section for testing.
3. Coordinate with Owner to re-establish cellular communications during panel cutover.
4. Provide notice to the Owner and Engineer prior to conducting a test.
5. Provide a detailed step-by-step test procedure, between 30 and 40 days before the commencement of testing activity, complete with forms for the recording of test results, testing equipment used, and a place for identification of the individuals performing and witnessing the test.

## 1.04 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittals:

1. Quality Assurance submittal:
   a. PCS Testing Manager Qualifications per Paragraph 1.05.
   b. Example test forms per Field Test Procedure Documentation per paragraph 2.02, revised to show project labeling.
2. FAT Submittal:
   a. FAT schedule and location.
   b. FAT procedures and testing documentation, per paragraph 3.02.

3. On-Site Testing Submittals: Provide the following submittals after review of the Quality Assurance and FAT Submittals:
    a. Preliminary Testing Submittal:
        1) Submit detailed testing plan and proposed testing documentation after review of the Quality Assurance submittal showing conformance with Part 2 of this section. Obtain approved submittal prior to testing per Paragraph 2.02:
            a) Sample control description. Coordinate with Engineer for inclusion of sample control descriptions in the submittal.
            b) Sample I/O interface summary.
            c) Sample testing status spreadsheets.
            d) Sample outline of the specific procedures used for the following testing phases:
                (1) Component Testing Sequence.
                (2) Functional Testing Sequence. Coordinate with the Owner's Programmer, who is responsible for development of the Functional Testing Sequence, for inclusion in this submittal.
                (3) Operational Testing.
            e) Proposed test forms per this section.
                (1) Coordinate with the Owner's Programmer, who is responsible for development of the Functional Testing forms, for inclusion in this submittal.
    b. Detailed Testing Submittal: Upon approval of the Preliminary Testing Submittal and at least 30 days prior to actual start up activities, the Systems Integrator shall submit the following per Paragraph 2.02:
        1) Final control descriptions. Coordinate with Engineer for inclusion of final control descriptions in the submittal.
        2) Final I/O Interface Summaries.
        3) Testing status spreadsheets.
        4) Final test procedures. Coordinate with the Owner's Programmer, who is responsible for development of the Functional Testing procedures, for inclusion of the final Functional Test procedures in this submittal.
        5) Detailed test forms for each test for this project organized by Pump Station.
            a) Component Test results.
            b) Functional Test results. Coordinate with the Owner's Programmer, who is responsible for development of the Functional Testing forms, for inclusion in this submittal.
            c) Operational Test results.
        6) Certified Factory Calibration Reports.

D. Closeout Submittals

1. Final Test Report Submittal: in bookmarked PDF format and assembled in a three-ring binder and submitted at the completion of the inspection and testing activities for a site. All closeout submittals shall be organized by Pump Station.
    a. Label the binder cover and spine to identify the project name and site name. Include in the test report the applicable test procedures for the site and the completed inspection and test report forms associated with the equipment and systems of that site.
    b. Organize test results by equipment item or system with individual, labeled tab dividers to identify each. The responsible testing entity is to acknowledge system deficiencies and noncompliant test results identified in the final test report as corrected.
    c. Documentation of network data communication nodes for network-type instruments, devices, and variable-frequency drives.
    d. Test equipment and test equipment calibration date.
    e. Component test results.
    f. Functional test results.
    g. Operational test results.

## 1.05 QUALITY ASSURANCE

A. PCS Testing Manager

1. Appoint a startup engineer or qualified specialist as Process Control System (PCS) Testing Manager to manage, coordinate, and supervise the testing work.
2. PCS Testing Manager Qualifications:
    a. The PCS Testing Manager shall have at least 5 years of total experience, or experience on at least five separate projects, in managing the testing and startup of similar electrical and instrumentation control systems.
3. The quality assurance program includes:
    a. Definition of testing groups, with testing executed on a site-by-site basis.
    b. Testing for each site executed in sequential tasks.
    c. Regularly updated testing status tracking by site and task.
    d. Regularly updated separate testing documentation for each site.

# PART 2 PRODUCTS

## 2.01 GENERAL

A. Test forms: Conform to the requirements of Reference Forms 40 61 13-A through 40 61 13-J included in Section 01 99 90. Develop additional or detailed forms as necessary. Use terms on test forms that comply with ISA 51.1.

B. Project Labeling:

1. The items specifying project labeling herein include the following as a minimum: Owner’s name, site name, project name, and project number.

## 2.02 TESTING DOCUMENTATION

A. Documentation Records:

1. Develop a record-keeping system to document progress and completion for each task at each site.
2. The following documentation shall be kept current and available for inspection on site in a location designated by the Owner:
   a. PCS Testing Manager's qualifications, project startup, and testing history, including resume per paragraph 1.05.
   b. List of names of Contractor's and System Integrator's personnel associated with final construction and testing, and normal and emergency contact telephone numbers.
   c. Testing Status spreadsheet with breakdown for each site, with percentage complete on each testing sequence task.
   d. Testing status specific to wiring test and loop testing status spreadsheet to include the I/O list organized by sites and system and loop number. Percent complete of the PCS system will be based on percentage of I/O points tested.
   e. Test Report Volumes.

B. Test Report Volumes:

1. Develop and maintain testing documentation for each Pump Station in separate volumes. Always keep each volume current and available for inspection on site in a location designated by the Owner. Include the following as a minimum:
   a. Three-ring binder with front cover and spine labeled: "Testing Documentation for (applicable) Site Name" including project labeling.
   b. Table of Contents with same labeling as the volume cover with tabs for each section:
   c. Section 1: Control Description
   d. Section 2: I/O Interface
   e. Section 3: Instrument Index
   f. Section 4: Test Procedures and Forms
   g. Section 5: Test Report

C. Control Description:

1. Coordinate with Engineer to provide a control description outlining operation for each site. The Control Description Specification Section 40 61 96 may be used as a basis, but coordinate with Engineer for inclusion of the final control description.

D. I/O Interface:

1. Provide I/O spreadsheets for each site. Coordinate with the Owner's Programmer for information related to PLC programming and I/O configuration. Spreadsheets are to include the following for each I/O point:
   a. Information shown in Section 40 61 93.
   b. Signal number/tag.
   c. Annotation description that may be logically abbreviated and that is subject to approval.

d. Complete physical I/O channel designation and addressing or communication I/O register designation.

e. Bit state (0 and 1) designations for digital I/O, e.g., 0 = OFF and 1 = RUNNING; 0 = ALARM and 1 = NOT IN ALARM.

f. Process range; engineering units and multipliers; and raw signal range count for analog I/O.

g. Signals: Fixed point and scaled at the controller with minimum four significant implied digits of scaling; e.g., 0 to 1,400 at controller for a pH range of 0 to 14 at operator interface.

h. Provide operator interface scaling to display decimal digits required.

i. Indicate pass/fail for each point for both pre-loop test and loop tests.

j. Indicate date of tests and comment for failed points.

E. Instrument Index:

1. Provide a detailed Instrument Index. The Instrument Index from Section 40 06 70 may be used as a basis. Indicate actual calibration ranges, set points, and deadbands.

F. Field Test Procedure Documentation:

1. Organize and assemble test procedures for each analog and discrete loop in the process control system in separate volumes for each Pump Station. Organize by I/O point. Submit final test records in electronic form by scanning and converting the records and files to Adobe PDF format, to preserve actual signatures and signoffs.

2. Include a detailed, step-by-step description of the required test procedure, panel, and terminal block numbers for points of measurement, input test values, expected resultant values, test equipment required, process setup requirements, and safety precautions.

3. Include test report forms for each loop, including forms for component, functional, and operational tests, with the test procedure documentation. Record the actual test results on these forms and assemble them into final test reports.

4. Preprint and populate information in the test report forms to the extent possible prior to commencing testing.

5. Include on the test report forms:

a. Project name.

b. Site name.

c. Instrument loop description.

d. Instrument loop identification number.

e. Instrument setup and configuration parameters.

f. Time and date of test.

g. Inspection checklist and results.

h. Reference to applicable test procedure.

i. Expected and actual test results for each test point in the loop including programmable controller data table or register values.

j. Test equipment used.

k. Space for remarks regarding test procedure or results, observations, etc.

l. Name, date, and signature of testing personnel.
m. Test witness's name and signature.

## PART 3 EXECUTION

### 3.01 GENERAL

A. General Requirements:

1. Materials, equipment, and construction included under this specification shall be inspected in accordance with this section and subsequent sections of this division. Testing shall be performed by the Contractor in accordance with this and subsequent sections of this division.
2. No required test shall be applied without prior notice to the Owner and Engineer. Between 30 and 40 days before the commencement of any testing activity, the Contractor shall provide a detailed step-by-step test procedure complete with forms for the recording of test results, testing equipment used, and a place for identification of the individual performing or, if applicable, witnessing the test.

B. Test Equipment and Materials:

1. Provide test equipment to conduct the specified tests that simulate inputs and read outputs with a rated accuracy at the point of measurement at least three times greater than the component under test.
2. Test instruments shall have a current calibration sticker showing date of calibration, deviation from standard, name of calibration laboratory and technician, and date recalibration is required. Certified calibration reports traceable to the National Institute of Standards and Technology shall be included with the final test report.
3. Provide a documenting calibration system to conduct process instrumentation calibration activities that consist of a documenting process calibrator and an instrumentation data management software system that captures the calibration results and electronically document instrument data, date of calibration, calibration procedures, and as-found and as-left instrument calibration data.
4. Provide an instrument calibration system such as Fluke 753 with Fluke DPC/Track Instrumentation Management software or similar system. Submit calibration files with the final test report in hard-copy and electronic formats that does not require specialized equipment or software to read and print the files.
5. Vendor software tools may document the systems where a licensed copy of the identical software including connectors, cables, keys, interface cards and devices required for operation is submitted with the final documentation files.

C. Performance Deviation Tolerances:

1. Tolerances shall be specified in Division 40. Where tolerances are not specified, refer to the manufacturer's published performance specifications.
2. Overall accuracy requirements for loops consisting of two or more components shall be the root-summation-square (RSS) of the component accuracy specifications. Tolerances for each required calibration point shall be calculated and recorded on the associated test report form.

D. Installed Tests:

1. The Contractor's PCS Testing Manager shall coordinate, manage, and supervise the quality assurance program that includes:
   a. Testing plan with the sequence for the test work.
   b. Documentation program that records tests results.
   c. Performance testing program systems.

E. Witnessing:

1. The Owner and Engineer reserve the right to observe factory and field-testing procedures. The Owner and Engineer shall be notified prior to testing, as specified herein.

### 3.02 PRE-OPERATIONAL TESTING

A. Factory Acceptance Test

1. General:
   a. Control system equipment shall be subject to a Factory Acceptance Test (FAT) with the factory acceptance tests and subsequent retests witnessed by the Owner and/or Engineer. Control system panel programmable logic controllers, operator interface terminals (OIT), and/or local panel displays shall be loaded with the PLC software, OIT/HMI/SCADA software, and the programming and graphic configuration application software, as provided by the Owner's Programmer, at the control system equipment supplier's factory prior to the FAT. The Systems Integrator shall perform an initial wiring check and certify in writing that the panel I/O has been tested prior to the Owner's Programmer coming on site. The Systems Integrator shall then perform the I/O check out portion of the FAT in collaboration with the Owner's Programmer, who shall be present at the FAT.
   b. Equipment, panel instruments, panels, or cabinets shall be inspected with factory testing performed. Provide written notice to the Owner and Engineer 30 working days before the commencement of the FAT activity and include:
      1) Schedule for the FAT.
      2) Location of the FAT.
      3) Testing equipment used.
      4) Detailed test procedure with forms for the recording of test results.
      5) Sign-off spaces for the individuals performing and witnessing the tests.
2. Factory Acceptance Test Procedures:
   a. Panels provided shall be interlocked or networked as applicable, operated, and checked-out by the equipment supplier prior to the FAT. Submit certification indicating that the panels are ready for the FAT.
   b. Prior to FAT, Contractor shall provide up to a week (up to 40 hours) for the Owner's Programmer to be onsite at the Contractor's panel shop to load the PLC program and perform preliminary software testing.
   c. The FAT shall include the following:
      1) Visual inspection of equipment, instruments, control panels, and graphic displays.

2) Validation of each input loop and output loop by simulated signals for analog inputs and by shorting discrete inputs.
3) Validation shall include:
a) Monitoring state changes on operator interface screens based on the inputs state change.
b) Observation of online PLC programming application software with the associated PLC outputs state change.
c) Outputs triggered by operator interface software devices (pushbuttons, sliders, manually entered values, etc.)
d) Calibration and operation of instruments on or in the control panels.
4) Repair of loops which do not pass validation.
5) Retest of the FAT at no additional cost.

d. Panels that pass the FAT may be shipped to the site upon shipping schedule and storage accommodation approval by the Engineer.

## 3.03 COMPONENT TESTING

A. General Requirements:
1. In general, tests shall be performed in the following order:

B. Wiring Tests:
1. Electrical power and signal cable ring-out and resistance testing. Conducted in accordance with Sections 26 05 00. Wiring tests shall not be conducted until cables have been properly terminated, tagged, and inspected.

C. Network and Bus Cable Inspection and Testing:
1. Test and verify control and instrumentation bus cabling using the standards that apply to the specific cable and bus type.
2. Pre-Active Testing: Inspect and test cables prior to energizing to verify the following:
a. Media type and specifications.
b. Physical routing and project-specific cable identification tagging.
c. Correct termination installation and connection of conductors to pins at terminations.
d. Record cable run length and compare to the manufacturer or industry standards to verify that lengths are within specifications.
e. Locations and values of network termination resistance.
f. Integrity and grounding of cable shields.
g. Values of transient protection (surge) elements.
h. Firmware revision level of network devices available prior to energization.
i. Settings of dip switches and configuration parameters.
3. Active System Testing: After the cable or network system has been activated for testing, Systems Integrator shall coordinate with Owner and the Owner's Programmer to provide diagnostic monitoring and signal analysis for the bus network system to evaluate network and bus integrity and data transfer quality. Measure, verify, and record the following parameters:
a. Node addressing.

b. Signal attenuation before and after a repeater device and at the farthest point in the network.
c. Total network trunk voltage and current loading as applicable.
d. Baud rate, message traffic rate, percent bandwidth used, error rate, and lost packet count.
e. Firmware revision level of the network devices.
f. Pre-active and active testing: within the specified range of values established by the referenced standards.
g. Correct the functionality of networks and devices connected to the network.

D. Instrument and Component Inspection:
1. PICS components inspection activities include the following:
a. Compare and validate instrument type and nameplate data with the drawings, specifications, and data sheet.
b. Validate instrument identification tag.
c. Confirm that instrument installation conforms to drawings, specifications, and manufacturer's instructions.
d. Verify proper conductor termination and tagging.
e. Visually check for physical damage, dirt accumulation, and corrosion.
f. Verify that isolation amplifiers, surge protection, and safety barriers are properly installed.
g. Report deficiencies identified within 24 hours of discovery. No instrument or system component shall be tested until deficiencies are addressed.

E. Instrumentation Calibration:
1. Calibrate instruments and final elements in accordance with the manufacturer's recommended procedures and tested in accordance with the Contractor's test procedure.
2. Complete and document instruments and component inspections to the satisfaction of the Engineer prior to individual component calibration and testing.
3. Calibrate analog instrument at 0, 10, 50, 90, and 100 percent of the specified full-scale range. Adjust each signal sensing trip and process sensing switch to the required setting. Verify instrument readout matches loop signal. Test data recorded on test forms as specified herein.
4. Test and adjust final element alignment to verify that each final element operates smoothly over the full range in response to the specified process control signals.
5. Enter test data on the applicable test forms at the time of testing: set alarm trips, control trips, and switches to initial values specified in Section 40 06 70 Instrument Index at this time. Check final elements for range, deadband, and speed of response.
6. Have any component repaired or replaced by the manufacturer where the component fails to meet the required tolerances. Repeat the specified tests until the component is within tolerance.
7. Install a calibration sticker on each instrument following successful calibration that indicates the date of calibration, the name of the testing company, and personnel who calibrated the instrument.
8. Test forms Section 40 61 13-Form D through I.

9. Certified Test Reports: Field test and inspection activities include verification of instrument parameter setup, verification of instrument zero, and performance at three operating points within the instrument range. Return each instrument that fails to demonstrate proper performance for recalibration or replaced as agreed depending on the impact to the project as determined by the Construction Manager.
    a. Where instrument field calibration is not feasible, certified factory calibration reports may be submitted that include the name and address of the laboratory that conducts the calibration testing.

F. Loop Testing:
1. Loop Testing shall not commence until the Wiring Testing has been completed and documented to the satisfaction of the Owner.
2. Each I/O point shall be tested as an integrated system from the field device to the termination on the I/O card in the panel, in collaboration with the Owner's Programmer.
3. For each discrete I/O point, verify and document contact status value for both the open and closed positions of the contact.
4. For analog points, verify analog value matches local display. Confirm calibration at 0, 25, 75, and 100 percent of value.
5. Check I/O point at the local panel display, if applicable, and at SCADA (via wireless or fiber communication), in coordination with the Owner's Programmer.
6. Correct loop circuitry and repeat the test until the instruments operate properly.

## 3.04 FUNCTIONAL TESTING

A. Process Control Strategy/Functional Testing:
1. Control Strategy Testing will not commence until the Loop Testing has been completed and documented to the satisfaction of the Owner.
2. Control Strategy Testing is performed by the Owner's Programmer in collaboration with the Systems Integrator, and consists of installing and debugging the PLC control logic program, verifying the interface points between the PLCs and field devices and equipment, and exercising the control strategies. Control Strategy Testing will be performed on one PLC at a time. Testing may be witnessed by the Engineer. Contractor to coordinate scheduling requirements including Programmer in accordance with Division 01. The following specific tasks are to be performed as a part of functional testing:
    a. Loss of remote site power shall have local PLC restart without error or operator intervention.
3. Owner SCADA HMI interface testing, performed by the Owner's Programmer, consists of installing and debugging the Owner SCADA HMI graphics, verifying the interface points between the PLC I/O points and programmed tags, and exercising the control strategies. Perform control strategy testing on one PLC at a time.
4. OIT testing, performed by the Owner's Programmer, consists of installing and debugging the OIT graphics, verifying the interface points between the PLC I/O points and programmed tags, and exercising the control strategies. Perform control strategy testing on one PLC at a time.

5. Provide qualified personnel to immediately correct any deficiencies in the Work that may be encountered during Control Strategy Testing. Failure of the Contractor to provide such personnel in a timely manner may prolong the time allotted to complete Control Strategy Testing.

B. Control System Closed Loop Testing:
   1. Closed-Loop Commissioning shall not commence until the Control Strategy Testing has been successfully completed and documented to the satisfaction of the Owner.
   2. Closed-loop commissioning tests, performed by the Owner's Programmer in collaboration with the Systems Integrator as part of the system tests, shall demonstrate stable operation of each loop under operating conditions. Tests shall include adjustment of loop tuning parameters.
   3. Tuning parameters: gain (or proportional band), integral time constant, and derivative time constant for each control loop, adjusted to provide 1/4-amplitude damping, unless otherwise specified.
   4. The loop response to a step disturbance shall be provided for each loop. Two graphs shall be made for cascaded control loops, one showing the secondary loop response with its set point in manual, and the second showing overall loop response.
   5. Control loops with "batch" features shall be adjusted to provide optimum response following start-up from an integral action saturation condition.
   6. Graph recording shall be provided showing the response and made at sufficient speed and amplitude to show 1/4 amplitude damping. Label to show loop number and title, and settings of parameters and set point.
   7. Where a loop is controlled under the direction of a programmable logic controller, the Owner's Programmer will perform the necessary adjustment of loop tuning parameters and set points; Systems Integrator shall record the loop response, adjusting final elements, and assuring total integrated loop performance as specified.

C. Functional Checkout:
   1. Conducted to verify the operation of discrete and hardwired control devices. Exercise the operable devices and energizing the control circuit. Operate control element, alarm device, and interlocks to verify the specified action occurs.

## 3.05 OPERATIONAL TESTING

A. Operational testing shall be performed after Functional Testing has been completed. Operational testing is a demonstration period with the system in full operation. During this time, the Owner operates the system, and the Owner's Programmer and Systems Integrator demonstrate that all functional requirements of this specification have been met. The test shall take place over a continuous twenty-one (21) day period as a minimum. During this time, the Owner's Programmer and Systems Integrator shall be available to provide support to the Owner and to correct any issues noted. Operational testing shall demonstrate the following:
   1. Each component of the system operates correctly with all other components of the system.
   2. Analog control loops operate in a stable manner.
   3. Hard-wired and software equipment interlocks perform correctly.
   4. Process control sequences perform correctly.

5. PLC application program performs monitoring and control functions correctly.
6. Operator interface graphics represent the monitoring and control functions correctly.

## 3.06 COMMISSIONING

A. After completion of the operational testing and agreement on the part of the Owner that the systems did meet all test requirements, commissioning will begin. The commissioning period for each remote site's process system shall be four (4) weeks. The Systems Integrator shall remove all temporary work and other alterations to the permanent systems that may have been needed during the operational or performance testing and shall perform the tasks necessary to make the improvements constructed under this contract fully operational. The Owner shall confirm in writing the date(s) that the system is ready for commissioning and on which actual commissioning activities commence. Activities conducted prior to such written confirmation shall not constitute commissioning.

B. The Owner's operation and maintenance personnel will be responsible for operation of the systems to be commissioned. The portion of the work to be commissioned shall be fully operational, performing all functions for which it was designed.

C. The Contractor shall be available at all times during commissioning periods to provide immediate assistance in case of failure of any portion of the system being constructed. Failure of equipment or facilities where, in the opinion of the Owner, a significant interruption or impact to performance occurs will be grounds for restarting the Commissioning Period. At the end of the commissioning period and when all corrections required by the Owner to assure a reliable and completely operational facility are complete, the Owner shall issue a completion certificate. Each system shall have been issued a completion certificate as a condition precedent to the final acceptance of the work of this contract

D. During the commissioning period, the Owner shall be responsible for all normal operational costs and the Contractor shall bear the costs of all necessary repairs or replacements, including labor and materials, required to keep the system being commissioned, operational.

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SECTION 40 61 93

PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes:

1. Input/output (I/O) list showing the following types of points that interface with the control system:
    a. Points that are hardwired into the control system.
    b. Points that are interfaced to the control system over a communications link.
2. The I/O list does not include internal software points generated by the control system and used solely within the control system.
3. The I/O list does not include individual read/write parameters involved in the data exchange between the PCS and networked devices. Instead, each device that exchanges data with the PCS over a communications link is represented as a single "point" in the I/O list along with a reference to the type of communications link and common equipment type. Refer to Section 40 61 96 for complete listings of the read/write parameters associated with the data exchange between the PCS and these common equipment types.
4. The I/O list identifies demolition I/O showing the hardwired I/O points associated with control and signal circuits being demolished as part of this project.

B. Related sections:

1. Section 40 61 13 – Process Control System General Provisions.
2. Section 40 61 21 – Process Control System Testing.
3. Section 40 61 96 – Process Control Descriptions.

### 1.02 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittal:

1. Submit I/O list with Section 40 67 00 submittal.

D. Informational Submittal:

1. Provide a copy of the electronic version of the complete list to the Engineer, at least monthly, when requested.

E. Closeout Submittal:

1. Provide a final copy of the electronic version of the complete list to the Owner at the beginning and at the end of Process Control System Testing – Section 40 61 21.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 FIELD QUALITY CONTROL

A. Refer to Section 40 61 21.

B. Maintain a copy of the complete Input/Output List with modifications during construction in Excel format.

### 3.02 ATTACHMENTS

A. 40 61 93 Attachment A: Input/Output (I/O) List
   1. The I/O List is organized based on site, then by PLC rack, slot, and channel number. The description of headings in I/O List is provided in the table below.

| Field or Heading | Example | Comment or Description |
|---|---|---|
| Item | 1 | Row number reference. |
| Utility | Sewer | Utility identification. |
| Site | Pump Station 1 | Site location of the I/O. |
| I/O Tag | SS_RH4_PS01_YA0100 | Unique tag identification. |
| Division ID | SS | Operational division or department. |
| Process Area ID | RH4 | Process area or zone. |
| Process Code | PS01 | Process or site code. |
| ISA Prefix | YA | Instrument functional identification. Refer to P&ID legend sheets. |
| Loop Number | 0100 | Sequential number that is part of a functional “loop”. |
| Suffix | A | Alpha identifier used to differentiate elements that would otherwise share the name tag, as required. |
| Description | Station Intrusion Alarm | Description/function of the I/O tag. |
| I/O Type | DI | AI, DI, DO, AO, NW (networked) |
| Panel | SS_RH4_PS01_CAB0100 | Panel where the I/O is physically wired. For networked I/O, the panel where the network switch resides. |
| PLC or RIO | SS_RH4_PS01_PLC0101 | PLC or RIO where the I/O is physically wired. For networked I/O, the PLC that executes the data exchange with the networked device. A RIO is associated with the PLC of the same loop number. |
| Rack | 00 | Match contract drawing, or if not shown, match to submittal information. |
| Slot | 03 | Match contract drawing, or if not shown, match to submittal information. |
| Channel | 00 | Match contract drawing, or if not shown, match to submittal information. |
| Module / Device Type | 24 VDC | 4-20 mA, ProfiNet, Profibus, Discrete Contact, etc. |

| Field or Heading | Example | Comment or Description |
| --- | --- | --- |
| Signal Type or Calibration Range | Dry Contact<br>0-10 ft | Applicable primarily to analog instruments. Provides the measured range and applicable engineering units for the instrument. |
| Wiring Diagram | I-01101 | Reference to the typical I/O wiring detail that is relevant to the I/O point. |
| Application Notes or Comments | N/A | Optional, as required for clarification. |
| Status | Existing | Status of the I/O point:<br>**New** – I/O point is new to the PLC/RIO panel.<br>**Existing** – I/O point is existing and to be re-terminated at new PLC panel.<br>**Spare** – I/O channel is a spare.<br>**Future** – I/O channel is being reserved for a future I/O point. |

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# SECTION 40 61 93_ PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

