City of Mercer Island

BID PROPOSAL, CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS FOR:

Booster Pump Station Upgrades

Project Number 24-03

RH2 Project No. M-I 21-0228

January 2024

Volume I of II

City of Mercer Island 9611 SE 36th Street Mercer Island, WA 98040 Phone: (206) 275-7822 Contact: Chris Marks, PE	RH2 Engineering, Inc. 22722 29th Drive SE, STE 210 Bothell, WA 98021 Phone: (425) 439-4008 Contact: Marine Behr, PE

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Volume I of II

Marine Behr, PE
Project Engineer
Signed: 01/23/2024

Jon Conner, SE
Structural Engineer
Signed: 01/23/2024

Mark Braaksma, PE
Electrical Engineer
Signed: 01/23/2024

CITY OF MERCER ISLAND
BOOSTER PUMP STATION UPGRADES
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Advertisement for Bids
City of Mercer Island

Project Title: Booster Pump Station Upgrades
Project Number: 24-03
Engineers Estimated Cost (range): $1.45 M to $1.75 M

Sealed bids will be received, not sent, electronically by the City until 2:00 PM on February 22, 2024. Bidders shall submit their bids in PDF format to the Public Works email address at: bids@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.

Work to be performed under this contract includes mechanical, structural, electrical, and automatic control upgrades to the booster pump station. The work must be completed in separate milestones to provide adequate water supply to customers and maintain fire flow requirements during construction. See Specification Section 1.32.13 for more information on phasing and scheduling.

A single contract is to be awarded to the responsible bidder submitting the lowest responsive bid. 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.

See Instructions to Bidders, element 9, for information regarding the option Pre-Bid Walkthrough. A non-mandatory Pre-Bid Walkthrough will be held at 10:00 AM on February 8, 2024. Bidders are to meet at the City's Booster Pump Station, 4350 88th Avenue SE, Mercer Island, WA 98040 to discuss the work, bidding forms, and procedures. Attendance by bidders, subcontractors and suppliers is strongly encouraged.

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.

Bidder questions are to be directed to Marine Behr, PE, by email only at mbehr@rh2.com. The City will receive questions until 12:00 PM on February 19, 2024. Questions received after this date will not be answered. All questions and responses will be posted in an addendum by 10:00 AM on February 20, 2024, to the Builders Exchange site.

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 – January 29, 2024, and February 8, 2024.

City of Mercer Island
Instructions to Bidders

1. ELIGIBILITY TO BID:

It is the intent of the City to award a contract to the lowest 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, 39.12.050, RCW 39.12.055, 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.

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

G. 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.

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, RCW 39.12.050, RCW 39.12.055, or RCW 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.

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

G. 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.

H. 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 Marine Behr, PE, in writing or by email to mbehr@rh2.com. No telephone questions will be accepted or considered. Bidders should include a reference to the specification section and paragraph number and/or drawing number in the Contract Documents.

All questions and responses will be posted by 10:00 AM on February 20, 2024, 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. A copy of the most recent prevailing wage schedule is in the Appendix of the specifications. 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. OPTIONAL PRE-BID MEETING/WALK THROUGH:

An optional Pre-Bid Meeting/Walk Through is scheduled on 10:00 AM on February 8, 2024. Meet at 4350 88th Avenue SE, Mercer Island, WA 98040. The City, at its sole discretion, may schedule an additional pre-bid meeting/walk through. If interested, contact Marine Behr, PE, at mbehr@rh2.com.

During the pre-bid meeting/walk through, all conversations are considered informal and are not contractually binding unless stated in the contract bid package, contract drawings, or modified by a written addendum. The order of precedence is written addendum, contract drawings, and lastly contract specifications.

10. 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.

11. 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.

12. 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.

13. DELIVERY OF BID:

Each Bid shall be submitted in PDF format via electronic transmission to the Public Works email address at: bids@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.

14. 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.

15. 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.

16. 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.

17. 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, the foreman's previous project experience as a foreman on 3 similar construction contracts, 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; foreman 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.

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.

18. 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.

19. 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.

20. 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.

21. 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.

22. 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.

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**

Non-Collusion Declaration

Project Name: _____

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

Contractor Declaration Pursuant to RCW 39.04.350(2)

Project Name: BOOSTER PUMP STATION UPGRADES

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

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
Mercer Island, Washington 98040

PROJECT TITLE: **Booster Pump Station Upgrades**

Bidder Declaration and Understanding

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 they have carefully examined the Contract Documents including the following addenda, receipt of all is hereby acknowledged:

Addendum Number	_____	Date	_____
	_____		_____
	_____		_____
	_____		_____

Start of Construction and Contract Completion Time

The Bidder agrees that they will begin work within 10 calendar days of the Notice to Proceed, and Final Completion of the entire project will be achieved within the allocated working days from the date of issuance of the Notice to Proceed (except for extensions of time granted in accordance with the General Terms and Conditions). The Bidder further agrees he/she will, if necessary, accelerate their 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 awarded this contract, they will achieve and meet Milestones A and B described in Specification Section 1.32.13 within the allocated working days.

a) Final Completion of Milestone A shall be met within 190 working days from the date of issuance of the Notice to Proceed.

b) Any project work associated with Milestone B can only be completed after the City's generator relocation project has been completed. The City will issue a Notice to Proceed to begin Milestone B. Final competition of Milestone B shall be met within 40 days from the date of issuance of the Notice to Proceed for Milestone B.

The Substantial Completion Date will be five (5) working days prior to the Final Completion Date for each respective milestone.

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 these 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.

SCHEDULE OF PRICES

Item	Description	Units	Quantity	Unit Price	Total Price
1	Mobilization, Demobilization, Site Preparation, and Clean-up	LS	1	= $_____	= $_____
2	Structural	LS	1	= $_____	= $_____
3	Sand and Thrust Block Removal	LS	1	= $_____	= $_____
4	Lower-Level Piping Coating System	LS	1	= $_____	= $_____
5	Pumps and Motors 1-5	EA	5	= $_____	= $_____
6	Pumps and Motors 6-7	EA	2	= $_____	= $_____
7	Mechanical	LS	1	= $_____	= $_____
8	Electrical	LS	1	= $_____	= $_____
9	Automatic Control	LS	1	= $_____	= $_____
10	Testing, Startup and Training Pumps 1-5	EA	5	= $_____	= $_____
11	Testing, Startup and Training Pumps 6-7	EA	2	= $_____	= $_____
12	Construction Records and Operation and Maintenance Manuals	EST	1	= $7,500_____	= $7,500_____

SUBTOTAL (Items 1 – 12)	$_____
Sales Tax @ 10.1% See General Conditions Section 59 or Special Provisions 1-07.2 for more information.	$_____
TOTAL BID AMOUNT SCHEDULE	$_____

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 _____

Subcontractor Listing – RCW 39.30.060

Pursuant to RCW 39.30.060, the Bidder shall list as part of its Bid either itself of 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 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, and electrical subcontractors applies only to proposed HVAC, plumbing, and electrical 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: _____

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

Booster Pump Station Upgrades

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.

AGREEMENT FORMS

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CITY OF MERCER ISLAND, WASHINGTON
PUBLIC WORKS CONTRACT
FOR
BOOSTER PUMP STATION UPGRADES

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 [insert address], 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 Booster Pump Station Upgrades 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 allocated working days as stated in the Bid Form, (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 $1500 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:

[INSERT FULL LEGAL NAME OF CONTRACTOR]

By: _____
[insert full legal name and title of signator]

Address:

Phone:
Email:

CITY:

CITY OF MERCER ISLAND

By: _____
Jessi Bon, City Manager

Attest:

By:_____
Andrea Larson, City Clerk

Approved as to form:

By: _____
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
				SALES TAX (10.1%) if applicable		
				NET TOTAL FOR UNIT COST ITEMS		

LUMP SUM ITEMS

ITEM	DESCRIPTION	COST	ADD or DELETE
	SALES TAX (10.1%) 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 _____, Project No._____, 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		Printed Name	
Title		Title	

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

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_____, Project No._____, 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:

LIABILITY ENDORSEMENT

These conditions apply to Commercial General Liability, Automobile Liability, Worker's Compensation and Employer's Liability, and Builder's Risk policies. Fill in the Policy Information and Signature sections if the information is not already provided on the ACORD or Certificate of Insurance forms.

Policy Amendments

This endorsement is issued in consideration of the policy premium. Notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto, it is agreed as follows:

1. INSURED. Owner, its elected or appointed officials, employees or volunteers are included as insureds with regard to damages and defense of claims arising from (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, or (c) premises owned, leased or used by the Named Insured.

2. CONTRIBUTION NOT REQUIRED. As respects (a) work performed by the Named Insured for or on behalf of Owner, or (b) products sold by the Named Insured to Owner; or (c) premises leased by the Named Insured from Owner, the insurance afforded by this policy shall be primary insurance respects Owner, its elected or appointed officials, employees or volunteers; or stand in an unbroken chain of coverage excess of the Named insureds scheduled underlying primary coverage. In either event, any other insurance maintained by Owner, its elected or appointed officials, employees or volunteers shall be excess of this insurance and shall not contribute with it.

3. SCOPE OF COVERAGE. This policy: (1) if primary, affords coverage at least as broad as Insurance Services Office form number GL 0001, Comprehensive General Liability Insurance and (2) if excess, affords coverage which is at least as broad as the primary insurance forms referenced in the preceding section (1). This policy requires Insurance Service Office Form CA 0001 or equivalent covering Automotive Liability, Symbol 1 (any auto).

4. SEVERABILITY OF INTEREST. The insurance afforded by this policy applies separately to each insured who is seeking coverage or against whom a claim is made or a suit is brought, except with respect to the Company's limit of liability.

5. PROVISIONS REGARDING THE INSURED'S DUTIES AFTER ACCIDENT OR LOSS. Any failure to comply with reporting of the policy shall not affect coverage provided to Owner, its elected or appointed officials, employees or volunteers.

6. CANCELLATION NOTICE. The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after forty-five (45) days prior written notice by Certified Mail Return Receipt requested has been given to Owner. Such notice shall be addressed as shown in the heading of this endorsement.

Signature of Insurer or Authorized Representative of the Insurer

I, _____ (print/type), warrant that I have authority to bind the below listed insurance company and by my signature hereon do so bind this company.

Signature of_____

Authorized Representative (original signature required on endorsement furnished to the Owner)

Organization _____

Title _____

Address _____

Telephone _____

RETAINAGE AGREEMENT

Contract Title _____

_____

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 _____

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.

TECHNICAL SPECIFICATIONS

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1.10 GENERAL

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

Sections in these specifications titled "*Related Sections*" shall be read as integral to the specification as if they were fully detailed within. All work and materials described in such sections shall be provided and performed by the Contractor.

1.10.16 Definitions

[CSI 01 42 16]

Approximate: Generally as shown or described, but has not been verified, or may require adjustment. No level of accuracy is implied or should be assumed.

Or Equal (Or Approved Equal): An alternate product, assembly, or method that the Owner's Representative has reviewed based on information provided by the Contractor and determined to provide functional equivalence, or better, than that specified. Such determination does not relieve the Contractor from responsibility should the product, assembly, or method fail to perform as needed.

Owner's Representative: Person(s) authorized by the Owner to observe the work, administer the contract, approve tests, make decisions, and otherwise act as an agent of the Owner. The terms Engineer, Owner's Observer, Owner's Inspector, and Owner are generally interchangeable with the term Owner's Representative.

Proposed: The word refers to work that is part of the Contract, to be performed by the Contractor. The word "proposed" does not need to show up to indicate work by the Contractor. Unless work is specifically noted to be performed by others, all work is to be performed by the Contractor.

1.11.00 Summary of Work

[CSI 01 11 00]

The City of Mercer Island Booster Pump Station Upgrades consists of structural, mechanical, electrical, and automatic control upgrades for the station. The station shall remain operational during construction and the installation of pumps will be completed in multiple phases and milestones as described in Section 1.32.13.

1.11.02 Reuse of Documents

[CSI 01 11 30]

Contractor and any Subcontractor or Supplier shall not:

1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
3. The prohibitions of this Paragraph will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

1.11.03 Electronic Data

[CSI 01 31 26]

1. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner to Contractor, or by Contractor to Owner, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
2. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 30 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 30-day acceptance period will be corrected by the transferring party.
3. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.
4. Computer Aided Design (CAD) files will not be made available to the Contractor. This includes AutoCAD™, Civil3D™, or other similar file types. Only printed hard copies or electronic representations of hard copies (e.g. PDF) will be provided.

1.13 Permits and Licenses

[CSI 01 41 26]

The Contractor shall acquire and pay all costs for all other necessary permits which may include:

- Electrical Permit

A copy of permits the Owner has acquired are available at the Owner's office for examination by bidders. Conform to the requirements of these permits and all other permits issued for this project. Permits the Owner will acquire after the bid opening will be made available when received by the Owner.

1.14 Work Restrictions

[CSI 01 14 00]

The contractor shall not perform work activities, store materials or equipment, move equipment through, or disturb in any way the areas outside the fenced reservoir and booster pump station site unless approved by the Owner in writing.

Work hours and days are restricted to Monday through Friday 7am to 7pm, Saturday 9am to 6pm. No work will be permitted on Sundays or Holidays. A noise exception from the City will be required if work is proposed by the contractor beyond the work hours listed here.

1.20 PRICE AND PAYMENT PROCEDURES

[CSI 01 20 00]

1.21.55 Cost Increases for Materials

[CSI 01 21 55]

There will be no allowance for additional payment should the cost of any materials go up during the original contract timeframe, or during any approved contract time extensions. The Contractor is responsible for securing prices at the time of bid.

1.25.00 Substitution Procedures

[CSI 1 25 00]

Any product or construction method that, in the opinion of the Owner, does not meet these specifications will be considered a substitution. Substitutions must be approved prior to incorporation into the project. The Owner has the right to reject any request for substitution. Incomplete requests will not be reviewed.

Requests shall include an explanation of why the request is being made along with drawings, details, specifications, and samples sufficient to allow the Owner to evaluate the proposed substitute. Requests shall include any change necessary in construction methods with a detailed description and related drawings of the proposed methods. Provide an itemized comparison of each proposed substitution with the specified product or method. If the Contractor believes there are no variations from the bid documents, include a statement to that fact in the request for substitution.

In making a request for a substitution, the Contractor represents that they have investigated the proposed product or method and has determined that it provides equal or superior form and function to the product specified. The Contractor shall coordinate incorporation of accepted substitutions into the work, making changes that may be required for the work to be completed.

The Contractor waives all claims for additional costs and time related to substitutions. The Owner reserves the right to charge the Contractor for the Owner's time required for incorporating the substitution into the work which may include but not be limited to observation, requests for information, and commissioning.

No guarantee is made that product model numbers included in the specifications or on the plans are current at the time of bidding. The bidder shall provide pricing in their proposal for current versions of discontinued models. If the bidder is uncertain of the correct replacement model, or feels there is a price discrepancy, the bidder shall request a substitution following the requirements of section 1.25.13.10 Substitutions Prior to Bid Opening. Requests for price increases after award will not be accepted.

1.25.13.10 Substitutions Prior to Bid Opening

[CSI 1 25 13 10]

Before opening bids, the Owner may consider written requests from product suppliers or prime bidders for substitutions. All requests for substitution must be received by Owner a minimum of 7 working days prior to bid opening. Approval of substitutions will be only by addendum. The bidder shall include in their proposal all costs for any modifications required to adopt the substitute.

1.25.13.15 Substitutions After Contract Execution

[CSI 1 25 13 15]

After contract execution, the Owner will consider requests for a substitution of products or methods in place of those specified. Submit electronically, or two hard copies of each request for a substitution. Submit requests early enough for the Owner to review the request without affecting the schedule. The Owner will review with reasonable promptness and will provide a response within 15 working days after receipt of all information required for the review, unless the complexity of the proposed substitution requires, in the Owner's sole opinion, additional review time.

If the Owner approves a request for substitution, and the Contractor subsequently requests an alternate substitution for the same or similar work, the Owner reserves the right to charge the Contractor for the costs required to review the alternate substitution.

1.30 ADMINISTRATIVE

[CSI 01 30 00]

1.31 Project Management and Coordination

[CSI 01 31 00]

1.31.01 Contractor's Responsibility

[CSI 01 31 01]

The work included in this contract is shown on the contract plans and described in these project specifications. All work incidental and necessary to the completion of the work described and shown shall be performed by the Contractor. In submitting a bid for this project, the Bidder warrants that they are an expert in this and related work, that they understand the process and functions shown, and that various work and processes not shown but necessary for the successful operation of this project will be provided by the Contractor.

The General (or Prime) Contractor is fully responsible for providing the subcontractors and suppliers with all relevant portions of the plans and specifications necessary to bid and construct the improvements.

Damage to existing utilities or property shall be repaired or replaced by the Contractor at the discretion of the Owner.

The Contractor and each of the Subcontractors are responsible for coordinating the required inspections. There are specific requirements for inspection responsibilities and the advance notice that must be given to minimize construction delays. It is the Contractor's responsibility to be familiar with these requirements, include the coordination necessary in this estimate of project costs and schedule, and to comply with the requirements during construction. Failure to follow proper inspection and notification procedures may result in on-site work stoppages and removal or demolition of unapproved structures or systems, all at the Contractor's expense. See Starting and Adjusting section for details.

Do not start work on this project or on any public or private right-of-way or easement until clearance is given by the Owner. It will be the responsibility of the Contractor to comply with the requirements of any permit for the project. Do not hinder private property access without a 24-hour notice to the private property owner, and do not hinder access for more than an 8-hour period. Do not disrupt emergency aid access to private property.

The Contractor is solely responsible for all elements of site safety. Inspections performed by the Owner are only to monitor and record that project plans and specifications are being complied with and construction is consistent with the design intent.

The Contractor is responsible for managing, coordinating, and overseeing its subcontractors, suppliers, manufacturers' representatives, or any other persons performing Work. The Contractor shall designate and have a competent person, familiar with the project and work being performed, on site at all times when work is being performed.

1.31.19 Progress Meetings

[CSI 01 31 19 23]

The Contractor shall schedule and hold regular on-site progress meetings at least every two weeks and at other times as requested by the Owner or as required by progress of the work. The Contractor, Owner, and all Subcontractors active on the site must attend each meeting.

Contractor to provide an agenda covering the following items at a minimum, as applicable.

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede planned schedule.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Discussion of upcoming required inspections/approvals.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Safety issues relating to work.
15. Other business relating to work.

1.32.13 Scheduling of Work

[CSI 01 32 13]

Refer also to the Completion Time section under the Instructions (or Information) to Bidders.

The Proposal describes the times for Substantial Completion and Physical Completion.

Construction of the project improvements involves work at an operational booster pump station and no shutdowns will be permitted to complete the work. This section provides an overview of the major phasing required for the work. The Contractor is responsible for providing all necessary materials, means and methods to meet the phasing requirements as intended by this section. The Owner will have other active and concurrent construction projects at the booster pump station site (generator relocation, tank improvements). The Contractor is responsible for coordinating all construction activities that may impact the other concurrent projects as necessary, including but not limited to: deliveries, heavy equipment, startup and testing.

The Contractor's project schedule shall include a detailed Phasing Schedule identifying all major steps to be performed. The Contractor may propose deviations to the requirements stated herein that may improve phasing of the proposed improvements. Deviations are subject to Owner review and approval and shall not be implemented if rejected.

The Owner has a vested interest in timely completion of the project improvements, especially Construction Milestone A.

Construction Milestone A

This work consists of all improvements for Pumps 1-5. To provide adequate water supply to customers while simultaneously providing adequate fire flow supply the construction phasing for Milestone A is as follows:

1. Install, Startup, and Test Pump 2 and 3. Maintain (3) existing pumps in operation.
2. Install, Startup, and Test Pump 1. Maintain (2) existing pumps in operation.
3. Install, Startup, and Test Pump 4 and 5.

The pumps in Steps 2 and 3 can be switched, as long as two (2) existing pumps are available and operational during Step 2.

Construction Milestone B

This works consists of all improvements for Pumps 6-7. The installation of these pumps can be completed only after the City's generator relocation project has been completed.

1. Install, Startup, and Test Pump 6 and 7.

Where the plans or specifications mention notification periods in hours or days, these time periods are assumed to be working days unless specifically stated otherwise. For example, a requirement of 48-hours notification for work desired to be performed at 1:00 pm Monday requires notification be provided no later than 1:00 pm the preceding Thursday.

1.32.16 Construction Progress Schedule

[CSI 01 32 16]

Contractor is responsible for providing an up to date construction schedule with each monthly pay estimate and at other times as requested by the Owner or as required by progress of the work. If the current schedule is still in-line with the previous schedule, the Contractor shall inform the Owner with each pay estimate. Non-working day requests shall also be submitted by the Contractor with each monthly pay estimate. Owner may delay monthly progress payments if Contractor fails to submit updated schedule and non-working day requests.

1.32.29 Periodic Work Observation

[CSI 01 32 29]

The Owner may elect to have a Consultant representative on site to monitor, observe and record construction progress. The Contractor maintains complete responsibility to verify construction is meeting the design intent and is being constructed in accordance with the plans and specifications. It is not the responsibility of the Consultant to address neither means and methods issues nor direct safety issues. The Consultant does not have the authority to stop work if unsafe conditions are observed.

1.33 Submittals

[CSI 01 33 00]

1.33.23 Shop Drawings, Product Data, and Samples

[CSI 01 33 23]

Submittals are required for all items installed on this contract. Address submittals to:

RH2 Engineering, Inc.
22722 29th Dr. SE, Suite 210
Bothell, WA 98021

Attn: Marine Behr, PE

Email: mbehr@rh2.com

Submittals may be provided in electronic format (preferred) or hard copy. Owner reserves the right to require the Contractor to provide hard-copy submittals at no additional cost to the Owner. When hard-copy submittals are provided, submit three (3) copies; one set will be returned to the Contractor after review.

Electronic submittal via email is acceptable, however the Contractor shall follow up with the Owner to verify that the submittal was received. The Owner assumes no responsibility for emails that do not make it to the recipient. In the case of electronic submittals, only one copy will be returned to the Contractor, either electronically or hard copy at the Owner's discretion.

Submittal data shall contain sufficient information on each item to determine if it complies with the contract requirements. Submittal cutsheets and datasheets shall be annotated by the Contractor to clearly indicate the equipment and materials that will be provided, including any options or additive items. No generic cutsheets or datasheets will be accepted.

Items installed in the work that have not been approved through the submittal process shall be removed and an approved product shall be furnished, all at the Contractor's expense.

Shop drawing review will be limited to general design requirements only and shall not relieve the Contractor from responsibility for errors or omissions, or responsibility for consequences due to deviations from the contract documents. No changes may be made in any submittal after it has been reviewed except with written notice and approval from the Owner.

Shop drawings shall be submitted on 8½-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch sheets and shall contain the following information:

- Project Name as it appears on the Document Cover.
- Prime Contractor and Applicable Subcontractor.
- RH2 Engineering.
- Owner's Name (City of Mercer Island).
- Applicable Specification and Drawings Reference.
- A stamp or statement that the Contractor has checked the equipment for conformance with the contract requirements, coordination with other work on the job, and dimensional suitability.
- A place for the Engineer to respond. (Engineer may elect to respond using the Engineer's standard forms.)

Submittals that do not comply with these requirements may be returned to the Contractor for re-submittal. The Contractor shall revise and resubmit as necessary. Acceptable submittals will be reviewed as promptly as possible and transmitted to the Contractor not later than 20 working days after receipt by the Engineer. Delays caused by the need for re-submittal shall not be a basis for an extension of contract time or delay damages.

Shop drawings and submittals shall contain the following information:

1. Drawings, dimensions, and weights.
2. Catalog information.

3. Model number, including descriptions for option and accessory codes.
4. Manufacturer's specifications.
5. Special handling instructions.
6. Maintenance requirements.
7. Wiring and control diagrams.
8. List of contract exceptions.

For integrated or package systems (see also 1.61.31), the components, shop drawings, instructions, and other elements may be submitted and reviewed individually. But the initial submittal must include the complete proposed system, and the final submittal must also be for the complete system clearly indicating all changes made during the submittal process.

The Contractor warrants that they have determined and verified all field measurements, field construction criteria, materials, catalog numbers, and similar data, and have checked and coordinated each submittal with the requirements of the work and of the contract documents.

The Owner will pay the costs and provide review services for a first and second review of each submittal item. Additional reviews shall be paid by Contractor by deducting up to $200 for each hour of review time from the next scheduled payment.

The Contractor is responsible for identifying the shop drawings and submittals required for this project. Specific submittal requirements may be listed in each section of these specifications. Contractor shall keep a complete and up to date copy of all submittals and review responses at the job site readily available to the Owner for inspection.

1.40 QUALITY REQUIREMENTS

[CSI 01 40 00]

1.42.19 Reference Standards

[CSI 01 42 19]

Certain other referenced standards used in this specification are from the latest editions of:

- Mercer Island Municipal Code
- IBC International Building Code
- UPC Uniform Plumbing Code
- IMC International Mechanical Code
- IFC International Fire Code
- NEC National Electrical Code
- AWWA American Water Works Association
- ANSI American National Standards Institute
- ASA American Standards Association

- ASTM American Society for Testing and Materials
- WSEC Washington State Energy Code

1.43.20 Warranty

[CSI 01 43 20]

The Contractor shall warrant all work and products for a period of one (1) year following the warranty start date except for those components and listed warrantees below.

The warranty start date shall be determined in accordance with section 7.9 of the General Provisions.

Warranty does not cover damage due to misuse by the Owner or conditions outside of the Owner or Contractor's control or exceptional events (force majeure) including war, strikes, floods (water exceeding normal high water mark), rainfall in excess of 100 year storm event, fire, earthquakes, high winds (over 85 mph for 3 seconds peak gust), freezes below 10 degrees Fahrenheit (Western Washington), governmental restrictions, vandalism, utility power failures, or utility power surges (unless due to Contractor provided surge suppressor failure). The Contractor has control over workmanship, third party subcontractors and parts and materials used to complete the project.

Warranties in addition to this warranty are listed in the following sections:

- Division 11.10.05 Pumps
- Division 11.20.1 Pump motors
- Division 15.34.01 Pilot-Operated Control Valves

1.45.16 Field Quality Control Procedures

[CSI 01 45 16]

Unless otherwise noted on the plans or within these specifications, provide 15-days notice to the Owner and appropriate reviewing agency for all inspections required. Time is not counted on weekends and holidays (inspections required on a Monday or the day after a holiday shall be scheduled a minimum of 15 days in advance not including the holiday hours or weekend hours.)

Contractor shall schedule and arrange for the following inspections and tests with the appropriate reviewing agency and testing company.

1.52.20 Locks and Keys

[CSI 01 52 20]

Contractor shall provide dedicated construction locks, or Owner's standard lock with removable construction core, for site and facility security during construction. Contractor shall provide Owner with two construction key(s) for all temporary locks. Owner may "double lock" any padlocks at their discretion.

The Owner will not provide Owner keys for the facility. The Contractor shall remove the existing key cores from booster pump station and replace with construction cores.

1.54 Construction Aids

[CSI 01 54 00]

The Contractor or product manufacturer may include work, materials, or components to aid in shipping, storage, installation, or other work for their convenience. Such items shall be removed prior to final project acceptance if they may interfere with the operation or maintenance of permanent work. Some examples include, but are not limited to:

- Lifting eyes: Remove only if a safety concern, obstruction, or directed by Owner.
- Picking holes: Plug holes of buried and exterior items, or if safety concern.
- Intermediate or shipping bracing: Remove and dispose.
- Protective shipping adhesives, coatings, or covers: Remove and clean residue.

1.60 PRODUCT REQUIREMENTS

[CSI 01 60 00]

1.61.31 Integrated (or Package) Products

[CSI 01 61 31]

Products specified as integrated or packaged must be administered with a single point of responsibility from a producer who regularly furnishes such products and is qualified to address and resolve issues during submittals, fabrication, installation, commissioning, and operation. These responsibilities will not be transferred to any other party without written approval by the Engineer. Products that fall under this category may include but are not limited to the following (when specified as packaged or integrated).

- Variable Frequency Drives

1.70 EXECUTION AND CLOSEOUT REQUIREMENTS

[CSI 01 70 00]

1.71 Examination and Preparation

[CSI 01 71 00]

1.74 Cleaning and Waste Management

[CSI 01 74 00]

1.74.23 Final Cleaning

[CSI 01 74 23]

All areas impacted by the work shall be restored to at least original condition, unless specifically identified otherwise in the plans or specifications. All costs are incidental.

Clean up debris and unused material and remove from the site and any buildings. If vehicle traffic causes ruts, repair asphalt (new or existing) in paved areas. In non-traffic areas back track with dozer or excavator and repair to final surface condition including necessary hydroseed, mulch, and landscaping. Eliminate weeds within the construction area prior to project closeout.

Buildings shall be broom clean and all foreign damage or markings removed or repaired.

Equipment shall be washed clean using appropriate methods.

Unpainted exposed concrete structures shall be cleaned to a consistent bare concrete surface finish. Remove extraneous substances such as efflorescence, leakage residue, and excess repair materials.

Remove existing equipment or materials identified in the contract documents or that interfere with the work. Dispose of all such existing equipment or materials unless the Owner requests items to be salvaged for their use. Owner has first right of salvage.

Should the Owner identify salvageable items of their property prior to removal, the Contractor shall protect said items from damage during the work, and will be responsible for reimbursing the Owner should the Contractor damage the items.

1.75 Starting and Adjusting

[CSI 01 75 00]

1.75.16 Startup Procedures

[CSI 01 75 16]

1.75.16.10 Startup

[CSI 01 71 16 10]

Startup shall consist of a simulated operation of all equipment and controls. The purpose of startup shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set, and that the facility will function as an operating unit.

Startup shall not occur on a Saturday, Sunday, Monday, Friday, on an Owner recognized holiday, or the day before or after an Owner recognized holiday unless approved in advance by the Owner.

Technically qualified product representatives shall be present for the startup phase. All representatives shall be trained, qualified, and have experience in troubleshooting and fixing field issues. The startup shall continue until it is demonstrated that all functions, controls, and equipment are functioning correctly.

Authorized manufacturer's representatives shall be provided for the following items:

- Pumps and motors
- Pilot-operated hydraulic control valves
- Variable frequency drives
- Motor control centers (electrician may qualify if approved by manufacturer)
- Field sensors (electrician may qualify if approved by manufacturer)

1.75.16.12 Startup and Testing Coordination

[CSI 01 75 16 12]

The Contractor shall conduct all testing and startup. Testing and startup shall not be a cause for claims for delay by the Contractor and all expenses for testing and startup shall be incidental to this contract.

The Contractor shall coordinate with the Owner for fire hydrants available to create demand during all testing and startup.

Refer to Specification Section 1.32.13 for Scheduling of Work. Startup and testing will be completed in multiple phases.

The placing of all improvements in service shall consist of three parts: "testing", "startup", and "operation". Not less than 21 calendar days before the anticipated time for beginning testing, the Contractor shall notify and submit to the Owner for approval, a complete plan for the following:

1. Schedules for tests:
    A. Telemetry Panel Factory Demonstration Test (at panel shop)
    B. Pumps and motors
    C. Control system
2. Detailed schedule of procedures for startup.
3. Complete schedule of events to be accomplished during testing.
4. An outline of work remaining under the contract that will be carried out concurrently with the operation phases.

Failure to provide proper notification to the Owner may lead to liquidated damages if schedule cannot be maintained. If rescheduling is required because components are not ready for testing, the notification requirements are reset as needed to provide 21 calendar days advance notice to reserve the Owner Representatives' time.

The Contractor shall arrange for all materials, supplies, and labor necessary to efficiently complete the testing, startup, and operation. Measuring devices must be functional, accurate, legible, and scaled appropriately for the test. The Owner has the right to reject or require verification for any measuring device the Owner suspects in its accuracy.

At a minimum, the Contractor shall provide:

- Calibrated pressure gauge(s) (max scale of 120% to 200% of test pressure)
- Pump/motor vibration measuring device (inches per second and inch peak to peak)

1.75.16.20 Testing

[CSI 01 75 16 20]

The Contractor may periodically request preliminary testing for items that must be covered or tested before other work can proceed. In these cases, do not cover up or test the work without timely notice to the Owner of its readiness for testing. Should any work be covered up without notice, approval, or consent, it must, if required by the Owner, be uncovered for examination at the Contractor's expense. All necessary equipment shall be set up and the work given a preliminary test so that defects may be discovered and repaired prior to calling out the Owner to witness the test.

Final testing consists of individual tests and checks made on equipment intended to provide proof of performance, operation, and control in the presence of the Owner. Assure proper alignment, size, condition, capability, strength, adjustment, lubrication, pressure, hydraulic test, leakage test, and all other tests deemed necessary by the Owner to determine that all materials and equipment are of specified quality, properly situated, anchored, and in all respects ready for use. Any certificates required in these specifications by the manufacturer's representatives shall be supplied to the Owner prior to startup.

All piping shall be tested as required by specifications and applicable codes. Tests on individual items of equipment shall be as necessary to show proper system operation. During testing, the Contractor shall correct any defective work discovered. Startup shall not begin until all tests required by these specifications have been completed and approved by the Owner.

Not less than five working days before the anticipated time for beginning the testing, the Contractor shall provide a list of representatives that will be attending the testing. The Owner may request additional representatives at no additional cost if said representatives are identified in these specifications.

Qualified product representatives to be on site for the following equipment, at a minimum:

- Pumps and motors
- Pilot-operated hydraulic control valves

Additional representatives required may be identified elsewhere in these specifications.

1.75.16.22 Scheduling of Owner Review for Testing

[CSI 01 75 16 22]

See Division 1.75.16.12 for scheduling and notification requirements.

The Contractor shall provide notification two working days and two working hours (to confirm readiness) of the scheduled test(s) to the Owner confirming that the Contractor has successfully completed all preliminary testing and that all equipment, tools, materials, labor, subcontractors, manufacturer's representatives, and all other items required for witnessed

testing are available and fully functional. Failure to provide advance notification and confirmation or meet any of the testing requirements will constitute a failed test in accordance with the section Inspection and Tests of the General Conditions.

A detailed testing schedule shall be provided by the Contractor and updated as needed to be at least 48 hours ahead of actual testing. If testing requires downtime in order to perform repairs due to failed test, the Contractor shall pay the Owner in the amount of $200 per hour per Owner Representative on site (minimum of $400 per scheduled visit) for downtime lasting longer than 2-hours required to complete repairs to verify the complete construction is ready for startup and operation. This amount will be deducted from the appropriate bid item that relates to the finished construction and documented by the Owner at their discretion. The Contractor must have all systems pre-tested prior to calling the Owner for formal testing.

