TACOMA WATER
REQUEST FOR BIDS
BONNEY LAKE 950 ZONE TANK and 950/1010 ZONE PUMP STATION
SPECIFICATION NO. TW22-0084F
Tacoma Water

BID PROPOSAL, CONTRACT DOCUMENTS, AND SPECIFICATIONS FOR:

Bonney Lake 950 Reservoir Zone Tank and 950/1010 Zone Pump Station

Project No. TAC 119.107

Spring 2022

THE CONTENT OF THIS DOCUMENT, AS A MEANS OF PROFESSIONAL SERVICE, IS PROTECTED BY 17 U.S.C. § 101, ET SEQ. AS SUCH, IT SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT OR PURPOSE WITHOUT WRITTEN AUTHORIZATION FROM RH2 ENGINEERING. © 2022 RH2 ENGINEERING, INC.

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Principal
Signed: 06/03/2022

Max Freimund, PE
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Structural
Signed: 06/03/2022

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Electrical
Signed: 06/03/2022
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REQUEST FOR BIDS TW22-0084F
Bonney Lake 950 Zone Tank and 950/1010 Zone Pump Station

Submittal Deadline: 11:00 a.m., Pacific Time, Tuesday, July 26, 2022

Submittals must be received by the City’s Procurement and Payables Division prior to 11:00 a.m. Pacific Time. For electronic submittals, the City of Tacoma will designate the time of receipt recorded by our email, bids@cityoftacoma.org, as the official time of receipt. This clock will be used as the official time of receipt of all parts of electronic bid submittals.

Submittal Delivery: Sealed submittals will be received as follows:

**By Email:**
bids@cityoftacoma.org
Maximum file size: 35 MB. Multiple emails may be sent for each submittal.

The original bid bond or cashier’s check shall be sent to the Contracting Agency and received by the Contracting Agency within 7 calendar days of the bid opening or the bidder may be deemed non-responsive.

Original bid bonds or cashier’s check will be delivered to:
City of Tacoma Procurement & Payables Division
Tacoma Public Utilities
P.O. Box 11007
Tacoma, WA 98411-0007

**Bid Opening:** Held virtually each Tuesday at 11AM. Attend via this link or call 1 (253) 215 8782. Submittals in response to a RFB will be recorded as received. As soon as possible, after 1:00 PM, on the day of submittal deadline, preliminary results will be posted to www.TacomaPurchasing.org.

**Solicitation Documents:** An electronic copy of the complete solicitation documents may be viewed and obtained by accessing the City of Tacoma Purchasing website at www.TacomaPurchasing.org.

- Register for the Bid Holders List to receive notices of addenda, questions and answers and related updates.
- Click here to see a list of vendors registered for this solicitation.

**Pre-Proposal Meeting:** A pre-proposal meeting will be held 9:00 a.m., PST, Thursday, July 7, 2022 via TEAMS.

Questions for this project will be accepted by the contact listed under additional information below no later than 3:00 p.m., PST, Tuesday, July 12, 2022. Answers will be posted to www.TacomaPurchasing.org on or about July 15, 2022.

**Project Scope:** This project includes construction of a five million gallon, welded steel reservoir; installation of a City pre-purchased booster pump station; on-site emergency power generator and associated communications building on site; site utilities; and on-site stormwater pond. The project also includes construction of approximately 1,330 linear feet of 24” water main, 115 linear feet of 12” water main, and 320 linear feet of 8” water main.

**Estimate:** $8,900,000.00

**Paid Sick Leave:** The City of Tacoma requires all employers to provide paid sick leave as set forth in Title 18 of the Tacoma Municipal Code. For more information, visit our Minimum Employment Standards Paid Sick Leave webpage.
Americans with Disabilities Act (ADA Information): The City of Tacoma, in accordance with Section 504 of the Rehabilitation Act (Section 504) and the Americans with Disabilities Act (ADA), commits to nondiscrimination on the basis of disability, in all of its programs and activities.

Specification materials can be made available in an alternate format by emailing Gail Himes at ghimes@cityoftacoma.org, or by calling her collect at 253-591-5785.

Title VI Information:
“The City of Tacoma” in accordance with provisions of Title VI of the Civil Rights Act of 1964, (78 Stat. 252, 42 U.S.C. sections 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin in consideration of award.

Additional Information: Requests for information regarding the specifications may be obtained by contacting Tisha Rico, Senior Buyer by email to trico@cityoftacoma.org

Protest Policy: City of Tacoma protest policy, located at www.tacomapurchasing.org, specifies procedures for protests submitted prior to and after submittal deadline.

Meeting sites are accessible to persons with disabilities. Reasonable accommodations for persons with disabilities can be arranged with 48 hours advance notice by calling 253-502-8468.
**SUBMITTAL CHECK LIST**

This checklist identifies items to be included with your submittal. Any submittal received without these required items may be deemed non-responsive and not be considered for award.

Submittals must be received by the City of Tacoma Purchasing Division by the date and time specified in the Request for Bids page.

<table>
<thead>
<tr>
<th>The following items make up your submittal package:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid Proposal</td>
</tr>
<tr>
<td>Signature Page</td>
</tr>
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</tbody>
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<tr>
<th>After award, the following documents will be executed:</th>
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<tbody>
<tr>
<td>Contract</td>
</tr>
<tr>
<td>Performance and Payment Bonds</td>
</tr>
<tr>
<td>Certificate of Insurance and related endorsements if required</td>
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</tbody>
</table>
GENERAL PROVISIONS
(Revised December 15, 2020)

SECTION I - BIDDING REQUIREMENTS
SECTION I REQUIREMENTS ARE BINDING ON ALL RESPONDENTS.

1.01 USE AND COMPLETION OF CITY PROPOSAL SHEETS

A. Respondent’s Proposal

Each Respondent must bid exactly as specified on the Proposal sheets. All proposals must remain open for acceptance by the City for a period of at least 60 calendar days from the date of opening of the bids.

B. Alterations of Proposals Not Allowed

Proposals that are incomplete or conditioned in any way contain alternatives or items not called for in the General Provisions and Specifications, or not in conformity with law may be rejected as being nonresponsive. The City cannot legally accept any proposal containing a substantial deviation from these Specifications.

C. Filling Out City Proposal Sheets

All proposals must be completed using the proposal sheets and forms included with this specification, and the prices must be stated in figures either written in ink or typewritten. No proposal having erasures or interlineations will be accepted unless initialed by the Respondent in ink.

1.02 CLARIFICATION OF PROPOSAL FOR RESPONDENT

If a prospective Respondent has any questions concerning any part of the Proposal, he/she may submit a written request for answer of his/her questions. Any interpretation of the Proposal will be made by an Addendum duly issued and mailed or delivered to each prospective Respondent. Such addendum must be acknowledged in the proposal. The City of Tacoma will not be responsible for any other explanation or interpretation of the bid documents.

1.03 RESPONDENT’S BOND OR CERTIFIED CHECK

Each bid for construction must be accompanied either by a certified or cashier’s check for 5 percent of the total amount bid, including tax, payable to the City Treasurer, or an approved bid bond, by a surety company authorized to do business in the State of Washington, for 5 percent of the total amount bid. The person legally authorized to sign the bid must sign all bid bonds. The approved bid bond form attached to these Specifications should be used: no substantial variations from the language thereof will be accepted.

If a bid bond is used, the 5 percent may be shown either in dollars and cents, or the bid bond may be filled in as follows, “5 percent of the total amount of the accompanying proposal.”

The check of the successful Respondent will be returned after award of the Contract, acceptance of the Payment and Performance Bond and City’s receipt of the signed Contract. The checks of all other Respondents will be returned immediately upon the award of the Contract. Bid bonds will not be returned.

1.04 DELIVERY OF PROPOSALS TO THE CITY’S PURCHASING OFFICE

A. Proposal packages must be received by the City’s Procurement and Payables Division in SAP Ariba (unless another form of delivery is stated), prior to the scheduled time and date stated in the Solicitation.

B. Supplier is solely responsible for timely delivery of its Submittal.

C. Submittals received after the time stated in the solicitation will not be accepted.

D. For purposes of determining whether a Submittal has been timely received in SAP Ariba, the City’s Procurement and Payables Division will rely on the submittal clock in SAP Ariba.
1.05 LICENSES/PERMITS

A. Suppliers, if applicable, must have a Washington state business license at the time of Submittal and throughout the term of the Contract. Failure to include a Washington state business license may be grounds for rejection of the Submittal or cancellation of contract award. Information regarding Washington state business licenses may be obtained at http://bls.dor.wa.gov.

B. Upon award, it is the responsibility of the Supplier to register with the City of Tacoma's Tax and License Division, 733 South Market Street, Room 21, Tacoma, WA 98402-3768, 253-591-5252, https://www.cityoftacoma.org/government/city_departments/finance/tax_and_license/. Supplier shall obtain a business license as is required by Tacoma Municipal Code Subtitle 6C.20.

C. During the term of the Contract, Supplier, at its expense, shall obtain and keep in force any and all necessary licenses and permits.

1.06 CONTRACTOR'S STATE REGISTRATION NUMBER

Contractors for construction or public works construction are required to be licensed by the state. If the provisions of Chapter 18.27 of the Revised Code of Washington apply to the Respondent, then the Respondent's Washington State Contractor's Registration No. must accompany the bid.

1.07 BID IS NONCOLLUSIVE

The Respondent represents by the submission of the Proposal that the prices in this Bid are neither directly nor indirectly the result of any formal or informal agreement with another Respondent.