## ATTACHMENT A

## INPUT/OUTPUT LIST

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SECTION 40 61 93 ATTACHMENT A
PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0100 | SS | RH4 | PS01 | YA | 0100 | | STATION INTRUSION ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-01101 | | EXISTING |
| 2 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0101 | SS | RH4 | PS01 | YA | 0101 | | PLC PANEL INTRUSION ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 3 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0102 | SS | RH4 | PS01 | NI | 0102 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 4 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0103 | SS | RH4 | PS01 | NI | 0103 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 5 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0104 | SS | RH4 | PS01 | NI | 0104 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 6 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XA0105A | SS | RH4 | PS01 | XA | 0105 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 7 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XA0105B | SS | RH4 | PS01 | XA | 0105 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 8 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0106 | SS | RH4 | PS01 | NI | 0106 | | UPS ON BATTERY | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 9 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XA0106 | SS | RH4 | PS01 | XA | 0106 | | UPS ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 10 | SEWER | PUMP STATION 01 | SS_RH4_PS01_JAL0106 | SS | RH4 | PS01 | JAL | 0106 | | UPS LOW BATTERY | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 11 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LAH0107 | SS | RH4 | PS01 | LAH | 0107 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-01101 | | EXISTING |
| 12 | SEWER | PUMP STATION 01 | SS_RH4_PS01_FAL0161 | SS | RH4 | PS01 | FAL | 0161 | | EXHAUST FAN LOW FLOW | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-01101 | | NEW |
| 13 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-01101 | | SPARE |
| 14 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-01101 | | SPARE |
| 15 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-01101 | | SPARE |
| 16 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-01101 | | SPARE |
| 17 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YI0110 | SS | RH4 | PS01 | YI | 0110 | | PUMP 1 RUN | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 18 | SEWER | PUMP STATION 01 | SS_RH4_PS01_HSA0110 | SS | RH4 | PS01 | HSA | 0110 | | PUMP 1 IN AUTO | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 19 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZIC0111 | SS | RH4 | PS01 | ZIC | 0111 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 20 | SEWER | PUMP STATION 01 | SS_RH4_PS01_FQI0112 | SS | RH4 | PS01 | FQI | 0112 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-01102 | | FUTURE |
| 21 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0110 | SS | RH4 | PS01 | YA | 0110 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 22 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LAHH0142 | SS | RH4 | PS01 | LAHH | 0142 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 23 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LAH0142 | SS | RH4 | PS01 | LAH | 0142 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 24 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LAL0142 | SS | RH4 | PS01 | LAL | 0142 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-01102 | | EXISTING |
| 25 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0142 | SS | RH4 | PS01 | YA | 0142 | | FOGROD LEVEL FAULT | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-01102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 26 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0143 | SS | RH4 | PS01 | YA | 0143 | | IS PANEL INTRUSION | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 27 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0144 | SS | RH4 | PS01 | NI | 0144 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 28 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0145 | SS | RH4 | PS01 | NI | 0145 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 29 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0146 | SS | RH4 | PS01 | NI | 0146 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 30 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0147 | SS | RH4 | PS01 | NI | 0147 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-01102 | | NEW |
| 31 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-01102 | | SPARE |
| 32 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-01102 | | SPARE |
| 33 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YI0120 | SS | RH4 | PS01 | YI | 0120 | | PUMP 2 RUN | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-01103 | | EXISTING |
| 34 | SEWER | PUMP STATION 01 | SS_RH4_PS01_HSA0120 | SS | RH4 | PS01 | HSA | 0120 | | PUMP 2 IN AUTO | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-01103 | | EXISTING |
| 35 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZIC0121 | SS | RH4 | PS01 | ZIC | 0121 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-01103 | | EXISTING |
| 36 | SEWER | PUMP STATION 01 | SS_RH4_PS01_FQI0122 | SS | RH4 | PS01 | FQI | 0122 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-01103 | | FUTURE |
| 37 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 38 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 39 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 40 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 41 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 42 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 43 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 44 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 45 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 46 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 47 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 48 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-01103 | | SPARE |
| 49 | SEWER | PUMP STATION 01 | SS_RH4_PS01_HSR0150 | SS | RH4 | PS01 | HSR | 0150 | | FLUSH VALVE IN REMOTE (FUTURE) | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-01104 | | FUTURE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZIO0150 | SS | RH4 | PS01 | ZIO | 0150 | | FLUSH VALVE OPEN (FUTURE) | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-01104 | | FUTURE |
| 51 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZIC0150 | SS | RH4 | PS01 | ZIC | 0150 | | FLUSH VALVE CLOSED (FUTURE) | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-01104 | | FUTURE |
| 52 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 53 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 54 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 55 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 56 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 57 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 58 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 59 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 60 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 61 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 62 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 63 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 64 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-01104 | | SPARE |
| 65 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YC0110 | SS | RH4 | PS01 | YC | 0110 | | PUMP 1 CALL TO RUN | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-01201 | | EXISTING |
| 66 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YC0120 | SS | RH4 | PS01 | YC | 0120 | | PUMP 2 CALL TO RUN | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-01201 | | EXISTING |
| 67 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZCO0150 | SS | RH4 | PS01 | ZCO | 0150 | | FLUSH VALVE CALL TO OPEN (FUTURE) | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO OPEN | I-01201 | | FUTURE |
| 68 | SEWER | PUMP STATION 01 | SS_RH4_PS01_ZCC0150 | SS | RH4 | PS01 | ZCC | 0150 | | FLUSH VALVE CALL TO CLOSE (FUTURE) | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO CLOSE | I-01201 | | FUTURE |
| 69 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XC0142 | SS | RH4 | PS01 | XC | 0142 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO RESET | I-01201 | | NEW |
| 70 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 05 | 24 VDC | | I-01201 | | SPARE |
| 71 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 06 | 24 VDC | | I-01201 | | SPARE |
| 72 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 07 | 24 VDC | | I-01201 | | SPARE |
| 73 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 08 | 24 VDC | | I-01201 | | SPARE |
| 74 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 09 | 24 VDC | | I-01201 | | SPARE |
| 75 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 10 | 24 VDC | | I-01201 | | SPARE |
| 76 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 11 | 24 VDC | | I-01201 | | SPARE |
| 77 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 12 | 24 VDC | | I-01201 | | SPARE |
| 78 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 13 | 24 VDC | | I-01201 | | SPARE |
| 79 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 14 | 24 VDC | | I-01201 | | SPARE |
| 80 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DO | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 07 | 15 | 24 VDC | | I-01201 | | SPARE |
| 81 | SEWER | PUMP STATION 01 | SS_RH4_PS01_II0110 | SS | RH4 | PS01 | II | 0110 | | PUMP 1 AMPS | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-01301 | | EXISTING |
| 82 | SEWER | PUMP STATION 01 | SS_RH4_PS01_FI0112 | SS | RH4 | PS01 | FI | 0112 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 08 | 01 | | X-X GPM | I-01301 | | FUTURE |
| 83 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LI0141 | SS | RH4 | PS01 | LI | 0141 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-01301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 84 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 08 | 03 | | | I-01301 | | SPARE |
| 85 | SEWER | PUMP STATION 01 | SS_RH4_PS01_II0120 | SS | RH4 | PS01 | II | 0120 | | PUMP 2 AMPS | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-01302 | | EXISTING |
| 86 | SEWER | PUMP STATION 01 | SS_RH4_PS01_FI0122 | SS | RH4 | PS01 | FI | 0122 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 09 | 01 | | X-X GPM | I-01302 | | FUTURE |
| 87 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 09 | 02 | | | I-01302 | | SPARE |
| 88 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 09 | 03 | | | I-01302 | | SPARE |
| 89 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LI0142 | SS | RH4 | PS01 | LI | 0142 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-01303 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 90 | SEWER | PUMP STATION 01 | SS_RH4_PS01_PI0135 | SS | RH4 | PS01 | PI | 0135 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 10 | 01 | | X-X PSIG | I-01303 | | FUTURE |
| 91 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 10 | 02 | | | I-01303 | | SPARE |
| 92 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 00 | 10 | 03 | | | I-01303 | | SPARE |
| 93 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0192 | SS | RH4 | PS01 | YA | 0192 | | RIO PANEL INTRUSION ALARM | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 94 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0193 | SS | RH4 | PS01 | NI | 0193 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 95 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0194 | SS | RH4 | PS01 | NI | 0194 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 96 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0195 | SS | RH4 | PS01 | NI | 0195 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 97 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XA0196 | SS | RH4 | PS01 | XA | 0196 | | NETWORK SWITCH 3 ALARM | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 98 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0197 | SS | RH4 | PS01 | NI | 0197 | | UPS ON BATTERY | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-01821 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | SEWER | PUMP STATION 01 | SS_RH4_PS01_XA0197 | SS | RH4 | PS01 | XA | 0197 | | UPS ALARM | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 100 | SEWER | PUMP STATION 01 | SS_RH4_PS01_JAL0197 | SS | RH4 | PS01 | JAL | 0197 | | UPS LOW BATTERY | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-01821 | | NEW |
| 101 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 102 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 103 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 104 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 105 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 106 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 107 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 108 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-01821 | | SPARE |
| 109 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YI0190 | SS | RH4 | PS01 | YI | 0190 | | GENERATOR RUN | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-01822 | | EXISTING |
| 110 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0190A | SS | RH4 | PS01 | YA | 0190 | A | GENERATOR FAIL | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-01822 | | NEW |
| 111 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LAL0190 | SS | RH4 | PS01 | LAL | 0190 | | GENERATOR LOW FUEL ALARM | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-01822 | | NEW |
| 112 | SEWER | PUMP STATION 01 | SS_RH4_PS01_YA0190B | SS | RH4 | PS01 | YA | 0190 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-01822 | | NEW |
| 113 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0191A | SS | RH4 | PS01 | NI | 0191 | A | ATS IN NORMAL | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-01822 | | EXISTING |
| 114 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0191B | SS | RH4 | PS01 | NI | 0191 | B | ATS IN GENERATOR | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-01822 | | NEW |
| 115 | SEWER | PUMP STATION 01 | SS_RH4_PS01_NI0191C | SS | RH4 | PS01 | NI | 0191 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-01822 | | NEW |
| 116 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 117 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 118 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 119 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 120 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 121 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 122 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 123 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 124 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | DI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-01822 | | SPARE |
| 125 | SEWER | PUMP STATION 01 | SS_RH4_PS01_LI0190 | SS | RH4 | PS01 | LI | 0190 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 04 | 00 | 4-20 mA | X-X IN | I-01831 | | FUTURE |
| 126 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 04 | 01 | 4-20 mA | | I-01831 | | SPARE |
| 127 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 04 | 02 | 4-20 mA | | I-01831 | | SPARE |
| 128 | SEWER | PUMP STATION 01 | ___ | | | | | | | SPARE | AI | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 00 | 04 | 03 | 4-20 mA | | I-01831 | | SPARE |
| 129 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0400 | SS | RH3 | PS04 | YA | 0400 | | VAULT & WETWELL INTRUSION ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-04101 | | EXISTING |
| 130 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0401 | SS | RH3 | PS04 | YA | 0401 | | PLC PANEL INTRUSION ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 131 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0402 | SS | RH3 | PS04 | NI | 0402 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 132 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0403 | SS | RH3 | PS04 | NI | 0403 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 133 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0404 | SS | RH3 | PS04 | NI | 0404 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 134 | SEWER | PUMP STATION 04 | SS_RH3_PS04_XA0405A | SS | RH3 | PS04 | XA | 0405 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 135 | SEWER | PUMP STATION 04 | SS_RH3_PS04_XA0405B | SS | RH3 | PS04 | XA | 0405 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 136 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0406 | SS | RH3 | PS04 | NI | 0406 | | UPS ON BATTERY | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 137 | SEWER | PUMP STATION 04 | SS_RH3_PS04_XA0406 | SS | RH3 | PS04 | XA | 0406 | | UPS ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 138 | SEWER | PUMP STATION 04 | SS_RH3_PS04_JAL0406 | SS | RH3 | PS04 | JAL | 0406 | | UPS LOW BATTERY | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-04101 | | NEW |
| 139 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HSA0462 | SS | RH3 | PS04 | HSA | 0462 | | WETWELL VENT FAN IN AUTO | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-04101 | | EXISTING |
| 140 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FAL0461 | SS | RH3 | PS04 | FAL | 0461 | | VENTILLATION FAN LOW FLOW | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-04101 | | SPARE |
| 141 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-04101 | | SPARE |
| 142 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-04101 | | SPARE |
| 143 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-04101 | | SPARE |
| 144 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-04101 | | SPARE |
| 145 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YI0410 | SS | RH3 | PS04 | YI | 0410 | | PUMP 1 RUN | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 146 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HSA0410 | SS | RH3 | PS04 | HSA | 0410 | | PUMP 1 IN AUTO | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 147 | SEWER | PUMP STATION 04 | SS_RH3_PS04_MAH0410 | SS | RH3 | PS04 | MAH | 0410 | | PUMP 1 MOISTURE LEAK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 148 | SEWER | PUMP STATION 04 | SS_RH3_PS04_TAH0410 | SS | RH3 | PS04 | TAH | 0410 | | PUMP 1 TEMPERATURE HIGH | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 149 | SEWER | PUMP STATION 04 | SS_RH3_PS04_ZIC0411 | SS | RH3 | PS04 | ZIC | 0411 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 150 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FQI0412 | SS | RH3 | PS04 | FQI | 0412 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-04102 | | FUTURE |
| 151 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HS0414 | SS | RH3 | PS04 | HS | 0414 | | PUMP 1 REMOTE START | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-04102 | | FUTURE |
| 152 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAHH0442 | SS | RH3 | PS04 | LAHH | 0442 | | WETWELL HIGH HIGH LEVEL ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 153 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAH0442 | SS | RH3 | PS04 | LAH | 0442 | | WETWELL HIGH LEVEL ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 154 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAL0442 | SS | RH3 | PS04 | LAL | 0442 | | WETWELL LOW LEVEL ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-04102 | | EXISTING |
| 155 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-04102 | | SPARE |
| 156 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0443 | SS | RH3 | PS04 | YA | 0443 | | IS PANEL INTRUSION | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-04102 | | NEW |
| 157 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0444 | SS | RH3 | PS04 | NI | 0444 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-04102 | | NEW |
| 158 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0445 | SS | RH3 | PS04 | NI | 0445 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-04102 | | NEW |
| 159 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0446 | SS | RH3 | PS04 | NI | 0446 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-04102 | | NEW |
| 160 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0447 | SS | RH3 | PS04 | NI | 0447 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-04102 | | NEW |
| 161 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YI0420 | SS | RH3 | PS04 | YI | 0420 | | PUMP 2 RUN | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 162 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HSA0420 | SS | RH3 | PS04 | HSA | 0420 | | PUMP 2 IN AUTO | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 163 | SEWER | PUMP STATION 04 | SS_RH3_PS04_MAH0420 | SS | RH3 | PS04 | MAH | 0420 | | PUMP 2 MOISTURE LEAK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 164 | SEWER | PUMP STATION 04 | SS_RH3_PS04_TAH0420 | SS | RH3 | PS04 | TAH | 0420 | | PUMP 2 TEMPERATURE HIGH | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 165 | SEWER | PUMP STATION 04 | SS_RH3_PS04_ZIC0421 | SS | RH3 | PS04 | ZIC | 0421 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 166 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FQI0422 | SS | RH3 | PS04 | FQI | 0422 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-04103 | | FUTURE |
| 167 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HS0424 | SS | RH3 | PS04 | HS | 0424 | | PUMP 2 REMOTE START | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 168 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YI0490 | SS | RH3 | PS04 | YI | 0490 | | GENERATOR RUN | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 169 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0490A | SS | RH3 | PS04 | YA | 0490 | A | GENERATOR FAIL | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 170 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAL0490 | SS | RH3 | PS04 | LAL | 0490 | | GENERATOR LOW FUEL ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 171 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0490B | SS | RH3 | PS04 | YA | 0490 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-04103 | | NEW |
| 172 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0491A | SS | RH3 | PS04 | NI | 0491 | A | ATS IN NORMAL | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 173 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0491B | SS | RH3 | PS04 | NI | 0491 | B | ATS IN GENERATOR | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-04103 | | NEW |
| 174 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0491C | SS | RH3 | PS04 | NI | 0491 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-04103 | | NEW |
| 175 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HS0490 | SS | RH3 | PS04 | HS | 0490 | | GENERATOR REMOTE SHUTDOWN | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 176 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NA0492 | SS | RH3 | PS04 | NA | 0492 | | MCC PHASE MONITOR FAIL | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-04103 | | EXISTING |
| 177 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YI0430 | SS | RH3 | PS04 | YI | 0430 | | PUMP 3 RUN | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 178 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HSA0430 | SS | RH3 | PS04 | HSA | 0430 | | PUMP 3 IN AUTO | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 179 | SEWER | PUMP STATION 04 | SS_RH3_PS04_MAH0430 | SS | RH3 | PS04 | MAH | 0430 | | PUMP 3 MOISTURE LEAK | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 180 | SEWER | PUMP STATION 04 | SS_RH3_PS04_TAH0430 | SS | RH3 | PS04 | TAH | 0430 | | PUMP 3 TEMPERATURE HIGH | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 181 | SEWER | PUMP STATION 04 | SS_RH3_PS04_ZIC0431 | SS | RH3 | PS04 | ZIC | 0431 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 182 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FQI0432 | SS | RH3 | PS04 | FQI | 0432 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-04104 | | FUTURE |
| 183 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HS0434 | SS | RH3 | PS04 | HS | 0434 | | PUMP 3 REMOTE START | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 184 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FQI0438 | SS | RH3 | PS04 | FQI | 0438 | | STATION DISCHARGE FLOW PULSE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-04104 | PULSE EQUALS 100 GALLONS. | EXISTING |
| 185 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAH0439 | SS | RH3 | PS04 | LAH | 0439 | | FLOW METER VAULT FLOOD | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-04104 | | EXISTING |
| 186 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 187 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 188 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 189 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 190 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 191 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 192 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-04104 | | SPARE |
| 193 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0470 | SS | RH3 | PS04 | YA | 0470 | | CONTROL BUILDING DOOR INTRUSION | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 00 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 194 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LAH0479 | SS | RH3 | PS04 | LAH | 0479 | | CONTROL BUILDING FLOOD | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 01 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 195 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HSA0471 | SS | RH3 | PS04 | HSA | 0471 | | CONTROL BUILDING FAN IN AUTO | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 02 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 196 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0472 | SS | RH3 | PS04 | YA | 0472 | | SMOKE DETECTOR INPUT ALARM | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 03 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 197 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NI0472 | SS | RH3 | PS04 | NI | 0472 | | SMOKE DETECTOR INPUT SUPERVISORY | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 04 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 198 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0473A | SS | RH3 | PS04 | YA | 0473 | A | GAS DETECTOR TROUBLE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 05 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 199 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0473B | SS | RH3 | PS04 | YA | 0473 | B | GAS DETECTOR ALARM 1 | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 06 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 200 | SEWER | PUMP STATION 04 | SS_RH3_PS04_HS0474 | SS | RH3 | PS04 | HS | 0474 | | REMOTE ALARM RESET | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 07 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 201 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LLB0474 | SS | RH3 | PS04 | LLB | 0474 | | LOW LEVEL FLOAT BYPASS | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 08 | 24 VDC | DRY CONTACT | I-04105 | | EXISTING |
| 202 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 09 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 203 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 10 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 204 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 11 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 205 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 12 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 206 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 13 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 207 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 14 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 208 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 15 | 24 VDC | DRY CONTACT | I-04105 | | SPARE |
| 209 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YC0410 | SS | RH3 | PS04 | YC | 0410 | | PUMP 1 CALL TO RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-04201 | | EXISTING |
| 210 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YC0420 | SS | RH3 | PS04 | YC | 0420 | | PUMP 2 CALL TO RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 01 | 24 VDC | ENERGIZE TO RUN | I-04201 | | EXISTING |
| 211 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YC0430 | SS | RH3 | PS04 | YC | 0430 | | PUMP 3 CALL TO RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 02 | 24 VDC | ENERGIZE TO RUN | I-04201 | | EXISTING |
| 212 | SEWER | PUMP STATION 04 | SS_RH3_PS04_NC0475 | SS | RH3 | PS04 | NC | 0475 | | CP-3 REMOTE PANEL MODE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 03 | 24 VDC | ENERGIZE TO POWER | I-04201 | | EXISTING |
| 213 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YA0475 | SS | RH3 | PS04 | YA | 0475 | | CP-3 ALARM ALERT | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 04 | 24 VDC | ENERGIZE TO ALARM | I-04201 | | EXISTING |
| 214 | SEWER | PUMP STATION 04 | SS_RH3_PS04_XC0442 | SS | RH3 | PS04 | XC | 0442 | | HARDWIRED LEVEL FLOAT CONTROL REMOTE RESET | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 05 | 24 VDC | ENERGIZE TO RESET | I-04201 | | SPARE |
| 215 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YD0410 | SS | RH3 | PS04 | YD | 0410 | | PUMP 1 INHIBIT/DIABLE RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 06 | 24 VDC | ENERGIZE TO STOP | I-04201 | | SPARE |
| 216 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YD0420 | SS | RH3 | PS04 | YD | 0420 | | PUMP 2 INHIBIT/DIABLE RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 07 | 24 VDC | ENERGIZE TO STOP | I-04201 | | SPARE |
| 217 | SEWER | PUMP STATION 04 | SS_RH3_PS04_YD0430 | SS | RH3 | PS04 | YD | 0430 | | PUMP 3 INHIBIT/DIABLE RUN | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 08 | 24 VDC | ENERGIZE TO STOP | I-04201 | | SPARE |
| 218 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 09 | 24 VDC | | I-04201 | | SPARE |
| 219 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 10 | 24 VDC | | I-04201 | | SPARE |
| 220 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 11 | 24 VDC | | I-04201 | | SPARE |
| 221 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 12 | 24 VDC | | I-04201 | | SPARE |
| 222 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 13 | 24 VDC | | I-04201 | | SPARE |
| 223 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 14 | 24 VDC | | I-04201 | | SPARE |
| 224 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | DO | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 08 | 15 | 24 VDC | | I-04201 | | SPARE |
| 225 | SEWER | PUMP STATION 04 | SS_RH3_PS04_II0410 | SS | RH3 | PS04 | II | 0410 | | PUMP 1 AMPS | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-04301 | | EXISTING |
| 226 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FI0412 | SS | RH3 | PS04 | FI | 0412 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 09 | 01 | 4-20 mA | X-X GPM | I-04301 | | FUTURE |
| 227 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LI0441 | SS | RH3 | PS04 | LI | 0441 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 09 | 02 | 4-20 mA | 0-10 FT | I-04301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |
| 228 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 09 | 03 | 4-20 mA | | I-04301 | | SPARE |
| 229 | SEWER | PUMP STATION 04 | SS_RH3_PS04_II0420 | SS | RH3 | PS04 | II | 0420 | | PUMP 2 AMPS | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-04302 | | EXISTING |
| 230 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FI0422 | SS | RH3 | PS04 | FI | 0422 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 10 | 01 | 4-20 mA | X-X GPM | I-04302 | | FUTURE |
| 231 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FI0438 | SS | RH3 | PS04 | FI | 0438 | | STATION DISCHARGE FLOW | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 10 | 02 | 4-20 mA | X-X GPM | I-04302 | | EXISTING |
| 232 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 10 | 03 | 4-20 mA | | I-04302 | | SPARE |
| 233 | SEWER | PUMP STATION 04 | SS_RH3_PS04_II0430 | SS | RH3 | PS04 | II | 0430 | | PUMP 3 AMPS | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 11 | 00 | 4-20 mA | X-X AMPS | I-04303 | | EXISTING |
| 234 | SEWER | PUMP STATION 04 | SS_RH3_PS04_FI0432 | SS | RH3 | PS04 | FI | 0432 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 11 | 01 | 4-20 mA | X-X GPM | I-04303 | | FUTURE |
| 235 | SEWER | PUMP STATION 04 | SS_RH3_PS04_PI0435 | SS | RH3 | PS04 | PI | 0435 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 11 | 02 | 4-20 mA | X-X PSIG | I-04303 | | FUTURE |
| 236 | SEWER | PUMP STATION 04 | SS_RH3_PS04_LI0490 | SS | RH3 | PS04 | LI | 0490 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 11 | 03 | 4-20 mA | X-X FT | I-04303 | | FUTURE |
| 237 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 12 | 00 | 4-20 mA | | I-04304 | | SPARE |
| 238 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 12 | 01 | 4-20 mA | | I-04304 | | SPARE |
| 239 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 12 | 02 | 4-20 mA | | I-04304 | | SPARE |
| 240 | SEWER | PUMP STATION 04 | ___ | | | | | | | SPARE | AI | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | 00 | 12 | 03 | 4-20 mA | | I-04304 | | SPARE |
| 241 | SEWER | PUMP STATION 04 | SS_RH3_PS04_U0410 | SS | RH3 | PS04 | U | 0410 | | PUMP 1 VFD NETWORKED I/O | NW | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | N/A | N/A | N/A | PROFINET | N/A | I-04501 | SCHNEIDER ELECTRIC ALTIVAR 61 VFD, MODBUS TCP/IP. PROFINET NETWORKED I/O | EXISTING |
| 242 | SEWER | PUMP STATION 04 | SS_RH3_PS04_U0420 | SS | RH3 | PS04 | U | 0420 | | PUMP 2 VFD NETWORKED I/O | NW | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | N/A | N/A | N/A | PROFINET | N/A | I-04501 | SCHNEIDER ELECTRIC ALTIVAR 61 VFD, MODBUS TCP/IP. PROFINET NETWORKED I/O | EXISTING |
| 243 | SEWER | PUMP STATION 04 | SS_RH3_PS04_U0430 | SS | RH3 | PS04 | U | 0430 | | PUMP 3 VFD NETWORKED I/O | NW | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | N/A | N/A | N/A | PROFINET | N/A | I-04501 | SCHNEIDER ELECTRIC ALTIVAR 61 VFD, MODBUS TCP/IP. PROFINET NETWORKED I/O | EXISTING |
| 244 | SEWER | PUMP STATION 04 | SS_RH3_PS04_U0460 | SS | RH3 | PS04 | U | 0460 | | EXHAUST FAN VFD NETWORKED I/O | NW | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_PLC0401 | N/A | N/A | N/A | PROFINET | N/A | I-04501 | SCHNEIDER ELECTRIC ALTIVAR 61 VFD, MODBUS TCP/IP. PROFINET NETWORKED I/O | EXISTING |
| 245 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1000 | SS | RH5 | PS10 | YA | 1000 | | STATION INTRUSION ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-10101 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 246 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1001 | SS | RH5 | PS10 | YA | 1001 | | PLC PANEL INTRUSION ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 247 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1002 | SS | RH5 | PS10 | NI | 1002 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 248 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1003 | SS | RH5 | PS10 | NI | 1003 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 249 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1004 | SS | RH5 | PS10 | NI | 1004 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 250 | SEWER | PUMP STATION 10 | SS_RH5_PS10_XA1005A | SS | RH5 | PS10 | XA | 1005 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 251 | SEWER | PUMP STATION 10 | SS_RH5_PS10_XA1005B | SS | RH5 | PS10 | XA | 1005 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 252 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1006 | SS | RH5 | PS10 | NI | 1006 | | UPS ON BATTERY | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 253 | SEWER | PUMP STATION 10 | SS_RH5_PS10_XA1006 | SS | RH5 | PS10 | XA | 1006 | | UPS ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 254 | SEWER | PUMP STATION 10 | SS_RH5_PS10_JAL1006 | SS | RH5 | PS10 | JAL | 1006 | | UPS LOW BATTERY | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 255 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LAH1007 | SS | RH5 | PS10 | LAH | 1007 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-10101 | | EXISTING |
| 256 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FAL1061 | SS | RH5 | PS10 | FAL | 1061 | | EXHAUST FAN LOW FLOW | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-10101 | | NEW |
| 257 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-10101 | | SPARE |
| 258 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-10101 | | SPARE |
| 259 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-10101 | | SPARE |
| 260 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-10101 | | SPARE |
| 261 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YI1010 | SS | RH5 | PS10 | YI | 1010 | | PUMP 1 RUN | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 262 | SEWER | PUMP STATION 10 | SS_RH5_PS10_HSA1010 | SS | RH5 | PS10 | HSA | 1010 | | PUMP 1 IN AUTO | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 263 | SEWER | PUMP STATION 10 | SS_RH5_PS10_ZIC1011 | SS | RH5 | PS10 | ZIC | 1011 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 264 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FQI1012 | SS | RH5 | PS10 | FQI | 1012 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-10102 | | FUTURE |
| 265 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1010 | SS | RH5 | PS10 | YA | 1010 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 266 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LAHH1042 | SS | RH5 | PS10 | LAHH | 1042 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 267 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LAH1042 | SS | RH5 | PS10 | LAH | 1042 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 268 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LAL1042 | SS | RH5 | PS10 | LAL | 1042 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-10102 | | EXISTING |
| 269 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1042 | SS | RH5 | PS10 | YA | 1042 | | FOGROD LEVEL FAULT | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-10102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 270 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1043 | SS | RH5 | PS10 | YA | 1043 | | IS PANEL INTRUSION | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-10102 | | NEW |
| 271 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1044 | SS | RH5 | PS10 | NI | 1044 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-10102 | | NEW |
| 272 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1045 | SS | RH5 | PS10 | NI | 1045 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-10102 | | NEW |
| 273 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1046 | SS | RH5 | PS10 | NI | 1046 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-10102 | | NEW |
| 274 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1047 | SS | RH5 | PS10 | NI | 1047 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-10102 | | NEW |
| 275 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-10102 | | SPARE |
| 276 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-10102 | | SPARE |
| 277 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YI1020 | SS | RH5 | PS10 | YI | 1020 | | PUMP 2 RUN | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-10103 | | EXISTING |
| 278 | SEWER | PUMP STATION 10 | SS_RH5_PS10_HSA1020 | SS | RH5 | PS10 | HSA | 1020 | | PUMP 2 IN AUTO | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-10103 | | EXISTING |
| 279 | SEWER | PUMP STATION 10 | SS_RH5_PS10_ZIC1021 | SS | RH5 | PS10 | ZIC | 1021 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-10103 | | EXISTING |
| 280 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FQI1022 | SS | RH5 | PS10 | FQI | 1022 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-10103 | | FUTURE |
| 281 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YI1090 | SS | RH5 | PS10 | YI | 1090 | | GENERATOR RUN | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-10103 | | EXISTING |
| 282 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1090A | SS | RH5 | PS10 | YA | 1090 | A | GENERATOR FAIL | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-10103 | | EXISTING |
| 283 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LAL1090 | SS | RH5 | PS10 | LAL | 1090 | | GENERATOR LOW FUEL ALARM | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-10103 | | NEW |
| 284 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YA1090B | SS | RH5 | PS10 | YA | 1090 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-10103 | | NEW |
| 285 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1091A | SS | RH5 | PS10 | NI | 1091 | A | ATS IN NORMAL | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-10103 | | NEW |
| 286 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1091B | SS | RH5 | PS10 | NI | 1091 | B | ATS IN GENERATOR | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-10103 | | NEW |
| 287 | SEWER | PUMP STATION 10 | SS_RH5_PS10_NI1091C | SS | RH5 | PS10 | NI | 1091 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-10103 | | NEW |
| 288 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-10103 | | SPARE |
| 289 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-10103 | | SPARE |
| 290 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-10103 | | SPARE |
| 291 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-10103 | | SPARE |
| 292 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-10103 | | SPARE |
| 293 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 294 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 295 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 296 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 297 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 298 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 299 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 300 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 301 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 302 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 303 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 304 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 305 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 306 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 307 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 308 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-10104 | | SPARE |
| 309 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YC1010 | SS | RH5 | PS10 | YC | 1010 | | PUMP 1 CALL TO RUN | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-10201 | | EXISTING |
| 310 | SEWER | PUMP STATION 10 | SS_RH5_PS10_YC1020 | SS | RH5 | PS10 | YC | 1020 | | PUMP 2 CALL TO RUN | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-10201 | | EXISTING |
| 311 | SEWER | PUMP STATION 10 | SS_RH5_PS10_XC1042 | SS | RH5 | PS10 | XC | 1042 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RESET | I-10201 | | NEW |
| 312 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 03 | 24 VDC | | I-10201 | | SPARE |
| 313 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 04 | 24 VDC | | I-10201 | | SPARE |
| 314 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 05 | 24 VDC | | I-10201 | | SPARE |
| 315 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 06 | 24 VDC | | I-10201 | | SPARE |
| 316 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 07 | 24 VDC | | I-10201 | | SPARE |
| 317 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 08 | 24 VDC | | I-10201 | | SPARE |
| 318 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 09 | 24 VDC | | I-10201 | | SPARE |
| 319 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 10 | 24 VDC | | I-10201 | | SPARE |
| 320 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 11 | 24 VDC | | I-10201 | | SPARE |
| 321 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 12 | 24 VDC | | I-10201 | | SPARE |
| 322 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 13 | 24 VDC | | I-10201 | | SPARE |
| 323 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 14 | 24 VDC | | I-10201 | | SPARE |
| 324 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | DO | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 07 | 15 | 24 VDC | | I-10201 | | SPARE |
| 325 | SEWER | PUMP STATION 10 | SS_RH5_PS10_II1010 | SS | RH5 | PS10 | II | 1010 | | PUMP 1 AMPS | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-10301 | | EXISTING |
| 326 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FI1012 | SS | RH5 | PS10 | FI | 1012 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 08 | 01 | | X-X GPM | I-10301 | | FUTURE |
| 327 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LI1041 | SS | RH5 | PS10 | LI | 1041 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-10301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 328 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 08 | 03 | | | I-10301 | | SPARE |
| 329 | SEWER | PUMP STATION 10 | SS_RH5_PS10_II1020 | SS | RH5 | PS10 | II | 1020 | | PUMP 2 AMPS | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-10302 | | EXISTING |
| 330 | SEWER | PUMP STATION 10 | SS_RH5_PS10_FI1022 | SS | RH5 | PS10 | FI | 1022 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 09 | 01 | | X-X GPM | I-10302 | | FUTURE |
| 331 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 09 | 02 | | | I-10302 | | SPARE |
| 332 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 09 | 03 | | | I-10302 | | SPARE |
| 333 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LI1042 | SS | RH5 | PS10 | LI | 1042 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-10303 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 334 | SEWER | PUMP STATION 10 | SS_RH5_PS10_PI1035 | SS | RH5 | PS10 | PI | 1035 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 10 | 01 | | X-X GPM | I-10303 | | FUTURE |
| 335 | SEWER | PUMP STATION 10 | SS_RH5_PS10_LI1090 | SS | RH5 | PS10 | LI | 1090 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 10 | 02 | 4-20 mA | X-X FT | I-10303 | | FUTURE |
| 336 | SEWER | PUMP STATION 10 | ___ | | | | | | | SPARE | AI | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_PLC1001 | 00 | 10 | 03 | | | I-10303 | | SPARE |
| 337 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_YA1200 | SS | RH5 | FS12 | YA | 1200 | | STATION INTRUSION ALARM | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-12101 | | EXISTING |
| 338 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_YA1201 | SS | RH5 | FS12 | YA | 1201 | | PLC PANEL INTRUSION ALARM | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 339 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_NI1202 | SS | RH5 | FS12 | NI | 1202 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 340 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_NI1203 | SS | RH5 | FS12 | NI | 1203 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 341 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_NI1204 | SS | RH5 | FS12 | NI | 1204 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 342 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_XA1205 | SS | RH5 | FS12 | XA | 1205 | | NETWORK SWITCH 1 ALARM | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 343 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-12101 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 344 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_NI1206 | SS | RH5 | FS12 | NI | 1206 | | UPS ON BATTERY | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 345 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_XA1206 | SS | RH5 | FS12 | XA | 1206 | | UPS ALARM | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 346 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_JAL1206 | SS | RH5 | FS12 | JAL | 1206 | | UPS LOW BATTERY | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-12101 | | NEW |
| 347 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_YI1210 | SS | RH5 | FS12 | YI | 1210 | | PUMP 1 RUN | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-12101 | | EXISTING |
| 348 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_YA1209 | SS | RH5 | FS12 | YA | 1209 | | GENERAL FAIL | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-12101 | | EXISTING |
| 349 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-12101 | | SPARE |
| 350 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-12101 | | SPARE |
| 351 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-12101 | | SPARE |
| 352 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DI | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-12101 | | SPARE |
| 353 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_YC1210 | SS | RH5 | FS12 | YC | 1210 | | PUMP 1 CALL TO RUN | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 00 | 24 VDC | ENERGIZED TO RUN | I-12201 | | NEW |
| 354 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 01 | 24 VDC | | I-12201 | | SPARE |
| 355 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 02 | 24 VDC | | I-12201 | | SPARE |
| 356 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 03 | 24 VDC | | I-12201 | | SPARE |
| 357 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 04 | 24 VDC | | I-12201 | | SPARE |
| 358 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 05 | 24 VDC | | I-12201 | | SPARE |
| 359 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 06 | 24 VDC | | I-12201 | | SPARE |
| 360 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 07 | 24 VDC | | I-12201 | | SPARE |
| 361 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 08 | 24 VDC | | I-12201 | | SPARE |
| 362 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 09 | 24 VDC | | I-12201 | | SPARE |
| 363 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 10 | 24 VDC | | I-12201 | | SPARE |
| 364 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 11 | 24 VDC | | I-12201 | | SPARE |
| 365 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 12 | 24 VDC | | I-12201 | | SPARE |
| 366 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 13 | 24 VDC | | I-12201 | | SPARE |
| 367 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 14 | 24 VDC | | I-12201 | | SPARE |
| 368 | SEWER | FLUSH STATION 12 | ___ | | | | | | | SPARE | DO | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_PLC1201 | 00 | 04 | 15 | 24 VDC | | I-12201 | | SPARE |
| 369 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1300 | SS | RH3 | PS13 | YA | 1300 | | STATION INTRUSION ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-13101 | | EXISTING |
| 370 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1301 | SS | RH3 | PS13 | YA | 1301 | | PLC PANEL INTRUSION ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 371 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1302 | SS | RH3 | PS13 | NI | 1302 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 372 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1303 | SS | RH3 | PS13 | NI | 1303 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 373 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1304 | SS | RH3 | PS13 | NI | 1304 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 374 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XA1305A | SS | RH3 | PS13 | XA | 1305 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 375 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XA1305B | SS | RH3 | PS13 | XA | 1305 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 376 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1306 | SS | RH3 | PS13 | NI | 1306 | | UPS ON BATTERY | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 377 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XA1306 | SS | RH3 | PS13 | XA | 1306 | | UPS ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 378 | SEWER | PUMP STATION 13 | SS_RH3_PS13_JAL1306 | SS | RH3 | PS13 | JAL | 1306 | | UPS LOW BATTERY | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 379 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAH1307 | SS | RH3 | PS13 | LAH | 1307 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-13101 | | EXISTING |
| 380 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FAL1361 | SS | RH3 | PS13 | FAL | 1361 | | EXHAUST FAN LOW FLOW | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-13101 | | NEW |
| 381 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-13101 | | SPARE |
| 382 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-13101 | | SPARE |
| 383 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-13101 | | SPARE |
| 384 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-13101 | | SPARE |
| 385 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YI1310 | SS | RH3 | PS13 | YI | 1310 | | PUMP 1 RUN | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-13102 | | EXISTING |
| 386 | SEWER | PUMP STATION 13 | SS_RH3_PS13_HSA1310 | SS | RH3 | PS13 | HSA | 1310 | | PUMP 1 IN AUTO | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-13102 | | EXISTING |
| 387 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZIC1311 | SS | RH3 | PS13 | ZIC | 1311 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-13102 | | EXISTING |
| 388 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FQI1312 | SS | RH3 | PS13 | FQI | 1312 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-13102 | | FUTURE |
| 389 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1310 | SS | RH3 | PS13 | YA | 1310 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-13102 | | EXISTING |
| 390 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAHH1342 | SS | RH3 | PS13 | LAHH | 1342 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 391 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAH1342 | SS | RH3 | PS13 | LAH | 1342 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 392 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAL1342 | SS | RH3 | PS13 | LAL | 1342 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-13102 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 393 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1342 | SS | RH3 | PS13 | YA | 1342 | | FOGROD LEVEL FAULT | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-13102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 394 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1343 | SS | RH3 | PS13 | YA | 1343 | | IS PANEL INTRUSION | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 395 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1344 | SS | RH3 | PS13 | NI | 1344 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 396 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1345 | SS | RH3 | PS13 | NI | 1345 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 397 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1346 | SS | RH3 | PS13 | NI | 1346 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 398 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1347 | SS | RH3 | PS13 | NI | 1347 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-13102 | | NEW |
| 399 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-13102 | | SPARE |
| 400 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-13102 | | SPARE |
| 401 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YI1320 | SS | RH3 | PS13 | YI | 1320 | | PUMP 2 RUN | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-13103 | | EXISTING |
| 402 | SEWER | PUMP STATION 13 | SS_RH3_PS13_HSA1320 | SS | RH3 | PS13 | HSA | 1320 | | PUMP 2 IN AUTO | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-13103 | | EXISTING |
| 403 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZIC1321 | SS | RH3 | PS13 | ZIC | 1321 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-13103 | | EXISTING |
| 404 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FQI1322 | SS | RH3 | PS13 | FQI | 1322 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-13103 | | FUTURE |
| 405 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 406 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 407 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 408 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 409 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 410 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 411 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 412 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 413 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 414 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 415 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 416 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-13103 | | SPARE |
| 417 | SEWER | PUMP STATION 13 | SS_RH3_PS13_HSR1350 | SS | RH3 | PS13 | HSR | 1350 | | FLUSH VALVE IN REMOTE (FUTURE) | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-13104 | | FUTURE |
| 418 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZIO1350 | SS | RH3 | PS13 | ZIO | 1350 | | FLUSH VALVE OPEN (FUTURE) | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-13104 | | FUTURE |
| 419 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZIC1350 | SS | RH3 | PS13 | ZIC | 1350 | | FLUSH VALVE CLOSED (FUTURE) | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-13104 | | FUTURE |
| 420 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 421 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 422 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 423 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 424 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 425 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 426 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 427 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 428 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 429 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 430 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 431 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 432 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-13104 | | SPARE |
| 433 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YC1310 | SS | RH3 | PS13 | YC | 1310 | | PUMP 1 CALL TO RUN | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-13201 | | EXISTING |
| 434 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YC1320 | SS | RH3 | PS13 | YC | 1320 | | PUMP 2 CALL TO RUN | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-13201 | | EXISTING |
| 435 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZCO1350 | SS | RH3 | PS13 | ZCO | 1350 | | FLUSH VALVE CALL TO OPEN (FUTURE) | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO OPEN | I-13201 | | FUTURE |
| 436 | SEWER | PUMP STATION 13 | SS_RH3_PS13_ZCC1350 | SS | RH3 | PS13 | ZCC | 1350 | | FLUSH VALVE CALL TO CLOSE (FUTURE) | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO CLOSE | I-13201 | | FUTURE |
| 437 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XC1342 | SS | RH3 | PS13 | XC | 1342 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO RESET | I-13201 | | NEW |
| 438 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 05 | 24 VDC | | I-13201 | | SPARE |
| 439 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 06 | 24 VDC | | I-13201 | | SPARE |
| 440 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 07 | 24 VDC | | I-13201 | | SPARE |
| 441 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 08 | 24 VDC | | I-13201 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 442 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 09 | 24 VDC | | I-13201 | | SPARE |
| 443 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 10 | 24 VDC | | I-13201 | | SPARE |
| 444 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 11 | 24 VDC | | I-13201 | | SPARE |
| 445 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 12 | 24 VDC | | I-13201 | | SPARE |
| 446 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 13 | 24 VDC | | I-13201 | | SPARE |
| 447 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 14 | 24 VDC | | I-13201 | | SPARE |
| 448 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DO | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 07 | 15 | 24 VDC | | I-13201 | | SPARE |
| 449 | SEWER | PUMP STATION 13 | SS_RH3_PS13_II1310 | SS | RH3 | PS13 | II | 1310 | | PUMP 1 AMPS | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-13301 | | EXISTING |
| 450 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FI1312 | SS | RH3 | PS13 | FI | 1312 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 08 | 01 | | X-X GPM | I-13301 | | FUTURE |
| 451 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LI1341 | SS | RH3 | PS13 | LI | 1341 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-13301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 452 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 08 | 03 | | | I-13301 | | SPARE |
| 453 | SEWER | PUMP STATION 13 | SS_RH3_PS13_II1320 | SS | RH3 | PS13 | II | 1320 | | PUMP 2 AMPS | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-3302 | | EXISTING |
| 454 | SEWER | PUMP STATION 13 | SS_RH3_PS13_FI1322 | SS | RH3 | PS13 | FI | 1322 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 09 | 01 | | X-X GPM | I-3302 | | FUTURE |
| 455 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 09 | 02 | | | I-3302 | | SPARE |
| 456 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 09 | 03 | | | I-3302 | | SPARE |
| 457 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LI1342 | SS | RH3 | PS13 | LI | 1342 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-13303 | VIA FODGOD LEVEL TRANSMITTER | EXISTING |
| 458 | SEWER | PUMP STATION 13 | SS_RH3_PS13_PI1335 | SS | RH3 | PS13 | PI | 1335 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 10 | 01 | | X-X PSIG | I-13303 | | FUTURE |
| 459 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 10 | 02 | | | I-13303 | | SPARE |
| 460 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_PLC1301 | 00 | 10 | 03 | | | I-13303 | | SPARE |
| 461 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1392 | SS | RH3 | PS13 | YA | 1392 | | RIO PANEL INTRUSION ALARM | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 462 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1393 | SS | RH3 | PS13 | NI | 1393 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 463 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1394 | SS | RH3 | PS13 | NI | 1394 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 464 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1395 | SS | RH3 | PS13 | NI | 1395 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 465 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XA1396 | SS | RH3 | PS13 | XA | 1396 | | NETWORK SWITCH 3 ALARM | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 466 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1397 | SS | RH3 | PS13 | NI | 1397 | | UPS ON BATTERY | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 467 | SEWER | PUMP STATION 13 | SS_RH3_PS13_XA1397 | SS | RH3 | PS13 | XA | 1397 | | UPS ALARM | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 468 | SEWER | PUMP STATION 13 | SS_RH3_PS13_JAL1397 | SS | RH3 | PS13 | JAL | 1397 | | UPS LOW BATTERY | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-13821 | | NEW |
| 469 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 470 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 471 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 472 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 473 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 474 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 475 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 476 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-13821 | | SPARE |
| 477 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YI1390 | SS | RH3 | PS13 | YI | 1390 | | GENERATOR RUN | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-13822 | | EXISTING |
| 478 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1390A | SS | RH3 | PS13 | YA | 1390 | A | GENERATOR FAIL | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 479 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAL1390 | SS | RH3 | PS13 | LAL | 1390 | | GENERATOR LOW FUEL ALARM | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 480 | SEWER | PUMP STATION 13 | SS_RH3_PS13_YA1390B | SS | RH3 | PS13 | YA | 1390 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 481 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1391A | SS | RH3 | PS13 | NI | 1391 | A | ATS IN NORMAL | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 482 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1391B | SS | RH3 | PS13 | NI | 1391 | B | ATS IN GENERATOR | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 483 | SEWER | PUMP STATION 13 | SS_RH3_PS13_NI1391C | SS | RH3 | PS13 | NI | 1391 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 484 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LAH1390 | SS | RH3 | PS13 | LAH | 1390 | | GENERATOR VAULT FLOOD | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-13822 | | NEW |
| 485 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 486 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 487 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 488 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 489 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 490 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 491 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 492 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | DI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-13822 | | SPARE |
| 493 | SEWER | PUMP STATION 13 | SS_RH3_PS13_LI1390 | SS | RH3 | PS13 | LI | 1390 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-13831 | | FUTURE |
| 494 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 04 | 01 | 4-20 mA | | I-13831 | | SPARE |
| 495 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 04 | 02 | 4-20 mA | | I-13831 | | SPARE |
| 496 | SEWER | PUMP STATION 13 | ___ | | | | | | | SPARE | AI | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_RIO1301 | 00 | 04 | 03 | 4-20 mA | | I-13831 | | SPARE |
| 497 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1400 | SS | RH2 | PS14 | YA | 1400 | | WETWELL INTRUSION ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-14101 | | EXISTING |
| 498 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1401 | SS | RH2 | PS14 | YA | 1401 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 499 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1402A | SS | RH2 | PS14 | NI | 1402 | A | PLC PANEL SOURCE 1 SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 500 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1403A | SS | RH2 | PS14 | NI | 1403 | A | PLC PANEL SOURCE 1 120V POWER AVAILABLE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 501 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1404A | SS | RH2 | PS14 | NI | 1404 | A | PLC PANEL 24V POWER SUPPLY 1 OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 502 | SEWER | PUMP STATION 14 | SS_RH2_PS14_XA1405A | SS | RH2 | PS14 | XA | 1405 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 503 | SEWER | PUMP STATION 14 | SS_RH2_PS14_XA1405B | SS | RH2 | PS14 | XA | 1405 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 504 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1406 | SS | RH2 | PS14 | NI | 1406 | | UPS ON BATTERY | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 505 | SEWER | PUMP STATION 14 | SS_RH2_PS14_XA1406 | SS | RH2 | PS14 | XA | 1406 | | UPS ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 506 | SEWER | PUMP STATION 14 | SS_RH2_PS14_JAL1406 | SS | RH2 | PS14 | JAL | 1406 | | UPS LOW BATTERY | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 507 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1407 | SS | RH2 | PS14 | YA | 1407 | | CONTROL PANEL INTRUSION ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-14101 | | SPARE |
| 508 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1408 | SS | RH2 | PS14 | YA | 1408 | | VALVE VAULT INTRUSION ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-14101 | | NEW |
| 509 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-14101 | | SPARE |
| 510 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-14101 | | SPARE |
| 511 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-14101 | | SPARE |
| 512 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-14101 | | SPARE |
| 513 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YI1410 | SS | RH2 | PS14 | YI | 1410 | | PUMP 1 RUN | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 514 | SEWER | PUMP STATION 14 | SS_RH2_PS14_HSA1410 | SS | RH2 | PS14 | HSA | 1410 | | PUMP 1 IN AUTO | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 515 | SEWER | PUMP STATION 14 | SS_RH2_PS14_ZIC1411 | SS | RH2 | PS14 | ZIC | 1411 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 516 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FQI1412 | SS | RH2 | PS14 | FQI | 1412 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-14102 | | FUTURE |
| 517 | SEWER | PUMP STATION 14 | SS_RH2_PS14_MAH1410 | SS | RH2 | PS14 | MAH | 1410 | | PUMP 1 MOISTURE LEAK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 518 | SEWER | PUMP STATION 14 | SS_RH2_PS14_TAH1410 | SS | RH2 | PS14 | TAH | 1410 | | PUMP 1 TEMPERATURE HIGH | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 519 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1410A | SS | RH2 | PS14 | YA | 1410 | A | PUMP 1 PHASE FAIL | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 520 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1410B | SS | RH2 | PS14 | YA | 1410 | B | PUMP 1 CONTROL POWER OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-14102 | | EXISTING |
| 521 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 522 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 523 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 524 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 525 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 526 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 527 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 528 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-14102 | | SPARE |
| 529 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YI1420 | SS | RH2 | PS14 | YI | 1420 | | PUMP 2 RUN | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 530 | SEWER | PUMP STATION 14 | SS_RH2_PS14_HSA1420 | SS | RH2 | PS14 | HSA | 1420 | | PUMP 2 IN AUTO | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 531 | SEWER | PUMP STATION 14 | SS_RH2_PS14_ZIC1421 | SS | RH2 | PS14 | ZIC | 1421 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 532 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FQI1422 | SS | RH2 | PS14 | FQI | 1422 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-14103 | | FUTURE |
| 533 | SEWER | PUMP STATION 14 | SS_RH2_PS14_MAH1420 | SS | RH2 | PS14 | MAH | 1420 | | PUMP 2 MOISTURE LEAK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 534 | SEWER | PUMP STATION 14 | SS_RH2_PS14_TAH1420 | SS | RH2 | PS14 | TAH | 1420 | | PUMP 2 TEMPERATURE HIGH | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 535 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1420A | SS | RH2 | PS14 | YA | 1420 | A | PUMP 2 PHASE FAIL | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 536 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1420B | SS | RH2 | PS14 | YA | 1420 | B | PUMP 2 CONTROL POWER OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 537 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YI1490 | SS | RH2 | PS14 | YI | 1490 | | GENERATOR RUN | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 538 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1490A | SS | RH2 | PS14 | YA | 1490 | A | GENERATOR FAIL | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-14103 | | NEW |
| 539 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LAL1490 | SS | RH2 | PS14 | LAL | 1490 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 540 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1490B | SS | RH2 | PS14 | YA | 1490 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-14103 | | NEW |
| 541 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LAH1940 | SS | RH2 | PS14 | LAH | 1940 | | GENERATOR VAULT FLOOD | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 542 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1490C | SS | RH2 | PS14 | YA | 1490 | C | GENERATOR VAULT INTRUSION | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-14103 | | EXISTING |
| 543 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-14103 | | NEW |
| 544 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-14103 | | NEW |
| 545 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FQI1438 | SS | RH2 | PS14 | FQI | 1438 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-14104 | | FUTURE |
| 546 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LAHH1442 | SS | RH2 | PS14 | LAHH | 1442 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 547 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LAH1442 | SS | RH2 | PS14 | LAH | 1442 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 548 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LAL1442 | SS | RH2 | PS14 | LAL | 1442 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 549 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1442 | SS | RH2 | PS14 | YA | 1442 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-14104 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 550 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1443B | SS | RH2 | PS14 | YA | 1443 | B | IS PANEL INTRUSION | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 551 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1402B | SS | RH2 | PS14 | NI | 1402 | B | PLC PANEL SOURCE 2 SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 552 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1403B | SS | RH2 | PS14 | NI | 1403 | B | PLC PANEL SOURCE 2 120V POWER AVAILABLE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 553 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1404B | SS | RH2 | PS14 | NI | 1404 | B | PLC PANEL 24V POWER SUPPLY 2 OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 554 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1409 | SS | RH2 | PS14 | NI | 1409 | | PLC PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 555 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YA1443A | SS | RH2 | PS14 | YA | 1443 | A | LEVEL CONTROL PANEL INTRUSION | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 556 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1491A | SS | RH2 | PS14 | NI | 1491 | A | ATS IN NORMAL | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-14104 | | EXISTING |
| 557 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1491B | SS | RH2 | PS14 | NI | 1491 | B | ATS IN GENERATOR | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 558 | SEWER | PUMP STATION 14 | SS_RH2_PS14_NI1491C | SS | RH2 | PS14 | NI | 1491 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-14104 | | NEW |
| 559 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-14104 | | SPARE |
| 560 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-14104 | | SPARE |
| 561 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YC1410 | SS | RH2 | PS14 | YC | 1410 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-14201 | | EXISTING |
| 562 | SEWER | PUMP STATION 14 | SS_RH2_PS14_YC1420 | SS | RH2 | PS14 | YC | 1420 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-14201 | | EXISTING |
| 563 | SEWER | PUMP STATION 14 | SS_RH2_PS14_XC1442 | SS | RH2 | PS14 | XC | 1442 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RESET | I-14201 | | NEW |
| 564 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 03 | 24 VDC | | I-14201 | | SPARE |
| 565 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 04 | 24 VDC | | I-14201 | | SPARE |
| 566 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 05 | 24 VDC | | I-14201 | | SPARE |
| 567 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 06 | 24 VDC | | I-14201 | | SPARE |
| 568 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 07 | 24 VDC | | I-14201 | | SPARE |
| 569 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 08 | 24 VDC | | I-14201 | | SPARE |
| 570 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 09 | 24 VDC | | I-14201 | | SPARE |
| 571 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 10 | 24 VDC | | I-14201 | | SPARE |
| 572 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 11 | 24 VDC | | I-14201 | | SPARE |
| 573 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 12 | 24 VDC | | I-14201 | | SPARE |
| 574 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 13 | 24 VDC | | I-14201 | | SPARE |
| 575 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 14 | 24 VDC | | I-14201 | | SPARE |
| 576 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | DO | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 07 | 15 | 24 VDC | | I-14201 | | SPARE |
| 577 | SEWER | PUMP STATION 14 | SS_RH2_PS14_II1410 | SS | RH2 | PS14 | II | 1410 | | PUMP 1 AMPS | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-14301 | | EXISTING |
| 578 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FI1412 | SS | RH2 | PS14 | FI | 1412 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 08 | 01 | | X-X GPM | I-14301 | | FUTURE |
| 579 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LI1441 | SS | RH2 | PS14 | LI | 1441 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-14301 | VIA ULTRASONIC LEVEL TRANSMITTER | NEW |
| 580 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 08 | 03 | | | I-14301 | | SPARE |
| 581 | SEWER | PUMP STATION 14 | SS_RH2_PS14_II1420 | SS | RH2 | PS14 | II | 1420 | | PUMP 2 AMPS | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-14302 | | EXISTING |
| 582 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FI1422 | SS | RH2 | PS14 | FI | 1422 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 09 | 01 | | X-X GPM | I-14302 | | FUTURE |
| 583 | SEWER | PUMP STATION 14 | SS_RH2_PS14_FI1438 | SS | RH2 | PS14 | FI | 1438 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 09 | 02 | | X-X GPM | I-14302 | | FUTURE |
| 584 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 09 | 03 | | | I-14302 | | SPARE |
| 585 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LI1442 | SS | RH2 | PS14 | LI | 1442 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-14303 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 586 | SEWER | PUMP STATION 14 | SS_RH2_PS14_PI1435 | SS | RH2 | PS14 | PI | 1435 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 10 | 01 | | X-X PSIG | I-14303 | | FUTURE |
| 587 | SEWER | PUMP STATION 14 | SS_RH2_PS14_LI1490 | SS | RH2 | PS14 | LI | 1490 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 10 | 02 | | X-X FT | I-14303 | | FUTURE |
| 588 | SEWER | PUMP STATION 14 | ___ | | | | | | | SPARE | AI | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_PLC1401 | 00 | 10 | 03 | | | I-14303 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 589 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1500 | SS | RH2 | PS15 | YA | 1500 | | STATION INTRUSION ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-15101 | | EXISTING |
| 590 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1501 | SS | RH2 | PS15 | YA | 1501 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 591 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1502 | SS | RH2 | PS15 | NI | 1502 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 592 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1503 | SS | RH2 | PS15 | NI | 1503 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 593 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1504 | SS | RH2 | PS15 | NI | 1504 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 594 | SEWER | PUMP STATION 15 | SS_RH2_PS15_XA1505A | SS | RH2 | PS15 | XA | 1505 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 595 | SEWER | PUMP STATION 15 | SS_RH2_PS15_XA1505B | SS | RH2 | PS15 | XA | 1505 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 596 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1506 | SS | RH2 | PS15 | NI | 1506 | | UPS ON BATTERY | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 597 | SEWER | PUMP STATION 15 | SS_RH2_PS15_XA1506 | SS | RH2 | PS15 | XA | 1506 | | UPS ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 598 | SEWER | PUMP STATION 15 | SS_RH2_PS15_JAL1506 | SS | RH2 | PS15 | JAL | 1506 | | UPS LOW BATTERY | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 599 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LAH1507 | SS | RH2 | PS15 | LAH | 1507 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-15101 | | EXISTING |
| 600 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FAL1561 | SS | RH2 | PS15 | FAL | 1561 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-15101 | | NEW |
| 601 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-15101 | | SPARE |
| 602 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-15101 | | SPARE |
| 603 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-15101 | | SPARE |
| 604 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-15101 | | SPARE |
| 605 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YI1510 | SS | RH2 | PS15 | YI | 1510 | | PUMP 1 RUN | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-15102 | | EXISTING |
| 606 | SEWER | PUMP STATION 15 | SS_RH2_PS15_HSA1510 | SS | RH2 | PS15 | HSA | 1510 | | PUMP 1 IN AUTO | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-15102 | | EXISTING |
| 607 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZIC1511 | SS | RH2 | PS15 | ZIC | 1511 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-15102 | | EXISTING |
| 608 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FQI1512 | SS | RH2 | PS15 | FQI | 1512 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-15102 | | FUTURE |
| 609 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1510 | SS | RH2 | PS15 | YA | 1510 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-15102 | | EXISTING |
| 610 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LAHH1542 | SS | RH2 | PS15 | LAHH | 1542 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 611 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LAH1542 | SS | RH2 | PS15 | LAH | 1542 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 612 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LAL1542 | SS | RH2 | PS15 | LAL | 1542 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 613 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1542 | SS | RH2 | PS15 | YA | 1542 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-15102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 614 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1543 | SS | RH2 | PS15 | YA | 1543 | | IS PANEL INTRUSION | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 615 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1544 | SS | RH2 | PS15 | NI | 1544 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 616 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1545 | SS | RH2 | PS15 | NI | 1545 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 617 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1546 | SS | RH2 | PS15 | NI | 1546 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 618 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1547 | SS | RH2 | PS15 | NI | 1547 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-15102 | | NEW |
| 619 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-15102 | | SPARE |
| 620 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-15102 | | SPARE |
| 621 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YI1520 | SS | RH2 | PS15 | YI | 1520 | | PUMP 2 RUN | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-15103 | | EXISTING |
| 622 | SEWER | PUMP STATION 15 | SS_RH2_PS15_HSA1520 | SS | RH2 | PS15 | HSA | 1520 | | PUMP 2 IN AUTO | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-15103 | | EXISTING |
| 623 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZIC1521 | SS | RH2 | PS15 | ZIC | 1521 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-15103 | | EXISTING |
| 624 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FQI1522 | SS | RH2 | PS15 | FQI | 1522 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-15103 | | FUTURE |
| 625 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YI1590 | SS | RH2 | PS15 | YI | 1590 | | GENERATOR RUN | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-15103 | | EXISTING |
| 626 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1590A | SS | RH2 | PS15 | YA | 1590 | A | GENERATOR FAIL | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-15103 | | EXISTING |
| 627 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LAL1590 | SS | RH2 | PS15 | LAL | 1590 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-15103 | | NEW |
| 628 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YA1590B | SS | RH2 | PS15 | YA | 1590 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-15103 | | NEW |
| 629 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1591A | SS | RH2 | PS15 | NI | 1591 | A | ATS IN NORMAL | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-15103 | | NEW |
| 630 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1591B | SS | RH2 | PS15 | NI | 1591 | B | ATS IN GENERATOR | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-15103 | | NEW |
| 631 | SEWER | PUMP STATION 15 | SS_RH2_PS15_NI1591C | SS | RH2 | PS15 | NI | 1591 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-15103 | | NEW |
| 632 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-15103 | | SPARE |
| 633 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-15103 | | SPARE |
| 634 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-15103 | | SPARE |
| 635 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-15103 | | SPARE |
| 636 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-15103 | | SPARE |
| 637 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FQI1538 | SS | RH2 | PS15 | FQI | 1538 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-15104 | | FUTURE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 638 | SEWER | PUMP STATION 15 | SS_RH2_PS15_HSR1550 | SS | RH2 | PS15 | HSR | 1550 | | FLUSH VALVE IN REMOTE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-15104 | | NEW |
| 639 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZIO1550 | SS | RH2 | PS15 | ZIO | 1550 | | FLUSH VALVE OPEN | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-15104 | | NEW |
| 640 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZIC1550 | SS | RH2 | PS15 | ZIC | 1550 | | FLUSH VALVE CLOSED | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-15104 | | NEW |
| 641 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 642 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 643 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 644 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 645 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 646 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 647 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 648 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 649 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 650 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 651 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 652 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-15104 | | SPARE |
| 653 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YC1510 | SS | RH2 | PS15 | YC | 1510 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-15201 | | EXISTING |
| 654 | SEWER | PUMP STATION 15 | SS_RH2_PS15_YC1520 | SS | RH2 | PS15 | YC | 1520 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-15201 | | EXISTING |
| 655 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZCO1550 | SS | RH2 | PS15 | ZCO | 1550 | | FLUSH VALVE CALL TO OPEN | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO OPEN | I-15201 | | NEW |
| 656 | SEWER | PUMP STATION 15 | SS_RH2_PS15_ZCC1550 | SS | RH2 | PS15 | ZCC | 1550 | | FLUSH VALVE CALL TO CLOSE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO CLOSE | I-15201 | | NEW |
| 657 | SEWER | PUMP STATION 15 | SS_RH2_PS15_XC1542 | SS | RH2 | PS15 | XC | 1542 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO RESET | I-15201 | | NEW |
| 658 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 05 | 24 VDC | | I-15201 | | SPARE |
| 659 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 06 | 24 VDC | | I-15201 | | SPARE |
| 660 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 07 | 24 VDC | | I-15201 | | SPARE |
| 661 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 08 | 24 VDC | | I-15201 | | SPARE |
| 662 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 09 | 24 VDC | | I-15201 | | SPARE |
| 663 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 10 | 24 VDC | | I-15201 | | SPARE |
| 664 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 11 | 24 VDC | | I-15201 | | SPARE |
| 665 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 12 | 24 VDC | | I-15201 | | SPARE |
| 666 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 13 | 24 VDC | | I-15201 | | SPARE |
| 667 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 14 | 24 VDC | | I-15201 | | SPARE |
| 668 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | DO | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 07 | 15 | 24 VDC | | I-15201 | | SPARE |
| 669 | SEWER | PUMP STATION 15 | SS_RH2_PS15_II1510 | SS | RH2 | PS15 | II | 1510 | | PUMP 1 AMPS | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-15301 | | EXISTING |
| 670 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FI1512 | SS | RH2 | PS15 | FI | 1512 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 08 | 01 | | X-X GPM | I-15301 | | FUTURE |
| 671 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LI1541 | SS | RH2 | PS15 | LI | 1541 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-15301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 672 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 08 | 03 | | | I-15301 | | SPARE |
| 673 | SEWER | PUMP STATION 15 | SS_RH2_PS15_II1520 | SS | RH2 | PS15 | II | 1520 | | PUMP 2 AMPS | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-15302 | | EXISTING |
| 674 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FI1522 | SS | RH2 | PS15 | FI | 1522 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 09 | 01 | | X-X GPM | I-15302 | | FUTURE |
| 675 | SEWER | PUMP STATION 15 | SS_RH2_PS15_FI1538 | SS | RH2 | PS15 | FI | 1538 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 09 | 02 | | X-X GPM | I-15302 | | FUTURE |
| 676 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 09 | 03 | | | I-15302 | | SPARE |
| 677 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LI1542 | SS | RH2 | PS15 | LI | 1542 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-15303 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 678 | SEWER | PUMP STATION 15 | SS_RH2_PS15_PI1535 | SS | RH2 | PS15 | PI | 1535 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 10 | 01 | | X-X PSIG | I-15303 | | FUTURE |
| 679 | SEWER | PUMP STATION 15 | SS_RH2_PS15_LI1590 | SS | RH2 | PS15 | LI | 1590 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 10 | 02 | 4-20 mA | X-X FT | I-15303 | | FUTURE |
| 680 | SEWER | PUMP STATION 15 | ___ | | | | | | | SPARE | AI | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_PLC1501 | 00 | 10 | 03 | | | I-15303 | | SPARE |
| 681 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1600 | SS | RH2 | PS16 | YA | 1600 | | STATION INTRUSION ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-16101 | | EXISTING |
| 682 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1601 | SS | RH2 | PS16 | YA | 1601 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 683 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1602 | SS | RH2 | PS16 | NI | 1602 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 684 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1603 | SS | RH2 | PS16 | NI | 1603 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 685 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1604 | SS | RH2 | PS16 | NI | 1604 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 686 | SEWER | PUMP STATION 16 | SS_RH2_PS16_XA1605A | SS | RH2 | PS16 | XA | 1605 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-16101 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 687 | SEWER | PUMP STATION 16 | SS_RH2_PS16_XA1605B | SS | RH2 | PS16 | XA | 1605 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 688 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1606 | SS | RH2 | PS16 | NI | 1606 | | UPS ON BATTERY | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 689 | SEWER | PUMP STATION 16 | SS_RH2_PS16_XA1606 | SS | RH2 | PS16 | XA | 1606 | | UPS ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 690 | SEWER | PUMP STATION 16 | SS_RH2_PS16_JAL1606 | SS | RH2 | PS16 | JAL | 1606 | | UPS LOW BATTERY | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 691 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LAH1607 | SS | RH2 | PS16 | LAH | 1607 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-16101 | | EXISTING |
| 692 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FAL1661 | SS | RH2 | PS16 | FAL | 1661 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-16101 | | NEW |
| 693 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-16101 | | SPARE |
| 694 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-16101 | | SPARE |
| 695 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-16101 | | SPARE |
| 696 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-16101 | | SPARE |
| 697 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YI1610 | SS | RH2 | PS16 | YI | 1610 | | PUMP 1 RUN | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-16102 | | EXISTING |
| 698 | SEWER | PUMP STATION 16 | SS_RH2_PS16_HSA1610 | SS | RH2 | PS16 | HSA | 1610 | | PUMP 1 IN AUTO | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-16102 | | EXISTING |
| 699 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZIC1611 | SS | RH2 | PS16 | ZIC | 1611 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-16102 | | EXISTING |
| 700 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FQI1612 | SS | RH2 | PS16 | FQI | 1612 | | PUMP 1 DISCHARGE FLOW PULSE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-16102 | PULSE EQUALS XX GALLONS. | NEW |
| 701 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1610 | SS | RH2 | PS16 | YA | 1610 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-16102 | | EXISTING |
| 702 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LAHH1642 | SS | RH2 | PS16 | LAHH | 1642 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 703 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LAH1642 | SS | RH2 | PS16 | LAH | 1642 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 704 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LAL1642 | SS | RH2 | PS16 | LAL | 1642 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 705 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1642 | SS | RH2 | PS16 | YA | 1642 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-16102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 706 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1643 | SS | RH2 | PS16 | YA | 1643 | | IS PANEL INTRUSION | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 707 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1644 | SS | RH2 | PS16 | NI | 1644 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 708 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1645 | SS | RH2 | PS16 | NI | 1645 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 709 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1646 | SS | RH2 | PS16 | NI | 1646 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 710 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1647 | SS | RH2 | PS16 | NI | 1647 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-16102 | | NEW |
| 711 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-16102 | | SPARE |
| 712 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-16102 | | SPARE |
| 713 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YI1620 | SS | RH2 | PS16 | YI | 1620 | | PUMP 2 RUN | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-16103 | | EXISTING |
| 714 | SEWER | PUMP STATION 16 | SS_RH2_PS16_HSA1620 | SS | RH2 | PS16 | HSA | 1620 | | PUMP 2 IN AUTO | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-16103 | | EXISTING |
| 715 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZIC1621 | SS | RH2 | PS16 | ZIC | 1621 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-16103 | | EXISTING |
| 716 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FQI1622 | SS | RH2 | PS16 | FQI | 1622 | | PUMP 2 DISCHARGE FLOW PULSE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-16103 | PULSE EQUALS XX GALLONS. | NEW |
| 717 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YI1690 | SS | RH2 | PS16 | YI | 1690 | | GENERATOR RUN | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-16103 | | EXISTING |
| 718 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1690A | SS | RH2 | PS16 | YA | 1690 | A | GENERATOR FAIL | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-16103 | | EXISTING |
| 719 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LAL1690 | SS | RH2 | PS16 | LAL | 1690 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-16103 | | NEW |
| 720 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YA1690B | SS | RH2 | PS16 | YA | 1690 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-16103 | | NEW |
| 721 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1691A | SS | RH2 | PS16 | NI | 1691 | A | ATS IN NORMAL | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-16103 | | NEW |
| 722 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1691B | SS | RH2 | PS16 | NI | 1691 | B | ATS IN GENERATOR | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-16103 | | NEW |
| 723 | SEWER | PUMP STATION 16 | SS_RH2_PS16_NI1691C | SS | RH2 | PS16 | NI | 1691 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-16103 | | NEW |
| 724 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-16103 | | SPARE |
| 725 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-16103 | | SPARE |
| 726 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-16103 | | SPARE |
| 727 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-16103 | | SPARE |
| 728 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-16103 | | SPARE |
| 729 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YI1630 | SS | RH2 | PS16 | YI | 1630 | | PUMP 3 RUN | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-16104 | | EXISTING |
| 730 | SEWER | PUMP STATION 16 | SS_RH2_PS16_HSA1630 | SS | RH2 | PS16 | HSA | 1630 | | PUMP 3 IN AUTO | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-16104 | | EXISTING |
| 731 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZIC1631 | SS | RH2 | PS16 | ZIC | 1631 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-16104 | | EXISTING |
| 732 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FQI1632 | SS | RH2 | PS16 | FQI | 1632 | | PUMP 3 DISCHARGE FLOW PULSE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-16104 | PULSE EQUALS XX GALLONS. | NEW |
| 733 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FQI1638 | SS | RH2 | PS16 | FQI | 1638 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-16104 | | FUTURE |
| 734 | SEWER | PUMP STATION 16 | SS_RH2_PS16_HSR1650 | SS | RH2 | PS16 | HSR | 1650 | | FLUSH VALVE IN REMOTE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-16104 | | NEW |
| 735 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZIO1650 | SS | RH2 | PS16 | ZIO | 1650 | | FLUSH VALVE OPEN | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-16104 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 736 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZIC1650 | SS | RH2 | PS16 | ZIC | 1650 | | FLUSH VALVE CLOSED | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-16104 | | NEW |
| 737 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 738 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 739 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 740 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 741 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 742 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 743 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 744 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-16104 | | SPARE |
| 745 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YC1610 | SS | RH2 | PS16 | YC | 1610 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-16201 | | EXISTING |
| 746 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YC1620 | SS | RH2 | PS16 | YC | 1620 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-16201 | | EXISTING |
| 747 | SEWER | PUMP STATION 16 | SS_RH2_PS16_YC1630 | SS | RH2 | PS16 | YC | 1630 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-16201 | | EXISTING |
| 748 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZCO1650 | SS | RH2 | PS16 | ZCO | 1650 | | FLUSH VALVE CALL TO OPEN | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO OPEN | I-16201 | | NEW |
| 749 | SEWER | PUMP STATION 16 | SS_RH2_PS16_ZCC1650 | SS | RH2 | PS16 | ZCC | 1650 | | FLUSH VALVE CALL TO CLOSE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO CLOSE | I-16201 | | NEW |
| 750 | SEWER | PUMP STATION 16 | SS_RH2_PS16_XC1642 | SS | RH2 | PS16 | XC | 1642 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 05 | 24 VDC | ENERGIZE TO RESET | I-16201 | | NEW |
| 751 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 06 | 24 VDC | | I-16201 | | SPARE |
| 752 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 07 | 24 VDC | | I-16201 | | SPARE |
| 753 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 08 | 24 VDC | | I-16201 | | SPARE |
| 754 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 09 | 24 VDC | | I-16201 | | SPARE |
| 755 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 10 | 24 VDC | | I-16201 | | SPARE |
| 756 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 11 | 24 VDC | | I-16201 | | SPARE |
| 757 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 12 | 24 VDC | | I-16201 | | SPARE |
| 758 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 13 | 24 VDC | | I-16201 | | SPARE |
| 759 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 14 | 24 VDC | | I-16201 | | SPARE |
| 760 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | DO | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 07 | 15 | 24 VDC | | I-16201 | | SPARE |
| 761 | SEWER | PUMP STATION 16 | SS_RH2_PS16_II1610 | SS | RH2 | PS16 | II | 1610 | | PUMP 1 AMPS | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-16301 | | EXISTING |
| 762 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FI1612 | SS | RH2 | PS16 | FI | 1612 | | PUMP 1 DISCHARGE FLOW | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 08 | 01 | 4-20 mA | X-X GPM | I-16301 | | EXISTING |
| 763 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LI1641 | SS | RH2 | PS16 | LI | 1641 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-16301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |
| 764 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 08 | 03 | | | I-16301 | | SPARE |
| 765 | SEWER | PUMP STATION 16 | SS_RH2_PS16_II1620 | SS | RH2 | PS16 | II | 1620 | | PUMP 2 AMPS | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-16302 | | EXISTING |
| 766 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FI1622 | SS | RH2 | PS16 | FI | 1622 | | PUMP 2 DISCHARGE FLOW | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 09 | 01 | 4-20 mA | X-X GPM | I-16302 | | EXISTING |
| 767 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FI1638 | SS | RH2 | PS16 | FI | 1638 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 09 | 02 | | X-X GPM | I-16302 | | FUTURE |
| 768 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 09 | 03 | | | I-16302 | | SPARE |
| 769 | SEWER | PUMP STATION 16 | SS_RH2_PS16_II1630 | SS | RH2 | PS16 | II | 1630 | | PUMP 3 AMPS | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-16303 | | EXISTING |
| 770 | SEWER | PUMP STATION 16 | SS_RH2_PS16_FI1632 | SS | RH2 | PS16 | FI | 1632 | | PUMP 3 DISCHARGE FLOW | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 10 | 01 | 4-20 mA | X-X GPM | I-16303 | | EXISTING |
| 771 | SEWER | PUMP STATION 16 | SS_RH2_PS16_PI1635 | SS | RH2 | PS16 | PI | 1635 | | PUMP COMMON DISCHARGE PRESSURE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 10 | 02 | 4-20 mA | X-X PSIG | I-16303 | | EXISTING |
| 772 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 10 | 03 | | | I-16303 | | SPARE |
| 773 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LI1642 | SS | RH2 | PS16 | LI | 1642 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-16304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 774 | SEWER | PUMP STATION 16 | SS_RH2_PS16_LI1690 | SS | RH2 | PS16 | LI | 1690 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 11 | 01 | 4-20 mA | X-X FT | I-16304 | | FUTURE |
| 775 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 11 | 02 | | | I-16304 | | SPARE |
| 776 | SEWER | PUMP STATION 16 | ___ | | | | | | | SPARE | AI | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_PLC1601 | 00 | 11 | 03 | | | I-16304 | | SPARE |
| 777 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1700 | SS | RH2 | PS17 | YA | 1700 | | STATION INTRUSION ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-17101 | | EXISTING |
| 778 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1701 | SS | RH2 | PS17 | YA | 1701 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 779 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1702 | SS | RH2 | PS17 | NI | 1702 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 780 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1703 | SS | RH2 | PS17 | NI | 1703 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 781 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1704 | SS | RH2 | PS17 | NI | 1704 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 782 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XA1705A | SS | RH2 | PS17 | XA | 1705 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 783 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XA1705B | SS | RH2 | PS17 | XA | 1705 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 784 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1706 | SS | RH2 | PS17 | NI | 1706 | | UPS ON BATTERY | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-17101 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 785 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XA1706 | SS | RH2 | PS17 | XA | 1706 | | UPS ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 786 | SEWER | PUMP STATION 17 | SS_RH2_PS17_JAL1706 | SS | RH2 | PS17 | JAL | 1706 | | UPS LOW BATTERY | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 787 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAH1707 | SS | RH2 | PS17 | LAH | 1707 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-17101 | | EXISTING |
| 788 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FAL1761 | SS | RH2 | PS17 | FAL | 1761 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-17101 | | NEW |
| 789 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-17101 | | SPARE |
| 790 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-17101 | | SPARE |
| 791 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-17101 | | SPARE |
| 792 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-17101 | | SPARE |
| 793 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YI1710 | SS | RH2 | PS17 | YI | 1710 | | PUMP 1 RUN | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-17102 | | EXISTING |
| 794 | SEWER | PUMP STATION 17 | SS_RH2_PS17_HSA1710 | SS | RH2 | PS17 | HSA | 1710 | | PUMP 1 IN AUTO | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-17102 | | EXISTING |
| 795 | SEWER | PUMP STATION 17 | SS_RH2_PS17_ZIC1711 | SS | RH2 | PS17 | ZIC | 1711 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-17102 | | EXISTING |
| 796 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FQI1712 | SS | RH2 | PS17 | FQI | 1712 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-17102 | | FUTURE |
| 797 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1710 | SS | RH2 | PS17 | YA | 1710 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-17102 | | EXISTING |
| 798 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAHH1742 | SS | RH2 | PS17 | LAHH | 1742 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 799 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAH1742 | SS | RH2 | PS17 | LAH | 1742 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 800 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAL1742 | SS | RH2 | PS17 | LAL | 1742 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 801 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1742 | SS | RH2 | PS17 | YA | 1742 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-17102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 802 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1743 | SS | RH2 | PS17 | YA | 1743 | | IS PANEL INTRUSION | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 803 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1744 | SS | RH2 | PS17 | NI | 1744 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 804 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1745 | SS | RH2 | PS17 | NI | 1745 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 805 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1746 | SS | RH2 | PS17 | NI | 1746 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 806 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1747 | SS | RH2 | PS17 | NI | 1747 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-17102 | | NEW |
| 807 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-17102 | | SPARE |
| 808 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-17102 | | SPARE |
| 809 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YI1720 | SS | RH2 | PS17 | YI | 1720 | | PUMP 2 RUN | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-17103 | | EXISTING |
| 810 | SEWER | PUMP STATION 17 | SS_RH2_PS17_HSA1720 | SS | RH2 | PS17 | HSA | 1720 | | PUMP 2 IN AUTO | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-17103 | | EXISTING |
| 811 | SEWER | PUMP STATION 17 | SS_RH2_PS17_ZIC1721 | SS | RH2 | PS17 | ZIC | 1721 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-17103 | | EXISTING |
| 812 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FQI1722 | SS | RH2 | PS17 | FQI | 1722 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-17103 | | FUTURE |
| 813 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 814 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 815 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 816 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 817 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 818 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 819 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 820 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 821 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 822 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 823 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 824 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-17103 | | SPARE |
| 825 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YI1730 | SS | RH2 | PS17 | YI | 1730 | | PUMP 3 RUN | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-17104 | | EXISTING |
| 826 | SEWER | PUMP STATION 17 | SS_RH2_PS17_HSA1730 | SS | RH2 | PS17 | HSA | 1730 | | PUMP 3 IN AUTO | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-17104 | | EXISTING |
| 827 | SEWER | PUMP STATION 17 | SS_RH2_PS17_ZIC1731 | SS | RH2 | PS17 | ZIC | 1731 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-17104 | | EXISTING |
| 828 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FQI1732 | SS | RH2 | PS17 | FQI | 1732 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-17104 | | FUTURE |
| 829 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FQI1738 | SS | RH2 | PS17 | FQI | 1738 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-17104 | | FUTURE |
| 830 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 831 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 832 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 833 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 834 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 835 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 836 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 837 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 838 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 839 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 840 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-17104 | | SPARE |
| 841 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YC1710 | SS | RH2 | PS17 | YC | 1710 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-17201 | | EXISTING |
| 842 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YC1720 | SS | RH2 | PS17 | YC | 1720 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-17201 | | EXISTING |
| 843 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YC1730 | SS | RH2 | PS17 | YC | 1730 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-17201 | | EXISTING |
| 844 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XC1742 | SS | RH2 | PS17 | XC | 1742 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-17201 | | NEW |
| 845 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 04 | 24 VDC | | I-17201 | | SPARE |
| 846 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 05 | 24 VDC | | I-17201 | | SPARE |
| 847 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 06 | 24 VDC | | I-17201 | | SPARE |
| 848 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 07 | 24 VDC | | I-17201 | | SPARE |
| 849 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 08 | 24 VDC | | I-17201 | | SPARE |
| 850 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 09 | 24 VDC | | I-17201 | | SPARE |
| 851 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 10 | 24 VDC | | I-17201 | | SPARE |
| 852 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 11 | 24 VDC | | I-17201 | | SPARE |
| 853 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 12 | 24 VDC | | I-17201 | | SPARE |
| 854 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 13 | 24 VDC | | I-17201 | | SPARE |
| 855 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 14 | 24 VDC | | I-17201 | | SPARE |
| 856 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DO | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 07 | 15 | 24 VDC | | I-17201 | | SPARE |
| 857 | SEWER | PUMP STATION 17 | SS_RH2_PS17_II1710 | SS | RH2 | PS17 | II | 1710 | | PUMP 1 AMPS | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-17301 | | EXISTING |
| 858 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FI1712 | SS | RH2 | PS17 | FI | 1712 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 08 | 01 | | X-X GPM | I-17301 | | FUTURE |
| 859 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LI1741 | SS | RH2 | PS17 | LI | 1741 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-17301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |
| 860 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 08 | 03 | | | I-17301 | | SPARE |
| 861 | SEWER | PUMP STATION 17 | SS_RH2_PS17_II1720 | SS | RH2 | PS17 | II | 1720 | | PUMP 2 AMPS | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-17302 | | EXISTING |
| 862 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FI1722 | SS | RH2 | PS17 | FI | 1722 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 09 | 01 | | X-X GPM | I-17302 | | FUTURE |
| 863 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FI1738 | SS | RH2 | PS17 | FI | 1738 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 09 | 02 | | X-X GPM | I-17302 | | FUTURE |
| 864 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 09 | 03 | | | I-17302 | | SPARE |
| 865 | SEWER | PUMP STATION 17 | SS_RH2_PS17_II1730 | SS | RH2 | PS17 | II | 1730 | | PUMP 3 AMPS | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-17303 | | EXISTING |
| 866 | SEWER | PUMP STATION 17 | SS_RH2_PS17_FI1732 | SS | RH2 | PS17 | FI | 1732 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 10 | 01 | | X-X GPM | I-17303 | | FUTURE |
| 867 | SEWER | PUMP STATION 17 | SS_RH2_PS17_PI1735 | SS | RH2 | PS17 | PI | 1735 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 10 | 02 | | X-X PSIG | I-17303 | | FUTURE |
| 868 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 10 | 03 | | | I-17303 | | SPARE |
| 869 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LI1742 | SS | RH2 | PS17 | LI | 1742 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-17304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 870 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 11 | 01 | | | I-17304 | | SPARE |
| 871 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 11 | 02 | | | I-17304 | | SPARE |
| 872 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_PLC1701 | 00 | 11 | 03 | | | I-17304 | | SPARE |
| 873 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1792 | SS | RH2 | PS17 | YA | 1792 | | RIO PANEL INTRUSION ALARM | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 874 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1793 | SS | RH2 | PS17 | NI | 1793 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 875 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1794 | SS | RH2 | PS17 | NI | 1794 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 876 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1795 | SS | RH2 | PS17 | NI | 1795 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 877 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XA1796 | SS | RH2 | PS17 | XA | 1796 | | NETWORK SWITCH 3 ALARM | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 878 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1797 | SS | RH2 | PS17 | NI | 1797 | | UPS ON BATTERY | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 879 | SEWER | PUMP STATION 17 | SS_RH2_PS17_XA1797 | SS | RH2 | PS17 | XA | 1797 | | UPS ALARM | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 880 | SEWER | PUMP STATION 17 | SS_RH2_PS17_JAL1797 | SS | RH2 | PS17 | JAL | 1797 | | UPS LOW BATTERY | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-17821 | | NEW |
| 881 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 882 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 883 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 884 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 885 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 886 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 887 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 888 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-17821 | | SPARE |
| 889 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YI1790 | SS | RH2 | PS17 | YI | 1790 | | GENERATOR RUN | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-17822 | | EXISTING |
| 890 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1790A | SS | RH2 | PS17 | YA | 1790 | A | GENERATOR FAIL | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-17822 | | EXISTING |
| 891 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAL1790 | SS | RH2 | PS17 | LAL | 1790 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-17822 | | NEW |
| 892 | SEWER | PUMP STATION 17 | SS_RH2_PS17_YA1790B | SS | RH2 | PS17 | YA | 1790 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-17822 | | NEW |
| 893 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1791A | SS | RH2 | PS17 | NI | 1791 | A | ATS IN NORMAL | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-17822 | | NEW |
| 894 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1791B | SS | RH2 | PS17 | NI | 1791 | B | ATS IN GENERATOR | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-17822 | | NEW |
| 895 | SEWER | PUMP STATION 17 | SS_RH2_PS17_NI1791C | SS | RH2 | PS17 | NI | 1791 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-17822 | | NEW |
| 896 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LAH1790 | SS | RH2 | PS17 | LAH | 1790 | | GENERATOR VAULT FLOOD | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-17822 | | EXISTING |
| 897 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 898 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 899 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 900 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 901 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 902 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 903 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 904 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | DI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-17822 | | SPARE |
| 905 | SEWER | PUMP STATION 17 | SS_RH2_PS17_LI1790 | SS | RH2 | PS17 | LI | 1790 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-17831 | | FUTURE |
| 906 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 04 | 01 | 4-20 mA | | I-17831 | | SPARE |
| 907 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 04 | 02 | 4-20 mA | | I-17831 | | SPARE |
| 908 | SEWER | PUMP STATION 17 | ___ | | | | | | | SPARE | AI | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_RIO1701 | 00 | 04 | 03 | 4-20 mA | | I-17831 | | SPARE |
| 909 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1800 | SS | RH2 | PS18 | YA | 1800 | | STATION INTRUSION ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-18101 | | EXISTING |
| 910 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1801 | SS | RH2 | PS18 | YA | 1801 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 911 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1802 | SS | RH2 | PS18 | NI | 1802 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 912 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1803 | SS | RH2 | PS18 | NI | 1803 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 913 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1804 | SS | RH2 | PS18 | NI | 1804 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 914 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XA1805A | SS | RH2 | PS18 | XA | 1805 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 915 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XA1805B | SS | RH2 | PS18 | XA | 1805 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 916 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1806 | SS | RH2 | PS18 | NI | 1806 | | UPS ON BATTERY | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 917 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XA1806 | SS | RH2 | PS18 | XA | 1806 | | UPS ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 918 | SEWER | PUMP STATION 18 | SS_RH2_PS18_JAL1806 | SS | RH2 | PS18 | JAL | 1806 | | UPS LOW BATTERY | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 919 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAH1807 | SS | RH2 | PS18 | LAH | 1807 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-18101 | | EXISTING |
| 920 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FAL1861 | SS | RH2 | PS18 | FAL | 1861 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-18101 | | NEW |
| 921 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-18101 | | SPARE |
| 922 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-18101 | | SPARE |
| 923 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-18101 | | SPARE |
| 924 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-18101 | | SPARE |
| 925 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YI1810 | SS | RH2 | PS18 | YI | 1810 | | PUMP 1 RUN | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-18102 | | EXISTING |
| 926 | SEWER | PUMP STATION 18 | SS_RH2_PS18_HSA1810 | SS | RH2 | PS18 | HSA | 1810 | | PUMP 1 IN AUTO | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-18102 | | EXISTING |
| 927 | SEWER | PUMP STATION 18 | SS_RH2_PS18_ZIC1811 | SS | RH2 | PS18 | ZIC | 1811 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-18102 | | EXISTING |
| 928 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FQI1812 | SS | RH2 | PS18 | FQI | 1812 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-18102 | | FUTURE |
| 929 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-18102 | | SPARE |
| 930 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAHH1842 | SS | RH2 | PS18 | LAHH | 1842 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 931 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAH1842 | SS | RH2 | PS18 | LAH | 1842 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-18102 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 932 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAL1842 | SS | RH2 | PS18 | LAL | 1842 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 933 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1842 | SS | RH2 | PS18 | YA | 1842 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-18102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 934 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1843 | SS | RH2 | PS18 | YA | 1843 | | IS PANEL INTRUSION | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 935 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1844 | SS | RH2 | PS18 | NI | 1844 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 936 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1845 | SS | RH2 | PS18 | NI | 1845 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 937 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1846 | SS | RH2 | PS18 | NI | 1846 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 938 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1847 | SS | RH2 | PS18 | NI | 1847 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-18102 | | NEW |
| 939 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-18102 | | SPARE |
| 940 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-18102 | | SPARE |
| 941 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YI1820 | SS | RH2 | PS18 | YI | 1820 | | PUMP 2 RUN | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-18103 | | EXISTING |
| 942 | SEWER | PUMP STATION 18 | SS_RH2_PS18_HSA1820 | SS | RH2 | PS18 | HSA | 1820 | | PUMP 2 IN AUTO | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-18103 | | EXISTING |
| 943 | SEWER | PUMP STATION 18 | SS_RH2_PS18_ZIC1821 | SS | RH2 | PS18 | ZIC | 1821 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-18103 | | EXISTING |
| 944 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FQI1822 | SS | RH2 | PS18 | FQI | 1822 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-18103 | | FUTURE |
| 945 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 946 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 947 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 948 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 949 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 950 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 951 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 952 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 953 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 954 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 955 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 956 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-18103 | | SPARE |
| 957 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YI1830 | SS | RH2 | PS18 | YI | 1830 | | PUMP 3 RUN | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-18104 | | EXISTING |
| 958 | SEWER | PUMP STATION 18 | SS_RH2_PS18_HSA1830 | SS | RH2 | PS18 | HSA | 1830 | | PUMP 3 IN AUTO | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-18104 | | EXISTING |
| 959 | SEWER | PUMP STATION 18 | SS_RH2_PS18_ZIC1831 | SS | RH2 | PS18 | ZIC | 1831 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-18104 | | EXISTING |
| 960 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FQI1832 | SS | RH2 | PS18 | FQI | 1832 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-18104 | | FUTURE |
| 961 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FQI1838 | SS | RH2 | PS18 | FQI | 1838 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-18104 | | FUTURE |
| 962 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 963 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 964 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 965 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 966 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 967 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 968 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 969 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 970 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 971 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 972 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-18104 | | SPARE |
| 973 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YC1810 | SS | RH2 | PS18 | YC | 1810 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-18201 | | EXISTING |
| 974 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YC1820 | SS | RH2 | PS18 | YC | 1820 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-18201 | | EXISTING |
| 975 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YC1830 | SS | RH2 | PS18 | YC | 1830 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-18201 | | EXISTING |
| 976 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XC1842 | SS | RH2 | PS18 | XC | 1842 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-18201 | | NEW |
| 977 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 04 | 24 VDC | | I-18201 | | SPARE |
| 978 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 05 | 24 VDC | | I-18201 | | SPARE |
| 979 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 06 | 24 VDC | | I-18201 | | SPARE |
| 980 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 07 | 24 VDC | | I-18201 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 981 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 08 | 24 VDC | | I-18201 | | SPARE |
| 982 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 09 | 24 VDC | | I-18201 | | SPARE |
| 983 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 10 | 24 VDC | | I-18201 | | SPARE |
| 984 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 11 | 24 VDC | | I-18201 | | SPARE |
| 985 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 12 | 24 VDC | | I-18201 | | SPARE |
| 986 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 13 | 24 VDC | | I-18201 | | SPARE |
| 987 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 14 | 24 VDC | | I-18201 | | SPARE |
| 988 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DO | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 07 | 15 | 24 VDC | | I-18201 | | SPARE |
| 989 | SEWER | PUMP STATION 18 | SS_RH2_PS18_II1810 | SS | RH2 | PS18 | II | 1810 | | PUMP 1 AMPS | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-18301 | | EXISTING |
| 990 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FI1812 | SS | RH2 | PS18 | FI | 1812 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 08 | 01 | | X-X GPM | I-18301 | | FUTURE |
| 991 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LI1841 | SS | RH2 | PS18 | LI | 1841 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-18301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 992 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 08 | 03 | | | I-18301 | | SPARE |
| 993 | SEWER | PUMP STATION 18 | SS_RH2_PS18_II1820 | SS | RH2 | PS18 | II | 1820 | | PUMP 2 AMPS | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-18302 | | EXISTING |
| 994 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FI1822 | SS | RH2 | PS18 | FI | 1822 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 09 | 01 | | X-X GPM | I-18302 | | FUTURE |
| 995 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FI1838 | SS | RH2 | PS18 | FI | 1838 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 09 | 02 | | X-X GPM | I-18302 | | FUTURE |
| 996 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 09 | 03 | | | I-18302 | | SPARE |
| 997 | SEWER | PUMP STATION 18 | SS_RH2_PS18_II1830 | SS | RH2 | PS18 | II | 1830 | | PUMP 3 AMPS | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-18303 | | EXISTING |
| 998 | SEWER | PUMP STATION 18 | SS_RH2_PS18_FI1832 | SS | RH2 | PS18 | FI | 1832 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 10 | 01 | | X-X GPM | I-18303 | | FUTURE |
| 999 | SEWER | PUMP STATION 18 | SS_RH2_PS18_PI1835 | SS | RH2 | PS18 | PI | 1835 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 10 | 02 | | X-X PSIG | I-18303 | | FUTURE |
| 1000 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 10 | 03 | | | I-18303 | | SPARE |
| 1001 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LI1842 | SS | RH2 | PS18 | LI | 1842 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-18304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1002 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 11 | 01 | | | I-18304 | | SPARE |
| 1003 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 11 | 02 | | | I-18304 | | SPARE |
| 1004 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_PLC1801 | 00 | 11 | 03 | | | I-18304 | | SPARE |
| 1005 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1892 | SS | RH2 | PS18 | YA | 1892 | | RIO PANEL INTRUSION ALARM | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1006 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1893 | SS | RH2 | PS18 | NI | 1893 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1007 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1894 | SS | RH2 | PS18 | NI | 1894 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1008 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1895 | SS | RH2 | PS18 | NI | 1895 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1009 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XA1896 | SS | RH2 | PS18 | XA | 1896 | | NETWORK SWITCH 3 ALARM | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1010 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1897 | SS | RH2 | PS18 | NI | 1897 | | UPS ON BATTERY | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1011 | SEWER | PUMP STATION 18 | SS_RH2_PS18_XA1897 | SS | RH2 | PS18 | XA | 1897 | | UPS ALARM | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1012 | SEWER | PUMP STATION 18 | SS_RH2_PS18_JAL1897 | SS | RH2 | PS18 | JAL | 1897 | | UPS LOW BATTERY | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-18821 | | NEW |
| 1013 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1014 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1015 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1016 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1017 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1018 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1019 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1020 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-18821 | | SPARE |
| 1021 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YI1890 | SS | RH2 | PS18 | YI | 1890 | | GENERATOR RUN | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-18822 | | EXISTING |
| 1022 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1890A | SS | RH2 | PS18 | YA | 1890 | A | GENERATOR FAIL | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1023 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAL1890 | SS | RH2 | PS18 | LAL | 1890 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1024 | SEWER | PUMP STATION 18 | SS_RH2_PS18_YA1890B | SS | RH2 | PS18 | YA | 1890 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1025 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1891A | SS | RH2 | PS18 | NI | 1891 | A | ATS IN NORMAL | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1026 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1891B | SS | RH2 | PS18 | NI | 1891 | B | ATS IN GENERATOR | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1027 | SEWER | PUMP STATION 18 | SS_RH2_PS18_NI1891C | SS | RH2 | PS18 | NI | 1891 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-18822 | | NEW |
| 1028 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LAH1890 | SS | RH2 | PS18 | LAH | 1890 | | GENERATOR VAULT FLOOD | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-18822 | | EXISTING |
| 1029 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1030 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1031 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1032 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1033 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1034 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1035 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1036 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | DI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-18822 | | SPARE |
| 1037 | SEWER | PUMP STATION 18 | SS_RH2_PS18_LI1890 | SS | RH2 | PS18 | LI | 1890 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-18831 | | FUTURE |
| 1038 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 04 | 01 | 4-20 mA | | I-18831 | | SPARE |
| 1039 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 04 | 02 | 4-20 mA | | I-18831 | | SPARE |
| 1040 | SEWER | PUMP STATION 18 | ___ | | | | | | | SPARE | AI | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_RIO1801 | 00 | 04 | 03 | 4-20 mA | | I-18831 | | SPARE |
| 1041 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1900 | SS | RH2 | PS19 | YA | 1900 | | STATION INTRUSION ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-19101 | | EXISTING |
| 1042 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1901 | SS | RH2 | PS19 | YA | 1901 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1043 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1902 | SS | RH2 | PS19 | NI | 1902 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1044 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1903 | SS | RH2 | PS19 | NI | 1903 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1045 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1904 | SS | RH2 | PS19 | NI | 1904 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1046 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XA1905A | SS | RH2 | PS19 | XA | 1905 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1047 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XA1905B | SS | RH2 | PS19 | XA | 1905 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1048 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1906 | SS | RH2 | PS19 | NI | 1906 | | UPS ON BATTERY | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1049 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XA1906 | SS | RH2 | PS19 | XA | 1906 | | UPS ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1050 | SEWER | PUMP STATION 19 | SS_RH2_PS19_JAL1906 | SS | RH2 | PS19 | JAL | 1906 | | UPS LOW BATTERY | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1051 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LAH1907 | SS | RH2 | PS19 | LAH | 1907 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-19101 | | EXISTING |
| 1052 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FAL1961 | SS | RH2 | PS19 | FAL | 1961 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-19101 | | NEW |
| 1053 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-19101 | | SPARE |
| 1054 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-19101 | | SPARE |
| 1055 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-19101 | | SPARE |
| 1056 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-19101 | | SPARE |
| 1057 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YI1910 | SS | RH2 | PS19 | YI | 1910 | | PUMP 1 RUN | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1058 | SEWER | PUMP STATION 19 | SS_RH2_PS19_HSA1910 | SS | RH2 | PS19 | HSA | 1910 | | PUMP 1 IN AUTO | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1059 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZIC1911 | SS | RH2 | PS19 | ZIC | 1911 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1060 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FQI1912 | SS | RH2 | PS19 | FQI | 1912 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-19102 | | FUTURE |
| 1061 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1910 | SS | RH2 | PS19 | YA | 1910 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1062 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LAHH1942 | SS | RH2 | PS19 | LAHH | 1942 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1063 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LAH1942 | SS | RH2 | PS19 | LAH | 1942 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1064 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LAL1942 | SS | RH2 | PS19 | LAL | 1942 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-19102 | | EXISTING |
| 1065 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1942 | SS | RH2 | PS19 | YA | 1942 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-19102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1066 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1943 | SS | RH2 | PS19 | YA | 1943 | | IS PANEL INTRUSION | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-19102 | | NEW |
| 1067 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1944 | SS | RH2 | PS19 | NI | 1944 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-19102 | | NEW |
| 1068 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1945 | SS | RH2 | PS19 | NI | 1945 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-19102 | | NEW |
| 1069 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1946 | SS | RH2 | PS19 | NI | 1946 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-19102 | | NEW |
| 1070 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1947 | SS | RH2 | PS19 | NI | 1947 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-19102 | | NEW |
| 1071 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-19102 | | SPARE |
| 1072 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-19102 | | SPARE |
| 1073 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YI1920 | SS | RH2 | PS19 | YI | 1920 | | PUMP 2 RUN | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-19103 | | EXISTING |
| 1074 | SEWER | PUMP STATION 19 | SS_RH2_PS19_HSA1920 | SS | RH2 | PS19 | HSA | 1920 | | PUMP 2 IN AUTO | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-19103 | | EXISTING |
| 1075 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZIC1921 | SS | RH2 | PS19 | ZIC | 1921 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-19103 | | EXISTING |
| 1076 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FQI1922 | SS | RH2 | PS19 | FQI | 1922 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-19103 | | FUTURE |
| 1077 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1078 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1079 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1080 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1081 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1082 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1083 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1084 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1085 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1086 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1087 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1088 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-19103 | | SPARE |
| 1089 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YI1930 | SS | RH2 | PS19 | YI | 1930 | | PUMP 3 RUN | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-19104 | | EXISTING |
| 1090 | SEWER | PUMP STATION 19 | SS_RH2_PS19_HSA1930 | SS | RH2 | PS19 | HSA | 1930 | | PUMP 3 IN AUTO | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-19104 | | EXISTING |
| 1091 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZIC1931 | SS | RH2 | PS19 | ZIC | 1931 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-19104 | | EXISTING |
| 1092 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FQI1932 | SS | RH2 | PS19 | FQI | 1932 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-19104 | | FUTURE |
| 1093 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FQI1938 | SS | RH2 | PS19 | FQI | 1938 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-19104 | | FUTURE |
| 1094 | SEWER | PUMP STATION 19 | SS_RH2_PS19_HSR1950 | SS | RH2 | PS19 | HSR | 1950 | | FLUSH VALVE IN REMOTE (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-19104 | | FUTURE |
| 1095 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZIO1950 | SS | RH2 | PS19 | ZIO | 1950 | | FLUSH VALVE OPEN (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-19104 | | FUTURE |
| 1096 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZIC1950 | SS | RH2 | PS19 | ZIC | 1950 | | FLUSH VALVE CLOSED (FUTURE) | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-19104 | | FUTURE |
| 1097 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1098 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1099 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1100 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1101 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1102 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1103 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1104 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-19104 | | SPARE |
| 1105 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YC1910 | SS | RH2 | PS19 | YC | 1910 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-19201 | | EXISTING |
| 1106 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YC1920 | SS | RH2 | PS19 | YC | 1920 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-19201 | | EXISTING |
| 1107 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YC1930 | SS | RH2 | PS19 | YC | 1930 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-19201 | | EXISTING |
| 1108 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZCO1950 | SS | RH2 | PS19 | ZCO | 1950 | | FLUSH VALVE CALL TO OPEN (FUTURE) | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO OPEN | I-19201 | | FUTURE |
| 1109 | SEWER | PUMP STATION 19 | SS_RH2_PS19_ZCC1950 | SS | RH2 | PS19 | ZCC | 1950 | | FLUSH VALVE CALL TO CLOSE (FUTURE) | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO CLOSE | I-19201 | | FUTURE |
| 1110 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XC1942 | SS | RH2 | PS19 | XC | 1942 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 05 | 24 VDC | ENERGIZE TO RESET | I-19201 | | NEW |
| 1111 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 06 | 24 VDC | | I-19201 | | SPARE |
| 1112 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 07 | 24 VDC | | I-19201 | | SPARE |
| 1113 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 08 | 24 VDC | | I-19201 | | SPARE |
| 1114 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 09 | 24 VDC | | I-19201 | | SPARE |
| 1115 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 10 | 24 VDC | | I-19201 | | SPARE |
| 1116 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 11 | 24 VDC | | I-19201 | | SPARE |
| 1117 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 12 | 24 VDC | | I-19201 | | SPARE |
| 1118 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 13 | 24 VDC | | I-19201 | | SPARE |
| 1119 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 14 | 24 VDC | | I-19201 | | SPARE |
| 1120 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DO | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 07 | 15 | 24 VDC | | I-19201 | | SPARE |
| 1121 | SEWER | PUMP STATION 19 | SS_RH2_PS19_II1910 | SS | RH2 | PS19 | II | 1910 | | PUMP 1 AMPS | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-19301 | | EXISTING |
| 1122 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FI1912 | SS | RH2 | PS19 | FI | 1912 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 08 | 01 | | X-X GPM | I-19301 | | FUTURE |
| 1123 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LI1941 | SS | RH2 | PS19 | LI | 1941 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-19301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 1124 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 08 | 03 | | | I-19301 | | SPARE |
| 1125 | SEWER | PUMP STATION 19 | SS_RH2_PS19_II1920 | SS | RH2 | PS19 | II | 1920 | | PUMP 2 AMPS | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-19302 | | EXISTING |
| 1126 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FI1922 | SS | RH2 | PS19 | FI | 1922 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 09 | 01 | | X-X GPM | I-19302 | | FUTURE |
| 1127 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FI1938 | SS | RH2 | PS19 | FI | 1938 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 09 | 02 | | X-X GPM | I-19302 | | FUTURE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1128 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 09 | 03 | | | I-19302 | | SPARE |
| 1129 | SEWER | PUMP STATION 19 | SS_RH2_PS19_II1930 | SS | RH2 | PS19 | II | 1930 | | PUMP 3 AMPS | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-19303 | | EXISTING |
| 1130 | SEWER | PUMP STATION 19 | SS_RH2_PS19_FI1932 | SS | RH2 | PS19 | FI | 1932 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 10 | 01 | | X-X GPM | I-19303 | | FUTURE |
| 1131 | SEWER | PUMP STATION 19 | SS_RH2_PS19_PI1935 | SS | RH2 | PS19 | PI | 1935 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 10 | 02 | | X-X PSIG | I-19303 | | FUTURE |
| 1132 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 10 | 03 | | | I-19303 | | SPARE |
| 1133 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LI1942 | SS | RH2 | PS19 | LI | 1942 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-19304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1134 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 11 | 01 | | | I-19304 | | SPARE |
| 1135 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 11 | 02 | | | I-19304 | | SPARE |
| 1136 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_PLC1901 | 00 | 11 | 03 | | | I-19304 | | SPARE |
| 1137 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1992 | SS | RH2 | PS19 | YA | 1992 | | RIO PANEL INTRUSION ALARM | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1138 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1993 | SS | RH2 | PS19 | NI | 1993 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1139 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1994 | SS | RH2 | PS19 | NI | 1994 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1140 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1995 | SS | RH2 | PS19 | NI | 1995 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1141 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XA1996 | SS | RH2 | PS19 | XA | 1996 | | NETWORK SWITCH 3 ALARM | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1142 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1997 | SS | RH2 | PS19 | NI | 1997 | | UPS ON BATTERY | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1143 | SEWER | PUMP STATION 19 | SS_RH2_PS19_XA1997 | SS | RH2 | PS19 | XA | 1997 | | UPS ALARM | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1144 | SEWER | PUMP STATION 19 | SS_RH2_PS19_JAL1997 | SS | RH2 | PS19 | JAL | 1997 | | UPS LOW BATTERY | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-19821 | | NEW |
| 1145 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1146 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1147 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1148 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1149 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1150 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1151 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1152 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-19821 | | SPARE |
| 1153 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YI1990 | SS | RH2 | PS19 | YI | 1990 | | GENERATOR RUN | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-19822 | | EXISTING |
| 1154 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1990A | SS | RH2 | PS19 | YA | 1990 | A | GENERATOR FAIL | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1155 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LAL1990 | SS | RH2 | PS19 | LAL | 1990 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1156 | SEWER | PUMP STATION 19 | SS_RH2_PS19_YA1990B | SS | RH2 | PS19 | YA | 1990 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1157 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1991A | SS | RH2 | PS19 | NI | 1991 | A | ATS IN NORMAL | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1158 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1991B | SS | RH2 | PS19 | NI | 1991 | B | ATS IN GENERATOR | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1159 | SEWER | PUMP STATION 19 | SS_RH2_PS19_NI1991C | SS | RH2 | PS19 | NI | 1991 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-19822 | | NEW |
| 1160 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1161 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1162 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1163 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1164 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1165 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1166 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1167 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1168 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | DI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-19822 | | SPARE |
| 1169 | SEWER | PUMP STATION 19 | SS_RH2_PS19_LI1990 | SS | RH2 | PS19 | LI | 1990 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-19831 | | FUTURE |
| 1170 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 04 | 01 | 4-20 mA | | I-19831 | | SPARE |
| 1171 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 04 | 02 | 4-20 mA | | I-19831 | | SPARE |
| 1172 | SEWER | PUMP STATION 19 | ___ | | | | | | | SPARE | AI | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_RIO1901 | 00 | 04 | 03 | 4-20 mA | | I-19831 | | SPARE |
| 1173 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2000 | SS | RH2 | PS20 | YA | 2000 | | STATION INTRUSION ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-20101 | | EXISTING |
| 1174 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2001 | SS | RH2 | PS20 | YA | 2001 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1175 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2002 | SS | RH2 | PS20 | NI | 2002 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1176 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2003 | SS | RH2 | PS20 | NI | 2003 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-20101 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1177 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2004 | SS | RH2 | PS20 | NI | 2004 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1178 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XA2005A | SS | RH2 | PS20 | XA | 2005 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1179 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XA2005B | SS | RH2 | PS20 | XA | 2005 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1180 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2006 | SS | RH2 | PS20 | NI | 2006 | | UPS ON BATTERY | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1181 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XA2006 | SS | RH2 | PS20 | XA | 2006 | | UPS ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1182 | SEWER | PUMP STATION 20 | SS_RH2_PS20_JAL2006 | SS | RH2 | PS20 | JAL | 2006 | | UPS LOW BATTERY | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1183 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAH2007 | SS | RH2 | PS20 | LAH | 2007 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-20101 | | EXISTING |
| 1184 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FAL2061 | SS | RH2 | PS20 | FAL | 2061 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-20101 | | NEW |
| 1185 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-20101 | | SPARE |
| 1186 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-20101 | | SPARE |
| 1187 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-20101 | | SPARE |
| 1188 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-20101 | | SPARE |
| 1189 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YI2010 | SS | RH2 | PS20 | YI | 2010 | | PUMP 1 RUN | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1190 | SEWER | PUMP STATION 20 | SS_RH2_PS20_HSA2010 | SS | RH2 | PS20 | HSA | 2010 | | PUMP 1 IN AUTO | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1191 | SEWER | PUMP STATION 20 | SS_RH2_PS20_ZIC2011 | SS | RH2 | PS20 | ZIC | 2011 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1192 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FQI2012 | SS | RH2 | PS20 | FQI | 2012 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-20102 | | FUTURE |
| 1193 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2010 | SS | RH2 | PS20 | YA | 2010 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1194 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAHH2042 | SS | RH2 | PS20 | LAHH | 2042 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1195 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAH2042 | SS | RH2 | PS20 | LAH | 2042 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1196 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAL2042 | SS | RH2 | PS20 | LAL | 2042 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-20102 | | EXISTING |
| 1197 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2042 | SS | RH2 | PS20 | YA | 2042 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-20102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1198 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2043 | SS | RH2 | PS20 | YA | 2043 | | IS PANEL INTRUSION | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-20102 | | NEW |
| 1199 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2044 | SS | RH2 | PS20 | NI | 2044 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-20102 | | NEW |
| 1200 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2045 | SS | RH2 | PS20 | NI | 2045 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-20102 | | NEW |
| 1201 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2046 | SS | RH2 | PS20 | NI | 2046 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-20102 | | NEW |
| 1202 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2047 | SS | RH2 | PS20 | NI | 2047 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-20102 | | NEW |
| 1203 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-20102 | | SPARE |
| 1204 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-20102 | | SPARE |
| 1205 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YI2020 | SS | RH2 | PS20 | YI | 2020 | | PUMP 2 RUN | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-20103 | | EXISTING |
| 1206 | SEWER | PUMP STATION 20 | SS_RH2_PS20_HSA2020 | SS | RH2 | PS20 | HSA | 2020 | | PUMP 2 IN AUTO | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-20103 | | EXISTING |
| 1207 | SEWER | PUMP STATION 20 | SS_RH2_PS20_ZIC2021 | SS | RH2 | PS20 | ZIC | 2021 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-20103 | | EXISTING |
| 1208 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FQI2022 | SS | RH2 | PS20 | FQI | 2022 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-20103 | | FUTURE |
| 1209 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1210 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1211 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1212 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1213 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1214 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1215 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1216 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1217 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1218 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1219 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1220 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-20103 | | SPARE |
| 1221 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YI2030 | SS | RH2 | PS20 | YI | 2030 | | PUMP 3 RUN | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-20104 | | EXISTING |
| 1222 | SEWER | PUMP STATION 20 | SS_RH2_PS20_HSA2030 | SS | RH2 | PS20 | HSA | 2030 | | PUMP 3 IN AUTO | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-20104 | | EXISTING |
| 1223 | SEWER | PUMP STATION 20 | SS_RH2_PS20_ZIC2031 | SS | RH2 | PS20 | ZIC | 2031 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-20104 | | EXISTING |
| 1224 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FQI2032 | SS | RH2 | PS20 | FQI | 2032 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-20104 | | FUTURE |
| 1225 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FQI2038 | SS | RH2 | PS20 | FQI | 2038 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-20104 | | FUTURE |