Schedule shall include control system testing starting on Mondays or Tuesdays so that the remainder of the week can be used to identify the stability of the control system for the SCADA system, pump station, or treatment plant. Control system testing shall not start on a Thursday, Friday, or the day before an Owner recognized holiday.

1.75.16.32 Pump Testing

[CSI 01 75 16 32 or 33 08 00]

See the applicable pump sections of these specifications for pump testing requirements.

1.75.16.40 Electrical and Control Systems Testing

[CSI 01 75 16 40 or 25 08 00 or 26 08 00]

See also the applicable electrical sections for electrical system testing.

The following is a list of components that shall be tested prior to project completion. This list is intended as a general guide and is not necessarily complete:

- Pressure sensors and alarms
- Local control
- Pressure switch
- Pressure transmitter
- Variable speed drives

1.78 Closeout Submittals

[CSI 01 78 00]

1.78.23 Operation and Maintenance Data

[CSI 01 78 23]

Failure to provide acceptable final documentation including operation and maintenance (O&M) manuals and as-built drawings will result in non-payment of the appropriate bid item in the schedule of prices.

Detailed requirements for specific equipment and systems may also be included in their respective specification sections.

Remove and preserve all tags and instructions that come packaged with or attached to equipment. Deliver all such documents to the Owner bound in a three-ring binder or with the O&M Manual. Insert documents in sleeves if they cannot be punched. Scan all such documents to Adobe PDF format and provide with the O&M Manual.

Prior to the receipt of payment for more than 90 percent of the work, deliver to the Owner acceptable manufacturer's instructions covering equipment and systems O&M procedures, for coatings furnished under this contract, and any additional items indicated by the Owner.

At a minimum, provide O&M information for the following:

- Pumps
- Motors
- Control Valves
- Controls
- Electrical systems

The operating and maintenance instructions shall include, as a minimum, the following data for each coating and equipment item:

Products

A. Identification including brand name, model number, and serial numbers.

B. Date of manufacture and date of installation on job site.

C. Complete as-built elementary wiring and one-line diagrams.

D. Complete parts list, by generic title and identification number, complete with exploded views of each assembly.

Maintenance

A. Recommended spare parts.

B. Lubrication schedule including the applicable lubricant designation available from the Standard Oil Company of California.

C. Recommended preventive maintenance procedures and schedules. Schedule shall be provided for daily, weekly, monthly, quarterly, semi-annually and annually maintenance.

D. Disassembly and re-assembly instructions including parts identification and a complete parts breakdown for all equipment.

E. Weights of individual components of each item of equipment weighing over 50 pounds.

F. Name, location, and telephone number of the nearest suppliers and spare parts warehouses.

G. All manufacturers' warranties. Include name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.

H. Cleaning, repair, and maintenance instructions for each coating system.

I. Provide USB flash drive or DVDs utilized in the manufacturer's instruction program.

Operation

A. Recommended trouble-shooting and startup procedures.

B. Recommended step-by-step operating procedures.

C. Emergency operation modes, if applicable.

D. Normal shutdown procedures.

E. Long term shutdown (mothballing) procedures.

F. Equipment specifications and guaranteed performance data.

G. General manuals which describe several items not in the contract will not be accepted unless all references to irrelevant equipment are neatly eradicated or blocked out.

All operations and maintenance manuals shall be in PDF electronic file format. The PDF files shall be based upon the following types of sources: original PDF files from the manufacturers and / or PDF files created directly from other electronic file formats such as .doc, .docx, .xls, .xlsx, or .dwg but not image formats such as .jpg or .TIF. The use of image formats may be approved, but on a case by case basis. In general, scanning hardcopies into PDF files is not acceptable. Doing so may be approved, but on a case by case basis.

Use standard page sizes which are:

- 8½ inches by 11 inches
- 11 inches by 17 inches
- 22 inches by 34 inches

Manuals shall be assembled and indexed so that information on each coating and piece of equipment can be readily found.

The Contractor shall secure and deliver to the Owner all equipment warranties and other warranties and guarantees required for all equipment and processes. Delivery shall be done at one time covering all major and minor equipment warranties. Copies of the warranties shall be included in each O&M Manual.

See Division 1.43.20 for details regarding required warranties for specific components.

1.78.39 Project Record Documents

[CSI 01 78 39]

Prior to receiving final payment for the work, deliver a complete set of "As-Constructed" records (also called as-built, or record plans) to the Owner. The Owner has sole discretion to determine if the records provided are legibly and accurately presented and may request

revisions, which shall be provided by the Contractor at no additional cost. Records shall be made as follows or as approved by the Owner:

- Yellow markings or highlights = deleted items
- Red markings = new or modified items

Records shall be provided in PDF format.

Provide "as-constructed" information on all items and work shown on the plans showing details of the finished product including dimensions, locations, outlines, changes, manufacturers, etc. The information must be in sufficient detail to allow the Owner's personnel to locate, maintain, and operate the finished product and its various components.

See also electrical plan requirements in Division 16.05.

1.79 Demonstration and Training

[CSI 01 79 00]

1.79.10 Training

[CSI 01 79 10]

At the time that the facility is ready to be put into operation, the Contractor is to conduct an operation and maintenance training meeting with the Owner to explain in detail the operation and maintenance requirements of each of the facility's components. The training meeting shall not occur on the same days as a startup.

Operation of the facility shall commence immediately after completion of testing, startup, and training and after satisfactory repairs and adjustments have been made.

1.80 PERFORMANCE REQUIREMENTS

[CSI 01 80 00]

1.81 Facility Performance Requirements

[CSI 01 81 00]

1.81.30 Seismic Restraint and Anchorage

[CSI 01 81 30]

Contractor shall furnish seismic restraint for all equipment, piping, valves, conduit, and other mechanical and electrical components. Seismic restraint shall be designed to meet IBC (ASCE 7 Chapter 13 – "Seismic Design Requirements for Nonstructural Components") code requirements. The following design values shall be used in calculating seismic forces:

Ip = 1.5	Sds = 1.137	Seismic Design Category = D

A complete seismic restraint system shall be provided including struts, straps, bolts, nuts, washers, etc. as required for secure attachment to foundations, pads, ceilings, floors, and/or walls.

Contractor shall submit either of the following in accordance with ASCE 7, 13.2.1 for all components:

1. Project-specific design and documentation prepared and submitted by a registered design professional.
2. Submittal of the manufacturer's certification that the component is seismically qualified by
    a. Analysis
    b. Testing in accordance with the alternative set forth in ASCE 7, Section 13.2.5.
    c. Experience data in accordance with the alternative set forth in ASCE 7, Section 13.2.6.

Special Certifications are required for the following systems for Seismic Design Categories C, D, E, and F. Systems shall be certified in accordance with ASCE 7, 13.2.2.

1. Mechanical and electrical equipment that must remain operable following the design earthquake. All mechanical and electrical equipment installed under this project falls under this category.
2. Components with hazardous contents.

All materials and fabrication shall be as required in these specifications. Contractor shall submit this information to the Owner for review prior to fabrication and installation.

Install seismic restraints when called for in the contract or recommended by the product manufacturer. Install in accordance with the manufacturer's requirements as applicable.

Seismic restraint systems shall be installed so as not to interfere with normal operations and maintenance of the equipment and other components as shown on the plans. Interference with normal operations and maintenance shall be as determined by the Owner. Drilled-in anchors for non-rotating equipment shall be Concrete Anchors unless otherwise specified.

1.81.40 Pressure Ratings

[CSI 01 81 40]

Fittings, valves, pipe, and other fluid systems shall have pressure ratings equal to or greater than the pressures identified herein, unless specifically called out otherwise in the plans or specifications. Pressures listed are gauge pressure, unless specified otherwise.

The pressure class of pipelines and appurtenances shall comply with the Owner's standards for minimum pressure class or the pressure class that meets the requirements of this section, whichever is greater.

Equipment Type or Function	Working Pressure
Suction Piping	10 psi
Discharge Piping	50 psi

Working Pressure: Manufacturer's rating of maximum pressure during extended operation.

1.81.45 Location Designations

[CSI 01 81 45]

The following location designations shall be used except where otherwise noted on the plans:

Dry Locations: Indoor continually dry areas including office, laboratory, blower, and electrical rooms.

Wet Locations: All locations exposed to the weather, whether under a roof or not, or within channels, basins or tanks.

Damp Locations: Process areas; areas containing pumps, valves, and major piping; all spaces wholly or partially underground, or having a wall or ceiling forming part of a channel or tank, unless otherwise designated on the Plans. Any areas which do not fall within the definitions for dry, wet, or corrosive shall be considered damp.

Corrosive Locations: Areas where chlorine gas under pressure, sulfuric acid, or liquid polymer are stored or processed, sewer wetwells and sewer manholes.

Immersed or **Submerged Locations:** Areas which are periodically, or continuously submerged in, or contain a liquid.

1.81.50 Materials in Contact with Domestic Water

[CSI 01 81 50]

All devices, components, and materials substantially in contact with potable water shall be certified by NSF International to comply with NSF/ANSI 61 (leachable materials) and NSF/ANSI 372 (lead content). Certification of compliance shall be supplied in writing at the time of the submittal process. See exceptions in WAC 246-290-220(1).

Division 2
Sitework (Not Used)

3.00 GENERAL

Sections in these specifications titled "*Common Work for . . .*" apply to all following subsections whether directly referenced or not.

3.05 Common Work for Concrete

[CSI 03 05 00]

Part 1 - General

This division covers that work necessary for furnishing and installing all concrete as described in these specifications and as shown on the Plans.

References

Materials shall conform to the following standards:

- Cement - ASTM C150
- Coarse aggregate - ASTM C33
- Fine aggregate - ASTM C33
- Admixtures - ASTM C494
- Air-entraining admixtures – ASTM C260
- Fly Ash – ASTM C618

Submittals

Submittal information shall be provided to the Owner for the following items:

- Concrete mix design including aggregate gradation and substantiating strength data.
- Admixture Data
- Concrete anchors
- Concrete anchor installer certification per ACI/CRSI Adhesive Anchor Installer Certification Program.
- Schedule of surface finishes
- Rebar mill certifications
- Rebar placement shop drawings
- Grouts

Concrete mix designs shall be submitted to the engineer for approval a minimum of two weeks prior to placing any concrete. The mix design shall include the amounts of cement, fine and coarse aggregate, water and admixtures, as well as the water cement ratio, slump, concrete yield, aggregate gradation, and substantiating strength data in accordance with ACI 318, Chapter 5. A batch plant inspection may be required, the cost of which shall be paid by the Contractor. Review of mix submittals by the engineer of record indicates only that

information presented conforms generally with contract documents. Contractor or supplier maintains full responsibility for specified performance.

Part 2 - Products

Components

Nominal maximum size for aggregates is the smallest standard sieve opening through which the entire amount of aggregate is permitted to pass. Provide intermediate aggregate grades as required to achieve a well-graded mix.

All concrete surfaces exposed to weather or standing water shall be air entrained. Total air content shall be in accordance with IBC requirements unless specified otherwise herein. Air shall be measured at the truck, unless otherwise agreed to.

Water used in concrete shall be potable.

Fly ash may be substituted for up to 15 percent of the required cement, except where noted.

Mixes

Concrete shall be mixed, conveyed, and proportioned in accordance with IBC section 1905.

The concrete mix shall include the amount of cement, fine and coarse aggregate, including aggregate gradations, water, and admixtures as well as water cement ratio, slump, concrete yield, and sustaining strength data in accordance with these specifications, the requirements of the International Building Code Section 1905, and the requirements of ACI 318.

Finishes

Coat all aluminum in contact with concrete as specified in Division 9.

Part 3 - Execution

Inspection

See Statement of Special Inspections on the Drawings for special inspection requirements. Provide two (2) full working day notice to Owner prior to needing the required inspections.

Also comply with local building department and permit requirements for inspection and notification.

The Contractor shall repair, replace or modify, as appropriate, any items noted in the Special Inspector's inspection or the building department inspection.

Testing

Concrete strength tests shall be performed per section 1905.6 of the IBC and per the requirements noted herein. The Owner will provide and pay all costs of concrete testing. The Engineer shall be furnished with copies of all inspection reports and test results.

Cylinders used for concrete strength tests shall be 6 by 12. Four by 8 cylinders may be used for mixes with maximum aggregates less than 1-inch, however the testing lab must apply a 0.94 multiplier to the compressive strength test results unless data acceptable to the Engineer is presented that would justify a higher multiplier. All mixes utilizing aggregates over 1 inch shall be tested using 6 by 12 cylinders.

When 4 by 8 cylinders are utilized AASHTO T23 requirements shall be followed, and the retainer used with neoprene pads when testing for compressive strength shall be constructed according to ASTM C1231.

The Contractor will coordinate all concrete testing with the testing agency. Costs will be paid by the Owner.

Give the Owner and testing agency 48-hour notice prior to concrete placement. If Contractor fails to provide the required notice, the Owner may elect to cancel the affected concrete placement. Contractor shall be responsible for costs and delays due to improper notification.

If the Contractor schedules a concrete placement and does not notify the Owner and testing agency of a cancellation within 24 hours of the scheduled placement, the Contractor shall pay the testing agency costs for an unnecessary trip. If the Contractor fails to provide the testing agency with adequate notification and testing agency cannot attend concrete placement, Contractor shall reschedule placement. Contractor shall be responsible for all associated delays.

The Contractor shall provide all assistance and cooperation necessary to testing personnel to obtain the required concrete tests. Contractor and Owner will have access to testing results as soon as they are available.

The testing agency shall take a minimum of four samples for every 50 yards of concrete placed (and a minimum of four per pour); one for a 7-day test, two for 28-day tests, and one for backup testing in case the other two samples do not meet design strength. Additional samples may be taken to verify strength prior to form removal at the Contractor's expense.

3.06 Maintenance of Concrete

[CSI 03 01 00]

3.06.30.71 Resurfacing of Cast-in-Place Concrete

[CSI 03 01 30.61]

Part 1 - General

This division covers that work necessary for repairing spalled and damaged concrete. Repair any areas with deterioration exceeding ½-inch, where rebar is exposed or where directed by the Owner.

Part 2 - Products

Materials

CONCRETE REPAIR MATERIAL: SikaTop 111 PLUS or equal cement-based repair mortar. Mortar shall be ANSI/NSF Standard 61 approved if in contact with potable water and contain a corrosion inhibitor. See Manufacturer's Literature for primer and auxiliary products appropriate for use with the repair material.

SILANE SEALER shall be alcohol based, 95 percent silane. No fillers, sterates or paraffins are allowed. Use DUR A PELL 100 as manufactured by Chemprobe Coating Systems or equal.

Part 3 - Execution

Preparation

The Contractor shall be familiar with the product and methods and be prepared to discuss the repair procedure at the Preconstruction Meeting.

High pressure power-wash the exposed structure to remove all loose, delaminated concrete to sound concrete.

Surface Preparation: Remove loose, delaminated concrete to sound concrete. Where corrosion of the reinforcement exists, continue bulk removal along the reinforcing steel and adjacent areas with evidence of corrosion-induced damage Under-cut all exposed reinforcing steel by a minimum of ¾-inch. The shape of the prepared cavity should be square or rectangular in shape. The edges of the patches shall be saw-cut perpendicular to the surface to a minimum depth of ½-inch. Repair area shall be a minimum of ½-inch deep throughout. Use abrasive blasting to remove residual dust, debris, fractured concrete, and contaminants that prevent proper bonding. Following abrasive blasting, blow out repair areas with oil-free compressed air. The final surface texture should be rough with minimum ⅛-inch amplitude.

Treatment of exposed reinforcement: All signs of corrosion should be removed from exposed reinforcing steel by an abrasive blasting, wire wheel or needle scaler. If the cross-sectional area of the reinforcing steel has been significantly reduced, the engineer should be consulted. Prime reinforcing as recommended by the repair material manufacturer.

Installation

Surface Saturation: Saturate surface with potable water. The base concrete shall be in a saturated surface dry (SSD) condition prior to application of repair material to prevent a rapid loss of moisture from the repair material and into the substrate.

Mixing and Application of Repair Material: Mixing and application shall be in strict accordance with the manufacturer's instructions. Apply the material with adequate pressure before the bond coat dries. Thoroughly consolidate the repair material into the corners of the patch and around any exposed reinforcement in the repair zone. If a second lift is required, thoroughly roughen the surface of the first lift by scoring the soft mortar to achieve an aggressive finish, similar in profile to the prepared concrete substrate. If the second lift will not be immediately applied, keep the first lift moist until application of the second lift. Finish to match existing surface. Cure using curing compound.

Apply silane sealer as specified to exposed surfaces and edges of roof slab.

3.10 FORMING AND ACCESSORIES

[CSI 03 10 00]

3.11 Formwork

[CSI 03 11 00]

3.11.13 Structural Cast in Place Forming

[CSI 03 11 13]

Part 1 – General

The Contractor shall submit a construction joint plan to the Engineer for review prior to formwork and rebar installation if altered from that shown on the Plans. Modifications to the construction joints shall be submitted to the Engineer no less than 7 working days prior to placing the forms and rebar.

Part 2 – Products

Materials

Unless otherwise directed, coat contact surface of forms with colorless, non-staining, mineral oil that is free from kerosene, or other approved suitable material, to permit satisfactory removal of forms without concrete damage.

Form construction for surfaces covered with backfill shall be made of steel, plywood, or dressed, matched lumber. Form construction for exposed surfaces shall be made of new plywood or steel without surface markings.

Part 3 - Execution

Installation/Construction

Concrete forms shall be sufficiently tight to prevent leakage of concrete or mortar and shall be properly braced or tied together to maintain desired position and shape until removed.

Conduits, pipes and sleeves of any material not harmful to concrete and within the limitations of ACI 318, Section 6.3 are permitted to be embedded in concrete with approval of the Engineer. Provide a ¾-inch chamfer or radius at all exposed corners and edges, unless specifically stated otherwise on the Plans.

Forms shall remain in place until the concrete has developed sufficient strength to withstand imposed loads without damage or deflection. Wall and slab forms shall remain in place for a minimum of 24 hours after completion of the pour. Forms for beams and suspended slabs shall remain in place for a minimum of 14 days AND until concrete has developed 28-day design strength, unless approved by the Engineer. The Contractor shall coordinate with the testing lab to verify concrete strength prior to form removal.

Do not allow water to flow through areas where forms are to be placed. During form construction and prior to placement of concrete, keep footings and floor slab areas free of standing water.

Field Quality Control

Variations from plumb, specified grade, conspicuous lines, and walls shall not exceed plus or minus ¼-inch in any 10-foot length, and shall not exceed one inch over the entire length. Variations from dimensions shall not exceed plus or minus ½-inch. Closer tolerances shall be achieved by the Contractor as necessary to accommodate equipment and other permanent materials.

3.15 Concrete Accessories

[CSI 03 15 00]

3.15.19 Concrete Anchors

[CSI 03 15 19 (cast-in) or 05 05 19 (drilled)]

Part 1 - General

Quality Assurance

Installation of adhesive anchors shall be performed by personnel certified in accordance with the ACI/CRSI Adhesive Anchor Installer Certification Program. In lieu of certification the installer shall attend on-site training held by the adhesive manufacturer prior to the installation of adhesive anchors.

Part 2 - Products

Materials

Concrete Anchors shall be Hilti HIT 500-V3, or Simpson SET-XP Adhesive Anchors.

Threaded rod shall be stainless steel except in dry locations.

Part 3 - Execution

Installation

Install in accordance with Manufacturer's recommendations. Special Inspection in accordance with IBC, Section 17, must be provided. Provide a minimum of 48 hours' notice to Engineer prior to starting installation. Concrete anchors shall not be used to resist tension or fatigue loading without Owner's evaluation and approval.

Use threaded rod or reinforcing bar as shown on the drawing, and meeting Manufacturer's recommendations. Provide minimum embedment as shown. Holes shall be drilled with carbide-tipped drill bit. Holes shall be cleaned of dust and debris. Adhesive shall be inserted with a mixing nozzle.

3.20 REINFORCING

[CSI 03 20 00]

3.21 Reinforcement Bars

[CSI 03 21 00]

3.21.11 Plain Steel Reinforcement Bars

[CSI 03 21 11]

Part 1 - General

References

ACI – American Concrete Institute- latest edition

CRSI Manual of Standard Practice – latest edition

Part 2 - Products

Materials

Grade – ASTM A706, Grade 60

ASTM A615, Grade 60 shall be permitted if:

(a) The actual yield strength based on mill tests does not exceed fy by more than 18,000 psi; and,

(b) The ratio of actual tensile strength to the actual yield strength is not less than 1.25.

Detailing - ACI 318 and ACI 315

Lap requirements - See schedule on Plans or as required by ACI 318

Tie wire - 16 gauge minimum

Bar supports shall conform to "Bar Support Specification" CRSI Manual of Standard Practice, MSP-1-80. Provide Class 1, plastic protected bar supports. Use pre-cast concrete blocks to support bars off ground. Bar supports in water holding and buried structures shall be non-metallic.

Bar supports for the bottom rebar mat of suspended slabs or beams in water holding structures must be point supports (chairs or dobbies), not continuous.

Part 3 - Execution

Installation

Reinforcing steel shall be detailed in accordance with ACI 315 and 318 and as shown on the Plans. Lap all reinforcements in accordance with "the reinforcing splice and development length schedule". Provide corner bars at all wall and footing intersections. Bend wire bar ties away from formwork to provide the same concrete clearance as shown on the Plans to the bars.

Welding of reinforcing steel shall not be performed unless specifically approved by the Engineer. If approved, Contractor will arrange and pay for all required Special Inspections associated with welding of reinforcing steel.

Field Quality Control

Reinforcing steel shall be free of rust and loose scale at time of concrete placement. Bars with kinks, improper bends, or reduced cross-section due to any cause will not be used. Bars shall not be field bent. Bars may not be tack-welded or otherwise heated.

If, within the project warranty period, rust spots appear on the concrete due to failure to achieve proper clearance on the rebar or wire ties, the Contractor shall grind out and patch the areas using a method satisfactory to the engineer.

3.30 CAST-IN-PLACE CONCRETE

[CSI 03 30 00]

3.30.05 Common Work for Cast in Place Concrete

[CSI 03 30 05]

Part 1 - General

Scheduling

Contractor shall schedule and attend a Concrete Placement meeting at least one week prior to placing concrete. The following shall attend:

- Owner
- Engineer
- Contractor
- Testing Laboratory Representative
- Concrete Supplier

Delivery

Concrete shall be transported in a truck mixer to the jobsite and discharged within 1.5 hours after cement has been added to water or aggregates. Rejected concrete will be at Contractor's expense.

Part 2 - Products

Components

If allowed, curing materials shall conform to ASTM C171 and liquid membrane-forming compounds shall conform to ASTM C309. When concrete is to be coated or stained, use UV-dissipating form release and curing compounds.

Part 3 - Execution

Preparation

Do not place concrete during rain, sleet, or snow until water and freezing protection is provided.

Position embedded items accurately, and support against displacement or movement during placement.

Fill voids in sleeves, insets, anchor slots, etc., temporarily with readily removable materials to prevent entry of concrete into voids.

Before beginning placement of concrete, remove hardened concrete and foreign materials from inner surface of mixing and conveying equipment. Before depositing concrete, remove debris from space to be occupied by the concrete. Secure reinforcement in position to prevent movement during concrete placement.

At construction joints, thoroughly clean surface of existing concrete to remove laitance. Roughen existing concrete surface to expose aggregate uniformly and apply approved bonding agent to existing concrete in accordance with manufacturer's recommendations. Prior to placing fresh concrete, dampen joint and coat with grout mixture in accordance with ACI 301, Section 8.5.

Installation

Placement shall be in accordance with IBC, Section 1905.

Place no concrete when air temperature is below or expected to be below 40 degrees during the 28-day curing period unless a low temperature concrete mix has been approved by the Owner. Provide adequate equipment for heating materials and protecting concrete during freezing or near freezing weather. Keep materials, reinforcement, forms, and ground in contact with concrete free from frost at time of placement. Heat mixing water as required. Use no materials containing ice.

Place no concrete when air temperature exceeds or is expected to exceed 85 degrees during the 28-day curing period unless a high temperature placement plan has been approved, and unless adequate precautions are taken to protect work. Cool ingredients prior to mixing. Flake ice or crushed ice of a size that will melt completely during mixing may be substituted for all or part of water. Cool forms and reinforcing prior to placing concrete.

Handle concrete from mixer, ready-mixed truck, or from transporting vehicle to place of final deposit by methods which prevent separation or loss of ingredients. Under no circumstances shall concrete that has partially hardened be deposited.

Place concrete in maximum lifts of 3 feet. Deposit concrete continuously so that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously, locate and reinforce construction joints at points as provided for in the Plans or as approved by the Owner. Maximum concrete drop shall be 5 feet.

Consolidate concrete by vibration, supplemented by hand spading, rodding, forking, or tamping. Thoroughly work concrete around reinforcement, around embedded items, and into corners of forms to eliminate air or rock pockets which may cause honeycombing, pitting, or planes of weakness. Insert and withdraw internal vibrators at points approximately 18 inches in each direction and extend into the lower concrete lifts. At each insertion, the duration shall be sufficient to consolidate the concrete; but not sufficient to cause segregation. Do not use vibrators to transport concrete within forms. Consolidate slabs by utilizing vibrating screeds, roller pipe screeds, internal vibrators, or other approved methods. Have a spare vibrator available at jobsite during concrete placing operations.

After removal of forms, cut out and patch defects in concrete surfaces. Remove form tie cones. Cut or snap off form ties to a depth of ¾-inch. Chip out rock pockets, holes from form tie removal, and other defects to solid concrete. Repair defects in accordance with 3.01.30.71.

Curing

See section 3.39.

3.31.30 Thrust Blocks, Driveways, Curb, Gutter, Sidewalks, Equipment Pads, and Fence Posts

[CSI 03 31 13.10]

Part 1 - General

Summary

All concrete for non-structural applications including thrust blocks, driveways, sidewalks, equipment pads, and fence post foundations. Hydraulic or Structural Concrete may be substituted.

Performance Requirements

28-day compressive strength – 4,500 psi minimum

Part 2 - Products

Mixes

Water/cement ratio - 0.45 maximum

Nominal maximum aggregate size – ¾-inch (AASHTO Grading No. 67)

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

3.34 Low Density Concrete

[CSI 03 34 00]

3.34.14 Controlled Low Strength Material (CLSM)

[CSI 03 34 13]

Part 1 - General

Summary

CLSM (also referred to as "controlled density fill" or CDF) shall be used where noted on the plans, including areas where proper compaction of backfill cannot be achieved.

Submittals

Mix design shall be submitted to the Engineer for approval.

Performance Requirements

CLSM shall conform to the following requirements:

- Minimum 28-Day Compressive Strength: 50 psi.
- Maximum 28-Day Compressive Strength: 200 psi.
- Flowability: 8 inch +/- 1 inch spread diameter (using a three (3) inch diameter by six (6) inch long cylinder and shall meet the requirements of ASTM D 6103 – Standard Test Method for Flow Consistency of CLSM). A standard concrete slump cone should not be used to measure the flowability of a CLSM mix.

Part 2 - Products

Mixes

Mix design shall be prepared by the manufacturer. Mix design shall include cement, sand aggregate, and water, and may include approved additives or admixtures.

Fine aggregate used shall be primarily granular with 100 percent passing a ¾-inch sieve, but not more than 12 percent passing the #200 sieve. No plastic fines shall be present.

Mix design shall not include fly ash or corrosive materials.

Field Quality Control

Protect CLSM for at least 24 hours after placement or for a duration as necessary to prevent displacement by construction equipment or traffic. CLSM placing may be started if weather conditions are favorable, when the temperature is a minimum of 34 degrees Fahrenheit and rising. At the time of placement, CLSM must have a temperature of at least 40 degrees Fahrenheit. Placing shall stop when the temperature is 38 degrees Fahrenheit or less and falling. CLSM shall not be placed on frozen ground.

Cure CLSM used for fill or pipe encasement for the following minimum durations prior to placement of any material directly over the CLSM. If traffic must be restored prior to the duration stated, or the open excavation must be closed for safety, span the excavation with temporary plating appropriate for the anticipated loading. Cold weather may require more time. Curing accelerators may be used to reduce these times if approved by the Owner.

- Pipe encasement: 4 hours.
- Non-traffic: 24 hours.
- Vehicular traffic under 5,000 lbs per axle: 48 hours
- Vehicular traffic over 5,000 lbs per axle: 72 hours
- Permanent structures: 7 days.

Part 3 - Execution

Installation

Where buoyancy and/or hydrostatic pressure is a concern, the engineer may require that CLSM be placed in lifts, with each lift being allowed to harden before placement of the next lift.

3.35 Concrete Finishing

[CSI 03 35 00]

3.35.05 Common Work for Surface Finishing

[CSI 03 35 05]

Part 2 - Products

Finishes

Each concrete area that requires finishing shall conform to one of the following requirements:

- Equipment Pads - Sacked Wall
- Pump and Fittings Supports – Sacked Wall

Part 3 - Execution

Preparation

Do not place concrete which requires finishing until the materials, tools, and labor necessary for finishing the wet concrete are on the job and acceptable to the Owner. If rainfall is possible, tent the work area prior to the pour and maintain protection until the concrete is cured sufficiently to resist damage.

3.35.58 Sacked Wall Finish

[CSI 03 35 58]

Part 1 – General

References

Provide sacked finish in accordance with Section 6-02.3(14)A of Standard Specifications.

3.39 Concrete Curing

[CSI 03 39 00]

Part 2 - Products

Materials

Curing compounds are not permitted on surfaces that will receive coatings.

Part 3 - Execution

Installation

All concrete for structures, sidewalks, drives, curbs, shotcrete (see section 3.37), and where directed by the Owner, shall be water-cured in accordance with ACI 308.1 unless approved in advance by the Owner. If allowed, curing compound shall be applied immediately after finishing or form removal. When plastic or burlap covers are used to augment or protect

curing, extend sheeting beyond the edges of the concrete and secure against wind lift. Inspect and adjust curing systems daily, including over weekends and holidays.

Concrete structures that require differential backfill as shown on the Plans or as required for construction shall cure for a minimum of the following prior to placing backfill:

- Backfill equal or greater than 24 inches: 7 days AND 28-day strength requirements.
- Backfill between 6 and 24 inches: 3 days AND 80-percent of the 28-day strength requirements.

3.60 GROUTING

[CSI 03 60 00]

3.62 Non-Shrink Grouting

[CSI 03 62 00]

3.62.13 Non-Metallic Non-Shrink Grout

[CSI 03 62 13]

Part 1 - General

Summary

Use Precision Non-Shrink Grout for grouting all equipment base plates, pipe supports, and base plates for metalwork. Precision Non-Shrink grout may also be used for all other non-shrink grouting operations. General Purpose Non-Shrink grout may be used for any applications other than those noted for Precision Non-shrink Grout. Non-shrink grout shall be used to seal all new pipe and conduit penetrations (watertight) into and out of all concrete and CMU block walled structures.

Storage and Handling

Stockpile grout to prevent contamination from foreign materials and store admixtures to prevent contamination or damage from excess temperature change

Part 2 - Products

Materials

Precision Non-Shrink Grout:

Provide a high-precision, fluid, non-shrink, quartz or non-catalyzed metallic aggregate grouting material. Provide a ready-to-use grout that hardens free from bleeding, settlement, or drying shrinkage when mixed, placed and cured at any consistency – fluid, flowable, plastic or damp-pack.

Provide precision, non-shrink natural aggregate grout that when cured produces the following properties:

A. Compressive Strength at fluid consistency (ASTM C109-Modified): 3500 psi (24 MPa) at 1 day, 7500 psi (52 MPa) at 28 days.

B. Passes ASTM C1107 as a grade B grout when tested as temperature minimum and maximums of 45 degrees Fahrenheit to 90 degrees Fahrenheit (8 degrees Celsius to 32 degrees Celsius) at a working time of 30 minutes. Grout must be tested at a fluid consistency per ASTM C939 and remain fluid at temperature range minimum and maximums for the 30-minute working time. All materials including water must be mixed and tested at temperature minimum/maximums.

C. Modulus of Elasticity at 28 days at fluid consistency (ASTM C469): 3.0 x 10^6 psi (20.7 GPa) minimum, 3.9 x 10^6 (27.0 GPa) maximum.

D. Coefficient of Thermal Expansion for fluid consistency (ASTM C531): 7.5 x 10^{-6}/ degrees Fahrenheit maximum (13.5 x 10^{-6}/ degrees Celsius).

E. Flexural strength at 28 days for fluid consistency (ASTM C78): 1300 psi (7.9 MPa).

F. Resistance to rapid freezing – thawing (ASTM C666, Procedure A): 300 cycles- min RDF 90 percent.

G. Split tensile strength at 28 days at fluid consistency (ASTM C496): 450 psi (3.1 MPa).

H. Pass 24-hour grout test under stated temperature, time and fluidity constraints. See MBT Protection and Repair 24-hour Grout Form.

Precision non-shrink grout shall be MasterFlow 928 or 885 Grout or approved equal.

General Purpose Non-Shrink Grout:

General Purpose Non-shrink grout shall meet the compressive strength and nonshrink requirements of CRD-C 621, Grades B and C; Corp of Engineers Specification for Non-shrink grout; and ASTM C1107, Grades B and C. General Purpose Non-shrink grout shall be MasterFlow 713, Dayton Superior 1107 Advantage, or approved equal.

Provide curing compounds as recommended by the grout manufacturer.

Water to be used in mixing the grout shall be potable.

Mixes

Comply with grout manufacturer's recommendations for mixing procedures.

Adjust water temperature to keep mixed grout temperature in the range of 45 degrees Fahrenheit (7 degrees Celsius) and 90 degrees Fahrenheit (32 degrees Celsius) minimum/maximum.

Use cold or iced water to extend working time in hot weather or in large placements.

Use warm water in cold conditions to achieve minimum as mixed temperatures.

Part 3 - Installation

Preparation

Mechanically remove unsound concrete within the limits of the grout placement.

Remove at least ¼-inch (6mm) of existing concrete facing and continue removal as required to expose sound aggregate.

Thoroughly clean the roughened surface of dirt, loose chips, and dust. Maintain substrate in a saturated condition for 24 hours prior to grouting. Surface should be saturated surface dry at time of grouting.

Clean baseplates and other metal surfaces to be grouted to obtain maximum adhesion. Remove loose rust and scale by grinding or sanding.

Comply with grout manufacturer's recommendations for form construction. Construct forms to be liquid tight.

Installation

Place grout mixture into prepared areas from one side to the other. Avoid placing grout from opposite sides in order to prevent voids. Work material firmly into the bottom and sides to assure good bond and to eliminate voids.