1.08 EVALUATION OF BID

A. Price, Experience, Delivery Time and Responsibility

In the evaluation of bids, the Respondent's experience, delivery time, quality of performance or product, conformance to the specifications and responsibility in performing other contracts (including satisfying all safety requirements) may be considered in addition to price. In addition, the bid evaluation factors set forth in City Code Section 1.06.262 may be considered by the City. Respondents who are inexperienced or who fail to properly perform other contracts may have their bids rejected for such cause.

B. Prequalified Electrical Contractor

Certain types of electrical construction require special expertise, experience, and prequalification of the Contractor (or subcontractor) by the City. In such cases, the Respondent must be prequalified or the Respondent must subcontract with a City prequalified electrical contractor for the specialty work.

C. Insertions of Material Conflicting with Specifications

Only material inserted by the Respondent to meet requirements of the Specifications will be considered. Any other material inserted by the Respondent will be disregarded as being nonresponsive and may be grounds for rejection of the Respondent's Proposal.

D. Correction of Ambiguities and Obvious Errors

The City reserves the right to correct obvious errors in the Respondent's proposal. In this regard, if the unit price does not compute to the extended total price, the unit price shall govern.

1.09 WITHDRAWAL OF BID

A. Prior to Bid Opening

Any Respondent may withdraw his/her Proposal prior to the scheduled bid opening time by delivering a written notice to the City's Procurement and Payables Office. The notice may be submitted in person or by mail; however, it must be received by the City's Procurement and Payables Office prior to the time of bid opening.

B. After Bid Opening

No Respondent will be permitted to withdraw his/her Proposal after the time of bid opening, as set forth in the Call for Bids, and before the actual award of the Contract, unless the award of Contract is delayed more than sixty (60) calendar days after the date set for bid opening. If a delay of more than 60 calendar days does occur, then the Respondent must submit written notice withdrawing his/her Proposal to the Purchasing Manager.
1.10 OPENING OF BIDS
At the time and place set for the opening of bids, all Proposals, unless previously withdrawn, will be publicly opened and read aloud, irrespective of any irregularities or informalities in such Proposal.

1.11 CITY COUNCIL/PUBLIC UTILITY BOARD FINAL DETERMINATION
The City Council or Public Utility Board of the City of Tacoma shall be the final judge as to which is the lowest and best bid in the interest of the City of Tacoma. The City reserves the right to reject any and all bids, waive minor deviations or informalities, and if necessary, call for new bids.

1.12 RESPONDENT’S REFUSAL TO ENTER INTO CONTRACT
Any Respondent who refuses to enter into a Contract after it has been awarded to the Respondent will be in breach of the agreement to enter the Contract and the Respondent's certified or cashier's check or bid bond shall be forfeited.

1.13 TAXES
A. Include In Proposal All Taxes
Respondent shall include in his/her Proposal all applicable local, city, state, and federal taxes. It is the Respondent's obligation to state on his/her Proposal sheet the correct percentage and total applicable Washington State and local sales tax. The total cost to the City including all applicable taxes may be the basis for determining the low Respondent.

B. Federal Excise Tax
The City of Tacoma is exempt from federal excise tax. Where applicable, the City shall furnish a Federal Excise Tax Exemption certificate.

C. City of Tacoma Business and Occupation Tax
Sub-Title 6A of the City of Tacoma Municipal Code (TMC) provides that transactions with the City of Tacoma, may be subject to the City of Tacoma’s Business and Occupation Tax. It is the responsibility of the Respondent awarded the Contract to register with the City of Tacoma’s Department of Tax and License, 733 South Market Street, Room 21, Tacoma, WA 98402-3768, telephone 253-591-5252. The City's Business and Occupation Tax amount shall not be shown separately but shall be included in the unit and/or lump sum prices bid.

1.14 FIRM PRICES/ESCALATION
Except as specifically allowed by the Special Provisions, only firm prices will be accepted.

1.15 AWARD
A. Construction and/or Labor Contracts
Unless specifically noted in the Special Provisions or Proposal sheets, all construction and/or labor contracts will be awarded to only one Respondent.

B. Supply/Equipment Contracts
The City reserves the right to award an equipment or supply contract for any or all items to one or more Respondents as the interests of the City will be best satisfied.

1.16 INCREASE OR DECREASE IN QUANTITIES
The City of Tacoma reserves the right to increase or decrease the quantities of any items under this Contract and pay according to the unit prices quoted in the Proposal (with no adjustments for anticipated profit).

1.17 EXTENSION OF CONTRACT
Contracts resulting from this specification shall be subject to extension by mutual agreement per the same prices, terms and conditions.
1.18 PAYMENT TERMS

A. Prices will be considered as net 30 calendar days if no cash discount is shown. Payment discount periods of twenty (20) calendar days or more if offered in the submittal, will be considered in determining the apparent lowest responsible submittal. Discounts will be analyzed in context of their overall cumulative effect. Invoices will not be processed for payment nor will the period of cash discount commence until receipt of a properly completed invoice and until all invoiced items are received and satisfactory performance of the Contractor has been attained. If an adjustment in payment is necessary due to damage or dispute, the cash discount period shall commence on the date final approval for payment is authorized.

B. ePayable/Credit Card Acceptance. Submittals offering ePayable/Credit card acceptance may be compared against submittals offering a prompt payment discount to evaluate the overall cumulative effect of the discount against the advantage to the City of the ePayable/Credit card acceptance, and may be considered in determining the apparent lowest responsible submittal.

1.19 PAYMENT METHOD – EPAYABLES – CREDIT CARD ACCEPTANCE – EFT/ACH ACCEPTANCE

A. Payment methods include:

• EPayables (Payment Plus). This is payment made via a virtual, single use VISA card number provided by the City’s commercial card provider. Suppliers accepting this option will receive “due immediately” payment terms. Two options for acceptance are available to suppliers. Both are accompanied by an emailed advice containing complete payment details:
  • Straight-through processing (buyer initiated). Immediate, exact payments directly deposited to supplier accounts by the City’s provider bank; the supplier does not need to know card account details.
  • Supplier retrieves card account through the secure, on-line portal provided via email notifications sent by the City’s commercial card provider.

• Credit card. Tacoma’s VISA procurement card program is supported by standard bank credit suppliers and requires that merchants abide by the VISA merchant operating rules. It provides “due immediately” payment terms.
  • Suppliers must be PCI-DSS compliant (secure credit card data management) and federal FACTA (sensitive card data display) compliant.
  • Suppliers must be set up by their card processing equipment provider (merchant acquirer) as a minimum of a Level II merchant with the ability to pass along tax, shipping and merchant references information.

• Electronic Funds Transfer (EFT) by Automated Clearing House (ACH). Standard terms are net 30 for this payment method.

• Check or other cash equivalent. Standard terms are net 30 for this payment method.

B. The City’s preferred method of payment is by ePayables (Payment Plus) followed by credit card (aka procurement card). Suppliers may be required to have the capability of accepting the City’s ePayables or credit card methods of payment. The City of Tacoma will not accept price changes or pay additional fees when ePayables (Payment Plus) or credit card is used.

C. The City, in its sole discretion, will determine the method of payment for goods and/or services as part of the Contract.

1.20 COOPERATIVE PURCHASING

The Washington State Interlocal Cooperative Act RCW 39.34 provides that other governmental agencies may purchase goods and services on this solicitation or contract in accordance with the terms and prices indicated therein if all parties are agreeable.

1.21 PUBLIC DISCLOSURE: PROPRIETARY OR CONFIDENTIAL INFORMATION

A. Respondent’s Submittals, all documents and records comprising any Contract awarded to Respondent, and all other documents and records provided to the City by Respondent are deemed public records subject to disclosure under the Washington State Public Records Act, Chapter 42.56 RCW (Public Records Act). Thus, City may be required, upon request, to disclose the Contract and documents or records related to it unless an exemption under the Public Records Act or other laws applies. In the event CITY receives a request for such disclosure, determines in its legal judgment that no applicable exemption to disclosure applies; and Respondent has complied with the requirements to Respondent has complied with the requirements to mark records considered confidential or proprietary.
as such requirements are stated below, City agrees to provide Respondent 10 days written notice of impending release. Should legal action thereafter be initiated by Respondent to enjoin or otherwise prevent such release, all expense of any such litigation shall be borne by Respondent, including any damages, attorneys’ fees or costs awarded by reason of having opposed disclosure. City shall not be liable for any release where notice was provided and Respondent took no action to oppose the release of information.

B. If Respondent provides City with records or information that Respondent considers confidential or proprietary, Respondent must mark all applicable pages or sections of said record(s) as “Confidential” or “Proprietary.” Further, in the case of records or information submitted in response to a Request for Proposals, an index must be provided indicating the affected pages or sections and locations of all such material identified Confidential or Proprietary. Information not included in the required index will not be reviewed for confidentiality or as proprietary before release. If Supplier fails to so mark or index Submittals and related records, then the City, upon request, may release said record(s) without the need to satisfy the requirements of subsection A above; and Respondent expressly waives its right to allege any kind of civil action or claim against the City pertaining to the release of said record(s). Submission of materials in response to City’s Solicitation shall constitute assent by Respondent to the foregoing procedure and Respondent shall have no claim against the City on account of actions taken pursuant to such procedure.

1.22 FEDERAL AID PROJECTS

The City of Tacoma 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 insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises as defined at 49 CFR, part 26, 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.