SECTION 40 61 93 ATTACHMENT A
PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1226 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1227 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1228 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1229 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1230 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1231 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1232 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1233 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1234 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1235 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1236 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-20104 | | SPARE |
| 1237 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YC2010 | SS | RH2 | PS20 | YC | 2010 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-20201 | | EXISTING |
| 1238 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YC2020 | SS | RH2 | PS20 | YC | 2020 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-20201 | | EXISTING |
| 1239 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YC2030 | SS | RH2 | PS20 | YC | 2030 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-20201 | | EXISTING |
| 1240 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XC2042 | SS | RH2 | PS20 | XC | 2042 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-20201 | | NEW |
| 1241 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 04 | 24 VDC | | I-20201 | | SPARE |
| 1242 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 05 | 24 VDC | | I-20201 | | SPARE |
| 1243 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 06 | 24 VDC | | I-20201 | | SPARE |
| 1244 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 07 | 24 VDC | | I-20201 | | SPARE |
| 1245 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 08 | 24 VDC | | I-20201 | | SPARE |
| 1246 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 09 | 24 VDC | | I-20201 | | SPARE |
| 1247 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 10 | 24 VDC | | I-20201 | | SPARE |
| 1248 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 11 | 24 VDC | | I-20201 | | SPARE |
| 1249 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 12 | 24 VDC | | I-20201 | | SPARE |
| 1250 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 13 | 24 VDC | | I-20201 | | SPARE |
| 1251 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 14 | 24 VDC | | I-20201 | | SPARE |
| 1252 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DO | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 07 | 15 | 24 VDC | | I-20201 | | SPARE |
| 1253 | SEWER | PUMP STATION 20 | SS_RH2_PS20_II2010 | SS | RH2 | PS20 | II | 2010 | | PUMP 1 AMPS | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-20301 | | EXISTING |
| 1254 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FI2012 | SS | RH2 | PS20 | FI | 2012 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 08 | 01 | | X-X GPM | I-20301 | | FUTURE |
| 1255 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LI2041 | SS | RH2 | PS20 | LI | 2041 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-20301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |
| 1256 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 08 | 03 | | | I-20301 | | SPARE |
| 1257 | SEWER | PUMP STATION 20 | SS_RH2_PS20_II2020 | SS | RH2 | PS20 | II | 2020 | | PUMP 2 AMPS | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-20302 | | EXISTING |
| 1258 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FI2022 | SS | RH2 | PS20 | FI | 2022 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 09 | 01 | | X-X GPM | I-20302 | | FUTURE |
| 1259 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FI2038 | SS | RH2 | PS20 | FI | 2038 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 09 | 02 | | X-X GPM | I-20302 | | FUTURE |
| 1260 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 09 | 03 | | | I-20302 | | SPARE |
| 1261 | SEWER | PUMP STATION 20 | SS_RH2_PS20_II2030 | SS | RH2 | PS20 | II | 2030 | | PUMP 3 AMPS | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-20303 | | EXISTING |
| 1262 | SEWER | PUMP STATION 20 | SS_RH2_PS20_FI2032 | SS | RH2 | PS20 | FI | 2032 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 10 | 01 | | X-X GPM | I-20303 | | FUTURE |
| 1263 | SEWER | PUMP STATION 20 | SS_RH2_PS20_PI2035 | SS | RH2 | PS20 | PI | 2035 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 10 | 02 | | X-X PSIG | I-20303 | | FUTURE |
| 1264 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 10 | 03 | | | I-20303 | | SPARE |
| 1265 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LI2042 | SS | RH2 | PS20 | LI | 2042 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-20304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1266 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 11 | 01 | | | I-20304 | | SPARE |
| 1267 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 11 | 02 | | | I-20304 | | SPARE |
| 1268 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_PLC2001 | 00 | 11 | 03 | | | I-20304 | | SPARE |
| 1269 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2092 | SS | RH2 | PS20 | YA | 2092 | | RIO PANEL INTRUSION ALARM | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1270 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2093 | SS | RH2 | PS20 | NI | 2093 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1271 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2094 | SS | RH2 | PS20 | NI | 2094 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1272 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2095 | SS | RH2 | PS20 | NI | 2095 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1273 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XA2096 | SS | RH2 | PS20 | XA | 2096 | | NETWORK SWITCH 3 ALARM | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1274 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2097 | SS | RH2 | PS20 | NI | 2097 | | UPS ON BATTERY | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-20821 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1275 | SEWER | PUMP STATION 20 | SS_RH2_PS20_XA2097 | SS | RH2 | PS20 | XA | 2097 | | UPS ALARM | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1276 | SEWER | PUMP STATION 20 | SS_RH2_PS20_JAL2097 | SS | RH2 | PS20 | JAL | 2097 | | UPS LOW BATTERY | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-20821 | | NEW |
| 1277 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1278 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1279 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1280 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1281 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1282 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1283 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1284 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-20821 | | SPARE |
| 1285 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YI2090 | SS | RH2 | PS20 | YI | 2090 | | GENERATOR RUN | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-20822 | | EXISTING |
| 1286 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2090A | SS | RH2 | PS20 | YA | 2090 | A | GENERATOR FAIL | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-20822 | | EXISTING |
| 1287 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAL2090 | SS | RH2 | PS20 | LAL | 2090 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-20822 | | NEW |
| 1288 | SEWER | PUMP STATION 20 | SS_RH2_PS20_YA2090B | SS | RH2 | PS20 | YA | 2090 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-20822 | | NEW |
| 1289 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2091A | SS | RH2 | PS20 | NI | 2091 | A | ATS IN NORMAL | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-20822 | | NEW |
| 1290 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2091B | SS | RH2 | PS20 | NI | 2091 | B | ATS IN GENERATOR | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-20822 | | NEW |
| 1291 | SEWER | PUMP STATION 20 | SS_RH2_PS20_NI2091C | SS | RH2 | PS20 | NI | 2091 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-20822 | | NEW |
| 1292 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LAH2090 | SS | RH2 | PS20 | LAH | 2090 | | GENERATOR VAULT FLOOD | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-20822 | | EXISTING |
| 1293 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1294 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1295 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1296 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1297 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1298 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1299 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1300 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | DI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-20822 | | SPARE |
| 1301 | SEWER | PUMP STATION 20 | SS_RH2_PS20_LI2090 | SS | RH2 | PS20 | LI | 2090 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-20831 | | FUTURE |
| 1302 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 04 | 01 | 4-20 mA | | I-20831 | | SPARE |
| 1303 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 04 | 02 | 4-20 mA | | I-20831 | | SPARE |
| 1304 | SEWER | PUMP STATION 20 | ___ | | | | | | | SPARE | AI | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_RIO2001 | 00 | 04 | 03 | 4-20 mA | | I-20831 | | SPARE |
| 1305 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2100 | SS | RH2 | PS21 | YA | 2100 | | STATION INTRUSION ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-21101 | | EXISTING |
| 1306 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2101 | SS | RH2 | PS21 | YA | 2101 | | PLC PANEL INTRUSION ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1307 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2102 | SS | RH2 | PS21 | NI | 2102 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1308 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2103 | SS | RH2 | PS21 | NI | 2103 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1309 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2104 | SS | RH2 | PS21 | NI | 2104 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1310 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XA2105A | SS | RH2 | PS21 | XA | 2105 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1311 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XA2105B | SS | RH2 | PS21 | XA | 2105 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1312 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2106 | SS | RH2 | PS21 | NI | 2106 | | UPS ON BATTERY | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1313 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XA2106 | SS | RH2 | PS21 | XA | 2106 | | UPS ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1314 | SEWER | PUMP STATION 21 | SS_RH2_PS21_JAL2106 | SS | RH2 | PS21 | JAL | 2106 | | UPS LOW BATTERY | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1315 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAH2107 | SS | RH2 | PS21 | LAH | 2107 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-21101 | | EXISTING |
| 1316 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FAL2161 | SS | RH2 | PS21 | FAL | 2161 | | EXHAUST FAN LOW FLOW | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-21101 | | NEW |
| 1317 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-21101 | | SPARE |
| 1318 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-21101 | | SPARE |
| 1319 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-21101 | | SPARE |
| 1320 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-21101 | | SPARE |
| 1321 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YI2110 | SS | RH2 | PS21 | YI | 2110 | | PUMP 1 RUN | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-21102 | | EXISTING |
| 1322 | SEWER | PUMP STATION 21 | SS_RH2_PS21_HSA2110 | SS | RH2 | PS21 | HSA | 2110 | | PUMP 1 IN AUTO | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-21102 | | EXISTING |
| 1323 | SEWER | PUMP STATION 21 | SS_RH2_PS21_ZIC2111 | SS | RH2 | PS21 | ZIC | 2111 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-21102 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1324 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FQI2112 | SS | RH2 | PS21 | FQI | 2112 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-21102 | | FUTURE |
| 1325 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2110 | SS | RH2 | PS21 | YA | 2110 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-21102 | | EXISTING |
| 1326 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAHH2142 | SS | RH2 | PS21 | LAHH | 2142 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1327 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAH2142 | SS | RH2 | PS21 | LAH | 2142 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1328 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAL2142 | SS | RH2 | PS21 | LAL | 2142 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1329 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2142 | SS | RH2 | PS21 | YA | 2142 | | FOGROD LEVEL FAULT | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-21102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1330 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2143 | SS | RH2 | PS21 | YA | 2143 | | IS PANEL INTRUSION | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1331 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2144 | SS | RH2 | PS21 | NI | 2144 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1332 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2145 | SS | RH2 | PS21 | NI | 2145 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1333 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2146 | SS | RH2 | PS21 | NI | 2146 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1334 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2147 | SS | RH2 | PS21 | NI | 2147 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-21102 | | NEW |
| 1335 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-21102 | | SPARE |
| 1336 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-21102 | | SPARE |
| 1337 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YI2120 | SS | RH2 | PS21 | YI | 2120 | | PUMP 2 RUN | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-21103 | | EXISTING |
| 1338 | SEWER | PUMP STATION 21 | SS_RH2_PS21_HSA2120 | SS | RH2 | PS21 | HSA | 2120 | | PUMP 2 IN AUTO | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-21103 | | EXISTING |
| 1339 | SEWER | PUMP STATION 21 | SS_RH2_PS21_ZIC2121 | SS | RH2 | PS21 | ZIC | 2121 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-21103 | | EXISTING |
| 1340 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FQI2122 | SS | RH2 | PS21 | FQI | 2122 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-21103 | | FUTURE |
| 1341 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1342 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1343 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1344 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1345 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1346 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1347 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1348 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1349 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1350 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1351 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1352 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-21103 | | SPARE |
| 1353 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YI2130 | SS | RH2 | PS21 | YI | 2130 | | PUMP 3 RUN | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-21104 | | EXISTING |
| 1354 | SEWER | PUMP STATION 21 | SS_RH2_PS21_HSA2130 | SS | RH2 | PS21 | HSA | 2130 | | PUMP 3 IN AUTO | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-21104 | | EXISTING |
| 1355 | SEWER | PUMP STATION 21 | SS_RH2_PS21_ZIC2131 | SS | RH2 | PS21 | ZIC | 2131 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-21104 | | EXISTING |
| 1356 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FQI2132 | SS | RH2 | PS21 | FQI | 2132 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-21104 | | FUTURE |
| 1357 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FQI2138 | SS | RH2 | PS21 | FQI | 2138 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-21104 | | FUTURE |
| 1358 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1359 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1360 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1361 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1362 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1363 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1364 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1365 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1366 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1367 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1368 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-21104 | | SPARE |
| 1369 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YC2110 | SS | RH2 | PS21 | YC | 2110 | | PUMP 1 CALL TO RUN | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-21201 | | EXISTING |
| 1370 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YC2120 | SS | RH2 | PS21 | YC | 2120 | | PUMP 2 CALL TO RUN | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-21201 | | EXISTING |
| 1371 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YC2130 | SS | RH2 | PS21 | YC | 2130 | | PUMP 3 CALL TO RUN | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-21201 | | EXISTING |
| 1372 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XC2142 | SS | RH2 | PS21 | XC | 2142 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-21201 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1373 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 04 | 24 VDC | | I-21201 | | SPARE |
| 1374 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 05 | 24 VDC | | I-21201 | | SPARE |
| 1375 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 06 | 24 VDC | | I-21201 | | SPARE |
| 1376 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 07 | 24 VDC | | I-21201 | | SPARE |
| 1377 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 08 | 24 VDC | | I-21201 | | SPARE |
| 1378 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 09 | 24 VDC | | I-21201 | | SPARE |
| 1379 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 10 | 24 VDC | | I-21201 | | SPARE |
| 1380 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 11 | 24 VDC | | I-21201 | | SPARE |
| 1381 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 12 | 24 VDC | | I-21201 | | SPARE |
| 1382 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 13 | 24 VDC | | I-21201 | | SPARE |
| 1383 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 14 | 24 VDC | | I-21201 | | SPARE |
| 1384 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DO | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 07 | 15 | 24 VDC | | I-21201 | | SPARE |
| 1385 | SEWER | PUMP STATION 21 | SS_RH2_PS21_II2110 | SS | RH2 | PS21 | II | 2110 | | PUMP 1 AMPS | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-21301 | | EXISTING |
| 1386 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FI2112 | SS | RH2 | PS21 | FI | 2112 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 08 | 01 | | X-X GPM | I-21301 | | FUTURE |
| 1387 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LI2141 | SS | RH2 | PS21 | LI | 2141 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-21301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 1388 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 08 | 03 | | | I-21301 | | SPARE |
| 1389 | SEWER | PUMP STATION 21 | SS_RH2_PS21_II2120 | SS | RH2 | PS21 | II | 2120 | | PUMP 2 AMPS | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-21302 | | EXISTING |
| 1390 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FI2122 | SS | RH2 | PS21 | FI | 2122 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 09 | 01 | | X-X GPM | I-21302 | | FUTURE |
| 1391 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FI2138 | SS | RH2 | PS21 | FI | 2138 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 09 | 02 | | X-X GPM | I-21302 | | FUTURE |
| 1392 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 09 | 03 | | | I-21302 | | SPARE |
| 1393 | SEWER | PUMP STATION 21 | SS_RH2_PS21_II2130 | SS | RH2 | PS21 | II | 2130 | | PUMP 3 AMPS | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-21303 | | EXISTING |
| 1394 | SEWER | PUMP STATION 21 | SS_RH2_PS21_FI2132 | SS | RH2 | PS21 | FI | 2132 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 10 | 01 | | X-X GPM | I-21303 | | FUTURE |
| 1395 | SEWER | PUMP STATION 21 | SS_RH2_PS21_PI2135 | SS | RH2 | PS21 | PI | 2135 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 10 | 02 | | X-X PSIG | I-21303 | | FUTURE |
| 1396 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 10 | 03 | | | I-21303 | | SPARE |
| 1397 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LI2142 | SS | RH2 | PS21 | LI | 2142 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-21304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1398 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 11 | 01 | | | I-21304 | | SPARE |
| 1399 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 11 | 02 | | | I-21304 | | SPARE |
| 1400 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_PLC2101 | 00 | 11 | 03 | | | I-21304 | | SPARE |
| 1401 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2192 | SS | RH2 | PS21 | YA | 2192 | | RIO PANEL INTRUSION ALARM | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1402 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2193 | SS | RH2 | PS21 | NI | 2193 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1403 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2194 | SS | RH2 | PS21 | NI | 2194 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1404 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2195 | SS | RH2 | PS21 | NI | 2195 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1405 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XA2196 | SS | RH2 | PS21 | XA | 2196 | | NETWORK SWITCH 3 ALARM | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1406 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2197 | SS | RH2 | PS21 | NI | 2197 | | UPS ON BATTERY | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1407 | SEWER | PUMP STATION 21 | SS_RH2_PS21_XA2197 | SS | RH2 | PS21 | XA | 2197 | | UPS ALARM | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1408 | SEWER | PUMP STATION 21 | SS_RH2_PS21_JAL2197 | SS | RH2 | PS21 | JAL | 2197 | | UPS LOW BATTERY | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-21821 | | NEW |
| 1409 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1410 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1411 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1412 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1413 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1414 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1415 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1416 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-21821 | | SPARE |
| 1417 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YI2190 | SS | RH2 | PS21 | YI | 2190 | | GENERATOR RUN | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-21822 | | EXISTING |
| 1418 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2190A | SS | RH2 | PS21 | YA | 2190 | A | GENERATOR FAIL | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-21822 | | NEW |
| 1419 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAL2190 | SS | RH2 | PS21 | LAL | 2190 | | GENERATOR LOW FUEL ALARM | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-21822 | | EXISTING |
| 1420 | SEWER | PUMP STATION 21 | SS_RH2_PS21_YA2190B | SS | RH2 | PS21 | YA | 2190 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-21822 | | NEW |
| 1421 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2191A | SS | RH2 | PS21 | NI | 2191 | A | ATS IN NORMAL | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-21822 | | EXISTING |