Ensure that foundation and baseplate are within maximum/minimum placement temperatures. Shade foundation from summer sunlight under hot conditions. Warm foundation when foundation temperature is below 45 degrees Fahrenheit (7 degrees Celsius).

Wet cure exposed shoulders for 48 hours followed by two coats of curing compound for best results. The minimal requirement is to wet cure until grout has reached final set, followed by two coats of curing compounds.

Division 4
Masonry (Not Used)

5.00 GENERAL

This division covers that work necessary for furnishing and installing metalwork as described in these specifications and as shown on the Plans.

Sections in these specifications titled "*Common Work for* . . . apply to all following subsections whether directly referenced or not.

5.05 Common Work for Metals

[CSI 05 05 00]

Part 1 - General

Related Sections

- Division 1.81.45 Location Designations
- Division 9 Finishes
- Division 1.81.30 Seismic Restraint

Submittals

Submittal information shall be provided to the Owner for the following items:

- Shop Drawings showing details of Fabricated Metalwork including connections and welding.
- Calculations and plans stamped by a professional engineer licensed in the State of Washington for all Contractor- or Manufacturer-designed components or assemblies.
- Hand rail and guardrail.
- Aluminum stair.
- Welder certifications if applicable. For ASME Section IX certifications, and if requested by the Owner, provide a continuity log if the last certification was 6 months prior to the work being performed.

Inspections

Unless otherwise noted on the Plans, specifications, or building department requirements, special inspections related to metal fabrications, placement and welding shall be subject to 48-hour notice to the Engineer prior to the inspection time. 48-hour notice is defined in Division 1, Contractor Responsibility.

Any Field welding shown on the Plans will require special inspections in accordance with section 1704.3 of the IBC and AISC 360.

Quality Assurance

Only prequalified welds (as defined by AWS) shall be used.

Fabricator shall be registered and approved by American Institute of Steel Construction (AISC) to perform shop fabrication without special inspection. Submit certificate of compliance to the Owner at the completion of fabrication. Owner will forward this to the Building Official.

If fabricator is not registered and approved, or the certificate of compliance is not received, the Contractor shall reimburse the Owner for all Special Inspections required by the IBC on shop fabricated items. The Contractor shall also reimburse the Owner for all Special Inspections required by the IBC for field welding not specifically shown on the Plans. Contractor shall alert Owner at least 30 calendar days in advance if such Special Inspections will be required in order to procure the services of a testing lab.

Special Inspection by the Owner does not relieve the Contractor of responsibility of performing his own inspections and testing to ensure that all items are properly constructed.

Part 2 - Products

Materials

Structural Steel

Structural steel shall conform to the following requirements:

Plates, shapes, angles, rods - ASTM A36 and A992, Fy ≥ 36 ksi

Special shapes, plates - ASTM A572, Fy ≥ 50 ksi

Stainless Steel

Stainless steel shall be type 304 (non-welded) or type 304L (welded) or as called out.

Fasteners - ASTM F593

Pipe - ASTM A240 or higher grade or as called out.

See Section 15.22.4 for information on pipe used for mechanical applications.

All stainless steel shall have a standard mill finish where concealed or No. 4 finish where exposed and shall be cleaned of all foreign matter before delivery to the job site.

Galvanized Steel

Base metal shall be as specified for Mild Steel.

Hot-dip galvanized after fabrication in accordance with ASTM A 924/A 924M.

Finishes: For pieces that will NOT be painted, galvanize with zinc coating in accordance with ASTM A 653/A 653M. For pieces that WILL be painted, galvanneal with zinc/10 percent iron coating in accordance with ASTM A 653/A 653M.

Aluminum

Plates - ASTM B209, Type 6061-T6

Extruded Shapes - ASTM B308, Type 6061-T6

Pipe - ASTM B210 Type 6061

Architectural Applications - ASTM B210, Type 6063

Aluminum materials in contact with concrete or other metals shall have surfaces coated per Division 9.

Manufactured Units

Design of Contractor- or Manufacturer-designed components or assemblies shall meet the specific component requirements as provided here-in, as well as all applicable state and federal codes. Design shall include gravity loads and seismic loads in accordance with ASCE 7-16 Chapter 13 "Seismic Design Requirements for Nonstructural Components". Design criteria shall be as provided herein for components, and as provided on the Plans.

Contractor-designed components and assemblies shall be shop welded and field bolted if possible. Field welding will NOT be allowed unless specifically shown, or there is no reasonable alternative.

Finishes

See Division 9 for information.

Part 3 - Execution

Fabrication

All welding shall be in accordance with AISC and American Welding Society (AWS) standards and shall be performed by AISC and/or AWS certified welders using electrodes to match base material. Only prequalified welds (as defined by AWS) shall be used. Welding inspection shall be performed in accordance with the applicable AWS provisions and Chapter 17 of the IBC. Shop welding requiring inspection or testing per IBC Chapter 17 must be tested by an independent testing laboratory certified by AWS and approved by the owner at the Contractor's expense. Field welding, where required or allowed, will be inspected by a representative of the owner at the owner's expense. This does not relieve the Contractor of responsibility of performing his own inspections and testing to ensure that all items are properly constructed.

All shop welds shall be ground smooth.

Any shop paint on metal surfaces adjacent to joints to be field welded shall be wire brushed to remove the paint film prior to welding.

Where steel items to be welded are galvanized, galvanizing must first be removed by grinding with a silicon carbide wheel, by grit blasting or by sand blasting.

Any cutting or grinding equipment used on stainless steel must be new or only previously used on other stainless-steel material.

All stainless-steel shop welds shall be pickled after welding to remove heat damage and contaminants. Field welds must be passivated using an Engineer approved product (Citrisurf 2210 or equal). If the metal will be in contact with potable water, pickling and passivation products must be citric acid based and thoroughly removed, or use a product approved by USDA or NSF.

Installation

Fabrications shall be installed as shown on the approved shop drawings. All members shall be accurately located and erected plumb and level.

Metal fabrications shall be installed or erected as based on the American Institute of Steel Construction (AISC) "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", latest edition, plus all referenced code requirements.

Temporary bracing, such as temporary guys, braces, false-work, cribbing, or other elements, shall be provided by the Contractor in accordance with the requirements of the "Code of Standard Practice", wherever necessary to accommodate all loads to which the structure may be subjected, including construction loads. Such bracing shall be left in place as long as may be required for safety. As erection progresses, the work shall be securely bolted or welded to compensate for all loads during construction.

No permanent bolting or welding shall be performed until the structure has been properly aligned.

5.05.23 Bolts and Other Connectors For Structural Elements

[CSI 05 05 23, 06 05 23]

Part 2 - Products

Materials

Bolts and other connectors not specifically called out otherwise shall be in accordance with the following.

Under no circumstances shall the fasteners be of lesser strength or higher corrosion potential than the materials being connected.

Connection bolts, nuts and washers for all materials in wet, damp or corrosive locations shall be Stainless Steel, alloy 304 in raw domestic or treated domestic water, alloy 316 in treatment process and sewage applications, and alloy 317 for acidic transport. Bolts and nuts shall meet ASTM F593B (bolts ¼-inch to 1½-inch in diameter with 30 ksi yield) and F594B (nuts). Use Nitronic 60 bolts and nuts for strong chlorine environments.

Steel and cast-iron fabrications: Connection bolts for dry locations shall be ASTM A307 galvanized or zinc plated bolts.

Structural Plastic Fabrications: Connection bolts shall be ASTM A307 galvanized in dry applications and Stainless Steel in wet, damp or corrosive locations.

Stainless steel fabrications: Fasteners to match same stainless series as structure (e.g. 300 series fasteners with 300 series structure)

Bolts installed into hardened concrete shall be Concrete Anchors per section 3.15.19.

Bolts and studs shall be long enough that at least two threads extend beyond the face of the tightened nut.

For pump anchor bolts, see Division 11.

For mechanical pipe (non-structural) connections, see Division 15.21, "Common Work for Pipe and Fittings".

Part 3 - Execution

Installation

All materials to be joined together shall be connected as shown on the Plans, specifications, as recommended by the manufacturer, or as required by standard industry practices if not otherwise specified.

Dissimilar metals:

In damp locations, isolate dissimilar metals using nylon isolation sleeves and washers, Cooper B-Line Nylon Headed Sleeve Kit or equal.

For wet locations: avoid dissimilar metals unless specifically approved or shown. Use similar metals with welded connections. If approved or shown, use galvanized mild steel bolts installed into prepped and coated holes with additional field coating over the top of bolt.

5.50 METAL FABRICATIONS

[CSI 05 50 00]

5.51 METAL STAIRS

[CSI 05 51 00]

5.51.05 Common Work for Stairs and Ladders

[CSI 05 51 05]

Part 1 - General

Design Requirements

Stair treads shall be prefabricated units that bolt on to stair side rails. Stair treads shall meet all ASCE 7, IBC, and OSHA Section 1910.24 requirements.

Ladders shall meet the requirements set forth in the IBC, ASCE 7, OSHA 1910.27 and WAC 296-876.

Safety cages, platforms, and fall prevention devices shall be provided as shown on the Plans. They shall comply with WAC Section 296-876-60065 through 296-876-60080.

Ladders shall extend the full distance from base landing to top access plus extension. Ladders that are short shall be field extended by method approved by the Engineer or replaced with proper length ladder.

Part 2 - Products

Materials

Stairs and ladders shall be complete with accessories as indicated on the Plans and as necessary for a secure installation.

Fabrication

Ladders shall be shop assembled, pre-drilled and prepared for field attachment of standoff clips, or as otherwise shown.

5.51.19 Metal Grating Stairs

[CSI 05 51 19]

Part 2 - Products

Materials

Width shall be as shown on the drawings. Materials shall match adjacent grating, or stair material. Bearing bar and cross bar configuration shall match adjacent grating. If no adjacent grating, minimum 1-inch by $^{3}/_{16}$-inch bearing bars with cross bars spaced at 4-inch on center, or as required to meet loading requirements. Each stair should be able to support at least five times the normal anticipated live load (OSHA 1910.25(b)(6)).

5.52 METAL RAILINGS

[CSI 05 52 00]

5.52.05 Common Work for Railings

[CSI 05 52 05]

Part 1 - General

References

Handrail and Guardrail systems shall be designed to meet the requirements of the IBC, ASCE 7, OSHA, and shall comply with Section 296-24-750 of the Washington Administrative Code.

Performance Requirements

Handrails and guardrails shall be designed to withstand a 200 lbs. concentrated load applied in any direction at any point to the top rail. Handrails and guardrails shall also be designed to withstand a load of 50 lbs./foot applied horizontally to the top rail. The two loads will not be applied simultaneously. The completed handrail installation shall prevent the passage of a sphere not more than 4-inch in diameter in areas with public access or 19-inches in diameter at electrical, mechanical or plumbing access areas not open to the public.

Part 2 - Products

Components

Handrail and guardrail systems shall be supplied and installed complete with posts, rails, toeboards, connectors, plugs, end caps, bolts, nuts and washers, and other accessories as required for a complete installation. Post spacing shall be a maximum of 6 feet, 0 inches on horizontal runs and 4 feet, 0 inches on inclined runs, or as shown on the Plans. Post locations shall be no greater than 24 inches nor less than 9 inches from horizontal or vertical change in handrail direction.

Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of handrail or guardrail shall be smooth and shall not be interrupted by a projecting fitting. (OSHA 1910.29(b), WAC 296-24-75011(1))

Toeboard is required where shown on the Plans, and where there is a danger of tools, materials, or equipment falling and striking employees below and shall conform to OSHA standards. Toeboard shall be a minimum of 3.5-inches tall. Toeboard shall begin ¼-inch above the walking surface where the walking surface is a solid surface to allow for drainage (not required for grating walking surface).

Openings in the rail shall be guarded by a self-closing gate (OSHA 1910.23(e)(1)). Safety chains shall not be used unless specifically shown on the Plans.

Handrail shall be face mounted to concrete unless specifically shown otherwise on the Plans.

5.52.15 Aluminum Railings

[CSI 05 52 15]

Part 1 - General

Related Section

5.05.23 Bolts and Other Connectors

Submittals

Shop drawings of all components, bases, toeboard, and posts must be submitted for approval.

Part 2 - Products

Manufacturers

Handrail shall be the product of a company normally engaged in the manufacture of pipe railing. Handrail and components shall be "TUFRAIL" as manufactured by Thompson Fabricating Company (Birmingham, AL.) or approved equal.

Components

Aluminum guardrail or handrail shall be extruded anodizing quality 6063 aluminum pipe of 1½ inch Schedule 40 pipe size. All other aluminum parts shall be fabricated from 6063 and 6061 extruded aluminum.

Posts and railings shall be a minimum of 1½ inch schedule 40 aluminum pipe, alloy 6105-T5, ASTM B-429 or B-221.

Toeboard shall be an extrusion that attaches to the posts with clamps which allow for expansion and contraction between posts. Toeboard shall be shipped loose, in stock lengths with pre-manufactured corners, for easy field installation.

Quality Control

The manufacturer shall submit calculations to the Engineer for approval. Testing of base casting or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.

The manufacturer shall show that its posts are of adequate strength to meet the loading requirements. If the manufacturer's posts are not of adequate strength, the manufacturer may reduce the post spacing or add reinforcing dowels or do both to meet the loading requirements.

The mid-rails at a corner return shall be able to withstand a 200-pound load without loosening. The manufacturer is to determine this dimension for their system and provide physical tests from a laboratory to confirm compliance.

Fabrication

Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.

Where railings require field assembly, sections shall be joined together with the manufacturer's component fittings. Jointing components that extend beyond (interrupting) the rail are not acceptable. All jointing components must be concealed and mechanically fastened with recessed stainless-steel hardware.

Finishes

All components shall have an Aluminum Association M10C22A41 (215-R1) clear anodized finish. The pipe shall be plastic wrapped. The plastic wrap shall be removed after erection. All pipe-shaped components shall have a circumferentially-brushed finish before anodizing.

Aluminum in contact with concrete or dissimilar materials shall be protected with a coat of coal-tar epoxy, or install a thin mylar isolator. Submit proposed method to engineer for review.

5.53 METAL GRATINGS

[CSI 05 53 00]

5.53.05 Common Work for Gratings

[CSI 05 53 05]

Part 1 - General

Related Sections

This section also applies to section 6.74.13 Fiberglass Reinforced Gratings.

Design Requirements

Grating shall be selected for a ¼-inch maximum deflection under a uniform live load of 100 psf or a point live load of 500 pounds at any point on the grating (whichever is more critical), unless otherwise shown on the Plans. Thickness shall be as needed to meet these requirements unless otherwise shown on the Plans.

Panels shall be sized such that any single grating piece shall not weigh more than 50 pounds.

The horizontal clearance between the grating and grating supports shall not be less than ¼-inch nor greater than ½-inch. Contractor shall field measure grating supports as required to achieve required fit. Shop drawings shall be based on field dimensions as appropriate.

Part 2 - Products

Materials

Unless shown otherwise, materials used for supporting members shall match the materials used for the grating except all embedded grating supports shall be stainless steel, and grating supports for FRP grating may be stainless steel.

Attachment between grating and supporting members below grating shall be made with a minimum of four clips per panel. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

Fabrication

Grating shall be fabricated in such a manner that field cutting and drilling is not required. Panels shall be fabricated and installed in strict accordance with the manufacturer's recommendations.

Part 3 - Execution

Installation

Cut notches around pipes, conduits and other penetrations in such a way that panel removal/installation will not impinge on said objects. The horizontal clearance around grating panels shall not be less than 1/8-inch nor greater than 3/8-inch. File and de-burr cut edges. Contractor shall field measure grating supports as required to achieve required fit. Shop drawings shall be based on field dimensions as appropriate.

Division 6
Wood, Plastics, and Composites

6.00 GENERAL

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

6.05 Common Work for Wood, Plastics, and Composites

[CSI 06 05 00]

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- FRP Data Sheets verifying specification requirements

Part 3 - Execution

Construction

Provide temporary bracing, such as temporary guys, braces, false-work, cribbing, or other elements, in accordance with the requirements of the "Code of Standard Practice", wherever necessary to accommodate all loads to which the structure may be subjected, including construction loads. Leave bracing in place for as long as required for safety. Securely fasten the work as erection progresses to compensate for all loads during construction.

Perform no permanent fastening until the structure has been properly aligned.

6.70 STRUCTURAL COMPOSITES

[CSI 06 70 00]

6.74.13 Fiberglass Reinforced Plastic (FRP) Grating

[CSI 06 74 13]

Part 1 - General

Related Sections

5.53.05 Common Work for Gratings also applies to this specification.

Design Requirements

Deflection with a 100 lb/sf distributed load or 500 lb concentrated load (whichever is more stringent) must be less than span length/100, and no more than 0.28-inch.

Gratings shall have tested burn time of less than 30 seconds and an extent of burn rate less than or equal to 10 millimeters per ASTM D635.

Supply a copy of the ICBO report or test report from an independent testing laboratory showing ASTM-E84 flame spread and structural properties, including deflection. Test results must be less than two years old. ASTM-E84 flame spread must be less than 30.

Part 2 - Products

Materials

FRP grating with a clear span of 48 inches or less may be molded grating with smooth mold surfaces. All bearing bars and cross-bars of the grating shall be molded at the same time into a one-piece construction.

FRP grating with a clear span of greater than 48 inches shall be pultruded structural load and tie bar components. Form the load bar using continuous strand roving and an outside covered with a continuous strand mat and a UV resistant synthetic surfacing veil. Provide mechanical and bonded intersection between the load and tie bar components. Every end of every load bar must be structurally supported.

Supporting members shall be FRP or stainless-steel structural shapes unless shown otherwise.

Finishes

Grating bars shall have a skid-resistant walking surface.

All finished surfaces of FRP items and fabrications shall be resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.

Seal all cut or damaged edges with a resin sealant of equal or superior corrosion resistance to the grating.

Division 7
Thermal and Moisture Protection (Not Used)

Division 8
Openings (Not Used)

9.00 GENERAL

This division covers work necessary for providing all materials, equipment, and labor to coat all items in accordance with these specifications.

Sections in these specifications titled *"Common Work for . . ."* apply to all following subsections whether directly referenced or not.

9.90 PAINTING AND COATING

[CSI 09 90 00]

9.90.05 Common Work for Painting and Coating

[CSI 09 90 05]

Part 1 – General

Scope

The work specified in this Section covers the furnishing and installation of protective coating, complete in place. Shop coating and/or factory applied finishes on manufactured or fabricated items may be specified elsewhere. Regardless of the number of coats previously applied, at least two coats of paint shall be applied in the field to all coated surfaces unless otherwise specified herein.

Submittals

Before beginning any painting or coating, submit a list of coatings and manufacturers for review by the Owner. Include the application each coating is intended for, any surface preparation, number of coats, method of application, and coating thickness.

Provide Safety Data Sheets (SDS) for all materials including solvents. Provide NSF certification for finishes in potential contact with potable water. Submit this information according to the requirements regarding shop drawings included herein.

Provide a schedule of coating operations and inspection timing. Coating inspections will be scheduled based upon Contractor-provided schedule, update schedule weekly or as necessary.

Provide manufacturer's approval of coating system applicator.

If submitted products are manufactured by a company other than the specified reference standard, provide complete comparison to specified projects including application procedures, coverage rates, and verification that product is appropriate for intended use. Provide information that demonstrates the submitted products are equal to the performance standards of products manufactured by Tnemec Corporation, which is the reference standard.

Performance Requirements

All finishes potentially in contact with potable water shall be National Sanitation Foundation (NSF) 61 or 600 certified for contact with potable water. Certification from the NSF or UL shall be supplied in writing at the time of the submittal process for Finishes. Verify the

submitted coatings' current NSF requirements, restrictions, and applicability to the coated items. Verify finishes used on the project are compliant with primary and secondary standards of the Safe Drinking Water Act. Any violation shall be remedied at the Contractor's expense.

The completed coating shall produce a minimum dry film thickness in accordance with the specifications as determined by the microtest thickness gauge or comparable instrument. In areas where this thickness is not developed, sufficient additional coats shall be applied to produce it.

Quality Assurance

The Contractor is responsible for compatibility of all shop and field applied paint products including the use of primer, intermediate, and top coats by different manufacturers if applicable. For any Contractor initiated substitutions, the Contractor shall verify complete compatibility between coatings provided for the project. If coatings are not compatible per manufacturer's review it is the Contractor's responsibility to remove incompatible coatings fully and replace with compatible coating systems.

Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to the underlying paint.

The Contractor is responsible for obtaining written documentation from equipment/material manufacturers regarding the date at which shop prime coatings are applied and shall strictly adhere to the coating manufacturer's recommendations for recoat time intervals. The Contractor shall submit to the Owner such documentation upon request.

Storage and Handling

Bring all materials to the job site in the original sealed and labeled containers of the paint manufacturer. Materials are subject to inspection by the Owner. Store paint supplies as recommended by the manufacturer and as approved by the Owner.

Extra Materials

For any products that have a shelf life longer than one year, provide one unbroken gallon container of each type and color of paint and each type of solvent and thinner used, as requested by the Owner. Dispose of all extra materials not desired by the Owner.

Waste Products

Collect, contain, transport, and dispose all waste products generated for this project. Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide appropriate containers for collection and disposal of waste, debris, and rubbish.

Part 2 – Products

Manufacturers

The following coating system manufacturers are approved subject to compliance with the Specifications contained herein:

1. Tnemec Company

2. Sherwin Williams
3. 3M
4. Carboline

The specified coating establishes the type and quality of the coating desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Owner to determine that the coatings proposed are equivalent to those named. Proposed coating shall be submitted for review in accordance with Division 1. Requests for review of equivalency will not be accepted from anyone except the Contractor.

Substitutions of the coatings of other manufacturers will be considered only if equivalent systems of coatings can be provided and only if a record of satisfactory experience with the system in equivalent applications is available. Offers for substitutions will not be considered which decrease film thickness, solids by volume or the number of coats to be applied, or which propose a change from the generic type of coating specified herein. All substitutions shall include complete test reports to prove compliance with specified performance criteria.

Part 3 – Execution

Preparation

Take any measures necessary to prevent over-spray of structures and/or components in the field from both preparation and coating work. Should over-spray occur, the Contractor is responsible for all costs associated with any damage resulting from over-spray.

Installers

Contractor is responsible for quality assurance including the retention of a coating applicator with experience necessary to complete the work as specified. Applicator's personnel shall be adequately trained for application of specified coatings. Applicator must prove adequate experience with the coatings specified for this project.

At the discretion of the Owner, the applicator must be approved to complete the coatings portion of the work. If the following requirements cannot be met, the applicator will not be approved on the project.

1. Coatings applicator and personnel shall be in the business of applying protective coatings for a minimum of three (3) years.
2. Coatings applicator must provide a minimum of three (3) case histories of similar projects that have been applied within the past five (5) years. Provide current contact information of past projects for confirmation of successful installations.
    a. Project name and location.
    b. Name and phone number of owner.
    c. Name and phone number of Contractor.
    d. Name and phone number of engineer.
    e. Name and phone number of coating manufacturer.

f. Approximate area of coatings applied.

g. Date of completion.

Examination

The Owner shall inspect and approve all surface preparations prior to application of any coating. Provide 24-hour notice prior to surface inspection needs.

Preparation

Prepare surfaces in accordance with the recommendations of the manufacturer of the coating to be applied to the surface, or the surface preparation requirements of these specifications, whichever are stricter. In general, all surface preparation shall meet Structural Steel Painting Council (SSPC) Surfacing Preparation (SP) guidelines, the National Association of Pipe Fitters (NAPF), American Water Works Association (AWWA) and/or the National Association of Corrosion Engineers (NACE) as noted herein unless more strictly described by coating manufacturer.

Apply coatings only during weather meeting the coating manufacturer's recommendations. Air and surface temperatures, humidity, and all other environmental conditions shall be within limits prescribed by the manufacturer for the coating being applied, and work areas shall be reasonably free of airborne dust at the time of application and while coating is drying.

Materials shall be mixed, thinned, and applied according to the manufacturer's printed instructions. Dry Film Thickness (DFT) shall be as stated herein or applied based on coverage rates of square feet per gallon (sq. ft./gal).

Installation/Construction

Apply paint in strict accordance with manufacturer's printed instructions except that coating thickness specified herein shall govern. Finished coating on all items shall be clean, undamaged, and of uniform thickness and color.

Coat in a manner satisfactory to the Owner. The DFT listed in these specifications must be met, regardless of the applied film thickness or number of coats.

Observe all safety precautions stated in the manufacturer's printed instructions. Provide adequate ventilation and lighting at all times.

The manufacturer's recommended drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of weather, confined spaces, or other reason, longer drying times may be necessary. The manufacturer's recommendation for recoating time intervals shall be strictly adhered to.

Field Quality Control

The prime Contractor shall be completely responsible for coating quality. The Contractor shall provide both wet and dry film gauges and make such available to the Owner when requested.

If coating inspector finds anomalies and/or defects, the Contractor shall re-prep and recoat those areas per the coating manufacturer's instructions.

Acceptance of the completed coatings shall be based on the proper application and proper preparation of the coated surfaces, and a finished product that meets minimum thickness and

does not contain runs, drips, surface irregularities, overspray, color variations, scratches, pinholes, holidays, and other surface signs that detract from the overall performance and/or appearance of the finished project.

If, in the Owner's sole opinion, the finished color of exterior coatings does not match the existing colors, the Contractor will recoat as necessary to achieve the approved color at no additional cost to the Owner.

Inspection

For metals exposed to exterior atmospheric conditions, first coat of paint or primer must be placed within four hours of passing inspection. Bare steel must be reblasted and reinspected if not successfully coated within this four-hour time frame, at the Contractor's expense.

Use the Pictorial Surface Preparation Standards for Painting Steel Surfaces (VIS-1) by the Steel Structures Painting Council (SSPC) as a visual standard for inspection of surface preparation of metal surfaces. Test-Tex Tape may also be used to verify surface profile.

Inspect each coat prior to application of the next coat. Areas found to contain runs, overspray, roughness, streaks, laps, sags, or other signs of improper application shall be repaired or recoated in accordance with the manufacturer's recommendations. Finish coats shall be uniform in color and sheen. Surface preparations and coatings not inspected and approved by the Owner will be uncovered for inspection and approval at no additional cost to the Owner.

Repair/Restoration

The Contractor is responsible for all costs associated with any damage that occurs as a result of over-spray.

Scratched, chipped, or otherwise damaged coatings, including factory coatings, shall be repaired before final acceptance will be given.

Cleaning

If any cleaning of equipment at the site is performed with solvents, such work shall be done over leak-proof linings. Preparation or coating materials may not be disposed of onsite.

9.90.06 Product and Color Schedule

[CSI 09 06 90 or 09 90 06]

Colors of finish coatings on process equipment, piping, and building surfaces shall conform to the following schedule. All finishes shall be glossy unless otherwise specified. Finish coatings, which are applied in the shop by the manufacturer, shall conform to this section. Factory coatings which are damaged shall be recoated in the field in accordance with these specifications.

Items of similar purpose shall be painted the same color, including the piping exposed in the lower-level partition areas. Pipes and fittings shall match the existing piping color.

9.90.13 Unpainted Items

[CSI 09 90 13]

Part 1 – General

Summary

Do not coat the following items unless specifically directed otherwise in these specifications or on the Plans.

- Aluminum, plastic, or stainless-steel items.
- Brass and copper pipe, valves, and fittings for plumbing fixtures.
- Nameplates, labels, or identification tags.
- Sensors, switches, transmitters.

Field painting is not required for equipment listed below if they come with a factory finish epoxy, polyurethane, or powder coat. Items supplied with only a factory prime coat must be field coated.

- Motors
- Control valve pilot systems
- Sensor piping systems
- Electrical panels

9.91.23 Interior Painting

[CSI 09 91 23]

9.91.23.01 – Proposed Ferrous Metal Pipe and Supports including Steel, Cast Iron, and Ductile Iron (Exposed Indoors and Outdoors).

[CSI 09 91 23 13]

Part 1 - General

This Section applies to all proposed pipe exterior which includes: pipe, valves, fittings, and ferrous pipe supports. This does not include brass or stainless steel piping and fittings.

Materials

For products that are supplied in bare (unprimed) metal:

1. Tnemec
    a. Primer: Series 1 Omnithane (2.5 to 3.5 Mil DFT).
    b. Intermediate Coat: Series N69 Hi-Build Epoxoline II (6 to 8 Mil DFT)
    c. Finish Coat: Series 73 or 1095 Endura-Shield (3 to 5 Mil DFT)

2. Sherwin Williams
    a. Primer: Corothane 1 Mio-Zinc Primer (2.5 to 3.5 Mil DFT)
    b. Intermediate: Macropoxy 646FC B58-600 Series (6 to 8 Mil DFT)
    c. Finish: Acrolon Ultra B65-830 Series (2 to 3 Mil DFT)

For products that are supplied with a manufacturer's coating:

1. Tnemec
    a. Finish Coat: Series 73 or 1095 Endura-Shield (3 to 5 Mil DFT)
2. Sherwin Williams
    a. Finish: Acrolon Ultra B65-830 Series (2 to 3 Mil DFT)

Part 3 – Execution

For items which are not supplied with a manufacturer's epoxy prime coat, surface preparation shall be as follows.

1. Ferrous Metals
    a. SSPC SP1 followed by SSPC-SP10 near white metal blast cleaning.
2. Ductile and Cast-Iron Materials
    a. Provide SSPC-SP1 followed by NAPF 500-03-04/05 Grey White Blast. Ductile Iron pipe shall be purchased without the standard asphaltic coating. Removal of asphalt coatings is extremely difficult and overly aggressive preparation can create a damaged surface unsuitable for coating.

For items which are supplied with a manufacturer's prime coat, surface preparation shall be SSPC SP1 and abrasion as necessary.

9.91.23.02 – Existing Ductile Iron Pipe In Lower-Level Partition Areas

[CSI 09 91 13 21]

Part 1 - General

This Section applies to all existing ductile iron pipe in the lower-level partition area of the booster pump station that will be exposed after removing the sand.

Part 2 - Products

1. Carboline
    a. Prime Coat: Carbomastic 15 Leafing Aluminum Epoxy (6 mils DFT)
    b. Intermediate Coat: Carbomastic 15 (6 mils DFT)
    c. Top Coat: Equal to finish coat submitted for Section 9.91.23.01.

Do not substitute with other than leafing aluminum epoxy.

Part 3 - Execution

Surface Preparation

1. Surface preparation and application of coatings shall be in accordance with manufacturer's written recommendations.
2. Ductile Iron: use a needle gun or abrasive blast to disrupt the coating on DI pipe and fittings, but it is not necessary to remove all asphaltic coating.
3. Do not coat bolt areas such as flanges or restrained joint holdback areas until connection is complete. Do not apply coating thicker than allowed by the Manufacturer at restrained joints.

Division 10
Specialties (Not Used)

Division 11
Equipment

11.00 GENERAL

Sections in these specifications titled "*Common Work for . . .*" apply to all following subsections whether directly referenced or not.

11.05 Common Work for Equipment

[CSI 11 05 00]

Part 1 - General

Related Sections

- Division 1.81.30 Seismic Restraint Requirements
- Division 9 Finishes

Submittals

Provide submittal information to the Owner for the following items:

- Pumps and Motor Assemblies
- Coatings
- Pump Anchor Bolts
- All other items listed in this division

11.06 Panel Signage

[CSI 10 14 23]

Part 2 - Products

Materials

Pump Signage

1. Provide a 2-inch high, temperature resistant metal or vinyl number or name on each pump or pump motor. Number shall face the pump control panels and be placed so as not to be obscured from other equipment. Confirm with Engineer the proper numbering or naming of each pump.

Electrical and Control Equipment

1. All components provided under this specification, both field- and panel-mounted, shall be provided with permanently-mounted nametags. The Engineer shall have complete control over the hardware to be labeled and the labeling provided. Provide labels as directed.
2. Provide a name tag for each piece of equipment and for each circuit and/or control device associated with the equipment.

3. Electrical equipment name plates and service legends shall be phenolic-engraved, rigid, laminated plastic type with adhesive back. Letter height shall be $^{5}/_{16}$-inch unless specified otherwise on the Plans. Labeling shall clearly identify the associate component. Color shall be black background with white letters.
4. Warning nameplates shall be provided on all panels and equipment which contain multiple power sources which may have energized circuits with the main disconnecting means in the off position. Lettering shall be white on red background.
5. Tags shall be securely attached. Adhesive backed tags shall also have at least two brass screws for positive fastening.
6. Provide engraved nameplates indicating load served, voltage, and phase for every circuit breaker, panel board, switchboard, motor control center, motor starter, disconnect switch, and fused switch.

11.10 PUMPS

[CSI 43 20 00]

11.10.05 Common Work for Pumps

[CSI 43 20 05]

Part 1 - General

Summary

This section covers work necessary to provide the pumps, complete with motors and accessories, described herein and as shown on the Plans.

Related Sections

- Division 1.75 Starting and Adjusting
- Division 1.81.40 Pressure Ratings
- Division 1.81.50 Materials in Contact with Drinking Water
- Division 9 Finishes
- Division 11.06 Panel Signage
- Division 11.19 Pump Anchor Bolts
- Division 11.20.1 Common Work for Pump Motors

References

- HI - Hydraulic Institute.
- ASTM - American Society for Testing and Materials.
- AISI - American Iron and Steel Institute.
- ANSI - American National Standards Institute.

Definitions

Pumps are classified by the following terms:

Centrifugal – Single or multi-stage impellor pumps, not of the turbine category. Examples are End Suction, Split Case, Double Split Case, and Vertical Multistage.

Performance Requirements

Power required to operate the pump(s) shall not exceed the motor nameplate horsepower regardless of any flow and head tolerances listed in this specification, unless allowed otherwise in the Pump Motors section.

The design and performance requirements listed for each pump must be met, with no exceptions. Pumps that do not meet all of the conditions will be rejected.

The design point must fall within the pump Preferred Operation Range (POR) referenced from the Best Efficiency Point (BEP) as follows:

Type	Specific Speed (US Units)	Design Point from BEP
Centrifugal	any	70% to 120%

Pump parts in contact with potable water shall be lead free complying with either NSF 61 ANSI 372 tested or NSF 61 Annex G compliant. Submit lead free information with pump submittal information.