SECTION II - CONTRACT REQUIREMENTS

2.01 CONTRACTOR'S RESPONSIBILITY

A. Contract Documents

The Respondent to whom the Contract is awarded, hereinafter called the Contractor, shall enter into a Contract with the City of Tacoma, within 10 days after receipt from the City of Tacoma of a properly prepared Contract. In addition, the Contractor will do all things required to promptly perform this Contract pursuant to the terms of this Contract. Certain contracts for supplies, goods or equipment may use the City Purchase Order in place of a formal contract document.

B. Surety Bonds

Except as modified by the Special Provisions, the Respondent to whom the Contract is awarded shall provide a payment and performance bond, including power of attorney, for 100 percent of the amount of his/her bid (including sales taxes), to insure complete performance of the Contract including the guarantee. The bonds must be executed by a surety company licensed to do business in the State of Washington. For a supply-type contract, a cashier’s check or cash may be substituted for the bonds; however, this cash or cashier’s check must remain with the City through the guarantee period and any interest on said amount shall accrue to the City.

C. Independent Contractor

Contractor is an independent contractor; no personnel furnished by the Contractor shall be deemed under any circumstances to be the agent or servant of the City. Contractor shall be fully responsible for all acts or omissions of Subcontractors and its and their suppliers and of persons employed by them, and shall be specifically responsible for sufficient and competent supervision and inspection to assure compliance in every respect with the Contract. There shall be no contractual relationship between any Subcontractors or supplier and the City arising out of or by virtue of this agreement. No provision of the Contract is intended or is to be construed to be for the benefit of any third party.
2.02 CONFLICTS IN SPECIFICATIONS

Anything mentioned in the Specifications and not shown on the Drawings and anything on the Drawings and not mentioned in the Specifications shall be of like effect and shall be understood to be shown and/or mentioned in both. In case of differences between Drawings and Specifications, the Specifications shall govern. In addition, in the event of any conflict between these General Provisions, the Special Provisions, the Technical Provisions and/or the Proposal pages, the following order of precedence shall control:

1. Proposal pages prevail if they conflict with the General, Special or Technical Provisions.
3. Technical Provisions prevail if they are in conflict with the General Provisions.

In case of discrepancy of figures between Drawings, Specifications or both, the matter shall immediately be submitted to the Engineer for determination. Failure to submit the discrepancy issue to the Engineer shall result in the Contractor's actions being at his/her own risk and expense. The Engineer shall furnish from time to time such detailed drawings and other information as he/she may consider necessary.

2.03 INSPECTION

A. Of the Work

All materials furnished and work done shall be subject to inspection.

The Inspector administering the Contract shall at all times have access to the work wherever it is in progress or being performed, and the Contractor shall provide proper facilities for such access and inspection. Such inspection shall not relieve the Contractor of the responsibility of performing the work correctly, utilizing the best labor and materials in strict accordance with the Specifications of this Contract. All material or work approved and later found to be defective shall be replaced without cost to the City of Tacoma.

B. Inspector's Authority

The inspector shall have power to reject materials or workmanship which do not fulfill the requirements of these Specifications, but in case of dispute the Contractor may appeal to the Director or Superintendent, whose decision shall be final. The word “Director” means the Director of the City of Tacoma General Government department that is administering the contract. The word “Superintendent” means the Superintendent of the City of Tacoma, Department of Public Utilities Division that is administering the contract.

The Contract shall be carried out under the general control of the representative of the particular City Department or Division administering the Contract, who may exercise such control over the conduct of the work as may be necessary, in his or her opinion, to safeguard the interest of the City of Tacoma. The Contractor shall comply with all orders and instructions given by the representative of the particular Department or Division administering the Contract in accordance with the terms of the Contract.

Provided, that for the purposes of construction contracts, such control shall only apply (a) to the extent necessary to ensure compliance with the provisions of this contract, and (b) to the extent necessary to fulfill any nondelegable duty of the City for the benefit of third parties not engaged in promoting the activity of this contract.

Nothing herein contained, however, shall be taken to relieve the Contractor of his/her obligations or responsibilities under the Contract.

2.04 FEDERAL, STATE AND MUNICIPAL REGULATIONS

All federal, state, municipal and/or local regulations shall be satisfied in the performance of all portions of this Contract. The Contractor shall be solely responsible for all violations of the law from any cause in connection with work performed under this Contract.
2.05 INDEMNIFICATION

A. Indemnification

Contractor acknowledges that pursuant to the terms of this agreement, Contractor is solely and totally responsible for the safety of all persons and property in the performance of this Contract. To the greatest extent allowed by law, Contractor assumes the risk of all damages, loss, cost, penalties and expense and agrees to indemnity, defend and hold harmless the City of Tacoma, from and against any and all liability which may accrue to or be sustained by the City of Tacoma on account of any claim, suit or legal action made or brought against the City of Tacoma for the death of or injury to persons (including Contractor's or subcontractor's employees) or damage to property involving Contractor, or subcontractor(s) and their employees or agents, arising out of and in connection with or incident to the performance of the Contract including if the City is found to have a nondelegable duty to see that work is performed with requisite care, except for injuries or damages caused by the sole negligence of the City. In this regard, Contractor recognizes that Contractor is waiving immunity under industrial Insurance Law, Title 51 RCW. This indemnification extends to the officials, officers and employees of the City and also includes attorney's fees and the cost of establishing the right to indemnification hereunder in favor of the City of Tacoma. In addition, within the context of competitive bidding laws, it is agreed that this indemnification has been mutually negotiated. Provided however, this provision is intended to be applicable to the parties to this agreement and it shall not be interpreted to allow a Contractor's employee to have a claim or cause of action against Contractor.

B. Limitation of Liability for Primarily Supply-Type Contracts

In all contracts where the total cost of the supply of materials and/or equipment constitute at least 70 percent of the total contract price (as determined by the City), the City agrees that it will not hold the contractor, supplier or manufacturer liable for consequential damages for that part of the contract related to the manufacture and/or design of the equipment, materials or supplies.

2.06 CONTRACTOR'S INSURANCE

A. During the course and performance of a Contract, Contractor will provide proof and maintain the insurance coverage in the amounts and in the manner specified in the City of Tacoma Insurance Requirements as is applicable to the services, products, and deliverables provided under the Contract. The City of Tacoma Insurance Requirements document, if issued, is fully incorporated into the Contract by reference.

B. Failure by City to identify a deficiency in the insurance documentation provided by Contractor or failure of City to demand verification of coverage or compliance by Contractor with these insurance requirements shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

2.07 ASSIGNMENT AND SUBLETTING OF CONTRACT

C. Assignment

The Contract shall not be assigned except with the consent of the Superintendent or his/her designee. Requests for assignment of this contract must be in writing with the written consent of the surety, and the request must show the proposed person or organization to which the contract is assigned is capable, experienced and equipped to perform such work. The proposed substitute person or organization may be required to submit to the City information as to his/her experience, financial ability and give statements covering tools, equipment, organization, plans and methods to fulfill any portion of the Contract prior to approval of assignment.

D. Subletting

The Contract shall not be sublet except with the written consent of the Superintendent or his/her designee. In the event that a prequalified electrical contractor is necessary to perform certain portions of the work, such work may be subcontracted with a City prequalified electrical contractor for the type of work involved.

Requests for subletting of this Contract must be in writing with the written consent of the Surety, and the request must show the proposed person or organization to which the Contract is sublet is capable, experienced and equipped to perform such work. The proposed substitute person or organization may be required to submit to the City information as to his experience, financial ability and give statements covering tools, equipment, organization, plans and methods to fulfill any portion of the Contract prior to approval of subletting.
The written consent approving the subletting of the Contract shall not be construed to relieve the Contractor of his/her responsibility for the fulfillment of the Contract. The Subcontractor shall be considered to be the agent of the Contractor and the Contractor agrees to be responsible for all the materials, work and indebtedness incurred by the agent.

A subcontractor shall not sublet any portion of a subcontract for work with the City without the written consent of the City.

2.08 DELAY

E. Extension of Time

With the written approval of the Superintendent or his/her designee, the Contractor may be granted additional time for completion of the work required under this Contract, if, in the Superintendent's opinion the additional time requested arises from unavoidable delay.

F. Unavoidable Delay

Unavoidable delays in the prosecution of the work shall include only delays from causes beyond the control of the Contractor and which he/she could not have avoided by the exercise of due care, prudence, foresight and diligence. Delay caused by persons other than the Contractor, Subcontractors or their employees will be considered unavoidable delays insofar as they necessarily interfere with the Contractor's completion of the work, and such delays are not part of this Contract.

Unavoidable delay will not include delays caused by weather conditions, surveys, measurements, inspections and submitting plans to the Engineer of the particular Division involved in administering this Contract.

2.09 GUARANTEE

A. Guarantee for Construction, Labor or Services Contract

Neither the final certificate of payment or any provision in the Contract Documents, nor partial or entire occupancy of the premises by the City, shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified. The City will give notice of observed defects with reasonable promptness.

If it has been discovered, before payment is required under the terms of the Contract, that there is a failure to comply with any of the terms and provisions of this Contract, the City has the right and may withhold payment.

In case of a failure of any part of the work, materials, labor and equipment furnished by the Contract or to fully meet all of the requirements of the Contract, the Contractor shall make such changes as may be necessary to fully meet all of the specifications and requirements of this Contract. Such changes shall be made at the Contractor's sole cost and expense without delay and with the least practicable inconvenience to the City of Tacoma. Rejected material and equipment shall be removed from the City's property by and at the expense of the Contractor.