SECTION 40 61 93 ATTACHMENT A
PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1422 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2191B | SS | RH2 | PS21 | NI | 2191 | B | ATS IN GENERATOR | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-21822 | | NEW |
| 1423 | SEWER | PUMP STATION 21 | SS_RH2_PS21_NI2191C | SS | RH2 | PS21 | NI | 2191 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-21822 | | NEW |
| 1424 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LAH2190 | SS | RH2 | PS21 | LAH | 2190 | | GENERATOR VAULT FLOOD | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-21822 | | EXISTING |
| 1425 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1426 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1427 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1428 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1429 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1430 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1431 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1432 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | DI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-21822 | | SPARE |
| 1433 | SEWER | PUMP STATION 21 | SS_RH2_PS21_LI2190 | SS | RH2 | PS21 | LI | 2190 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-21831 | | FUTURE |
| 1434 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 04 | 01 | 4-20 mA | | I-21831 | | SPARE |
| 1435 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 04 | 02 | 4-20 mA | | I-21831 | | SPARE |
| 1436 | SEWER | PUMP STATION 21 | ___ | | | | | | | SPARE | AI | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_RIO2101 | 00 | 04 | 03 | 4-20 mA | | I-21831 | | SPARE |
| 1437 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2200 | SS | RH1 | PS22 | YA | 2200 | | STATION INTRUSION ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-22101 | | EXISTING |
| 1438 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2201 | SS | RH1 | PS22 | YA | 2201 | | PLC PANEL INTRUSION ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1439 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2202 | SS | RH1 | PS22 | NI | 2202 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1440 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2203 | SS | RH1 | PS22 | NI | 2203 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1441 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2204 | SS | RH1 | PS22 | NI | 2204 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1442 | SEWER | PUMP STATION 22 | SS_RH1_PS22_XA2205A | SS | RH1 | PS22 | XA | 2205 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1443 | SEWER | PUMP STATION 22 | SS_RH1_PS22_XA2205B | SS | RH1 | PS22 | XA | 2205 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1444 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2206 | SS | RH1 | PS22 | NI | 2206 | | UPS ON BATTERY | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1445 | SEWER | PUMP STATION 22 | SS_RH1_PS22_XA2206 | SS | RH1 | PS22 | XA | 2206 | | UPS ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1446 | SEWER | PUMP STATION 22 | SS_RH1_PS22_JAL2206 | SS | RH1 | PS22 | JAL | 2206 | | UPS LOW BATTERY | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1447 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAH2207 | SS | RH1 | PS22 | LAH | 2207 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-22101 | | EXISTING |
| 1448 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FAL2261 | SS | RH1 | PS22 | FAL | 2261 | | EXHAUST FAN LOW FLOW | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-22101 | | NEW |
| 1449 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-22101 | | SPARE |
| 1450 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-22101 | | SPARE |
| 1451 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-22101 | | SPARE |
| 1452 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-22101 | | SPARE |
| 1453 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YI2210 | SS | RH1 | PS22 | YI | 2210 | | PUMP 1 RUN | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-22102 | | EXISTING |
| 1454 | SEWER | PUMP STATION 22 | SS_RH1_PS22_HSA2210 | SS | RH1 | PS22 | HSA | 2210 | | PUMP 1 IN AUTO | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-22102 | | EXISTING |
| 1455 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZIC2211 | SS | RH1 | PS22 | ZIC | 2211 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-22102 | | EXISTING |
| 1456 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FQI2212 | SS | RH1 | PS22 | FQI | 2212 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-22102 | | FUTURE |
| 1457 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2210 | SS | RH1 | PS22 | YA | 2210 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-22102 | | EXISTING |
| 1458 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAHH2242 | SS | RH1 | PS22 | LAHH | 2242 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1459 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAH2242 | SS | RH1 | PS22 | LAH | 2242 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1460 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAL2242 | SS | RH1 | PS22 | LAL | 2242 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1461 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2242 | SS | RH1 | PS22 | YA | 2242 | | FOGROD LEVEL FAULT | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-22102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1462 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2243 | SS | RH1 | PS22 | YA | 2243 | | IS PANEL INTRUSION | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1463 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2244 | SS | RH1 | PS22 | NI | 2244 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1464 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2245 | SS | RH1 | PS22 | NI | 2245 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1465 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2246 | SS | RH1 | PS22 | NI | 2246 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1466 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2247 | SS | RH1 | PS22 | NI | 2247 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-22102 | | NEW |
| 1467 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-22102 | | SPARE |
| 1468 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-22102 | | SPARE |
| 1469 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YI2220 | SS | RH1 | PS22 | YI | 2220 | | PUMP 2 RUN | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |
| 1470 | SEWER | PUMP STATION 22 | SS_RH1_PS22_HSA2220 | SS | RH1 | PS22 | HSA | 2220 | | PUMP 2 IN AUTO | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1471 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZIC2221 | SS | RH1 | PS22 | ZIC | 2221 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |
| 1472 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FQI2222 | SS | RH1 | PS22 | FQI | 2222 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-22103 | | FUTURE |
| 1473 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YI2290 | SS | RH1 | PS22 | YI | 2290 | | GENERATOR RUN | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |
| 1474 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2290A | SS | RH1 | PS22 | YA | 2290 | A | GENERATOR FAIL | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |
| 1475 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAL2290 | SS | RH1 | PS22 | LAL | 2290 | | GENERATOR LOW FUEL ALARM | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-22103 | | NEW |
| 1476 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YA2290B | SS | RH1 | PS22 | YA | 2290 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-22103 | | NEW |
| 1477 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2291A | SS | RH1 | PS22 | NI | 2291 | A | ATS IN NORMAL | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-22103 | | NEW |
| 1478 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2291B | SS | RH1 | PS22 | NI | 2291 | B | ATS IN GENERATOR | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-22103 | | NEW |
| 1479 | SEWER | PUMP STATION 22 | SS_RH1_PS22_NI2291C | SS | RH1 | PS22 | NI | 2291 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-22103 | | NEW |
| 1480 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LAH2290 | SS | RH1 | PS22 | LAH | 2290 | | GENERATOR VAULT FLOOD | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-22103 | | EXISTING |
| 1481 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-22103 | | SPARE |
| 1482 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-22103 | | SPARE |
| 1483 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-22103 | | SPARE |
| 1484 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-22103 | | SPARE |
| 1485 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YI2230 | SS | RH1 | PS22 | YI | 2230 | | PUMP 3 RUN | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-22104 | | EXISTING |
| 1486 | SEWER | PUMP STATION 22 | SS_RH1_PS22_HSA2230 | SS | RH1 | PS22 | HSA | 2230 | | PUMP 3 IN AUTO | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-22104 | | EXISTING |
| 1487 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZIC2231 | SS | RH1 | PS22 | ZIC | 2231 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-22104 | | EXISTING |
| 1488 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FQI2232 | SS | RH1 | PS22 | FQI | 2232 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-22104 | | FUTURE |
| 1489 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FQI2238 | SS | RH1 | PS22 | FQI | 2238 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-22104 | | FUTURE |
| 1490 | SEWER | PUMP STATION 22 | SS_RH1_PS22_HSR2250 | SS | RH1 | PS22 | HSR | 2250 | | FLUSH VALVE IN REMOTE (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-22104 | | FUTURE |
| 1491 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZIO2250 | SS | RH1 | PS22 | ZIO | 2250 | | FLUSH VALVE OPEN (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-22104 | | FUTURE |
| 1492 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZIC2250 | SS | RH1 | PS22 | ZIC | 2250 | | FLUSH VALVE CLOSED (FUTURE) | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-22104 | | FUTURE |
| 1493 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1494 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1495 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1496 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1497 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1498 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1499 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1500 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-22104 | | SPARE |
| 1501 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YC2210 | SS | RH1 | PS22 | YC | 2210 | | PUMP 1 CALL TO RUN | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-22201 | | EXISTING |
| 1502 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YC2220 | SS | RH1 | PS22 | YC | 2220 | | PUMP 2 CALL TO RUN | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-22201 | | EXISTING |
| 1503 | SEWER | PUMP STATION 22 | SS_RH1_PS22_YC2230 | SS | RH1 | PS22 | YC | 2230 | | PUMP 3 CALL TO RUN | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-22201 | | EXISTING |
| 1504 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZCO2250 | SS | RH1 | PS22 | ZCO | 2250 | | FLUSH VALVE CALL TO OPEN (FUTURE) | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO OPEN | I-22201 | | FUTURE |
| 1505 | SEWER | PUMP STATION 22 | SS_RH1_PS22_ZCC2250 | SS | RH1 | PS22 | ZCC | 2250 | | FLUSH VALVE CALL TO CLOSE (FUTURE) | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO CLOSE | I-22201 | | FUTURE |
| 1506 | SEWER | PUMP STATION 22 | SS_RH1_PS22_XC2242 | SS | RH1 | PS22 | XC | 2242 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 05 | 24 VDC | ENERGIZE TO RESET | I-22201 | | NEW |
| 1507 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 06 | 24 VDC | | I-22201 | | SPARE |
| 1508 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 07 | 24 VDC | | I-22201 | | SPARE |
| 1509 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 08 | 24 VDC | | I-22201 | | SPARE |
| 1510 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 09 | 24 VDC | | I-22201 | | SPARE |
| 1511 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 10 | 24 VDC | | I-22201 | | SPARE |
| 1512 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 11 | 24 VDC | | I-22201 | | SPARE |
| 1513 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 12 | 24 VDC | | I-22201 | | SPARE |
| 1514 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 13 | 24 VDC | | I-22201 | | SPARE |
| 1515 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 14 | 24 VDC | | I-22201 | | SPARE |
| 1516 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | DO | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 07 | 15 | 24 VDC | | I-22201 | | SPARE |
| 1517 | SEWER | PUMP STATION 22 | SS_RH1_PS22_II2210 | SS | RH1 | PS22 | II | 2210 | | PUMP 1 AMPS | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-22301 | | EXISTING |
| 1518 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FI2212 | SS | RH1 | PS22 | FI | 2212 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 08 | 01 | | X-X GPM | I-22301 | | FUTURE |
| 1519 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LI2241 | SS | RH1 | PS22 | LI | 2241 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-22301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1520 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 08 | 03 | | | I-22301 | | SPARE |
| 1521 | SEWER | PUMP STATION 22 | SS_RH1_PS22_II2220 | SS | RH1 | PS22 | II | 2220 | | PUMP 2 AMPS | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-22302 | | EXISTING |
| 1522 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FI2222 | SS | RH1 | PS22 | FI | 2222 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 09 | 01 | | X-X GPM | I-22302 | | FUTURE |
| 1523 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FI2238 | SS | RH1 | PS22 | FI | 2238 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 09 | 02 | | X-X GPM | I-22302 | | FUTURE |
| 1524 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 09 | 03 | | | I-22302 | | SPARE |
| 1525 | SEWER | PUMP STATION 22 | SS_RH1_PS22_II2230 | SS | RH1 | PS22 | II | 2230 | | PUMP 3 AMPS | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-22303 | | EXISTING |
| 1526 | SEWER | PUMP STATION 22 | SS_RH1_PS22_FI2232 | SS | RH1 | PS22 | FI | 2232 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 10 | 01 | | X-X GPM | I-22303 | | FUTURE |
| 1527 | SEWER | PUMP STATION 22 | SS_RH1_PS22_PI2235 | SS | RH1 | PS22 | PI | 2235 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 10 | 02 | | X-X PSIG | I-22303 | | FUTURE |
| 1528 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 10 | 03 | | | I-22303 | | SPARE |
| 1529 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LI2242 | SS | RH1 | PS22 | LI | 2242 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-22304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1530 | SEWER | PUMP STATION 22 | SS_RH1_PS22_LI2290 | SS | RH1 | PS22 | LI | 2290 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 11 | 01 | 4-20 mA | X-X FT | I-22304 | | FUTURE |
| 1531 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 11 | 02 | | | I-22304 | | SPARE |
| 1532 | SEWER | PUMP STATION 22 | ___ | | | | | | | SPARE | AI | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_PLC2201 | 00 | 11 | 03 | | | I-22304 | | SPARE |
| 1533 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2300 | SS | RH1 | PS23 | YA | 2300 | | STATION INTRUSION ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-23101 | | EXISTING |
| 1534 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2301 | SS | RH1 | PS23 | YA | 2301 | | PLC PANEL INTRUSION ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1535 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2302 | SS | RH1 | PS23 | NI | 2302 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1536 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2303 | SS | RH1 | PS23 | NI | 2303 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1537 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2304 | SS | RH1 | PS23 | NI | 2304 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1538 | SEWER | PUMP STATION 23 | SS_RH1_PS23_XA2305A | SS | RH1 | PS23 | XA | 2305 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1539 | SEWER | PUMP STATION 23 | SS_RH1_PS23_XA2305B | SS | RH1 | PS23 | XA | 2305 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1540 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2306 | SS | RH1 | PS23 | NI | 2306 | | UPS ON BATTERY | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1541 | SEWER | PUMP STATION 23 | SS_RH1_PS23_XA2306 | SS | RH1 | PS23 | XA | 2306 | | UPS ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1542 | SEWER | PUMP STATION 23 | SS_RH1_PS23_JAL2306 | SS | RH1 | PS23 | JAL | 2306 | | UPS LOW BATTERY | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1543 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAH2307 | SS | RH1 | PS23 | LAH | 2307 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-23101 | | EXISTING |
| 1544 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FAL2361 | SS | RH1 | PS23 | FAL | 2361 | | EXHAUST FAN LOW FLOW | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-23101 | | NEW |
| 1545 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-23101 | | SPARE |
| 1546 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-23101 | | SPARE |
| 1547 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-23101 | | SPARE |
| 1548 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-23101 | | SPARE |
| 1549 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YI2310 | SS | RH1 | PS23 | YI | 2310 | | PUMP 1 RUN | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-23102 | | EXISTING |
| 1550 | SEWER | PUMP STATION 23 | SS_RH1_PS23_HSA2310 | SS | RH1 | PS23 | HSA | 2310 | | PUMP 1 IN AUTO | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-23102 | | EXISTING |
| 1551 | SEWER | PUMP STATION 23 | SS_RH1_PS23_ZIC2311 | SS | RH1 | PS23 | ZIC | 2311 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-23102 | | EXISTING |
| 1552 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FQI2312 | SS | RH1 | PS23 | FQI | 2312 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-23102 | | FUTURE |
| 1553 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2310 | SS | RH1 | PS23 | YA | 2310 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-23102 | | EXISTING |
| 1554 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAHH2342 | SS | RH1 | PS23 | LAHH | 2342 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1555 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAH2342 | SS | RH1 | PS23 | LAH | 2342 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1556 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAL2342 | SS | RH1 | PS23 | LAL | 2342 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1557 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2342 | SS | RH1 | PS23 | YA | 2342 | | FOGROD LEVEL FAULT | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-23102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1558 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2343 | SS | RH1 | PS23 | YA | 2343 | | IS PANEL INTRUSION | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1559 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2344 | SS | RH1 | PS23 | NI | 2344 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1560 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2345 | SS | RH1 | PS23 | NI | 2345 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1561 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2346 | SS | RH1 | PS23 | NI | 2346 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1562 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2347 | SS | RH1 | PS23 | NI | 2347 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-23102 | | NEW |
| 1563 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-23102 | | SPARE |
| 1564 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-23102 | | SPARE |
| 1565 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YI2320 | SS | RH1 | PS23 | YI | 2320 | | PUMP 2 RUN | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-23103 | | EXISTING |
| 1566 | SEWER | PUMP STATION 23 | SS_RH1_PS23_HSA2320 | SS | RH1 | PS23 | HSA | 2320 | | PUMP 2 IN AUTO | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-23103 | | EXISTING |
| 1567 | SEWER | PUMP STATION 23 | SS_RH1_PS23_ZIC2321 | SS | RH1 | PS23 | ZIC | 2321 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-23103 | | EXISTING |
| 1568 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FQI2322 | SS | RH1 | PS23 | FQI | 2322 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1569 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YI2390 | SS | RH1 | PS23 | YI | 2390 | | GENERATOR RUN (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1570 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2390A | SS | RH1 | PS23 | YA | 2390 | A | GENERATOR FAIL (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1571 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAL2390 | SS | RH1 | PS23 | LAL | 2390 | | GENERATOR LOW FUEL ALARM (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1572 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YA2390B | SS | RH1 | PS23 | YA | 2390 | B | GENERATOR PRE-ALARM WARNING (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1573 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2391A | SS | RH1 | PS23 | NI | 2391 | A | ATS IN NORMAL (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1574 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2391B | SS | RH1 | PS23 | NI | 2391 | B | ATS IN GENERATOR (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1575 | SEWER | PUMP STATION 23 | SS_RH1_PS23_NI2391C | SS | RH1 | PS23 | NI | 2391 | C | ATS UTILITY POWER AVAILABLE (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1576 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LAH2390 | SS | RH1 | PS23 | LAH | 2390 | | GENERATOR VAULT FLOOD (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-23103 | | FUTURE |
| 1577 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-23103 | | SPARE |
| 1578 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-23103 | | SPARE |
| 1579 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-23103 | | SPARE |
| 1580 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-23103 | | SPARE |
| 1581 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YI2330 | SS | RH1 | PS23 | YI | 2330 | | PUMP 3 RUN | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-23104 | | EXISTING |
| 1582 | SEWER | PUMP STATION 23 | SS_RH1_PS23_HSA2330 | SS | RH1 | PS23 | HSA | 2330 | | PUMP 3 IN AUTO | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-23104 | | EXISTING |
| 1583 | SEWER | PUMP STATION 23 | SS_RH1_PS23_ZIC2331 | SS | RH1 | PS23 | ZIC | 2331 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-23104 | | EXISTING |
| 1584 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FQI2332 | SS | RH1 | PS23 | FQI | 2332 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-23104 | | FUTURE |
| 1585 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FQI2338 | SS | RH1 | PS23 | FQI | 2338 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-23104 | | FUTURE |
| 1586 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1587 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1588 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1589 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1590 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1591 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1592 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1593 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1594 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1595 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1596 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-23104 | | SPARE |
| 1597 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YC2310 | SS | RH1 | PS23 | YC | 2310 | | PUMP 1 CALL TO RUN | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-23201 | | EXISTING |
| 1598 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YC2320 | SS | RH1 | PS23 | YC | 2320 | | PUMP 2 CALL TO RUN | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-23201 | | EXISTING |
| 1599 | SEWER | PUMP STATION 23 | SS_RH1_PS23_YC2330 | SS | RH1 | PS23 | YC | 2330 | | PUMP 3 CALL TO RUN | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-23201 | | EXISTING |
| 1600 | SEWER | PUMP STATION 23 | SS_RH1_PS23_XC2342 | SS | RH1 | PS23 | XC | 2342 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-23201 | | NEW |
| 1601 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 04 | 24 VDC | | I-23201 | | SPARE |
| 1602 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 05 | 24 VDC | | I-23201 | | SPARE |
| 1603 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 06 | 24 VDC | | I-23201 | | SPARE |
| 1604 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 07 | 24 VDC | | I-23201 | | SPARE |
| 1605 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 08 | 24 VDC | | I-23201 | | SPARE |
| 1606 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 09 | 24 VDC | | I-23201 | | SPARE |
| 1607 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 10 | 24 VDC | | I-23201 | | SPARE |
| 1608 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 11 | 24 VDC | | I-23201 | | SPARE |
| 1609 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 12 | 24 VDC | | I-23201 | | SPARE |
| 1610 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 13 | 24 VDC | | I-23201 | | SPARE |
| 1611 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 14 | 24 VDC | | I-23201 | | SPARE |
| 1612 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | DO | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 07 | 15 | 24 VDC | | I-23201 | | SPARE |
| 1613 | SEWER | PUMP STATION 23 | SS_RH1_PS23_II2310 | SS | RH1 | PS23 | II | 2310 | | PUMP 1 AMPS | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-23301 | | EXISTING |
| 1614 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FI2312 | SS | RH1 | PS23 | FI | 2312 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 08 | 01 | | X-X GPM | I-23301 | | FUTURE |
| 1615 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LI2341 | SS | RH1 | PS23 | LI | 2341 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-23301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | EXISTING |
| 1616 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 08 | 03 | | | I-23301 | | SPARE |
| 1617 | SEWER | PUMP STATION 23 | SS_RH1_PS23_II2320 | SS | RH1 | PS23 | II | 2320 | | PUMP 2 AMPS | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-23302 | | EXISTING |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1618 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FI2322 | SS | RH1 | PS23 | FI | 2322 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 09 | 01 | | X-X GPM | I-23302 | | FUTURE |
| 1619 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FI2338 | SS | RH1 | PS23 | FI | 2338 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 09 | 02 | | X-X GPM | I-23302 | | FUTURE |
| 1620 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 09 | 03 | | | I-23302 | | SPARE |
| 1621 | SEWER | PUMP STATION 23 | SS_RH1_PS23_II2330 | SS | RH1 | PS23 | II | 2330 | | PUMP 3 AMPS | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-23303 | | EXISTING |
| 1622 | SEWER | PUMP STATION 23 | SS_RH1_PS23_FI2332 | SS | RH1 | PS23 | FI | 2332 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 10 | 01 | | X-X GPM | I-23303 | | FUTURE |
| 1623 | SEWER | PUMP STATION 23 | SS_RH1_PS23_PI2335 | SS | RH1 | PS23 | PI | 2335 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 10 | 02 | | X-X PSIG | I-23303 | | FUTURE |
| 1624 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 10 | 03 | | | I-23303 | | SPARE |
| 1625 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LI2342 | SS | RH1 | PS23 | LI | 2342 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-23304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1626 | SEWER | PUMP STATION 23 | SS_RH1_PS23_LI2390 | SS | RH1 | PS23 | LI | 2390 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 11 | 01 | 4-20 mA | X-X FT | I-23304 | | FUTURE |
| 1627 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 11 | 02 | | | I-23304 | | SPARE |
| 1628 | SEWER | PUMP STATION 23 | ___ | | | | | | | SPARE | AI | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_PLC2301 | 00 | 11 | 03 | | | I-23304 | | SPARE |
| 1629 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2400 | SS | RH1 | PS24 | YA | 2400 | | STATION INTRUSION ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-24101 | | EXISTING |
| 1630 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2401 | SS | RH1 | PS24 | YA | 2401 | | PLC PANEL INTRUSION ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1631 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2402 | SS | RH1 | PS24 | NI | 2402 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1632 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2403 | SS | RH1 | PS24 | NI | 2403 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1633 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2404 | SS | RH1 | PS24 | NI | 2404 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1634 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XA2405A | SS | RH1 | PS24 | XA | 2405 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1635 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XA2405B | SS | RH1 | PS24 | XA | 2405 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1636 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2406 | SS | RH1 | PS24 | NI | 2406 | | UPS ON BATTERY | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1637 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XA2406 | SS | RH1 | PS24 | XA | 2406 | | UPS ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1638 | SEWER | PUMP STATION 24 | SS_RH1_PS24_JAL2406 | SS | RH1 | PS24 | JAL | 2406 | | UPS LOW BATTERY | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1639 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAH2407 | SS | RH1 | PS24 | LAH | 2407 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-24101 | | EXISTING |
| 1640 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FAL2461 | SS | RH1 | PS24 | FAL | 2461 | | EXHAUST FAN LOW FLOW | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-24101 | | NEW |
| 1641 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-24101 | | SPARE |
| 1642 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-24101 | | SPARE |
| 1643 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-24101 | | SPARE |
| 1644 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-24101 | | SPARE |
| 1645 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YI2410 | SS | RH1 | PS24 | YI | 2410 | | PUMP 1 RUN | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-24102 | | EXISTING |
| 1646 | SEWER | PUMP STATION 24 | SS_RH1_PS24_HSA2410 | SS | RH1 | PS24 | HSA | 2410 | | PUMP 1 IN AUTO | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-24102 | | EXISTING |
| 1647 | SEWER | PUMP STATION 24 | SS_RH1_PS24_ZIC2411 | SS | RH1 | PS24 | ZIC | 2411 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-24102 | | EXISTING |
| 1648 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FQI2412 | SS | RH1 | PS24 | FQI | 2412 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-24102 | | FUTURE |
| 1649 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-24102 | | SPARE |
| 1650 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAHH2442 | SS | RH1 | PS24 | LAHH | 2442 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1651 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAH2442 | SS | RH1 | PS24 | LAH | 2442 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1652 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAL2442 | SS | RH1 | PS24 | LAL | 2442 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1653 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2442 | SS | RH1 | PS24 | YA | 2442 | | FOGROD LEVEL FAULT | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-24102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1654 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2443 | SS | RH1 | PS24 | YA | 2443 | | IS PANEL INTRUSION | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1655 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2444 | SS | RH1 | PS24 | NI | 2444 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1656 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2445 | SS | RH1 | PS24 | NI | 2445 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1657 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2446 | SS | RH1 | PS24 | NI | 2446 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1658 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2447 | SS | RH1 | PS24 | NI | 2447 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-24102 | | NEW |
| 1659 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-24102 | | SPARE |
| 1660 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-24102 | | SPARE |
| 1661 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YI2420 | SS | RH1 | PS24 | YI | 2420 | | PUMP 2 RUN | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-24103 | | EXISTING |
| 1662 | SEWER | PUMP STATION 24 | SS_RH1_PS24_HSA2420 | SS | RH1 | PS24 | HSA | 2420 | | PUMP 2 IN AUTO | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-24103 | | EXISTING |
| 1663 | SEWER | PUMP STATION 24 | SS_RH1_PS24_ZIC2421 | SS | RH1 | PS24 | ZIC | 2421 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-24103 | | EXISTING |
| 1664 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FQI2422 | SS | RH1 | PS24 | FQI | 2422 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-24103 | | FUTURE |
| 1665 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1666 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1667 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1668 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1669 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1670 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1671 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1672 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1673 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1674 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1675 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1676 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-24103 | | SPARE |
| 1677 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YI2430 | SS | RH1 | PS24 | YI | 2430 | | PUMP 3 RUN | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-24104 | | EXISTING |
| 1678 | SEWER | PUMP STATION 24 | SS_RH1_PS24_HSA2430 | SS | RH1 | PS24 | HSA | 2430 | | PUMP 3 IN AUTO | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-24104 | | EXISTING |
| 1679 | SEWER | PUMP STATION 24 | SS_RH1_PS24_ZIC2431 | SS | RH1 | PS24 | ZIC | 2431 | | PUMP 3 CHECK VALVE CLOSED | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-24104 | | EXISTING |
| 1680 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FQI2432 | SS | RH1 | PS24 | FQI | 2432 | | PUMP 3 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-24104 | | FUTURE |
| 1681 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FQI2438 | SS | RH1 | PS24 | FQI | 2438 | | HGMH FLOW PULSE (FUTURE) | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-24104 | | FUTURE |
| 1682 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1683 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1684 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1685 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1686 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1687 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1688 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1689 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1690 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1691 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1692 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-24104 | | SPARE |
| 1693 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YC2410 | SS | RH1 | PS24 | YC | 2410 | | PUMP 1 CALL TO RUN | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-24201 | | EXISTING |
| 1694 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YC2420 | SS | RH1 | PS24 | YC | 2420 | | PUMP 2 CALL TO RUN | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-24201 | | EXISTING |
| 1695 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YC2430 | SS | RH1 | PS24 | YC | 2430 | | PUMP 3 CALL TO RUN | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO RUN | I-24201 | | EXISTING |
| 1696 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XC2442 | SS | RH1 | PS24 | XC | 2442 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO RESET | I-24201 | | NEW |
| 1697 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 04 | 24 VDC | | I-24201 | | SPARE |
| 1698 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 05 | 24 VDC | | I-24201 | | SPARE |
| 1699 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 06 | 24 VDC | | I-24201 | | SPARE |
| 1700 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 07 | 24 VDC | | I-24201 | | SPARE |
| 1701 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 08 | 24 VDC | | I-24201 | | SPARE |
| 1702 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 09 | 24 VDC | | I-24201 | | SPARE |
| 1703 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 10 | 24 VDC | | I-24201 | | SPARE |
| 1704 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 11 | 24 VDC | | I-24201 | | SPARE |
| 1705 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 12 | 24 VDC | | I-24201 | | SPARE |
| 1706 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 13 | 24 VDC | | I-24201 | | SPARE |
| 1707 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 14 | 24 VDC | | I-24201 | | SPARE |
| 1708 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DO | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 07 | 15 | 24 VDC | | I-24201 | | SPARE |
| 1709 | SEWER | PUMP STATION 24 | SS_RH1_PS24_II2410 | SS | RH1 | PS24 | II | 2410 | | PUMP 1 AMPS | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-24301 | | EXISTING |
| 1710 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FI2412 | SS | RH1 | PS24 | FI | 2412 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 08 | 01 | | X-X GPM | I-24301 | | FUTURE |
| 1711 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LI2441 | SS | RH1 | PS24 | LI | 2441 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-24301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 1712 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 08 | 03 | | | I-24301 | | SPARE |
| 1713 | SEWER | PUMP STATION 24 | SS_RH1_PS24_II2420 | SS | RH1 | PS24 | II | 2420 | | PUMP 2 AMPS | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-24302 | | EXISTING |
| 1714 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FI2422 | SS | RH1 | PS24 | FI | 2422 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 09 | 01 | | X-X GPM | I-24302 | | FUTURE |
| 1715 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FI2438 | SS | RH1 | PS24 | FI | 2438 | | HGMH DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 09 | 02 | | X-X GPM | I-24302 | | FUTURE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1716 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 09 | 03 | | | I-24302 | | SPARE |
| 1717 | SEWER | PUMP STATION 24 | SS_RH1_PS24_II2430 | SS | RH1 | PS24 | II | 2430 | | PUMP 3 AMPS | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 10 | 00 | 4-20 mA | X-X AMPS | I-24303 | | EXISTING |
| 1718 | SEWER | PUMP STATION 24 | SS_RH1_PS24_FI2432 | SS | RH1 | PS24 | FI | 2432 | | PUMP 3 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 10 | 01 | | X-X GPM | I-24303 | | FUTURE |
| 1719 | SEWER | PUMP STATION 24 | SS_RH1_PS24_PI2435 | SS | RH1 | PS24 | PI | 2435 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 10 | 02 | | X-X PSIG | I-24303 | | FUTURE |
| 1720 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 10 | 03 | | | I-24303 | | SPARE |
| 1721 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LI2442 | SS | RH1 | PS24 | LI | 2442 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 11 | 00 | 4-20 mA | X-X FT | I-24304 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1722 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 11 | 01 | | | I-24304 | | SPARE |
| 1723 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 11 | 02 | | | I-24304 | | SPARE |
| 1724 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_PLC2401 | 00 | 11 | 03 | | | I-24304 | | SPARE |
| 1725 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2492 | SS | RH1 | PS24 | YA | 2492 | | RIO PANEL INTRUSION ALARM | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 00 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1726 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2493 | SS | RH1 | PS24 | NI | 2493 | | RIO PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 01 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1727 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2494 | SS | RH1 | PS24 | NI | 2494 | | RIO PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 02 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1728 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2495 | SS | RH1 | PS24 | NI | 2495 | | RIO PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 03 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1729 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XA2496 | SS | RH1 | PS24 | XA | 2496 | | NETWORK SWITCH 3 ALARM | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 04 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1730 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2497 | SS | RH1 | PS24 | NI | 2497 | | UPS ON BATTERY | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 05 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1731 | SEWER | PUMP STATION 24 | SS_RH1_PS24_XA2497 | SS | RH1 | PS24 | XA | 2497 | | UPS ALARM | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 06 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1732 | SEWER | PUMP STATION 24 | SS_RH1_PS24_JAL2497 | SS | RH1 | PS24 | JAL | 2497 | | UPS LOW BATTERY | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 07 | 24 VDC | DRY CONTACT | I-24821 | | NEW |
| 1733 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 08 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1734 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 09 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1735 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 10 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1736 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 11 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1737 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 12 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1738 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 13 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1739 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 14 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1740 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 02 | 15 | 24 VDC | DRY CONTACT | I-24821 | | SPARE |
| 1741 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YI2490 | SS | RH1 | PS24 | YI | 2490 | | GENERATOR RUN | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-24822 | | EXISTING |
| 1742 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2490A | SS | RH1 | PS24 | YA | 2490 | A | GENERATOR FAIL | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-24822 | | NEW |
| 1743 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAL2490 | SS | RH1 | PS24 | LAL | 2490 | | GENERATOR LOW FUEL ALARM | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-24822 | | EXISTING |
| 1744 | SEWER | PUMP STATION 24 | SS_RH1_PS24_YA2490B | SS | RH1 | PS24 | YA | 2490 | B | GENERATOR PRE-ALARM WARNING | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-24822 | | NEW |
| 1745 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2491A | SS | RH1 | PS24 | NI | 2491 | A | ATS IN NORMAL | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-24822 | | EXISTING |
| 1746 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2491B | SS | RH1 | PS24 | NI | 2491 | B | ATS IN GENERATOR | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-24822 | | NEW |
| 1747 | SEWER | PUMP STATION 24 | SS_RH1_PS24_NI2491C | SS | RH1 | PS24 | NI | 2491 | C | ATS UTILITY POWER AVAILABLE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-24822 | | NEW |
| 1748 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LAH2490 | SS | RH1 | PS24 | LAH | 2490 | | GENERATOR VAULT FLOOD | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-24822 | | NEW |
| 1749 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1750 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1751 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1752 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1753 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1754 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1755 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1756 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | DI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-24822 | | SPARE |
| 1757 | SEWER | PUMP STATION 24 | SS_RH1_PS24_LI2490 | SS | RH1 | PS24 | LI | 2490 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 04 | 00 | 4-20 mA | X-X FT | I-24831 | | FUTURE |
| 1758 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 04 | 01 | 4-20 mA | | I-24831 | | SPARE |
| 1759 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 04 | 02 | 4-20 mA | | I-24831 | | SPARE |
| 1760 | SEWER | PUMP STATION 24 | ___ | | | | | | | SPARE | AI | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_RIO2401 | 00 | 04 | 03 | 4-20 mA | | I-24831 | | SPARE |
| 1761 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2500 | SS | RH1 | PS25 | YA | 2500 | | STATION INTRUSION ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 00 | 24 VDC | DRY CONTACT | I-25101 | | EXISTING |
| 1762 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2501 | SS | RH1 | PS25 | YA | 2501 | | PLC PANEL INTRUSION ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 01 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1763 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2502 | SS | RH1 | PS25 | NI | 2502 | | PLC PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 02 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1764 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2503 | SS | RH1 | PS25 | NI | 2503 | | PLC PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 03 | 24 VDC | DRY CONTACT | I-25101 | | NEW |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1765 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2504 | SS | RH1 | PS25 | NI | 2504 | | PLC PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 04 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1766 | SEWER | PUMP STATION 25 | SS_RH1_PS25_XA2505A | SS | RH1 | PS25 | XA | 2505 | A | NETWORK SWITCH 1 ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 05 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1767 | SEWER | PUMP STATION 25 | SS_RH1_PS25_XA2505B | SS | RH1 | PS25 | XA | 2505 | B | NETWORK SWITCH 2 ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 06 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1768 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2506 | SS | RH1 | PS25 | NI | 2506 | | UPS ON BATTERY | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 07 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1769 | SEWER | PUMP STATION 25 | SS_RH1_PS25_XA2506 | SS | RH1 | PS25 | XA | 2506 | | UPS ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 08 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1770 | SEWER | PUMP STATION 25 | SS_RH1_PS25_JAL2506 | SS | RH1 | PS25 | JAL | 2506 | | UPS LOW BATTERY | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 09 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1771 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAH2507 | SS | RH1 | PS25 | LAH | 2507 | | STATION DRY WELL FLOOD ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 10 | 24 VDC | DRY CONTACT | I-25101 | | EXISTING |
| 1772 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FAL2561 | SS | RH1 | PS25 | FAL | 2561 | | EXHAUST FAN LOW FLOW | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 11 | 24 VDC | DRY CONTACT | I-25101 | | NEW |
| 1773 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 12 | 24 VDC | DRY CONTACT | I-25101 | | SPARE |
| 1774 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 13 | 24 VDC | DRY CONTACT | I-25101 | | SPARE |
| 1775 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 14 | 24 VDC | DRY CONTACT | I-25101 | | SPARE |
| 1776 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 03 | 15 | 24 VDC | DRY CONTACT | I-25101 | | SPARE |
| 1777 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YI2510 | SS | RH1 | PS25 | YI | 2510 | | PUMP 1 RUN | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 00 | 24 VDC | DRY CONTACT | I-25102 | | EXISTING |
| 1778 | SEWER | PUMP STATION 25 | SS_RH1_PS25_HSA2510 | SS | RH1 | PS25 | HSA | 2510 | | PUMP 1 IN AUTO | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 01 | 24 VDC | DRY CONTACT | I-25102 | | EXISTING |
| 1779 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZIC2511 | SS | RH1 | PS25 | ZIC | 2511 | | PUMP 1 CHECK VALVE CLOSED | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 02 | 24 VDC | DRY CONTACT | I-25102 | | EXISTING |
| 1780 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FQI2512 | SS | RH1 | PS25 | FQI | 2512 | | PUMP 1 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 03 | 24 VDC | DRY CONTACT | I-25102 | | FUTURE |
| 1781 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2510 | SS | RH1 | PS25 | YA | 2510 | | MOTOR CONTROL PANEL PHASE FAIL | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 04 | 24 VDC | DRY CONTACT | I-25102 | | EXISTING |
| 1782 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAHH2542 | SS | RH1 | PS25 | LAHH | 2542 | | WETWELL FOGROD HIGH HIGH LEVEL ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 05 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1783 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAH2542 | SS | RH1 | PS25 | LAH | 2542 | | WETWELL FOGROD HIGH LEVEL ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 06 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1784 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAL2542 | SS | RH1 | PS25 | LAL | 2542 | | WETWELL FOGROD LOW LEVEL ALARM | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 07 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1785 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2542 | SS | RH1 | PS25 | YA | 2542 | | FOGROD LEVEL FAULT | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 08 | 24 VDC | DRY CONTACT | I-25102 | CABLE SHORT CIRCUIT/GREASE BUILDUP | NEW |
| 1786 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2543 | SS | RH1 | PS25 | YA | 2543 | | IS PANEL INTRUSION | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 09 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1787 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2544 | SS | RH1 | PS25 | NI | 2544 | | IS PANEL SURGE PROTECTION DEVICE OK | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 10 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1788 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2545 | SS | RH1 | PS25 | NI | 2545 | | IS PANEL 120V POWER AVAILABLE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 11 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1789 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2546 | SS | RH1 | PS25 | NI | 2546 | | IS PANEL 24V POWER SUPPLY OK | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 12 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1790 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2547 | SS | RH1 | PS25 | NI | 2547 | | IS PANEL 24V POWER SUPPLY REDUNDANCY MODULE OK | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 13 | 24 VDC | DRY CONTACT | I-25102 | | NEW |
| 1791 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 14 | 24 VDC | DRY CONTACT | I-25102 | | SPARE |
| 1792 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 04 | 15 | 24 VDC | DRY CONTACT | I-25102 | | SPARE |
| 1793 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YI2520 | SS | RH1 | PS25 | YI | 2520 | | PUMP 2 RUN | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 00 | 24 VDC | DRY CONTACT | I-25103 | | EXISTING |
| 1794 | SEWER | PUMP STATION 25 | SS_RH1_PS25_HSA2520 | SS | RH1 | PS25 | HSA | 2520 | | PUMP 2 IN AUTO | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 01 | 24 VDC | DRY CONTACT | I-25103 | | EXISTING |
| 1795 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZIC2521 | SS | RH1 | PS25 | ZIC | 2521 | | PUMP 2 CHECK VALVE CLOSED | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 02 | 24 VDC | DRY CONTACT | I-25103 | | EXISTING |
| 1796 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FQI2522 | SS | RH1 | PS25 | FQI | 2522 | | PUMP 2 DISCHARGE FLOW PULSE (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 03 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1797 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YI2590 | SS | RH1 | PS25 | YI | 2590 | | GENERATOR RUN (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 04 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1798 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2590A | SS | RH1 | PS25 | YA | 2590 | A | GENERATOR FAIL (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 05 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1799 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAL2590 | SS | RH1 | PS25 | LAL | 2590 | | GENERATOR LOW FUEL ALARM (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 06 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1800 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YA2590B | SS | RH1 | PS25 | YA | 2590 | B | GENERATOR PRE-ALARM WARNING (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 07 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1801 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2591A | SS | RH1 | PS25 | NI | 2591 | A | ATS IN NORMAL (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 08 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1802 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2591B | SS | RH1 | PS25 | NI | 2591 | B | ATS IN GENERATOR (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 09 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1803 | SEWER | PUMP STATION 25 | SS_RH1_PS25_NI2591C | SS | RH1 | PS25 | NI | 2591 | C | ATS UTILITY POWER AVAILABLE (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 10 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1804 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LAH2590 | SS | RH1 | PS25 | LAH | 2590 | | GENERATOR VAULT FLOOD (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 11 | 24 VDC | DRY CONTACT | I-25103 | | FUTURE |
| 1805 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 12 | 24 VDC | DRY CONTACT | I-25103 | | SPARE |
| 1806 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 13 | 24 VDC | DRY CONTACT | I-25103 | | SPARE |
| 1807 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 14 | 24 VDC | DRY CONTACT | I-25103 | | SPARE |
| 1808 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 05 | 15 | 24 VDC | DRY CONTACT | I-25103 | | SPARE |
| 1809 | SEWER | PUMP STATION 25 | SS_RH1_PS25_HSR2550 | SS | RH1 | PS25 | HSR | 2550 | | FLUSH VALVE IN REMOTE (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 00 | 24 VDC | DRY CONTACT | I-25104 | | FUTURE |
| 1810 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZIO2550 | SS | RH1 | PS25 | ZIO | 2550 | | FLUSH VALVE OPEN (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 01 | 24 VDC | DRY CONTACT | I-25104 | | FUTURE |
| 1811 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZIC2550 | SS | RH1 | PS25 | ZIC | 2550 | | FLUSH VALVE CLOSED (FUTURE) | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 02 | 24 VDC | DRY CONTACT | I-25104 | | FUTURE |
| 1812 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 03 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1813 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 04 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |

| Item | Utility | Site | IO Tag | Division ID | Process Area ID | Process Code | ISA Prefix | Loop Number | Suffix | Description | IO Type | Panel | PLC / RIO | Rack | Slot | Channel | Module/ Device Type | Signal Type or Calibration Range | Wiring Diagram | Application Notes | STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1814 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 05 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1815 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 06 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1816 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 07 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1817 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 08 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1818 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 09 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1819 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 10 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1820 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 11 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1821 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 12 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1822 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 13 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1823 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 14 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1824 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 06 | 15 | 24 VDC | DRY CONTACT | I-25104 | | SPARE |
| 1825 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YC2510 | SS | RH1 | PS25 | YC | 2510 | | PUMP 1 CALL TO RUN | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 00 | 24 VDC | ENERGIZE TO RUN | I-25201 | | EXISTING |
| 1826 | SEWER | PUMP STATION 25 | SS_RH1_PS25_YC2520 | SS | RH1 | PS25 | YC | 2520 | | PUMP 2 CALL TO RUN | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 01 | 24 VDC | ENERGIZE TO RUN | I-25201 | | EXISTING |
| 1827 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZCO2550 | SS | RH1 | PS25 | ZCO | 2550 | | FLUSH VALVE CALL TO OPEN (FUTURE) | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 02 | 24 VDC | ENERGIZE TO OPEN | I-25201 | | FUTURE |
| 1828 | SEWER | PUMP STATION 25 | SS_RH1_PS25_ZCC2550 | SS | RH1 | PS25 | ZCC | 2550 | | FLUSH VALVE CALL TO CLOSE (FUTURE) | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 03 | 24 VDC | ENERGIZE TO CLOSE | I-25201 | | FUTURE |
| 1829 | SEWER | PUMP STATION 25 | SS_RH1_PS25_XC2542 | SS | RH1 | PS25 | XC | 2542 | | HARDWIRED FOGROD CONTROL REMOTE RESET | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 04 | 24 VDC | ENERGIZE TO RESET | I-25201 | | NEW |
| 1830 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 05 | 24 VDC | | I-25201 | | SPARE |
| 1831 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 06 | 24 VDC | | I-25201 | | SPARE |
| 1832 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 07 | 24 VDC | | I-25201 | | SPARE |
| 1833 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 08 | 24 VDC | | I-25201 | | SPARE |
| 1834 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 09 | 24 VDC | | I-25201 | | SPARE |
| 1835 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 10 | 24 VDC | | I-25201 | | SPARE |
| 1836 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 11 | 24 VDC | | I-25201 | | SPARE |
| 1837 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 12 | 24 VDC | | I-25201 | | SPARE |
| 1838 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 13 | 24 VDC | | I-25201 | | SPARE |
| 1839 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 14 | 24 VDC | | I-25201 | | SPARE |
| 1840 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | DO | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 07 | 15 | 24 VDC | | I-25201 | | SPARE |
| 1841 | SEWER | PUMP STATION 25 | SS_RH1_PS25_II2510 | SS | RH1 | PS25 | II | 2510 | | PUMP 1 AMPS | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 08 | 00 | 4-20 mA | X-X AMPS | I-25301 | | EXISTING |
| 1842 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FI2512 | SS | RH1 | PS25 | FI | 2512 | | PUMP 1 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 08 | 01 | | X-X GPM | I-25301 | | FUTURE |
| 1843 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LI2541 | SS | RH1 | PS25 | LI | 2541 | | WETWELL LEVEL (PRIMARY) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 08 | 02 | 4-20 mA | 0-10 FT | I-25301 | VIA SUBMERSIBLE PRESSURE TRANSDUCER | NEW |
| 1844 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 08 | 03 | | | I-25301 | | SPARE |
| 1845 | SEWER | PUMP STATION 25 | SS_RH1_PS25_II2520 | SS | RH1 | PS25 | II | 2520 | | PUMP 2 AMPS | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 09 | 00 | 4-20 mA | X-X AMPS | I-25302 | | EXISTING |
| 1846 | SEWER | PUMP STATION 25 | SS_RH1_PS25_FI2522 | SS | RH1 | PS25 | FI | 2522 | | PUMP 2 DISCHARGE FLOW (FUTURE) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 09 | 01 | | X-X GPM | I-25302 | | FUTURE |
| 1847 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 09 | 02 | | | I-25302 | | SPARE |
| 1848 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 09 | 03 | | | I-25302 | | SPARE |
| 1849 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LI2542 | SS | RH1 | PS25 | LI | 2542 | | WETWELL LEVEL (SECONDARY) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 10 | 00 | 4-20 mA | X-X FT | I-25303 | VIA FODGOD LEVEL TRANSMITTER | NEW |
| 1850 | SEWER | PUMP STATION 25 | SS_RH1_PS25_PI2535 | SS | RH1 | PS25 | PI | 2535 | | PUMP COMMON DISCHARGE PRESSURE (FUTURE) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 10 | 01 | 4-20 mA | X-X PSIG | I-25303 | | FUTURE |
| 1851 | SEWER | PUMP STATION 25 | SS_RH1_PS25_LI2590 | SS | RH1 | PS25 | LI | 2590 | | GENERATOR FUEL LEVEL (FUTURE) | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 10 | 02 | 4-20 mA | X-X FT | I-25303 | | FUTURE |
| 1852 | SEWER | PUMP STATION 25 | ___ | | | | | | | SPARE | AI | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_PLC2501 | 00 | 10 | 03 | | | I-25303 | | SPARE |

SECTION 40 61 96

PROCESS CONTROL DESCRIPTIONS

## PART 1–GENERAL

### 1.01 SUMMARY

A. This Section provides the integrated automation control descriptions for the Sewer SCADA Systems Replacement project, including common function requirements and specific equipment operational function requirements.

### 1.02 SCOPE

A. The Owner's Programmer will provide all programmable logic controller (PLC) and process control system (PCS) based software modifications to incorporate the controls indicated within this Section. This Section is provided as Information Only for the Contractor for coordination with process control system testing specified in Section 40 61 21.

## PART 2 PRODUCTS

### 2.01 PROCESS CONTROL DESCRIPTION DOCUMENTATION

A. Refer to Section 40 61 96 Attachment A for the process control descriptions.

## PART 3 EXECUTION

### 3.01 GENERAL

A. The process control descriptions are for reference in the modification of the process controller and SCADA software programs in support of the new control system installed under this project.

### 3.02 TESTING

A. Refer to Section 40 61 21.

### 3.03 ATTACHMENTS

A. 40 61 96 Attachment A: Sewer Site Control Strategies.

**END OF SECTION**

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# SECTION 40 61 96_ PROCESS CONTROL DESCRIPTIONS

## ATTACHMENT A

## SEWER SITE CONTROL STRATEGIES

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# Sewer Site
# Control Strategies

Prepared for
City of Mercer Island, Washington
September 2022

Brown AND Caldwell
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Seattle, WA 98101

# Table of Contents

# List of Tables

# Revision History

| Revision History | | | | | | |
|---|---|---|---|---|---|---|
| Revision | Status | Date | Prepared By | | | Description |
| | | | Name | Organization | Role | |
| 1.0 | Draft | 12/23/2019 | Caitlin Bliesner | BC | Consultant | Pilot sites draft for review |
| 2.0 | Draft | 9/15/2021 | Caitlin Bliesner | BC | Consultant | Sewer Pump Station 16 updated draft for review |
| 3.0 | Draft | 2/24/2022 | Caitlin Bliesner/ Christine Audo | BC | Consultant | Sewer sites draft for review |
| 4.0 | Final | 9/2022 | Caitlin Bliesner | BC | Consultant | Bid Set |

# List of Abbreviations

| | |
|---|---|
| ATS | automatic transfer switch |
| BC | Brown and Caldwell |
| City | City of Mercer Island |
| DNP3 | Distributed Network Protocol 3 |
| gpm | gallons per minute |
| HGMH | hydraulic grade manhole |
| HIM | human interface module |
| HMI | human machine interface |
| HOA | hand-off-auto |
| I/O | input/output |
| IS | intrinsically safe |
| ISA | International Society of Automation |
| KCDNR | King County Department of Natural Resources |
| MCC | motor control center |
| NEC | National Electrical Code |
| O&M | operation and maintenance |
| OHCA | open-hold-close-auto |
| OIT | operator interface terminal |
| PID | proportional-integral-derivative |
| PLC | programmable logic controller |
| PM | power monitor |
| PRV | pressure-reducing valve / pressure relief valve |
| PS | pump station |
| PZ | pressure zone |
| SCADA | supervisory control and data acquisition |
| SI | system integrator |
| SPU | Seattle Public Utilities |
| THD | total harmonic distortion |
| UPS | uninterruptible power supply |
| VFD | variable frequency drive |
| VAC/Vac | volts alternating current |
| VDC/Vdc | volts direct current |
| WQA | water quality analyzer |

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## Section 1

# Development and Approach

The control strategies describe the requirements for supervisory control and data acquisition (SCADA) operation with the programmable logic controller (PLC) and graphical user displays to be implemented by the Owner's Programmer. The control strategies describe control operation for the City's sewer system, including common function requirements and specific equipment operational requirements. The control strategies described in this document will be incorporated into the PLC and process control system SCADA software. The control strategies are based on BC's understanding of the City's objectives for control and monitoring, as well as recommendations for improvement based on industry best practices.

All control functions are programmed in the PLCs, and the SCADA system performs supervisory functions through the human machine interface (HMI) screens. The *SCADA and Smart Utility Standards*[1] document provides details on the PLC and SCADA programming standards and implementation. As a result, the control strategies describe how the system is to operate, and do not necessarily describe every software component required to make the system function.

## 1.1 Background

These control strategies are part of the City's SCADA Equipment Replacement project (Project). The Project will replace the City's legacy sewer telemetry system with a new unified, secure control system to meet operational needs. The City has standardized on the Siemens WinCC OA platform for SCADA application programming and on the Siemens ET200SP hardware platform. The project will address near-term risk from aging automation infrastructure and obsolete technology. The project's objectives are to implement a consistent, standards-based, fully integrated sewer SCADA system with improved reliability and ease of operations.

## 1.2 Format

The control strategy format is divided into four main sections:

**System Overview.** This section provides an overview of the City's sewer system, including site types and their functions.

**Common Functions.** This section describes common functions that apply to all sites. These common functions are described in this upfront section and allow for standardization between sites and to limit repetition within individual site control strategies.

**Sewer Sites Control Strategies.** This section includes the control strategies for seventeen sewer sites. Pump Station 11 is being upgraded as part of the King County North Mercer Island/Entai sewer upgrade project and is not included as part of this system replacement. As such, the control strategy for Pump Station 11 is not included in this document at this time.

[1] *SCADA and Smart Utility Standards,* City of Mercer Island, 2020 (draft).

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Section 2

# System Overview

An overview of the City's sewer system is provided below.

## 2.1 Sewer System

The City's sewer collection system is composed of a lakeline pipe which surrounds the island and 18 pump station sites (17 pump stations and 1 flush station). The stations are grouped into five different hydraulic segments called reaches and pump to either the King County Department of Natural Resources (KCDNR) South Mercer Pump Station or North Mercer Pump Station (see table below).

The SCADA system provides remote control and monitoring to the 18 pump stations. The majority of the pump stations have a dry well, which houses the pumps and associated electrical equipment; and a wetwell, which receives flow from the upstream pump station and local area sewer lines. There are two sites that contain submersible pumps in the wetwell, with electrical equipment located at grade level.

Each station consists of two or three pumps. The pumps operate using lead/lag control to pump sewage from the wetwell to the lakeline pipe. For the flushing station, a single pump operates on a SCADA programmed timer to push lake water through the pipeline and move sewage to the next pump station.

Table 2-1. Sewer Pump Stations by Reach

| Reach | Pump Station |
|---|---|
| Reach 1 (East Stations) | Pump Station 25** |
| | Pump Station 24 |
| | Pump Station 23 |
| | Pump Station 22** |
| Reach 2 (Southwest Stations) | Pump Station 14 |
| | Pump Station 15* |
| | Pump Station 16* |
| | Pump Station 17 |
| | Pump Station 18 |
| | Pump Station 19** |
| | Pump Station 20 |
| | Pump Station 21 |
| Reach 3 (Northwest Stations) | Pump Station 13** |
| | Pump Station 4 |
| Reach 4 (North Stations) | Pump Station 1** |

Table 2-1. Sewer Pump Stations by Reach

| Reach | Pump Station |
| --- | --- |
| Reach 5 (Northeast Stations) | Pump Station 10 |
| | Pump Station 11 |
| | Flush Station 12* |

*Station has flushing capabilities.

**Station will have flushing capabilities in the future.

Section 3

# Common Functions

This section describes common function requirements for the application programming of the City's sewer collection systems. These common functions are described in this upfront section and allow for standardization between sites. The common functions apply to individual sites, as applicable. Refer to the control strategy for a particular site.

In addition, an input/output (I/O) list details the hardwired points that interface with the control system. The list includes set points and ranges for status monitoring, control, and alarm parameters. The I/O list is being developed for the Contract documents as part of Task 701: Preliminary Design Development for the sewer collection system.

## 3.1 Common Analog I/O Functions

The following subsections describe common analog I/O functions, which can be hardwired to the PLC or data communicated over a network bus.

### 3.1.1 I/O Conditioning

A. Where necessary, digital filtering is used to smooth out noise that is part of an analog signal used for process control.

B. Engineering units are computed based on the 0 to 100 percent range assigned for each analog input.

### 3.1.2 I/O Alarming

A. Signal Out-of-Range Alarm

   a. A signal out-of-range alarm is detected by the PLC and alarmed at the human-machine interface (HMI). The PLC will automatically reset the active alarm when the analog input returns to within a valid signal range of -5 to +105 percent.

B. High-High, High, Low-Low and Low Alarms

   a. The instrument alarms require an adjustable deadband for reset (default is 2 percent) and operator adjustable delay timer (default is 3 seconds) to prevent nuisance alarms.

   b. Analog points are programmed to have their low-low limit and low limit set to the low engineering units range (manually set to a value of 0 and 5 percent of the engineering units range), and their high and high-high limits set to the high engineering units range (manually set to a value of 95 and 100 percent of the engineering units range), unless specified otherwise in the control strategy for a particular site.

   c. Analog alarms have an option for latching the alarm state until reset by the operator.

   d. Refer to Section 3.9.1 for alarm priorities.

### 3.1.3 Output Value Hold

A. The operator can select to hold the output of the analog input processing to allow for maintenance or calibration of the instrument. When the hold is released processing returns to normal with the output updating every scan cycle.

B. Output in Hold Alarm

   a. If an output value is still in hold after an adjustable period of time, generate an alarm. This alarm is intended to alert operations if an output value is left in hold for an extended period of time.

### 3.1.4 Rate Variable Totalization

A. Selected “rate” variables (flows, volumes, power, etc.) are totalized in the PLC on a continuous basis. Totalizers can be reset through the HMI. Totalizers include an ongoing total and daily total values for the last week.

### 3.1.5 Calculated Analog Values

A. Calculated analog values are values that are computed by PLCs or HMI programming, such as flow rates calculated as the sum or difference of other flows, loading rates, and volumes based on level.

B. Values calculated by PLCs have the same features as “real” analog inputs with respect to alarming, totalizing, trending, and historical data.

## 3.2 Common Discrete I/O Functions

The following subsections describe common discrete I/O functions, which can be hardwired to the PLC or data communicated over a network bus.

### 3.2.1 Discrete Input with Alarm

A. Processing for discrete inputs includes a normal/reverse acting option to adjust for normally open/closed or normally energized/de-energized inputs.

B. Alarm Configuration

   a. Discrete inputs can optionally include an alarm. Alarm state can be configured for normally open or normally closed

   b. Refer to Section 3.9.1 for alarm priorities.

   c. Discrete alarms include an option to alarm on open or closed state.

   d. Discrete alarms have an option for latching the alarm state until reset by the operator.

C. Nuisance Tripping

   a. To prevent nuisance tripping by “noisy” signals, an operator adjustable time period must elapse before the alarm condition is activated in the HMI as an alarm. The default value for the pre-set alarm delay is 3 seconds but should be confirmed by the Owner’s Programmer based on the requirements of the application. This alarm delay is programmed in the PLC.

   Pre-set delay times should only be used where a signal is known to cause nuisance tripping.

D. Alarm Flooding

a. To prevent alarm flooding, or excess alarms, which typically result during equipment failures, start-ups, and shutdowns, excess alarms will be suppressed (inhibited). For example, a “loss of power” alarm may trigger unnecessary or redundant alarms, such as pump “fail to run.”

b. The effort to minimize alarm flooding will be started as a baseline during software development, updated during testing, and finalized during commissioning.

### 3.2.2 Equipment Run Times

A. Equipment run times are computed for all equipment in the PLC, displayed on the HMI, and logged to the data historian. Run-time totals can be reset by the operator from an HMI display, when applicable. Run times for constant speed and variable speed motors are displayed on the popup windows for the motors.

B. For VFDs, run times displayed at local HIM can be reset at the equipment HIM.

### 3.2.3 Equipment Starts

A. The number of equipment starts are computed for all equipment in the PLC, displayed on the HMI, and logged to the data historian. Equipment start-counts can be reset by the operator from an HMI display, when applicable.

### 3.2.4 Flow Pulse Totalization

A. For flow meters with separate flow pulse inputs, flow is totalized in the PLC on a continuous basis. Each pulse signal is associated with a specific volume of flow. Totalizers can be reset through the HMI. Totalizers include an ongoing total and daily total values for the last week.

## 3.3 Common Control Functions – General

The following subsections describe common control functions for general equipment.

### 3.3.1 Bumpless Transfer from SCADA Manual to/from SCADA Auto

A. When equipment is in SCADA Manual mode (i.e., operator is controlling via SCADA) or SCADA Auto mode, the PLC and HMI track the equipment’s status (on, off, opened, closed, speed, position, etc.) and adjust the PLC outputs to match the status. The purpose is to prevent any change in the equipment’s status when it is switched from SCADA Manual to SCADA Auto or vice versa.

B. Where backup closed loop control is implemented (vendor-supplied package systems) and the control is in the local control mode, the PLC tracks the local control output and adjusts the PLC output to match to prevent introduction of any unnecessary bump in the process when it is switched back to Remote from Local.

### 3.3.2 Equipment Speed

A. Speed control and feedback signals are configured as a percentage value based on the equipment’s allowable operating range (AOR) upper threshold. The AOR upper threshold is determined by the more restrictive of the VFD, motor, and driven-equipment manufacturer operating limits.

## 3.4 Proportional Integral Derivative (PID) Control

A Proportional–Integral–Derivative controller (PID controller) is a generic control loop feedback controller.

A. A PID controller attempts to correct the error between a measured process variable and a desired set point by calculating and then outputting a corrective action that can adjust the process accordingly and rapidly, to keep the error within the control deadband.

B. PID control (or any combination of these PID, PI, I, D, etc.) is only implemented within PLC application programming. The HMI provides faceplate displays and access to PID parameters, but not actual control algorithms.

C. PID control includes the option for one PID controller to receive its setpoint from another controller in Cascade control mode. For example, the reservoir level controller may set the flow setpoint to the reservoir incoming flow control. This allows the operator the option to operate with either local flow control or cascade control.

## 3.5 Common Valve Control Functions

The following subsections describe common valve control functions for automated flow control valves and isolation valves.

### 3.5.1 Valve Control Interfaces – Flow Control Valve (with solenoid operators)

The water distribution system uses Cla-Val™ type control valves to regulate water supply and system pressure. The Cla-Val™ consists of a diaphragm valve with dome cover and pilot control system. A set of solenoid valve operators — an open solenoid, a close solenoid, and sometimes an enable solenoid — allow valve control from the local PLC and SCADA.

The position of the FCV is adjusted to maintain a flow set point using the solenoid valves. The close solenoid allows upstream flow into the valve dome to move it in the closed direction. The open solenoid allows flow to leave the valve dome to move it in the open direction. The enable solenoid, if present, needs to be energized to allow valve control by the open and close solenoids. If the enable solenoid is de-energized (either by operator selection or power loss), the valve operates hydraulically based on the local pilot settings on the valve.

Flow control valves are supplied with control capability from multiple locations. Normally, the flow control valves are controlled from SCADA, but they can also be controlled from OPEN/HOLD/CLOSE/AUTO (OHCA) selector switches located in the field.

A. When the OHCA is in the OPEN position, the valve modulates in the open direction. When the OHCA is in the HOLD position, the valve holds its current position. When the OHCA is in the CLOSE position, the valve modulates in the closed direction. When in the AUTO position, the valve is modulated via SCADA, based on parameters programmed in the control sequence or manually as directed by the operator from the HMI. In all cases, the enable solenoid must be energized to allow valve control via the open or close solenoids.

    a. Hardwired interlocks override all controls regardless of control location (local or SCADA). These interlocks are typically for personnel safety and equipment protection.

    b. Software interlocks override all SCADA Auto or SCADA Manual control but are ignored when valves are controlled locally (OHCA in OPEN/HOLD/CLOSE positions) or a hardwire interlock is active.

c. If the valve has an enable solenoid, in the event of power loss, the valve operates hydraulically based on the local pilot settings on the valve.
d. If the valve does not have an enable solenoid, in the event of power loss, the valve holds its last position.
e. When the OHCA is in the OPEN or CLOSE position, the PLC tracks the status of the OPEN or CLOSE position selection in order to track the valve position.

### 3.5.2 Valve Status, Output, Alarms – Flow Control Valve (with solenoid operators)

A. The following hardwired status and output parameters are continuously monitored for each flow control valve:
   a. Valve in auto status
   b. Valve open command
   c. Valve close command
   d. Valve enable command, if applicable
   e. Valve closed feedback
B. Flow control valves include various alarm options. Each alarm has the same options as the discrete input alarms, optional latching configuration, time delay, normally open/closed option, and alarm priority level of 4-1, as described in Section 3.9.1. Alarm options include:
   a. Valve fail to open
   b. Valve fail to close
   c. Valve not in auto
   d. I/O health fault, which identifies if any of the I/O associated with the valve is faulty.

### 3.5.3 Valve Control Interfaces – Isolation Valve

Isolation valves are supplied with control capability from multiple locations. Normally, the valves are controlled from SCADA, but they can also be controlled from OPEN/CLOSE/AUTO (OCA) selector switches located in the field.