Pump Name or No.	1-5	6-7
Type	Vertical Split Case	In-Line Vertical
Maximum Speed	1,800 rpm	3550 rpm
Design Flow 1	2,310 gpm	535 gpm
Design Head 1	126 ft	117 ft
Design Flow 2	3,750 gpm	880 gpm
Design Head 2	81 ft	62 ft
Min. Shutoff Head	152 ft	141 ft
Max. Shutoff Head	157 ft	146 ft
Performance Requirements at Design Point		
Min. Pump Efficiency	84%	80%
BEP Position	Left of Design Point	Right of Design Point
Tolerance Grade at Design Point	1U	2B
Max. NPSHR3	43 ft at 3,750 gpm	50 ft at 839 gpm
Max. NPSHR3	11 ft at 2,310 gpm	18 ft at 535 gpm
Fluid	Potable Water	Potable Water
Max. Fluid Temperature	60 degrees F	68 degrees F

Head Conditions

Head conditions specified in the table are inclusive of all pump components including the casing/bowls, discharge head or elbow, column pipe, and intake strainer, as applicable.

Tolerance Grade

Performance range shall adhere to the HI 11.6 (submersible sewer pumps) or HI 14.6 (centrifugal and vertical pumps) tolerances stated herein are referenced at the specified design point(s). Flow tolerance is measured at the design point head. Head tolerance is measured at the design point flow. Efficiency is evaluated where a straight line drawn from zero flow, zero head, passes through the design point and crosses the actual pump curve.

All tolerance requirements listed must be met. They are not independently exclusive.

Pumps 1-5: Grade 1U (0% to +10% Flow, and 0% to +6% Head, and no less than 0% Efficiency).

Pumps 6-7: Grade 2B (±8% Flow, and ±5% Head, and no less than -5% Efficiency).

Submittals

Provide the following information:

The three apparent low bidders must submit data showing all operating characteristics of all proposed pumps no more than five working days after the bid opening. The bidder shall provide a letter guaranteeing that their proposed pumps will meet all the specified operational conditions. Award of the bid will be contingent on the bidder submitting complete and accurate information showing compliance with the specifications.

Source Quality Control

- A minimum of 5 installations with similarly sized and configured pumps in equivalent fluid applications installed by the Contractor or installer subcontractor. Include location, contact name, and number.
- Company name, address, and phone of the closest manufacturer's authorized service company and a qualified service company. Qualified service may be a company that is not a manufacturer's authorized service center but can perform competent service and order repair and replacement parts. Authorized service must within the 48 contiguous US states. Qualified service must be within 200 miles of the project site.

Product Data:

- Specifications and data describing all pump parts, pieces, and components. Include information on materials of construction and proposed coating systems.
- Performance curves showing total dynamic head (TDH) in feet, efficiency, and net-positive-suction head required (NPSHR) versus output in gallons per minute (gpm). All losses from the drive shaft, seal, coupling, and other mechanical losses shall be included in the data presented. Catalog or software generated curves may be submitted for preliminary approval and ordering.
- Additional VFD pump curves for speeds at 40 percent, 60 percent, 80 percent, and 100 percent of full speed for Pumps 1-5 and Pumps 6-7.
- Documentation on assembled pump and motor unit natural frequency. Natural frequency shall not occur within 20 percent of speed above or below the pump's 1-5 operating speed range of 1,100 rpm to 3,550 rpm, and pump's 6-7 operating speed range of 2,700 rpm to 3,550 rpm.
- Complete list of all pump system components and accessories.
- Bearing life (L10) for ball and roller bearings. Calculations supporting L10 of no less than 40,000 hours.

Shop Drawings:

- Detailed dimensional drawings showing outline dimensions, lengths, overall sizes, materials, and weights for each pump unit and associated accessories.

Closeout Submittals: Provide the following submittals prior to project closeout:

- Operations and Maintenance manual.
- Manufacturer signed warranties with pump serial numbers.

Schedule

Provide delivery time in time from approval of shop drawings/submittal. All equipment shall be delivered within 16-20 weeks or less from approval of complete submittal information.

Quality Assurance

The pump manufacturer is responsible for the motor and pump assembly.

Delivery, Storage, and Handling

Deliver, store, and handle pumps in accordance with manufacturer's recommendations.

Warranty

Warrant all pumping equipment described in this section and provided under this contract against defects in materials and workmanship for a period of two years after date of project acceptance.

Following pump and motor installation, furnish the services of a qualified manufacturer's representative to inspect pump units and inform Owner, prior to field testing, of any defects or concerns regarding condition of each unit and its installation at the job site. Upon resolution of any defects or concerns (if any) and work performed by the Contractor at their expense, to the satisfaction of the Owner, manufacturer's warranty shall then be in full effect with no reservation or qualifications other than those stated in the manufacturer's warranty. Upon completion of pump installation, manufacturer's representative shall provide written certification that equipment is fully warranted as installed.

Extra Materials

Provide any special tools required for pump or motor maintenance.

Part 2 - Products

Existing Products

The supplied pump(s) shall fit into the space of the existing pump(s) being replaced. Verify dimensions in the field for pump installation. If modifications to any equipment or new adapters are necessary to accept the new pump, provide all required modifications and adapters, and include the price in the bid. Additional reimbursement for modifications will be paid by time and materials only if, in the opinion of the Engineer, actual conditions vary materially from those presented in these contract documents and were not reasonably determinable from a pre-bid field inspection.

Manufacturers

The following manufacturers are pre-approved for use on this project. The bidder may submit another brand for review prior to the bid. Follow the procedures under Division 1.25.13.10

Substitutions Prior to Bid Opening. Accepted brands will be approved through addendum. No substitutions for different pump brands will be accepted after the bid.

Centrifugal
Ruhrpumpen
Grundfos
Goulds
Flowserve
Peerless

Components

For pumps in domestic water applications, all wetted pump components, coatings, and lubricants shall be approved for use in potable drinking water in accordance with U.S. Food and Drug Administration (FDA) or National Sanitation Federation (NSF 61) rules and regulations.

Neither 201 nor alloy-20 stainless steels are approved for any pump components unless specifically mentioned otherwise in these specifications.

All pump system components are to come from the pump manufacturer and include:

- Motor
- All other necessary appurtenances for complete unit assembly.

Accessories

Provide removable guards to protect personnel from rotating components. Guards to meet the minimum requirements of WAC 296-806-20042.

All pumps are to include an engraved non-corrodible metal nameplate on the exterior of the pump head or body (duplicate attached to pump support flange or shipped loose if submersible), readily accessible without requiring any disassembly. The nameplate shall include, at a minimum, the following information (as applicable for the type of pump):

- Pump Manufacturer
- Pump Model Number
- Pump Serial Number
- Impeller Number
- Impeller Trim
- Number of Stages
- Design TDH (feet)
- Design Flow (gpm)

- Supplier Name and Phone Number
- Date of Manufacture

Source Quality Control

Factory Pump Performance Testing and Certification

Factory testing curves and data on each pump must be provided prior to pump delivery. Variations between factory tests and previously submitted catalog curves may be cause for rejection. Factory testing of the pump may use a dynamometer or calibrated shop motor.

Perform a performance test as described in the latest edition of Hydraulic Institute's (HI) Pump Tests (ANSI/HI 14.6 Centrifugal and Vertical, ANSI/HI 11.6 Submersible), with results submitted to the Engineer and approved for each pump prior to shipment to the construction site. Test pumps at the factory to HI standards, except as modified below.

- Test speed must be within 20 percent of the rated speed unless prior written approval is given by the Owner. Approval is not guaranteed.
- HI 14.6.5.7.1: No less than three additional test points beyond the five points listed in the HI standard are required. Two of these points between shutoff head and design point, and one point to the right of the design point.
- HI 14.6 Appendix K, 11.6.10: Model tests are not allowed unless prior approval is given by Owner. Supplier shall submit a written request to perform a model test with procedures outlined for Owner's review.
- Provide a certified data sheet and performance curve for each pump similar to HI 14.6 Appendix H pump test summary of information. At a minimum provide:
    - Information per HI standards.
    - TDH (ft) vs. Flow (gpm)
    - Power (hp) vs. Flow (gpm)
    - NPSHR (ft) vs. Flow (gpm) (catalog data is acceptable)
    - Motor Input Power
    - Hydraulic Efficiency (%) vs. Flow (gpm) (where applicable)

Perform factory vibration testing as follows:

- Take vibration readings under normal operating conditions at the design point.
- If a throttled valve is used to adjust the operational point during vibration testing, the valve must be no closer than 20 times the pipe diameter from the pump and separated from the pump by at least one flexible pipe joint.
- For variable speed pumps, take readings at full speed and two reduced speeds as directed by the Owner. Do not test below the manufacturer's lowest allowed speed.

- Read vibrations at the locations described in HI 9.6.4.2.3. In general, the reading locations shall be at:
    - The middle of each bearing housing of between bearing pumps.
    - Near the outer casing bearing of end suction pumps.
    - Near the top of the motor support flange for vertical motors.
- Read vibrations in the three orthogonal planes, with the maximum reading governing the results. If the vibration tests fail, the pump manufacturer and/or Contractor shall modify the equipment and/or installation and retest until the standards are met. Submit the vibration test results to the Owner. The manufacturer's representative shall provide proper, calibrated instrumentation to verify completed unit vibration.
- Factory vibration testing shall be performed by a Level 1 certified Vibration Analysis Tester. The results of the test shall be reviewed by a Level 3 certified Vibration Analysis Tester. Certification shall be current and from one of the following: Mobius Institute, Vibration Institute, Technical Associates of Charlotte.

Graphs must be submitted and approved prior to shipment of pumps.

Provide preliminary curves to the Owner prior to performing official factory tests for verification of performance criteria and pump selection.

Part 3 - Execution

Preparation

Disinfect domestic water pumps by flushing with a solution of 50 ppm chlorine prior to installation. After disinfecting, immediately flush and rinse the pumps with clean water to remove the high chlorine concentration solution. This includes the impellers and interior of bowls and casings.

Installation/Construction

Install pumps in accordance with manufacturer's directions. Installation shall be supervised and approved by manufacturer's representative prior to operating or field testing.

Adjust pump assemblies so that driving units are properly aligned, plumb, and level with the driven units and all interconnecting shafts and couplings. Flexible couplings shall not be used to compensate for misalignment.

Connect piping to the pump in a manner which prevents strain on the pump casing or head.

Field Quality Control

See Division 1.75 Starting and Adjusting for scheduling and notification requirements.

A qualified and authorized representative of the pump manufacturer shall conduct or supervise the field testing. Prior to acceptance of installed pumps, manufacturer's representative shall demonstrate proper operation of pumps at capacities stated.

Contractor is responsible for startup and adjustments to meet the specifications. Perform field tests to represent the performance of the new pump(s) when operating under actual field

conditions and to establish the acceptance of the pump(s) furnished and installed. Perform the field test in the presence of the Owner after the piping and controls have been installed.

Perform a performance test similar to those described in the latest edition of Hydraulic Institute's (HI) Pump Tests (ANSI/HI 14.6 centrifugal and vertical, ANSI/HI 11.6 Submersible), with results for each pump submitted to the Owner for approval.

Perform a field test to the accuracy obtainable with the monitoring equipment installed with the piping and instrumentation. If sufficient field devices are not available to test all parameters, the Contractor shall provide testing gauges and meters as needed. At a minimum, the following are needed:

- Suction pressure gauge or water level probe.
- Discharge pressure gauge.
- Flow meter.
- Electric current and voltage meter(s), one per phase.
- Vibration sensor.

Where existing gauges and meters are retained and not been replaced under this contract, the Contractor may temporarily replace such equipment during testing with their own at their expense, if approved by the Owner. The Owner makes no guarantee of the accuracy of existing gauges and meters.

Results shall be within plus or minus 1 percent of the tolerances listed above under Performance Requirements.

Perform testing under the observation of the Owner. At that time, the following data shall be collected for each pump:

- TDH vs. Flow at a minimum of three points which include: Shutoff head (unless pressure is deemed excessive by the Owner), fully open to system, and approximately 50 percent design flow with throttled discharge valve. Additional points may be required at the discretion of the Owner.
- Overall Efficiency (motor power draw required for this calculation).
- Take vibration readings under normal operating conditions at the design point. If it is not possible to reach the exact design point, then the vibration readings will be taken within the preferred operating range at a point agreed to by the Owner. A factory vibration test is not a substitute for a field test.
- If a throttled valve is used to adjust the operational point during vibration testing, the valve must be no closer than 20 times the pipe diameter from the pump and separated from the pump by at least one flexible pipe joint.
- For variable speed pumps, take readings at full speed and two reduced speeds as directed by the Owner. Do not test below 50% of design flow without Owner's approval.

- Read vibrations at the locations described in HI 9.6.4.2.3. In general, the reading locations shall be at:
    - The middle of each bearing housing of between bearing pumps.
    - Near the outer casing bearing of end suction pumps.
    - Near the top of the motor support flange for vertical motors.
- Read vibrations in the three orthogonal planes, with the maximum reading governing the results. If the vibration tests fail, the pump manufacturer and/or Contractor shall modify the equipment and/or installation and retest until the standards are met. Submit the vibration test results to the Owner. The manufacturer's representative shall provide proper, calibrated instrumentation to verify completed unit vibration.
- Field vibration testing shall be performed by a Level 1 certified Vibration Analysis Tester. Certification shall be current and from one of the following: Mobius Institute, Vibration Institute, Technical Associates of Charlotte.

Maximum allowable completed unit vibration amplitude (pump and motor installed) shall be per the current HI Standards, Section 9.6.4.2.5.1.

Upon completion of pump installation and testing, manufacturer's representative shall provide written certification that equipment is installed correctly and fully warranted. Provide certification that pumps meet all requirements set forth in these specifications and submittal literature. The Contractor shall provide a written report of all test conditions and results.

Repair

Repair and retest units failing any field test. If unit fails second field test, unit will be rejected, and supplier shall furnish a unit that will perform as specified.

11.11.27 Horizontal or Vertical Split Case Pumps

[CSI 43 23 21.13]

Part 1 - General

Related Sections

- Division 11.10.05 Common Work for Pumps
- Division 11.20.01 Common Work for Pump Motors
- Division 1.81.40 Pressure Ratings

Extra Materials

Provide (1) spare pump impeller.

Provide (1) set of mechanical seals.

Part 2 - Products

Manufacturers

Pumps shall be equal to Goulds 3410-V 8x10-12 M or Approved Equal.

Components

Construction

Major pump components shall be of cast iron. Coating shall be PPG Amercoat 133 Oxide Red (8 –10 mil DFT).

Casing

The casing is horizontally split. The upper and lower halves are held together with cap screws, plus studs on each side of each stuffing box to aid in disassembly/reassembly. Flanged suction and discharge connections are located in the lower half of the casing. The casing is supported by integral cast feet. Separate bearing housings are attached to machined fits in each end of the casing with cap screws.

ANSI Class 125 flanges. The casings are standard with two jack screws, two lifting lugs, two tapered dowel pins for alignment, and a .030" parting gasket. The casing gasket shall be non asbestos.

The upper half casing is provided with a vent connection, a priming connection and two stuffing box seal ring connections. The lower half is provided with two drain connections.

Impeller

The impeller is an enclosed, double suction design providing axial hydraulic balance. The impeller shall be 316 stainless steel (11.875 in rated, max = 12.000 in, min = 9.000 in).

Wear Rings

Casing wear rings are supplied as standard to maintain proper running clearance and to minimize leakage between suction and discharge chambers of the casing. Each ring is held in position by two anti−rotation pins, located in milled slots at the horizontal parting surface. Casing wear rings shall be Nitronic 60.

The impeller wear rings are held in position by axial set screws. Field installation of impeller rings requires a remachine of the impeller hubs. The casing rings remain the same for both the less−impeller ring and with−impeller ring designs. The impeller wear rings shall be 316 stainless steel.

Shaft

The shaft is a heavy duty design to minimize deflection and vibration. The shaft deflection is a maximum of 0.002 inches at the stuffing box faces under the worst operating conditions. The shaft on the M group pump is "completely dry" with gasket seals between the shaft sleeves and impeller hubs. The M size has an AISI 4140 shaft as standard and straight bore shaft.

Shaft Sleeves

The M group pumps are standard with shaft sleeves. The shaft sleeves are keyed at the impeller end and held axially by threaded sleeve nuts. Sleeves protect the stuffing box areas only, and are held in position by Loctite. Shaft sleeve shall be 316 stainless steel.

Mechanical Seals

Mechanical seals shall be Chesterton 155 1RCO-NSF (Carbon vs. Silicon Carbide) – (Cartridge – Single). Larger bore stuffing boxes are standard when utilizing mechanical seals, providing an improved environment and greater sealing flexibility.

Bearings

The Model 3410 is standard with double row ball thrust bearings and a single row deep groove ball bearing at the coupling end. There are only two sizes of bearing housings and bearings utilized on the complete Model 3410 product line. Bearings shall be SKF 6207 (inboard) and SKF 3306 A/C3 (outboard).

The coupling shall be Rexnord – Omega Rex Elastomer -E-30 (standard orange element) and the coupling guard shall be carbon steel.

The thrust bearing is held in position with a tapered snap rings and is locked in the thrust bearing housing to take any unbalanced axial thrust load. The radial bearing is free to float axially in the bearing housing taking radial loads only. The bearing housings are completely sealed by lip seals and deflectors. Labyrinth type oil seals as well as magnetic face oil seals are available.

Grease lubrication is standard. Oil lubrication is optional and utilizes the same shaft, bearings and bearing housings. bearing cooling is available with oil lubrication only, and is required for temperatures over 250° F.

Baseplates

Cast iron baseplates are furnished as standard. They include a drip collection chamber with a tapped drain connection and an opening suitable for grouting.

Part 3 - Execution

Installation

Installation of the pump units shall be in accordance with the manufacturer's specifications and directions. The installation shall be supervised and approved by the manufacturer's representative prior to operating or field testing the units.

A fabricated steel support is provided for the pump and motor. The pump feet are bolted to the side of the support structure. The top of the support is machined to accept a vertical solid shaft motor with either a NEMA P base motor. P base motors utilize a thrust bearing that is designed to accommodate thrust loads.

Upon completion of the pump installation, the manufacturer shall provide written certification that the equipment is fully warranted as installed.

11.11.30 Vertical Centrifugal

[CSI 43 23 31.29]

Part 1 – General

Design Requirements

The pumps shall be of the in-line vertical centrifugal design.

Extra Materials

Provide (1) spare pump impeller.

Provide (1) set of mechanical seals.

Part 2 – Products

Manufacturers

Grundfos or approved equal.

Components

Small Vertical In-Line Pumps shall have the following features:

1. The pump impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement.
2. The suction/discharge base shall have ANSI Class 125 flange or internal pipe thread (NPT) connections.
3. Pump construction
    a. Suction/discharge base, pump head, motor stool: Cast iron (Class 30).
    b. Impellers, diffuser chambers, outer sleeve: 316 Stainless Steel
    c. Shaft Steel: 316 or 431 Stainless Steel
    d. Impeller wear rings: 304 Stainless Steel or Teflon
    e. Shaft journals and chamber bearings: Silicon Carbide, Aluminum Oxide Ceramic, bronze or tungsten carbide
    f. O-rings: Buna N
4. Shaft couplings for motor flange sizes 184TC and smaller shall be made of cast iron or sintered steel. Shaft couplings for motor flange sizes larger than 184TC shall be made of ductile iron (ASTM 60-40-18).
5. The shaft seal shall be a balanced O-ring cartridge type with the following features:
    a. Collar, Drivers, Spring: 316 Stainless Steel
    b. Shaft Sleeve, Gland Plate: 316 Stainless Steel
    c. Stationary Ring: Silicon carbide – graphite embedded

d. Rotating Ring: Silicon carbide – graphite embedded, or carbon graphite.

e. O-rings: EPDM

6. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling, and motor. The entire cartridge shaft seal shall be removable as a one-piece component.

11.19 Pump Anchor Bolts

[CSI 03 15 19 (cast-in) or 05 05 19 (drilled)]

Part 2 - Products

Materials

Pump anchor bolts to be epoxy anchors equal to Hilti HIT-RE 500-SD or Simpson Strong Tie SET-XP using 316 stainless steel threaded rod. Rod diameter to be the largest that will fit in the pre-drilled pump mounting base, unless approved otherwise by the Engineer.

Rod Diameter	$^3/_8$-inch	$^1/_2$-inch	$^5/_8$-inch	$^3/_4$-inch	$^7/_8$ -inch
Minimum Embedment	3.5-inch	4.25-inch	5-inch	6.625-inch	7.5-inch
Minimum Edge Distance	5.25-inch	6.5-inch	7.5-inch	10-inch	10-inch

11.20 PUMP MOTORS

11.20.01 Common Work for Pump Motors

[CSI 40 05 93]

Part 1 - General

Summary

This section is not applicable for chemical dosing pumps or small sump pumps.

Related Sections

- Division 9 Finishes
- Division 11.10.05 Common Work for Pumps

References

- HI - Hydraulic Institute.
- ASTM - American Society for Testing and Materials.
- AISI - American Iron and Steel Institute.
- ANSI - American National Standards Institute.
- IEEE – Institute of Electrical and Electronics Engineers

Submittals

Submittal information shall be provided for each individual motor.

Complete list of all motor components and accessories to be provided. All motor system components are to come from the pump manufacturer.

Company name, address, and phone of the closest manufacturer's authorized service company and a qualified service company. Qualified service may be a company that is not a manufacturer's authorized service center but can perform competent service and order repair and replacement parts. Authorized service must within the 48 contiguous US states. Qualified service must be within 200 miles of the project site.

Specifications and data describing all motor parts, pieces, and components. Include information on materials of construction and proposed coating systems.

Motor data including type, torque, RPM, no-load current, full-load amps, service factor, power factor, and motor efficiency at full-load. Provide maximum recommended motor starts per hour.

For variable speed drive motors, provide performance curves and motor efficiency at 25, 50, 75, and 100-percent of full load.

Bearing life (L10) for ball and roller bearings. Calculations supporting L10 of no less than 40,000 hours.

Shop Drawings:

- Detailed dimensional drawings showing outline dimensions, lengths, overall sizes, materials, and weights for each motor and accessories.
- Wiring diagrams for motor and any embedded sensors or switches.

Closeout Submittals: Provide the following submittals prior to project closeout:

- Operations and Maintenance Manual
- Manufacturer signed warranties with serial numbers.

Quality Assurance

Motors shall be dynamically balanced at the factory and shall have rigid mounting maximum vibration amplitude meeting NEMA MG-1 Grade A:

	Grade A
Maximum Vibration	0.0019 inch pk-pk 0.12 inch / sec
1,200 rpm	All sizes
1,800 rpm	All sizes
3,600 rpm	All sizes

Delivery, Storage, and Handling

Deliver, store, and handle motors in accordance with manufacturer recommendations. Store in a dry, enclosed environment and in the same orientation as their final mounting.

Design Requirements

Motors designed for continuous cycle.

Motors (not including submersibles) to be premium efficiency with efficiency at design point not less than shown in Table C405.8(1) or C405.8(2), as applicable, of the Washington State Energy Code (WAC 51-11C-40508), current edition. Efficiency as determined by IEEE Standard 112, Test Method B.

Size motors such that power draw in the defined operating range of the pump shall not exceed the nameplate size. Power draw shall not encroach into the service factor. Motor size selection shall include all losses, including motor and pump bearings.

Reverse thrust bearings: Oil-bath lubricated with up-thrust (or reverse axial thrust) protection of 30 percent of the normal operating thrust, or as required to support the pump reverse thrust at dry startup, whichever is less.

Pump Name or No.	**1-5**	**6-7**
Phase, Volts, Hz	3-ph, 460-V, 60-Hz	3-ph, 460-V, 60-Hz
Horsepower (max. nameplate)	100 hp	25 hp
Starting (full voltage, reduced voltage, VFD) [1]	As shown	As shown
Nominal maximum speed (rpm)	1,800	1,800
Inverter duty (yes/no) [2]	Yes	Yes
Shaft (solid/hollow)	Solid	Solid
Steady bushing required (yes/no) [3]	Yes	No
Reverse ratchet (yes/no) [4]	Yes	Yes
Enclosure [5]	TEFC	ODP or TEFC
NEMA Design [6]	B	B
Service Factor	1.15	1.15
Max ambient temperature rating	40° Celsius	40° Celsius
Insulation	Class F (115° Celsius rise max.)	Class F (115° Celsius rise max.)
Actual field temperature rise	Class B (90° Celsius max.)	Class B (90° Celsius max.)
Anti-Condensation heaters (yes/no) [7]	No	No
Winding temperature sensors (PTC/RTD/None) [8]	None	None
Winding thermostats (yes/no) [9]	No	No
Bearing temperature sensors (yes/no)	No	No
Fluid leakage sensor (yes/no)	No	No

Table Footnotes

1. Full or reduced voltage starting: If not listed here, then as shown on the plans.
2. Motors for use with Variable Frequency Drives shall be inverter duty rated per NEMA MG1 Part 31.

   Motors for use with VFDs shall be provided with either insulated bearings, ground brushes, or a shaft (bearing) grounding ring. Shaft grounding ring equal to AEGIS.
3. Steady bushing (vertical motors): Must be provided when using a hollow shaft and mechanical seal. Also required for motors larger than 10 hp at speeds above 2,500 rpm.
4. Reverse ratchets: drop-in ball type (not pin and spring) non-reverse mechanism.
5. Other enclosure types will not be accepted if they are higher on the list below than the type shown in the table. Substitutions for Explosion Proof motors are not allowed.
6. For motors larger than 500 hp that include flywheels, provide RPM vs Torque curve, RPM vs Current curve, and acceleration time for entire connected load inertia.
7. Motor windings with imbedded heaters with external connections for connection to 120 VAC power. Provide self-regulating heaters to prevent moisture condensation in windings during prolonged periods of non-use.
8. Winding temperature sensors: One positive temperature coefficient (PTC) thermistor or resistant temperature detector (RTD) per phase embedded in the winding for a total of three (3) sensors. PTC thermistors shall be wired in series, RTD shall be wired individually. All wires clearly labeled at the termination point.
9. Normally closed thermostat, one per winding phase, connected in series.

Provide wiring diagrams for internal sensors and switches on the outside of the motor. Clearly label all such sensor and switch wires for connection to the control system.

Integral thermal and fluid leakage sensors and switches shall have separate contacts from the overload protection systems.

Warranty

All equipment described in this section and provided under this contract shall be warranted against defects in materials and workmanship for a period of two years after date of project acceptance.

Following motor installation, furnish services of a qualified manufacturer's representative to inspect units and inform Owner, prior to field testing, of any defects or concerns regarding condition of each unit and its installation at the job site. Upon resolution of any defects or concerns (if any) and work performed by the Contractor at their expense, manufacturer's warranty shall then be in full effect with no reservation or qualifications other than those stated in the manufacturer's warranty.

Upon completion of motor installation, manufacturer's authorized representative shall provide written certification that equipment is fully warranted as installed. A combined pump-motor warranty will be acceptable in lieu of separate warranties.

Maintenance

Provide any special tools required for motor maintenance. Provide enough lubricant for one service change.

Motor Voltage for Station Retrofit

Contractor shall verify incoming voltage provided by power supplier matches the voltage shown on the Plans and within these specifications. Contractor shall provide written verification from the power supplier that the voltage supplied to the site matches the pump motor voltage. Provide such notice with pump submittal.

Part 2 - Products

Accessories

All motors are to include an engraved non-corrosive metal nameplate on the exterior of the motor (duplicate shipped separately if submersible), readily accessible without requiring any disassembly. The nameplate shall include, at a minimum, the following information. Common abbreviations shown in brackets [ ].

- Manufacturer's name
- Motor type [TYPE]
- Model Number [MN, MODEL, MOD.NO]
- Serial Number [SN, SERIAL, SER NO]
- Frame size [FRAME]
- NEMA design letter [DESIGN]
- Insulation class or rated temperature rise [INS, CLASS]
- Nominal Power (hp) [HP, OUTPUT]
- Time rating [RATING]
- Locked rotor kVA code [CODE]
- Service Factor [SF]
- Voltage [VOLTS]
- Phase [PH]
- Frequency (Hz) [CYCLES]
- Full load amps [FLA]
- Full load speed (rpm) [SPEED, FL RPM]
- Nominal Efficiency (%) [NEMA NOM EFF]
- Date of Manufacture

- Special ratings (Inverter duty, NFPA, Class 1 Division 1, UL, etc.)
- Thermal protection (if sensors or switches are included)

Connect motor and pump shaft with manufacturer's recommended coupling, complete with non-release protection (if non-reversing ratchet is not specified), to prevent pump shaft from unscrewing in the event of phase or flow reversal. Non-submersible motors heavier than 50 pounds shall have lifting lugs.

Finishes

Pump motors shall be furnished with a prime coat or finished epoxy coat of the manufacturer's standard finish. Stainless steel casings need not be coated. Motors with only a primer coating shall be finish coated in the field with a product suitable for the environment and the motor temperature range, submit to Owner for approval.

Part 3 - Execution

Examination

Provide all lifting equipment necessary for installation of the motors.

Installation/Construction

Install units in accordance with manufacturer's specifications and direction.

Field Quality Control

Installation shall be supervised and approved by manufacturer's representative prior to operating or field testing units. A field test shall be conducted and/or supervised by the pump or motor manufacturer's representative after the piping and controls have been installed. Upon completion of installation and testing, manufacturer's representative shall provide written certification that equipment is fully warranted installed.

Contractor is responsible for calibration, startup, and initial performance to meet specifications herein. A field test shall be made to give an indication of the performance of the new motor when it is operating under actual field conditions and to establish the acceptance of the motor furnished and installed. The field test shall be observed by the Engineer after the piping and controls have been installed. Testing shall be completed in accordance with the requirements provided above.

The Contractor shall provide calibrated and certified measuring devices to measure voltage, current, and power factor for each pump motor after they have been installed. The manufacturer's representative shall provide proper, calibrated instrumentation to verify maximum completed unit vibration amplitude.

The following data shall be collected for each motor:

- Motor current (amps), voltage, and power factor vs. Flow (gpm) at points specified by the Owner which may include shutoff head, throttled flow at 50-percent, and full flow.
- Vibration at design point.
- Vibration vs. Speed (variable speed motors only).

Repair and retest units failing field test. If unit fails second field test, unit will be rejected, and supplier shall furnish a unit that will perform as specified.

Division 12
Furnishings (Not Used)

Division 13
Special Construction (Not Used)

Division 14
Conveying Systems (Not Used)

15.00 GENERAL

This division covers the work necessary for furnishing and installing mechanical appurtenances and accessories as described in these Specifications and shown on the Plans.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

15.05 Common Work for Mechanical

[CSI 33 05 00]

Part 1 - General

Summary

Provide the necessary piping, plumbing, fittings, and appurtenances to make all piping systems complete, tested, and ready for operation as specified herein and as shown on the Plans. Some fittings that are necessary for the complete piping system installation and operation may not have been shown. Provide fittings, pipe, and appurtenances necessary, whether shown on the Plans or not, to make all piping systems complete, tested, and ready for operation.

Some pipe supports, thrust blocking, and tie rods are not shown on the Plans. Provide pipe supports, thrust blocking, and tie rods for pipes as required by accepted design criteria to support and restrain the loads encountered.

Related Sections

- Division 1.81.30 Seismic Restraint and Anchorage
- Division 1.81.40 Pressure Ratings
- Division 1.81.50 Materials in Contact with Drinking Water
- Division 9 Finishes

References

All products in contact with drinking water to be low-lead (less than 0.25 percent) content in compliance with NSF/ANSI 372.

Submittals

Submittal information shall be provided to the Owner for the following items:

- Ductile iron pipe
- Ductile iron fittings
- Couplings
- Tapping tees
- Isolation valves

- Control valves
- Pressure gauges
- Pressure switches
- Gauge pressure transmitters
- Air Valves
- Suction Diffuser
- Other mechanical components listed in this division or required by the Engineer

Part 2 – Products

Existing Products

Materials

All valves, meters, hydrants, specialties, appurtenances, and other such mechanical and plumbing components that are of similar purpose shall be of a single manufacturer and model line. Do not "mix and match" unless specifically stated otherwise or allowed by the Engineer. The intention of this requirement is to maintain consistency across all components installed on the project for function, maintenance, aesthetics, and details of installation.

Part 3 - Execution

Field Quality Control

Pressure gauges used for testing and commissioning shall be in good working order and scaled appropriately for the test. Scale range shall not exceed 200% of the test pressure. For example, for a 250 psi test, the gauge scale shall not exceed 500 psi. The Owner has the right to reject any gauges that are suspect in their accuracy.

If any components that have been approved by the Owner are not rated for the specified system test pressure, remove or isolate those components during pressure testing in a method acceptable to the Owner. Said components must still be pressure tested in their permanent configuration at their individual test pressure rating.

Cleaning

Potable Water Systems

For pipe and fittings that cannot be disinfected, such as those used for final connections to live systems, swab with 200 ppm chlorine solution or immerse in a 50 ppm chlorine solution.

15.20 PIPE AND FITTINGS

15.21 Common Work for Pipe and Fittings

[CSI 33 05 00 or 40 05]

Part 2 - Products

Components

Under no circumstance shall the fasteners be of lesser strength or higher corrosive potential than the materials being connected. If dissimilar metals are adjacent (for example: stainless steel flange connecting to ductile iron flange) a dielectric insulation kit shall be used.

Fasteners for pipe and fittings: Per AWWA standards unless otherwise specified. All relevant subsections of AWWA C100, C200, and C500. All bolts and studs shall be long enough so that no less than two threads extend beyond the face of the nut. Non-submerged flange bolts to be ASTM A307 Grade A, zinc plated.

Finishes

For conditions other than submerged, all nuts and bolts shall be zinc plated, and suitable for above and below grade locations as required. Where above grade/exposed piping is specially coated, the connecting nuts and bolts shall be coated using the same system unless directed otherwise by the Owner.

Part 3 - Execution

Construction

All piping and related equipment to be joined shall be connected as shown on the Plans, specifications, as recommended by the manufacturer or as required by standard industry practices if not otherwise specified.

15.22 Metal Pipe and Fittings

15.22.02 Ductile Iron Pipe and Fittings

[CSI 33 05 19 or 40 05 19]

Part 1 - General

Design Requirements

Ductile iron pipe shall have thickness designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressures to meet the requirements of Division 1.81.40 unless listed as more stringent below.

The pipe thickness shall not be less than that of Class 53 pipe for non-flanged pipe.

Flanged joints shall conform to ANSI Standard B16.1 and be of the class shown on the plans.

When grooved ends are used, AWWA ductile iron pipe, minimum Class 53, shall be grooved in accordance with AWWA C606. Rigid radius groove dimensions shall be utilized where flexibility is neither required nor desired. Pipe ends shall be factory grooved.

Extra Materials

Provide one (1) spare ductile iron space saver flange reducer.