B. Guarantee for Supply Contracts

Unless a longer period is specified, the supplier and/or manufacturer of the supplies, materials and/or equipment furnished pursuant to this Contract agrees to correct any defect or failure of the supplies, materials and/or equipment which occurs within one year from the date of: (1) test energization if electrical or mechanical equipment; (2) commencement of use if supplies or materials, provided, however, said guarantee period shall not extend beyond eighteen months after date of receipt by the City. All of the costs (including shipping, dismantling and reinstallation) of repairs and/or corrections of defective or failed equipment, supplies and/or material is the responsibility of the supplier and/or manufacturer.

When the supplier is not the manufacturer of the item of equipment, supplier agrees to be responsible for this guarantee and supplier is not relieved by a manufacturer's guarantee.
C. Guarantee Period Extension

The Contract guarantee period shall be suspended from the time a significant defect is first documented by the City until the work or equipment is repaired or replaced by Contractor and accepted by the City. In addition, in the event less than ninety (90) days remain on the guarantee period (after recalculating), the guarantee period shall be extended to allow for at least ninety (90) days from the date the work or equipment is repaired or replaced and accepted by the City.

2.10 DEDUCTIONS FOR UNCORRECTED WORK

If the City of Tacoma deems it expedient to correct work not done in accordance with the terms of this Contract, an equitable deduction from the Contract price shall be made.

2.11 CITY OF TACOMA’S RIGHT TO TERMINATE CONTRACT

A. Termination for Convenience

1. Supplies. The City may terminate a Contract for supplies at any time upon prior written notice to Contractor. Upon the effective date of termination specified in such notice, and payment by the City, all conforming supplies, materials, or equipment previously furnished hereunder shall become its property.

2. Services. The City may terminate a Contract for services at any time, with or without cause, by giving 10-business day’s written notice to Supplier. In the event of termination, all finished and unfinished work prepared by Supplier pursuant to the Contract shall be provided to the City. In the event City terminates the Contract due to the City’s own reasons and without cause due to Supplier’s actions or omissions, the City shall pay Supplier the amount due for actual work and services necessarily performed under the Contract up to the effective date of termination, not to exceed the total compensation set forth in the Contract.

B. Termination for Cause

1. The City may terminate a Contract for either services or supplies in the event of any material breach of any of the terms and conditions of the Contract if the Contractor’s breach continues in effect after written notice of breach and 30 days to cure such breach and fails to cure such breach.

2. Bankruptcy. If the Contractor should be adjudged as bankrupt, or makes a general assignment for the benefit of creditors, or a receiver should be appointed on account of his/her insolvency, or if he/she or any of his/her subcontractors should violate any of the provisions of the Contract, or if the work is not being properly and diligently performed, the City of Tacoma may serve written notice upon the Contractor and Surety, executing the Payment and Performance Bond, of its intention to terminate the Contract; such notice will contain the reasons for termination of the Contract, and unless within 10 days after the serving of such notice, such violation shall cease and an arrangement satisfactory to the City of Tacoma for correction thereof shall be made, the Contract shall, upon the expiration of said 10 days, cease and terminate and all rights of the Contractor hereunder shall be forfeited. In the event the Contract is terminated for cause, Contractor shall not be entitled to any lost profits resulting therefrom.

3. Notice. In the event of any such termination for cause, the City of Tacoma shall immediately send (by regular mail or other method) written notice thereof to the Surety and the Contractor. Upon such termination the Surety shall have the right to take over and perform the Contract, provided however, the Surety must provide written notice to the City of its intent to complete the work within 15 calendar days of its receipt of the original written notice (from the City) of the intent to terminate. Upon termination and if the Surety does not perform the work, the City of Tacoma may take over the work and prosecute the same to completion by any method it may deem advisable, for the account of and at the expense of the Contractor, and the Contractor and the Surety shall be liable to the City of Tacoma for all cost occasioned to the City of Tacoma thereby. The City of Tacoma may without liability for doing so, take possession of and utilize in completing the work, such materials, equipment, plant and other property belonging to the Contractor as may be on the site of the work and necessary therefore.
2.12 LIENS
In the event that there are any liens on file against the City of Tacoma, the City of Tacoma shall be entitled to withhold final or progress payments to the extent deemed necessary by the City of Tacoma to properly protect the outstanding lien claimants until proper releases have been filed with the City Clerk.

2.13 LEGAL DISPUTES
A. General
Washington law shall govern the interpretation of the Contract. The state or federal courts located in Pierce County Washington shall be the sole venue of any mediation, arbitration, or litigation arising out of the Contract.

Respondents providing submittals from outside the legal jurisdiction of the United States of America will be subject to Tacoma’s City Attorney’s Office (CAO) opinion as to the viability of possible litigation pursuant to a contract resulting from this Specification. If it is the opinion of the CAO that any possible litigation would be beyond reasonable cost and/or enforcement, the submittal may be excluded from evaluation.

B. Attorney Fees
For contracts up to $250,000, which become the subject of litigation or arbitration, the substantially prevailing party may be entitled to reasonable attorney fees, as provided in RCW 39.04.240. Provided, however, the attorney fee hourly rate for the City of Tacoma’s assistant city attorneys is agreed to be $150 per hour or the same as the hourly rate for Contractor’s legal counsel, whichever is greater.

2.14 DELIVERY
Prices must be quoted F.O.B. destination, freight prepaid and allowed with risk of loss during transit remaining with Contractor/Supplier (unless otherwise stated in these Specifications) to the designated address set forth in these Specifications.

Deliveries shall be between 9:00 a.m. and 3:30 p.m.; Monday through Friday only (except legal holidays of the City of Tacoma).

Legal holidays of the City of Tacoma are:

<table>
<thead>
<tr>
<th>Holiday</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Year's Day</td>
<td>January 1</td>
</tr>
<tr>
<td>Martin Luther King's Birthday</td>
<td>3rd Monday in January</td>
</tr>
<tr>
<td>Washington's Birthday</td>
<td>3rd Monday in February</td>
</tr>
<tr>
<td>Memorial Day</td>
<td>Last Monday in May</td>
</tr>
<tr>
<td>Independence Day</td>
<td>July 4</td>
</tr>
<tr>
<td>Labor Day</td>
<td>1st Monday in September</td>
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<tr>
<td>Veteran's Day</td>
<td>November 11</td>
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<tr>
<td>Thanksgiving Day</td>
<td>4th Thursday of November</td>
</tr>
<tr>
<td>Day after Thanksgiving</td>
<td>4th Friday of November</td>
</tr>
<tr>
<td>Christmas Day</td>
<td>December 25</td>
</tr>
</tbody>
</table>

When any of these holidays occur on Saturday or Sunday, the preceding Friday or the following Monday, respectively, is a legal holiday for the City of Tacoma.

2.15 PACKING SLIPS AND INVOICES
A. Packing slips and shipping notices shall be sent to the specific City Division or Department receiving the item(s) at the address stated in City’s Solicitation or as otherwise stated in the Contract and include complete description of items, contents of items if crated or cased, quantity, shipping point, carrier, bill of lading number and City of Tacoma purchase order.

B. Each invoice shall show City of Tacoma purchase order number, release number if applicable, quantity, unit of measure, item description, unit price and extended price for each line if applicable, services and deliverables provided if applicable. Line totals shall be summed to give a grand total to which sales tax shall be added, if applicable.

1. For transactions conducted in SAP Ariba, invoices shall be submitted through Ariba.
2. For invoices paid by ACH or by check, unless stated otherwise, invoices shall be electronically submitted by email with corresponding PO number listed in the subject line to accountspayable@cityoftacoma.org.
3. For invoices paid by credit card, invoices shall also display the last name of the cardholder and last four digits (only) of the card number (e.g., Jones/6311). Unless stated otherwise, invoices shall be electronically submitted by email with corresponding PO number listed in the subject line to (do not combine different POs into one invoice or charge) to pcardadmin@cityoftacoma.org.

2.16 APPROVED EQUALS

A. Unless an item is indicated as "No substitute", special brands, when named, are intended to describe the standard of quality, performance or use desired. Equal items will be considered by the City, provided that the respondent specifies the brand and model, and provides all descriptive literature, independent test results, product samples, local servicing and parts availability to enable the City to evaluate the proposed "equal".

B. The decision of the City as to what items are equal shall be final and conclusive. If the City elects to purchase a brand represented by the respondent to be an "equal", the City's acceptance of the item is conditioned on the City's inspection and testing after receipt. If, in the sole judgment of the City, the item is determined not to be an equal, the item shall be returned at the respondent's expense.

C. When a brand name or level of quality is not stated by the respondent, it is understood the offer is exactly as specified. If more than one brand name is specified, respondents must clearly indicate the brand and model/part number being bid.

2.17 ENTIRE AGREEMENT

This written contract represents the entire Agreement between the parties and supersedes any prior oral statements, discussions or understandings between the parties.

2.18 CODE OF ETHICS

The City's Code of Ethics, Chapter 1.46, Tacoma Municipal Code, provides ethical standards for City personnel and prohibits certain unethical conduct by others including respondents and contractors. Violation of the City's Code of Ethics will be grounds for termination of this contract.

2.19 FEDERAL FINANCIAL ASSISTANCE

If federal funds, including FEMA financial assistance to the City of Tacoma, will be used to fund, pay or reimburse all or a portion of the Contract, Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives and the following clauses will be incorporated into the Contract:

A. EQUAL EMPLOYMENT OPPORTUNITY During the performance of this Contract, Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

1. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other
employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

B. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (B)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (B)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
3. Withholding for unpaid wages and liquidated damages. The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (B)(2) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (B)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (B)(1) through (4) of this section.