A. When the OCA is in the OPEN position, the valve opens. When the OCA is in the CLOSE position, the valves closes. When in the AUTO position, the valve is controlled by SCADA, based on parameters programmed in the control sequence or manually as directed by the operator from the HMI.
   a. Hardwired interlocks override all controls regardless of control location (local or SCADA). These interlocks are typically for personnel safety and equipment protection.
   b. Software interlocks override all SCADA Auto or SCADA Manual control but are ignored when valves are controlled locally (OCA in OPEN/CLOSE positions) or a hardwire interlock is active.
   c. In the event of power loss, the valve fails in its last position.

### 3.5.4 Valve Status, Output, and Alarms – Isolation Valve

A. The following hardwired status and output parameters are continuously monitored for each valve:
   a. Valve in auto status
   b. Valve close/open command

c. Valve closed feedback (where provided)

d. Valve open feedback (where provided)

B. Isolation valves include various alarm options. Each alarm has the same options as the discrete input alarms, optional latching configuration, time delay, normally open/closed option, and alarm priority level of 4-1, as described in Section 3.9.1. Alarm options include:

a. Valve fail to open, determined by a valve being commanded to open, and closed feedback (via limit switch) is still received after a set time frame.

b. Valve fail to close, determined by a valve being commanded to close, and opened feedback (via limit switch) is still received after a set time frame.

c. Valve not in auto

d. I/O health fault, which identifies if any of the I/O associated with the valve is faulty.

## 3.6 Common Pump Control Functions

The following subsections describe common pump control functions for constant speed and variable speed applications.

### 3.6.1 Pump Control Interfaces – Constant Speed Pumps

All pumps are supplied with control capability from multiple locations. Normally the constant speed pumps are controlled from SCADA, but they can also be controlled from HAND/OFF/AUTO (HOA) selector switches located at the motor starter panel.

A. When the HOA is in the HAND position, the pump starts and runs continuously. When the HOA is placed in the OFF position, the pump stops and is prevented from starting. When in the AUTO position, the pumps are started and stopped via SCADA, based on parameters programmed in the control sequence or manually as directed by the operator from the HMI.

a. If the motor on/off state does not agree with the commanded position for an operator-defined time, a fault is declared at the HMI.

b. Hardwired interlocks override all controls regardless of control location (local or SCADA). These interlocks are typically for personnel safety and equipment protection.

c. Software interlocks override all SCADA Auto or SCADA Manual control but are ignored when pumps are controlled locally (HOA in HAND or OFF positions) or a hardwire interlock is active.

B. The control strategy for a particular site may identify variations to this standard pump control interface.

### 3.6.2 Pump Status, Output, and Alarms – Constant Speed Pumps

A. The following hardwired status and output parameters are continuously monitored for each constant speed pump:

a. Pump run status

b. Pump in auto status

c. Pump amps (where provided)

d. Pump check valve open (where provided)

e. Pump call to run

f. Pump interlock status (where provided)

B. Constant speed motor control includes various alarm options. Each alarm has the same options as the discrete input alarms, optional latching configuration, time delay, normally open/closed option, and alarm priority level of 4-1, as described in Section 3.9.1. Alarm options include:

a. Fail to start
b. Fail to stop
c. Check valve fault
d. MCC HOA not in auto (where provided)
e. Field HOA not in auto (where provided)
f. Interlocks active, which identifies if there are interlocks active, causing the motor to not be in the ready state.
g. I/O health fault, which identifies if any of the I/O associated with the motor is faulty.

### 3.6.3 Pump Control Interfaces – Variable Speed Pumps

All pumps are supplied with control capability from multiple locations. Variable speed pumps have a human-interface module (HIM) mounted on the front of the VFD enclosure. In addition, some VFDs have a separate HOA selector switch on the front of the VFD enclosure. This applies to both hardwired and networked equipment.

A. Under normal conditions, the HAND/AUTO selection at the HIM is set to AUTO. When in AUTO, the pumps are started and stopped and their speed is adjusted via SCADA.

*Note: The control interface at the VFD is a function of the VFD manufacturer and the VFD's initial configuration.*

B. Operators can control the pumps locally by setting the field HOA to the HAND position. When the HOA is in the HAND position, the HIM must also be set to HAND. While in HAND, the pump starts and runs continuously. The speed of VFD driven pumps can also be adjusted from the local HIM. When the HOA is placed in the OFF position, the pump stops and is prevented from starting. When in the AUTO position, the pumps are started and stopped and their speed is adjusted via SCADA, based on parameters programmed in the control sequence or manually as directed by the operator from the HMI.

a. If the motor on/off state does not agree with the commanded position for an operator-defined time, a fault is declared at the HMI.
b. Hardwired interlocks override all controls regardless of control location (local or remote). These interlocks are typically for personnel safety and equipment protection.
c. Software interlocks override all SCADA Auto or SCADA Manual control but are ignored when pumps are controlled locally (HIM in HAND mode or HOA in HAND or OFF positions) or a hardwire interlock is active.

C. The control strategy for a particular site may identify variations to this standard pump control interface.

### 3.6.4 Pump Status, Output, and Alarms – Variable Speed Pumps

A. The following hardwired status and output parameters are continuously monitored for hardwired variable speed pumps:

a. Pump run status
b. Pump in auto status

   c. Pump in remote status
   d. Pump amps (where provided)
   e. Pump check valve open (where provided)
   f. Pump call to run
   g. Pump interlock status (where provided)

B. Variable speed motor control includes various alarm options. Each alarm has the same options as the discrete input alarms, optional latching configuration, time delay, normally open/closed option, and alarm priority level of 4–1, as described in Section 3.9.1. Alarm options include:
   a. Fail to start
   b. Fail to stop
   c. E-stop active (where provided)
   d. Check valve fault (where provided)
   e. MCC HOA not in auto (where provided)
   f. HIM not in auto (where provided)
   g. Local disconnect open (where provided)
   h. Interlocks active, which identifies if there are interlocks active, causing the motor to not be in the ready state.
   i. I/O health fault, which identifies if any of the I/O associated with the motor is faulty.
   j. External trip active

### 3.6.5 VFD Motor Control

Variable frequency drives (VFDs) are programmed to ensure proper minimum and maximum speed values are achieved.

A. When a pump is commanded to start, it is brought online to the minimum speed set at the VFD and set to the commanded speed using a ramp rate configured at the VFD.

   *Note: Pump minimum and maximum values and VFD ramp rate are based on the VFD's initial configuration.*

B. When a VFD is connected to a PID loop, the pump speed is determined by scaling the PID output (0 – 100%) to the minimum and maximum pump speeds. For example, if the pump minimum and maximum speeds are 50% and 100% respectively, a PID output of 50% would correspond to a pump speed of 75%.

C. When a pump is commanded to stop, it ramps down to the minimum speed based on a ramp rate configured at the VFD. Once the pump speed is below the minimum, it is stopped.

### 3.6.6 Multiple Pump Variable Speed PID Control

Multiple pump variable speed applications are programmed to sequence pumps and adjust speed based on the output of a PID controller. The PID controller is used to maintain a desired process set point, such as flow, level, or pressure within a control deadband. A measured process variable provides feedback to the PID controller. The PID controller attempts to correct the error between the measured process variable and set point by calculating and determining a corrective action for the process. For multiple pump variable speed applications, the corrective action is adjusting pump speed and the number of pumps in operation. Pump start and stop transitions are handled using a transition algorithm as described below.

The lead pump starts if the error between the measured process variable and the set point are outside of the control deadband for an adjustable time delay. The speed of the lead pump is adjusted through the PLC's PID algorithm to maintain the set point, using the measured process variable as feedback.

If the current pump(s) are operating at maximum speed, and the process variable remains outside the control deadband for an adjustable amount of time, the next pump (e.g. lag pump 1) is called to run.

Similarly, if the current pump(s) are operating at minimum speed, and the process variable remains outside the control deadband for an adjustable amount of time, the last pump on (e.g. lag pump 1) is called to stop.

During pump start/stop transitions, pumps are programmed using a transition algorithm to help minimize system disruptions with bringing on/off another pump. During this transition period, the PID control algorithm is temporarily bypassed, and the speed set point of the pump(s) in operation undergoes an operator adjustable step adjustment (as a percent of speed). This step adjustment is meant to anticipate the system impact of bringing on/off another pump. The initial step adjustments will be determined in the field during start up. The step adjustments may vary if going from 1-to-2 pumps, 2-to-3 pumps, and so on.

Once all pumps are operating at the step-adjusted speed, control resumes using the PID algorithm. All pumps then have their speed adjusted based on the output of the PID controller as previously described.

For example, if the current speed control output is 80% for one pump running, and a step transition from 1-to-2 pumps is set at 10%, when a second pump is called to run, the first pump ramps down to 70% speed, while the second pump is brought up to 70% speed. Once both pumps are running at 70% speed, after an adjustable time delay, the PID algorithm resumes.

The control strategy for a particular site may define additional functions and restrictions that affect the implementation of this control function.

### 3.6.7 Pump Alternation Sequence

Pump alternation is determined by the PLC, which is programmed to alternate pumps as Lead/Lag 1/Lag 2 and so forth, after each run cycle. Each pump is assigned a position in the sequence (Lead/Lag 1/Lag 2, etc.). Any pump that is out of service is removed from the pump alternation sequence.

If a pump is called to start and does not start after an adjustable time, then the following occurs:

A. A pump fail alarm is issued.

B. The next available pump, including any standby pumps, is called to start.

C. The failed pump is taken out of the pump alternation sequence and designated as 'out of service' until the pump fail alarm is manually reset by the operator.

For a lead pump that runs continuously, lead pump alternates after an operator adjustable time (number of hours between lead change). During the lead pump transition, the two pumps will overlap in the transition, such that in the event the pump called to run fails, the old lead pump continues to run.

In addition, the operator has the option to disable the pump alternation sequence. If it is desired to switch the lead pump, the pump can be taken "out of service" and then put back in service, and it will go to the back of the alternation sequence. .

In the pump alternation sequence, the number of pumps allowed to run may be limited based on power availability. The control strategy for a particular site may define additional functions and restrictions for the pump alternation sequence.

## 3.7 Common Monitoring Functions

The following subsections describe common monitoring functions. The control strategy for a particular site may define additional monitoring functions.

### 3.7.1 Communication Interfaces

All communication interfaces are monitored for their current status. An alarm is activated when there is a failure of communications. The calculation and/or logic used to identify communications varies depending on the network interface and available parameters. The following network interfaces are continuously monitored for each network segment (DNP3, Profinet, Modbus TCP, Profibus, etc.):

A. Communications status
B. Communications failure alarm
C. Power supply failure

### 3.7.2 Site PLC Monitoring

The site PLCs are monitored for various fault conditions. The following site PLC monitoring alarms are monitored:

A. Processor stopped or program mode
B. I/O module status (individual for each I/O module)

### 3.7.3 Common Panel Hardwired Status/Alarm Points

The following hardwired status and alarm parameters are continuously monitored at each panel:

A. PLC panel 120 VAC power available
B. PLC panel 24 VDC power supply OK
C. IS panel 24 VDC power supply redundancy module OK (where provided)
D. IS panel 120 VAC power available (where provided)
E. IS panel 24 VDC power supply OK (where provided)
F. Network switch alarm (per switch, where provided)
G. UPS on battery
H. UPS alarm
I. UPS low battery
J. Surge protection device OK
K. Panel intrusion

### 3.7.4 Common Remote Site Hardwired Status/Alarm Points

The following hardwired status and alarm parameters are continuously monitored at each remote site:

A. Intrusion alarm
    a. An intrusion alarm delay function is provided to allow enough time for the operator to disable prior to alarm initiation, or to allow enough time for operator to enable the alarm and exit prior to alarm initiation.
B. Flood alarm (where provided)

### 3.7.5 Loss of Power

A. Sites with generator

   a. Loss of power is determined by the status of ‘PLC panel 120 Vac power available’ in the panel and ‘generator run’ status. If PLC panel 120 Vac power is not available and generator run status is not received after a time delay, alarm for ‘loss of power.’

B. Sites without generator

   a. Loss of power is determined by the status of ‘PLC panel 120 Vac power available’ in the panel. If PLC panel 120 Vac power is not available after a time delay, alarm for ‘loss of power.’

## 3.8 Additional Equipment Hardwired Status/Alarm Points

The following subsections describe hardwired status and alarm points for additional equipment. The control strategy for a particular site may define additional functions and restrictions that affect the implementation of this control function.

### 3.8.1 Generator Hardwired Status/Alarm Points

A. Generator monitoring varies by site. Below are some of the parameters monitored at sewer sites. Refer to the I/O list.

   a. Generator run
   b. Generator fail
   c. Generator Pre-Alarm Warning
   d. Generator fuel tank low level alarm
   e. Generator vault flood, if applicable
   f. ATS in normal position
   g. ATS in generator position
   h. ATS utility power available

B. Generator runtime since last service

   a. Generator runtime since last service (i.e. fueling) is calculated and displayed at SCADA. The value can be reset at SCADA.

C. Overall generator runtime

   a. Overall generator runtime is calculated and displayed at SCADA.

D. Generator fail to run

   a. If the ATS is in the generator position and generator run status is not received after a time delay, alarm for ‘generator fail to run.’

E. ATS fail to transfer

   a. If there is loss of utility power (based on utility power status) and ‘ATS in generator position’ is not received after a time delay, alarm for ‘ATS fail to transfer.’

## 3.9 Standard Alarm Management

The following subsections describe the approach for standard alarm management. The control strategy for a particular site may define additional functions and restrictions that affect the implementation of this.

### 3.9.1 Alarm Priority

Alarms are programmed to have a priority level of 4-1. The alarm priority level indicates the importance/urgency of the alarm. The assigned alarm priority dictates how the alarm is displayed on the SCADA HMI screens through color, shape, and annunciation protocol (animation, sound, and remote alarm notification). A preliminary alarm list will be developed at a later date. This list will be started as a baseline alarm list, to be modified during testing and finalized during commissioning. Alarms should have an audit lifecycle. The SCADA and Smart Utility Standards document will provide more details on the definition of alarm priorities and how they are implemented. The four priorities are summarized as follows:

4 = Critical

3 = High

2 = Medium

1 = Low

### 3.9.2 No Response Alarm

If an equipment unit is in the SCADA control mode (either SCADA Manual or SCADA Automatic) and is called to operate (start, stop, open, close, etc.) and the appropriate response (on, off, opened, closed, etc.) is not received after an adjustable time delay (typically 5 seconds for motors and 15 seconds for valves), then:

A. Generate an alarm.
B. If the output was generated by an automatic control sequence, suspend or abort the sequence and hold until reset command from the HMI is generated.

### 3.9.3 Insufficient Number of Pumps in Ready State

A ready state is defined as follows: the pump has not failed, the pump control interface is in AUTO at the local interface, and the pump control interface in SCADA AUTO at the HMI. If an insufficient number of pumps are not in the ready state after an adjustable period of time, generate an alarm for ‘Minimum Pumps Not Ready.’ This alarm is intended to alert operations if equipment is left in the HAND or OFF positions (i.e. not in AUTO) for an extended period of time. The minimum number of pumps required to be in the ready state varies by site. The minimum number is operator adjustable from the SCADA HMI. Refer to the control strategy for a particular site for the minimum number of pumps required to be in the ready state.

When alternation logic calls for more pumps to run than are in the ready state, an alarm will also be generated for ‘More Pumps Called than Available.’

### 3.9.4 Unexpected Status Change Alarm

If a device in SCADA control mode changes its run/stop or open/closed status without being commanded to do so, generate an alarm.

### 3.9.5 Sequence Fail Alarm

If a control sequence cannot proceed to the next step because the current step’s completion criteria has not been met, after a step-specific, adjustable time delay, an alarm is generated. This alarm condition inhibits running the sequence until it is manually reset by operator action.

### 3.9.6 Alarm Reset

For discrete and analog alarms, the operator is required to reset the alarm in order for the alarm to return to normal and any automated permissive to continue. Reset selection is provided on the local OIT, if applicable, to reset the site alarms. A PLC reset is also provided on the SCADA screen for each individual site.

### 3.9.7 Set Points, Alarm limits, Timer Presets, Control Modes, and Lead/Lag Status

All set points, control limits, alarm limits, timer presets, control modes, and lead/lag status used by PLCs, vendor-supplied package system PLCs, are monitored by and adjusted through the HMI.

## 3.10 Network Data Exchange Requirements for Common Equipment Types

The following subsections describe the minimum data exchange requirements between the PLC/SCADA and common types of networked equipment.

### 3.10.1 Variable Frequency Drives (VFD) – Profibus or Profinet

The following table provides minimum requirements for monitoring and control parameters exchanged between the PLC/SCADA and the VFD via Profibus or Profinet. Data exchange may vary by VFD manufacturer. The table below is provided as a baseline.

Table 3-1. Data Exchange Requirements - VFD

| Read/Write | Parameter |
|---|---|
| Read | In HAND (HIM status) |
| Read | In AUTO (HIM status) |
| Read | Ready |
| Read | Running |
| Read | Output frequency |
| Write | Frequency reference |
| Read | Motor RPM |
| Read | Motor current |
| Read | Motor torque |
| Read | Motor power |
| Read | Motor voltage |
| Read | DC-link voltage |
| Read | Fault |
| Write | Run command |
| Write | Reset |

### 3.10.2 Power Monitors (PM) - Profibus

The following table provides minimum requirements for monitoring and control parameters exchanged between the PLC/SCADA and the power monitor via Profibus. Data exchange may vary by power monitor manufacturer. The table below is provided as a baseline.

Table 3-2. Data Exchange Requirements – Power Monitor

| Read/Write | Parameter |
|---|---|
| Read | Phase current (A, B, C, and average) |
| Read | Line-to-line voltage (AB, BC, CA, and average) |
| Read | Line-to-neutral voltage (A, B, C, and average) |
| Read | Watts (A, B, C, and total) |
| Read | Volt-ampere (VA) total |
| Read | Volt-ampere reactive (VAR) total |
| Read | Power factor (A, B, C, and total) |
| Read | Phase current (A, B, and C) total harmonic distortion (THD) |

### 3.10.3 Water Quality Analyzers - Profibus

The following table provides minimum requirements for monitoring and control parameters exchanged between the PLC/SCADA and the water quality analyzer via Profibus. Data exchange may vary by water quality analyzer. The table below is provided as a baseline.

Table 3-3. Data Exchange Requirements – Water Quality Analyzer

| Read/Write | Parameter |
|---|---|
| Read | Chlorine |
| Read | pH |
| Read | Water temperature |

## Section 4

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# Section 5

# Sewer Site Control Strategies

The following section includes control strategies for individual sewer sites:

- Pump Station 1**
- Pump Station 4
- Pump Station 10
- Flush Station 12*
- Pump Station 13**
- Pump Station 14
- Pump Station 15*
- Pump Station 16*
- Pump Station 17
- Pump Station 18
- Pump Station 19**
- Pump Station 20
- Pump Station 21
- Pump Station 22**
- Pump Station 23
- Pump Station 24
- Pump Station 25**

*Station has flushing capabilities.

**Station will have flushing capabilities in the future.

Pump Station 11 is being upgraded as part of the King County North Mercer Island/Entai sewer upgrade project and is not included as part of this system replacement. As such, the control strategy for Pump Station 11 is not included in this document at this time.

## 5.1 Pump Station 1

Pump Station (PS) 1 is located within Reach 4, serving the northern end of the island before ending at the King County North Mercer Pump Station. PS 1 is a dry well/wetwell configuration with two constant speed pumps.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 1 to the King County North Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve.** The flush valve at PS 1 will be replaced as part of a future project. The existing flush valve consists of a butterfly valve and electric actuator and is not connected to SCADA. The existing flush system draws water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. Typically, flushing happens during low flows (at night). The existing flush valve operates based on a local timer and opens at set time intervals to flush the Lakeline pipe. The future flush valve will consist of a new valve and electric actuator. Limit switches will monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 1 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.1.1 Equipment

**Table 5-1. PS 1 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH4_PS01_CAB0100 | PS 1 PLC Panel |
| SS_RH4_PS01_GNG0100 | PS 1 Go/No-Go Panel |
| SS_RH4_PS01_RIO0100 | PS 1 Remote I/O Panel |
| SS_RH4_PS01_MCP0110 | PS 1 Motor Control Panel |
| SS_RH4_PS01_RSP0110 | PS 1 Pump 1 |
| SS_RH4_PS01_RSP0120 | PS 1 Pump 2 |
| SS_RH4_PS01_IS0140 | PS 1 Intrinsically Safe (IS) Panel |

| Table 5-1. PS 1 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH4_PS01_ACT0150 | PS 1 Flush Valve Electric Actuator |
| SS_RH4_PS01_FLV0150 | PS 1 Flush Valve |
| SS_RH4_PS01_EF0160 | PS 1 Exhaust Fan |
| SS_RH4_PS01_GEN0190 | PS 1 Standby Generator |
| SS_RH4_PS01_ATS0191 | PS 1 Automatic Transfer Switch (ATS) |

### 5.1.2 Instruments

| Table 5-2. PS 1 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH4_PS01_YA0108A | PS 1 Beacon |
| SS_RH4_PS01_YA0108B | PS 1 Horn |
| SS_RH4_PS01_ZSC0111 | PS 1 Pump 1 Check Valve Limit Switch |
| SS_RH4_PS01_FIT0112 | PS 1 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH4_PS01_ ZSC0121 | PS 1 Pump 2 Check Valve Limit Switch |
| SS_RH4_PS01_ FIT0122 | PS 1 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH4_PS01_YS0100 | PS 1 Intrusion Switch |
| SS_RH4_PS01_LSH0107 | PS 1 Flood Switch |
| SS_RH4_PS01_LT0141 | PS 1 Level Transmitter (Primary) |
| SS_RH4_PS01_ LIT0142 | PS 1 FogRod Level Transmitter (Secondary) |
| SS_RH4_PS01_ PIT0135 | PS 1 Discharge Pressure Transmitter (Future) |
| SS_RH4_PS01_ZSO0150 | PS 1 Flush Valve Open Limit Switch (Future) |
| SS_RH4_PS01_ZSC0150 | PS 1 Flush Valve Closed Limit Switch (Future) |
| SS_RH4_PS01_FSL0161 | PS 1 Exhaust Fan Low Flow Switch |
| SS_RH4_PS01_ LT0190 | PS 1 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.1.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:

   i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

   ii. When SCADA Manual control is selected, the pumps operate as follows:

      1. The operator can manually start and stop the pump via the SCADA HMI.

      2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH3_PS01_LT0141). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH3_PS01_LIT0142).

   ii. When primary level transmitter SCADA Auto control is selected, the pumps operate as follows:

      1. During operation, two pumps operate as Lead/Lag.

      2. On rising wetwell level:

         a. Initial state:

            i. The level is below the Start Lead level set point, and all pumps are stopped.

         b. Start Lead pump:

            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

         c. Start Lag pump:

            i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

      3. On falling wetwell level:

         a. Stop Lead pump:

            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag pump:

i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

i. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, two pumps operate as Lead/Lag.

2. On rising wetwell level:

c. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

d. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

e. Start Lag pump:

i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:

f. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

g. Stop Lag pump:

i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iii. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

iv. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High high level (XX FT, setpoint TBD): Start Pump 2.
3. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-3 below.

**Table 5-3. PS 1 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |

| Table 5-3. PS 1 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

Set points to be tuned in the field during start up.

B. The PS 1 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

  a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.
  b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
  c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).
  d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.
  e. The low flow alarm is monitored at SCADA.

### 5.1.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

  a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.1.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

  a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.
  b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. In the future, wetwell high high level (operator adjustable) will cause the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.1.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 1 Level Transmitter (Primary)

1. Level

ii. PS 1 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 1 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

iv. PS 1 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

v. PS 1 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vi. PS 1 Pump 1 Check Valve Limit Switch

1. Closed

vii. PS 1 Pump 2 Check Valve Limit Switch

1. Closed

viii. PS 1 Flush Valve (Future)

1. In remote (Future)

ix. PS 1 Flush Valve Open Position Switch (Future)

1. Open (Future)

x. PS 1 Flush Valve Closed Position Switch (Future)

1. Closed (Future)

xi. PS 1 Generator

1. Run

xii. PS 1 Generator Fuel Level Sensor (Future)

1. Level (Future)

xiii. PS 1 ATS

1. ATS in normal

2. ATS in generator
3. ATS utility power available

xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xv. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.1.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 1 FogRod Level Transmitter (via relay outputs)

1. Wetwell high-high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 1 Flood Switch

1. Flood alarm

iii. PS 1 Station Intrusion Switch

1. Intrusion alarm

iv. PS 1 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 1 Generator

1. Fail
2. Low fuel alarm
3. Pre-alarm warning

vi. PS 1 Motor Control Panel

1. Phase fail

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for ‘Insufficient Pumps in Ready State’ alarm:

1. Require a minimum of one pump to be in Ready State, or generate an alarm.

ii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iii. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

iv. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.1.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 1 Pumps 1-2 Flow Meters/Transmitters (SS_RH3_PS01_FIT0112/22).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.1.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.2 Pump Station 4

Pump Station (PS) 4 is located within Reach 3, serving the western to northern end of the island before ending at the King County North Mercer Pump Station. PS 4 is a wetwell configuration with three variable speed submersible pumps. This station has an above ground control building and a remote control box.

**Control Overview.** The three variable speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 4 to the King County North Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with a primary level transmitter and level switches for level control and monitoring. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a level switch system provides secondary monitoring and hardwired backup control for the pumps. The level switch system consists of a series of level float switches wired to the IS Panel, which provides hardwired control directly to the MCC. The level transmitter monitors the level of the wetwell.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow.** A magnetic flow meter measures the discharge flow of the pump station. In the future, three magnetic flow meters will be installed to monitor the discharge flow of each pump.

**Control Building and Wetwell Vent Fans.** Existing fans in the control building and wetwell are monitored by SCADA.

**Generator and Automatic Transfer Switch.** Pump Station 4 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA and are both located in the indoor electrical control room.

**Remote Control Box CP-3.** Pump Station 4 has an existing remote control panel CP-3 with a remote start option for each pump, alarm reset, low float bypass, and pump running indication.

**Combustible Gas Detector Panel CP-CGD.** Pump Station 4 has an existing combustible gas detector panel for the wetwell classified area.

**Ventilation Fan Low Flow Switch.** An exhaust fan in the ventilation vault provides the required number of air changes for the wetwell scrubber. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated.

### 5.2.1 Equipment

| Table 5-4. PS 4 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH3_PS04_CAB0400 | PS 4 PLC Panel |
| SS_RH3_PS04_MCC-1 | PS 4 Motor Control Center |
| SS_RH3_PS04_RSP0410 | PS 4 Pump 1 |
| SS_RH3_PS04_RSP0420 | PS 4 Pump 2 |
| SS_RH3_PS04_RSP0430 | PS 4 Pump 3 |
| SS_RH3_PS04_IS0440 | PS 4 Intrinsically Safe (IS) Panel |
| CP-3 | PS 4 Remote Control Box |
| CP-CGD | PS 4 Combustible Gas Detector Panel |
| SS_RH3_PS04_EF0471 | PS 4 Control Building Fan |
| SS_RH3_PS04_EF0462 | PS 4 Wetwell Vent Fan |
| SS_RH3_PS04_GEN0490 | PS 04 Standby Generator |
| SS_RH3_PS04_ATS0491 | PS 04 Automatic Transfer Switch (ATS) |

### 5.2.2 Instruments

| Table 5-5. PS 4 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH3_PS04_MSH0410 | PS 4 Pump 1 Moisture Limit Switch |
| SS_RH3_PS04_TSH0410 | PS 4 Pump 1 Temperature Limit Switch |
| SS_RH3_PS04_ZSC0411 | PS 4 Pump 1 Check Valve Limit Switch |
| SS_RH3_PS04_FIT0412 | PS 4 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH3_PS04_MSH0420 | PS 4 Pump 2 Moisture Limit Switch |
| SS_RH3_PS04_TSH0420 | PS 4 Pump 2 Temperature Limit Switch |
| SS_RH3_PS04_ ZSC0421 | PS 4 Pump 2 Check Valve Limit Switch |
| SS_RH3_PS04_ FIT0422 | PS 4 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH3_PS04_MSH0430 | PS 4 Pump 3 Moisture Limit Switch |
| SS_RH3_PS04_TSH0430 | PS 4 Pump 3 Temperature Limit Switch |
| SS_RH3_PS04_ ZSC0431 | PS 4 Pump 3 Check Valve Limit Switch |
| SS_RH3_PS04_ FIT0432 | PS 4 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH3_PS04_ PIT0435 | PS 4 Discharge Pressure Transmitter (Future) |
| SS_RH3_PS04_ FIT0438 | PS 4 Station Discharge Flow Meter |
| SS_RH3_PS04_ LSH0479 | PS 4 Control Building Flood Switch |
| SS_RH3_PS04_ LSH0439 | PS 4 Flow Meter Vault Flood Switch |
| SS_RH3_PS04_YS0400 | PS 4 Vault & Wetwell Intrusion Switches |

**Table 5-5. PS 4 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH3_PS04_LT0441 | PS 4 Level Transducer (Primary) |
| SS_RH3_PS04_ LSL0442 | PS 4 Low Level Switch (Secondary) |
| SS_RH3_PS04_ LSH0442 | PS 4 High Level Switch (Secondary) |
| SS_RH3_PS04_ LSHH0442 | PS 4 High High Level Switch (Secondary) |
| SS_RH3_PS04_ YS0470 | PS 4 Control Building Door Intrusion |
| SS_RH3_PS04_ SD0472 | PS 4 Control Building Smoke Detector |
| SS_RH3_PS04_ CGD0473 | PS 4 Combustible Gas Detector |
| SS_RH3_PS04_ LSH0479 | PS 4 Control Building Flood Switch |
| SS_RH3_PS04_ LT0490 | PS 4 Generator Fuel Level Sensor (Future) |
| SS_RH3_PS04_FSL0461 | PS 4 Ventilation Fan Low Flow Switch |

*Future instruments are included in the operation description.*

### 5.2.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor control center bucket for each pump can be operated as follows:

a. Local Manual Control:

i. When the HOA is in HAND, local control is enabled. The operator can then select the speed of the pump using the speed dial to start the pump. Once a speed is selected, the pump runs continuously.

ii. OFF stops the pump.

iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:

i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

ii. When SCADA Manual control is selected, the pumps operate as follows:

1. The operator can manually start and stop the pump via the SCADA HMI. The pump speed is not selectable via the SCADA HMI.

2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

i. When SCADA Auto control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:

a. Initial state:

i. The level is below the Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

ii. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

iii. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the float level switches are hardwired to start and stop the pumps. The float level switch output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

e. Speed Control:

i. The speed control for each VFD is handled via programming setup in the VFD drive only. Speed monitoring and control are not handled by SCADA.

f. Wetwell level control is summarized in Table 5-6 below.

**Table 5-6. PS 4 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| LSHH (Relay Output) | Hardwired | Level switch high high level alarm | | |
| LSH (Relay Output) | Hardwired | Start Pump 1 / Level switch high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | |
| Level Transmitter | Software | Start Lag 1 Pump | | |
| LSHH | Software | Start Lag 1 Pump<br>Time delay Start Lag 2 Pump | | |
| Level Transmitter | Software | Start Lead Pump | | |
| LSH | Software | Start Lead Pump | | |
| Level Transmitter | Software | Stop Lag 1 Pump | | |
| LSL | Software | Stop Lead Pump<br>Stop Lag 1 Pump<br>Stop Lag 2 Pump | | |
| Level Transmitter | Software | Stop Lag 2 Pump | | |
| Level Transmitter | Software | Stop Lead Pump | | |
| LSL (Relay Output) | Hardwired | Stop Pump(s) /Level switch low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level switch control starts pumps logic |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

Set points to be tuned in the field during start up.

g. Control Panel CP-3 Panel Mode:

i. When CP-3 Panel mode is enabled, level control mode is disabled.

ii. When the HOA is in AUTO, the pump start/stop is based off the selector switch position. The pump selector switches at the control panel CP-3 can be operated as follows:

1. Pump 1 Remote Start: The operator can manually start and stop the pump via the selector switch.
2. Pump 2 Remote Start: The operator can manually start and stop the pump via the selector switch.
3. Pump 3 Remote Start: The operator can manually start and stop the pump via the selector switch.

iii. Low Level Float Bypass: The operator can manually bypass the low float alarm at the OIT via the selector switch.

iv. CP-3 Alarm Alert: The CP-3 control panel will alert the operator of an alarm with the horn and red indication light alarm. The following conditions will activate the alarm system:

1. Level Alarms per Table 5-6.
2. Pump(s) Alarm per Section 5.2.7

v. The operator can push the Alarm Reset pushbutton to temporarily silence the horn and red indication light alarm at the CP-3 control panel. This will also reset alarms for the level switches at OIT/SCADA if within normal ranges.

### 5.2.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload, overtemperature, seal fail, and VFD fault are hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.2.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears.

b. Wetwell low level based on the level switches causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. Pump Inhibit/Disable can be selected by operator to shutdown or prohibit start.

### 5.2.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 4 Level Transmitter (Primary)

1. Level

ii. PS 4 Station Discharge Flow Meter/Transmitter
    1. Flow
    2. Flow pulse
iii. PS 4 Pump 1 Discharge Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)
iv. PS 4 Pump 2 Discharge Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)
v. PS 4 Pump 3 Discharge Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)
vi. PS 4 Discharge Pressure Transmitter (Future)
    1. Pressure (Future)
vii. PS 4 Pump 1 Check Valve Limit Switch
    1. Closed
viii. PS 4 Pump 2 Check Valve Limit Switch
    1. Closed
ix. PS 4 Pump 3 Check Valve Limit Switch
    1. Closed
x. PS 4 Generator
    1. Run
xi. PS 4 Generator Fuel Level Sensor (Future)
    1. Level (Future)
xii. PS 4 ATS
    1. ATS in normal
    2. ATS in generator
    3. ATS utility power available
xiii. PS 4 Wetwell Vent Fan
    1. Auto
xiv. PS 4 Control Building Fan
    1. Auto
xv. PS 4 Smoke Detector
    1. Supervisory input
xvi. PS 4 CP-3 Remote Panel
    1. Remote panel mode

2. Low level float bypass
3. Pump 1 Remote Start
4. Pump 2 Remote Start
5. Pump 3 Remote Start

xvii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xviii. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

c. Network

i. Pump 1 VFD (Modbus TCP/IP – For Information)

ii. Pump 2 VFD (Modbus TCP/IP – For Information)

iii. Pump 3 VFD (Modbus TCP/IP – For Information)

iv. Exhaust Fan VFD (Modbus TCP/IP – For Information)

### 5.2.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 4 Pump 1

1. Motor Temperature High
2. Moisture Leak Seal Fail

ii. PS 4 Pump 2

1. Motor Temperature High
2. Moisture Leak Seal Fail

iii. PS 4 Pump 3

1. Motor Temperature High
2. Moisture Leak Seal Fail

iv. PS 4 Float Level Switches (via relay outputs)

1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level

v. PS 4 Flow Meter Vault Flood Switch

1. Flood alarm

vi. PS 4 Control Building Flood Switch
    1. Flood alarm
vii. PS 4 Ventilation Fan Low Flow Switch
    1. Low Flow
viii. PS 4 Vault & Wetwell Intrusion Switches
    1. Intrusion alarm
ix. PS 4 Control Building Intrusion Switch
    1. Intrusion alarm
x. PS 4 Smoke Detector
    1. Input alarm
xi. PS 4 Gas Detector
    1. Trouble
    2. Gas detection alarm
xii. PS 4 Generator
    1. Fail
    2. Low fuel alarm
    3. Pre-alarm warning
    4. Remote Shutdown
xiii. PS 4 MCC Phase Monitor
    1. Fail
xiv. PS 4 CP-3 Remote Panel
    1. CP-3 Alarm alert
xv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xvi. Refer to Section 3.7 for common alarm functions:
    1. Common panel hardwired alarms

b. Software:
    i. Refer to 3.9.3 for ‘Insufficient Pumps in Ready State’ alarm:
        1. Require a minimum of two pumps to be in Ready State, or generate an alarm.
    ii. Lag 2 pump called to run
        1. Generate an alarm when the Lag 2 pump is called to run.
    iii. Level transmitter measurement discrepancy
        1. Refer to Section 5.1.8.
    iv. Refer to Section 3.7 for common alarm functions:
        1. Communication interface alarms

2. Site PLC alarms

v. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.2.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. While pumps are running, this calculation is paused.

b. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 4 Pumps 1-3 Flow Meters/Transmitters (SS_RH3_PS04_FIT0412/22/32).

c. Flow Pulse Totalization

i. Refer to flow pulse totalization in Section 3.2.4.

d. Pump run times

i. Refer to equipment run times in Section 3.2.2.

e. Pump starts

i. Refer to equipment starts in Section 3.2.3.

f. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.2.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment automatically restarts at the speed indicated on the speed dial.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

c. When the Generator Remote Shutdown pushbutton is activated, the pushbutton is hardwired directly to stop the generator. An alarm will be sent via SCADA to alert the operator. An operator will need to manually reset the generator on site to de-activate the alarm.

## 5.3 Pump Station 10

Pump Station (PS) 10 is located within Reach 5, serving the northeastern side of the island before ending at Pump Station 11. PS 10 is a dry well/wetwell configuration with two constant speed pumps.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 10 to the next pump station, PS 11, where it then flows directly into King County's pipeline. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 10 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.3.1 Equipment

**Table 5-7. PS 10 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH5_PS10_CAB1000 | PS 10 PLC Panel |
| SS_RH5_PS10_GNG1000 | PS 10 Go/No-Go Panel |
| SS_RH5_PS10_MCP1010 | PS 10 Motor Control Panel |
| SS_RH5_PS10_RSP1010 | PS 10 Pump 1 |
| SS_RH5_PS10_RSP1020 | PS 10 Pump 2 |
| SS_RH5_PS10_IS1040 | PS 10 Intrinsically Safe (IS) Panel |
| SS_RH5_PS10_EF1060 | PS 10 Exhaust Fan |
| SS_RH5_PS10_GEN1090 | PS 10 Standby Generator |
| SS_RH5_PS10_ATS1091 | PS 10 Automatic Transfer Switch (ATS) |

### 5.3.2 Instruments

| Table 5-8. PS 10 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH5_PS10_YA1008A | PS 10 Beacon |
| SS_RH5_PS10_YA1008B | PS 10 Horn |
| SS_RH5_PS10_ZSC1011 | PS 10 Pump 1 Check Valve Limit Switch |
| SS_RH5_PS10_FIT1012 | PS 10 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH5_PS10_ ZSC1021 | PS 10 Pump 2 Check Valve Limit Switch |
| SS_RH5_PS10_ FIT1022 | PS 10 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH5_PS10_YS1000 | PS 10 Intrusion Switch |
| SS_RH5_PS10_LSH1007 | PS 10 Flood Switch |
| SS_RH5_PS10_LT1041 | PS 10 Level Transmitter (Primary) |
| SS_RH5_PS10_ LIT1042 | PS 10 FogRod Level Transmitter (Secondary) |
| SS_RH5_PS10_ PIT1035 | PS 10 Discharge Pressure Transmitter (Future) |
| SS_RH5_PS10_FSL1061 | PS 10 Exhaust Fan Low Flow Switch |
| SS_RH5_PS10_ LT1090 | PS 10 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.3.3 Operation

B. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:
   a. Local Manual Control:
      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.
      ii. OFF stops the pump.
      iii. AUTO enables SCADA control or local hardwired control (backup level control).
   b. SCADA Manual Control:
      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
      ii. When SCADA Manual control is selected, the pumps operate as follows:
         1. The operator can manually start and stop the pump via the SCADA HMI.
         2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:
   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH5_PS10_LT1041). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH5_PS10_LIT1042).
   ii. When primary level transmitter SCADA Auto control is selected, the pumps operate as follows:
      1. During operation, two pumps operate as Lead/Lag.
      2. On rising wetwell level:
         a. Initial state:
            i. The level is below the Start Lead level set point, and all pumps are stopped.
         b. Start Lead pump:
            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
         c. Start Lag pump:
            i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.
            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.
      3. On falling wetwell level:
         a. Stop Lead pump:
            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
         b. Stop Lag pump:
            i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.
   iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:
      1. During operation, two pumps operate as Lead/Lag.
      2. On rising wetwell level:
         a. Initial state:
            i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:
    i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag pump:
    i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.
    ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag pump:
        i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:
    i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:
        1. High level (XX FT, setpoint TBD): Start Pump 1.
        2. High High level (XX FT, setpoint TBD): Start Pump 2.
        3. Low level (XX FT, setpoint TBD): Stop all pumps.
    ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.
    iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-9 below.

**Table 5-9. PS 10 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

Set points to be tuned in the field during start up.

C. The PS 10 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.
   b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
   c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).
   d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.
   e. The low flow alarm is monitored at SCADA.

### 5.3.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

   a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.3.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

   a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.
   b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.
   c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.3.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 10 Level Transmitter (Primary)

1. Level

ii. PS 10 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 10 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 10 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

v. PS 10 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vi. PS 10 Pump 1 Check Valve Limit Switch

1. Closed

vii. PS 10 Pump 2 Check Valve Limit Switch

1. Closed

viii. PS 10 Generator

1. Run

ix. PS 10 Generator Fuel Level Sensor (Future)

1. Level (Future)

x. PS 10 ATS

1. ATS in normal
2. ATS in generator
3. ATS utility power available

xi. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xii. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.3.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 10 FogRod Level Transmitter (via relay outputs)

1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 10 Flood Switch

1. Flood alarm

iii. PS 10 Station Intrusion Switch

1. Intrusion alarm

iv. PS 10 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 10 Generator

1. Fail
2. Low fuel alarm
3. Pre-alarm warning

vi. PS 10 Motor Control Panel

1. Phase fail

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of one pump to be in Ready State, or generate an alarm.

ii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iii. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

iv. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.3.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 10 Pumps 1-2 Flow Meters/Transmitters (SS_RH5_PS10_FIT1012/22).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.3.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.4 Flush Station 12

Flush Station (FS) 12 is located within Reach 5, serving the northeastern side of the island before ending at Pump Station 11. FS 12 is a dry well configuration with one constant speed pump that serves as flush pump.

**Control Overview.** The constant speed pump operates using duty control to draw water from the lake structure and discharge to the lakeline system. From the Lakeline pipe, the water is transferred from FS 12 to pump station PS 11, the final destination in the reach. The pump starts and stops based on an operator set time interval.

### 5.4.1 Equipment

| Table 5-10. FS 12 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH5_FS12_CAB1200 | FS 12 PLC Panel |
| SS_RH5_FS12_MCP1210 | FS 12 Motor Control Panel |
| SS_RH5_FS12_FLP1210 | FS 12 Pump 1 |

### 5.4.2 Instruments

| Table 5-11. FS 12 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH5_FS12_YS1200 | FS 12 Intrusion Switch |

*Future instruments are included in the operation description.*

### 5.4.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for the pump can be operated as follows:
   a. Local Manual Control:
      i. When the HOA is in HAND, local control is enabled. The operator can then select the RUN pushbutton to start the pump. Once RUN is pushed, the pump runs continuously.
      ii. OFF stops the pump.
      iii. AUTO enables SCADA control.
   b. SCADA Manual Control:
      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
      ii. When SCADA Manual control is selected, the pump operates as follows:
         1. The operator can manually start and stop the pump via the SCADA HMI.
   c. SCADA Auto Control:
      i. When SCADA Auto control is selected, the valve operates as follows:
         1. The valve is commanded to open automatically at a set time of day (initially set at 12:30 AM) for 3 minutes (operator adjustable).

### 5.4.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.4.5 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ii. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Flush Pump Start Time

ii. Flush Pump Stop Time

iii. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.4.6 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. FS 12 Station Intrusion Switch

1. Intrusion alarm

ii. FS 12 General Fail

1. Fail alarm

iii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

iv. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Flush pump to be in Ready State or generate an alarm.

ii. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

### 5.4.7 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Pump run times

i. Refer to equipment run times in Section 3.2.2.

b. Pump starts

i. Refer to equipment starts in Section 3.2.3.

## 5.5 Pump Station 13

Pump Station (PS) 13 is located within Reach 3, serving the western to northern end of the island before ending at the King County North Mercer Pump Station. PS 13 is a dry well/wetwell configuration with two constant speed pumps.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 13 to the next pump station, PS 4, in the reach, eventually ending at the King County North Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve (Future).** The flush valve at PS 13 will be replaced as part of a future project. The existing flush valve is not operable and is not connected to SCADA. Once replaced, the existing flush system will draw water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. The future flush valve will consist of a new valve and electric actuator. Limit switches will monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 13 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.5.1 Equipment

| Table 5-12. PS 13 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH3_PS13_CAB1300 | PS 13 PLC Panel |
| SS_RH3_PS13_GNG1300 | PS 13 Go/No-Go Panel |
| SS_RH3_PS13_RIO1300 | PS 13 Remote I/O Panel |
| SS_RH3_PS13_MCP1310 | PS 13 Motor Control Panel |
| SS_RH3_PS13_RSP1310 | PS 13 Pump 1 |
| SS_RH3_PS13_RSP1320 | PS 13 Pump 2 |
| SS_RH3_PS13_IS1340 | PS 13 Intrinsically Safe (IS) Panel |
| SS_RH3_PS13_FLV1350 | PS 13 Flush Valve (Future) |
| SS_RH3_PS13_ACT1350 | PS 13 Flush Valve Electric Actuator (Future) |
| SS_RH3_PS13_EF1360 | PS 13 Exhaust Fan |
| SS_RH3_PS13_GEN1390 | PS 13 Standby Generator |
| SS_RH3_PS13_ATS1391 | PS 13 Automatic Transfer Switch (ATS) |

### 5.5.2 Instruments

| Table 5-13. PS 13 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH3_PS13_YA1308A | PS 13 Beacon |
| SS_RH3_PS13_YA1308B | PS 13 Horn |
| SS_RH3_PS13_ZSC1311 | PS 13 Pump 1 Check Valve Limit Switch |
| SS_RH3_PS13_FIT1312 | PS 13 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH3_PS13_ ZSC1321 | PS 13 Pump 2 Check Valve Limit Switch |
| SS_RH3_PS13_ FIT1322 | PS 13 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH3_PS13_YS1300 | PS 13 Intrusion Switch |
| SS_RH3_PS13_LSH1307 | PS 13 Flood Switch |
| SS_RH3_PS13_LT1341 | PS 13 Level Transmitter (Primary) |
| SS_RH3_PS13_ LIT1342 | PS 13 FogRod Level Transmitter (Secondary) |
| SS_RH3_PS13_ PIT1335 | PS 13 Discharge Pressure Transmitter (Future) |
| SS_RH3_PS13_ZSO1350 | PS 13 Flush Valve Open Limit Switch (Future) |
| SS_RH3_PS13_ZSC1350 | PS 13 Flush Valve Closed Limit Switch (Future) |
| SS_RH3_PS13_FSL1361 | PS 13 Exhaust Fan Low Flow Switch |

**Table 5-13. PS 13 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH3_PS13_LSH1390 | PS 13 Generator Vault Flood Switch |
| SS_RH3_PS13_ LT1390 | PS 13 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.5.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

   b. SCADA Manual Control:

      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

      ii. When SCADA Manual control is selected, the pumps operate as follows:

         1. The operator can manually start and stop the pump via the SCADA HMI.

         2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

   c. SCADA Auto Control:

      i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH3_PS13_LT1341). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH3_PS13_LIT1342).

      ii. When primary level transmitter SCADA Auto control is selected, the pumps operate as follows:

         1. During operation, two pumps operate as Lead/Lag.

         2. On rising wetwell level:

            a. Initial state:

               i. The level is below the Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

   i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag pump:

   i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

   ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:

   a. Stop Lead pump:

      i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

   b. Stop Lag pump:

      i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

i. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

   1. During operation, two pumps operate as Lead/Lag.

   2. On rising wetwell level:

      a. Initial state:

         i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

      b. Start Lead pump:

         i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

      c. Start Lag pump:

         i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

         ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

   3. On falling wetwell level:

      a. Stop Lead pump:

         i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag pump:

i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

ii. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

iii. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-14 below.

**Table 5-14. PS 13 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-14. PS 13 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

Set points to be tuned in the field during start up.

B. The PS 13 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:
   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.
   b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
   c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.5.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

   a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.5.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

   a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

   b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

   c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.5.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

   a. Hardwired:

      i. PS 13 Level Transmitter (Primary)

         1. Level

      ii. PS 13 FogRod Level Transmitter (Secondary)

         1. Level

      iii. PS 13 Pump 1 Discharge Flow Meter/Transmitter (Future)

         1. Flow (Future)
         2. Flow pulse (Future)

      iv. PS 13 Pump 2 Discharge Flow Meter/Transmitter (Future)

         1. Flow (Future)
         2. Flow pulse (Future)

      v. PS 13 Discharge Pressure Transmitter (Future)

         1. Pressure (Future)

      vi. PS 13 Pump 1 Check Valve Limit Switch

         1. Closed

vii. PS 13 Pump 2 Check Valve Limit Switch
1. Closed
viii. PS 13 Flush Valve (Future)
1. In remote (Future)
ix. PS 13 Flush Valve Open Position Switch (Future)
1. Open (Future)
x. PS 13 Flush Valve Closed Position Switch (Future)
1. Closed (Future)
xi. PS 13 Generator
1. Run
xii. PS 13 Generator Fuel Level Sensor (Future)
1. Level (Future)
xiii. PS 13 ATS
1. ATS in normal
2. ATS in generator
3. ATS utility power available
xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xv. Refer to Section 3.7 for common monitoring functions:
1. Common panel hardwired status points.

b. Software:
i. Refer to Section 3.7 for common monitoring functions:
1. Communication interfaces
2. Site PLC monitoring

### 5.5.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:
i. PS 13 FogRod Level Transmitter (via relay outputs)
1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)
ii. PS 13 Flood Switch
1. Flood alarm

iii. PS 13 Station Intrusion Switch
   1. Intrusion alarm
iv. PS 13 Exhaust Fan Low Flow Switch
   1. Low Flow
v. PS 13 Generator
   1. Fail
   2. Low fuel alarm
   3. Pre-alarm warning
vi. PS 13 Generator Vault Flood Switch
   1. Flood alarm
vii. PS 13 Motor Control Panel
   1. Phase fail
viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
ix. Refer to Section 3.7 for common alarm functions:
   1. Common panel hardwired alarms

b. Software:
   i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:
      1. Require a minimum of one pump to be in Ready State, or generate an alarm.
   ii. Level transmitter measurement discrepancy
      1. Refer to Section 5.1.8.
   iii. Refer to Section 3.7 for common alarm functions:
      1. Communication interface alarms
      2. Site PLC alarms
   iv. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.5.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:
   a. Wetwell level rate of rise and station inlet flow
      i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

   i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

   i. Calculate the station total flow as the sum of the PS 13 Pumps 1-2 Flow Meters/Transmitters (SS_RH3_PS13_FIT1312/22).

d. Flow Pulse Totalization (Future)

   i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

   i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

   i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

   i. Refer to equipment run times in Section 3.2.2.

### 5.5.9 Operation on Generator

A. Loss of Power:

   a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

   b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.6 Pump Station 14

Pump Station (PS) 14 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 14 is a submersible pump station, consisting of a wetwell with two constant speed submersible pumps and two below grade vaults. An above ground control panel enclosure houses control and electrical equipment. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 14 to the next pump station, PS 15, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. An ultrasonic level transmitter is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Generator and Automatic Transfer Switch.** Pump Station 14 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch and intrusion switch that are monitored by SCADA.

### 5.6.1 Equipment

**Table 5-15. PS 14 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH2_PS14_CAB1400 | PS 14 PLC Panel |
| SS_RH2_PS14_MCP1410 | PS 14 Pump 1 Motor Control Panel |
| SS_RH2_PS14_MCP1420 | PS 14 Pump 2 Motor Control Panel |
| SS_RH2_PS14_RSP1410 | PS 14 Pump 1 |
| SS_RH2_PS14_RSP1420 | PS 14 Pump 2 |
| SS_RH2_PS14_IS1440A | PS 14 Level Control Panel |
| SS_RH2_PS14_IS1440B | PS 14 Intrinsically Safe (IS) Panel |
| SS_RH2_PS14_GEN1490 | PS 14 Standby Generator |
| SS_RH2_PS14_ATS1491 | PS 14 Automatic Transfer Switch (ATS) |

### 5.6.2 Instruments

**Table 5-16. PS 14 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH2_PS14_MSH1110 | PS 14 Pump 1 Moisture Limit Switch |
| SS_RH2_PS14_TSH1410 | PS 14 Pump 1 Temperature Limit Switch |
| SS_RH2_PS14_ZSC1411 | PS 14 Pump 1 Check Valve Limit Switch |

| Table 5-16. PS 14 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS14_FIT1412 | PS 14 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS14_MSH1420 | PS 14 Pump 2 Moisture Limit Switch |
| SS_RH2_PS14_TSH1420 | PS 14 Pump 2 Temperature Limit Switch |
| SS_RH2_PS14_ ZSC1421 | PS 14 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS14_ FIT1422 | PS 14 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS14_YS1400 | PS 14 Wetwell Intrusion Switch |
| SS_RH2_PS14_YS1407 | PS 14 Control Panel Intrusion Switch |
| SS_RH2_PS14_YS1408 | PS 14 Valve Vault Intrusion Switch |
| SS_RH2_PS14_LIT1441 | PS 14 Level Transmitter (Primary) |
| SS_RH2_PS14_ LIT1442 | PS 14 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS14_ PIT1435 | PS 14 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS14_FT1438 | PS 14 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS14_ LT1490 | PS 14 Generator Fuel Level Sensor (Future) |
| SS_RH2_PS14_LSH1490 | PS 14 Generator Vault Flood Switch |
| SS_RH2_PS14_YS1490C | PS 14 Generator Vault Intrusion Switch |

*Future instruments are included in the operation description.*

### 5.6.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. Once HAND is selected, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

   b. SCADA Manual Control:

      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

      ii. When SCADA Manual control is selected, the pumps operate as follows:

         1. The operator can manually start and stop the pump via the SCADA HMI.

         2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS14_LIT1441). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS14_LIT1442).

   ii. When primary level transmitter SCADA Auto control is selected, the pumps operate as follows:

      1. During operation, two pumps operate as Lead/Lag.

      2. On rising wetwell level:

         a. Initial state:

            i. The level is below the Start Lead level set point, and all pumps are stopped.

         b. Start Lead pump:

            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

         c. Start Lag pump:

            i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

      3. On falling wetwell level:

         a. Stop Lead pump:

            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

         b. Stop Lag pump:

            i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

   iii. When FogRod SCADA Auto control is selected, the pumps operate as follows:

      1. During operation, two pumps operate as Lead/Lag.

      2. On rising wetwell level:

         a. Initial state:

            i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag pump:

i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag pump:

i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.

2. High High level (XX FT, setpoint TBD): Start Pump 2.

3. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-17 below.

**Table 5-17. PS 14 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low low level |

*Set points to be tuned in the field during start up.*

### 5.6.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload and overtemperature are hardwired to shut off the motor. The motor overtemperature reset button is located on front of the motor control panel. Motor overload can be reset from inside the motor control panel.