Part 2 - Products

Manufactured Units

Pipe shall be cement-lined and asphaltic coated in accordance with ANSI Standard A21.4 (AWWA C104) unless otherwise specified and shall conform to ANSI Standard A21.51 (AWWA C151).

Rubber gasket pipe joints are to be push-on-joint (Tyton) or mechanical joint (MJ) in accordance with ANSI Standard A21.11 (AWWA C-111), unless otherwise specified.

When requested, furnish certification from the manufacturer of the pipe and gasket being supplied that inspection and all of the specified tests have been made, and the results comply with requirements of this standard.

Ductile Iron Fittings

All fittings shall be ductile iron where possible. Steel fittings will not be accepted where ductile iron is called out on the plans. Ductile iron fittings shall be short-body, cement-lined, and for the pressure rating noted in Division 1.81.40. Metal thickness and manufacturing processes shall conform to applicable portions of ANSI Standards A21.20, A21.11, B16.2, and B16.4.

Standard cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C104).

Mechanical joint (MJ), ductile iron, compact fittings 3-inches through 24-inches, and 54- inches through 64-inches shall be in accordance with AWWA C153.

Flanged pipe spools shall be fabricated from minimum Class 53 wall thickness pipe and conform to ANSI/AWWA C115/A21.15 with the exception that flanges shall be fabricated from ductile iron unless otherwise specified in the Contract Documents. Interior shall be cement lined.

Ductile iron flange (FL) fittings shall be in accordance with AWWA C110 and fabricated from ductile iron unless otherwise specified in the Contract Documents with a bolt pattern to match adjacent pipe. Gasket material for flanges shall be Styrene Butadiene Rubber (SBR, Buna-S), neoprene, nitrile rubber (NBR, Buna-N), chlorinated butyl, or cloth-inserted rubber. Gaskets shall be full-face. Gaskets shall be a minimum ⅛-inch thick.

Type of ends shall be specified as mechanical joint (MJ), restrained joint (RJ), true restrained joint (TRJ), plain end (PE), flanged (FL), or grooved (GR).

Grooved couplings shall be manufactured in two or more segments of cast ductile iron, conforming to A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, FlushSeal® type. Mechanical coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to physical properties of ASTM A-183, minimum tensile strength 110,000 psi (758450 kPa) as provided standard Victaulic. Victaulic Style 31. The

coupling gasket shall conform to AWWA pipe outside diameter and coupling housing, manufactured of elastomers as designated in ASTM D-2000. Gaskets used on potable water systems shall be UL classified in accordance with ANSI/NSF-61. Reference shall always be made to the latest published Selection Guide for Victaulic Gaskets for proper gasket selection for the intended service.

Finishes

For above grade and exposed pipes, including those inside structures, prepare surfaces and coat the exterior per Division 9.91.23.01.

Part 3 - Execution

Installation

Install ductile iron water mains in accordance with AWWA C600. Provide tools and equipment, including any special tools required for installing each type of pipe used.

The amount of deflection at each pipe joint shall not exceed 3-degrees per joint (11 inches over 18 feet), or the manufacturer's printed recommended deflections, whichever is less.

Install grooved components in accordance with manufacturer's latest recommendations. Follow the instructions listed in the latest Victaulic I-300 assembly manual. Pipe ends shall be clean and free from indentations and projections in the area from pipe end to groove. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. A Victaulic factory trained field representative (direct employee) shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Victaulic's factory trained representative shall periodically visit the job site and review installation. Contractor shall remove and replace any improperly installed products.

15.22.08 Brass/Bronze Pipe and Fittings

[CSI 33 05 12 or 40 05 12]

Part 1 - General

References

Brass to be low-lead content in compliance with NSF/ANSI 372 to have no more than 0.25 percent lead content.

Brass nipples: ASTM B687

Brass fittings: ANSI/ASME B16.15 (threaded) Class 125 lb. (up to 200 psi water), 250 lb. (up to 400 psi water); B16.18 (soldered).

Part 2 - Products

Materials

Brass pipe, nipples, and fittings to have threaded ends.

15.30 VALVES

15.31 Common Work for Valves

[CSI 40 05 51 or 33 14 19]

Part 1 – General

Design and Performance Requirements

Valves noted on the Plans or in other parts of the Specifications shall meet the requirements herein. Valves shall be designed for the intended service.

Valve suppliers shall review the design and certify that the valve provided in the submittal is appropriate for the application and will operate as shown and described. Any discrepancies from the design and the valves shall be brought to the Engineer's attention during the bidding process. Valves that do not operate as specified and per normal industry standards shall be replaced or modified so that they operate within the design parameters at the Contractor's expense.

Pressure rating shall be per Division 1.81.40 unless shown otherwise.

Part 2 – Products

Components

If shear pins are installed with any valve, the manufacturer shall certify the shear pin(s) to fail between 95 to 99 percent of the operator shaft failure torque. Provide concrete supports for operators where required, as shown on the Plans.

Buried valves shall be equipped with an AWWA 2-inch wrench nut with a minimum of 10 turns required to close the valve, unless otherwise noted on the Plans. Exposed valves shall be equipped with lever actuator for valves 3 inches and smaller, or handwheel actuator for valves 4 inches and larger, unless otherwise noted on Plans. Valves located at elevations higher than 6 feet above the finished floor shall be equipped with chainwheel operator.

Buried valves where the operator nut is more than 3 feet below the valve box lid shall be provided with a solid shaft valve nut extension to reach between 18-inches and 30-inches of the ground surface. Extension shall attach to the nut with a set screw. Diameter of extension shall be appropriate for the valve size and length of extension, but under no circumstances shall be less than 1 inch for 4-foot-long extension rods, or 1.25 inch for rods longer than 4 feet. Extension shall function without excessive twisting.

Part 3 - Execution

Installation

Install valves in strict accordance with the manufacturer's instructions and as shown on the Plans. Verify alignment and adjustments after installation. Provide buried valves with all operators or valves boxes installed so that wrenches or operators perform freely and without binding or other interference. Bed and backfill buried valves according to the requirements of the pipe to which they are attached.

15.32 Isolation Valves

15.32.02 Resilient Wedge (Seat) Gate Valves

[CSI 40 05 61.23]

Part 1 – General

Design Requirements

All gate valves for water lines 3 inches and larger shall be of the resilient, wedge-type, and shall meet or exceed the performance requirements of AWWA C509 or AWWA C515-Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service, unless shown otherwise. Valves shall be suitable for installation with the type and class of pipe being installed. The wedge shall be fully encapsulated with vulcanized SBR rubber or EPDM. Ends as shown on the plans. Valve opening direction shall be counter-clockwise.

Buried valves shall have non-rising stem (NRS). Non-buried valves on fire protection systems shall have outside stem and yoke (OS&Y). Other valves as shown on the plans.

Part 3 - Execution

Field Quality Control

Where buried valves will be installed in a horizontal orientation and for buried valves 16-inch and larger in any orientation, operate the valve over the full range of travel in both directions prior to installation in the presence of the Owner to verify gate travels smoothly and without binding. Service or replace valves that do not travel smoothly.

Installation

Install valves in strict accordance with manufacturer's instructions and as shown on the Plans. Verify alignment and adjustments after installation. Provide buried valves with all operators or valve boxes installed so that wrenches and operators perform freely and without binding or other interference. Bed and backfill buried valves according to requirements of the pipe to which they are attached.

15.33 Check Valves

15.33.02 Swing Check Valves

[CSI 40 05 65.23]

Part 1 – General

Design Requirements

The swing check valve shall function to permit flow in only one direction. The valve shall close tightly, without slamming, when the pressure on the discharge side exceeds the pressure on the inlet side. All swing check valves shall conform with AWWA C508 and the following specifications.

The valve shall be constructed to withstand the pressures stated in Division 1.81.40. Flanges shall be drilled to ANSI B16.1, Class 125# or as specified in the Plans.

Operating pressure range is 0 psi (low) to 100 psi (high). The manufacturer shall certify that the check valve will seal completely within the operational range.

Part 2 – Products

Manufacturers

The valve shall be equal to Golden Anderson Fig. 220-DS swing check valve or M&H Model 159 Swing Check Valve. Valve swing arm shall be weighted. Swing arm shall be oriented as shown on the plans. If not shown, swing arm shall be located to be free to move without restriction.

Manufactured Units

The swing check valve body shall be constructed with heavy cast iron or cast steel and have a bronze or stainless-steel seat ring, rubber clapper facing, a non-corrosive shaft and external counterweight attachment. See Plans for which side of the valve to locate the counterweight.

The valve disc shall be constructed of cast iron or cast steel and shall be suspended from a non-corrosive shaft. The valve shall allow the equivalent flow area of the adjoining pipe. The shaft shall pass through a stiffing box and be connected to the swing arm in the outside of the valve.

Finishes

The interior and exterior of the valve body, bonnet and seal plate shall be coated with fusion-bonded epoxy meeting AWWA C-550 (latest revision). Interior coating shall be a minimum dry film thickness of 7 Mils, not including primer. Exterior coating shall be a minimum dry film thickness of 5 Mils, not including primer. Alternatively, exterior may be coated per Division 9.90.

15.33.12 Dual Disc Check Valve

[CSI 40 05 65.29]

Part 1 – General

Design Requirements

The check valve shall be of the dual disc, wafer style with torsion spring induced closure to permit flow in only one direction. All dual disc check valves shall conform with AWWA C518 and the following specifications.

All components shall be NSF Standard 61 compliant. The valve shall be constructed to withstand the pressures stated in Division 1.81.40. Wafer style valves shall be installed between ANSI B16.1, Class 125# flanges or as specific in the Plans.

Part 2 – Products

Manufacturers

The valve shall be Val-Matic Dual Disc Check Valve Series #8800W or an approved equal.

Manufactured Units

The body shall be of one-piece construction incorporating a vulcanized synthetic seal. Seal design shall include a raised sealing bead for positive seating at both high and low pressures. The disc shall fully overlap the synthetic seal, preventing pressure indentations. Opening and closing of the valve shall utilize a lift and pivot action to prevent seal wear and ensure long seal life. Disc stabilization in the full open position shall be provided by the use of a stop pin. The stop and pivot pins shall be stabilized by the use of synthetic spheres to prevent wear due to vibration during operating conditions. The design shall incorporate a raised seat and ½" body wall to disc clearance to ensure proper operation after long periods of inactivity and potential corrosion buildup. Closure shall be assisted with a torsion spring to provide a cracking pressure of 0.25 psig.

The dual disc check valve shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The disc shall be constructed of ASTM B584, Alloy C87600 cast bronze. The pivot and stop pins shall be Type 316 stainless steel. The torsion spring shall be ASTM A313 Type 316 stainless steel. The seal shall be Buna-N per ASTM D2000-BG.

Finishes

The interior and exterior of the valve shall be coated with an NSF/ANSI 61 certified fusion-bonded epoxy meeting AWWA C-550 (latest revision). The exterior of the valve shall be coated with a universal alkyd primer. Alternatively, exterior may be coated per Division 9.90.

Part 3 – Execution

Installation

The valves shall be monitored during startup and testing for chattering. No chattering is permitted, and each individual valve shall be evaluated. Valves shall be tested at different pump flow rates, including full flow. Adjustments may be needed, including but not limited to changing the torsion spring to accommodate the flow.

The valves shall be hydrostatically tested at 2 times the rated cold working pressure. A seat closure test at 2 times the valve rating shall be conducted to demonstrate zero leakage. Additional tests shall be conducted when specified. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.

15.34 Pilot-Operated Control Valves

15.34.01 Common Work for Pilot-Operated Control Valves

[CSI 40 05 65.05, 40 05 67.05]

Part 1 – General

Submittals

Valve suppliers shall review the design and certify that the valve provided in the submittal will operate as described and within the conditions specified. Any discrepancies from the design and the specified valves shall be brought to the Owner's attention during the submittal process.

Performance Requirements

Valves shall be designed for the intended service. Install valves in strict accordance with manufacturer's instructions and as shown on the Plans.

Valves that do not operate as intended shall be replaced or modified so that they operate within the design parameters at the Contractor's expense.

All valves shall be rated for the pressures shown in Division 1.81.40, unless stated otherwise within the individual valve specification.

Part 2 – Products

Manufactured Units

Valves shall be diaphragm-actuated, hydraulically-operated valves and shall have a cover chamber sealed from the body by a flexible, synthetic rubber diaphragm. Control of the valve shall be from direct-acting, adjustable spring-loaded diaphragm valve(s) and/or solenoid valve(s) as appropriate for the valve function. Pilot controls shall be selected appropriately for the system operational pressure range. Valves to be globe or angle style with flanged or threaded ends as shown on the Plans.

Components

Provide brass or SS nameplates on all valves indicating valve size, inlet side (or flow direction), valve model and control pilot adjustment ranges.

Provide valves with all pilots, solenoids and controls preassembled to operate the valve in its intended function. Solenoids shall be powered by 120 VAC current. Provide each valve with stainless steel trim. Diaphragm shaft shall be stainless steel.

Provide a valve position sight gauge equal to Cla-Val model X101.

Provide a single point valve position limit switch assembly.

Provide speed controls on the opening and closing pilots.

Finishes

Provide all hydraulic control valves with an epoxy coating on the interior flow path and exterior body. Interior epoxy shall be certified for potable water use.

Field Quality Control

The valve manufacturer's representative shall inspect the installation prior to operating or field testing. A field test shall be conducted and/or supervised by the valve manufacturer's representative after the piping and controls have been installed. Upon completion of installation and testing, manufacturer's representative shall provide written certification that equipment is fully warranted installed.

15.34.30 Back Pressure Sustaining/Check Valves – Pilot-Operated Control

[CSI 40 05 67.33]

Part 2 – Products

Manufacturers

Valves shall be Cla-Val Model 650G-90BCDSVYKC combination backpressure sustaining and check valve.

Manufactured Units

Backpressure sustaining/check valve control of valve shall be designed to permit flow whenever inlet pressure exceeds spring setting. When outlet pressure exceeds inlet pressure, valve shall close tight to prevent reverse flow.

Factory backpressure setting of 50 psi. Maximum pressure differential across the valve is expected to be 40 psi.

15.35 Air Valves

[CSI 40 05 78]

15.35.02 Air Valves – Clean Water

15.35.02.01 Combination Air and Vacuum Valves – Clean Water

[CSI 40 05 78.19]

Part 2 – Products

Manufacturers

Combination air and vacuum valves shall be equal to APCO 140C series.

Manufactured Units

Provide air valve's body and cover fabricated from cast iron. Provide internal parts, including float, seat, needle, linkage, level pins, retaining rings and screws fabricated from either stainless steel or bronze. Size as shown on the Plans.

Part 3 – Execution

Installation

If not detailed on the Plans, valves shall be attached to water main via tap, brass pipe, and an isolation ball valve and fittings as necessary. Outlet shall be provided with a brass male by female threaded return bend to direct air away from any mechanical or electrical components.

15.35.02.02 Air Release Valve – Clean Water

[CSI 40 05 78.11]

Part 2 – Products

Manufacturers

Air release valve shall be equal to APCO Model No. 50.

Manufactured Units

Provide air valve's body and cover fabricated from cast iron. Provide internal parts, including float, seat, needle, linkage, level pins, retaining rings and screws fabricated from either stainless steel or bronze. Size as shown on the Plans.

Part 3 – Execution

Installation

If not detailed on the Plans, valves shall be attached to water main via tap, brass pipe, and an isolation ball valve and fittings as necessary. Outlet shall be provided with a brass male by female threaded return bend to direct air away from any mechanical or electrical components.

15.40 PIPING SPECIALTIES

15.40.01 Dismantling Joint

[CSI 40 05 06.13]

Part 1 – General

Design Criteria

Dismantling joint shall be accessible and capable of repeated installations and removals and capable of the testing and working pressures as specified in Division 1.81.40. Joint adjustment range of no less than 2-inches for 12-inch diameter and smaller pipe, and 3-inches for 14-inch diameter and larger pipe. Joint assembly to include limiting rods to prevent pull-out.

Part 2 – Products

Manufacturers

Dismantling joint shall be Romac DJ400 with limit rods or equal.

Part 3 – Execution

Installation

Install per the manufacturer's instructions. Set the assembly at the midpoint of the adjustment range unless specifically called out otherwise on the Plans.

15.40.03 Pipe, Valve, and Conduit Supports

[CSI 40 05 07]

Part 1 - General

Summary

This section includes providing pipe supports, hangers, guides, and anchors.

Related Sections

- Division 1.81.30 Seismic Restraint
- Division 5.05.23 Bolts and other Connectors

References

Pipe supports furnished under this section shall comply in all respects with the requirements of the following standards.

- ANSI/ASME B31.1 Power Piping
- ANSI/MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture
- ANSI/MSS SP-69 Pipe Hangers and Supports - Selection and Application

Performance Standards

Piping systems, including connections to equipment, shall be properly supported to prevent deflection and stresses. Supports shall comply with ANSI/ASME B31.1, except as otherwise indicated.

Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

Support plumbing drainage and vents in accordance with the Uniform Plumbing Code.

Submittals

Pipe Hanger/Support Design Calculations

Shop drawings of engineered pipe hangers/supports, including details of concrete inserts. Drawings shall include location plan showing location of the hanger/support in relation to the structure and/or equipment.

Part 2 – Products

Manufacturers

Pipe supports, hangers, guides, and anchors shall be Anvil, Unistrut, Tolco, Standon, or equal.

Flange supports shall be equal to Standon Adjustable Model S89 Flange Support. Pipe supports shall be equal to Standon Adjustable Model S92 Pipe Support. Both flange and pipe supports shall be equal to those manufactured by Material Resources, Hillsboro, Oregon.

Components

Provide and install all equipment necessary for compete support systems including, but not limited to, base, riser pipe, anchor bolts, hanger rod, support cradle or clamp, and fasteners.

Except as otherwise noted, pipe support components shall comply with the types in ANSI/MSS SP-58.

Engineered Supports: Pipe hangers, supports for piping and conduits (raceways), and all spring support assemblies shall be completely engineered.

Pipe Hangers: Pipe hangers shall be capable of supporting the pipe in all conditions of operation. Pipe hangers shall allow for free expansion and contraction of the piping and prevent excessive stress on the equipment. Hangers shall have a means of vertical adjustment after erection. Hangers shall be designed so that they cannot become disengaged by any movement of the pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of the safety valves shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loadings only.

Hangers Subject to Horizontal Movement: At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit movement. Where horizontal pipe movement is greater than ¼-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the minimum to maximum temperature, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the maximum temperature position.

Spring-Type Hangers: Spring-type pipe hangers shall be provided for piping where vibration or vertical expansion and contraction is anticipated (engine exhausts and similar piping). Spring-type hangers shall be sized to the manufacturer's printed recommendations and loading conditions indicated. Variable spring supports shall be provided with means to limit misalignment, buckling and eccentric loading, or to prevent overstressing of the spring. Variable spring supports shall be provided with the means to indicate the compression of the spring at all times. Supports shall be designed for a maximum variation of 25 percent for the total travel resulting from thermal movement.

Freestanding Piping: Freestanding pipe connections to equipment, including chemical feeders and pumps, shall be firmly attached to fabricated steel frames made of angles, channels or I-beams anchored to the structure. Exterior, freestanding overhead piping shall be supported on fabricated pipe stands, consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles, and U-bolts or clamps installed to secure piping.

Finishes

Unless otherwise noted, all fabricated pipe supports, other than stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM 123. Other than stainless steel and non-ferrous supports, supports shall be coated in accordance with Division 9.90.

Part 3 - Execution

Installation

Piping shall be rigidly anchored to walls, slabs, and ceilings by means of suitable pipe supports, wall brackets, or pipe hangers.

Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's installation instructions and ANSI/ASME B31.1. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

Stand-on Pipe Support: Adjust support, secure to pipe and secure to floor as recommended by the manufacturer.

Riser Supports: Risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

Support Spacing: Pipe supports shall be placed to meet the following maximum spacing, unless otherwise noted or shown on the Plans: maximum vertical support spacing of 5 feet, and maximum horizontal support spacing of 10 feet. Support shall be provided at horizontal bends, base of risers (vertical bends), floor penetrations, connections to pumps, blowers, and other equipment, valves and appurtenances. Support spacing shall meet the local plumbing code where applicable. Support spacing may be increased from that noted above provided adequate calculations are provided supporting the change.

Support Anchorage: Concrete anchors shall be as specified in Division 3, Concrete Anchors. All channel strut type supports shall have a minimum of 2 anchors per support.

Suspend pipe hangers from hanger rods, secure with double nuts.

Securely anchor plastic pipe, valves and headers to prevent movement during operation of valves. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

Provide ductile iron elbows or tees supported from floors with base fittings. Support base fittings with metal supports, or when indicated on the Plans, concrete piers.

Do not use chains, plumbers' straps, wire, or similar devices for suspending, supporting or restraining pipes.

Install riser clamps at floor penetrations and where indicated on the Plans.

Field Quality Control

Pipe supports and hangers shall be positioned in such a way as to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other work.

Properly support, suspend or anchor exposed pipe, fittings, valves and appurtenances to prevent sagging, overstressing or movement of piping and to prevent thrusts or loads on or against connected pumps, blowers or other equipment.

15.40.13 Suction Diffuser

[CSI 40 05 06]

Part 1 – General

Extra Materials

Provide one (1) spare suction diffuser.

Part 2 – Products

Manufacturers

Suction Diffuser shall be Xylem Inc. Bell & Gossett SDG or equal.

Components

The suction diffuser body shall be made of either cast iron or ductile iron. The suction diffuser shall include a Flow Cone to eliminate recirculation and direct flow completely out of the body and into the pump suction. The suction diffuser shall include a full-length, 4-plane, removable straightening vane. The straightening vane shall be made of either carbon steel or 304 stainless steel. The suction diffuser shall include a full-length removable orifice cylinder with 3/16" perforations and 51% open area. The orifice cylinder shall be made of either carbon steel or 304 stainless steel. The suction diffuser shall have a full-length removable start-up strainer. The start-up strainer shall be made of 16 mesh bronze wire. The suction diffuser shall be available with either flanged end connections or grooved end connections. Flange end connections should be designed according to ANSI Class 150 Standards. Suction diffuser models with either flange x flange or groove x flange end connections should be rated for 175 psi (1,207 kPa) maximum working pressure. Models with groove x groove end connections should be rated for 300 psi (2,068 kPa) working pressure. The suction diffuser shall have a maximum temperature rating of 250°F (121°C).

Part 3 – Execution

Installation

Install per the manufacturer's instructions.

15.41 Tapping Tees and Valves

[CSI 33 05 09.43]

15.41.02 Tapping Tees and Valves for Ductile Iron, Cast Iron, Steel, Asbestos Cement, and PVC Pipe

[CSI 33 05 09.43 or 40 05 76.13]

Part 1 - General

Related Sections

- Division 1.81.40 Pressure Ratings;

- Division 15.32.02 RW Gate Valve.

Design Requirements

Tapping tees shall be reinforced as necessary to meet the required pressure rating.

Steel tapping tees shall be constructed to the standards of AWWA C200, C206, C207, and C208.

Tapping tee outlet branch on steel tees must have wall thickness no less than ¼-inch.

Stainless steel tapping tees used on ductile iron, cast iron, or steel pipe must have a full perimeter continuous interior lining such that the stainless steel is not in direct contact with the metal pipe.

Site Conditions

Existing suction pipeline pressure is 10 psi and discharge pipeline pressure is 50 psi.

Part 2 - Products

Components

The Contractor is responsible for verifying the existing pipes outside diameter and material prior to ordering the tap.

Tapping tees for hot-tapping or wet-tapping of active water mains shall be provided where shown on the Plans.

Valve shall be resilient seat with alignment lugs if necessary for the tapping machine. The Contractor may substitute a standard AWWA C509 or C515 resilient seat valve if documentation is provided that the tapping machine does not require alignment lugs.

Tees shall include a minimum ½-inch test port.

Finishes

Steel tapping tees shall be epoxy coated inside and out per AWWA C213. Stainless steel tees do not require coating.

Part 3 - Execution

Construction

Tap size shall be as needed to preserve the structural integrity of the pipe being cut. Tap hole diameter shall be no less than the nominal branch diameter when the branch pipe diameter is smaller than the run diameter. Tap hole diameter for "size on size" tee shall be no more than 1-inch smaller diameter than the actual branch diameter, unless approved by the Engineer.

15.60 PRESSURE MEASUREMENT

[CSI 40 73 00]

15.60.01 Common Work for Pressure Measurement

[CSI 40 73 05]

Part 1 – General

Design Requirements

Pressure and level measurement devices shall be scaled and rated for the application.

Part 3 – Execution

Installation

All devices shall be installed to be field serviceable without taking the facility out of service. Readouts shall be positioned to be easily read from a standing position and central to the room, unless otherwise allowed by the Engineer.

15.61 Pressure Gauges

[CSI 40 73 13]

Part 1 – General

References

- ASME B40.100 (B40.1 Analog, B40.7 Digital)

Performance Requirements

Analog: Grade 2A (±0.5 percent of span) unless stated otherwise in the Products section.

Digital: Grade 2A (±0.5 percent of span) or AR (±1 percent of reading) unless stated otherwise in the Products section.

Submittals

Provide catalog sheets showing dimensions, pressure range, accuracy and optional accessories.

Part 2 – Products

Manufacturers

Marsh, 3D Instruments, or approved equal.

Materials

Provide gauges per the table below. Gauges completely suitable for measuring potable water with wetted parts of brass, bronze, or stainless steel.

Location	Pump 6 and 7 Suction	Pump 6 and 7 Discharge
Full Scale	0-30 psi	0-100 psi
Normal Operating Range	5-15 psi	40-60 psi
Analog or Digital	Analog	Analog
Surface or Stem Mount	Stem	Stem
Connection Size	0.5"	0.5"
Accuracy Grade	See Perf. Req'ts	See Perf. Req'ts
Glycerin fill or Dry	Glycerin	Glycerin
Face Size 2.5" or 4.5"	4.5"	4.5"

Part 3 - Execution

Installation

Install gauges where shown on the Plans. Support gauges adequately. Tighten only with the connection hex nut, do not twist the case.

Field Quality Control

Where a new gauge is connected directly to the plumbing of a pressure transmitter, the gauge must read within its accuracy grade compared to the transmitter, unless the transmitter is proven faulty.

If the Engineer suspects any gauge is inaccurate, provide a calibrated gauge for comparison, or other method of verification acceptable to the Engineer.

Replace or calibrate gauges that do not meet the accuracy requirements.

15.62 Pressure Switch

[CSI 40 73 36]

Part 1 – General

Design Requirements

Provide pressure switches that are surface mount type with ¼-inch or ½-inch NPT bottom fittings (or as shown on the plans if different) and completely suitable for operation when connected to potable water. All wetted parts shall be brass or stainless steel; no aluminum will be allowed. Provide unit with clear Lexan cover over trip settings that are screwdriver adjustable and displayed in psi. Housings shall be NEMA 4 rated with waterproof conduit connections.

Select switches to provide suitable over-pressure protection for specific pressure range involved at each location. Sensors shall be seamless brass or stainless steel. Setpoints shown are estimates and may require adjustment at startup.

Location	Scale Range	High Setpoint	Low Setpoint	Run Setpoint
Pump 6 and 7 Discharge	0-150 psi	150 psi	30 psi	80 psi

Part 2 – Products

Manufacturers

United Electric 400 series, or equal.

Part 3 – Execution

Installation

Install switches as shown on the Plans. If not shown, securely install and mount in a location approved by the Owner.

15.63 Gauge Pressure Transmitter

[CSI 40 73 26]

Part 1 – General

Design Requirements

Provide transmitter with ½-inch process connections or as shown on the plans if different, and completely suitable for measuring pressure in potable water. Select ranges to provide a system that utilizes the largest percentage of available span for each transmitter. Transmitter shall transmit in pounds per square inch displayed at the device screen and through the 4-20mA output.

Location	Low end of range	High end of range (minimum)	High end of range (maximum)
Suction pressure	0 psi	0 psi	30 psi
Discharge pressure	0 psi	25 psi	100 psi

Part 2 – Products

Manufacturers

Pressure transmitter shall be Foxboro IGP10, Endress+Hauser Cerabar S PMP71, Siemens Sitrans P DS III, or equal.

Manufactured Units

Pressure transmitters shall be all solid state with a 4-20ma output. All wetted parts shall be stainless steel. Transmitter shall be hermetically sealed to withstand submergence or an operating environment of 100 percent humidity for an indefinite period of time. Total error band shall not exceed 0.25 percent of full scale over a temperature range of 0-100 degrees Celsius. Voltage input shall be 9 to 20 VDC without more than a 0.12 percent change in output. Volumetric displacement of bridge from 0 psi to max-rated pressure shall be less than 0.01 cubic inches. Provide electronics with built-in protection against AC line transients and lightning spikes, and an R/F filter to reject external electrical and internal noise. Zero and span adjustments shall be non-interacting.

A digital indicator with on-board pushbuttons shall be provided to display the measurement with a choice of units. The pushbuttons shall allow zero and span adjustments and local configuration without the need for a hand-held terminal.

Part 3 – Execution

Installation

Transmitter installations shall be equipped with drain and bleed and isolation valves to remove air from transmitter diaphragm. Contractor shall be completely responsible for proper operation and interface of transmitter with other electronics provided on the project.

15.75 Plumbing Fixtures

[CSI 22 40 00]

15.75.16 Brass Ball Valves

[CSI 40 05 63.34]

Part 1 – General

Performance Requirements

Ball valves rated for 250 psi W.O.G. minimum. Valve to be "full-port" style.

Part 2 – Products

Manufactured Unit

Ends to be threaded, unless specifically shown otherwise on the plans. Include ¼ turn lever handle. If available space does not allow handle to operate without interference, replace with tee handle.

15.75.21 Unions

[CSI 40 05 06]

Part 2 – Products

Manufactured Units

As shown on the Plans, unions shall be water tight, capable of pressure forces of the pipe it is connected to, and allow a minimum of ¼-inch of play for installation and maintenance flexibility. Unions shall be threaded to match the pipe it connects and match the pipe material (copper, brass or PVC).

16.00 GENERAL

The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and specifications.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following sections whether directly referenced or not.

The Contractor shall reference Division 1.25 regarding substitutes and "or-equals".

16.05 Common Work for Electrical

[CSI 26 05 00]

Part 1 - General

Summary

Plans are diagrammatic and indicate general arrangements of systems and equipment, except when specifically, dimensioned or detailed. The intention of the plans is to show size, capacity, approximated location, direction and general relationship of one work phase to another, but not exact detail or arrangement.

Regulatory Requirements

The Contractor shall coordinate and provide all permits, licenses, approvals, inspections by the authority having jurisdiction and other arrangements for work on this project and all fees shall be paid for by the Contractor. The Contractor shall include these fees in the bid price.

Related Sections

See the following sections for items that may be provided and/or installed with other electrical equipment.

- Division 11.20 Pump motors

Codes and Standards

Provide all electrical work in accordance with latest edition of National Electrical Code, National Electrical Safety Code, Washington State Electrical, and local ordinances. If any conflict occurs between government adopted code rules and these specifications, the codes are to govern. All electrical products shall bear a label from a certified testing laboratory recognized by the State of Washington. Recognized labels in the State of Washington are UL, ETL, and CSA-US.

Definitions

Dry Locations: All those indoor areas which do not fall within the definitions below for wet, damp, or corrosive locations and which are not otherwise designated on the Plans.

The words "plans" and "drawings" are used interchangeably in this specification and in all cases shall be interpreted to mean "Plans".

The word "provide" shall be interpreted to mean furnish and install.

Design Requirements

Unless otherwise noted, provide enclosures as follows:

1. Indoors Unclassified Locations: NEMA Type 12

Submittals

Provide submittals of each item specified in this division to engineer for approval in accordance with Division 1 of these specifications. Submittals for motor control centers, motor control panels, control panels, instrumentation panels, and pump control panels shall include at a minimum: a wiring diagram or connection schematic, and an interconnection diagram.

Wiring Diagram or Connection Schematic

1. Include all devices in a system and show their physical relationship to each other including terminals and interconnecting wiring in assembly. This diagram shall be in a form showing interconnecting wiring only by terminal designations (wireless diagram).

Interconnection Diagram

1. Show all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. Show references to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Show bundled wires on a single line with the direction of entry/exit of the individual wires clearly shown. Identify all devices and equipment. Show terminal blocks as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Show spare wires and cables.

Provide submittal information for the following items:

1. Variable Frequency Drives
2. Circuit Breakers
3. Conduit and Fittings
4. Outlet and Junction Boxes
5. Wire and Cables
6. Other Electrical Components listed in this Division and/or required by the Engineer.

Project Conditions

Contractor shall keep all power shutdown periods to a minimum. Carry out shutdowns only after a shutdown schedule has been submitted and approved by both the Owner and the Engineer.

Part 2 - Products

Source Quality Control

Provide adequate space and fit for the electrical installation, including, but not limited to, determination of access-ways and doorways, shipping sections, wall and floor space, and space occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the Plans. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with National Electric Code (NEC) and shall be installed in locations which will provide adequate cooling.

Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions unless approved by the Owner.

Identification of Listed Products

Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the inspection authority may require the product to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.

Materials

Use equipment, materials and wiring methods suitable for the types of locations in which they will be located, as defined in Definitions above.

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

Components

Fasteners for securing to walls, floors, and the like shall meet the requirements of Division 5.05.23.

Accessories

Wire Identification

1. Identify each wire or cable at each termination and in each pull-box using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as approved by the Engineer. Identify each wire or cable in each pull-box with plastic sleeves having permanent markings. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Finishes

Refer to each electrical equipment section of these specifications for painting requirements of equipment enclosures.

Part 3 - Execution

Installation

General

1. Complete the wiring, connection, adjustment, calibration, testing and operation of mechanical equipment having electrical motors and/or built-in or furnished electrical components in accordance with electrical code, UL listing requirements and manufacturer's instructions. Install electrical components that are furnished with mechanical equipment.
2. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
3. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components accessories and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified properly functional.

Workmanship

1. Assign a qualified representative who shall supervise the electrical construction work from beginning to completion and final acceptance.
2. Provide all labor using qualified craftsmen, who have had experience on similar projects.
3. Ensure that all equipment and materials fit properly in their installations.

Field Services

1. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up and operation of the equipment, and to correct any problems which occur during testing and start-up.

Installing Equipment

1. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
2. Install all floor-mounted equipment on 3½-inch high reinforced concrete pads.
3. Install all equipment and junction boxes to permit easy access for normal maintenance.

Cutting, Drilling, and Welding

1. Provide any cutting, drilling, and welding that is required for the electrical construction work.

2. Structural members shall not be cut or drilled, except when approved by the Engineer. Use a core drill wherever it is necessary to drill through concrete or masonry. Perform patch work with the same materials as the surrounding area and finish to match.