C. CLEAN AIR ACT

1. Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.

2. Contractor agrees to report each violation to the City and understands and agrees that the City will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

3. Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

D. FEDERAL WATER POLLUTION CONTROL ACT

1. Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

2. Contractor agrees to report each violation to the City, understands, and agrees that the City will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

3. Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

E. DEBARMMENT AND SUSPENSION

1. This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor’s principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

2. Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

3. This certification is a material representation of fact relied upon by the City. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (insert name of recipient/subrecipient/applicant), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

4. Contractor agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.
F. **BYRD ANTI-LOBBYING AMENDMENT**

1. Contractors who apply or bid for an award of $100,000 or more shall file the required certification with City. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the City.

2. If applicable, Contractor must sign and submit to the City the following certification:

**APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING**

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor, __________, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap.38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

___________________________________
Signature of Contractor’s Authorized Official

___________________________________
Name and Title of Contractor's Authorized Official

___________ Date
G. PROCUREMENT OF RECOVERED MATERIALS

1. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:
   a. Competitively within a timeframe providing for compliance with the contract performance schedule;
   b. Meeting contract performance requirements; or
   c. At a reasonable price.

2. Information about this requirement, along with the list of EPA-designated items, is available at EPA’s Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

3. Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

[Section III is for contracts that involve construction and/or labor, and are not applicable to contracts solely for material/supply purchases.]

GENERAL PROVISIONS

SECTION III - CONSTRUCTION AND/OR LABOR CONTRACTS

SECTION III REQUIREMENTS APPLY ONLY TO CONSTRUCTION AND/OR LABOR CONTRACTS AND ARE IN ADDITION TO APPLICABLE REQUIREMENTS CONTAINED IN SECTION II CONTRACT REQUIREMENTS.

3.01 RESPONDENT’S DUTY TO EXAMINE

The Respondent agrees to be responsible for examining the site(s) and to have compared them with the Specifications and Contract Drawings, and to be satisfied as to the facilities and difficulties attending the execution of the proposed Contract (such as uncertainty of weather, floods, nature and condition of materials to be handled and all other conditions, obstacles and contingencies) before the delivery of his/her Proposal. No allowance will be subsequently made by the City on behalf of the Respondent by reason of any error or neglect on Respondent’s part, for such uncertainties as aforesaid.

3.02 PERMITS

Except when modified by the Special Provisions, the Contractor shall procure and pay for all permits and licenses necessary for the completion of this Contract including those permits required by the City of Tacoma. The City will obtain county or state road crossing permits if required. In the event a necessary permit is not obtained, the Contractor will not be permitted to work on items subject to said permit and any delays caused thereby will not be subject to extra compensation or extensions.

3.03 NOTIFICATION OF OTHER GOVERNMENTAL AGENCIES AND UTILITIES WHEN UNDERGROUND WORK IS INVOLVED

The Contractor shall notify all other affected governmental agencies and utilities whenever underground work is done under the terms of this Contract. The Contractor is required to obtain permission of the appropriate public and private utilities and governmental agencies before performing underground work pursuant to the terms of this Contract. The Contractor is required to call "one call" at 1-800-424-5555 for all work involving excavation or digging more than 12 inches beneath ground or road surface.

The City may have indicated on the plans and specifications the existence of certain underground facilities that are known to the City department responsible for this Contract. It is the Contractor's responsibility to fully comply with the Underground Utility Locate Law, Chapter 19.122 RCW. If the site conditions are "changed or differing" as defined by RCW 19.122.040(l), the Contractor may pursue the party responsible for not properly marking or identifying the underground facility. The Contractor agrees not to file any claim or legal action against the City (department responsible for this Contract) for said "changed or differing" conditions unless said City department is solely responsible for the delay or damages that the Contractor may have incurred.
3.04 TRENCH EXCAVATION BID ITEM

In the event that “trench excavation” in excess of four feet requires a safety system pursuant to Washington State law and safety shoring, sloping, sheeting, or bracing is used, a separate bid item should be set forth in the Proposal for this work. If a separate bid item is not set forth in the Proposal pages, said installed safety system shall be paid at $3.00 per lineal foot of trench, which unit price includes both sides of the trench.

3.05 SAFETY

A. General

The Contractor shall, at all times, exercise adequate precautions for the safety of all persons, including its employees and the employees of a Subcontractor, in the performance of this Contract and shall comply with all applicable provisions of federal, state, county and municipal safety laws and regulations. It is the Contractor's responsibility to furnish safety equipment or to contractually require Subcontractors to furnish adequate safety equipment relevant to their responsibilities.

The Contractor shall obtain the necessary line clearance from the inspector before performing any work in, above, below or across energized Light Division circuits.

The Inspector and/or Engineer may advise the Contractor and the Safety Officer of any safety violations. It is the Contractor's responsibility to make the necessary corrections. Failure to correct safety violations is a breach of this Contract and, as such, shall be grounds for an order from the Safety Officer, Inspector or Engineer to cease further work and remove from the job site until the condition is corrected. Time and wages lost due to such safety shutdowns shall not relieve the Contractor of any provisions of Section 3.14 of this Specification and shall be at the sole cost of the Contractor. The purpose of this authority to stop work is to enforce the contract and not to assume control except to the extent necessary to ensure compliance with the provisions of this contract.

Any of the above actions by employees of the City of Tacoma shall in no way relieve the Contractor of his/her responsibility to provide for the safety of all persons, including his/her employees.

B. Work Hazard Analysis Report

The Contractor will be required to complete a work hazard analysis report. This report shall outline how the Contractor proposes to satisfy all safety laws and regulations involved in performing the work. This report shall be completed and submitted to the City Safety Officer before the pre-construction conference. A copy of the report shall be maintained at the work site (accessible to the supervisor).

3.06 PROTECTION OF WORKERS AND PROPERTY

The Contractor shall erect and maintain good and sufficient guards, barricades and signals at all unsafe places at or near the work and shall, in all cases, maintain safe passageways at all road crossings, and crosswalks, and shall do all other things necessary to prevent accident or loss of any kind.

The Contractor shall protect from damage all utilities, improvements, and all other property that is likely to become displaced or damaged by the execution of the work under this Contract.

The Contractor is responsible for all roads and property damaged by his/her operations as shall be determined by the Engineer administering this Contract. The Contractor shall be responsible for repairing all damage to roads caused by his/her operations to the satisfaction of the particular governmental body having jurisdiction over the road.

3.07 CONTRACTOR - SUPERVISION AND CHARACTER OF EMPLOYEES

A. Superintendent to Supervise Contractor's Employees

The Contractor shall keep on his/her work, during its progress, a competent superintendent and any necessary assistants, all of whom must be satisfactory to the City of Tacoma. The Contractor's superintendent shall not be changed except with the consent of the City of Tacoma, unless the Contractor's superintendent proves to be unsatisfactory to the Contractor and ceases to be in his/her employ. The Contractor's superintendent shall represent the Contractor in his/her absence and all directions given to him/her shall be binding as if given to the Contractor directly. The Contractor shall give efficient supervision to the work, using his/her best skill and attention.
B. Character of Contractor’s Employees
The Contractor shall employ only competent, skillful, faithful and orderly persons to do the work, and whenever the Engineer administering the Contract shall notify the Contractor in writing that any person on the work is, in his or her opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, the Contractor shall forthwith discharge such persons from the work and shall not again employ him or her on this Contract.

3.08 CONTRACTOR’S COMPLIANCE WITH THE LAW

A. Hours of Labor
The Contractor and Subcontractors shall be bound by the provisions of RCW Chapter 49.28 (as amended) relating to hours of labor. Except as set forth in the Special Provisions, eight (8) hours in any calendar day shall constitute a day's work on a job performed under this Contract.

In the event that the work is not performed in accordance with this provision and in accordance with the laws of the State of Washington, then this Contract may be terminated by the City of Tacoma for the reason that the same is not performed in accordance with the public policy of the State of Washington as defined in said statutes.

B. Prevailing Wages

If federal, state, local, or any applicable law requires Supplier to pay prevailing wages in connection with a Contract, and Supplier is so notified by the City, then Supplier shall pay applicable prevailing wages.

If applicable, a Schedule of Prevailing Wage Rates and/or the current prevailing wage determination made by the Secretary of Labor for the locality or localities where the Contract will be performed is attached and made of part of the Contract by this reference. If prevailing wages do apply to the Contract, Supplier and its subcontractors shall:

1. Be bound by and perform all transactions regarding the Contract relating to prevailing wages and the usual fringe benefits in compliance with the provisions of Chapter 39.12 RCW, as amended, the Washington State Prevailing Wage Act and/or the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable, including the federal requirement to pay wages not less than once a week,

2. Ensure that no worker, laborer or mechanic employed in the performance of any part of the Contract shall be paid less than the prevailing rate of wage specified on that Schedule and/or specified in a wage determination made by the Secretary of Labor (unless specifically preempted by federal law, the higher of the Washington state prevailing wage or federal Davis-Bacon rate of wage must be paid) and Additionally, in compliance with applicable federal law, contractors are required to pay wages not less than once a week.