### 5.6.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.6.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 14 Level Transmitter (Primary)

1. Level

ii. PS 14 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 14 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

iv. PS 14 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

v. PS 14 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vi. PS 14 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

vii. PS 14 Pump 1 Check Valve Limit Switch

1. Closed

viii. PS 14 Pump 2 Check Valve Limit Switch

1. Closed

ix. PS 14 Generator

1. Run

x. PS 14 Generator Fuel Level Sensor (Future)
   1. Level (Future)

xi. PS 14 ATS
   1. ATS in normal
   2. ATS in generator
   3. ATS utility power available

xii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xiii. Refer to Section 3.7 for common monitoring functions:
   1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:
   1. Communication interfaces
   2. Site PLC monitoring

### 5.6.7 Alarming

B. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 14 FogRod Level Transmitter (via relay outputs)
   1. Wetwell high high level
   2. Wetwell high level
   3. Wetwell low level
   4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 14 Wetwell Intrusion Switch
   1. Intrusion alarm

iii. PS 14 Control Panel Intrusion Switch
   1. Intrusion alarm

iv. PS 14 Valve Vault Intrusion Switch
   1. Intrusion alarm

v. PS 14 Generator
   1. Fail
   2. Low fuel alarm
   3. Pre-alarm warning

vi. PS 14 Generator Vault Intrusion Switch
   1. Intrusion alarm

vii. PS 14 Generator Vault Flood Switch
  1. Flood alarm
viii. PS 14 Pump 1 Control Power
  1. Power OK
ix. PS 14 Pump 2 Control Power
  1. Power OK
x. PS 14 Pump 1 Motor Control Panel
  1. Phase fail
xi. PS 14 Pump 2 Motor Control Panel
  1. Phase fail
xii. PS 14 Pump 1 Moisture Switch
  1. Moisture leak
xiii. PS 14 Pump 2 Moisture Switch
  1. Moisture leak
xiv. PS 14 Pump 1 High Temperature Switch
  1. Temperature high
xv. PS 14 Pump 2 High Temperature Switch
  1. Temperature high
xvi. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xvii. Refer to Section 3.7 for common alarm functions:
  1. Common panel hardwired alarms

b. Software:
  i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:
    1. Require a minimum of one pump to be in Ready State, or generate an alarm.
  ii. Level transmitter measurement discrepancy
    1. Refer to Section 5.1.8.
  iii. PS 14 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
    1. Flow alarm (Future)
  iv. Refer to Section 3.7 for common alarm functions:
    1. Communication interface alarms
    2. Site PLC alarms
  v. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.6.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 14 Pumps 1-2 Flow Meters/Transmitters (SS_RH2_PS14_FIT1412/22) minus the flow measured through the HGMH (SS_RH2_PS14_FIT1438).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.6.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment automatically restarts when power is returned.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.7 Pump Station 15

Pump Station (PS) 15 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 15 is a dry well/wetwell configuration with two constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 15 to the next pump station, PS 16, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve.** The flush valve at PS 15 consists of a butterfly valve and electric actuator. The flush system draws water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. The flush valve opens at set time intervals to flush the Lakeline pipe. Typically, flushing happens during low flows (at night). Limit switches monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 15 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.7.1 Equipment

| Table 5-18. PS 15 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS15_CAB1500 | PS 15 PLC Panel |
| SS_RH2_PS15_GNG1500 | PS 15 Go/No-Go Panel |
| SS_RH2_PS15_MCP1510 | PS 15 Motor Control Panel |
| SS_RH2_PS15_RSP1510 | PS 15 Pump 1 |
| SS_RH2_PS15_RSP1520 | PS 15 Pump 2 |
| SS_RH2_PS15_IS1540 | PS 15 Intrinsically Safe (IS) Panel |
| SS_RH2_PS15_ACT1550 | PS 15 Flush Valve Electric Actuator |
| SS_RH2_PS15_FLV1550 | PS 15 Flush Valve |
| SS_RH2_PS15_EF1560 | PS 15 Exhaust Fan |
| SS_RH2_PS15_GEN1590 | PS 15 Standby Generator |
| SS_RH2_PS15_ATS1591 | PS 15 Automatic Transfer Switch (ATS) |

### 5.7.2 Instruments

| Table 5-19. PS 15 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS15_YA1508A | PS 15 Beacon |
| SS_RH2_PS15_YA1508B | PS 15 Horn |
| SS_RH2_PS15_ZSC1511 | PS 15 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS15_FIT1512 | PS 15 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS15_ ZSC1521 | PS 15 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS15_ FIT1522 | PS 15 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS15_YS1500 | PS 15 Intrusion Switch |
| SS_RH2_PS15_LSH1507 | PS 15 Flood Switch |
| SS_RH2_PS15_LT1541 | PS 15 Level Transmitter (Primary) |
| SS_RH2_PS15_ LIT1542 | PS 15 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS15_ PIT1535 | PS 15 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS15_ZSO1550 | PS 15 Flush Valve Open Limit Switch |
| SS_RH2_PS15_ZSC1550 | PS 15 Flush Valve Closed Limit Switch |
| SS_RH2_PS15_FSL1561 | PS 15 Exhaust Fan Low Flow Switch |
| SS_RH2_PS15_FT1538 | PS 15 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS15_ LT1590 | PS 15 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.7.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

- a. Local Manual Control:
  - i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.
  - ii. OFF stops the pump.
  - iii. AUTO enables SCADA control or local hardwired control (backup level control).
- b. SCADA Manual Control:
  - i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
  - ii. When SCADA Manual control is selected, the pumps operate as follows:
    1. The operator can manually start and stop the pump via the SCADA HMI.
    2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.
- c. SCADA Auto Control:
  - i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS15_LT1541). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS15_LIT1542).
  - ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
    1. During operation, two pumps operate as Lead/Lag.
    2. On rising wetwell level:
       - a. Initial state:
         - i. The level is below the Start Lead level set point, and all pumps are stopped.
       - b. Start Lead pump:
         - i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
       - c. Start Lag pump:
         - i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:

   a. Stop Lead pump:

      i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

   b. Stop Lag pump:

      i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, two pumps operate as Lead/Lag.

2. On rising wetwell level:

   a. Initial state:

      i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

   b. Start Lead pump:

      i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

   c. Start Lag pump:

      i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.

      ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.

3. On falling wetwell level:

   a. Stop Lead pump:

      i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

   b. Stop Lag pump:

      i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-20 below.

**Table 5-20. PS 15 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | 9.25 | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | 9.0 | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | 8.25 | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | 7.0 | |
| Level Transmitter | Software | Start Lag Pump | 6.05 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | 6.0 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | 5.55 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | 5.25 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | 4.05 | Instrument is based on selected wetwell level control method at SCADA |

**Table 5-20. PS 15 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| FogRod | Software | Stop Lag Pump | 4.5 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | 3.55 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | 3.75 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | 3.25 | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | 3.0 | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | 2.75 | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. PS 15 Flush Valve is a motorized valve with local and SCADA control capability. The valve has local field controls with LOCAL/OFF/REMOTE (LOR) and OPEN/STOP/CLOSE (OSC) selections and operates as follows:

a. Local Manual Control:

i. When the LOR selector switch is in the OFF position, the valve does not operate.

ii. When the LOR selector switch is in LOCAL, the valve can be operated via the OSC selector switch.

1. When in OPEN, the valve is commanded to the fully open position,
2. When in CLOSE, the valve is commanded to the fully closed position.
3. When in STOP, the valve is commanded to stop in the current position.

b. SCADA Manual Control:

i. When the LOR selector switch is in REMOTE, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the valve at the SCADA HMI.

ii. When SCADA Manual control is selected, the valve operates as follows:

1. The operator can manually open and close the valve via the SCADA HMI.

c. SCADA Auto Control:

i. When SCADA Auto control is selected, the valve operates as follows:

1. The valve is commanded to open automatically at a set time of day (initially set at 12:30 AM) for 10 minutes (operator adjustable).

C. The PS 15 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.7.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.7.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. Wetwell high high level (operator adjustable) causes the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.7.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 15 Level Transmitter (Primary)
  1. Level

ii. PS 15 FogRod Level Transmitter (Secondary)
  1. Level

iii. PS 15 Pump 1 Discharge Flow Meter/Transmitter (Future)
  1. Flow (Future)
  2. Flow pulse (Future)

iv. PS 15 Pump 2 Discharge Flow Meter/Transmitter (Future)
  1. Flow (Future)
  2. Flow pulse (Future)

v. PS 15 Discharge Pressure Transmitter (Future)
  1. Pressure (Future)

vi. PS 15 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
  1. Flow (Future)
  2. Flow pulse (Future)

vii. PS 15 Pump 1 Check Valve Limit Switch
  1. Closed

viii. PS 15 Pump 2 Check Valve Limit Switch
  1. Closed

ix. PS 15 Flush Valve
  1. In remote

x. PS 15 Flush Valve Open Position Switch
  1. Open

xi. PS 15 Flush Valve Closed Position Switch
  1. Closed

xii. PS 15 Generator
  1. Run

xiii. PS 15 Generator Fuel Level Sensor (Future)
  1. Level (Future)

xiv. PS 15 ATS
  1. ATS in normal
  2. ATS in generator

3. ATS utility power available

xv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xvi. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.7.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 15 FogRod Level Transmitter (via relay outputs)

1. Wetwell high-high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 15 Flood Switch

1. Flood alarm

iii. PS 15 Station Intrusion Switch

1. Intrusion alarm

iv. PS 15 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 15 Generator

1. Fail
2. Low fuel alarm
3. Pre-alarm warning

vi. PS 15 Motor Control Panel

1. Phase fail

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:
   i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:
      1. Require a minimum of one pump to be in Ready State, or generate an alarm.
   ii. Level transmitter measurement discrepancy
      1. Refer to Section 5.1.8.
   iii. PS 15 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
      1. Flow alarm (Future)
   iv. Refer to Section 3.7 for common alarm functions:
      1. Communication interface alarms
      2. Site PLC alarms
   v. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.7.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:
   a. Wetwell level rate of rise and station inlet flow
      i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.
   b. Level transmitter measurement discrepancy
      i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.
   c. Station discharge flow total (Future)
      i. Calculate the station total flow as the sum of the PS 15 Pumps 1-2 Flow Meters/Transmitters (SS_RH2_PS15_FIT1512/22) minus the flow measured through the HGMH (SS_RH2_PS15_FIT1538).
   d. Flow Pulse Totalization (Future)
      i. Refer to flow pulse totalization in Section 3.2.4.
   e. Pump run times
      i. Refer to equipment run times in Section 3.2.2.
   f. Pump starts
      i. Refer to equipment starts in Section 3.2.3.
   g. Generator run times
      i. Refer to equipment run times in Section 3.2.2.

### 5.7.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.8 Pump Station 16

Pump Station (PS) 16 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 16 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 16 to the next pump station, PS 17, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve.** The flush valve at PS 16 consists of a butterfly valve and electric actuator. The flush system draws water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. The flush valve opens at set time intervals to flush the Lakeline pipe. Typically, flushing happens during low flows (at night). Limit switches monitor the open and closed positions of the valve.

**Pump Discharge Pressure.** A pressure transmitter monitors pressure on the common pump discharge header.

**Station Flow.** Three magnetic flow meters measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 16 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.8.1 Equipment

Table 5-21. PS 16 Equipment

| Tag Number | Description |
|---|---|
| SS_RH2_PS16_CAB1600 | PS 16 PLC Panel |
| SS_RH2_PS16_GNG1600 | PS 16 Go/No-Go Panel |
| SS_RH2_PS16_MCP1610 | PS 16 Motor Control Panel |
| SS_RH2_PS16_RSP1610 | PS 16 Pump 1 |
| SS_RH2_PS16_RSP1620 | PS 16 Pump 2 |
| SS_RH2_PS16_RSP1630 | PS 16 Pump 3 |
| SS_RH2_PS16_IS1640 | PS 16 Intrinsically Safe (IS) Panel |
| SS_RH2_PS16_ACT1650 | PS 16 Flush Valve Electric Actuator |
| SS_RH2_PS16_FLV1650 | PS 16 Flush Valve |
| SS_RH2_PS16_EF1660 | PS 16 Exhaust Fan |
| SS_RH2_PS16_GEN1690 | PS 16 Standby Generator |
| SS_RH2_PS16_ATS1691 | PS 16 Automatic Transfer Switch (ATS) |

### 5.8.2 Instruments

Table 5-22. PS 16 Instruments

| Tag Number | Description |
|---|---|
| SS_RH2_PS16_YA1608A | PS 16 Beacon |
| SS_RH2_PS16_YA1608B | PS 16 Horn |
| SS_RH2_PS16_ZSC1611 | PS 16 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS16_FIT1612 | PS 16 Pump 1 Discharge Flow Meter/Transmitter |
| SS_RH2_PS16_ ZSC1621 | PS 16 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS16_ FIT1622 | PS 16 Pump 2 Discharge Flow Meter/Transmitter |
| SS_RH2_PS16_ ZSC1631 | PS 16 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS16_ FIT1632 | PS 16 Pump 3 Discharge Flow Meter/Transmitter |

| Table 5-22. PS 16 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS16_YS1600 | PS 16 Intrusion Switch |
| SS_RH2_PS16_LSH1607 | PS 16 Flood Switch |
| SS_RH2_PS16_LT1641 | PS 16 Level Transmitter (Primary) |
| SS_RH2_PS16_ LIT1642 | PS 16 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS16_ PIT1635 | PS 16 Discharge Pressure Transmitter |
| SS_RH2_PS16_ZSO1650 | PS 16 Flush Valve Open Limit Switch |
| SS_RH2_PS16_ZSC1650 | PS 16 Flush Valve Closed Limit Switch |
| SS_RH2_PS16_FSL1661 | PS 16 Exhaust Fan Low Flow Switch |
| SS_RH2_PS16_FT1638 | PS 16 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS16_ LT1690 | PS 16 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.8.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

a. Local Manual Control:

i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

ii. OFF stops the pump.

iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:

i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

ii. When SCADA Manual control is selected, the pumps operate as follows:

1. The operator can manually start and stop the pump via the SCADA HMI.

2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS16_LT1641). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS16_LIT1642).

ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
    1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
    2. On rising wetwell level:
        a. Initial state:
            i. The level is below the Start Lead level set point, and all pumps are stopped.
        b. Start Lead pump:
            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
        c. Start Lag 1 pump:
            i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
        d. Start Lag 2 pump:
            i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
            ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
            iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.
    3. On falling wetwell level:
        a. Stop Lead pump:
            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
        b. Stop Lag 1 pump:
            i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
        c. Stop Lag 2 pump:
            i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:
    1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:
    a. Initial state:
        i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.
    b. Start Lead pump:
        i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
    c. Start Lag 1 pump:
        i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
        ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
    d. Start Lag 2 pump:
        i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
        ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
        iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.
3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag 1 pump:
        i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
    c. Stop Lag 2 pump:
        i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-23 below.

**Table 5-23. PS 16 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | 8.25 | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | 8.0 | Hardwired level control starts Pump 2, time delay relay to start Pump 3 |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | 7.25 | Hardwired level control starts Pump 1 |
| Level Transmitter | Software | High level alarm | 7.2 | |
| Level Transmitter | Software | Start Lag 2 Pump | 7.0 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | 6.5 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | 6.5 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | 5.75 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | 6.0 | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-23. PS 16 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod | Software | Start Lead Pump | 5.0 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | 3.5 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | 4.25 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | 3.0 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | 3.5 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | 2.5 | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | 2.75 | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | 2.0 | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | 2.25 | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | 1.75 | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. PS 16 Flush Valve is a motorized valve with local and SCADA control capability. The valve has local field controls with LOCAL/OFF/REMOTE (LOR) and OPEN/STOP/CLOSE (OSC) selections and operates as follows:

d. Local Manual Control:

i. When the LOR selector switch is in the OFF position, the valve does not operate.

ii. When the LOR selector switch is in LOCAL, the valve can be operated via the OSC selector switch.

1. When in OPEN, the valve is commanded to the fully open position,
2. When in CLOSE, the valve is commanded to the fully closed position.
3. When in STOP, the valve is commanded to stop in the current position.

e. SCADA Manual Control:

i. When the LOR selector switch is in REMOTE, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the valve at the SCADA HMI.

ii. When SCADA Manual control is selected, the valve operates as follows:
1. The operator can manually open and close the valve via the SCADA HMI.

f. SCADA Auto Control:
i. When SCADA Auto control is selected, the valve operates as follows:
1. The valve is commanded to open automatically at a set time of day (initially set at 12:30 AM) for 10 minutes (operator adjustable).

C. The PS 16 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:
a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.
b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).
d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.
e. The low flow alarm is monitored at SCADA.

### 5.8.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:
a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.8.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:
a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.
b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. Wetwell high high level (operator adjustable) causes the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.8.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 16 Level Transmitter (Primary)

1. Level

ii. PS 16 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 16 Pump 1 Discharge Flow Meter/Transmitter

1. Flow
2. Flow pulse

iv. PS 16 Pump 2 Discharge Flow Meter/Transmitter

1. Flow
2. Flow pulse

v. PS 16 Pump 3 Discharge Flow Meter/Transmitter

1. Flow
2. Flow pulse

vi. PS 16 Discharge Pressure Transmitter

1. Pressure

vii. PS 16 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

viii. PS 16 Pump 1 Check Valve Limit Switch

1. Closed

ix. PS 16 Pump 2 Check Valve Limit Switch

1. Closed

x. PS 16 Pump 3 Check Valve Limit Switch

1. Closed

xi. PS 16 Flush Valve

1. In remote

xii. PS 16 Flush Valve Open Position Switch

1. Open

xiii. PS 16 Flush Valve Closed Position Switch

1. Closed

xiv. PS 16 Generator

1. Run

xv. PS 16 Generator Fuel Level Sensor (Future)

1. Level (Future)

xvi. PS 16 ATS

1. ATS in normal
2. ATS in generator
3. ATS utility power available

xvii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xviii. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.8.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 16 FogRod Level Transmitter (via relay outputs)

1. Wetwell high-high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 16 Flood Switch

1. Flood alarm

iii. PS 16 Station Intrusion Switch

1. Intrusion alarm

iv. PS 16 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 16 Generator

1. Fail
2. Low fuel alarm

3. Pre-alarm warning

vi. PS 16 Motor Control Panel

1. Phase fail

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 16 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms

2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.8.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 16 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS16_FIT1612/22/32) minus the flow measured through the HGMH (SS_RH2_PS16_FIT1638).

d. Flow Pulse Totalization

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.8.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.9 Pump Station 17

Pump Station (PS) 17 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 17 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 17 to the next pump station, PS 18, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future).** A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 17 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.9.1 Equipment

**Table 5-24. PS 17 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH2_PS17_CAB1700 | PS 17 PLC Panel |
| SS_RH2_PS17_GNG1700 | PS 17 Go/No-Go Panel |
| SS_RH2_PS17_RIO1700 | PS 17 Remote I/O Panel |
| SS_RH2_PS17_MCP1710 | PS 17 Motor Control Panel |
| SS_RH2_PS17_RSP1710 | PS 17 Pump 1 |
| SS_RH2_PS17_RSP1720 | PS 17 Pump 2 |
| SS_RH2_PS17_RSP1730 | PS 17 Pump 3 |
| SS_RH2_PS17_IS1740 | PS 17 Intrinsically Safe (IS) Panel |
| SS_RH2_PS17_EF1760 | PS 17 Exhaust Fan |
| SS_RH2_PS17_GEN1790 | PS 17 Standby Generator |
| SS_RH2_PS17_ATS1791 | PS 17 Automatic Transfer Switch (ATS) |

### 5.9.2 Instruments

**Table 5-25. PS 17 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH2_PS17_YA1708A | PS 17 Beacon |
| SS_RH2_PS17_YA1708B | PS 17 Horn |

| Table 5-25. PS 17 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS17_ZSC1711 | PS 17 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS17_FIT1712 | PS 17 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS17_ ZSC1721 | PS 17 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS17_ FIT1722 | PS 17 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS17_ ZSC1731 | PS 17 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS17_ FIT1732 | PS 17 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS17_YS1700 | PS 17 Intrusion Switch |
| SS_RH2_PS17_LSH1707 | PS 17 Flood Switch |
| SS_RH2_PS17_LT1741 | PS 17 Level Transmitter (Primary) |
| SS_RH2_PS17_ LIT1742 | PS 17 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS17_ PIT1735 | PS 17 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS17_FSL1761 | PS 17 Exhaust Fan Low Flow Switch |
| SS_RH2_PS17_FT1738 | PS 17 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS17_LSH1790 | PS 17 Generator Vault Flood Switch |
| SS_RH2_PS17_ LT1790 | PS 17 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.9.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

a. Local Manual Control:

i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

ii. OFF stops the pump.

iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:

i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

ii. When SCADA Manual control is selected, the pumps operate as follows:

1. The operator can manually start and stop the pump via the SCADA HMI.

2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS17_LT1741). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS17_LIT1742).

   ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:

      1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

      2. On rising wetwell level:

         a. Initial state:

            i. The level is below the Start Lead level set point, and all pumps are stopped.

         b. Start Lead pump:

            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

         c. Start Lag 1 pump:

            i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

         d. Start Lag 2 pump:

            i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

            ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

            iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

      3. On falling wetwell level:

         a. Stop Lead pump:

            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

         b. Stop Lag 1 pump:

            i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
2. On rising wetwell level:

a. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-26 below.

**Table 5-26. PS 17 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-26. PS 17 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 17 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.9.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.9.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.9.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 17 Level Transmitter (Primary)

1. Level

ii. PS 17 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 17 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

iv. PS 17 Pump 2 Discharge Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)
v. PS 17 Pump 3 Discharge Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)
vi. PS 17 Discharge Pressure Transmitter (Future)
   1. Pressure (Future)
vii. PS 17 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)
viii. PS 17 Pump 1 Check Valve Limit Switch
   1. Closed
ix. PS 17 Pump 2 Check Valve Limit Switch
   1. Closed
x. PS 17 Pump 3 Check Valve Limit Switch
   1. Closed
xi. PS 17 Generator
   1. Run
xii. PS 17 Generator Fuel Level Sensor (Future)
   1. Level (Future)
xiii. PS 17 ATS
   1. ATS in normal
   2. ATS in generator
   3. ATS utility power available
xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xv. Refer to Section 3.7 for common monitoring functions:
   1. Common panel hardwired status points.

b. Software:
   i. Refer to Section 3.7 for common monitoring functions:
      1. Communication interfaces
      2. Site PLC monitoring

### 5.9.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 17 FogRod Level Transmitter (via relay outputs)

1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 17 Flood Switch

1. Flood alarm

iii. PS 17 Station Intrusion Switch

1. Intrusion alarm

iv. PS 17 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 17 Generator

1. Fail
2. Low fuel alarm
3. Pre-alarm warning

vi. PS 17 Generator Vault Flood Switch

1. Flood alarm

vii. PS 17 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 17 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.9.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 17 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS17_FIT1712/22/32) minus the flow measured through the HGMH (SS_RH2_PS17_FIT1738).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.9.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.10 Pump Station 18

Pump Station (PS) 18 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 18 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 18 to the next pump station, PS 19, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future).** A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 18 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.10.1 Equipment

| Table 5-27. PS 18 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS18_CAB1800 | PS 18 PLC Panel |
| SS_RH2_PS18_GNG1800 | PS 18 Go/No-Go Panel |
| SS_RH2_PS18_RIO1800 | PS 18 Remote I/O Panel |
| SS_RH2_PS18_MCP1810 | PS 18 Motor Control Panel |
| SS_RH2_PS18_RSP1810 | PS 18 Pump 1 |
| SS_RH2_PS18_RSP1820 | PS 18 Pump 2 |
| SS_RH2_PS18_RSP1830 | PS 18 Pump 3 |
| SS_RH2_PS18_IS1840 | PS 18 Intrinsically Safe (IS) Panel |
| SS_RH2_PS18_EF1860 | PS 18 Exhaust Fan |
| SS_RH2_PS18_GEN1890 | PS 18 Standby Generator |
| SS_RH2_PS18_ATS1891 | PS 18 Automatic Transfer Switch (ATS) |

### 5.10.2 Instruments

| Table 5-28. PS 18 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS18_YA1808A | PS 18 Beacon |
| SS_RH2_PS18_YA1808B | PS 18 Horn |
| SS_RH2_PS18_ZSC1811 | PS 18 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS18_FIT1812 | PS 18 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS18_ ZSC1821 | PS 18 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS18_ FIT1822 | PS 18 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS18_ ZSC1831 | PS 18 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS18_ FIT1832 | PS 18 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS18_YS1800 | PS 18 Intrusion Switch |
| SS_RH2_PS18_LSH1807 | PS 18 Flood Switch |
| SS_RH2_PS18_LT1841 | PS 18 Level Transmitter (Primary) |
| SS_RH2_PS18_ LIT1842 | PS 18 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS18_ PIT1835 | PS 18 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS18_FSL1861 | PS 18 Exhaust Fan Low Flow Switch |
| SS_RH2_PS18_FT1838 | PS 18 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS18_LSH1890 | PS 18 Generator Vault Flood Switch |
| SS_RH2_PS18_ LT1890 | PS 18 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.10.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

   b. SCADA Manual Control:

      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

      ii. When SCADA Manual control is selected, the pumps operate as follows:

         1. The operator can manually start and stop the pump via the SCADA HMI.

         2. The operator can also select a "WETWELL DRAWDOWN" option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

   c. SCADA Auto Control:

      i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS18_LT1841). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS18_LIT1842).

      ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:

         1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

         2. On rising wetwell level:

            a. Initial state:

               i. The level is below the Start Lead level set point, and all pumps are stopped.

            b. Start Lead pump:

               i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

            c. Start Lag 1 pump:

               i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:

a. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:
   i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
   ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
   iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:
   a. Stop Lead pump:
      i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
   b. Stop Lag 1 pump:
      i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
   c. Stop Lag 2 pump:
      i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:
   i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:
      1. High level (XX FT, setpoint TBD): Start Pump 1.
      2. High High level (XX FT, setpoint TBD): Start Pump 2.
      3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
      4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-29 below.

**Table 5-29. PS 18 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-29. PS 18 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 18 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.10.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.10.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.10.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 18 Level Transmitter (Primary)
   1. Level

ii. PS 18 FogRod Level Transmitter (Secondary)
   1. Level

iii. PS 18 Pump 1 Discharge Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)

iv. PS 18 Pump 2 Discharge Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)

v. PS 18 Pump 3 Discharge Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)

vi. PS 18 Discharge Pressure Transmitter (Future)
   1. Pressure (Future)

vii. PS 18 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
   1. Flow (Future)
   2. Flow pulse (Future)

viii. PS 18 Pump 1 Check Valve Limit Switch
   1. Closed

ix. PS 18 Pump 2 Check Valve Limit Switch
   1. Closed

x. PS 18 Pump 3 Check Valve Limit Switch
    1. Closed
xi. PS 18 Generator
    1. Run
xii. PS 18 Generator Fuel Level Sensor (Future)
    1. Level (Future)
xiii. PS 18 ATS
    1. ATS in normal
    2. ATS in generator
    3. ATS utility power available
xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xv. Refer to Section 3.7 for common monitoring functions:
    1. Common panel hardwired status points.

b. Software:
    i. Refer to Section 3.7 for common monitoring functions:
        1. Communication interfaces
        2. Site PLC monitoring

### 5.10.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:
    i. PS 18 FogRod Level Transmitter (via relay outputs)
        1. Wetwell high high level
        2. Wetwell high level
        3. Wetwell low level
        4. FogRod level fault (Cable short circuit/grease buildup)
    ii. PS 18 Flood Switch
        1. Flood alarm
    iii. PS 18 Station Intrusion Switch
        1. Intrusion alarm
    iv. PS 18 Exhaust Fan Low Flow Switch
        1. Low Flow
    v. PS 18 Generator
        1. Fail
        2. Low fuel alarm

3. Pre-alarm warning

vi. PS 18 Generator Vault Flood Switch

1. Flood alarm

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 18 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.10.8Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)
   i. Calculate the station total flow as the sum of the PS 18 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS18_FIT1812/22/32) minus the flow measured through the HGMH (SS_RH2_PS18_FIT1838).
d. Flow Pulse Totalization (Future)
   i. Refer to flow pulse totalization in Section 3.2.4.
e. Pump run times
   i. Refer to equipment run times in Section 3.2.2.
f. Pump starts
   i. Refer to equipment starts in Section 3.2.3.
g. Generator run times
   i. Refer to equipment run times in Section 3.2.2.

### 5.10.9 Operation on Generator

A. Loss of Power:
   a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.
   b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump 'fail to start' and check valve 'fail to open' alarms are implemented so that the pumps do not fault.

## 5.11 Pump Station 19

Pump Station (PS) 19 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 19 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 19 to the next pump station, PS 20, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve (Future).** The flush valve at PS 19 will be replaced as part of a future project. The existing flush valve is not operable since pneumatic equipment has been removed. The flush valve is not connected to SCADA. Once replaced, the existing flush system will draw water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. The future flush valve will consist of a new valve and electric actuator. Limit switches will monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future).** A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 19 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.11.1 Equipment

**Table 5-30. PS 19 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH2_PS19_CAB1900 | PS 19 PLC Panel |
| SS_RH2_PS19_GNG1900 | PS 19 Go/No-Go Panel |
| SS_RH2_PS19_RIO1900 | PS 19 Remote I/O Panel |
| SS_RH2_PS19_MCP1910 | PS 19 Motor Control Panel |
| SS_RH2_PS19_RSP1910 | PS 19 Pump 1 |
| SS_RH2_PS19_RSP1920 | PS 19 Pump 2 |
| SS_RH2_PS19_RSP1930 | PS 19 Pump 3 |
| SS_RH2_PS19_IS1940 | PS 19 Intrinsically Safe (IS) Panel |
| SS_RH2_PS19_ACT1950 | PS 19 Flush Valve Electric Actuator (Future) |
| SS_RH2_PS19_FLV1950 | PS 19 Flush Valve (Future) |
| SS_RH2_PS19_EF1960 | PS 19 Exhaust Fan |
| SS_RH2_PS19_GEN1990 | PS 19 Standby Generator |
| SS_RH2_PS19_ATS1991 | PS 19 Automatic Transfer Switch (ATS) |

### 5.11.2 Instruments

| Table 5-31. PS 19 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS19_YA1908A | PS 19 Beacon |
| SS_RH2_PS19_YA1908B | PS 19 Horn |
| SS_RH2_PS19_ZSC1911 | PS 19 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS19_FIT1912 | PS 19 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS19_ ZSC1921 | PS 19 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS19_ FIT1922 | PS 19 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS19_ ZSC1931 | PS 19 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS19_ FIT1932 | PS 19 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS19_YS1900 | PS 19 Intrusion Switch |
| SS_RH2_PS19_LSH1907 | PS 19 Flood Switch |
| SS_RH2_PS19_LT1941 | PS 19 Level Transmitter (Primary) |
| SS_RH2_PS19_ LIT1942 | PS 19 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS19_ PIT1935 | PS 19 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS19_ZSO1950 | PS 19 Flush Valve Open Limit Switch (Future) |
| SS_RH2_PS19_ZSC1950 | PS 19 Flush Valve Closed Limit Switch (Future) |
| SS_RH2_PS19_FSL1961 | PS 19 Exhaust Fan Low Flow Switch |
| SS_RH2_PS19_FT1938 | PS 19 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS19_ LT1990 | PS 19 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.11.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

   b. SCADA Manual Control:

      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

- ii. When SCADA Manual control is selected, the pumps operate as follows:
  1. The operator can manually start and stop the pump via the SCADA HMI.
  2. The operator can also select a "WETWELL DRAWDOWN" option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

- i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS19_LT1941). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS19_LIT1942).
- ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
  1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
  2. On rising wetwell level:
     - a. Initial state:
       - i. The level is below the Start Lead level set point, and all pumps are stopped.
     - b. Start Lead pump:
       - i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
     - c. Start Lag 1 pump:
       - i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
       - ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
     - d. Start Lag 2 pump:
       - i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
       - ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
       - iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag 1 pump:
        i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
    c. Stop Lag 2 pump:
        i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
2. On rising wetwell level:
    a. Initial state:
        i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.
    b. Start Lead pump:
        i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
    c. Start Lag 1 pump:
        i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
        ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
    d. Start Lag 2 pump:
        i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
        ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
        iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag 1 pump:
        i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
    c. Stop Lag 2 pump:
        i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:
    1. High level (XX FT, setpoint TBD): Start Pump 1.
    2. High High level (XX FT, setpoint TBD): Start Pump 2.
    3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
    4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-32 below.

**Table 5-32. PS 19 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |

**Table 5-32. PS 19 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 19 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:
   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.
   b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
   c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).
   d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.
   e. The low flow alarm is monitored at SCADA.

### 5.11.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:
   a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.11.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:
   a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.
   b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. In the future, wetwell high high level (operator adjustable) will cause the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.11.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 19 Level Transmitter (Primary)

1. Level

ii. PS 19 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 19 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 19 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

v. PS 19 Pump 3 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

vi. PS 19 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vii. PS 19 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

viii. PS 19 Pump 1 Check Valve Limit Switch

1. Closed

ix. PS 19 Pump 2 Check Valve Limit Switch

1. Closed

x. PS 19 Pump 3 Check Valve Limit Switch

1. Closed

xi. PS 19 Flush Valve (Future)

1. In remote (Future)

xii. PS 19 Flush Valve Open Position Switch (Future)

1. Open (Future)

xiii. PS 19 Flush Valve Closed Position Switch (Future)
1. Closed (Future)
xiv. PS 19 Generator
1. Run
xv. PS 19 Generator Fuel Level Sensor (Future)
1. Level (Future)
xvi. PS 19 ATS
1. ATS in normal
2. ATS in generator
3. ATS utility power available
xvii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xviii. Refer to Section 3.7 for common monitoring functions:
1. Common panel hardwired status points.

b. Software:
i. Refer to Section 3.7 for common monitoring functions:
1. Communication interfaces
2. Site PLC monitoring

### 5.11.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:
i. PS 19 FogRod Level Transmitter (via relay outputs)
1. Wetwell high-high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)
ii. PS 19 Flood Switch
1. Flood alarm
iii. PS 19 Station Intrusion Switch
1. Intrusion alarm
iv. PS 19 Exhaust Fan Low Flow Switch
1. Low Flow
v. PS 19 Generator
1. Fail
2. Low fuel alarm

3. Pre-alarm warning

vi. PS 19 Motor Control Panel

1. Phase fail

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for ‘Insufficient Pumps in Ready State’ alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 19 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.11.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 19 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS19_FIT1912/22/32) minus the flow measured through the HGMH (SS_RH2_PS19_FIT1938).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.11.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.12 Pump Station 20

Pump Station (PS) 20 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 20 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 20 to the next pump station, PS 21, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future).** A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 20 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.12.1 Equipment

**Table 5-33. PS 20 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH2_PS20_CAB2000 | PS 20 PLC Panel |
| SS_RH2_PS20_GNG2000 | PS 20 Go/No-Go Panel |
| SS_RH2_PS20_RIO2000 | PS 20 Remote I/O Panel |
| SS_RH2_PS20_MCP2010 | PS 20 Motor Control Panel |
| SS_RH2_PS20_RSP2010 | PS 20 Pump 1 |
| SS_RH2_PS20_RSP2020 | PS 20 Pump 2 |
| SS_RH2_PS20_RSP2030 | PS 20 Pump 3 |
| SS_RH2_PS20_IS2040 | PS 20 Intrinsically Safe (IS) Panel |
| SS_RH2_PS20_EF2060 | PS 20 Exhaust Fan |
| SS_RH2_PS20_GEN2090 | PS 20 Standby Generator |
| SS_RH2_PS20_ATS2091 | PS 20 Automatic Transfer Switch (ATS) |

### 5.12.2 Instruments

**Table 5-34. PS 20 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH2_PS20_YA2008A | PS 20 Beacon |
| SS_RH2_PS20_YA2008B | PS 20 Horn |

| Table 5-34. PS 20 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS20_ZSC2011 | PS 20 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS20_FIT2012 | PS 20 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS20_ ZSC2021 | PS 20 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS20_ FIT2022 | PS 20 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS20_ ZSC2031 | PS 20 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS20_ FIT2032 | PS 20 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS20_YS2000 | PS 20 Intrusion Switch |
| SS_RH2_PS20_LSH2007 | PS 20 Flood Switch |
| SS_RH2_PS20_LT2041 | PS 20 Level Transmitter (Primary) |
| SS_RH2_PS20_ LIT2042 | PS 20 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS20_ PIT2035 | PS 20 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS20_FSL2061 | PS 20 Exhaust Fan Low Flow Switch |
| SS_RH2_PS20_FT2038 | PS 20 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS20_LSH2090 | PS 20 Generator Vault Flood Switch |
| SS_RH2_PS20_ LT2090 | PS 20 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.12.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

a. Local Manual Control:

i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

ii. OFF stops the pump.

iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:

i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

ii. When SCADA Manual control is selected, the pumps operate as follows:

1. The operator can manually start and stop the pump via the SCADA HMI.

2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:

   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS20_LT2041). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS20_LIT2042).

   ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:

      1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

      2. On rising wetwell level:

         a. Initial state:

            i. The level is below the Start Lead level set point, and all pumps are stopped.

         b. Start Lead pump:

            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

         c. Start Lag 1 pump:

            i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

         d. Start Lag 2 pump:

            i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

            ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

            iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

      3. On falling wetwell level:

         a. Stop Lead pump:

            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

         b. Stop Lag 1 pump:

            i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:

a. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-35 below.

**Table 5-35. PS 20 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-35. PS 20 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 20 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.12.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.12.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screenThe interlock automatically resets after the high high level condition clears.

### 5.12.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 20 Level Transmitter (Primary)

1. Level

ii. PS 20 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 20 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 20 Pump 2 Discharge Flow Meter/Transmitter (Future)
1. Flow (Future)
2. Flow pulse (Future)

v. PS 20 Pump 3 Discharge Flow Meter/Transmitter (Future)
1. Flow (Future)
2. Flow pulse (Future)

vi. PS 20 Discharge Pressure Transmitter (Future)
1. Pressure (Future)

vii. PS 20 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
1. Flow (Future)
2. Flow pulse (Future)

viii. PS 20 Pump 1 Check Valve Limit Switch
1. Closed

ix. PS 20 Pump 2 Check Valve Limit Switch
1. Closed

x. PS 20 Pump 3 Check Valve Limit Switch
1. Closed

xi. PS 20 Generator
1. Run

xii. PS 20 Generator Fuel level Sensor (Future)
1. Level (Future)

xiii. PS 20 ATS
1. ATS in normal
2. ATS in generator
3. ATS utility power available

xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xv. Refer to Section 3.7 for common monitoring functions:
1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:
1. Communication interfaces
2. Site PLC monitoring

### 5.12.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 20 FogRod Level Transmitter (via relay outputs)

1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 20 Flood Switch

1. Flood alarm

iii. PS 20 Station Intrusion Switch

1. Intrusion alarm

iv. PS 20 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 20 Generator

1. Fail
2. Low fuel alarm
3. Pre-alarm warning

vi. PS 20 Generator Vault Flood Switch

1. Flood alarm

vii. PS 20 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 20 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.12.8Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 20 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS20_FIT2012/22/32) minus the flow measured through the HGMH (SS_RH2_PS20_FIT2038).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.12.9Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.13 Pump Station 21

Pump Station (PS) 21 is located within Reach 2, serving the western to southern end of the island before ending at the King County South Mercer Pump Station. PS 21 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 21 to the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 21 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.13.1 Equipment

| Table 5-36. PS 21 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS21_CAB2100 | PS 21 PLC Panel |
| SS_RH2_PS21_GNG2100 | PS 21 Go/No-Go Panel |
| SS_RH2_PS21_RIO2100 | PS 21 Remote I/O Panel |
| SS_RH2_PS21_MCP2110 | PS 21 Motor Control Panel |
| SS_RH2_PS21_RSP2110 | PS 21 Pump 1 |
| SS_RH2_PS21_RSP2120 | PS 21 Pump 2 |
| SS_RH2_PS21_RSP2130 | PS 21 Pump 3 |
| SS_RH2_PS21_IS2140 | PS 21 Intrinsically Safe (IS) Panel |
| SS_RH2_PS21_EF2160 | PS 21 Exhaust Fan |
| SS_RH2_PS21_GEN2190 | PS 21 Standby Generator |
| SS_RH2_PS21_ATS2191 | PS 21 Automatic Transfer Switch (ATS) |

### 5.13.2 Instruments

| Table 5-37. PS 21 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH2_PS21_YA2108A | PS 21 Beacon |
| SS_RH2_PS21_YA2108B | PS 21 Horn |
| SS_RH2_PS21_ZSC2111 | PS 21 Pump 1 Check Valve Limit Switch |
| SS_RH2_PS21_FIT2112 | PS 21 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS21_ ZSC2121 | PS 21 Pump 2 Check Valve Limit Switch |
| SS_RH2_PS21_ FIT2122 | PS 21 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS21_ ZSC2131 | PS 21 Pump 3 Check Valve Limit Switch |
| SS_RH2_PS21_ FIT2132 | PS 21 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH2_PS21_YS2100 | PS 21 Intrusion Switch |
| SS_RH2_PS21_LSH2107 | PS 21 Flood Switch |
| SS_RH2_PS21_LT2141 | PS 21 Level Transmitter (Primary) |
| SS_RH2_PS21_ LIT2142 | PS 21 FogRod Level Transmitter (Secondary) |
| SS_RH2_PS21_ PIT2135 | PS 21 Discharge Pressure Transmitter (Future) |
| SS_RH2_PS21_FSL2161 | PS 21 Exhaust Fan Low Flow Switch |
| SS_RH2_PS21_FT2138 | PS 21 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH2_PS21_LSH2190 | PS 21 Generator Vault Flood Switch |
| SS_RH2_PS21_ LT2190 | PS 21 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.13.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

    a. Local Manual Control:

        i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

        ii. OFF stops the pump.

        iii. AUTO enables SCADA control or local hardwired control (backup level control).

    b. SCADA Manual Control:

        i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

        ii. When SCADA Manual control is selected, the pumps operate as follows:

            1. The operator can manually start and stop the pump via the SCADA HMI.

            2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

    c. SCADA Auto Control:

        i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH2_PS21_LT2141). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH2_PS21_LIT2142).

        ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:

            1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

            2. On rising wetwell level:

                a. Initial state:

                    i. The level is below the Start Lead level set point, and all pumps are stopped.

                b. Start Lead pump:

                    i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

                c. Start Lag 1 pump:

                    i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:

a. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.

2. High High level (XX FT, setpoint TBD): Start Pump 2.

3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.

4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-38 below.

**Table 5-38. PS 21 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-38. PS 21 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 21 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.13.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.13.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.13.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 21 Level Transmitter (Primary)

1. Level

ii. PS 21 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 21 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 21 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

v. PS 21 Pump 3 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

vi. PS 21 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vii. PS 21 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

viii. PS 21 Pump 1 Check Valve Limit Switch

1. Closed

ix. PS 21 Pump 2 Check Valve Limit Switch

1. Closed

x. PS 21 Pump 3 Check Valve Limit Switch
   1. Closed
xi. PS 21 Generator
   1. Run
xii. PS 21 Generator Fuel Level Sensor (Future)
   1. Level (Future)
xiii. PS 21 ATS
   1. ATS in normal
   2. ATS in generator
   3. ATS utility power available
xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xv. Refer to Section 3.7 for common monitoring functions:
   1. Common panel hardwired status points.

b. Software:
   i. Refer to Section 3.7 for common monitoring functions:
      1. Communication interfaces
      2. Site PLC monitoring

### 5.13.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:
   i. PS 21 FogRod Level Transmitter (via relay outputs)
      1. Wetwell high high level
      2. Wetwell high level
      3. Wetwell low level
      4. FogRod level fault (Cable short circuit/grease buildup)
   ii. PS 21 Flood Switch
      1. Flood alarm
   iii. PS 21 Station Intrusion Switch
      1. Intrusion alarm
   iv. PS 21 Exhaust Fan Low Flow Switch
      1. Low Flow
   v. PS 21 Generator
      1. Fail
      2. Low fuel alarm

3. Pre-alarm warning

vi. PS 21 Generator Vault Flood Switch

1. Flood alarm

vii. PS 21 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 21 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.13.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)
    i. Calculate the station total flow as the sum of the PS 20 Pumps 1-3 Flow Meters/Transmitters (SS_RH2_PS21_FIT2112/22/32) minus the flow measured through the HGMH (SS_RH2_PS21_FIT2138).
d. Flow Pulse Totalization (Future)
    i. Refer to flow pulse totalization in Section 3.2.4.
e. Pump run times
    i. Refer to equipment run times in Section 3.2.2.
f. Pump starts
    i. Refer to equipment starts in Section 3.2.3.
g. Generator run times
    i. Refer to equipment run times in Section 3.2.2.

### 5.13.9 Operation on Generator

A. Loss of Power:
    a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.
    b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.14 Pump Station 22

Pump Station (PS) 22 is located within Reach 1, serving the eastern side of the island before ending at the King County South Mercer Pump Station. PS 22 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 22 to the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve (Future).** The flush valve at PS 22 will be replaced as part of a future project. The existing flush valve consists of a pneumatic actuator and is not connected to SCADA. The existing flush system draws water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. Typically, flushing happens during low flows (at night). The existing flush valve operates based on a local timer and opens at set time intervals to flush the Lakeline pipe. The future flush valve will consist of a new valve and electric actuator. Limit switches will monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 22 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

## 5.14.1 Equipment

**Table 5-39. PS 22 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH1_PS22_CAB2200 | PS 22 PLC Panel |
| SS_RH1_PS22_GNG2200 | PS 22 Go/No-Go Panel |
| SS_RH1_PS22_MCP2210 | PS 22 Motor Control Panel |
| SS_RH1_PS22_RSP2210 | PS 22 Pump 1 |
| SS_RH1_PS22_RSP2220 | PS 22 Pump 2 |
| SS_RH1_PS22_RSP2230 | PS 22 Pump 3 |
| SS_RH1_PS22_IS2240 | PS 22 Intrinsically Safe (IS) Panel |
| SS_RH1_PS22_ACT2250 | PS 22 Flush Valve Electric Actuator (Future) |
| SS_RH1_PS22_FLV2250 | PS 22 Flush Valve (Future) |
| SS_RH1_PS22_EF2260 | PS 22 Exhaust Fan |
| SS_RH1_PS22_GEN2290 | PS 22 Standby Generator |

| Table 5-39. PS 22 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS22_ATS2291 | PS 22 Automatic Transfer Switch (ATS) |

### 5.14.2Instruments

| Table 5-40. PS 22 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS22_YA2208A | PS 22 Beacon |
| SS_RH1_PS22_YA2208B | PS 22 Horn |
| SS_RH1_PS22_ZSC2211 | PS 22 Pump 1 Check Valve Limit Switch |
| SS_RH1_PS22_FIT2212 | PS 22 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS22_ ZSC2221 | PS 22 Pump 2 Check Valve Limit Switch |
| SS_RH1_PS22_ FIT2222 | PS 22 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS22_ ZSC2231 | PS 22 Pump 3 Check Valve Limit Switch |
| SS_RH1_PS22_ FIT2232 | PS 22 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS22_YS2200 | PS 22 Intrusion Switch |
| SS_RH1_PS22_LSH2207 | PS 22 Flood Switch |
| SS_RH1_PS22_LT2241 | PS 22 Level Transmitter (Primary) |
| SS_RH1_PS22_ LIT2242 | PS 22 FogRod Level Transmitter (Secondary) |
| SS_RH1_PS22_ PIT2235 | PS 22 Discharge Pressure Transmitter (Future) |
| SS_RH1_PS22_ZSO2250 | PS 22 Flush Valve Open Limit Switch (Future) |
| SS_RH1_PS22_ZSC2250 | PS 22 Flush Valve Closed Limit Switch (Future) |
| SS_RH1_PS22_FSL2261 | PS 22 Exhaust Fan Low Flow Switch |
| SS_RH1_PS22_FT2238 | PS 22 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH1_PS22_LSH2290 | PS 22 Generator Vault Flood Switch |
| SS_RH1_PS22_ LT2290 | PS 22 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.14.3Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:
   a. Local Manual Control:
      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.
      ii. OFF stops the pump.
      iii. AUTO enables SCADA control or local hardwired control (backup level control).

b. SCADA Manual Control:
   i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
   ii. When SCADA Manual control is selected, the pumps operate as follows:
      1. The operator can manually start and stop the pump via the SCADA HMI.
      2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:
   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH1_PS22_LT2241). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH1_PS22_LIT2242).
   ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
      1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
      2. On rising wetwell level:
         a. Initial state:
            i. The level is below the Start Lead level set point, and all pumps are stopped.
         b. Start Lead pump:
            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
         c. Start Lag 1 pump:
            i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
         d. Start Lag 2 pump:
            i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
            ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
            iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag 1 pump:
        i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
    c. Stop Lag 2 pump:
        i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
2. On rising wetwell level:
    a. Initial state:
        i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.
    b. Start Lead pump:
        i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
    c. Start Lag 1 pump:
        i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
        ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
    d. Start Lag 2 pump:
        i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
        ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
        iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag 1 pump:
        i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
    c. Stop Lag 2 pump:
        i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:
    1. High level (XX FT, setpoint TBD): Start Pump 1.
    2. High High level (XX FT, setpoint TBD): Start Pump 2.
    3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
    4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-41 below.

**Table 5-41. PS 22 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |

| Table 5-41. PS 22 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 22 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.14.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.14.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. In the future, wetwell high high level (operator adjustable) will cause the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.14.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 22 Level Transmitter (Primary)

1. Level

ii. PS 22 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 22 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 22 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

v. PS 22 Pump 3 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

vi. PS 22 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vii. PS 22 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

viii. PS 22 Pump 1 Check Valve Limit Switch

1. Closed

ix. PS 22 Pump 2 Check Valve Limit Switch

1. Closed

x. PS 22 Pump 3 Check Valve Limit Switch

1. Closed

xi. PS 22 Flush Valve (Future)

1. In remote (Future)

xii. PS 22 Flush Valve Open Position Switch (Future)

1. Open (Future)

xiii. PS 22 Flush Valve Closed Position Switch (Future)

1. Closed (Future)

xiv. PS 22 Generator

1. Run

xv. PS 22 Generator Fuel Level Sensor (Future)

1. Level (Future)

xvi. PS 22 ATS

1. ATS in normal
2. ATS in generator
3. ATS utility power available

xvii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xviii. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces
2. Site PLC monitoring

### 5.14.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 22 FogRod Level Transmitter (via relay outputs)

1. Wetwell high-high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 22 Flood Switch

1. Flood alarm

iii. PS 22 Station Intrusion Switch

1. Intrusion alarm

iv. PS 22 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 22 Generator

1. Fail
2. Low fuel alarm

3. Pre-alarm warning

vi. PS 22 Generator Vault Flood Switch

1. Flood alarm

vii. PS 22 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 22 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.14.8Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

   i. Calculate the station total flow as the sum of the PS 22 Pumps 1-3 Flow Meters/Transmitters (SS_RH1_PS22_FIT2212/22/32) minus the flow measured through the HGMH (SS_RH1_PS22_FIT2238).

d. Flow Pulse Totalization (Future)

   i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

   i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

   i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

   i. Refer to equipment run times in Section 3.2.2.

### 5.14.9 Operation on Generator

A. Loss of Power:

   a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

   b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.15 Pump Station 23

Pump Station (PS) 23 is located within Reach 1, serving the eastern side of the island before ending at the King County South Mercer Pump Station. PS 23 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 23 to the next pump station, PS 22, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch (Future).** Pump Station 23 has a standby generator to supply backup power to the station. The City has plans to replace the existing generator in a future project, at which time additional generator and automatic transfer switch (ATS) parameters will be monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch to be monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

## 5.15.1 Equipment

**Table 5-42. PS 23 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH1_PS23_CAB2300 | PS 23 PLC Panel |
| SS_RH1_PS23_GNG2300 | PS 23 Go/No-Go Panel |
| SS_RH1_PS23_MCP2310 | PS 23 Motor Control Panel |
| SS_RH1_PS23_RSP2310 | PS 23 Pump 1 |
| SS_RH1_PS23_RSP2320 | PS 23 Pump 2 |
| SS_RH1_PS23_RSP2330 | PS 23 Pump 3 |
| SS_RH1_PS23_IS2340 | PS 23 Intrinsically Safe (IS) Panel |
| SS_RH1_PS23_EF2360 | PS 23 Exhaust Fan |
| SS_RH1_PS23_GEN2390 | PS 23 Standby Generator (Future) |
| SS_RH1_PS23_ATS2391 | PS 23 Automatic Transfer Switch (ATS) (Future) |

## 5.15.2 Instruments

**Table 5-43. PS 23 Instruments**

| Tag Number | Description |
|---|---|
| SS_RH1_PS23_YA2308A | PS 23 Beacon |
| SS_RH1_PS23_YA2308B | PS 23 Horn |

| Table 5-43. PS 23 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS23_ZSC2311 | PS 23 Pump 1 Check Valve Limit Switch |
| SS_RH1_PS23_FIT2312 | PS 23 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS23_ ZSC2321 | PS 23 Pump 2 Check Valve Limit Switch |
| SS_RH1_PS23_ FIT2322 | PS 23 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS23_ ZSC2331 | PS 23 Pump 3 Check Valve Limit Switch |
| SS_RH1_PS23_ FIT2332 | PS 23 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS23_YS2300 | PS 23 Intrusion Switch |
| SS_RH1_PS23_LSH2307 | PS 23 Flood Switch |
| SS_RH1_PS23_LT2341 | PS 23 Level Transmitter (Primary) |
| SS_RH1_PS23_ LIT2342 | PS 23 FogRod Level Transmitter (Secondary) |
| SS_RH1_PS23_ PIT2335 | PS 23 Discharge Pressure Transmitter (Future) |
| SS_RH1_PS23_FSL2361 | PS 23 Exhaust Fan Low Flow Switch |
| SS_RH1_PS23_FT2338 | PS 23 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH1_PS23_LSH2390 | PS 23 Generator Vault Flood Switch (Future) |
| SS_RH1_PS23_ LT2390 | PS 23 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.15.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:
   a. Local Manual Control:
      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.
      ii. OFF stops the pump.
      iii. AUTO enables SCADA control or local hardwired control (backup level control).
   b. SCADA Manual Control:
      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
      ii. When SCADA Manual control is selected, the pumps operate as follows:
         1. The operator can manually start and stop the pump via the SCADA HMI.
         2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:
    i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH1_PS23_LT2341). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH1_PS23_LIT2342).
    ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
        1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
        2. On rising wetwell level:
            a. Initial state:
                i. The level is below the Start Lead level set point, and all pumps are stopped.
            b. Start Lead pump:
                i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
            c. Start Lag 1 pump:
                i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
                ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
            d. Start Lag 2 pump:
                i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
                ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
                iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.
        3. On falling wetwell level:
            a. Stop Lead pump:
                i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
            b. Stop Lag 1 pump:
                i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:
   i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:
   1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.
   2. On rising wetwell level:
      a. Initial state:
         i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.
      b. Start Lead pump:
         i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
      c. Start Lag 1 pump:
         i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.
         ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.
      d. Start Lag 2 pump:
         i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.
         ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.
         iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.
   3. On falling wetwell level:
      a. Stop Lead pump:
         i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
      b. Stop Lag 1 pump:
         i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.
      c. Stop Lag 2 pump:
         i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-44 below.