Metal Panels

1. Mount all metal panels, which are mounted on, or abutting concrete walls in damp locations or any outside walls ¼-inch from the wall and paint the back side of the panels with a high build epoxy primer with the exception of stainless-steel panels. Film thickness shall be 10 Mils minimum.

Seismic Requirements

1. See Division 1.81.30

Load Balance

1. Balance electrical load between phases as nearly as possible on panelboards, motor control centers, and other equipment where balancing is required.
2. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

Field Quality Control

Minor Deviations

1. The electrical plans are diagrammatic in nature and the location of devices, fixtures, and equipment is approximate unless dimensioned. Based on this, the right is reserved by the owner to provide for minor adjustments and deviations from the locations shown on the Plans without any extra cost. Deviations from the Plans and/or specifications required by code shall also be done, subsequent to Owner's approval, without extra cost.
2. Plans indicate the general location and number of the electrical equipment items. When raceway, boxes, and ground connections are shown, they are shown diagrammatically only and indicate the general character and approximate location. Layout does not necessarily show the total number of raceways or boxes for the circuits required. Furnish, install, and place in satisfactory condition all raceways, boxes, conductors, and connections, and all of the materials required for the electrical systems shown or noted in the contract documents complete, fully operational, and fully tested upon the completion of the project.

Project Record Plans

1. A set of Plans shall be maintained at the job site showing any deviations in the electrical systems from the original design. A set of electrical Plans, marked in red to indicate the routing of concealed conduit runs and any deviations from the original design, shall be submitted to the Owner for review prior to final acceptance.
2. After testing and acceptance of the project the Contractor shall furnish in the O&M manuals an accurate connection schematic and interconnection diagram for every service entrance panel, pump control panel, motor control center, and instrumentation panel provided this project.

Cleanup and Equipment Protection

Equipment Protection

1. Always exercise care after installation of equipment, motor control centers, control panels, etc., to keep out foreign matter, dust debris, and moisture. Use protective sheet metal covers, canvas, heat lamps, etc., as needed to ensure equipment protection.

Cleaning Equipment

1. Thoroughly clean all soiled surfaces of installed equipment and materials upon completion of the project. Clean out and vacuum all construction debris from the bottom of all equipment enclosures.

Painting

1. Repaint any electrical equipment or materials scratched or marred in shipment or installation, using paint furnished by the equipment manufacturer.

Final Cleanup

1. Upon completion of the electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean and acceptable to the Owner.
2. Lamps and fluorescent tubes shall be cleaned, and defective units replaced at the time of final acceptance.

16.15 Grounding and Bonding for Electrical Systems

[CSI 26 05 26]

Part 1 - General

References

Service and equipment grounding shall be per Article 250 of the NEC.

Performance Requirements

Verify that a low-resistance ground path is provided for all circuits so an accidental contact to ground of any live conductor will instantly trip the circuit.

Part 3 - Execution

General Grounding Installation

When available a UFER ground per latest edition of NEC shall be provided as the primary means to ground the electrical system.

Provide a ground wire in every conduit carrying a circuit of over 110 volts to ground.

Motor Grounding Installation

Extend equipment ground bus via grounding conductor installed in motor feeder raceway. Connect to motor frame.

When using nonmetallic flexible tubing install an equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.

Ground Connections

Above grade ground connections shall be exothermic weld, mechanical, or compression-type connectors; or brazing.

Install all ground connections is strict accordance with connector manufacturer's recommendations and methods.

16.30 BASIC PANEL EQUIPMENT AND DEVICES

16.31 Operating and Indicating Devices

[CSI 26 09 00, 40 78 00]

Part 1 - General

Operating and indicating devices minimum rating shall be NEMA 13. Operator devices mounted in outdoor panels, corrosive areas or where exposed to moisture shall be NEMA 4X.

16.31.2 Run Time Meters

[CSI 26 09 13.22, 40 78 13.22]

Manufacturers

HECON GO series or equal.

Manufactured Units

Hour meter (elapsed time meters) shall be 2-inch by 1-inch nominal size, rectangular case type for flush panel mounting. The meter face shall be of the style that most closely resembles the panel indicating instruments if provided and shall have black trim with white or aluminized face. The meters shall have a 6-digit non-resettable register with the last digit indicating tenths of an hour.

16.31.4 Indicating Lights

[CSI 26 09 13.31, 40 78 16]

Manufacturers

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Indicating lights shall be NEMA type 4/4X/13, corrosion resistant, water-tight, oil-tight, full voltage, push-to-test, high visibility 28 chips LED type. Pilot lights shall be rated for the proper operating voltage. Appropriate lens caps shall be provided as shown on Plans.

16.31.5 Selector Switch

[CSI 26 09 16.21 40 78 19.21]

Manufacturers

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Selector switches shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type selector switches with contacts rated for 10 amperes continuous at proper operating voltage. Operators shall be black knob type. Units shall have the number of positions and contact arrangements and spring return function (if any) as shown on Plans. Units shall be single-hole mounting, accommodating panel thicknesses from $^{1}/_{16}$-inch minimums to ¼-inch maximum.

16.31.6 Pushbuttons

[CSI 26 09 16.23, 40 78 19.25]

Manufacturers

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Pushbuttons shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type push buttons with momentary contacts rated for 10-ampere continuous at proper operating voltage. Button color shall be as specified in control panels and shall have a full guard. Pushbutton contact arrangements shall be as shown on Plans. Size of pushbuttons as indicated on the Plans.

Special Functions

Pushbutton for "emergency stop" applications shall have maintained contacts and red mushroom head operators.

16.32 Panel Relays

[CSI 26 09 16, 40 78 53]

Part 1 – General

General

Relays shall be provided as necessary to perform switching functions required of control panels and other control circuits as shown on the Plans and described in the technical specifications. Appropriate relay type and associated contacts shall be selected based on the application from the control wiring diagrams or the functional description. Where timing relays and control relays require additional contacts, provide auxiliary control relays properly sized for the application.

All contacts and relays shall be NEMA rated and UL recognized.

The electrical life expectancy for the relay shall be over 500,000 operations at 120V AC, 10 amp; (over 200,000 operations at 120V AC, 10 amp for SPDT, 3PDT, and 4PDT). The mechanical life expectancy for the relay shall be over 50,000,000 operations.

16.32.1 Control Relays

[CSI 26 09 16.31, 40 78 53.21]

Manufacturers

- Square D Class 8501, Type K or R
- Allen Bradley 700 Type HA or HB
- IDEC RH Series; or equal

Manufactured Units

Relays for general purpose use shall be DPDT or 3PDT, 10-amp contacts with the appropriate coil voltage for the application. Relays shall be plug-in type with matching socket. All relays shall have LED indicators to signal when the coil is energized. Relay coils shall be rated for continuous duty.

16.35 Control Panel Accessories

16.35.1 Terminal Blocks

[CSI 26 05 83 or 26 27 26]

Part 2 – Products

Manufactured Units

Terminal blocks shall be one-piece, molded, plastic blocks with screw-type terminals and barriers rated for 600 volts. Terminals shall be double-sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protection cover removed.

Part 3 – Execution

Installation

All wires between panel-mounted equipment and other equipment shall be terminated at terminal blocks. Switches shall be terminated at the terminal blocks with crimp-type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for their terminal block screws and for the number and size of the wires terminated. All wires shall be labeled with the circuit number and common function.

16.35.2 Nameplates

[CSI 26 05 53, 10 14 23]

Part 2 – Products

Manufactured Units

Standard nameplates shall be made of $^{1}/_{16}$-inch thick machine engraved laminated phenolic having black letters not less than $^{3}/_{16}$-inch high on white background. One-inch high lettering shall be used for the large nameplates required for the control panels and motor control centers.

Part 3 – Execution

Installation

Nameplates shall be provided on all electrical devices including but not limited to motor control equipment, MCC cubicles, control stations, junction boxes, panels, motors, instruments, switches, indicating lights, meters, and all electrical equipment enclosures. Each motor control center compartment and control panel shall have a nameplate designating the equipment and its identifying number and size or rating. Data shall be as shown on the Plans and reviewed via the submittal process. Nameplates shall have name, number and/or function as is applicable for clear identification.

Provide one large nameplate for each motor control center and/or control panel identifying the equipment as indicated on the Plans.

Nameplates on steel panels shall be secured with stainless steel drive screws. Where it is proposed that nameplates will be secured with pressure sensitive tape or bonding cement, the process and samples shall be submitted to the Engineer for acceptance.

Nameplates shall be provided for identifying all operator interface (lights, switches, etc.) and other devices that are located outside or inside the panels.

Nameplates shall be provided for identifying all relays and devices that are located inside the panels.

Special Functions

Provide warning nameplates on all panels and equipment, which contain multiple power sources. Lettering shall be white on red background.

16.40 LOW VOLTAGE MOTOR CONTROL EQUIPMENT

[CSI 26 29 00]

16.45 Variable Frequency Drive

[CSI 26 29 23]

Part 1 - General

Summary

The Variable Frequency Drive (VFD) system shall contain all components required to meet the performance, protection, safety, and certification criteria of this specification.

Related Sections

- Division 10.14 Signage
- Division 16.30 Basic Panel Equipment and Devices
- Division 16.41 Motor Control Center

References

- National Fire Protection Association - NFPA 70 - US National Electrical Code.
- National Electrical Manufacturers Association - NEMA 250 - Enclosures for Electrical Equipment.
- Underwriters Laboratory Inc. – UL 508.
- Canadian Standards Association International – CAN/CSA-C22.2 No. 14-05.
- International Electrical Code - IEC 146.
- Institute of Electrical and Electronics Engineers, Inc. - IEEE 519 - IEEE Standard Practices and Requirements for Harmonic Control in Electrical Power Systems.
- Seismic Standards ASCE 7-10, IBC, CBC, ICC_ESAC156, IEEE 693 and California OSHPD.

Submittals

Submit under provisions of Sections 1.33 and 16.05.

Shop Drawings - Approval

1. Elevation Drawings: Include dimensional information and conduit routing locations.
2. Unit Descriptions: Include amperage ratings, enclosure ratings, fault ratings, nameplate information, and so on, as required for approval.
3. Wiring Diagrams:
    a) Power Diagram: Include amperage ratings, circuit breaker frame sizes, circuit breaker continuous amp ratings, and so on, as required for approval.
    b) Control Diagram: Include disconnect devices, pilot devices, and so on.
4. Major components list.

Product Data Sheets

1. VFD and Operator Interface publications.
2. Data sheets and publications on all major components including, but not limited to, the following:
    a) Contactors
    b) Circuit breaker and fuse (power and control)
    c) Control power transformers
    d) Pilot devices
    e) Relays/Timers

Test procedures shall be per the manufacturer's standards.

Closeout Submittals (Operation and Maintenance Manuals)

Submit under provisions of Sections 1.79.2 and 17.94.

Shop Drawings – Final as shipped

1. Elevation Drawings: Include dimensional information and conduit routing locations.
2. Unit Descriptions: Include amperage ratings, enclosure ratings, fault ratings, nameplate information, and so on, as required for approval.
3. Wiring Diagrams:
    a) Power Diagram: Include amperage ratings, circuit breaker frame sizes, circuit breaker continuous amp ratings, and so on, as required for approval.
    b) Control Diagram: Include disconnect devices, pilot devices, and so on.
    c) Diagrams shall updated based on field modifications and shall be accurate depicting point-to-point wiring.
4. Major components list.

Product Data Sheets

1. VFD and Operator Interface publications.
2. Data sheets and publications on all major components including, but not limited to, the following:
    a) Contactors
    b) Circuit breaker and fuse (power and control)
    c) Control power transformers
    d) Pilot devices
    e) Relays/Timers

Test procedures shall be per the manufacturer's standards.

Operation and Maintenance Data

1. Service and Contact information
2. VFD and Operator Interface User Manuals
3. Troubleshooting / Service Manuals

Quality Assurance

Qualifications:

1. Manufacturers:
    a) The VFD and all associated optional equipment shall be UL listed or recognized.
    b) The VFD shall contain a UL label attached on the inside of the enclosure cabinet.
2. Suppliers:
    a) All inspection and testing procedures shall be developed and controlled under the guidelines of the Supplier's quality system and must be registered to ISO 9001 and regularly reviewed and audited by a third-party registrar.
    b) The VFD shall be factory pre-wired, assembled and tested as a complete package.

Delivery, Storage, and Handling

Contractor shall coordinate the shipping of equipment with the manufacturer.

Contactor shall store the equipment in a clean and dry space at an ambient temperature range of -25 degrees Celsius to 55 degrees Celsius (-13 degrees Fahrenheit to 130 degrees Fahrenheit).

The Contractor shall protect the units from dirt, water, construction debris, and traffic.

Design Requirements

Drive(s) shall be of the size, capacity and quantity as shown on the Plans. VFD supplier shall confirm motor HP, amperage, service factor and operating requirements with motor supplier.

The VFD motor controller shall convert 480 Volt, 3-phase, 60 Hertz utility power to adjustable voltage (0 - 460V) and frequency (0 - 60 Hz.) 3-phase, AC power for stepless motor speed control with a capability of 10:1 speed range. All general options and modifications shall mount within the standard adjustable frequency controller enclosure.

The controller(s) shall be suitable for use with any standard NEMA-B squirrel-cage induction motor(s) having a 1.15 Service factor. At any time in the future, it shall be possible to substitute any standard motor (equivalent horsepower, voltage, and current) in the field.

The variable frequency control shall operate satisfactorily when connected to a bus supplying other solid-state power conversion equipment which may be causing up to 10 percent total harmonic voltage distortion and commutation notches up to 36,500-volt microseconds, or when other VFDs are operated from the same bus. Manufacturers shall certify at submittal time that their equipment will function satisfactorily under these circumstances.

Individual or simultaneous operation of the VFDs shall not add more than 5 percent total harmonic current distortion to the normal bus, nor more than 10 percent while operating from standby generator per IEEE 519, 2014. Prior to project completion, the Contractor shall provide verification through both measurement and calculations that the system is compliant with IEEE 519, 2014.

Part 2 – Products

Manufacturer

The variable frequency drive shall be Siemens, type SINAMICS G120XE, no substitutions.

General

Provide variable frequency controllers suitable for operating variable or constant torque loads. Controllers shall meet or exceed the ratings listed below:

1. All components listed shall be integral to the VFD lineup, factory wired and tested as a complete system. VFDs shall be 6-pulse converter types with a minimum 3-percent-line reactors or internal DC link reactors.
2. For the complete enclosed drive assembly, the main input circuit breaker shall be rated in accordance with NEC and UL requirements and shall be interlocked with the enclosure door, with flange mounted handle to provide positive disconnect of incoming AC power. The handle and mechanism shall always remain attached to the circuit breaker, even when the enclosure door is open.
3. The VFD manufacturer shall not predict or be responsible for pre-existing voltage distortion on the line or distortion from sources supplied by others. Maximum input voltage unbalance shall be 0.5 percent as defined in NEMA MG 1 section 14.35.2.
4. The point of common coupling (PCC) for all harmonic calculations and field measurements for both voltage and current distortion shall be defined as the plant designated PCC.

Ratings

1. The VFD shall be at least 94 percent efficient at full load and 90 percent of speed according to EC 50598 (IEC 61800-9-2) and shall have fundamental power factor (cos Φ) range of 0.95 to 0.99.
2. Rated input voltage: 480 volts plus 10 percent and minus 15 percent, three-phase.
3. Rated AC input line frequency: 47 to 63 hertz.
4. Voltage Dip Ride-Through: VFD shall be capable of sustaining continued operation with a 10 percent dip in nominal line voltage and with a 15 percent dip for up to 1 minute. Output speed may decline only if current limit rating of VFD is exceeded.
5. Power Loss Ride-through: VFD shall have the capability of riding though power dips up to for 3 to 5 cycles without a controller trip depending on load and operating condition. In this extended ride through, the drive shall use the energy generated by the load inertia of the motor to power the electronic circuits.
6. The output power of VFD shall be up to 700HP (500 HP constant torque, 700HP variable torque) where VFD shares common programming, human machine interface or operator panel or keypad and options.
7. VFD shall have a short-circuit current rating (SCCR) of up to 100,000 amperes rms symmetrical when protected by UL approved fuses or circuit breakers or motor starter protectors (MSP) also known as Type E combination motor controllers (CMC).
8. Motor nameplate voltage: 460 volts, three phase 60 hertz (as specified on project motor list).
9. Operating ambient temperature range shall be -4 degrees Fahrenheit to 113 degrees Fahrenheit (-20 degrees Celsius to 45 degrees Celsius) without requiring output current derating.
10. Elevation or altitude: Up to 3,300 ft (1,000 meters) above MSL without output current derating.
11. Humidity at installation location: Non-condensing relative humidity to 95 percent.
12. The VFD shall be capable of running at a minimum of 135 percent of rated nameplate current for 3 seconds and then 110 percent of rated nameplate current for 57 seconds or 110 percent of rated nameplate current for 60 seconds, at rated temperature for variable torque applications or Low Overload (LO) rating.
13. The VFD shall be capable of running at a minimum 150 percent of nameplate current for 60 seconds, at rated temperature for constant torque applications or High Overload (HO) rating.

Construction

1. The converter section shall be 6-pulse utilizing diodes and the latest IGBT technology for inverter section and Digital microprocessor control.

2. The controller shall produce an adjustable AC voltage/frequency output. It shall have an output voltage regulator to maintain correct output V/Hz ratio despite incoming voltage variations.
3. VFD's high performance control system shall be configured as open loop sensorless or encoderless vector control. Autotuning for vector control optimization shall be provided. In addition, flux current control, programmable multi-point V/Hz curve, Linear V/Hz control, and Quadratic V/Hz control shall be provided.
4. Torque control shall be configured in the VFD and activated by command input.
5. The controller shall have a continuous output current rating of at least 100 percent of motor nameplate current.
6. The internal DC bus capacitors shall be designed for a minimum of 10 years. Periodic maintenance replacement of internal capacitors shall not be required.
7. The controller(s) shall be suitable for use with any standard NEMA design asynchronous (induction) motor, permanent magnet synchronous motor (PMSM) or synchronous reluctance motor (SRM).
8. VFD shall be able to be located at least up to 150 meters from a motor with the shielded cables for VFDs rated up to 20hp or above 400hp. For VFDs rated between 25hp and 400hp, the motor cable length shall be up to 200 meters when shielded cables are used. The use of output reactors or filters shall be required when the shielded cables are needed for longer distances.
9. All fans or blowers shall be turned on only when the drive is running.
10. The VFD keypad or operator panel or operator interface shall be pluggable high-resolution graphical color keypad with integral LCD display and shall have depth of 9 mm or 0.4 inch. The keypad shall also have door mounting option for the complete enclosed drive assembly.
11. The VFD shall have conformal coated printed circuit boards in compliance with minimum Class 3C2 rating according to IEC/EN 60721-3-3 for protection against chemical substances and optionally shall comply with Class 3C3 rating according to IEC/EN 60721-3-3 when required per project specifications for the VFD operation in the harsh environment where corrosive gases such as Sulphur dioxide (SO_2), Hydrogen sulfide (H_2S), Chlorin (Cl), Ammonia (NH_3) etc. are inevitable.
12. Silent motor operation shall be possible when using high switching frequencies. Drive de-rating for higher switching frequencies shall be available.
13. The VFD shall have complete inverter and motor protection.
14. The VFD shall be capable of stopping the load without the use of a braking resistor by selecting either DC braking or compound braking function.
15. The VFD shall be capable of providing SIL 3/PL e rated Safe Torque Off (STO) hardware-based safety function to protect against active movement of the drive according to IEC 61508 and IEC 61800-5-2.

16. The VFD shall be capable of firmware upgrades using a Micro Memory Card (MMC) or Secure Digital (SD) Card.

Basic Features

The keypad of operator panel shall be capable of controlling the VFD and setting drive parameters and shall include the following features:

1. The digital display must present all diagnostic message and parameter values in English or metric engineering units, without the use of codes.
2. The digital keypad shall include at a minimum a manual start pushbutton, manual stop pushbutton, Hand/Auto pushbutton and additional control devices to scroll and enter numerical values.
3. A plain English user menu, rather than codes, shall be provided in software in nonvolatile memory as a guide to parameter setting and be resettable in the field through the keypad.
4. The digital display shall be selectively configured to display parameter names with set point and actual values selectable in percent or physical units, and up to three quasi-analog bar graphs of any parameter values. Parameter values to be displayed shall include:
   a. Speed in rpm.
   b. Output current in amperes.
   c. Output Frequency in hertz.
   d. DC bus voltage.
   e. Output voltage.
   f. Total 3-phase output power in kW or HP.
   g. Torque in Nm.
   h. Kilowatt-hour meter.
   i. Elapsed time running meter.
5. The VFD shall have intuitive quick commissioning for the application, motor data and control information using high resolution graphical color keypad. In addition, to ensure personnel safety, the VFD shall offer wireless commissioning and diagnostic option using pluggable Wi-Fi module which can be used in conjunction with any mobile device (smart phone, laptop or tablet) to program the VFD wirelessly from up to maximum 50 meters (164 feet) away and without requiring to install any mobile or PC app. Bluetooth devices shall not be permitted.
6. In addition, the drive shall provide automatic calibrate or autotuning routine to optimize motor electrical characteristics within the VFD.
7. Binary Connector (BiCo) technology shall be included for customizing signals as required by the application.

8. The VFD shall include a customer selectable automatic restart feature. When enabled, the VFD shall automatically attempt to restart after a trip condition (programmable to allow for individual fault selection) resulting from for example supply failure, instantaneous overcurrent, overvoltage, or overload. For safety, the drive shall shut down and require manual reset and restart if the automatic reset/restart function (programmable for up to 10 attempts) is not successful within a customer programmable time period (programmable for up to 600s).
9. VFD shall have the capability of communicating via an RS-485 serial port or industrial Ethernet port:
    a. Serial communications shall be available for USS, Modbus RTU, BACnet MS/TP or Profibus protocols.
    b. Industrial Ethernet communications shall be available for Profinet or EtherNet/IP protocols.
    c. Data communication shall be preconfigured and not require special programming to access parameter values, status, and fault data.
10. VFD shall provide Four skip frequencies to avoid operation at critical frequencies.
11. VFD shall have a PID regulator for set point control.
12. The VFD shall be specifically designed for pumps, fans, and compressors applications.
13. VFD shall have the following internal pump-specific functions available:
    a. Deragging or blockage protection
    b. Pipe filling
    c. Multi-pump control:
        1) Pump switchover
        2) Stop mode
        3) Service mode
        4) Cascade control mode
    d. Blockage, leakage, and dry-running protection
    e. Cavitation protection
    f. Condensation protection
    g. Frost protection
14. VFD shall have the following internal fan-specific functions available:
    a. Flying restart
    b. Automatic restart
    c. Skip frequency bands
    d. Fire mode

e. No load, torque, and rotation (belt) monitoring with sensor

15. VFD shall have the following internal general energy efficiency and system performance functions available:
    a. Energy Optimization to reduce motor losses
    b. Eco mode to adjust output motor voltage to improve energy savings
    c. Bypass mode
    d. Hibernation or sleep mode
    e. Energy/Flow Calculator
    f. Support of high efficiency motors including permanent magnet and synchronous reluctance motors
    g. Real time clock and programmable timers
16. VFD shall have the following internal functions to increase system up-time:
    a. Keep running mode
    b. Kinetic buffering
    c. Essential service mode
    d. Dual ramp
    e. Multi-speed setpoints
    f. No load, torque, and rotation (belt) monitoring with sensor

Enclosure

For a complete enclosed drive assembly all VFD components shall be factory mounted and wired on a dead front, grounded, in at least UL Type 1 (NEMA 1) rated enclosure. If a free-standing enclosure is provided, then it shall be suitable for mounting on a concrete housekeeping pad.

Protective Features and Circuits

The controller shall include the following protective features, faults, and alarms:

1. Instantaneous overcurrent and overvoltage trip.
2. Undervoltage and power loss protection.
3. Power unit over temperature alarm and protection.
    a. Upon sensing an over temperature condition, the VFD is to be programmable to either limit its output to maintain the temperature below its limit, or to automatically trip.
4. Ground fault (when connected to a solidly grounded supply). A separate monitor shall be supplied, where shown on the drawings, for other types of high resistance or ungrounded supply systems.

5. An electronic or solid-state overload circuit:
    a. It shall be designed to protect an AC motor operated by the VFD output from extended overload operation on an inverse time basis (I squared T trip).
    b. This electronic overload shall be UL and NEC recognized as adequate motor protection.
    c. No additional hardware such as motor overload relays or motor thermostats shall be required.
    d. VFD shall be capable of thermal sensor detection, thermistor, or thermostat for motor over temperature.
    e. VFD shall provide protection against opening or shorting of motor leads.
6. When power is restored after a complete power outage, the VFD shall be capable of catching the motor while it is still spinning and restoring it to proper operating speed without the use of an encoder.
7. The VFD shall be protected from damage due to the following:
    a. Three-phase short circuit on VFD output terminals.
    b. Loss of input power due to opening of VFD input disconnect device or utility power failure during VFD operation.
    c. Loss of one (1) phase of input power.
8. The VFD shall be able to withstand the following fault conditions without damage to the power circuit components:
    a. Failure to connect a motor to the VFD output.
    b. VFD output open circuit that may occur during operation.
    c. VFD output short circuit that may occur during operation.
9. Microprocessor fault/memory chip error.
10. DC bus over voltage trip.
11. Critical frequency avoidance circuit. Four (4) set points selective from 0 to maximum frequency. Bandwidth of set points shall be adjustable.
12. Current limit circuit to automatically phase back output current and frequency to prevent excessive currents from damaging motor insulation (frequency output rollback).

The following conditions shall cause an orderly drive shutdown and lockout:

1. Overcurrent at start-up
2. Instantaneous over current
3. Over temperature of VFD or external fault
4. Motor over temperature
5. Ground fault in motor output circuit

6. Over voltage during shut down
7. Motor I squared T trip

The VFD should be able to track the sequence of alarms and faults over time using a real time clock.

Parameter Log

All drive setting adjustments and operation parameters shall be stored in a parameter log:

1. It lists allowable maximum and minimum points and the present set values.
2. It shall be accessible, depending on the communication option or requirement, via a RS-232, RS-485 serial or Ethernet port and on the keypad display.
3. The controller shall have a slot to allow the parameter log to be downloadable on to a compact flash memory card by using the keypad.
4. The drive shall have the capability to be reset to factory conditions via parameter change.

Input/Output Features

1. Two programmable analog inputs (4-20mA/0-20mA/0-10V)
2. One fully programmable analog output (0-20mA/0-10V)
3. Minimum six (6) fully programmable electrically isolated digital inputs (24V DC)
4. Minimum three (3) fully programmable 250V AC relay outputs as digital outputs
5. One (1) motor temperature sensor input (PTC, KTY/Pt100/Pt1000/Ni1000)
6. Minimum one (1) electrically isolated failsafe digital safety input for Safe Torque Off (STO) safety function.
7. The VFD shall be also capable of extending the inputs and outputs additionally using optional IO extension module as follows:
    a. One (1) scalable and programmable analog input (0-20mA/0-10V)
    b. Two (2) fully programmable analog outputs (0-20mA/0-10V)
    c. Two (2) fully programmable electrically isolated digital inputs (24V DC)
    d. Four (4) fully programmable 250V AC relay outputs as digital outputs (4-20mA/0-20mA/0-10V)
    e. One (1) motor temperature sensor input (Pt1000/Ni1000)

Diagnostic Features and Fault Handling

1. The VFD shall include a comprehensive microprocessor based digital diagnostic system which monitors its own control functions and displays faults and operating conditions.
2. The drive shall record and display the last faults and warning messages that occurred in the drive.

3. A "Fault Log" shall be accessible via bus communications as well as line by line on the operator panel display. The "FAULT LOG" shall record, store, and display the following for the 64 most recent events.
    a. Time stamp
    b. Type of fault
4. All faults and events shall be stored with English descriptions in addition to fault codes.
5. First-time users shall be supported by dialog menus, with a standard graphics-based display maximizing clarity when setting the drive parameters. The VFD shall be preset from a factory to run a matching NEMA (horsepower rated) or IEC (Kilowatt rated) motor. However, shall also provide option to a user to set application specific parameters. This shall enable a drive to be up and running after only setting the preliminary parameters within the VFD configuration process.
6. The software shall allow configuration including but not limited to the following:
    a. Digital and analog I/O terminals
    b. Bus interface
    c. Set point channel (e.g., fixed set points)
    d. Speed control (e.g., ramp-function generator, limits)
    e. Diagnostics
7. Experts shall be able to gain rapid access to the individual parameters via the keypad or operator panel without having to use a computer to navigate dialogs.
8. In addition, the following functions shall be available for optimization purposes
    a. Motor identification
    b. Self-optimization
9. Modifications
    a. Any modifications to a standard product required to meet this specification shall be performed by the VFD manufacturer only. Distributor or system integrator changes to the VFD manufacturer's product are specifically disallowed

Part 3 – Execution

Setup

VFD Manufacturer shall program:

1. All fault settings to reset after fault condition returns to normal
2. Minimum and maximum motor speeds provided by motor manufacturer.
3. Hertz change per second.
4. Hand speed control shall be set to 95 percent of full range for panel mounted HOA switch.

VFD Supplier shall provide documentation on how to control the drive over Profinet. This information should include a unique list of parameter, relay, setpoint, input/output, and control addressing as shown on the Plans and detailed in these specifications. A generic list does not meet this requirement.

Examination

Verify that location is ready to receive equipment.

Verify that the building environment can be maintained within the service conditions required by the manufacturer of the VFD.

Testing

This equipment shall be tested and placed into operation by a qualified factory representative trained in start-up and troubleshooting procedures for equipment being installed.

All components shall be factory tested both by the manufacturer at the manufacturer's facility and in the presence of the Engineer by the manufacturer or manufacturer's representative at the manufacturer's facility. Factory testing shall be witnessed by the Engineer. If factory witness testing is to occur at the manufacturer's facility, the manufacturer's facility where testing takes place shall be located within the United States of America. Shipment of VFD to the job site shall not be allowed until the Engineer has witnessed factory testing and approved the VFD for shipment to the job site.

Installation

Installation shall be in compliance with all manufacturer requirements, instructions, and drawings.

Startup

At a minimum, the start-up service shall include:

1. Perform pre-Power Check
2. Megger Motor Resistances: Phase-to-Phase and Phase-to-Ground
3. Verify system grounding per manufacturer's specifications
4. Verify power and signal grounds
5. Check connections
6. Check environment

Drive Power-up and Commissioning:

1. Measure Incoming Power Phase-to-Phase and Phase-to-Ground
2. Measure DC Bus Voltage
3. Measure AC Current Unloaded and Loaded
4. Measure Output Voltage Phase-to-Phase and Phase-to-Ground
5. Verify input reference signal

All measurements shall be recorded.

Drive shall be tuned for system operation.

Drive parameter listing shall be provided.

The line side converter shall be configured and tuned for the local input power conditions.

The motor side inverter shall be tuned for system operation.

Training

Manufacturer to provide a quantity of one 4-hour sessions of on-site instruction.

The instruction shall include the operational and maintenance requirements of the variable frequency drive.

The basis of the training shall be the variable frequency drive, the engineered drawings and the user manual. At a minimum, the training shall:

1. Review the engineered drawings identifying the components shown on the drawings.
2. Review starting / stopping and speed control options for the controller.
3. Review operation of the HIM for programming and monitoring of the variable frequency drive.
4. Review the maintenance requirements of the variable frequency drive.
5. Review safety concerns with operating the variable frequency drive.

16.55 Switches and Protective Devices

[CSI 26 18 00 (medium voltage) 26 28 00 (low voltage)]

16.55.1 Common Work for Switches and Protective Devices

[CSI 26 18 05, 26 28 05]

Part 1 - General

Design Requirements

Overcurrent devices shall be NEMA rated.

Extra Materials

Provide one fuse for each ungrounded conductor and a minimum of one spare fuse per phase of each ampacity and voltage used on the project. Deliver fuses to Owner at the completion of the project.

Part 3 – Execution

Installation

Overcurrent protection devices and safety switches shall be centered 60 inches above the finished floor unless noted otherwise on the Plans.

16.55.13 Fuses

[CSI 26 18 16, 26 28 13]

Part 1 - General

Design Requirements

Fuses shall be of the type and amperage indicated on the Plans. The voltage rating shall be appropriate for the application indicated. The fuse types indicated on the Plans imply a certain set of fuse characteristics. No substitutions of fuse types will be allowed without Engineer approval.

Part 2 - Products

Manufacturers

Fuses shall be:

- Bussman,
- Gould Shawmut
- Littlefuse
- Reliance
- Or Equal

Materials

Fuses in motor circuits which are indicated but not sized, shall be provided with Manufacturer's recommended size based on the actual motor installed. In-line or integrally-mounted fuse clips shall be provided on all control power or low-voltage transformers.

16.55.16 Molded Case Circuit Breakers

[CSI 26 28 16.14]

Part 1 - General

Design Requirements

Breakers shall have the interrupting rating and trip rating indicated on the Plans. All breakers shall be calibrated for operation in an ambient temperature of 40 degrees Celsius.

Circuit breaker selection shall be coordinated with VFD supplier to provide adequate overcurrent protection.

Part 2 - Products

Manufactured Units

Molded case circuit breakers shall be quick-make and quick-break type with wiping type contacts. Each breaker shall be provided with arc chutes and individual trip mechanisms on each pole consisting of both thermal and magnetic trip elements. Two and three pole breakers

shall be common trip. Molded case circuit breakers shall be trip-free. Each breaker shall have trip indication independent of the "ON" or "OFF" positions.

Circuit breaker selection shall be coordinated with VFD supplier to provide adequate overcurrent protection.

16.60 CONDUCTORS

16.61 Low Voltage Wire and Cable

[CSI 26 05 19]

Part 1 - General

Design Requirements

This section is for power and control conductors for 600 volts or less.

All conductors shall be copper. Wire or cable not shown on the Plans or specified, but required, shall be of the type and size required for the application and in conformance with the applicable code.

Part 2 - Products

Materials

Conductors

1. Solid and stranded copper wire shall be 600-volt Type THW, THWN, or THHW, Class B stranding, sizes #14 AWG, #12 AWG, and #10 AWG only. Use of THHN insulation shall not be allowed. Aluminum conductors shall not be allowed.
2. Stranded copper wire shall be 600-volt Type XHHW, Class B stranding, sizes #8 AWG and larger. Aluminum conductors shall not be allowed.