3. Immediately upon award of the Contract, contact the Department of Labor and Industries, Prevailing Wages section, Olympia, Washington and/or the federal Department of Labor, to obtain full information, forms and procedures relating to these matters. Per such procedures, a Statement of Intent to Pay Prevailing Wages and/or other or additional documentation required by applicable federal law, must be submitted by Contractor and its subcontractors to the City, in the manner requested by the City, prior to any payment by the City hereunder, and an Affidavit of Wages Paid and/or other or additional documentation required by federal law must be received or verified by the City prior to final Contract payment. In the event any dispute arises as to what are the prevailing rates of wages for work of a similar nature and such dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the State of Washington, Department of Labor and industries whose decision shall be final, conclusive and binding on all parties involved in the dispute.
**3.09 COPELAND ANTI-KICKBACK ACT**

For contracts subject to Davis Bacon Act the following clauses will be incorporated into the Contract:

A. **Contractor.** The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

B. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

C. **Breach.** A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.

**3.10 CHANGES**

A. **In Plans or Quantities**

The City of Tacoma, without invalidating this Contract, or any part of this Contract, may order extra work or make reasonable changes by altering, adding to or deducting from the materials, work and labor and the Contract sum will be adjusted accordingly. All such work and labor shall be executed under the conditions of the original Contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. When work or bid items are deducted, reduced or eliminated, it is agreed that no payment will be made to Contractor for anticipated profit.

B. **Extra Work**

Any claim or order for extra materials, work and labor made necessary by alterations or additions to the plans or by other reasons for which no price is provided in this Contract, shall not be valid unless the Contractor and Engineer administering the Contract have agreed upon a price prior to commencing extra work, and the agreement has been signed by the Contractor and approved by the Superintendent or his/her designee, and approved by the payment and performance bond surety.

C. **Extra Work - No Agreed Price**

If it is impracticable to fix an increase in price definitely in advance, the order may fix a maximum price which shall not under any circumstances, be exceeded, and subject to such limitation, such alteration, modification, or extra shall be paid for at the actual necessary cost as determined by the City of Tacoma, which cost (including an allowance for profit) shall be determined as the sum of the following items (1) to (7) inclusive:

1. Labor, computed at regular wage scale, including premium on compensation insurance and charge for social security taxes, and other taxes, pertaining to labor; no charge for premium pay shall be allowed unless authorized by the Engineer administering the Contract;

2. The proportionate cost of premiums on comprehensive general liability and other insurance applicable to the extra work involved and required under this Contract;

3. Material, including sales taxes pertaining to materials;

4. Plant and equipment rental, to be agreed upon in writing before the work is begun; no charge for the cost of repairs to plant or equipment will be allowed;

5. Superintendence, general expense and profit computed at 20 percent of the total of paragraphs (1) to (4) inclusive;

6. The proportionate cost of premiums on bonds required by this Contract, computed by 1 1/2 percent of the total of paragraphs (1) to (5) inclusive.

7. The City of Tacoma reserves the right to furnish such materials as it may deem expedient, and no allowance will be made for profit thereon.

Whenever any extra work is in progress, for which the definite price has not been agreed on in advance, the Contractor shall each day, report to the Engineer the amount and cost of the labor and material used, and any other expense incurred in such extra work on the preceding day, and no claim for compensation for such extra work will be allowed unless such report shall have been made.
The above-described methods of determining the payment for work and materials shall not apply to the performance of any work or the furnishing of any material, which, in the judgment of the Engineer administering the Contract, may properly be classified under items for which prices are established in the Contract.

D. Claims for Extra Work

If the Contractor claims that any instructions by drawings or otherwise, involve extra cost under this Contract, he/she shall give the City of Tacoma written notice thereof within 30 days after receipt of such instruction, and in any event before proceeding to execute the work, except in an emergency endangering life or property, and the procedures governing the same shall be as provided for immediately above in this paragraph. The method in these paragraphs is the only method available to the Contractor for payment of claims for extra work performed under the terms of this Contract.

3.11 CLEANING UP

The Contractor shall at all times, at his/her own expense, keep the premises free from accumulation of waste materials or debris caused by any workers or the work, at the completion of the work the Contractor shall remove all his waste materials from and about the site and all his/her equipment, sanitary facilities and surplus materials. In the case of dispute, the City of Tacoma may remove the debris and charge the cost to the Contractor as the City of Tacoma shall determine to be just. All material that is deposited or placed elsewhere than in places designated or approved by the Engineer administering the Contract will not be paid for and the Contractor may be required to remove such material and deposit or place it where directed.

3.12 PROGRESS PAYMENT

Progress payments will be made up to the amount of ninety-five percent (95%) of the actual work completed as shall be determined by the Engineer administering the Contract.

The Contractor may request that an escrow account be established as permitted by law, in which event the Contractor will earn interest on the retained funds.

When the time for construction, services and/or installation will exceed thirty (30) days, the Contractor may request, by invoice, to be paid a progress payment based on percentage of work completed. The Engineer will review and approve the progress payment request on a monthly basis.

3.13 FINAL PAYMENT

The final payment of five percent (5%) of the Contract price shall be approved on final acceptance of the work under this Contract by the Superintendent or his/her designee. In addition, before final payment is made, the Contractor shall be required to:

A. Provide a certificate from the Washington State Department of Revenue that all taxes due from the Contractor have been paid or are collectible in accordance with the provisions of Chapter 60.28 and Title 82 of the Revised Code of Washington;

B. Provide the General Release to the City of Tacoma on the form set forth in these Contract documents;

C. Provide a release of any outstanding liens that have been otherwise filed against any monies held or retained by the City of Tacoma;

D. File with the City Director of Finance, and with the Director of the Washington State Department of Labor and Industries, on the state form to be provided, an affidavit of wages paid;

E. File with the City Director of Finance, on the state form to be provided, a statement from the State of Washington, Department of Labor and Industries, certifying that the prevailing wage requirements have been satisfied.

F. File with the City Director of Finance, on the state form to be provided, a statement of release from the Public Works Contracts Division of the State of Washington, Department of Labor and Industries, verifying that all industrial insurance and medical aid premiums have been paid.

If there is a fee assessed to the City for any certificate, release or other form required by law, the contractor agrees that the fee amount may be passed on to the Contractor and deducted from the monies paid to the Contractor.
3.14 FAILURE TO COMPLETE THE WORK ON TIME

Should the completion of the work required under the Contract be delayed beyond the expiration of the period herein set for the completion of said work, or such extension of said period as may be allowed by reason of unavoidable delays, there shall be deducted from the total Contract price of work, for each calendar day by which such completion shall be delayed beyond said period of such extension thereof the sum of $300 or a sum of money as set forth hereinafter in these Specifications, as the amount of such deduction per calendar day.

Said sum shall be considered not as a penalty, but as liquidated damages, which the City will suffer by reason of the failure of the Contractor to perform and complete the work within the period, herein fixed or such extensions of said period as may be allowed by reason of unavoidable delays.

Any money due or to become due the Contractor may be retained by the City to cover said liquidated damages, and should such money not be sufficient to cover such damages, the City shall have the right to recover the balance from the Contractor or his/her Sureties.

The filing of any bid for the work herein contemplated shall constitute acknowledgment by the Respondent that he/she understands, agrees and has ascertained that the City will actually suffer damages to the amount hereinabove fixed for each and every calendar day during which the completion of the work herein required shall be delayed beyond the expiration of the period herein fixed for such completion or such extension of said period as may be allowed by reason of unavoidable delays.

3.15 CITY RESERVES RIGHT TO USE FACILITIES PRIOR TO ACCEPTANCE

The City of Tacoma hereby reserves the right to use the facilities herein contracted prior to final acceptance under this Contract. The use of said facilities, as mentioned herein, shall not be construed as a waiver or relinquishment of any rights that the City of Tacoma has under this Contract.

3.16 LIST OF SUBCONTRACTORS

Bid proposals for construction, alteration or repair of any building or other public works that may exceed $1,000,000 including tax shall satisfy the following requirement: Respondent shall submit as part of the bid, the names of the subcontractors, with whom the respondent, if awarded the contract, will subcontract performance of the work of heating, ventilation and air conditioning, plumbing as described in chapter 18.106 RCW, and electrical as described in chapter 19.28 RCW, or to name itself for the work. The respondent shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the respondent must indicate which subcontractor will be used for which alternate. Failure to comply with this provision or the naming of two or more subcontractors to perform the same work shall require the City (pursuant to state law RCW 39.30.060) to determine that respondent's bid is nonresponsive; therefore, the bid will be rejected.
CITY OF TACOMA  
FINANCE/PURCHASING DIVISION  
SPECIAL NOTICE TO BIDDERS

Public works and improvement projects for the City of Tacoma are subject to Washington state law and Tacoma Municipal Code, including, but not limited to the following:

I. STATE OF WASHINGTON

A. RESPONSIBILITY CRITERIA – STATE OF WASHINGTON

In order to be considered a responsible bidder the bidder must meet the following mandatory state responsibility criteria contained in RCW 39.04.350:

1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable:
   a. Have Industrial Insurance (workers’ compensation) coverage for the bidder’s employees working in Washington, as required in Title 51 RCW;
   b. Have a Washington Employment Security Department number, as required in Title 50 RCW;
   c. Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 (unlicensed or unregistered contractors) or 39.12.065(3) (prevailing wage).
5. Have received training on the requirements related to public works and prevailing wage under this chapter and chapter 39.12 RCW and must designate a person or persons to be trained on these requirements. The training must be provided by the department of labor and industries or by a training provider whose curriculum is approved by the department. Bidders that have completed three or more public works projects and have had a valid business license in Washington for three or more years are exempt from this subsection.

B. RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS:

Effective March 30, 2012, RCW 39.04.380 imposes a reciprocal preference for resident contractors. Any bid received from a non-resident contractor from a state that provides an in-state percentage bidding preference is subject application of a comparable percentage disadvantage.