**Table 5-44. PS 23 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-44. PS 23 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 23 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.15.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.15.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.15.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 23 Level Transmitter (Primary)

1. Level

ii. PS 23 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 23 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

iv. PS 23 Pump 2 Discharge Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)

v. PS 23 Pump 3 Discharge Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)

vi. PS 23 Discharge Pressure Transmitter (Future)
    1. Pressure (Future)

vii. PS 23 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)
    1. Flow (Future)
    2. Flow pulse (Future)

viii. PS 23 Pump 1 Check Valve Limit Switch
    1. Closed

ix. PS 23 Pump 2 Check Valve Limit Switch
    1. Closed

x. PS 23 Pump 3 Check Valve Limit Switch
    1. Closed

xi. PS 23 Generator (Future)
    1. Run (Future)

xii. PS 23 Generator Fuel Level Sensor (Future)
    1. Level (Future)

xiii. PS 23 ATS (Future)
    1. ATS in normal (Future)
    2. ATS in generator (Future)
    3. ATS utility power available (Future)

xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xv. Refer to Section 3.7 for common monitoring functions:
    1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:
    1. Communication interfaces
    2. Site PLC monitoring

### 5.15.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 23 FogRod Level Transmitter (via relay outputs)

1. Wetwell high high level
2. Wetwell high level
3. Wetwell low level
4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 23 Flood Switch

1. Flood alarm

iii. PS 23 Station Intrusion Switch

1. Intrusion alarm

iv. PS 23 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 23 Generator (Future)

1. Fail (Future)
2. Low fuel alarm (Future)
3. Pre-alarm warning (Future)

vi. PS 23 Generator Vault Flood Switch (Future)

1. Flood alarm (Future)

vii. PS 23 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for ‘Insufficient Pumps in Ready State’ alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 23 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.15.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 23 Pumps 1-3 Flow Meters/Transmitters (SS_RH1_PS23_FIT2312/22/32) minus the flow measured through the HGMH (SS_RH1_PS23_FIT2338).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times

i. Refer to equipment run times in Section 3.2.2.

### 5.15.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.16 Pump Station 24

Pump Station (PS) 24 is located within Reach 1, serving the eastern side of the island before ending at the King County South Mercer Pump Station. PS 24 is a dry well/wetwell configuration with three constant speed pumps. The station has a hydraulic grade manhole (HGMH) located downstream of the station to provide recirculation of sewage back to the wetwell. The HGMH structure is intended to protect private property should the Lakeline get plugged.

**Control Overview.** The three constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 24 to the next pump station, PS 23, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Three magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**HGMH Flow (Future)**. A flow meter will be installed in the future to monitor flow through the HGMH. This meter will be used to determine the frequency and quantity of discharge flow being recirculated to the wetwell. This information is important in understanding Lakeline health.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch.** Pump Station 24 has a standby generator to supply backup power to the station. The generator and associated automatic transfer switch (ATS) are monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch that is monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.16.1 Equipment

| Table 5-45. PS 24 Equipment | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS24_CAB2400 | PS 24 PLC Panel |
| SS_RH1_PS24_GNG2400 | PS 24 Go/No-Go Panel |
| SS_RH1_PS24_RIO2400 | PS 24 Remote I/O Panel |
| SS_RH1_PS24_MCP2410 | PS 24 Motor Control Panel |
| SS_RH1_PS24_RSP2410 | PS 24 Pump 1 |
| SS_RH1_PS24_RSP2420 | PS 24 Pump 2 |
| SS_RH1_PS24_RSP2430 | PS 24 Pump 3 |
| SS_RH1_PS24_IS2440 | PS 24 Intrinsically Safe (IS) Panel |
| SS_RH1_PS24_EF2460 | PS 24 Exhaust Fan |
| SS_RH1_PS24_GEN2490 | PS 24 Standby Generator |
| SS_RH1_PS24_ATS2491 | PS 24 Automatic Transfer Switch (ATS) |

### 5.16.2 Instruments

| Table 5-46. PS 24 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS24_YA2408A | PS 24 Beacon |
| SS_RH1_PS24_YA2408B | PS 24 Horn |
| SS_RH1_PS24_ZSC2411 | PS 24 Pump 1 Check Valve Limit Switch |
| SS_RH1_PS24_FIT2412 | PS 24 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS24_ ZSC2421 | PS 24 Pump 2 Check Valve Limit Switch |
| SS_RH1_PS24_ FIT2422 | PS 24 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS24_ ZSC2431 | PS 24 Pump 3 Check Valve Limit Switch |
| SS_RH1_PS24_ FIT2432 | PS 24 Pump 3 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS24_YS2400 | PS 24 Intrusion Switch |
| SS_RH1_PS24_LSH2407 | PS 24 Flood Switch |
| SS_RH1_PS24_LT2441 | PS 24 Level Transmitter (Primary) |
| SS_RH1_PS24_ LIT2442 | PS 24 FogRod Level Transmitter (Secondary) |
| SS_RH1_PS24_ PIT2435 | PS 24 Discharge Pressure Transmitter (Future) |
| SS_RH1_PS24_FSL2461 | PS 24 Exhaust Fan Low Flow Switch |
| SS_RH1_PS24_FT2438 | PS 24 Hydraulic Grade Manhole Flow Meter/Transmitter (Future) |
| SS_RH1_PS24_LSH2490 | PS 24 Generator Vault Flood Switch |
| SS_RH1_PS24_ LT2490 | PS 24 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

## 5.16.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:

   a. Local Manual Control:

      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.

      ii. OFF stops the pump.

      iii. AUTO enables SCADA control or local hardwired control (backup level control).

   b. SCADA Manual Control:

      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.

      ii. When SCADA Manual control is selected, the pumps operate as follows:

         1. The operator can manually start and stop the pump via the SCADA HMI.

         2. The operator can also select a “WETWELL DRAWDOWN” option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

   c. SCADA Auto Control:

      i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH1_PS24_LT2441). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH1_PS24_LIT2442).

      ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:

         1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

         2. On rising wetwell level:

            a. Initial state:

               i. The level is below the Start Lead level set point, and all pumps are stopped.

            b. Start Lead pump:

               i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

            c. Start Lag 1 pump:

               i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:

1. During operation, up to three pumps operate as Lead/Lag 1/Lag 2.

2. On rising wetwell level:

a. Initial state:

i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.

b. Start Lead pump:

i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.

c. Start Lag 1 pump:

i. When the level reaches the Start Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump starts.

ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag 1 pump starts.

d. Start Lag 2 pump:

i. When the level reaches the Start Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump starts.

ii. Alternatively, if the Lag 1 pump is running longer than an adjustable time period, the Lag 2 pump starts.

iii. When the Lag 2 pump is called to run, an alarm is signaled at SCADA.

3. On falling wetwell level:

a. Stop Lead pump:

i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.

b. Stop Lag 1 pump:

i. When the level reaches the Stop Lag 1 level set point and is maintained for an adjustable time period, the Lag 1 pump stops.

c. Stop Lag 2 pump:

i. When the level reaches the Stop Lag 2 level set point and is maintained for an adjustable time period, the Lag 2 pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump’s sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. After a set time delay (via time delay relay) and the low level has not been reached, Start Pump 3.
4. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-47 below.

**Table 5-47. PS 24 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2, time delay relay to start Pump 3 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 1 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag 2 Pump | | Instrument is based on selected wetwell level control method at SCADA |

| Table 5-47. PS 24 Wetwell Level Control Summary | | | | |
|---|---|---|---|---|
| Instrument | Source | Action | Set point (feet) | Notes |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 24 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a “Go” green light and a “No-Go” red light, with “Go” signifying it is safe to enter and “No-Go” signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a “horn silence” pushbutton, which allows the operator to silence the horn for 15 minutes under a “No-Go” condition while the beacon remains lit.

b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.

c. A low flow alarm creates a “No-Go” situation signifying the space is not safe to enter, and the “No-Go” light is on. When the low flow alarm is not active, the “Go” light is on (hardwired).

d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the “horn silence” pushbutton on the Go/No-Go panel.

e. The low flow alarm is monitored at SCADA.

### 5.16.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.16.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.

b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.

c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. The interlock automatically resets after the high high level condition clears.

### 5.16.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 24 Level Transmitter (Primary)

1. Level

ii. PS 24 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 24 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

iv. PS 24 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

v. PS 24 Pump 3 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

vi. PS 24 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vii. PS 24 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow (Future)

2. Flow pulse (Future)

viii. PS 24 Pump 1 Check Valve Limit Switch

1. Closed

ix. PS 24 Pump 2 Check Valve Limit Switch

1. Closed

x. PS 24 Pump 3 Check Valve Limit Switch
   1. Closed
xi. PS 24 Generator
   1. Run
xii. PS 24 Generator Fuel Level Sensor (Future)
   1. Level (Future)
xiii. PS 24 ATS
   1. ATS in normal
   2. ATS in generator
   3. ATS utility power available
xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.
xv. Refer to Section 3.7 for common monitoring functions:
   1. Common panel hardwired status points.

b. Software:
   i. Refer to Section 3.7 for common monitoring functions:
      1. Communication interfaces
      2. Site PLC monitoring

### 5.16.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:
   i. PS 24 FogRod Level Transmitter (via relay outputs)
      1. Wetwell high high level
      2. Wetwell high level
      3. Wetwell low level
      4. FogRod level fault (Cable short circuit/grease buildup)
   ii. PS 24 Flood Switch
      1. Flood alarm
   iii. PS 24 Station Intrusion Switch
      1. Intrusion alarm
   iv. PS 24 Exhaust Fan Low Flow Switch
      1. Low Flow
   v. PS 24 Generator
      1. Fail
      2. Low fuel alarm

3. Pre-alarm warning

vi. PS 24 Generator Vault Flood Switch

1. Flood alarm

vii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

viii. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of two pumps to be in Ready State, or generate an alarm.

ii. Lag 2 pump called to run

1. Generate an alarm when the Lag 2 pump is called to run.

iii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iv. PS 24 Hydraulic Grade Manhole Flow Meter/Transmitter (Future)

1. Flow alarm (Future)

v. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms

2. Site PLC alarms

vi. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.16.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. Recirculation flow (future) measured by the HGMH flow meter is subtracted from the incoming flow rate to determine the overall station inlet flow. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)
   i. Calculate the station total flow as the sum of the PS 20 Pumps 1-3 Flow Meters/Transmitters (SS_RH1_PS24_FIT2412/22/32) minus the flow measured through the HGMH (SS_RH1_PS24_FIT2438).
d. Flow Pulse Totalization (Future)
   i. Refer to flow pulse totalization in Section 3.2.4.
e. Pump run times
   i. Refer to equipment run times in Section 3.2.2.
f. Pump starts
   i. Refer to equipment starts in Section 3.2.3.
g. Generator run times (Future)
   i. Refer to equipment run times in Section 3.2.2.

### 5.16.9 Operation on Generator

A. Loss of Power:
   a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.
   b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

## 5.17 Pump Station 25

Pump Station (PS) 25 is located within Reach 1, serving the eastern side of the island before ending at the King County South Mercer Pump Station. PS 25 is a dry well/wetwell configuration with two constant speed pumps.

**Control Overview.** The two constant speed pumps operate using lead/lag control to draw down the sewage in a wetwell, discharging to the Lakeline pipe. From the Lakeline pipe, the sewage is transferred from PS 25 to the next pump station, PS 24, in the reach, eventually ending at the King County South Mercer Pump Station. Pumps start and stop based on wetwell level.

**Wetwell Level.** The wetwell is equipped with two means of level control and monitoring: a primary level transmitter and a secondary (backup) level system. A submersible pressure transducer is the primary means of level control for the pumps. Should the primary instrument or PLC fail, a FogRod level system provides secondary monitoring and hardwired backup control for the pumps. The FogRod system consists of a series of conductivity switches wired to a transmitter. The FogRod transmitter monitors the level of the wetwell. The primary and secondary levels are compared and alarm if there is a disagreement.

**Check Valve.** Each pump has an associated check valve on the discharge line. The check valve opens when the pump is started. The closed position of the check valve is monitored by a limit switch.

**Flush Valve (Future).** The flush valve at PS 25 will be replaced as part of a future project. The existing flush valve consists of a pneumatic actuator and is not connected to SCADA. The existing flush system draws water from the lake to provide flushing of the Lakeline pipe downstream of the pump station. Typically, flushing happens during low flows (at night). The existing flush valve operates based on a local timer and opens at set time intervals to flush the Lakeline pipe. The future flush valve will consist of a new valve and electric actuator. Limit switches will monitor the open and closed positions of the valve.

**Pump Discharge Pressure (Future).** A pressure transmitter will be installed in the future to monitor pressure on the common pump discharge header.

**Station Flow (Future).** Two magnetic flow meters will be installed in the future to measure the discharge flow of each pump.

**Exhaust Fan Low Flow Switch and Go/No-Go Panel.** An exhaust fan in the dry well provides the required number of air changes to declassify the dry well space. A thermal flow switch in the exhaust duct confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the setpoint, then a low flow alarm is generated. The low flow alarm is tied into a Go/No-Go Panel inside the station hatch door and horn/beacon inside the dry well to warn operators of low ventilation flow and a No-Go condition.

**Generator and Automatic Transfer Switch (Future).** Pump Station 25 has a standby generator to supply backup power to the station. The City has plans to replace the existing generator in a future project, at which time additional generator and automatic transfer switch (ATS) parameters will be monitored by SCADA. The generator and ATS are located in a below grade vault which has a flood switch to be monitored by SCADA.

**Flood Switch.** A flood switch is located at the bottom of the dry well pump level to indicate flood conditions in the dry well.

### 5.17.1 Equipment

**Table 5-48. PS 25 Equipment**

| Tag Number | Description |
|---|---|
| SS_RH1_PS25_CAB2500 | PS 25 PLC Panel |
| SS_RH1_PS25_GNG2500 | PS 25 Go/No-Go Panel |
| SS_RH1_PS25_MCP2510 | PS 25 Motor Control Panel |
| SS_RH1_PS25_RSP2510 | PS 25 Pump 1 |
| SS_RH1_PS25_RSP2520 | PS 25 Pump 2 |
| SS_RH1_PS25_IS2540 | PS 25 Intrinsically Safe (IS) Panel |
| SS_RH1_PS25_ACT2550 | PS 25 Flush Valve Electric Actuator (Future) |
| SS_RH1_PS25_FLV2550 | PS 25 Flush Valve (Future) |
| SS_RH1_PS25_EF2560 | PS 25 Exhaust Fan |
| SS_RH1_PS25_GEN2590 | PS 25 Standby Generator (Future) |
| SS_RH1_PS25_ATS2591 | PS 25 Automatic Transfer Switch (ATS) (Future) |

### 5.17.2 Instruments

| Table 5-49. PS 25 Instruments | |
|---|---|
| Tag Number | Description |
| SS_RH1_PS25_YA2508A | PS 25 Beacon |
| SS_RH1_PS25_YA2508B | PS 25 Horn |
| SS_RH1_PS25_ZSC2511 | PS 25 Pump 1 Check Valve Limit Switch |
| SS_RH1_PS25_FIT2512 | PS 25 Pump 1 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS25_ ZSC2521 | PS 25 Pump 2 Check Valve Limit Switch |
| SS_RH1_PS25_ FIT2522 | PS 25 Pump 2 Discharge Flow Meter/Transmitter (Future) |
| SS_RH1_PS25_YS2500 | PS 25 Intrusion Switch |
| SS_RH1_PS25_LSH2507 | PS 25 Flood Switch |
| SS_RH1_PS25_LT2541 | PS 25 Level Transmitter (Primary) |
| SS_RH1_PS25_ LIT2542 | PS 25 FogRod Level Transmitter (Secondary) |
| SS_RH1_PS25_ PIT2535 | PS 25 Discharge Pressure Transmitter (Future) |
| SS_RH1_PS25_ZSO2550 | PS 25 Flush Valve Open Limit Switch (Future) |
| SS_RH1_PS25_ZSC2550 | PS 25 Flush Valve Closed Limit Switch (Future) |
| SS_RH1_PS25_FSL2561 | PS 25 Exhaust Fan Low Flow Switch |
| SS_RH1_PS25_LSH2590 | PS 25 Generator Vault Flood Switch (Future) |
| SS_RH1_PS25_ LT2590 | PS 25 Generator Fuel Level Sensor (Future) |

*Future instruments are included in the operation description.*

### 5.17.3 Operation

A. The local HAND/OFF/AUTO (HOA) selector switch at the motor starter panel for each pump can be operated as follows:
   a. Local Manual Control:
      i. When the HOA is in HAND, local control is enabled. The operator can then select the FORWARD pushbutton to start the pump. Once FORWARD is pushed, the pump runs continuously.
      ii. OFF stops the pump.
      iii. AUTO enables SCADA control or local hardwired control (backup level control).
   b. SCADA Manual Control:
      i. When the HOA is in AUTO, SCADA control is enabled. The operator can then select between SCADA Manual and SCADA Auto control of the equipment at the SCADA HMI.
      ii. When SCADA Manual control is selected, the pumps operate as follows:
         1. The operator can manually start and stop the pump via the SCADA HMI.

2. The operator can also select a "WETWELL DRAWDOWN" option via the SCADA HMI. When this is selected, the pump starts and continues to run until the Lead Stop level set point is reached.

c. SCADA Auto Control:
   i. The wetwell level control method (primary transmitter or FogRod) is operator selectable and displayed on the HMI screen. Under normal operation, pumps are started and stopped based on the primary level transmitter (SS_RH1_PS25_LT2541). If the FogRod is selected, pumps are started and stopped based on the analog output signal from the FogRod level transmitter (SS_RH1_PS25_LIT2542).
   ii. When primary level transmitter SCADA Auto Control is selected, the pumps operate as follows:
      1. During operation, the two pumps operate as Lead/Lag.
      2. On rising wetwell level:
         a. Initial state:
            i. The level is below the Start Lead level set point, and all pumps are stopped.
         b. Start Lead pump:
            i. When the level reaches the Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
         c. Start Lag pump:
            i. When the level reaches the Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.
            ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.
      3. On falling wetwell level:
         a. Stop Lead pump:
            i. When the level falls below the Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
         b. Stop Lag pump:
            i. When the level reaches the Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.
   iii. When FogRod SCADA Auto Control is selected, the pumps operate as follows:
      1. During operation, two pumps operate as Lead/Lag.

2. On rising wetwell level:
    a. Initial state:
        i. The level is below the FogRod Start Lead level set point, and all pumps are stopped.
    b. Start Lead pump:
        i. When the level reaches the FogRod Start Lead level set point and is maintained for an adjustable time period, the Lead pump starts.
    c. Start Lag pump:
        i. When the level reaches the FogRod Start Lag level set point and is maintained for an adjustable time period, the Lag pump starts.
        ii. Alternatively, if the Lead pump is running longer than an adjustable time period, the Lag pump starts.
3. On falling wetwell level:
    a. Stop Lead pump:
        i. When the level falls below the FogRod Lead Stop level set point and is maintained for an adjustable time period, the Lead pump stops.
    b. Stop Lag pump:
        i. When the level reaches the FogRod Stop Lag level set point and is maintained for an adjustable time period, the Lag pump stops.

iv. While in SCADA Auto, pumps alternate after each run cycle as described in Section 3.6.7.

v. If SCADA Auto control is not enabled for a pump or the pump fails to run when it is called to operate, that pump's sequence position is set to OOS (out of service) and is skipped in the operational sequence and the next pump in the sequence assumes its new role.

d. Local Hardwired Control:

i. When the HOA is in Auto, local hardwired level control is enabled as a backup to SCADA control. Output contacts from the FogRod level transmitter are hardwired to start and stop the pumps if the wetwell level falls outside of the normal operating range. The FogRod relay outputs will be positioned outside the boundary of the SCADA level setpoints. The FogRod output contacts and relay logic are hardwired as follows:

1. High level (XX FT, setpoint TBD): Start Pump 1.
2. High High level (XX FT, setpoint TBD): Start Pump 2.
3. Low level (XX FT, setpoint TBD): Stop all pumps.

ii. A local FOGROD PUMP RESET pushbutton is mounted to the front of the IS panel to stop the pumps while under hardwired FogRod control. The local FOGROD PUMP RESET pushbutton will only stop the pumps if the level is below the FogRod High level setpoint.

iii. A hardwired FogRod control remote reset button can be selected at the SCADA HMI to remotely stop the pumps from running while under hardwired control.

e. Wetwell level control is summarized in Table 5-50 below.

**Table 5-50. PS 25 Wetwell Level Control Summary**

| Instrument | Source | Action | Set point (feet) | Notes |
|---|---|---|---|---|
| Level Transmitter | Software | High high level alarm | | |
| FogRod (Relay Output) | Hardwired | FogRod high high level alarm | | |
| FogRod (Relay Output) | Hardwired | Start Pump 1 / FogRod high level alarm | | Hardwired level control starts Pump 1, time delay relay to start Pump 2 |
| Level Transmitter | Software | High level alarm | | |
| Level Transmitter | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Start Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lag Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| FogRod | Software | Stop Lead Pump | | Instrument is based on selected wetwell level control method at SCADA |
| Level Transmitter | Software | Low level alarm | | Warning alarm on low level |
| FogRod (Relay Output) | Hardwired | Stop Pump(s) / FogRod low level alarm | | Hardwired level control stops all Pump(s) from FogRod high level control starts pumps logic |
| Level Transmitter | Software | Low low level shutdown | | Software interlock to shutdown pumps on low-low level |

*Set points to be tuned in the field during start up.*

B. The PS 25 Exhaust Fan operates continuously to provide the required number of air changes for the dry well. The Exhaust Fan operates via local control only (no SCADA control). The exhaust fan low flow switch and Go/No-Go panel operate as follows:

   a. The station has a Go/No-Go panel inside the dry well hatch door. The panel has a "Go" green light and a "No-Go" red light, with "Go" signifying it is safe to enter and "No-Go" signifying the space is not safe to enter. In addition to the Go/No-Go Panel at the station entrance, there is a horn/beacon inside the pump station dry well. The Go/No-Go panel has a "horn silence" pushbutton, which allows the operator to silence the horn for 15 minutes under a "No-Go" condition while the beacon remains lit.
   b. A low flow switch in the ventilation ducting confirms that the exhaust fan is running at an acceptable flow rate. If the flow drops below the low flow setpoint, a low flow alarm is generated. The low air flow alarm is hardwired into the Go/No-Go panel and the horn/beacon.
   c. A low flow alarm creates a "No-Go" situation signifying the space is not safe to enter, and the "No-Go" light is on. When the low flow alarm is not active, the "Go" light is on (hardwired).
   d. The horn and beacon activate upon a low flow alarm. The horn is tied to the pump station access hatch position (intrusion switch) and alarms in the hatch open position only (hardwired). The horn can be silenced temporarily using the "horn silence" pushbutton on the Go/No-Go panel.
   e. The low flow alarm is monitored at SCADA.

### 5.17.4 Hardwired Interlocks

A. The following are hardwired interlocks active in LOCAL or SCADA control:

   a. Motor overload is hardwired to shut off the motor. The motor overload reset button is located on front of the motor starter panel.

### 5.17.5 Software Interlocks

A. The following are PLC logic interlocks active in SCADA Manual or SCADA Auto control:

   a. Wetwell low low level (operator adjustable) based on the primary level transmitter causes the pump to shutdown or prohibit start. The interlock automatically resets after the low low level condition clears. This software interlock is only active if the primary level transmitter is being used for control.
   b. Wetwell low level based on the FogRod causes the pump to shutdown or prohibit start. The interlock automatically resets after the low level condition clears.
   c. If an out-of-range alarm on the wetwell primary level transmitter is active, the secondary level transmitter becomes the primary until the alarm clears. Interlock can be enabled/disabled from the HMI screen. In the future, wetwell high high level (operator adjustable) will cause the flush valve to close or prohibit open. The interlock automatically resets after the high high level condition clears.

### 5.17.6 Monitoring

A. In addition to the common statuses specified in Section 3.6.2, the following statuses are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 25 Level Transmitter (Primary)

1. Level

ii. PS 25 FogRod Level Transmitter (Secondary)

1. Level

iii. PS 25 Pump 1 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

iv. PS 25 Pump 2 Discharge Flow Meter/Transmitter (Future)

1. Flow (Future)
2. Flow pulse (Future)

v. PS 25 Discharge Pressure Transmitter (Future)

1. Pressure (Future)

vi. PS 25 Pump 1 Check Valve Limit Switch

1. Closed

vii. PS 25 Pump 2 Check Valve Limit Switch

1. Closed

viii. PS 25 Flush Valve (Future)

1. In remote (Future)

ix. PS 25 Flush Valve Open Position Switch (Future)

1. Open (Future)

x. PS 25 Flush Valve Closed Position Switch (Future)

1. Closed (Future)

xi. PS 25 Generator (Future)

1. Run (Future)

xii. PS 25 Generator Fuel Level Sensor (Future)

1. Level (Future)

xiii. PS 25 ATS (Future)

1. ATS in normal (Future)
2. ATS in generator (Future)
3. ATS utility power available (Future)

xiv. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

xv. Refer to Section 3.7 for common monitoring functions:

1. Common panel hardwired status points.

b. Software:

i. Refer to Section 3.7 for common monitoring functions:

1. Communication interfaces

2. Site PLC monitoring

### 5.17.7 Alarming

A. In addition to the common alarms specified in Section 3.6.2, the following alarms are continually monitored and displayed at the SCADA HMI:

a. Hardwired:

i. PS 25 FogRod Level Transmitter (via relay outputs)

1. Wetwell high high level

2. Wetwell high level

3. Wetwell low level

4. FogRod level fault (Cable short circuit/grease buildup)

ii. PS 25 Flood Switch

1. Flood alarm

iii. PS 25 Station Intrusion Switch

1. Intrusion alarm

iv. PS 25 Exhaust Fan Low Flow Switch

1. Low Flow

v. PS 25 Generator (Future)

1. Fail (Future)

2. Low fuel alarm (Future)

3. Pre-alarm warning (Future)

vi. PS 25 Generator Vault Flood Switch (Future)

1. Flood alarm (Future)

vii. PS 25 Motor Control Panel

1. Phase fail

viii. Refer to Section 3.6.2 for pump status, output, and alarms for constant speed pumps.

ix. Refer to Section 3.7 for common alarm functions:

1. Common panel hardwired alarms

b. Software:

i. Refer to 3.9.3 for 'Insufficient Pumps in Ready State' alarm:

1. Require a minimum of one pump to be in Ready State, or generate an alarm.

ii. Level transmitter measurement discrepancy

1. Refer to Section 5.1.8.

iii. Refer to Section 3.7 for common alarm functions:

1. Communication interface alarms
2. Site PLC alarms

iv. Refer to Section I/O Alarming3.1.2 for common I/O Alarming.

### 5.17.8 Calculations

A. The following calculations are performed and displayed at the SCADA HMI:

a. Wetwell level rate of rise and station inlet flow

i. While pumps are OFF, the wetwell level rate of rise is calculated using the wetwell level signal and an operator entered gallons per foot setting for the wetwell. This information is used to calculate the incoming flow rate to the wetwell on a continuous basis. While pumps are running, this calculation is paused.

b. Level transmitter measurement discrepancy

i. The difference between the two level transmitter measurements is calculated. A level transmitter measurement discrepancy alarm is activated when the difference between measurements exceeds an operator-adjustable set point based on percentage of calibrated range. Note the FogRod level transmitter can only measure in 10% intervals.

c. Station discharge flow total (Future)

i. Calculate the station total flow as the sum of the PS 25 Pumps 1-2 Flow Meters/Transmitters (SS_RH1_PS25_FIT2512/22).

d. Flow Pulse Totalization (Future)

i. Refer to flow pulse totalization in Section 3.2.4.

e. Pump run times

i. Refer to equipment run times in Section 3.2.2.

f. Pump starts

i. Refer to equipment starts in Section 3.2.3.

g. Generator run times (Future)

i. Refer to equipment run times in Section 3.2.2.

### 5.17.9 Operation on Generator

A. Loss of Power:

a. On loss of power, while the pump HOA is in AUTO, equipment automatically restarts when power is returned. While the pump HOA is in HAND, equipment requires operator initiation at the motor starter panel via the FORWARD pushbutton.

b. When switching on/off generator, time delays (initially set at 15 seconds) on the pump ‘fail to start’ and check valve ‘fail to open’ alarms are implemented so that the pumps do not fault.

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## Section 6

# Limitations

This document was prepared solely for City of Mercer Island in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Mercer Island and Brown and Caldwell dated April 4, 2019. This document is governed by the specific scope of work authorized by City of Mercer Island; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Mercer Island and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Further, Brown and Caldwell makes no warranties, express or implied, with respect to this document, except for those, if any, contained in the agreement pursuant to which the document was prepared.

All data, drawings, documents, or information contained this report have been prepared exclusively for the person or entity to whom it was addressed and may not be relied upon by any other person or entity without the prior written consent of Brown and Caldwell unless otherwise provided by the Agreement pursuant to which these services were provided.

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## Section 7

# References

*General Sewer Plan*, City of Mercer Island, 2018.

*SCADA and Smart Utility Standards*, City of Mercer Island, 2019 (draft).

*Sewer System Lake Line Access Evaluation and Lake Line Program Development*, City of Mercer Island, 2019.

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SECTION 40 63 43

PROGRAMMABLE LOGIC CONTROLLERS AND INTERFACE TERMINALS

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. Scope

1. This Section specifies requirements for programmable logic controllers (PLC) designed to execute discrete and continuous control logic with high reliability in industrial applications. This Section also specifies remote input/outputs (RIO) and panel-mounted operator interface terminals (OIT) to serve as graphical user interfaces for local control, monitoring, alarming, and data logging.
2. Mount PLCs, RIOs, and OITs in existing control panel enclosures or new panel enclosures as specified. Enclosures and components not specific to the PLC platform are specified in Section 40 67 00.
3. Software licensing will be purchased by the Owner.

B. PLC and RIO Schedule

1. Provide each site with a PLC or RIO as indicated in the schedule below. Refer to Section 40 67 00A Panel Schedule and the Drawings for site PLC, RIO, and OIT requirements. Refer to Section 40 67 00A Panel Schedule for site PLC processor and memory card requirements. Size PLC or RIO based on minimum I/O card requirements in Section 40 67 00A Panel Schedule and per Section 40 61 93A Input/Output List.

| Site | Panel No. | PLC or RIO No. | Testing |
|---|---|---|---|
| Pump Station 1 | SS_RH4_PS01_CAB0100 | SS_RH4_PS01_PLC0101 | 40 61 21 |
| Pump Station 1 | SS_RH4_PS01_RIO0100 | SS_RH4_PS01_RIO0101 | 40 61 21 |
| Pump Station 4 | SS_RH3_PS04_CAB0400 | SS_RH3_PS04_ PLC0401 | 40 61 21 |
| Pump Station 10 | SS_RH5_PS10_CAB1000 | SS_RH5_PS10_ PLC1001 | 40 61 21 |
| Flush Station 12 | SS_RH5_FS12_CAB1200 | SS_RH5_FS12_ PLC1201 | 40 61 21 |
| Pump Station 13 | SS_RH3_PS13_CAB1300 | SS_RH3_PS13_ PLC1301 | 40 61 21 |
| Pump Station 13 | SS_RH3_PS13_RIO1300 | SS_RH3_PS13_ RIO1301 | 40 61 21 |
| Pump Station 14 | SS_RH2_PS14_CAB1400 | SS_RH2_PS14_ PLC1401 | 40 61 21 |
| Pump Station 15 | SS_RH2_PS15_CAB1500 | SS_RH2_PS15_ PLC1501 | 40 61 21 |
| Pump Station 16 | SS_RH2_PS16_CAB1600 | SS_RH2_PS16_ PLC1601 | 40 61 21 |
| Pump Station 17 | SS_RH2_PS17_CAB1700 | SS_RH2_PS17_ PLC1701 | 40 61 21 |
| Pump Station 17 | SS_RH2_PS17_RIO1700 | SS_RH2_PS17_ RIO1701 | 40 61 21 |
| Pump Station 18 | SS_RH2_PS18_CAB1800 | SS_RH2_PS18_ PLC1801 | 40 61 21 |
| Pump Station 18 | SS_RH2_PS18_RIO1800 | SS_RH2_PS18_ RIO1801 | 40 61 21 |
| Pump Station 19 | SS_RH2_PS19_CAB1900 | SS_RH2_PS19_ PLC1901 | 40 61 21 |
| Pump Station 19 | SS_RH2_PS19_RIO1900 | SS_RH2_PS19_ RIO1901 | 40 61 21 |
| Pump Station 20 | SS_RH2_PS20_CAB2000 | SS_RH2_PS20_ PLC2001 | 40 61 21 |
| Pump Station 20 | SS_RH2_PS20_RIO2000 | SS_RH2_PS20_ RIO2001 | 40 61 21 |
| Pump Station 21 | SS_RH2_PS21_CAB2100 | SS_RH2_PS21_ PLC2101 | 40 61 21 |
| Pump Station 21 | SS_RH2_PS21_RIO2100 | SS_RH2_PS21_ RIO2101 | 40 61 21 |
| Pump Station 22 | SS_RH1_PS22_CAB2200 | SS_RH1_PS22_ PLC2201 | 40 61 21 |

| Site | Panel No. | PLC or RIO No. | Testing |
|---|---|---|---|
| Pump Station 23 | SS_RH1_PS23_CAB2300 | SS_RH1_PS23_ PLC2301 | 40 61 21 |
| Pump Station 24 | SS_RH1_PS24_CAB2400 | SS_RH1_PS24_ PLC2401 | 40 61 21 |
| Pump Station 24 | SS_RH1_PS24_RIO2400 | SS_RH1_PS24_ RIO2401 | 40 61 21 |
| Pump Station 25 | SS_RH1_PS25_CAB2500 | SS_RH1_PS25_ PLC2501 | 40 61 21 |

C. General Requirements

1. General requirements shall be as specified in Sections 40 61 13 and 40 67 00.

## 1.02 QUALITY ASSURANCE

A. References

1. This Section contains references to the following documents that are part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this Section as if referenced directly. In the event of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid or on the effective date of the Agreement if there were no Bids.
3. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
4. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

| Reference | Title |
|---|---|
| IEC 61131-3 | Programmable Controllers – Part 3: Programming Languages |
| NEMA IA 2.2 | Programmable Controllers – Equipment Requirements and Tests |
| NEMA IA 2.3 | Programmable Controllers – Programming Languages |

B. This Section references other sections with associated work specified therein:

1. Section 40 61 21 Process Control System Testing
2. Section 40 61 93 Process Control System Input/Output List
3. Section 40 67 00 Control System Equipment Panels and Racks

## 1.03 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittals:

1. A copy of this Specification Section, with addendum updates included, and all referenced and applicable Sections, with addendum updates included, with each paragraph check-marked to indicate Specification compliance or marked to indicate requested deviations from Specification requirements. A check mark shall denote full compliance with a paragraph as a whole.
   a. If deviations from the Specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.
   b. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Specifications.
   c. *Failure to include a copy of the marked-up Specification Sections, along with justification(s) for any requested deviations to the Specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.*
2. A copy of the contract documents relating to the submitted equipment, with addendum updates that apply to the equipment in this section, marked to show specific changes necessary for the equipment proposed in the submittal. If no changes are required, mark the drawing(s) "no changes required" on the drawing index. Drawings marked "no changes required" on the drawing index do not need to be included in the submittal. Failure to include copies of the relevant drawings with the submittal shall be cause for rejection of the entire submittal with no further review.
3. Marked product literature for the equipment specified herein.
4. PLC Input/Output (I/O) interconnection diagram drawings.
5. Internal power distribution schematic diagram drawings.
6. PLC power supply loading calculations.
7. Bill of Material for the equipment specified herein, organized by site, including the following component information:
   a. Functional name or description
   b. Manufacturer
   c. Model number
   d. Quantity
8. PLC rack layout diagram.
9. List of spare parts to be provided and quantities.

D. Closeout Submittals:

1. Submit under Section 40 61 21 and per the requirements of this Section.
   a. Operating and maintenance information shall be provided in accordance with Section 01 78 23. Include the following for the PLC system:
      1) Manufacturer, Representative, and Supplier contact information.

2) Manufacturer instruction manuals shall include only the following as applicable to the PLC system:
   a) Safety Precautions.
   b) Environmental Conditions.
   c) Troubleshooting guides and diagnostic techniques.
   d) Component connection diagrams.
   e) Removal and replacement instructions.
3) Warranty information.
4) Final reviewed submittal.
5) As-built drawings with record of switch and jumper settings for all components.
6) List of spare parts provided.

## PART 2 PRODUCTS

### 2.01 GENERAL

A. Manufacturer
   1. The PLC/RIO manufacturer and model shall be Siemens ET200SP family of PLC controllers.
   2. The OIT manufacturer and model shall be Siemens TP1200 Comfort Panel.
   3. Manufacturers and models shall be as specified for the purpose of compatible and efficient utilization of existing equipment, supplies, and personnel training and experience; no substitutions are permitted.
   4. Where there is conflict in the part numbers between the drawings and this Section, this Section shall prevail.

B. Materials
   1. Equipment and/or products shall be new and unused at the time of system assembly and must not be scheduled for end of service by the manufacturer.

### 2.02 PROGRAMMABLE LOGIC CONTROLLER

A. Manufacturer:
   1. Siemens.

B. Processor:
   1. Siemens 1510SP-1 PN.
      a. Part number: 6ES7510-1DJ01-0AB0.
   2. Accessories:
      a. SD Memory card
         1) 4MB storage. Part number: 6ES7954-8LC03-0AA0.
      b. Bus Adapter
         1) 2 RJ45 Ports for PROFINET. Part number: 6ES7193-6AR00-0AA0

C. Networking Connections: Provide all communication interfaces, network cables, taps, terminators, power supplies, and accessories for a complete operating network.

1. DNP3 Module.
    a. Part number: 6GK7542-6VX00-0XE0.
    b. Bus Adapter – 2 RJ45 Ports. Part number: 6ES7193-6AR00-0AA0
2. PROFINET Interface Module.
    a. Part number: 6ES7155-6AR00-0AN0.

D. Input and Output Modules:

1. Digital Inputs:
    a. Part number: 6ES7131-6BH01-0BA0.
2. Digital Outputs:
    a. Part number: 6ES7132-6BH01-0BA0.
3. Analog Inputs:
    a. Part number: 6ES7134-6GD01-0BA1.
4. Analog Outputs (SPARE ONLY):
    a. Part number: 6ES7135-6HD00-0BA1.
5. Accessories:
    a. Separated Base Unit. Part number: 6ES7193-6BP00-0DA0.
    b. Jumpered Base Unit. Part number: 6ES7193-6BP00-0BA0.
6. Spare Input/Outputs (Installed):
    a. Refer to Section 40 67 00A Panel Schedule for minimum I/O card requirements by site.

E. Miscellaneous:

1. Provide all cables, taps, terminators, power supplies, and accessories for a complete operating PLC system. Include in Bill of Materials list.

## 2.03 OPERATOR INTERFACE TERMINAL

A. Manufacturer:

1. Siemens.

B. Operator Interface Terminal:

1. 12” Comfort Panel. SIMATIC HMI TP1200 Comfort.
    a. Part number: 6AV2124-0MC01-0AX0.
2. Accessories:
    a. SD Memory card – 2GB storage. Part number: 6AV2181-8XP00-0AX0.

## 2.04 NOT USED

## 2.05 SPARE PARTS

A. The following spare parts shall be provided:

1. One of each unique processor module.
2. One of each unique communication module.

3. One for each ten, minimum of one for each unique I/O module.
4. Three of each unique terminal base unit.
5. One 12” operator interface terminal.

## 2.06 CONTROL PANEL FABRICATION

A. Refer to Section 40 67 00.

B. Detail shop drawings showing field connections and any terminal block jumpering required.

C. Terminate all used and spare I/O wiring to terminal blocks.

D. Refer to Section 40 67 00 for wire numbers.

E. Refer to input/output card drawings for terminal connections.

# PART 3 EXECUTION

## 3.01 INSTALLATION

A. Refer to Section 40 67 00. PLC to be DIN rail mounted inside control panels as specified in Section 40 67 00 and on the Drawings.

B. Connect input and output devices to the PLC via control panel terminal blocks, not directly to the PLC.

## 3.02 FIELD INSPECTION AND TESTING

A. Refer to Section 40 67 00.

B. Systems Integrator: The supplier of each PLC system shall provide a qualified service representative to perform the following:
   1. Inspect the PLC, RIO, and OIT installation including I/O and network systems, hardware configuration switch and jumper settings.
   2. Monitor all PLC system diagnostic indicators, both hardware and software, and certify that the PLC, RIO, and OIT system performance meets or exceeds the Manufacturer’s published specifications.
   3. Assist in all testing. The Systems Integrator’s time on site shall be based on Section 01 32 16 - Construction Progress Schedule.
   4. Coordinate with Owner’s Programmer for modification to PLC programs as required.
   5. Certify in writing to the Engineer that the PLC system has been installed and configured in accordance with the Manufacturer’s published guidelines.

C. Contractor
   1. Fault or trouble conditions shall be investigated and resolved by the Contractor to the satisfaction of the PLC supplier.

## 3.03 TRAINING

A. Training shall conform to the requirements of Section 01 79 00.

B. In addition to Section 40 61 13 requirements, provide four (4) hours of operating and maintenance training at the Project site to the Owner's personnel on the product components/hardware by the manufacturer or certified representative. Training shall include:

1. Hardware overview.
2. Power-up and power down of hardware.
3. Description of status and trouble indication lights.
4. Definition and identification of fault codes, trouble codes, and common troubleshooting.
5. Installation, removal, and replacement of components/hardware parts.
6. Ensure component is properly networked and the network is active.

END OF SECTION

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SECTION 40 67 00

CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. Scope:

1. This section specifies requirements for process control system (PCS) control panels.
2. This section specifies requirements for power supply and conditioning equipment required to support the instrumentation and communication systems specified.
3. Provide the instrument, control, and monitoring features indicated on the drawings. Panels shall be arranged to separate control and instrument devices from power wiring. Panel shall be arranged for dedicated field wiring terminations rated for 600 Vac or less for power, control, and instrument signal wiring, in accordance with NEC Article 409.
4. Panels shall be fabricated by a UL-508A recognized facility and shall bear the appropriate UL 508A Industrial Control Panel label. Panels for Hazardous (Classified) locations shall bear the appropriate UL 698A label. Panels shall be labeled in accordance with Article 409 of the National Electrical Code.
5. Panels that contain programmable logic controllers (PLC), remote input/output (RIO), and operator interface terminal (OIT) units shall be as indicated in the Panel Schedule. Programmable controllers, RIOs, and OITs shall comply with Section 40 63 43. The Panel Schedule is located at the end of this section as Attachment A.
6. Specific panel devices are specified herein and in Section 26 05 00.
7. Field modifications require a UL inspector site inspection for approval of panel corrections and to re-label the panel after the field modifications are completed.
8. Contractor custom panels are specified herein and shown on the drawings.
9. Seismic anchoring and bracing: Sections 40 61 13.

B. Panel Design:

1. General:
   a. Additional panel hardware is specified in other Sections within Division 40.
2. Control Power Distribution:
   a. Panel containing 120-volt powered equipment shall use the din-rail power distribution method with circuit breakers, fuses, and blown fuse indication. Power is restricted to 120 Vac and 24 Vdc as shown on the Drawings.
3. Power Supplies:
   a. Panel containing direct current powered instruments or serving as the termination point for transmission loop powered field instruments shall contain direct current power supply system as specified herein.
4. Electrical Control Devices:
   a. Pushbuttons, indicating lights, selector switches, and similar equipment located in panels specified in this section shall comply with the requirements of Section 26 05 00.

5. Uninterruptible Power Supplies:
    a. Panel mounted 120 Vac input/120 Vac output and 24 Vdc input/24 Vdc output uninterruptible power supplies are specified herein.

C. Panel Schedule:
1. The Panel Schedule, located in Attachment A at the end of this section, lists Contractor custom panels required for the project along with specific requirements for each panel. Specific custom panel requirements are specified on the panel layout referenced in the Panel Schedule.
2. Refer to paragraph 3.08 for description of headings.

## 1.02 QUALITY ASSURANCE

A. References:
1. This section contains references to the following documents that are part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid or on the effective date of the Agreement if there were no Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
3. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

| Reference | Title |
|---|---|
| EIA RS-310C | Racks, Panels, and Associated Equipment |
| NEMA 250 | Enclosures for Electrical Equipment |
| UL 94 | Tests for Flammability of Plastic Materials for Parts in Devices and Appliances |
| UL 508A | Industrial Control Panels |
| UL 698A | Industrial Control Panels Relating to Hazardous (Classified) Locations |
| NFPA 79 | Electrical Standard for Industrial Machinery |
| NFPA 70 | National Electrical Code (NEC) |
| NEMA ICS 6 | Industrial Control and Systems: Enclosures |
| ANSI/UL 497-1995 | Standard for Protectors for Paired Conductor Communications Circuits |
| UL 1012 | Power Supplies |
| UL 1449 | UL Standard for Safety for Surge Protective Devices |

4. This Section references other sections with associated work specified therein:
   a. Section 26 05 00 specifies raceways, conductors, and device requirements.
   b. Section 40 61 21 Process Control System Testing
   c. Section 40 63 43 Programable Logic Controllers

B. Listed Products:
   1. Equipment and components shall be Underwriters Laboratory (UL) listed for the purpose or UL recognized.
   2. The control panels, including new back panels, shall be fabricated by a UL 508A recognized facility and shall bear the appropriate UL 508A Industrial Control Panel label. Where intrinsic safety barriers are used within a control panel, provide UL 698A factory applied label as required by UL.
   3. All panels shall be labeled in accordance with NEC Article 409.
   4. Panels that do not comply with the specified products shall not be accepted. Cost to retrofit the panel as specified shall be borne by the panel supplier. Corrections or modifications to UL 508A Industrial Control Panels or UL 698A Industrial Control Panels Relating to Hazardous (Classified) Locations shall be transported to the panel supplier's facility for corrections, testing, relabeling and inspection.

C. Factory Testing:
   1. Prior to shipment, the manufacturer shall test the functional operation of the control panel as described in the control description Section 40 61 21.

D. Shipment, Protection and Storage:
   1. Equipment shipment, protection and storage shall conform to the requirements specified in Section 01 66 00.

## 1.03 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittals:
   1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
      a. A <u>check mark</u> shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.
      b. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

   c. *Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.*
2. A marked copy of Section 40 61 13.
3. A marked copy of Section 40 61 21.
4. A marked copy of Section 40 61 93.
5. A marked copy of Section 26 05 00.
6. A copy of the contract documents relating to the submitted equipment, with addendum updates that apply to the equipment in this section, marked to show specific changes necessary for the equipment proposed in the submittal. If no changes are required, mark the drawing(s) "no changes required" on the drawing index. Drawings marked "no changes required" on the drawing index do not need to be included in the submittal. Failure to include copies of the relevant drawings with the submittal shall be cause for rejection of the entire submittal with no further review.
7. Marked product literature of all the enclosure electrical devices and components mounted on or within the control panel.
8. List of miscellaneous items, cables, spare and replenishment parts, and chemicals to be provided, including Safety Data Sheet (SDS) information.
9. Dimensioned drawings:
   a. Exterior panel and layout
   b. Interior devices and layout
   c. Door-in-door construction devices, where required
10. Panel assembly drawings including sections showing clearances between face and rear mounted equipment.
11. Nameplate engraving schedule:
   a. Indicate engraving by line
   b. Character size
   c. Nameplate size
   d. Panel and equipment tag number and description
12. Heat load calculations demonstrating cooling requirements for each cabinet based on device-rated temperatures (minimum and maximum), highest ambient temperature listed in Section 40 61 13, and humidity for the area in which the subject panel will be located.
13. Power supply sizing calculations demonstrating that selected power supply is sufficient to supply total connected loads plus an additional 20 percent for future expansion.
14. UPS and UPS battery sizing calculations demonstrating the UPS is sufficient to supply total connected loads plus an additional 50 percent for future expansion and can meet battery backup time requirements.
15. Wiring drawings:
   a. Schematic diagrams
   b. Internal wiring diagrams
   c. Connection diagrams

d. Panel power distribution drawings
    1) On panel power distribution drawings, provide each circuit breaker and fuse with a unique ID number and identify an amp rating.
e. Power and control single line diagrams to comply with NEC Article 409.
f. Interconnection diagrams

16. Network block diagrams
17. Section 40 61 93 I/O List, updated to reflect any necessary modifications during construction.

D. Informational Submittals:
1. The following data shall be provided in accordance with Section 01 33 00:
    a. Manufacturer's certification for the performance of features of the specified equipment that cannot be readily inspected.
    b. Special requirements for delivery of the information such as time, manner, place, or quantity.
    c. Installation and training forms specified in Part 3.

E. Closeout Submittal:
1. Manufacturer's operation and maintenance information as specified in Section 01 78 23. Manual shall include final reviewed submittal and separate record of all final configuration, jumper, and switch settings.
2. As-built record drawings incorporating all modifications to the originally submitted panel drawings; as-built record drawings must be provided in both AutoCAD and Portable Document Format (PDF) format and as specified in Section 01 78 39.
3. Test results as specified in Section 40 61 21.
4. List of spare parts provided.

### 1.04 ENVIRONMENTAL CONDITIONS

A. Refer to Section 40 61 13.

## PART 2 PRODUCTS

### 2.01 FABRICATION

A. General:
1. Brace equipment and panel supports shall be designed per installation detail drawings. Equipment panels shall be capable of operation following a disturbance.
2. Nameplates with tag number and equipment description shall identify interior and exterior components. Instruments shall be mounted for access to components and ease of removal. Cutouts for future equipment shall be blanked off with suitable covers. Instrument tag numbers shall be identified on the panel rear.
3. Face-mounted equipment shall be flush or semi-flush with flat-black escutcheons. Face-mounted instruments that are more than 6 inches deep, weigh more than 10 pounds, or exert more than a 4 ft-lb moment force on the face of the panel shall be supported underneath at the rear by a 1-inch x 1/8-inch thick steel angle.

4. Panels less than 60 inches high shall be provided with floor stands to raise the top of the panel to 60 inches above the floor or work platform. Panels that weigh less than 100 pounds may be wall mounted.
5. Panels with specified requirements including stainless steel or aluminum mounting requirements that are indicated on the project drawings or on the project details take precedence over the panel types or panel features indicated herein.
6. Provide short-circuit current rating as required to meet NEC 409.110 (4) marking, or identify panel for exception to NEC 409.110 (4) during submittal process.

B. Panel Layout:
1. Provide 20 percent spare contiguous sub-panel area for future expansion.
2. Provide minimum of 20 percent spare terminal blocks, with a minimum of 10 analog, discrete, power.
3. Provide minimum of 12 inches clear space from the bottom of the panel to the bottom of the subpanel, or as shown on the drawings.
4. Face-mounted equipment flush or semi-flush with flat-black escutcheons.
5. Panel tops of wall-mounted panels: mounted at the same elevation.
6. Panel inner door contains a copy of the record elementary and wiring diagrams, or reference as allowed per NEC Article 409.
7. Panel inner door contains a drawing holder.
8. Panel drawings enclosed in a transparent, protective jacket.
9. Panel functions as specified.
10. Panels with floor stands, to raise the top of the panel to 60 inches above the floor or work platform.
11. Wall mounting of panel weighs less than 100 pounds, where wall space is available,

C. Enclosures:
1. Panel enclosures shall comply with the requirements of NEC Article 409 and NEMA 250.
2. Manufacturer:
   a. Hoffmann Enclosures, Inc.
   b. Saginaw Control and Engineering.
   c. Or approved equal.

D. Back Panels:
1. Manufacturer:
   a. Hoffmann Enclosures, Inc.
   b. Saginaw Control and Engineering.
   c. Or approved equal.

E. Side Panels:
1. Manufacturer:
   a. Hoffmann Enclosures, Inc.
   b. Saginaw Control and Engineering.
   c. Or approved equal.

## 2.02 ENVIRONMENTAL CONTROL

A. Forced air ventilation shall be provided for panels where indicated on the Drawings or if the cabinet's heat load calculations indicate that the interior temperature of the cabinet will exceed 115 degrees F, under worst case conditions.

B. Ventilation for control panels shall be venturi fans provided on 5-1/2-inch high-notched panel. Ventilation for consoles shall be similar to that for panels except EIA RS-310 mounting is not required. Fans shall be equipped with UL-approved, NEMA rating to match panel, replaceable filters. Fans shall provide at least 240 cubic feet per minute (CFM), or sized per submitted heat load calculations. Fans shall be thermostatically controlled. Noise level at 3 feet from exterior wall and 30 degrees off axis shall not exceed 60 NC units.

C. Where specified, panels shall also be provided with thermostatically controlled space heaters. Space heater surface temperature that exceeds 120 degrees F requires an expanded metal guard. Thermostats shall be Honeywell T631 series, Penn Controls A28AA-4, or approved equal.

D. Where specified, panels shall also be provided with thermostatically controlled low-profile enclosure heaters. Thermostats shall be Honeywell T631 series, Penn Controls A28AA-4, or approved equal. Low-profile enclosure heaters shall be McMaster-Carr 3850N13, or approved equal.

   1. Heaters in RIO panels shall be finger safe.

E. Panel air conditioning cooling requirements shall be a cooling system that does not exchange cabinet interior air with ambient air. The cooling system shall be either a closed glycol loop heat exchange system or a CFC-free refrigeration system as required for the specified equipment and instrument complement and ambient temperature conditions.

F. Panel air conditioner shall be NEMA rated based on the installed area environment and the coils shall be Heresite, or equal coated and protected from corrosion and premature failure.

G. All external tapping shall be self-sealing screws of the same metal of the enclosure to maintain the NEMA rating of the enclosure.

## 2.03 PROTECTION COATING AND FINISH

A. Panels located outdoors or located in corrosive areas shall be bottom coated with waterproof coatings.

## 2.04 NAMEPLATES

A. External door-mounted components and the panel description shall be identified with plastic nameplates. Stick machine engraved labels shall identify tag number of instruments inside panels. Nameplates shall be attached to panel surfaces, not to instruments.

B. The machine engraved laminated black phenolic nameplates with white lettering shall be provided for panel-mounted equipment. Nameplate engraving shall include the instrument tag number and description in 3/32-inch minimum size lettering.

C. The machine embossed metallic adhesive labels shall identify tag number of instruments inside panels. Nameplates shall be attached to panel surfaces, not to instruments.

D. The nameplates shall be attached to the panel with a minimum of two self-tapping 316 stainless steel screws. Provide RTV sealant for nameplates for NEMA-4X stainless steel panels.

E. The nameplate wording may be changed without additional cost or time prior to commencement of engraving. Submit nameplate legend with the panel submittal.

## 2.05 PANEL FEATURES

A. Interconnection Wiring: Panel Interconnecting Wiring:

1. Panel control wiring: Single conductor stranded copper NEC rated Type MTW No. 16 AWG minimum (rated 10 A per NFPA 79, Table 12.5.1), with an exception for factory supplied PLC wiring harnesses that are UL approved.
2. Panel instrument wiring: Twisted No. 16 AWG shielded pair or tri conductors.
3. Panel power wiring: Conductors specified in Division 26 and meet the NEC requirements for power including phase, grounded, and grounding conductors.
4. Wiring shall be supported independently of terminations by lacing to panel support structure or by slotted flame retardant plastic wiring channels.
5. Wiring channels shall comply with UL 94, Type V.
6. Plastic wireway with covers shall be used to route groups of wires. Wireway fill shall be sized to provide 50% maximum fill.
   a. Panduit PanelMax shall be used for existing panels with limited space. This applies to the PLC Panels for Pump Station 14, Pump Station 15, and Pump Station 25. Refer to Panel layout drawings.
7. Panels with wireways within 1" of components shall provide raised DIN rail.
8. Plastic spiral wrap shall be used for exposed wires. Wires that cross door hinges shall be enclosed in plastic spiral wrap.