Splices

1. For Lighting Systems and Power Outlets: Wire nuts shall be twist-on type insulated connectors utilizing an outer insulating cover and a means for connecting and holding the conductors firmly.
2. All Equipment: Crimp type connectors shall be insulated type, suitable for the size and material of the wires and the number of wires to be spliced and for use with either solid or stranded conductors.
3. Division 16 Equipment and Power Conductors: Bolted pressure connectors shall be suitable for the size and material of the conductors to be spliced.
4. All Equipment: Epoxy splice kits shall include epoxy resin, hardener, mold, and shall be suitable for use in wet and hazardous locations.

Terminations

1. Crimp type terminals shall be self-insulating sleeve type, with ring or rectangular type tongue, suitable for the size and material of the wire to be terminated, and for use with either solid or stranded conductors.

2. Terminal lugs shall be split bolt or bolted split sleeve type in which the bolt or set screw does not bear directly on the conductor.
3. Wire Markers shall be plastic sleeve type. Wire numbers shall be permanently imprinted on the markers.

Finishes

Color Coding: Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. An isolated ground conductor shall be identified with an orange tracer in the green body. Ungrounded conductor colors shall be as follows:

1. 277/480 Volt, 3 Phase: Yellow, brown and orange.

Part 3 – Execution

Location (Installment) Schedule

Provide the following conductors for the following applications:

1. Use stranded copper conductors for all power and control circuits unless noted otherwise on plans or below. Size as noted on the Plans.
2. Size #14 AWG wire or smaller shall not be allowed on power circuits.

Installation

Conductor Splices

1. Splices: Install all conductors without splices unless necessary for installation, as determined by the Engineer. Splices when permitted shall be completed using an approved splice kit intended for the type of conductor and the application. The splice shall be in accordance with the splice kit manufacturer's instructions.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as favorably by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: For all circuits 150 volts to ground or more and for all motor circuits over ½ horsepower, test cables per NETA Paragraph 7.3.1. The insulation resistance shall be 20 megohms or more. Submit results to Engineer for review.

16.63 Signal Cable

[CSI 27 15 00]

Part 2 - Products

Materials

Twisted Shielded Pairs (TSP)

1. Cable shall conform to IEEE 383, UL 13, and UL 83 and shall be type PLTC cable suitable for direct burial. Each TSP shall consist of two #16 AWG, 7-strand copper conductors per ASTM B8 with 15 Mils PVC insulation and individual conductor jacket of nylon. Conductors shall be twisted with 2-inch or shorter lay, with 100 percent foil shielding and tinned copper drain wires. The cable shall have an overall PVC jacket with a thickness of 35 Mils. The insulation system shall be rated at 90 degrees Celsius and for operation at 600 volts.

Special Cables

1. CAT 5E Profinet cable shall be shielded 600V UL rated. The use of a 300V cable is not acceptable. Profinet cables shall be Belden 7962A or equal.

Part 3 - Execution

Installation

Cable Installation

1. Cables shall be continuous from initiation to termination without splices.
2. Cable shielding shall be grounded at one end of the cable only. Bonding shall be to a single ground point only. Bonding from cable to cable in multiple run installations shall not be permitted.
3. Install instrumentation cables in separate raceway systems with voltages not to exceed 30 volts DC.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as determined by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: Perform insulation resistance on all circuits. Make these tests before any equipment has been connected. Test the insulation with a 500 Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 20 mega ohms or more. Submit results to Engineer for review.

16.70 RACEWAYS, BOXES, AND FITTINGS

[CSI 26 05 33]

16.71 Raceways

[CSI 26 05 33.23]

Part 1 – General

Design Requirements

Conduit sizes not noted on Plans shall be in accordance with NEC requirements for the quantities and sizes of wire installed therein.

Grounding of the raceway, junction boxes, fittings and any other boxes is the responsibility of the Contractor. Ground conductors, bushings, connections, clamps and other materials as needed to ground the raceway system is the responsibility of the Contractor. All raceways shall be grounded in accordance with the NEC.

Part 2 – Products

Components

Conduit and Fittings

1. Galvanized Rigid Steel (GRS): Rigid conduit shall be steel, hot dipped galvanized inside and out. The GRS must meet USA Standards Institute C80-1 Underwriters Laboratories Standard UL6 and carry a UL label. Use cast threaded hub fittings and junction boxes for all rigid conduit except in locations not permitted by the NEC.
2. Flexible Metal Conduit (Flex-LT): Flexible conduit shall be interlocking single strip, hot dipped galvanized and shall have a polyvinyl chloride jacket extruded over the outside to form a flexible watertight raceway. Flexible conduit shall be American Brass Company Sealtite Type VA, General Electric Type UA or equal.

Conduit and Cable Supports

1. Conduit Supports: Hot dipped galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe straps used with galvanized clamp backs and nesting backs where required. Conduit support for PVC or PVC coated rigid steel shall be one-hole PVC or epoxy coated clamps or PVC conduit wall hangers.
2. Ceiling Hangers: Ceiling hangers shall be adjustable galvanized carbon steel rod hangers. Unless otherwise specified, hanger rods shall be ½-inch all-thread rod and shall meet

ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

Conduit Sealants

1. Moisture Barrier Types: Sealant shall be a non-toxic, non-shrink, non-hardening, putty type hand applied material providing an effective barrier under submerged conditions.
2. Fire Retardant Types: Fire stop material shall be a reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL 1479. Provide products indicated by the manufacturer to be suitable for the type and size of penetration.

Part 3 - Installation

Raceway Applications

Galvanized Rigid Steel (GRS) conduit shall be used in all locations unless noted otherwise below or on the Plans.

ABOVE GRADE CONDUITS (non-corrosive areas) shall be:

1. GRS for power and control wiring.
2. GRS for instrumentation and telecommunications wiring.
3. GRS for motor leads from VFDs.

ALL CONNECTIONS TO VIBRATING EQUIPMENT OR MOTORS shall be:

1. Liquidtight flexible metallic conduit for indoor, non-corrosive areas and all motor leads from VFDs.

Installation

All conduits shall be concealed in the floor, walls, ceiling slab, or beneath the floor slab. Surface mounted conduit will not be accepted unless noted otherwise on the construction Plans.

Size of Raceways:

1. Raceway sizes as shown on the Plans, if not shown on the Plans, then size in accordance with NFPA 70.
2. Unless specifically indicated otherwise, the minimum raceway size shall be:
   a) Conduit: ¾-inch

All raceways shall contain a separate grounding conductor.

Spare conduits shall contain one $^{3}/_{16}$-inch diameter nylon pull rope.

Conduit routing is shown diagrammatic on the Plans. Contractor is responsible for routing the conduits in a neat manner, parallel and perpendicular to walls and ceilings.

Location of conduit ends are shown approximately. Contractor is responsible for ending conduits in location that will not conflict with electrical equipment. Route conduit ends to facilitate ease of equipment maintenance. Conduits extending from the floor to a device shall be located as close as possible to avoid creating a hazard.

Conduit shall not be routed on exterior of structures except as specifically indicated on the Plans.

Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

Securely fasten raceways at intervals and locations required by NEC, or the type of raceway employed.

Provide all required openings in walls, floors and ceilings for conduit penetration.

1. Do not install one (1) inch and larger raceways in or through structural members (beams, slabs, etc.) unless approved by Engineer.
2. New Construction: Avoid cutting openings, where possible, by setting sleeves or frames in masonry and concrete, and by requesting openings in advance.
3. Existing Construction: Core drill openings in masonry and concrete. Avoid structural members and rebar.

Analog signal conduits shall be separated from power or control conduits. The separation shall be a minimum of 12-inches for metallic conduits and 24-inches for nonmetallic conduits.

Plastic raceway joints shall be solvent cemented in accordance with recommendations of raceway manufacturer.

All conduit openings not encased in a panel shall be sealed with duct seal.

Wireway Installation

1. Straight sections and fittings shall be solidly bolted together to be mechanically rigid and electrically continuous. Dead ends shall be closed. Unused conduit openings shall be plugged.
2. Wireways shall be supported every 5 feet minimum.

16.72 Boxes and Enclosures

16.72.2 Outlet and Junction Boxes

[CSI 26 05 33.16]

Part 1 – General

Design Requirements

Outlet boxes and switch boxes shall be designed for mounting flush wiring devices.

Outlet boxes shall not be less than 4-inch square and 1½-inch deep. Ceiling boxes shall withstand a vertical force of 200 pounds for five minutes. Wall boxes shall withstand a vertical downward force of 50 pounds for five minutes.

Part 2 – Products

Materials

Use cast boxes with threaded hubs for all rigid and intermediate conduits. Steel boxes may be used with rigid and intermediate conduits where cast boxes are not allowed by the NEC. All boxes shall be of proper size to accommodate devices, connectors, and number of wires present in the box. Boxes shall be readily accessible.

Cast box bodies and cover shall be cast or malleable iron with a minimum wall thickness of ⅛-inch at every point, and not less than ¼-inch at tapped holes for rigid conduit. Bosses are not acceptable. Mounting lugs shall be provided at the back or bottom corners of the body. Covers shall be secured to the box body with No. 6 or larger brass or bronze flathead screws. Boxes shall be provided with neoprene cover gaskets. Outlet boxes shall be of the FS types. Boxes shall conform to FS W-C-586C and UL 514.

Sheet metal boxes shall conform to UL 50, with a hot-dipped galvanized finish conforming to ASTM A123. Boxes and box extension rings shall be provided with knockouts. Boxes shall be formed in one piece from carbon-steel sheets.

Non-metallic boxes shall be hot-compressed fiberglass, one-piece, molded with reinforcing of polyester material, with a minimum wall thickness of ⅛-inch.

Finishes

Where only cast aluminum is available for certain types of fixture boxes, an epoxy finish shall be provided.

16.95 Testing

[CSI 26 08 00]

16.95.1 Common Work for Testing

[CSI 26 08 05]

Part 1 - General

Submittals

Test reports shall be submitted to the Engineer prior to final acceptance in accordance with Division 1.33 of these specifications.

Scheduling and Coordination

The Contractor shall inform the Engineer in advance of testing in accordance with the requirements listed in Division 1 of these specifications.

Prior to scheduling the testing, the Contractor shall have satisfied themselves that the project area is properly cleaned up; all patching and painting deemed necessary properly completed; and all systems, equipment and controls are functioning as intended.

Part 2 - Products

Source Quality Control

Submit reports of factory tests and adjustments performed by equipment manufacturers to the Engineer prior to field testing and adjustment of equipment. These reports shall identify the equipment and show dates, results of test, measured values and final adjustment settings. Provide factory tests and adjustments for equipment where factory tests are specified in the equipment specifications. The Engineer may inspect the fabricated equipment at the factory before shipment to job site. Provide the Engineer with sufficient prior notice so that an inspection can be arranged at the factory.

Part 3 – Execution

Site Testing

Test all circuits for continuity, freedom from ground, and proper operation during progress of the work.

Insulation Resistance, Continuity, and Rotation: Perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior and in addition to tests performed by the testing laboratory specified herein.

Electric Motors: Perform voltage, current and resistance tests on all motors ½ horsepower and larger installed this project. Insulation resistance readings shall be taken with a 500-volt megger for 30 seconds with the circuit conductors connected to the motor. Verify that an overload condition does not exist.

Conduct special test as required for service and/or system ground.

Arc Flash Study, Protection Device Coordination, and Short Circuit Analysis

[CSI 26 05 73.13, 26 05 73.16, 26 05 73.19]

Provide the services of a recognized independent testing laboratory or coordination analysis consultant for the proper system coordination of the protective devices furnished on this project. Submit the name and the qualifications of the laboratory or consultant for review by the Engineer; qualifications must include professional registration of proposed personnel as electrical engineers.

The protective device on the line side closest to the fault or abnormal conditions shall isolate the problem portion of the system and minimize damage in that portion. The rest of the system shall be maintained in normal service. The coordination shall be in conformance with the recommendations of latest IEEE Standard 242.

Provide an Arc Flash Hazard Study for the electrical distribution system shown on the Plans. The intent of the Arc Flash Hazard Study is to determine hazards that exist at each major piece of electrical equipment shown on the one-line diagrams. This includes switchgear, switchboards, panelboards, motor control centers, generators, transfer switches, and transformers. The study will include creation of Arc Flash Hazard Warning Labels listing all items as required in NFPA 70E-2021. These labels serve as a guide to assist technicians and others in the selection of proper Personal Protective Equipment when working around exposed and energized conductors. The electrical contractor will install the labels. The arc

flash hazard study shall consider all operating scenarios during normal conditions alternate operations, emergency power conditions, and any other operations, which could result in maximum arc flash hazard. The label shall list the maximum incidental energy calculated and the scenario number and description on the label.

Submit the analysis that shall include arc flash, impedance, and short circuit calculations, list of any assumptions made and the analysis, the recommended settings of the protective devices, and the system time/current characteristic curves. The submittal shall be completed and submitted in conjunction with the circuit breaker submittal to allow time for review and re-submittal, if necessary, before the implementation of final settings and adjustments by the testing laboratory.

Field Quality Control

General

1. Conduct final test in the presence of Owner and/or their authorized representative. Contractor shall provide all testing instrumentation and labor required to demonstrate satisfactory operation of systems, equipment and controls.

Operational Tests

1. Operational test all circuits to demonstrate that the circuits and equipment have been properly installed, adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions, and demonstrate satisfactory interfacing with the data acquisition and alarm systems.

16.95.3 Conductor Test Report

[CSI 26 08 13]

Conductor Test Report Page 1 of 1														
PROJECT:								OWNER:						
Contractor Co. Name: Tested by:								Phone Number: Test Date:						
Race-way Label (1)	V (2)	C (3)	Operating Load Voltage						Insulation Resistance - OHMS					
			VAB	VCB	VCA	VAN	VBN	VCN	A-B	B-C	C-A	A-G	B-G	C-G
A														
B														
C														
D														
E														
F														
G														

1. Refer to raceway and wire schedule and one-line diagram for description of feeder identified by label shown on this report
2. Visual Inspection – Check when completed
3. Continuity Test – Check when completed

Division 17
Automatic Control (Not Used)

18.0 GENERAL

It is the intention of these specifications that performance of work under bid items shall result in complete construction, in proper operating condition, of improvements identified in these written specifications and accompanying plans. Work and material not specifically listed herein but required according to the plans and specifications and general practice shall be included in Contractor's bid price in the most closely applicable bid item.

If a minimum bid amount has been established for any item and the bidder's entry is less than the minimum specified amount, the Owner will unilaterally revise the price to the minimum specified amount and recalculate the total. The recalculated total will be used by the Owner for award purposes and to fix the contract price amount and the amount of the contract bond.

If a maximum or fixed bid amount has been established for any item and the bidder's entry exceeds the maximum or fixed specified amount, the Owner will reduce the bid item price to the maximum or fixed specified amount and relocate the offsetting amounts to bid items of the Owner's choosing.

Bid Item 1 – Mobilization, Demobilization, Site Preparation, and Cleanup

Lump sum price covers complete cost of furnishing, installing and testing, complete and in-place, all work and materials necessary to: move and organize equipment and personnel onto the job site; secure job site; traffic control for deliveries; provide and maintain necessary support facilities; obtain all necessary permits and licenses; prepare site for construction operations; maintain site and surrounding areas during construction; move all personnel and equipment off site after contract completion; cleanup site prior to final acceptance; and accomplish all other items of work not specifically listed in other divisions.

No more than 80-percent of bid amount for this item will be paid before final payment request, and this bid amount may not be more than 10-percent of value of total contract.

Payment shall be lump sum.

Bid Item 2 – Structural

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for constructing the structural components of the booster pump station complete as shown on the Plans and detailed in the contract specifications including, but not limited to: demolition (removal, haul, and disposal) of the existing pump pads, plates and barrels, and abandonment of the pump cans; demolition (removal, haul, and disposal) of the existing floor as necessary for mechanical improvements; installing and relocating both existing and new pipe supports; providing temporary supports; cast-in-place concrete for pumps and fittings; stairs with handrails and guardrails, grating and supports, plexiglass wall, miscellaneous metal work, ladders, waterproofing, patching, repairing, and testing.

Payment shall be lump sum.

Bid Item 3 – Sand and Thrust Block Removal

Lump sum price shall cover the complete cost of providing all materials, equipment and labor necessary for removing the sand and thrust block in the lower-level partition area of the booster pump station as shown on the Plans and detailed in the contract specifications including, but not limited to: removal, haul and disposal of the sand and thrust block.

Payment shall be lump sum.

Bid Item 4 – Lower-Level Piping Coating System

Lump sum price shown shall cover the complete cost of providing all labor, materials and equipment necessary for the surface preparation and coating system of the lower-level discharge piping that will be exposed after removing the sand as shown on the Plans and detailed in the contract specifications.

Payment shall be lump sum.

Bid Item 5 – Pumps and Motors 1-5

Unit price shown shall cover the complete cost of providing all labor, materials and equipment necessary for supplying and installing the vertical split case pumps, motors, and supplying spare parts as shown on the Plans and detailed in the contract specifications.

Payment shall be per pump supplied, installed, successfully tested, and placed into service.

Bid Item 6 – Pumps and Motors 6-7

Unit price shown shall cover the complete cost of providing all labor, materials and equipment necessary for supplying and installing the vertical in-line pumps, motors, and supplying spare parts as shown on the Plans and detailed in the contract specifications.

Payment shall be per pump supplied, installed, successfully tested, and placed into service.

Bid Item 7 – Mechanical

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the mechanical work shown on the Plans, and detailed in the contract specifications, including, but not limited to: demolition (removal, haul and disposal) of existing mechanical as noted in the plans; all mechanical work, equipment, and finishes associated with the systems in this bid item, and supplying spare parts as shown in the Plans and detailed in the contract specifications.

Payment shall be lump sum.

Bid Item 8 – Electrical

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the electrical work shown on the Plans, and detailed in the contract specifications.

Payment shall be lump sum.

Bid Item 9 – Automatic Control

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the automatic control system as shown on the Plans, and detailed in the contract specifications.

Payment shall be lump sum.

Bid Item 10 – Testing, Startup and Training Pumps 1-5

Unit price shown shall cover the complete cost of providing all labor and materials necessary for testing and startup of the project as shown on the Plans, and detailed in the contract specifications. Payment shall be per each pump. Partial payment of up to 20 percent of the total bid item cost is allowed once the pump is successfully tested, completely operational and staff trained as determined by the Owner and Engineer. Minimum cost for this bid item shall be $12,000.

Payment shall be per pump supplied, installed, successfully tested, and placed into service.

Bid Item 11 – Testing, Startup and Training Pumps 6-7

Unit price shown shall cover the complete cost of providing all labor and materials necessary for testing and startup of the project as shown on the Plans, and detailed in the contract specifications. Payment shall be per each pump. Partial payment of up to 50 percent of the total bid item cost is allowed once the pump is successfully tested, completely operational and staff trained as determined by the Owner and Engineer. Minimum cost for this bid item shall be $6,000.

Payment shall be per pump supplied, installed, successfully tested, and placed into service.

Bid Item 12 – Construction Records and Operation and Maintenance Manuals

Lump sum price shown shall cover the complete cost of providing all mark-up plans necessary for the Owner to create accurate construction records as detailed in the specifications. The work includes as-constructed locations and elevations of improvements, records of all mechanical and electrical equipment for maintenance purposes, and operation and maintenance manuals. The price for this work will be $7,500. Failure to comply with the construction requirements and furnish acceptable construction records will result in the deletion of this bid item by change order.

Payment for this work will not be made prior to the final payment. Payment shall be lump sum.

APPENDIX A - PREVAILING MINIMUM HOURLY WAGE RATES

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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 February 22, 2024. A copy of the applicable prevailing wage rates are also available for viewing at the City of Mercer Island, Maintenance Department located at 9611 SE 36th Street.

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APPENDIX B - 1977 BOOSTER PUMP STATION AS-BUILTS

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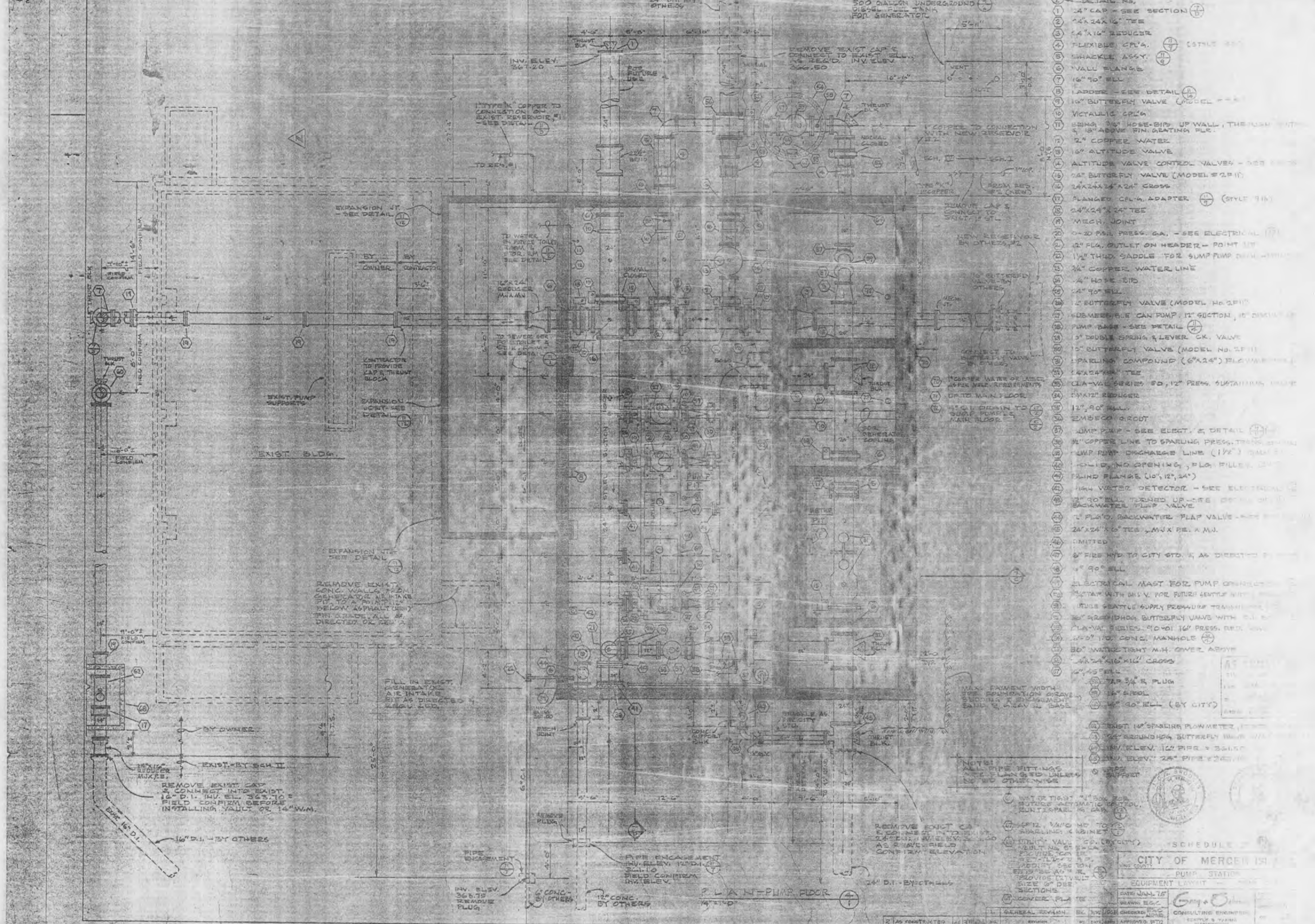
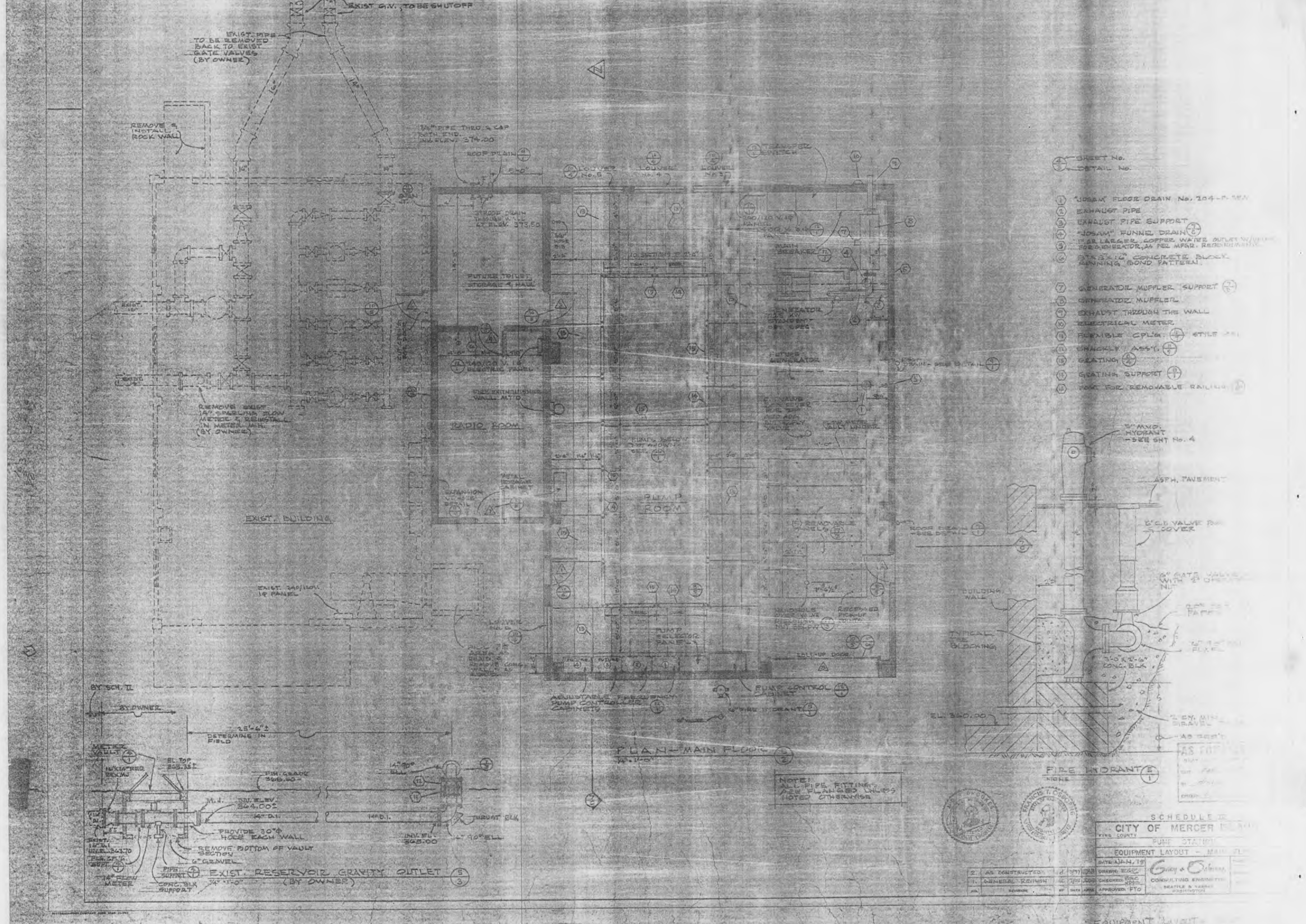
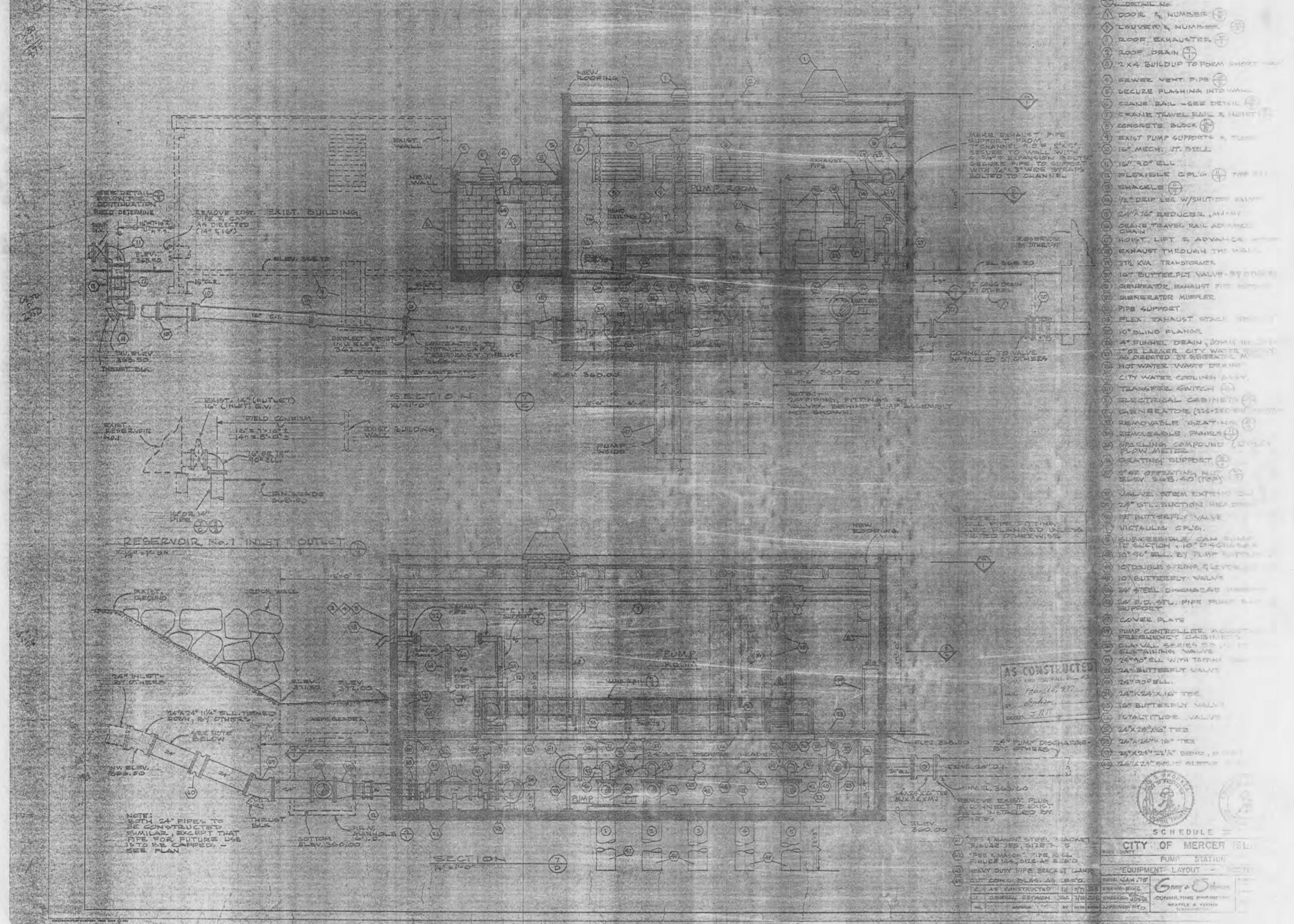
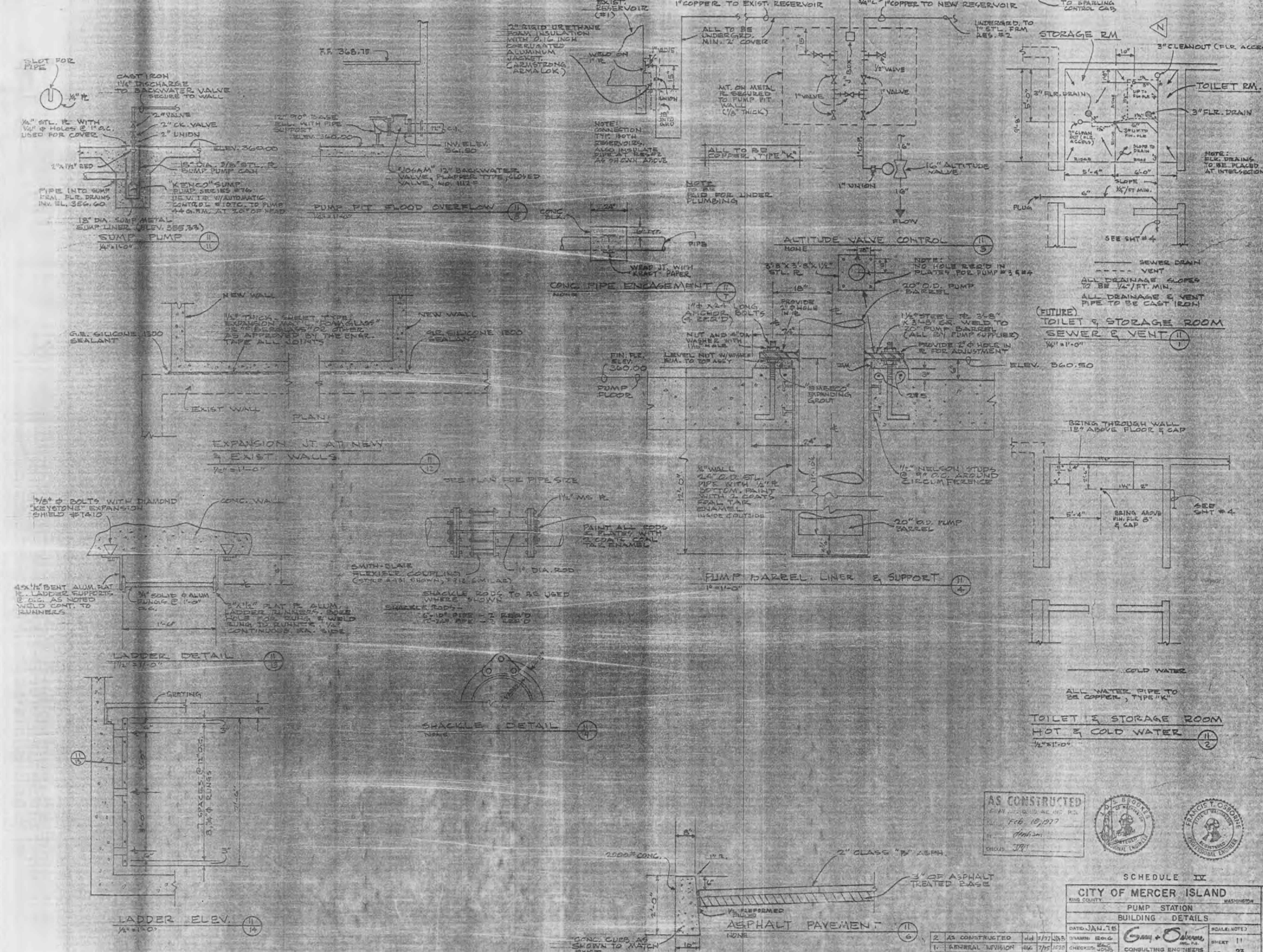