A non-resident contractor from a state that provides an in-state percentage bidding preference means a contractor that:

1. Is from a state that provides a percentage bid preference to its resident contractors bidding on public works projects, and
2. Does not have a physical office located in Washington at the time of bidding on the City of Tacoma public works project.

The state of residence for a non-resident contractor is the state in which the contractor was incorporated, or if not a corporation, the state in which the contractor’s business entity was formed.
The City of Tacoma will evaluate all non-resident contractors for an out of state bidder preference. If the state of the non-resident contractor provides an in state contractor preference, a comparable percentage disadvantage will be applied to the non-resident contractor's bid prior to contract award. The responsive and lowest and best responsible bidder after application of any non-resident disadvantage will be awarded the contract.

The reciprocal preference evaluation does not apply to public works procured pursuant to RCW 39.04.155, RCW 39.04.280, federally funded competitive solicitations where such agencies prohibit the application of bid preferences, or any other procurement exempt from competitive bidding.

Bidders must provide the City of Tacoma with their state of incorporation or the state in which the business entity was formed and include whether the bidder has a physical office located in Washington.

The bidder shall submit documentation demonstrating compliance with above criteria on the enclosed State Responsibility and Reciprocal Bidder Information form.

C. SUBCONTRACTOR RESPONSIBILITY

1. The Contractor shall include the language of this subcontractor responsibility section in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. The requirements of this section apply to all subcontractors regardless of tier.

2. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:
   
   a. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
   
   b. Have a current Washington Unified Business Identifier (UBI) number;
   
   c. If applicable, have:
      
      a. Have Industrial Insurance (workers’ compensation) coverage for the bidder’s employees working in Washington, as required in Title 51 RCW;
      
      b. A Washington Employment Security Department number, as required in Title 50 RCW;
      
      c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
      
      d. An electrical contractor license, if required by Chapter 19.28 RCW;
      
      e. An elevator contractor license, if required by Chapter 70.87 RCW and;
   
3. Not be disqualified from bidding on any public works contract under RCW 39.06.010 (unlicensed or unregistered contractors) or 39.12.065(3) (prevailing wage).
II. CITY OF TACOMA

A. SUPPLEMENTAL RESPONSIBILITY CRITERIA – CITY OF TACOMA:

In order to be considered a responsible bidder, the prospective bidder shall have all of the following qualifications set forth in Tacoma Municipal Code 1.06.262:

1. Adequate financial resources or the ability to secure such resources;
2. The necessary experience, stability, organization and technical qualifications to perform the proposed contract;
3. The ability to comply with the required performance schedule, taking into consideration all existing business commitments;
4. A satisfactory record of performance, integrity, judgment and skills; and
5. Be otherwise qualified and eligible to receive an award under applicable laws and regulations.

In addition to the mandatory bidder responsibility criteria listed immediately above, the City may, in addition to price, consider any or all of the following criteria contained in Tacoma Municipal Code Chapter 1.06.262 in determining bidder responsibility:

1. The ability, capacity, experience, stability, technical qualifications and skill of the respondent to perform the contract;
2. Whether the respondent can perform the contract within the time specified, without delay or interference;
3. Integrity, reputation, character, judgment, experience, and efficiency of the respondents, including past compliance with the City’s Ethics Code;
4. Quality of performance of previous contracts;
5. Previous and existing compliance with laws and ordinances relating to contracts or services;
6. Sufficiency of the respondent’s financial resources;
7. Quality, availability, and adaptability of the supplies, purchased services or public works to the particular use required;
8. Ability of the respondent to provide future maintenance and service on a timely basis;
9. Payment terms and prompt pay discounts;
10. The number and scope of conditions attached to the submittal;
11. Compliance with all applicable City requirements, including but not limited to the City’s Ethics Code and its Equity in Contracting and Local Employment and Apprenticeship Training programs;
12. Other qualification criteria set forth in the specification or advertisement that the appropriate department or division head determines to be in the best interests of the City.

The City may require bidders to furnish information, sworn or certified to be true, to demonstrate compliance with the City responsibility criteria set forth above. If the city manager or director of utilities is not satisfied with the sufficiency of the information provided, or if the prospective respondent does not substantially meet all responsibility requirements, any submittal from such respondent must be disregarded.
B. ADDITIONAL SUPPLEMENTAL CRITERIA

Pursuant to RCW 39.04.350(3), the Bidder shall demonstrate to the satisfaction of the City of Tacoma that the Bidder and their Subcontractors are qualified to perform the work under this Contract and therefore are a responsible Bidder. To be responsible, the Bidder, including the General Contractor and their subcontractors must demonstrate an appropriate level of experience, technical competence and successful past performance of work. The information in the Statement of Qualifications Form will assist the City of Tacoma in making such determination.

C. MODIFICATIONS TO SUPPLEMENTAL CRITERIA

Potential bidders may request modifications to the City’s supplemental criteria by submitting a written request to the Purchasing Division via email to bids@cityoftacoma.org no later than 5:00 p.m. Pacific Time, three days prior to the submittal deadline. Please include the Specification No. and Title when submitting such requests. Requests must include justification for why certain criteria should be modified. Requests received after this date and time will not be considered.

The City will respond to a timely submitted request prior to the bid opening date. Changes to the supplemental criteria, if warranted, will be issued by addendum to the solicitation documents and posted to the City’s website for the attention of all prospective bidders.

D. DETERMINATION OF BIDDER RESPONSIBILITY

If the City determines the bidder does not meet the criteria above and is therefore not a responsible bidder, the City shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees, the bidder may appeal the determination in a manner consistent with the City’s Protest Policy. Appeals are coordinated by the Purchasing Division heard by the Procurement and Payables Division manager for contracts less than or equal to $500,000 and by Contracts and Awards Board for contracts greater than $500,000.
PART I

BID PROPOSAL AND CONTRACT FORMS
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<th>Quantity</th>
<th>Unit Price</th>
<th>Total Price</th>
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## TW22-0084F Bonney Lake 950 Zone Tank and 950/1010 Zone Booster Pump Station

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## Tacoma Water
### Bid Proposal

**TW22-0084F Bonney Lake 950 Zone Tank and 950/1010 Zone Booster Pump Station**

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<thead>
<tr>
<th>Item</th>
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<td>26</td>
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<td>Automatic Control</td>
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**Total Base Bid (Items 1-30)** $__________________
REQUEST FOR BIDS SPECIFICATION NO. TW22-0084F
Bonney Lake 950 Zone Tank and 950/1010 Zone Pump Station

The undersigned bidder/proposer hereby agrees to execute the proposed contract and furnish all materials, labor, tools, equipment and all other facilities and services in accordance with these specifications.

The bidder/proposer agrees, by submitting a bid/proposal under these specifications, that in the event any litigation should arise concerning the submission of bids/proposals or the award of contract under this specification, Request for Bids, Request for Proposals or Request for Qualifications, the venue of such action or litigation shall be in the Superior Court of the State of Washington, in and for the County of Pierce.

Non-Collusion Declaration

The undersigned bidder/proposer hereby certifies under penalty of perjury that this bid/proposal is genuine and not a sham or collusive bid/proposal, or made in the interests or on behalf of any person or entity not herein named; and that said bidder/proposer has not directly or indirectly induced or solicited any contractor or supplier on the above work to put in a sham bid/proposal or any person or entity to refrain from submitting a bid/proposal; and that said bidder/proposer has not, in any manner, sought by collusion to secure to itself an advantage over any other contractor(s) or person(s).

Bidder/Proposer’s Registered Name

Signature of Person Authorized to Enter into Contracts for Bidder/Proposer

Date

Address

Printed Name and Title

City, State, Zip

(Area Code) Telephone Number / Fax Number

Authorized Signatory E-Mail Address

State Business License Number
in WA, also known as UBI (Unified Business Identifier) Number


State Contractor’s License Number
(See Ch. 18.27, R.C.W.)

E-Mail Address for Communications

Addendum acknowledgement #1_____ #2_____ #3_____ #4_____ #5_____

THIS PAGE MUST BE SIGNED AND RETURNED WITH SUBMITTAL.
Herewith find deposit in the form of a cashier’s check in the amount of $__________________ which amount is not less than 5-percent of the total bid.

SIGN HERE__________________________________

---

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we, ______________________________________________________________, as Principal, and ______________________________________________________________, as Surety, are held and firmly bound unto the City of Tacoma, as Obligee, in the penal sum of ____________________________ dollars, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for faithful performance thereof, with Surety or Sureties approved by the Obligee; or if the Principal shall, in case of failure to do so, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS _______________ DAY OF __________________, 20______.

PRINCIPAL: 

____________________________________________________________________

SURETY: 

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

__________________, 20___ ___

Received return of deposit in the sum of $ _______________________________________________

____________________________________________________________________
Certification of Compliance with Wage Payment Statutes

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date 7/1/2022, that the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as 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.

I certify under penalty of perjury under the laws of the state of Washington that the foregoing is true and correct.

Bidder

________________________________________
Signature of Authorized Official*

________________________________________
Printed Name

________________________________________
Title

________________________  __________________________  __________________________
Date  City  State

Check One:
Individual □  Partnership □  Joint Venture □  Corporation □

State of Incorporation, or if not a corporation, the state where business entity was formed:

________________________________________

If a co-partnership, give firm name under which business is transacted:

________________________________________

* If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.
Specification No. ______________________

Name of Bidder: ______________________

State Responsibility and Reciprocal Bid Preference Information

Certificate of registration as a contractor (Must be in effect at the time of bid submittal):

Number: ____________________________
Effective Date: ______________________
Expiration Date: ______________________

Current Washington Unified Business Identifier (UBI) Number:

Number: ____________________________

Do you have industrial insurance (workers’ compensation) Coverage for your employees working in Washington?