B. Conductor Identification:

1. Wiring shall be tagged at every termination with machine printed plastic sleeves or pre-printed self-sticking labels as manufactured by W.H. Brady, 3M, or approved equal. No hand-written labels are permitted.
2. Three-part wire numbers for instrument and control panel internal conductors:
   a. Part-1: Prefix of the wire number shall be the ISA prefix and instrument loop number or equipment tag number.
   b. Part-2: Code letter and wire colors per the following tables.
   c. Part-3: Number that identifies individual circuit conductor Terminal Number.

| Code | 120 Vac Conductor | Color |
|---|---|---|
| L | Power | Black |
| C | Control | Red |
| N | Neutral | White |
| PG | Ground | Green |

| Code | Vdc Conductor | Color |
|---|---|---|
| PS | 24 Vdc Power | Blue |
| CS | 24 Vdc Control | Light blue |
| COM | 24 Vdc Common (0 Vdc) | White w/ blue |
| S+ | Signal (+) | Black |
| SG | Signal Ground | White |
| EG | Equipment Ground | Green |
| FV | Panel Foreign Voltage | Yellow |

C. Conductor Installation and Protection:

1. Power and control wiring shall be carried in covered channels separate from low voltage signal circuits. If practical, a general barrier may be provided between AC control devices and the electronic equipment.
2. Terminal blocks shall be strap screw type rated for 300 or 600 volts. Each terminal strip shall have a unique identifying alphanumeric code at one end and a vinyl-marking strip running the entire length of the terminal strip with a unique number for each terminal. Numbers shall be machine printed and 1/8 inch high.
3. No more than two connections shall be made to one terminal. In the case of two connections, a twin-wire insulated ferrule shall be used.
4. Wire connectors shall be insulated ferrule crimp type terminals. Systems Integrator shall prepare wires and wire labels for interconnections between field and control panels.
5. Terminal blocks shall be DIN rail mounted, screw type, rated for 600 volts or 300 volts, and have a width between 6 and 7 mm. Knife disconnect terminal blocks shall be provided for electrical circuit isolation where foreign voltage enters control panel. Fuse terminal blocks shall be tip-out or draw-out type with LED blown fuse indicators and shall be provided with fuse sized per circuit requirements. Terminal blocks candidate manufacturers:
   a. Phoenix Contact UT 4 series (current rating as required).
   b. Or approved equal.

D. Field Wiring:

1. Field wiring shall be connected to separate dedicated terminal blocks or terminal-style relays in a dedicated part of the panel where the field cables enter the panel. Provide a dedicated raceway on the field side of the terminal block for field wiring use only.

E. Fuse and Fuse Holders:

1. Fuses for 120 Vac circuits shall have a minimum of 12,000-amperes interrupting capacity and blown fuse indicators.
2. Fuses for 24 Vdc circuits shall be fast acting glass tube type rated 1/8 or 1/10 amp for 4-20 mA loops.
3. Fuses for 24 Vdc circuits shall be 1/2 amp for the power supply to individual instruments.
4. Fuse holders shall be tip-out or draw-out type with blown fuse indication.
5. Provide Phoenix Contact or approved equal products.

F. Circuit Breakers:
1. Provide circuit breaker for branch circuit protection. Circuit breaker UL rated, 10kA interrupting capacity, DIN rail mounted, and trip current rating to be determined based on the circuit load by Contractor.
2. Allen Bradley 1489 series, or approved equal.

G. Panel Power:
1. 120 Vac control power source: Single power source for all control and DC power.
   a. Provide direct current power supplies, as required for the load.
   b. Provide UPS power, 120 Vac or 24 Vdc, as indicated on the drawings.
   c. Provide power supply redundancy module as indicated on the drawings.
2. Provide a 120 Vac circuit for the panel light, receptacle, heating, fan, or heat exchanger as required.
3. Receptacle shall comply with Section 26 05 00.

H. Accessories:
1. Panels greater than 30" high x 20" wide shall include GFCI convenience receptacles and LED utility lights with separate on/off switch, or as indicated on the drawings.
   a. LED utility lights in RIO panels shall be finger safe.
2. Receptacles and utility lights shall not be powered by the UPS, where included.
3. Print pocket.
4. Panels greater than 30" high x 20" wide shall include a fold-up shelf of sufficient size, sufficient weight capacity, and the proper angle for supporting a laptop computer mounted to the inside of the enclosure.

I. Corrosion Inhibitors:
1. All control panels shall be provided with vapor-emitting corrosion inhibitors to protect the control panel electrical components against corrosion. Corrosion inhibitors shall provide a minimum of 24 months of protection before replacement is required. Each inhibitor shall provide protection for a minimum of 11 cubic feet of panel volume. Manufacturer/model: Cortec Corporation VpCI-111 or approved equal.

J. Fail-Safe Wiring:
1. Fail-safe wiring of control relay or other on/off device or instrument provides the condition that will occur upon loss-of-power or internal failure in the device such that the relay is de-energized in the failure or loss-of-power condition such that the control relay contact operation provides for equipment failing in a safe mode.

## 2.06 CONTROL DEVICES

A. Pushbuttons and selector switches shall comply with Section 26 05 00.

B. Control Relays:
1. Provide:
   a. DIN rail-mounted, terminal block style.
   b. Coil rating: 24 VDC/VAC or 120 VAC/VDC, as required by application.
   c. Contact rating (120 VAC): 30 A (break) and 3 A (make).

d. Contact rating (24 VDC): 1 A (break/make).
e. Contact type: gold-plated SPDT or DPDT, as required by application.
f. Built-in reverse DC polarity protection and surge protection.
g. LED indicator light to show when coil is energized.
h. Rated for Class I, Division 2 hazardous locations, as required by application.

2. Manufacturer/model: Allen-Bradley 700-HL Series or approved equal.

C. Control Timers:

1. Provide:
   a. DIN rail-mounted, terminal block style.
   b. Contact rating (24 VDC): 1 A.
   c. Contact type: gold-plated SPDT pr DPDT, as required by application.
   d. LED indicator light to show when timer is energized.
   e. Rated for Class I, Division 2 hazardous locations, as required by application.
   f. Adjustable time range from 0.3 – 30 minutes
2. Manufacturer/model: Phoenix Contact ETD-BL-1T Series or approved equal.

## 2.07 INDICATING LIGHTS

A. Indicating lights shall be equipped with colored lenses as specified in Section 26 05 00.

## 2.08 POWER SUPPLY AND CONDITIONING EQUIPMENT

A. Except for power supply units which form an integral part of an individual piece of equipment, all power supply and conditioning equipment shall comply with UL 1012 and shall be approved by UL, CSA, or FM for the application.

B. Power supply equipment shall be provided in redundant configurations, where shown on the drawings, such that failure of a single unit will not disable all or any part of the instrumentation and communication systems.

C. Direct-Current Power Supplies:

1. Nominal 24-volt direct-current instrumentation and control power supply:
   a. DIN rail-mounted with integral input fuse.
   b. Capable of withstanding six times nominal current for 12 milliseconds (ms) to allow for coordination with downstream circuit protection devices.
   c. Nominal input voltage range: 100 to 240 Vac.
   d. Input voltage range: 85 to 264 Vac.
   e. Frequency range: 45 to 63 Hz.
   f. Mains buffering: ≥ 20 ms.
   g. Nominal output voltage: 24 Vdc ± 3 percent.
   h. Output voltage setting range: 22.8 to 28 Vdc.
   i. Nominal output current: per 24 Vdc power supply sizing calculations.
   j. Output ripple voltage: < 150 millivolts (mV) peak-to-peak.
   k. Load regulation (dynamic, 10 to 90 percent): < 2 percent.

l. DC OK indication: visual LED indication and SPST contact rated for at least 0.3 A at 60 Vdc.
m. Operating temperature: -13 to 158 degrees F.
n. Maximum operating temperature before derating: 140 degrees F.
o. Relative humidity range: 5 to 95 percent.
p. MTBF: ≥ 520,000 hours.
q. FM Approved or UL Listed for Class I, Division 2 hazardous locations, as required.
r. The panel supplier shall calculate the required VA rating at 120 percent of connected load. Submit load calculations, schematic diagrams, and wiring connection diagrams.
s. Manufacturer:
    1) Siemens SITOP PSU100S.
    2) Or approved equal.

D. Uninterruptible Power System (UPS) – 120 Vac:
    1. Provide on-line, industrial-grade, double conversion type UPS, with electrical isolation including output neutral:
        a. Nominal input voltage: 120 Vac.
        b. Nominal output voltage: 120 Vac.
    2. The online UPS system shall be provided with integral sealed no maintenance, hot-swappable batteries, with extended battery modules as required to provide full capacity backup power for 30 minute minimum at connected load with integral battery charger.
    3. The panel supplier shall calculate the required kVA rating at 150 percent of connected load. Submit load calculations, schematic diagrams, and wiring connection diagrams. Provide battery cabling and other required cabling for a complete system.
    4. The UPS shall be mounted within the panel on a pedestal or tray with stainless-steel legs to provide space for wire entry and passage. UPS and battery system shall be physically secured to panel while still allowing access for maintenance and removal.
    5. The UPS shall be configured with a plug and receptacle to allow ease of removal from the panel; and to allow the panel to operate on utility power.
    6. Provide relay output contacts for remote monitoring of UPS on battery, UPS alarm, and UPS low battery. Provide visual LED indication and SPST contact rated for at least 0.1 A at 30 Vdc.
    7. Manufacturer:
        a. Eaton 9SX series.
        b. Or approved equal.

E. Uninterruptible Power System (UPS) – 24 Vdc
    1. Provide industrial-grade UPS with electrical isolation. UPS shall consist of direct current power supply, charge controller, and sealed backup battery pack:
        a. Nominal input voltage: 24 Vdc
        b. Nominal output voltage: 24 Vdc
    2. Provide rechargeable battery backup system with sealed no maintenance batteries.
    3. DIN rail mount UPS and battery.

4. Provide relay output contacts for remote monitoring of UPS on battery, UPS alarm, and UPS low battery. Provide visual LED indication and SPST contact rated for at least 0.1 A at 30 Vdc.
5. Size UPS system for 45 minutes of backup time on batteries at 100% load + 50% of load for future growth. Submit load calculations, schematic diagrams, and wiring connection diagrams.
6. Manufacturer:
   a. Siemens SITOP UPS1600 with UPS1100 battery module.
   b. Or approved equal.

F. Power Supply Redundancy Module – 24 Vdc
   1. Provide redundancy module for 24 Vdc power supply modules where indicated in drawings.
   2. Nominal 24-volt direct-current redundancy module suitable for decoupling two power supplies:
      a. DIN rail-mounted with integral input fuse.
      b. Supply voltage: 24 Vdc.
      c. Input voltage: 24 Vdc.
      d. Frequency range: 45 to 63 Hz.
      e. Nominal output voltage: 24 Vdc ± 0.5V.
      f. Rated current value: 10A
      g. Efficiency at Vout rated: >95%
      h. Status indication: visual LED indication and SPST contact to indicate when “at least one input voltage < switching threshold,” rated for at least 0.6 A at 30 Vdc.
      i. Operating temperature: -13 to 158 degrees F.
      j. Maximum operating temperature before derating: 140 degrees F.
      k. Relative humidity range: 5 to 95 percent.
      l. FM Approved or UL Listed for Class I, Division 2 hazardous locations, as required.
   3. Manufacturer:
      a. Siemens SITOP PSE202U 10A
      b. Or approved equal.

## 2.09 SURGE PROTECTION

A. General:
   1. Surge protection shall be provided to protect the electronic instrumentation systems from surges propagating along the signal and power supply lines. The protection systems shall be such that the protection level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, be maintenance free, and self-restoring.
   2. Provide lightning and surge protection devices at all antennas, as well as signal lines, communication networks, and power feeds for all lines that originate or are routed outside a building on any part of the existing or proposed circuits.

3. Lightning and surge protection devices shall provide full protection from line to line and from line to ground. Units shall be DIN-rail mounted, rated for a minimum of 10kA maximum surge current and voltage suitable for the type of circuit being protected. Reaction time shall be on the order of nanoseconds.

B. Panel Power Supply:
1. Requirements for incoming panel power supply surge protection devices are as follows:
   a. DIN rail-mounted, one-pole, Type 2, plug-in type selected to protect the equipment.
   b. Removable without changing the impedance of the circuit.
   c. Nominal voltage: 120 Vac, single-phase.
   d. Maximum operating voltage: 150 Vac.
   e. Nominal discharge current: 15 kA.
   f. Surge current capacity: 40 kA.
   g. Voltage protection level (line-neutral): ≤ 700 V.
   h. Response time: ≤ 25 ns.
   i. Surge protection fault indication: visual indication and SPDT contact rated for at least 0.5 A at 120 Vac and 30 Vdc.
   j. Operating temperature: -40 to 176 degrees F.
2. Manufacturer/model: Bussmann BSPM1A series or approved equal.

C. Power and Control Circuits (120 Vac):
1. Requirements for SPDs on 120 Vac power and control circuits are as follows:
   a. DIN rail-mounted, two-pole, Type 4, plug-in type selected to protect the equipment.
   b. Removable without changing the impedance of the circuit.
   c. Nominal voltage: 120 Vac, single-phase.
   d. Maximum operating voltage: 150 Vac.
   e. Nominal load current: 25 A.
   f. Nominal discharge current: 2 kA.
   g. Total discharge current: 4 kA.
   h. Voltage protection level (line-neutral): ≤ 640 V.
   i. Response time: ≤ 25 ns.
   j. Surge protection fault indication: visual indication.
   k. Operating temperature: -40 to 176 degrees F.
2. Manufacturer/model: Bussman BSPH2A series or approved equal.

D. Power and Control Circuits (24 Vdc):
1. Requirements for SPDs on 24 Vdc power and control circuits are as follows:
   a. DIN rail-mounted, two-pole, Type 4, plug-in type selected to protect the equipment.
   b. Removable without changing the impedance of the circuit.
   c. Nominal voltage: 24 Vdc.

d. Maximum operating voltage: 30 Vdc.
e. Nominal load current (AC): 25 A.
f. Nominal discharge current: 1 kA.
g. Total discharge current: 2 kA.
h. Voltage protection level (line-neutral): ≤ 180 V.
i. Response time: ≤ 25 ns.
j. Surge protection fault indication: visual indication.
k. Operating temperature: -40 to 176 degrees F.

2. Manufacturer/model:
   a. Bussman BSPH2A series (single-channel).
   b. Phoenix Contact Plugtrab PT-IQ series (multi-channel).
   c. Or approved equal.

E. Signal Circuits (4-20 mA):
   1. Requirements for SPDs on 4–20 mA signal circuits are as follows:
      a. DIN rail-mounted, four-pole, plug-in type selected to protect the equipment.
      b. Removable without signal interruption.
      c. Nominal voltage: 24 Vdc.
      d. Maximum operating voltage: 33 Vdc.
      e. Nominal current: 0.75 A.
      f. Total lightning impulse current: 10 kA.
      g. Total nominal discharge current: 20 kA.
      h. Series impedance per line: 1.8 ohms or less.
      i. Operating temperature: -40 to 176 degrees F.
   2. Manufacturer/model:
      a. Bussman BSPD24DING series.
      b. Or approved equal.

## 2.10 INTRINSIC SAFETY ISOLATORS

A. Single-channel, galvanically isolated intrinsic safety isolators for all non-fieldbus networked discrete and analog signals to instruments, not rated as explosion-proof, located in classified areas. The intrinsically safe isolators shall be:
   1. DIN rail mounted.
   2. EMI/RFI compliant with IEC 801.1-5.
   3. Support 24 Vdc or 120 Vac signals, depending on application.
   4. FM Approved or UL Listed for application.

B. Intrinsic safety barriers for two-wire transmitters shall be of the active, isolating, loop powered or 24VDC type.
   1. Manufacturers:
      a. Stahl Series 9000
      b. Or approved equal.

C. Intrinsic safety relays for each level switch shall be of the active, isolating, loop powered type.

   1. Manufacturers:

      a. Stahl Series 9002/77-220-146-001

      b. Phoenix Contact 2835493

      c. Or approved equal.

## 2.11 SIGNAL CURRENT ISOLATORS/CONVERTERS

A. Provide isolators/converters where:

   1. Galvanic isolation of milliampere transmission signals from 2-wire, 3-wire, or 4-wire transmitters with inadequately isolated output circuits is required.

   2. Conversion from active to passive current signals is required.

   3. Conversion from RTD signals (or voltage-based signals) to 4-20 mA signals is required.

B. The operating power shall be 24 Vdc and the device shall be DIN rail mounted. Provide DIP switch set up to allow for easy configuration of the converters.

C. Input signals shall be 4 to 20 mA, unless otherwise specified. Output signals shall be 4 to 20 mA and error shall not exceed 0.1 percent of span. Input resistance shall not exceed 550 ohms with an output load of 250 ohms. The output signal shall be active or passive as specified.

D. Manufacturer: Phoenix Contact MINI, or approved equal.

## 2.12 PANEL GROUNDING

A. Each panel shall be provided with a minimum of two copper ground bars.

   1. One bar (NEC required) shall be bonded to the panel or panel frame or back-plate and to the facility grounding system.

   2. Second (signal) ground bar shall be mounted on insulated stand-offs and shall be bonded to the panel ground bar only at one point.

   3. Provide additional ground bar(s) if indicated on drawings.

B. Signal circuits, signal cable shields, and low-voltage DC power supply commons shall be bonded to the signal ground bar.

C. Field analog wiring shields shall only be grounded at the signal ground bar. Test to verify that single ground point at panel signal ground bar.

D. Surge protectors and separately derived AC power supplies shall be bonded to the frame ground bar.

E. Panels exceeding 36-inches width shall contain ground bars shall be 1/4- by 1-inch copper bars extending the entire length of the panel interior at the bottom of the panel.

## 2.13 NETWORK SWITCHES

A. Managed Ethernet Switch:
  1. Power: 24 VDC.
  2. Ports: Eight (8) or Sixteen (16), as shown on the drawings, 10/100 Mbps ports, RJ45 sockets with ESD and Surge Protection on all Built-In ports.
  3. Configurable alarm contact; SPST contact rated for at least 0.1 A at 30 Vdc.
  4. LED status light for fault/alarm indication.
  5. Mounting: 35 mm DIN rail.
  6. Managed Features:
     a. DHCP per port
     b. SNMP (Simple Network Management Protocol)
     c. Port security: MAC address based filtering
     d. Monitoring: Include software
     e. Port Mirroring
     f. Port Trunking
     g. 802.1p QoS and Port QoS
  7. Store and forward technology.
  8. Auto sensing 10/100 Base TX, Duplex, and MDIX
  9. Supported Protocols:
     a. RSTP (Rapid Spanning Tree Protocol)
  10. Environmental Conditions:
     a. Operating Temperature: -40 to 60 degrees C.
     b. Relative Humidity: 5 to 95% condensing fanless operation.
  11. Switch shall be UL approved for application.
  12. Manufacturer:
     a. Siemens SCALENCE XC.
     b. Or approved equal.

## 2.14 DC TO DC CONVERTERS

A. DC/DC Converter shall provide NEC Class 2 output with 24 VDC input and 24VDC output.
  1. DIN rail mounted.
  2. Efficiency: 90.5%.
  3. Manufacturer:
     a. PULS CD5.241-L1.
     b. Or approved equal.

## 2.15 INTRUSION DOOR SWITCHES

A. Magnetic reed switch, hermetically sealed, for installation on enclosure doors for intrusion alarm detection.

B. Contacts rated for switching currents from 20 to 100 mA at 24 volts DC, Form C, DPDT.

C. Manufacturer:
   1. Hoffman.
   2. Or approved equal.

## 2.16 HORN AND BEACON

A. Horn
   1. Low current, volume adjustable flush mount horn designed for panel installation.
      a. 24VDC power supply
      b. 80-100dB adjustable output
      c. NEMA 4X rated
   2. Manufacturer:
      a. Edwards Signaling, 870 Series.
      b. Or approved equal.

B. Beacon
   1. Steady-On LED Beacon in NEMA 4X enclosure for panel installation.
      a. 24VDC power supply
      b. Red lens
      c. Grey base
   2. Manufacturer:
      a. Edwards Signaling, 125LEDS Series.
      b. Or approved equal.

C. Provide NEMA 4X enclosure for horn and beacon to both be housed in. Refer to drawing installation detail for layout.

## 2.17 CLEAR COVER BOX

A. Where indicated in drawings for RIO Panels, provide a clear cover box for 120VAC panel components. This shall provide a barrier of all 120VAC components and wiring from personnel opening and working on the 24vdc portion of the panel.
   1. Mounted to back panel.

B. Provide Warning Label on clear cover box as stated on drawings.

## 2.18 SIGNAL DUPLICATOR

A. Provide a 4-way analog signal duplicator where indicated in the drawings. The signal duplicator shall meet the following requirements:
   1. Output current: 4-20mA.
      a. Minimum of two output signals.
   2. Input current: 4-20mA.
   3. Power: 24VDC or loop powered.
   4. Configurable with DIP switch or software.

5. DIN rail mounted.
6. Screw connection.

B. Manufacturer:
   1. Phoenix Contact 2905026.
   2. Automation Direct
   3. Or approved equal.

### 2.19 PANEL DRAWING PROTECTION

A. Provide wiring diagrams in accordance with Section 01 33 00. Provide a panel-wiring diagram and schematic for each panel in a plastic bag or plastic container to avoid water damage and aging.

### 2.20 PROCESS INDICATOR

A. Refer to specification 40 70 00 for process indicator requirements.

### 2.21 SWING-OUT PANEL (NOT USED)

### 2.22 SPARE PARTS

A. The following spare parts shall be provided:
   1. Three LED panel light replacements.
   2. Five of each type and rating of fuse used.
   3. Five of each type of circuit breaker used.
   4. Five of each type primary protector surge suppressor used.
   5. Two of each type of surge protective device used.
   6. Two of each type of intrinsic safety isolator used.
   7. One 24 Vdc power supply.
   8. One 24 Vdc power supply redundancy module.
   9. One UPS of each type.
   10. Three UPS batteries of each type.
   11. Five of each type of control relay used.
   12. One network switch.
   13. One DC to DC converter.

## PART 3 EXECUTION

### 3.01 GENERAL

A. Floor mounted cabinets shall be mounted and shimmed to precise alignment, so doors operate without binding. Sealant shall be provided for conduit entering the panels.

B. Floor-mounted panels except in dry control rooms or electrical equipment rooms shall be mounted on 3-1/2-inch minimum height concrete pads, grouted bases, or as shown on the drawings. Coating shall be provided for outdoor panels in contact on concrete. Field panels and cabinets shall be mounted in compliance with Section 40 61 13.

C. Terminals and terminal blocks shall be sprayed after all terminations have been completed with a silicone resin conformal coating, Fine-L-Coat Type SR, Dow Corning, or approved equal. Spray coating only required for control panels in corrosive or classified installation environments.

D. Provide panels with the Record As-built schematic, connection, and interconnection diagrams mounted behind panel document holder on the inside of the door. Place documentation in a water proof clear bag in the panel document holder.

E. Vacuum clean control panels and cabinets in accordance with Sections 01 74 23 and 40 61 13.

F. Verify that all panels have been labeled with Arc Flash warning labels per NEC 110.16. Provide labels, with Arc Flash protection boundary and PPE levels. Refer to Section 26 05 00 for specifications regarding Arc Flash.

## 3.02 MOUNTING

A. Mount new back panels within existing enclosures as specified. In some cases, the migration from old to new requires the existing back panel to stay in service while transitioning the wiring over to the new back panel. Provide a temporary support structure to locate the existing back panel and allow the new back panel to be installed and circuited.

B. Control panels supported directly by concrete or concrete block walls shall be spaced out not less than 5/8 inch by framing channel between instrument and wall. Sills shall be leveled so panel structures will not be distorted. Panels shall be shimmed to precise alignment so doors operate without binding and mounted where shock or vibration will impair its operation.

C. Support systems shall not be attached to handrails, process piping or mechanical equipment. Control panels supported directly by concrete or concrete block walls shall be spaced out from the wall to provide for air circulation around the panels.

D. Steel used for support of equipment shall be 316 stainless steel. Support systems including panels shall be designed to prevent deformation greater than 1/8 inch under the attached equipment load and an external load of 200 pounds in any direction.

E. Floor-mounted cabinets, except in dry control rooms or electrical equipment rooms, shall be mounted on 3-1/2-inch minimum height concrete pads, grouted bases, or as shown on the drawings.

F. Panels shall be shimmed to precise alignment, so doors operate without binding. Sealant shall be provided under panels not located in dry control or electrical equipment rooms.

G. Center-line of wall-mounted panels shall be 48 inches above the floor.

H. Panel tops of wall-mounted panels shall be mounted at the same elevation.

## 3.03 PANEL DOOR CUT-OUTS

A. Remove existing panel mounted OIT and install new OIT, where shown on the drawings. Modify door as needed to accommodate new OIT size. Provide mounting gaskets and other appurtenances as needed to fill in any gaps in door cut-outs and to retain the enclosure’s NEMA rating.

B. Refer to Section 40 70 00 for panel mounted level indicator specifications.

## 3.04 NETWORK SWITCHES

A. Coordinate the configuration setting of the network switches with the Owner and Engineer prior to SCADA networking.

## 3.05 PANEL POWER SUPPLY

A. Power supply and conditioning equipment shall be mounted and connected in compliance with the manufacturer's instructions.

B. Line side disconnect switches shall be provided for power supply and conditioning equipment. Line and load side overcurrent protection shall be provided for power supply and conditioning equipment in compliance with NFPA 70.

C. Small power supply and conditioning equipment may be mounted in the panel served. Larger units shall be mounted adjacent to the equipment served. Where unconditioned power is brought into control panels, it shall be enclosed in metallic raceways within the panel.

D. Power supply and conditioning equipment larger than 5 kVA load capacity supported from surfaces other than concrete shall be provided with sound isolators.

E. Final raceway connections shall be a flexible conduit in compliance with Division 26.

## 3.06 FACTORY TESTING

A. The control panel shall be assembled, interconnected, and functionally tested at the assembly shop prior to shipment. The Owner/Engineer shall have the option of witnessing the factory shop test. The Contractor shall notify the Owner/Engineer at least three (3) weeks in advance prior to the scheduled factory shop test.

## 3.07 FIELD TESTING

A. Field verify the following for Instrument and Control Panels:
   1. Control circuits grounded with one terminal of each load device connected to the grounded conductor.
   2. Control contacts installed in the ungrounded side of the circuit.
   3. Panel signal and control wiring separated and installed in separate wireways with barriers between the power wiring and the signal and control wiring.
   4. Barriers between the power wiring and the signal and control wiring.
   5. Connected to the site grounding system, as specified.

6. Inner door contains a copy of the Record elementary and wiring diagrams, in a protected drawing holder. Drawings shall be enclosed in a transparent, protective jacket.
7. Panel Functions as specified.
8. Mounted with stainless steel Unistrut, fittings, and fasteners.
9. Tested in accordance with Section 40 61 21.

## 3.08 TRAINING

A. Training shall conform to the requirements of Section 01 79 00.

B. Provide four (4) hours of operating and maintenance training at the Project site to the Owner's personnel on the control panel components/hardware. Training shall include:
   1. Hardware overview.
   2. Power-up and power down of hardware.
   3. Description of status and trouble indication lights.
   4. Definition and identification of fault codes, trouble codes, and common troubleshooting.
   5. Installation, removal, and replacement of components/hardware parts.

## 3.09 ATTACHMENTS

A. 40 67 00 Attachment A: Panel Schedule
   1. Description of headings in the Panel Schedule.

| Field or Heading | Example | Comment or Description |
|---|---|---|
| Item | 1 | Row number reference. |
| Utility | Sewer | Utility identification. |
| Site | Pump Station 1 | Site name. |
| Panel Tag | SS_RH4_PS01_CAB0100 | Panel tag name. |
| Back Panel Installation Location | New Enclosure | Identifies where new interior panel is to be located. |
| Existing Enclosure Size (H x W x D) (inches) | N/A | Existing enclosure size, if applicable. |
| New Enclosure Size (H x W x D) (inches) | 60 x 36 x 12 | New enclosure size, if applicable. |
| Enclosure Mounting Type | Wall Mounted | Panel mounting description |
| Back Panel Size (H x W) (inches) | 58 x 34 | Identifies new back panel size. |
| Enclosure Location | Dry Well | Identifies where enclosure is located. |
| Panel Layout Drawing | I-01001 | Reference to the panel layout drawing number. |
| NEMA Rating | 4X | NEMA rating of existing enclosure (if being reused) or new enclosure (if being replaced). |

| Field or Heading | Example | Comment or Description |
|---|---|---|
| Installation Detail | I-00003 Detail B | Reference to the installation detail for new enclosures. |
| Processor | Siemens 1510SP-1 PN; 4MB Memory Card | Identifies the PLC processor model for the panel and the SD memory card size, if applicable. |
| Operator Interface Terminal | 12” OIT | Identifies whether the panel design includes an operator interface terminal and size. |
| Minimum I/O Module Count by Type (DI, DO, AI, AO) | 4, 1, 3, 0 | For PLC/RIO panels, identifies the minimum input/output module count by type. Refer to panel layout drawing for more details. |
| Site Notes | New enclosure to be installed in location of demo’d PLC enclosure | Optional, as required for clarification. |

**END OF SECTION**

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# SECTION 40 67 00_ CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

## ATTACHMENT A

## PANEL SCHEDULE

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**SECTION 40 67 00 ATTACHMENT A**

**PANEL SCHEDULE**

| Item | Utility | Site | Panel Tag | Back Panel Installation Location | Existing Enclosure Size (H x W x D) (inches) | New Enclosure Size (H x W x D) (inches) | Enclosure Mounting Type | Back Panel Size (H x W) (inches) | Enclosure Location | Panel Layout Drawing | NEMA Rating | Installation Detail | Processor | Operator Interface Terminal | Minimum I/O Module Count by Type | | | | Site Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | DI | DO | AI | AO | |
| 1 | SEWER | PUMP STATION 1 | SS_RH4_PS01_CAB0100 | NEW ENCLOSURE | N/A | 60 x 36 x 12 | WALL MOUNTED | 58 x 34 | DRY WELL | I-01001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 2 | SEWER | PUMP STATION 1 | SS_RH4_PS01_IS0140 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-01011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 3 | SEWER | PUMP STATION 1 | SS_RH4_PS01_GNG0100 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-01021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 1 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-01021 PHOTO A |
| 4 | SEWER | PUMP STATION 1 | SS_RH4_PS01_RIO0100 | NEW ENCLOSURE | N/A | 36 x 24 x 10 | WALL MOUNTED | 34 x 22 | GENERATOR ENCLOSURE | I-01811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-01801 PHOTO B |
| 5 | SEWER | PUMP STATION 4 | SS_RH3_PS04_CAB0400 | EXISTING ENCLOSURE | 60 x 36 x 12 | N/A | WALL MOUNTED | 58 X 34 | INDOOR (CONTROL BUILDING) | I-04001 | 4 | N/A | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 5 | 1 | 4 | 0 | BACK PANEL TO BE INSTALLED IN EXISTING ENCLOSURE. |
| 6 | SEWER | PUMP STATION 4 | SS_RH3_PS04_IS0440 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22 x 22 | INDOOR (CONTROL BUILDING) | I-04011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | |
| 7 | SEWER | PUMP STATION 10 | SS_RH5_PS10_CAB1000 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-10001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 8 | SEWER | PUMP STATION 10 | SS_RH5_PS10_IS1040 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-10011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 9 | SEWER | PUMP STATION 10 | SS_RH5_PS10_GNG1000 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-10021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 10 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-10021 PHOTO A |
| 10 | SEWER | FLUSH STATION 12 | SS_RH5_FS12_CAB1200 | NEW ENCLOSURE | N/A | 48 x 24 x 12 | WALL MOUNTED | 45 x 21 | DRY WELL | I-12001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 1 | 1 | 0 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 11 | SEWER | PUMP STATION 13 | SS_RH3_PS13_CAB1300 | NEW ENCLOSURE | N/A | 60 x 36 x 12 | WALL MOUNTED | 58 x 34 | DRY WELL | I-13001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 12 | SEWER | PUMP STATION 13 | SS_RH3_PS13_IS1340 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-13011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 13 | SEWER | PUMP STATION 13 | SS_RH3_PS13_GNG1300 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-13021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 13 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-13021 PHOTO A |
| 14 | SEWER | PUMP STATION 13 | SS_RH3_PS13_RIO1300 | NEW ENCLOSURE | N/A | 36 x 24 x 10 | WALL MOUNTED | 34 x 22 | GENERATOR VAULT | I-13811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-13801 PHOTO B |
| 15 | SEWER | PUMP STATION 14 | SS_RH2_PS14_CAB1400 | EXISTING ENCLOSURE | 48 x 24 x 12 | N/A | WALL MOUNTED | 45 x 21 | OUTDOOR (IN NEMA 3R ENCLOSURE) | I-14001 | 4 | N/A | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | BACK PANEL TO BE INSTALLED IN EXISTING ENCLOSURE. |
| 16 | SEWER | PUMP STATION 14 | SS_RH2_PS14_IS1440A | NEW ENCLOSURE | N/A | 12 x 12 x 6 | WALL MOUNTED | 10.2 x 10.2 | OUTDOOR (IN NEMA 3R ENCLOSURE) | I-14011 | 4 | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN OUTDOOR CONTROL ENCLOSURE. |
| 17 | SEWER | PUMP STATION 14 | SS_RH2_PS14_IS1440B | EXISTING ENCLOSURE | 12 x 12 x 6 | N/A | WALL MOUNTED | 10.2 x 10.2 | OUTDOOR (IN NEMA 3R ENCLOSURE) | I-14011 | 4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | BACK PANEL TO BE INSTALLED IN EXISTING ENCLOSURE. |
| 18 | SEWER | PUMP STATION 15 | SS_RH2_PS15_CAB1500 | EXISTING ENCLOSURE | 48 x 24 x 12 | N/A | WALL MOUNTED | 45 x 21 | DRY WELL | I-15001 | 4 | N/A | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | BACK PANEL TO BE INSTALLED IN EXISTING ENCLOSURE. |
| 19 | SEWER | PUMP STATION 15 | SS_RH2_PS15_IS1540 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-15011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 20 | SEWER | PUMP STATION 15 | SS_RH2_PS15_GNG1500 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-15021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 15 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-15021 PHOTO A |
| 21 | SEWER | PUMP STATION 16 | SS_RH2_PS16_CAB1600 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-16001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 22 | SEWER | PUMP STATION 16 | SS_RH2_PS16_IS1640 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-16011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 23 | SEWER | PUMP STATION 16 | SS_RH2_PS16_GNG1600 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-16021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 16 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-16021 PHOTO A |
| 24 | SEWER | PUMP STATION 17 | SS_RH2_PS17_CAB1700 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-17001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |

**SECTION 40 67 00 ATTACHMENT A**

**PANEL SCHEDULE**

| | | | | | | | | | | | | | | | Minimum I/O Module Count by Type | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **Utility** | **Site** | **Panel Tag** | **Back Panel Installation Location** | **Existing Enclosure Size (H x W x D) (inches)** | **New Enclosure Size (H x W x D) (inches)** | **Enclosure Mounting Type** | **Back Panel Size (H x W) (inches)** | **Enclosure Location** | **Panel Layout Drawing** | **NEMA Rating** | **Installation Detail** | **Processor** | **Operator Interface Terminal** | **DI** | **DO** | **AI** | **AO** | **Site Notes** |
| 25 | SEWER | PUMP STATION 17 | SS_RH2_PS17_IS1740 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-17011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 26 | SEWER | PUMP STATION 17 | SS_RH2_PS17_GNG1700 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-17021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 17 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-17021 PHOTO A |
| 27 | SEWER | PUMP STATION 17 | SS_RH2_PS17_RIO1700 | NEW ENCLOSURE | N/A | 30 x 20 x 8 | WALL MOUNTED | 28 x 18 | GENERATOR VAULT | I-17811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR VAULT ENCLOSURE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-17801 PHOTO B |
| 28 | SEWER | PUMP STATION 18 | SS_RH2_PS18_CAB1800 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-18001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 29 | SEWER | PUMP STATION 18 | SS_RH2_PS18_IS1840 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-18011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 30 | SEWER | PUMP STATION 18 | SS_RH2_PS18_GNG1800 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-18021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 18 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-18021 PHOTO A |
| 31 | SEWER | PUMP STATION 18 | SS_RH2_PS18_RIO1800 | NEW ENCLOSURE | N/A | 30 x 20 x 8 | WALL MOUNTED | 28 x 18 | GENERATOR VAULT | I-18811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-18801 PHOTO B |
| 32 | SEWER | PUMP STATION 19 | SS_RH2_PS19_CAB1900 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-19001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 33 | SEWER | PUMP STATION 19 | SS_RH2_PS19_IS1940 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-19011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 34 | SEWER | PUMP STATION 19 | SS_RH2_PS19_GNG1900 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-19021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 19 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-19021 PHOTO A |
| 35 | SEWER | PUMP STATION 19 | SS_RH2_PS19_RIO1900 | NEW ENCLOSURE | N/A | 36 x 24 x 10 | EQUIPMENT RACK MOUNTED | 34 x 22 | GENERATOR ENCLOSURE | I-19811 | 4X | I-00004 DETAIL A | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-19801 PHOTO B |
| 36 | SEWER | PUMP STATION 20 | SS_RH2_PS20_CAB2000 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-20001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 37 | SEWER | PUMP STATION 20 | SS_RH2_PS20_IS2040 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-20011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 38 | SEWER | PUMP STATION 20 | SS_RH2_PS20_GNG2000 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-20021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 20 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-20021 PHOTO A |
| 39 | SEWER | PUMP STATION 20 | SS_RH2_PS20_RIO2000 | NEW ENCLOSURE | N/A | 30 x 20 x 8 | WALL MOUNTED | 28 x 18 | GENERATOR VAULT | I-20811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-20801 PHOTO B |
| 40 | SEWER | PUMP STATION 21 | SS_RH2_PS21_CAB2100 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-21001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 41 | SEWER | PUMP STATION 21 | SS_RH2_PS21_IS2140 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-21011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 42 | SEWER | PUMP STATION 21 | SS_RH2_PS21_GNG2100 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-21021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 21 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-21021 PHOTO A |
| 43 | SEWER | PUMP STATION 21 | SS_RH2_PS21_RIO2100 | NEW ENCLOSURE | N/A | 30 x 20 x 8 | WALL MOUNTED | 28 x 18 | GENERATOR VAULT | I-21811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-21801 PHOTO B |
| 44 | SEWER | PUMP STATION 22 | SS_RH1_PS22_CAB2200 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-22001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 45 | SEWER | PUMP STATION 22 | SS_RH1_PS22_IS2240 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-22011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 46 | SEWER | PUMP STATION 22 | SS_RH1_PS22_GNG2200 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-22021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 22 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-22021 PHOTO A |
| 47 | SEWER | PUMP STATION 23 | SS_RH1_PS23_CAB2300 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-23001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 48 | SEWER | PUMP STATION 23 | SS_RH1_PS23_IS2340 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-23011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |

## SECTION 40 67 00 ATTACHMENT A

## PANEL SCHEDULE

| Item | Utility | Site | Panel Tag | Back Panel Installation Location | Existing Enclosure Size (H x W x D) (inches) | New Enclosure Size (H x W x D) (inches) | Enclosure Mounting Type | Back Panel Size (H x W) (inches) | Enclosure Location | Panel Layout Drawing | NEMA Rating | Installation Detail | Processor | Operator Interface Terminal | Minimum I/O Module Count by Type | | | | Site Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | DI | DO | AI | AO | |
| 49 | SEWER | PUMP STATION 23 | SS_RH1_PS23_GNG2300 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-23021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 23 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-23021 PHOTO A |
| 50 | SEWER | PUMP STATION 24 | SS_RH1_PS24_CAB2400 | NEW ENCLOSURE | N/A | 72 X 30 X 16 | WALL MOUNTED | 70 x 28 | DRY WELL | I-24001 | 4X | I-00003 DETAIL B | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 4 | 0 | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D PLC ENCLOSURE. |
| 51 | SEWER | PUMP STATION 24 | SS_RH1_PS24_IS2440 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-24011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D LEVEL TRANSDUCER JUNCTION BOX |
| 52 | SEWER | PUMP STATION 24 | SS_RH1_PS24_GNG2400 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-24021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 24 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-24005 PHOTO A |
| 53 | SEWER | PUMP STATION 24 | SS_RH1_PS24_RIO2400 | NEW ENCLOSURE | N/A | 30 x 20 x 8 | WALL MOUNTED | 28 x 18 | GENERATOR VAULT | I-24811 | 4X | I-00003 DETAIL B | N/A | N/A | 2 | 0 | 1 | 0 | NEW ENCLOSURE TO BE INSTALLED IN GENERATOR SITE ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-24801 PHOTO B |
| 54 | SEWER | PUMP STATION 25 | SS_RH1_PS25_CAB2500 | EXISTING ENCLOSURE | 48 x 24 x 12 | N/A | WALL MOUNTED | 45 x 21 | DRY WELL | I-25001 | 4 | N/A | SIEMENS 1510SP-1 PN; 4MB MEMORY CARD | 12" OIT | 4 | 1 | 3 | 0 | BACK PANEL TO BE INSTALLED IN EXISTING ENCLOSURE. |
| 55 | SEWER | PUMP STATION 25 | SS_RH1_PS25_IS2540 | NEW ENCLOSURE | N/A | 24 x 24 x 10 | WALL MOUNTED | 22.2 x 22.2 | DRY WELL | I-25011 | 4X | I-00003 DETAIL B | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED IN LOCATION OF DEMO'D MJK CONTROLLER |
| 56 | SEWER | PUMP STATION 25 | SS_RH1_PS25_GNG2500 | NEW ENCLOSURE | N/A | 8 x 3.25 x 2.75 | WALL MOUNTED | A/R | DRY WELL HATCH | I-25021 | 4X | I-00003 DETAIL D | N/A | N/A | N/A | N/A | N/A | N/A | NEW ENCLOSURE TO BE INSTALLED INSIDE OF PS 25 HATCH ACCORDING TO INSTALLATION DETAIL AND LOCATION DETAIL I-25005 PHOTO A |

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SECTION 40 70 00

INSTRUMENTATION FOR PROCESS SYSTEMS

## PART 1 GENERAL

### 1.01 SUMMARY

A. This section specifies requirements for instrumentation that quantitatively convert the measured variable energy into a form suitable for measurement and process measurement accessories. Instrumentation includes:

1. Flow measurement
2. Level measurement

B. The instrumentation forms a part of the process control systems specified in Section 40 61 13 and Section 40 06 70. Application requirements are specified in the Instrument Index, Section 40 06 70.

C. Related sections:

1. Section 40 06 70 - Schedules for Instrumentation of Process Systems.
2. Section 40 61 13 - Process Control System General Provisions.
3. Section 40 61 21 - Process Control System Testing.

### 1.02 REFERENCES

A. Reference Standards:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
3. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
4. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

| Reference | Title |
|---|---|
| IEEE 100 | Standard Dictionary of Electrical and Electronics Terms |
| ISA 51.1 | Process Instrumentation Terminology |
| NEMA 250 | Enclosures for Electrical Equipment |

| Reference | Title |
| --- | --- |
| NEMA ICS 1 | Industrial Control and Systems: General Requirements |
| OSHA | Occupational Safety and Health Administration |

## 1.03 DEFINITIONS

A. General: Definitions of terminology related to Instrumentation and Industrial Electronic Systems used in the specifications as defined in IEEE 100, ISA 51.1, and NEMA ICS 1.

## 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Section 40 61 13.

## 1.05 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Requirements: Section 40 61 13.

C. Action Submittals: Include with submittal a cover sheet, indexed by item, and cross-referenced to the appropriate specification paragraph, and organized in the following order:

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration. Referenced and applicable sections to be marked up and submitted include:
    a. Section 01 79 00 – Demonstration and Training
    b. Section 01 78 23 – Operating and Maintenance Data
    c. Section 40 61 13 - Process Control System General Provisions
    d. Section 40 06 70 – Instrument Index
2. Manufacturer’s product information for all instrumentation and accessories items.
    a. Marked to only show products intended to be ordered, and salient features meeting specification requirements along with:
        1) Installation details and mounting accessories.
        2) Electrical and signal connection details.
3. Instrument Index as defined in Section 40 06 70.
4. List of miscellaneous items, cables, spare parts, provided in accordance with INSTRUSPEC sheet requirements.

5. Interconnection Diagrams as defined in Section 40 61 13.
6. A copy of the contract document Instrumentation Drawings relating to the submitted equipment, with addendum updates that apply to the equipment in this section, marked to show specific changes necessary for the equipment proposed in the submittal. If no changes are required, mark the drawing(s) "no changes required" on the drawing index. Drawings marked "no changes required" on the drawing index do not need to be included in the submittal. Failure to include copies of the relevant drawings with the submittal shall be cause for rejection of the entire submittal with no further review.
7. Marked product literature of all equipment and features to be provided.
    a. Installation drawings for only the transmitters, sensors, and mounting accessories to be provided.
    b. Electrical and signal connection drawings for only the transmitters and sensors to be provided.
8. Marked product literature for surge protectors.
9. ISA Data Sheets.

D. Informational Submittals:
1. Instrument manufacturer certifications and compliance documentation included in the shipped package.
2. Manufacturer's certification for the performance of features of the specified equipment that cannot be readily inspected.
3. Safety Data Sheets (SDS) for chemicals such as an instrument fill fluid per OSHA requirements.

E. Closeout Submittals:
1. Operating and maintenance information as specified in Section 40 61 13. Include final reviewed submittal and separate record of all final configuration, jumper, and switch settings for each instrument.
2. Record loop diagrams.
3. Calibration reports, either manufacturer certification or PCS Integrator's final calibration provided in the field.
4. SDS.
5. Record documentation shall include the data sheets specified in this section.
6. The following data provided in accordance with Section 01 33 00:
    a. Operating and maintenance information as specified in Section 40 61 13. Include final reviewed submittal and separate record of all final configuration, jumper, and switch settings for each instrument.
    b. Test results as specified in Section 40 61 21-2.02.

## 1.06 QUALITY ASSURANCE

A. Manufacturer: Equipment furnished under this section to be the products of firms regularly engaged in the design and manufacture of such equipment for a minimum of five years.

B. Identification of Listed Products: Provide instrumentation listed for the purpose for which they are to be used, by an independent nationally recognized testing laboratory. Three such organizations are Underwriters Laboratories (UL), Canadian Standards Association (CSA), and Electrical Testing Laboratories (ETL). Provide independent nationally recognized testing laboratory acceptable to the inspection authority having jurisdiction and is recognized by OSHA.

C. Installer: Installation, calibration and testing of equipment furnished under this section to be performed by qualified, skilled, systems integrator personnel specified in Section 40 61 13, who are regularly engaged in such activities involving systems of similar complexity.

D. References are listed in Section 40 61 13 and are a part of this section as specified and modified.

## 1.07 ENVIRONMENTAL CONDITIONS

A. Equipment provided under this section suitable for operation under ambient conditions described in Section 40 61 13.

# PART 2 PRODUCTS

## 2.01 INSTRUMENTATION SPECIFICATION SHEETS (INSTRUSPEC)

A. General requirements for instruments specified in this section are specified on the INSTRUSPEC sheets in the Part 4 Appendix at the end of this section.

B. Application requirements are specified in the Instrument Index, and/or on the drawings.

## 2.02 GENERAL REQUIREMENTS

A. General:

1. In accordance with Section 01 33 00, the General Conditions of the Contract Documents, drawings, information, and technical data for all equipment as, required in Section 40 61 13 and this section shall be provided. All required product data for this section shall be included in one complete package.

B. Process switches:

1. Contact outputs used for alarm actuation shall be normally-closed or normally-opened as required by the process condition to open to initiate the alarm.
2. Contact outputs used to control equipment shall be normally-opened and shall close to start the equipment.
3. Contacts monitored by solid state equipment such as programmable controllers shall be hermetically sealed and rated for switching currents from 20 to 100 mA at 24 volts DC.
4. Contacts, monitored by electromagnetic devices such as mechanical relays, shall be rated as NEMA ICS 2, designation B300.
5. Double barriers provided between switch elements and process fluids such that failure of one barrier does not permit process fluids into electrical enclosures.
6. Switch electrical enclosures rated as NEMA 250, Type 4X minimum.

7. Switch range shall be selected so that the specified set point is at least 30 percent but not more than 70 percent of the span, between the upper range limit and the lower range limit.
8. Surge protection shall be provided to protect the electronic instrumentation systems from surges propagating along the signal lines for switches outside. Eaton MTL WWIP-N or approved equal.

C. Measuring elements and transmitters:
1. Provide process indicator complying with paragraph 2.03 with any transmitter that does not include an integral indicator. Calibrate indicators, whether integral or separate, in process units, and engraved on the indicator scale plate.
2. The two-wire type transmitters derive operating power from the signal transmission circuit.
3. Transmitters to meet specified performance requirements with load variations within the range of 0 to 600 ohms with the power supply at a nominal 24 volts DC with the default range of 0 to 100% linearly corresponding to 4 to 20 mAdc.
4. Transmitter output increases with increasing measurement.
5. Time constant adjustable from 0.5 to 5.0 seconds for transmitters used for flow, level transmitters used for flow measurement, or pressure measurement.
6. Transmitter output galvanically isolated via electro-mechanical or optical technology.
7. Transmitter enclosures rated NEMA 250, Type 4X, unless otherwise specified.
8. Transmitters located outdoors, provide surge protectors:
   a. Signal: Emerson/Rosemount Model 470 D, Emerson/EDCO SS64-036-2, CCI SPN-42 FS28 Series, or approved equal.
   b. AC Power: UL 1449, LED indicator, screw terminal connections, NEMA 4X. EDCO HSP121A or approved equal.
9. Four-wire transmitters isolate signal output from power or provide signal isolator as specified in paragraph 2.04 connected in the output signal circuit.

## 2.03 PROCESS INDICATOR

A. Analog output process indicators shall be 0.5-inch digit height display enclosed in a NEMA 4/4X rated meter case. Provide indicators with accuracy within one percent of span. Provide a diode to maintain loop continuity for indicator removal. Displays shall be scaled in engineering units, over the calibrated range of the associated instrument. Calibrate the indicator scale in process units.
1. 1/8 DIN Analog input panel meter
2. 5-Digit Red display
3. 24VDC
4. Provide USB Programming Cable

B. Manufacturers:
1. Red Lion Model Pax
2. Siemens Sitrans RD200
3. Or approved equal.

### 2.04 SIGNAL ISOLATOR (NOT USED)

### 2.05 VALVES (NOT USED)

## PART 3 EXECUTION

### 3.01 INSTALLATION

A. General:
   1. General requirements for the installation of primary elements specified in this section are listed on INSTRUSPEC sheets.
   2. Installation requirements are specified in Section 40 61 13.

B. Process Connections:
   1. General: Process connections shall be arranged such that instruments may be readily removed for maintenance without disruption of process units or draining of large tanks or vessels. Unions or flange connections shall be provided as necessary to permit removal without rotating equipment.
      a. Where process taps are not readily accessible from instrument locations, an isolation valve shall be provided at the instrument.
      b. Isolation valves shall be provided for each instrument where multiple instruments are connected to one process tap.
      c. Pipe between the process connection and instruments shall be 1/2-inch unless otherwise noted.
   2. Safety Instruments: No valves shall be installed at pressure taps for safety instruments. Safety instruments shall not be connected to the same process tap as instruments used for control, indication, or recording except when annular chemical seals are used.
   3. Isolation/Block/Bleed/Test Valves: Valves shall be provided at all process taps, except as follows:
      a. Temperature taps, where valves are unnecessary.
      b. Pump discharge pressure taps where no instrument is permanently installed. Isolation valves shall be provided.
      c. Process taps for safety instruments.
   4. Flushing/Calibration Connection: Provide quick-connect fitting with the Bleed/ Test Valve for flushing and calibration.

C. Electrical Connections:
   1. Final connections between rigid raceway systems and instruments shall be made with jacketed flexible conduit with a maximum length of 2 feet.

D. Outdoor Transmitters:
   1. Transmitters mounted outdoors shall be provided with rain/sun hood per Drawing Details.

### 3.02 TESTING

A. Testing requirements are specified in Section 40 61 21.

## 3.04 TRAINING

A. Training requirements are specified in Sections 01 79 00. Provide two training sessions, each with one hour for each type of instrument.

# PART 4 APPENDIX - INSTRUSPECS

## 4.01 INSTRUSPECS

A. General requirements for instruments specified in this section are listed on INSTRUSPEC sheets herein. Application requirements are specified in the Instrument Index, and/or on the drawings.

Table A

| INSTRUSPEC Symbol | Instrument description | Instrument function |
|---|---|---|
| FTS | Thermal Flow Switch | Flow Measurement |
| LDT1 | Displacer Level Transmitter / Switches | Level Measurement |

## 4.02 INSTRUMENT IDENTIFICATION: FTS

A. Instrument Function: Flow Measurement

B. Instrument Description: Thermal Flow Switch

C. Power Supply: 24 volts DC

D. Signal Input: Process

E. Signal Output: Contact as specified in paragraph 2.02

F. Process Connection: Insertion, ¾" MNPT, as specified

G. Product Requirements:

1. Flow switch shall be the thermal convection type. Switch point shall not be affected by process fluid temperature changes in the range of 32 to 140 degrees F and shall have a repeatability of plus or minus 5 percent of range.
2. Control unit shall operate with the specified repeatability in an ambient temperature range of 25 to 120 degrees F.
3. Sensor probe length and insertion depth per manufacturer's instructions for the duct size and application.
4. Housing: NEMA 4X.
    a. Class I Div 1 Rated for switches placed in classified areas. Switch shall be provided with explosion proof rated housing.
5. Response time: 3 seconds.
6. Wetted Material: 316L Stainless Steel.
7. Operating Pressure: Full vacuum to 4000 psig (275 bar).
8. Provide handheld calibrator Model MC-5.

H. Approved Manufacturers:
    1. Ameritrol FX series.
    2. Fluid Components Inc. FLT93, Flow Technology Inc.
    3. Or approved equal.

I. Execution:
    1. Installation: Install in accordance with manufacturer's instructions. Refer to Contract Drawing I-0004 Detail C for sensor mounting.

## 4.03 INSTRUMENT IDENTIFICATION: LDT1

A. Instrument Function: Level Measurement

B. Instrument Description: Displacer Level Transmitter / Switch

C. Power Supply: As specified in paragraph 2.02.
    1. 10-30 VDC, 4W

D. Signal Input: Process

E. Signal Output: As specified in paragraph 2.02.

F. Process Connection: Mounting Bracket fixed under wetwell hatch.

G. Product Requirements:
    1. Displacer level transmitter: Displacer, mounting bracket, cable, and transmitter.
    2. Transmitter: Detect fluid level by 10 level contacts along the rod.
    3. Transmitter: Mount in NEMA 4X panel as specified.
    4. Sensor: Wetted parts type 316 stainless steel.
    5. Accuracy: 1.0 percent of span.
    6. Transmitter Operating Temperature Rating: -40 to 158 degF.
    7. Warranty: 2 years.
    8. Cable: Custom 11-core cable with braided shield, PVC insulation & outer jacket, 20AWG or greater, length as required.
    9. Level Relay Outputs: 10 relays, rated at 250VC/30VDC 6A, configurable as NO or NC.
    10. Fault Relay Outputs: 2 relays, rated at 250VC/30VDC 6A, configurable as NO or NC.
    11. Approvals: Approval for sensor installation in Class I, Division 1 location.
    12. Manufacturer:
        a. FOGRod
            1) Level-7.5-50
                a) Sensor: FOG-7.5-50
                b) Transmitter: LIT-100
            2) Accessory: FOG-ISB
        b. No equal, per Owner’s standards.

H. Execution:

1. Installation: Install in accordance with manufacturer's instructions. Refer to Contract Drawing I-0004 Detail B for sensor mounting.
    a. Location and elevation of FOGRod sensor to be field adjusted during startup in coordination with the Owner.
2. Manufacturer to provide sensor/transmitter, full length cables, and meter.
3. Calibration: In accordance with Section 40 06 70. Switch set point and reset point adjusted as specified.

**END OF SECTION**

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