DETAIL NO.
1 24" CAP - SEE SECTION
2 24"x24"x16" TEE
3 24"x16" REDUCER
4 FLEXIBLE CPL'G.
5 SHACKLE ASSY.
6 WALL FLANGE
7 16" 90° ELL
8 LADDER - SEE DETAIL
9 16" BUTTERFLY VALVE (MODEL
10 VICTAULIC CPL'G
11 BRING 3/4" HOSE-BIBS UP WALL, THROUGH
& 18" ABOVE FIN. GRATING FLR.
12 2" COPPER WATER
13 16" ALTITUDE VALVE
14 ALTITUDE VALVE CONTROL VALVES
15 24" BUTTERFLY VALVE (MODEL #2F11)
16 24"x24"x24"x24" CROSS
17 FLANGED CPL'G. ADAPTER (STYLE 716)
18 24"x24"x24" TEE
19 MECH. JOINT
20 0-20 PSI. PRESS. GA. - SEE ELECTRICAL
21 12" FLG. OUTLET ON HEADER - POINT
22 1½" THRD. SADDLE FOR SUMP PUMP
23 3/4" COPPER WATER LINE
24 3/4" HOSE BIB
25 24" 90° ELL
26 12" BUTTERFLY VALVE (MODEL No. 2F11)
27 SUBMERSIBLE CAN PUMP. 12" SECTION
28 PUMP BASE - SEE DETAIL
29 12" DOUBLE SPRING & LEVER CK. VALVE
30 10" BUTTERFLY VALVE (MODEL No. 2F11)
31 SPARLING COMPOUND (6"x24") FLOWMETER
32 24"x24"x12" TEE
33 CLA-VAL SERIES 50, 12" PRESS. SUSTAINING VALVE
34 24"x12" REDUCER
35 12", 90° ELL
36 EMBECO GROUT
37 SUMP PUMP - SEE ELECT. & DETAIL
38 ½" COPPER LINE TO SPARLING PRESS.
39 SUMP PUMP DISCHARGE LINE (1½")
40 SOLID, NO OPENING, FLG. FILLER
41 BLIND FLANGE (10", 12", 24")
42 HIGH WATER DETECTOR - SEE ELECTRICAL
43 12" 90° ELL TURNED UP - SEE
BACKWATER FLAP VALVE
44 12" FLG'D. BACKWATER FLAP VALVE
45 24"x24"x20" TEE, MJ x PE. x M.J.
46 OMITTED
47 6" FIRE HYD. TO CITY STD. & AS DIRECTED
48 6" 90° ELL
49 ELECTRICAL MAST FOR PUMP
53 CLA-VAL SERIES 90-01 16" PRESS.
54 5'-0" I.D. CONC. MANHOLE
55 30" WATER TIGHT M.H. COVER ABOVE
56 24"x24"x16"x16" CROSS
57 16", 45° ELL
58 TAP 3/4" & PLUG
59 16" SPOOL
60 16" 90° ELL (BY CITY)
EXIST. BLDG.
PLAN - PUMP FLOOR
NOTE: ALL PIPE FITTINGS ARE FLANGED UNLESS NOTED OTHERWISE
REMOVE EXIST. CAP & CONNECT INTO EXIST. 16" D.I. INV. EL. 363.10 ± FIELD CONFIRM BEFORE INSTALLING VAULT OR 14" W.M.
16" D.I. - BY OTHERS
24" D.I. - BY OTHERS
SCHEDULE
CITY OF MERCER ISLAND
KING COUNTY
PUMP STATION
EQUIPMENT LAYOUT
DATE: JAN. 75
DRAWN: E.G.C.
APPROVED
CONSULTING ENGINEERS
SEATTLE & YAKIMA WASHINGTON
2 AS CONSTRUCTED
1 GENERAL REVISION


EXIST. G.V. TO BE SHUT OFF
EXIST. PIPE TO BE REMOVED BACK TO EXIST. GATE VALVES (BY OWNER)
REMOVE & INSTALL ROCK WALL
ROOF DRAIN
LOUVER No. 5
LOUVER No. 4
LOUVER No. 3
TRANSFER SWITCH
FUTURE TOILET STORAGE & HALL
MAIN BREAKER
GENERATOR
FUTURE GENERATOR
RADIO ROOM
EXIST. BUILDING
PUMP ROOM
PUMP SELECTOR PANEL
ROLL-UP DOOR
ADJUSTABLE FREQUENCY PUMP CONTROLLER CABINETS
PUMP CONTROL CABINET
PLAN - MAIN FLOOR
NOTE: ALL PIPE FITTINGS ARE FLANGED UNLESS NOTED OTHERWISE
EXIST. RESERVOIR GRAVITY OUTLET (BY OWNER)
METER VAULT
PROVIDE 30" Ø HOLE EACH WALL
REMOVE BOTTOM OF VAULT SECTION
6" GRAVEL
CONC. BLK SUPPORT
SHEET No.
DETAIL No.
1 "JOSAM" FLOOR DRAIN No. 204-P
2 EXHAUST PIPE
3 EXHAUST PIPE SUPPORT
4 "JOSAM" FUNNEL DRAIN
5 1" OR LARGER COPPER WATER OUTLET FOR GENERATOR, AS PER MFGR. REQUIREMENTS
6 8"x8"x16" CONCRETE BLOCK RUNNING BOND PATTERN.
7 GENERATOR MUFFLER SUPPORT
8 GENERATOR MUFFLER
9 EXHAUST THROUGH THE WALL
10 ELECTRICAL METER
11 FLEXIBLE CPL'G. STYLE
12 SHACKLE ASS'Y.
13 GRATING
14 GRATING SUPPORT
15 POST FOR REMOVABLE RAILING
5" MVO. HYDRANT -SEE SHT No. 4
ASPH. PAVEMENT
6" C.I. VALVE BOX & COVER
6" GATE VALVE
BUILDING WALL
TYPICAL BLDG.
EL. 360.00
FIRE HYDRANT
NONE
SCHEDULE II
CITY OF MERCER
KING COUNTY
PUMP STATION
EQUIPMENT LAYOUT - MAIN FL
DATE: JAN. 19
DRAWN: EGC
CHECKED:
APPROVED: FTO
2. AS CONSTRUCTED
1. GENERAL REVISION
NO. REVISION BY DATE APPD
Gray & Osborne
CONSULTING ENGINEERS
SEATTLE & YAKIMA WASHINGTON
FRANCIS T. OSBORNE
EQUIPMENT LAYOUT


PUMP ROOM
EXIST. BUILDING
NEW ROOFING
NEW WALL
SECTION
RESERVOIR No. 1 INLET & OUTLET
FIELD CONFIRM
EXIST. BUILDING WALL
CONNECT TO VALVE INSTALLED BY OTHERS
ELEV. 360.00
PUMP INSIDE
ROCK WALL
EXIST. GROUND
24" INLET BY OTHERS
24" STL. DISCHARGE HEADER
PUMP PIT
NOTE: BOTH 24" PIPES TO BE CONSTRUCTED SIMILAR, EXCEPT THAT PIPE FOR FUTURE USE IS TO BE CAPPED. - SEE PLAN
AS CONSTRUCTED
DOOR & NUMBER
LOUVER & NUMBER
ROOF EXHAUSTER
ROOF DRAIN
SEWER VENT PIPE
CRANE RAIL - SEE DETAIL
CONCRETE BLOCK
16" MECH. JT. STL.
16" 90° ELL
FLEXIBLE CPL'G.
SHACKLE
37½ KVA TRANSFORMER
GENERATOR EXHAUST PIPE
GENERATOR MUFFLER
PIPE SUPPORT
10" BLIND FLANGE
HOT WATER WASTE DRAIN
CITY WATER COOLING
TRANSFER SWITCH
ELECTRICAL CABINET
REMOVABLE GRATING
REMOVABLE PANELS
GRATING SUPPORT
24" STL. SUCTION HEADER
VICTAULIC CPL'G.
10" 90° ELL
10" BUTTERFLY VALVE
24" STEEL DISCHARGE
COVER PLATE
24" 90° ELL WITH TAPPING
24" BUTTERFLY VALVE
24" 90° ELL.
24"x24"x16" TEE
16" BUTTERFLY VALVE
16" ALTITUDE VALVE
SCHEDULE
CITY OF MERCER ISLAND
KING COUNTY
PUMP STATION
EQUIPMENT LAYOUT
DATE JAN. '75
Gray & Osborne
CONSULTING ENGINEERS
SEATTLE & YAKIMA WASHINGTON



SCHEDULE IV

CITY OF MERCER ISLAND
KING COUNTY — WASHINGTON

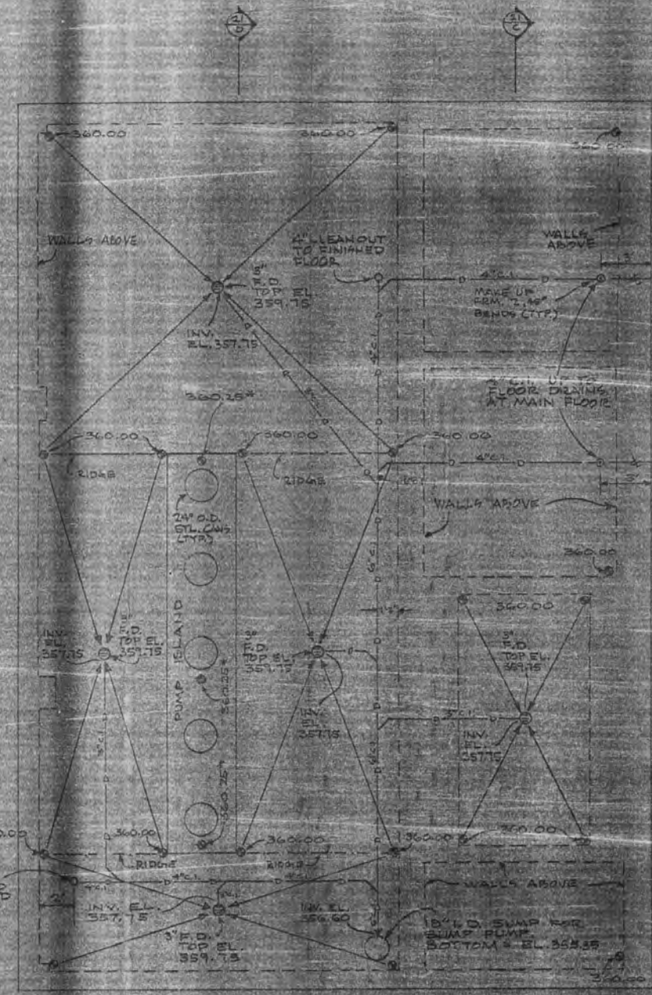
PUMP STATION
BUILDING DETAILS

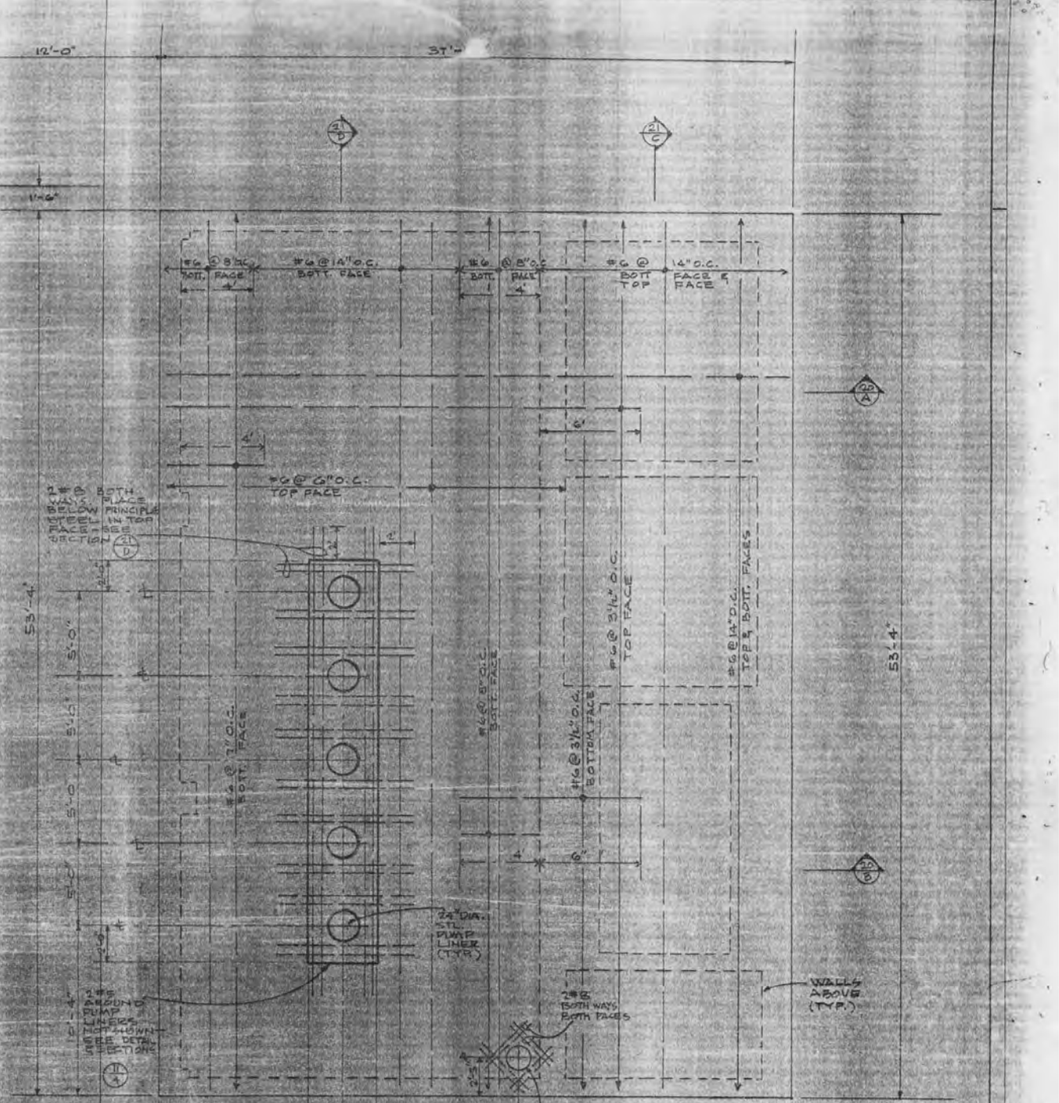
NO.	REVISION	BY	DATE	APP'D
2	AS CONSTRUCTED	dd	3/77	JDSB
1.	GENERAL REVISION	BHG	7/75	JDSB

DATE: JAN. 75
DRAWN: BHG
CHECKED: JDSB
APPROVED: FTO

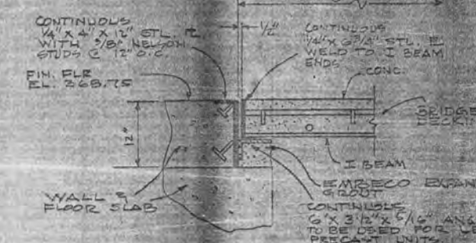
Gray & Osborne, Inc., P.S.
CONSULTING ENGINEERS
SEATTLE & YAKIMA, WASHINGTON

SCALE: NOTED
SHEET 11 OF 23
JOB NO. 69599

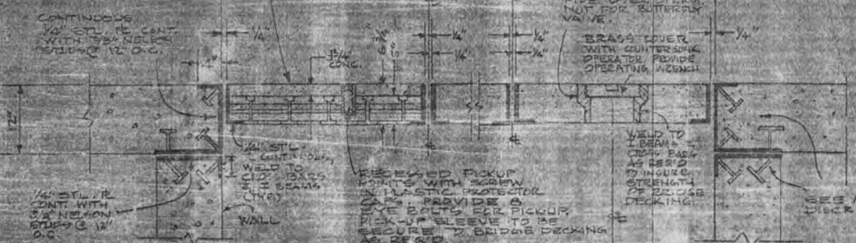




PLAN - PUMP FLOOR DRAINAGE



METER VAULT REMOVABLE PANELS



SECTION - EAST & WEST

NOTE:
METAL FLOOR SYSTEM TO BE INCLUDED IN THE BID ITEM "MISC. METALS" CONCRETE TO BE INCLUDED IN THE 3,000 psi CONCRETE ITEM.

PLAN - PUMP FLOOR

SCHEDULE IV

CITY OF MERCER ISLAND
KING COUNTY WASHINGTON

PUMP STATION

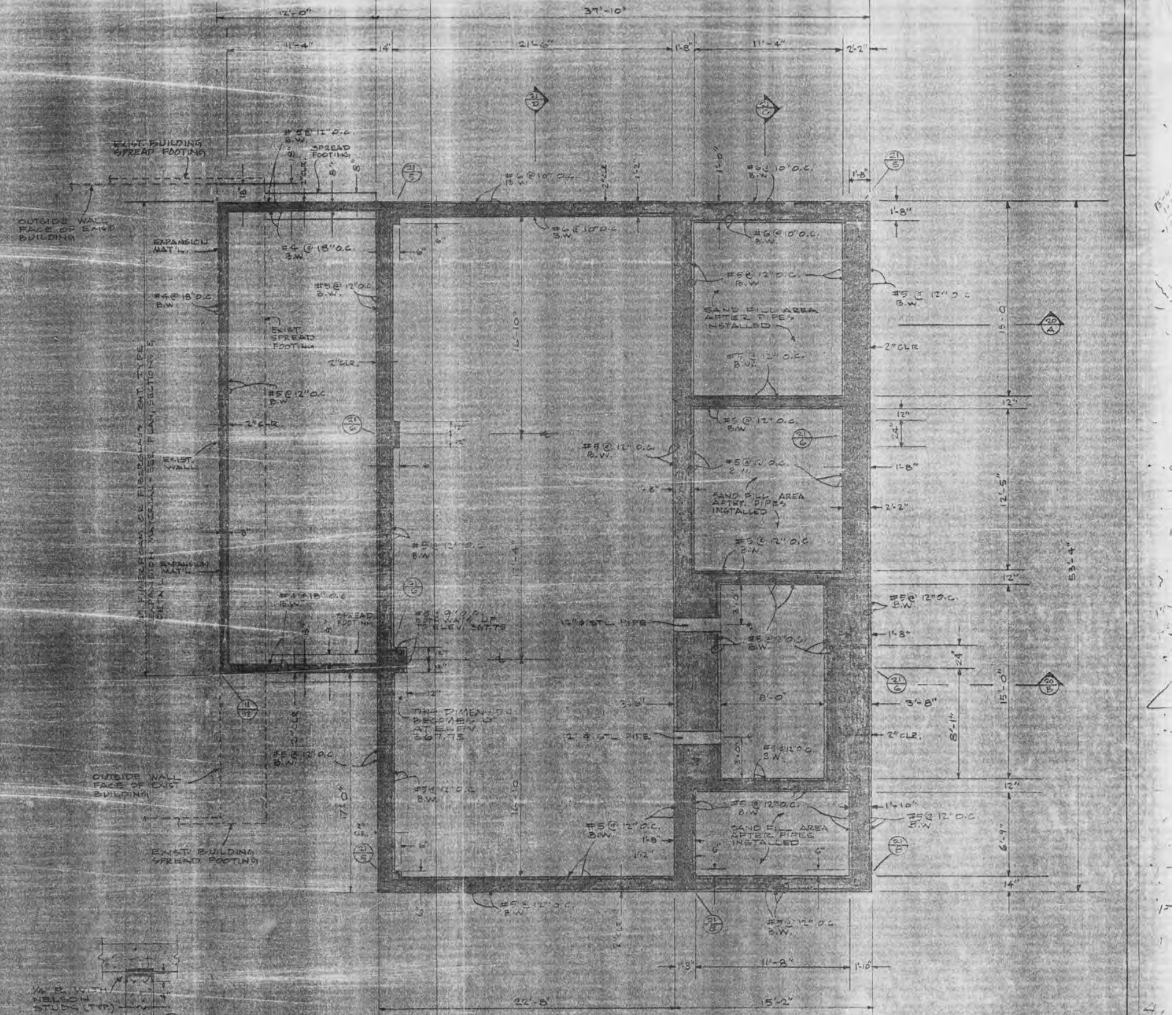
STRUCTURAL-PUMP FLOOR PLAN

NO.	REVISION	BY	DATE	APPD
2	AS CONSTRUCTED	AA	7/7/1958	
1	GENERAL REVISION	ESC	7/19	JDS

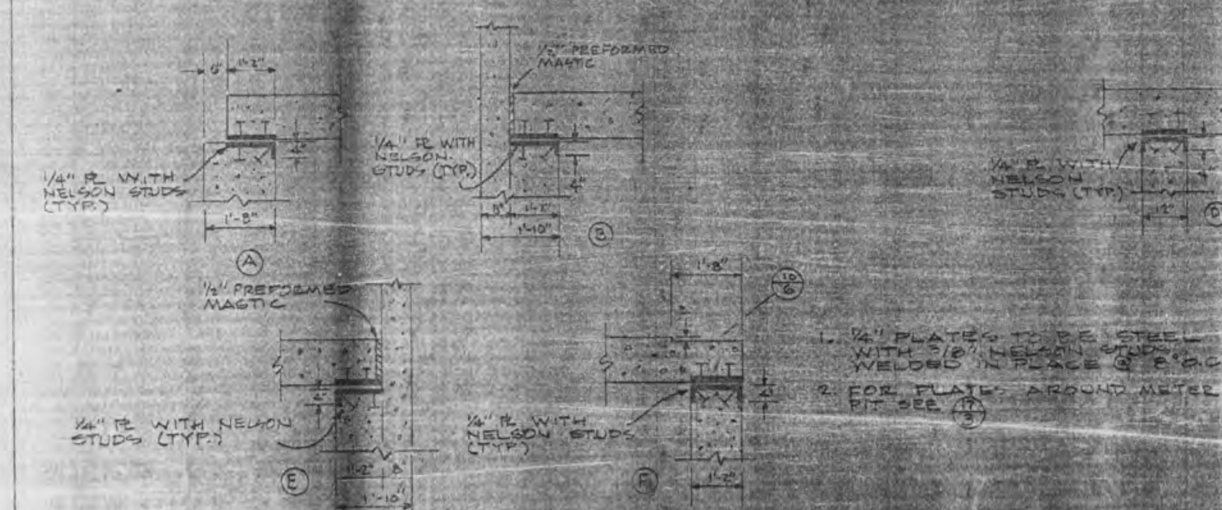
DATE: JAN. '56
DRAWN: ESC
CHECKED: JDS
APPROVED: FTO

Gray & Osborne, Inc. CONSULTING ENGINEERS SEATTLE & YAKIMA, WASHINGTON

SCALE: NOTED
SHEET 17 OF 23
JOB NO. 6515.18



PLAN — WALLS BELOW FINISHED FLOOR, ELEVATION 368.75
1/4" = 1'-0"
(18/1)



1. 1/4" PLATES TO BE STEEL WITH 3/8" NELSON STUDS WELDED IN PLACE @ 8" O.C.
2. FOR PLATES AROUND METER PIT SEE (17/3)

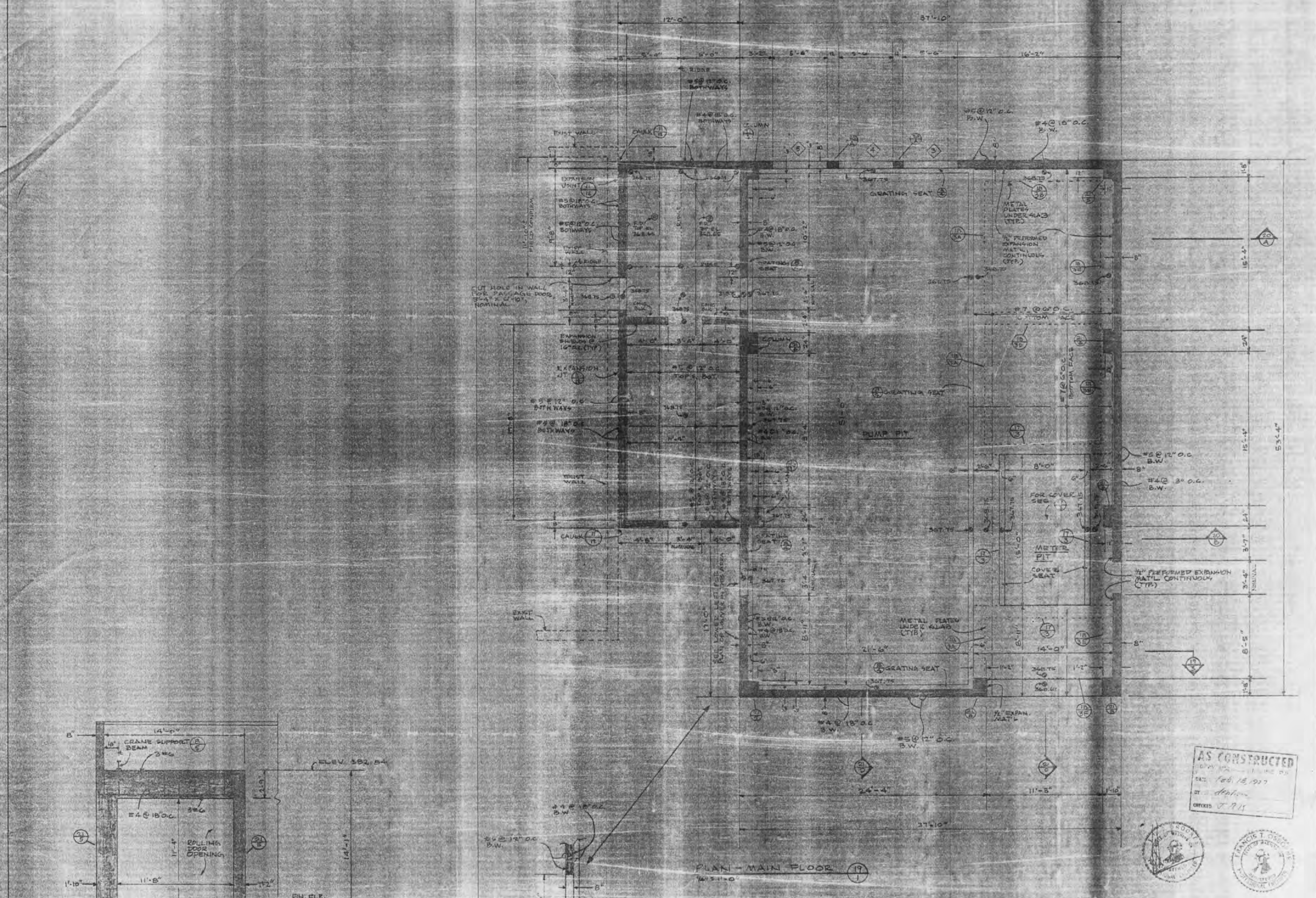
CONCRETE FLOOR CONNECTION PLATES (18/3)
1/2" = 1'-0"

AS CONSTRUCTED

SCHEDULE IV

CITY OF MERCER ISLAND — KING COUNTY, WASHINGTON						
PUMP STATION						
STRUCTURAL—PUMP STATION WALLS						
2.	AS CONSTRUCTED		2/77	JDB	DATE: JAN. 75	SCALE: NOTED
1.	GENERAL REVISION	EGC	7/75	JDB	DRAWN: EGC	SHEET 18
NO.	REVISION	BY	DATE	APPD	CHECKED: JD&B	OF 23
					APPROVED: FTD	JOB NO. 69598

Gray + Osborne, INC., P.S.
CONSULTING ENGINEERS
SEATTLE & YAKIMA, WASHINGTON



SCHEDULE IV

CITY OF MERCER ISLAND
KING COUNTY — WASHINGTON

PUMP STATION

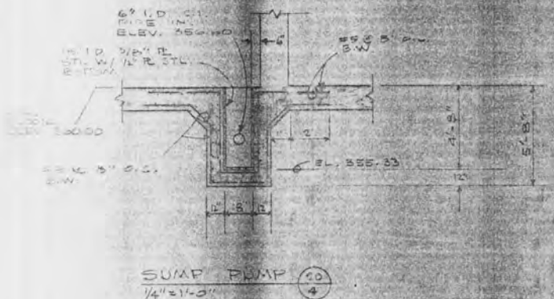
STRUCTURAL — MAIN FLOOR PLAN

2.	AS CONSTRUCTED	dd	2/77	JD&B
1.	GENERAL REVISION	E&L	7/75	JD&B
NO.	REVISION	BY	DATE	APP'D

DATE: JAN. 75
DRAWN: EGC
CHECKED: JD&B
APPROVED: PTO

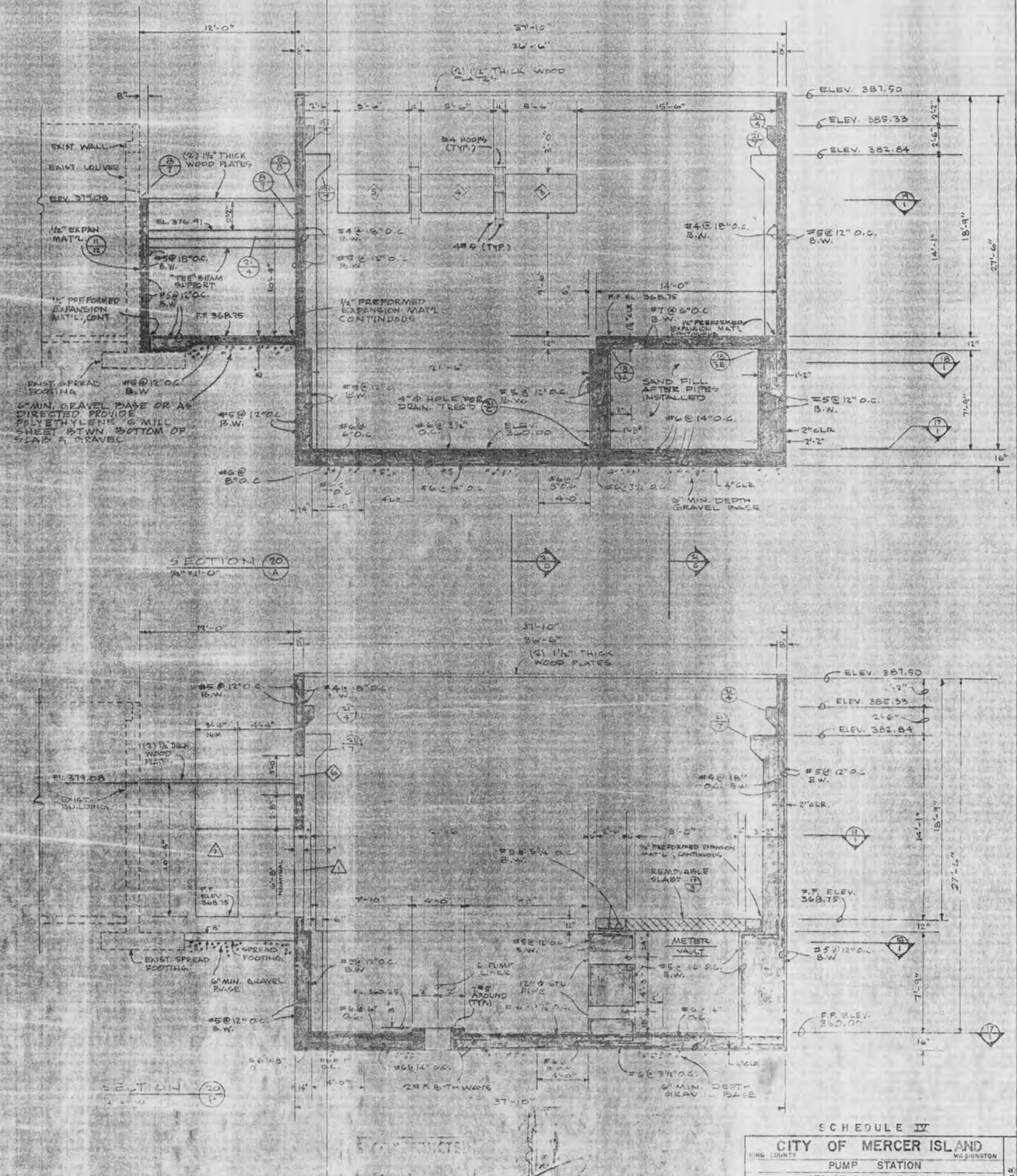
Gray & Osborne, Inc., P.E.
CONSULTING ENGINEERS
SEATTLE & YAKIMA, WASHINGTON

SCALE: NOTED
SHEET 19 OF 23



SUMP PUMP (20/4)
1/4"=1'-0"

TYP. HOLE THROUGH WALL (20/6)
NO SCALE



SECTION (20/A)
1/4"=1'-0"

SECTION (20/B)
1/4"=1'-0"

SCHEDULE IV

CITY OF MERCER ISLAND
KING COUNTY WASHINGTON

PUMP STATION
STRUCTURAL — SECTIONS

NO.	REVISION	BY	DATE	APPD
3	AS CONSTRUCTED	RK	2/17/98	
2.	REVISE STL. SIZE	SGL	7/17/96	
1.	GENERAL REVISION	SGL	7/15/96	

DATE JAN. '95
DRAWN SGL
CHECKED JDP
APPROVED FTO

Gray + Osborne, INC., P.S.
CONSULTING ENGINEERS
SEATTLE, WASHINGTON

SCALE: NOTED
SHEET 20
OF 23

JOB NO. 6-1-92

SECTION
1/4"=1'-0"

TEE BEAM CORBEL SUPPORT

COLUMN AT CORNER
1/2"=1'-0"

TYPICAL COLUMN
1/2"=1'-0"

COLUMN AT ROLLING DOOR
1/2"=1'-0"

COLUMN AT MID POINT
1/2"=1'-0"

SECTION
1/4"=1'-0"

SECTION
1/4"=1'-0"

AS CONSTRUCTED
DATE FEB 16, 1977
BY
CHECKED JRR

SCHEDULE IV

CITY OF MERCER ISLAND
KING COUNTY WASHINGTON
PUMP STATION
STRUCTURAL — SECTIONS

NO.	REVISION	BY	DATE	APP'D
E	AS CONSTRUCTED		4/77	
1.	GENERAL REVISION	EGC	7/75	

DATE: JAN. 75
DRAWN: EGC
CHECKED: JDB
APPROVED: FTD

Gray & Osborne INC. P.S.
CONSULTING ENGINEERS
SEATTLE & YAKIMA, WASHINGTON

SCALE NOTED
SHEET 21
OF 23
JOB NO. 6715.10

APPENDIX C - EXISTING PUMP CAN DEPTH DIMENSION

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4
18
3
18
2
18
1
18
15
180