☐ Yes  ☐ No  ☐ Not Applicable

Washington Employment Security Department Number

Number: ____________________________

☐ Not Applicable

Washington Department of Revenue state excise tax Registration number:

Number: ____________________________

☐ Not Applicable

Have you been disqualified from bidding any public works contracts under RCW 39.06.010 or 39.12.065(3)?

☐ Yes  ☐ No
If yes, provide an explanation of your disqualification on a separate page.

☐ Yes  ☐ No

Do you have a physical office located in the state of Washington?

☐ Yes  ☐ No

If incorporated, in what state were you incorporated?

State: _______________  ☐ Not Incorporated

If not incorporated, in what state was your business entity formed?

State: _______________

☐ Yes  ☐ No

Have you completed the training required by RCW 39.04.350, or are you on the list of exempt businesses maintained by the Department of Labor and Industries?

☐ Yes  ☐ No
STATEMENT OF QUALIFICATIONS
FOR CONTRACTORS

This form shall be completed in its entirety and submitted with the bid. **Failure to submit and meet the requirements as stated in Division 1, Section 1.31.01 of the Technical Specifications may be grounds for rejection of the bid.**

The City of Tacoma will be the sole judge in determining if the prospective contractor meets the minimum experience requirements.

The successful contractor shall have completed a minimum of five (5) projects of similar size and scope within the past ten years to include a minimum of (1) five million gallon reservoir. The construction superintendent shall have been the construction superintendent for a minimum of five (5) projects of similar size and scope in the past ten years to include a minimum of (1) five million gallon reservoir.

**Contractor:**
Name: ____________________________________________

Address: ____________________________________________

Phone:__________________ Contact Person: _______________________

**Project Experience**

#1 Project Name: ____________________________________________

Owner:__________________ Contact Person/Phone No: _______________________

Description of Work: ____________________________________________

________________________________________________________________

Completion Date: ____________________________________________

#2 Project Name: ____________________________________________

Owner:__________________ Contact Person/Phone No: _______________________

Description of Work: ____________________________________________

________________________________________________________________

Completion Date: ____________________________________________

Bidder Name: _______________________

Specification No. TW22-0084F
#3 Project Name: 

Owner: ___________________ Contact Person/Phone No: ___________________

Description of Work: ____________________________________________
______________________________________________________________

Completion Date: ________________________________________________

#4 Project Name: 

Owner: ___________________ Contact Person/Phone No: ___________________

Description of Work: ____________________________________________
______________________________________________________________

Completion Date: ________________________________________________

#5 Project Name: 

Owner: ___________________ Contact Person/Phone No: ___________________

Description of Work: ____________________________________________
______________________________________________________________

Completion Date: ________________________________________________

Bidder Name: _______________________

Specification No. TW22-0084F
STATEMENT OF QUALIFICATIONS
FOR CONTRACTORS

The construction superintendent shall have been the construction superintendent for a minimum of five (5) projects of similar size and scope in the past ten years to include a minimum of (1) five million gallon reservoir.

Construction Superintendent:
Name: ____________________________ Years employed by contractor: __________

#1 Project Name/Date: ____________________________
Owner: ______________________ Contact Person/Phone No: __________________________
Description of Work: ____________________________

#2 Project Name/Date: ____________________________
Owner: ______________________ Contact Person/Phone No: __________________________
Description of Work: ____________________________

#3 Project Name/Date: ____________________________
Owner: ______________________ Contact Person/Phone No: __________________________
Description of Work: ____________________________

#4 Project Name/Date: ____________________________
Owner: ______________________ Contact Person/Phone No: __________________________
Description of Work: ____________________________

Bidder Name: ____________________________
Specification No. TW22-0084F
#5 Project Name/Date: ______________________________________

Owner:__________________ Contact Person/Phone No: ______________________

Description of Work: ______________________________________

________________________________________________________
List of Subcontractor Categories of Work

Project Name ____________________________________________________________

Subcontractor(s) that are proposed to perform the work of heating, ventilation and air conditioning, and/or plumbing, as described in Chapter 18.106 RCW, and electrical as described in Chapter 19.28 RCW must be listed below. **This information must be submitted with the bid proposal or within one hour of the published bid submittal time via email to bids@cityoftacoma.org.**

Subcontractor(s) that are proposed to perform the work of structural steel installation and/or rebar installation must be listed below. **This information must be submitted with the bid proposal or within forty-eight hours of the published bid submittal time via email to bids@cityoftacoma.org.**

Failure to list subcontractors or naming more than one subcontractor to perform the same work will result in your bid being non-responsive. Contractors self-performing must list themselves below. The work to be performed is to be listed below the subcontractor(s) name.

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<tr>
<th>Subcontractor Name</th>
<th>Work to be Performed</th>
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EIC REQUIREMENT FORM

EQUITY IN CONTRACTING REQUIREMENTS & PROCEDURES:

All bidders must complete and submit with their bid the following solicitation form contained in the bid submittal package:

City of Tacoma – EIC Utilization Form

IMPORTANT NOTE:

It is the bidder’s responsibility to ensure that the subcontractor(s) listed on the EIC Utilization Form are currently certified by the State of Washington’s Office of Minority and Women Business Enterprises (OMWBE) at the time of bid opening. This may be verified by contacting the EIC Office at 253-591-5826 between 8 AM and 5 PM, Monday through Friday or the OMWBE Office at (866) 208-1064. Please refer to the City of Tacoma EIC code.

Equity in Contracting Requirements

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A list of EIC-eligible companies is available on the following web site addresses:

www.omwbe.diversitycompliance.com*

MATERIAL MISSTATEMENTS CONCERNING COMPLETED ACTIONS BY THE BIDDER IN ANY SWORN STATEMENT OR FAILURE TO MEET COMMITMENTS AS INDICATED ON THE EIC UTILIZATION FORM MAY RENDER THE BIDDER IN DEFAULT OF CITY ORDINANCE 1.07

CCD/SBE: 20000083740
Date of Record: 05/25/2022

*For the OMWBE list, be sure to look for businesses in Pierce, King, Lewis, Mason, Grays Harbor, Thurston, or any counties adjacent to the county in which the work is performed per 1.07.050(2)(b-c). Contact the EIC Office if you have any questions.

Document Updated 5.5.2021
This form is to document only the contractors, subcontractors, material suppliers or other types of firms that are intended to be used to meet the stated EIC requirements for the contract awarded from this solicitation. This information will be used to determine contract award. Additional forms may be used if needed.

- You must include this form with your bid submittal in order for your bid to be responsive.
- Prime contractors are required to solicit bids from Businesses that are "Certified" by the Office of Minority and Women's Business Enterprises (OMWBE) [www.omwbe.wa.gov] as a MBE, WBE, and SBE to be know as "Certified Business".
- It is the Prime contractor’s responsibility to verify the certification status of the business(s) intended to be utilized prior to the submittal deadline.

Bidder’s Name: _____________________________________________________________
Address: __________________________________________________________________
City/State/Zip: ____________________________

Spec. No. _________________ Base Bid * $ ________________

<table>
<thead>
<tr>
<th>a. Business Name and Certification Number(s)</th>
<th>b. MBE, WBE, or SBE (Write all that apply)</th>
<th>c. NAICS code(s)</th>
<th>d. Contractor Bid Amount (100%)</th>
<th>e. Material Supplier Bid Amount (20%)</th>
<th>f. Estimated MBE Usage Dollar Amount</th>
<th>g. Estimated WBE Usage Dollar Amount</th>
<th>h. Estimated SBE Usage Dollar Amount</th>
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Complete business names and phone numbers are required to verify your usage of Certified Businesses

i. MBE Utilization %
j. WBE Utilization %
k. SBE Utilization %

By signing and submitting this form the bidder certifies that the OMWBE Certified Business(s) listed will be used on this project including all applicable change orders.

Type or Print Name of Responsible Officer / Title ____________________________
Signature of Responsible Officer ____________________________
Date ____________________________

CCD/EIC/BID DOCS revised March 4, 2022
INSTRUCTIONS FOR COMPLETING
EIC UTILIZATION FORM

The purpose of these instructions is to assist bidders in properly completing the EIC Utilization Form.

This form when submitted with your bid, provides information to the City of Tacoma to accurately review and evaluate your proposed EIC usage.

1. * Base Bid is the prime contractor’s bid, plus any alternates, additives and deductibles selected by the City of Tacoma. Also, please refer to Items #10-12 below.

2. Column “a” – List all Certified Business(s) that you will be awarding a contract to if you are the successful bidder.

3. Column "b" – Identify if the Certified Business(s) is being utilized as an MBE, WBE, or SBE. (Businesses may count towards multiple requirements).

4. Column "c" – List the appropriate NAICS code(s) for the scope of work, services, or materials/supplies for each Certified Business.

5. Column “d” – The bid amount must be indicated for all listed Certified Businesses that you plan on doing business with. This quote is the price that you and the Certified Businesses have negotiated prior to bid opening.

6. Column “e” – The bid amount must be indicated for all listed Certified Businesses that you plan on doing business with. This quote is the price that you and the material supplier have negotiated prior to bid opening.

7. Column "f" – Estimated MBE Usage Dollar Amount: For all MBE firms used, multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

8. Column “g” – Estimated WBE Usage Dollar Amount: For all WBE firms used, multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

9. Column “h” – Estimated SBE Usage Dollar Amount: For all MBE, WBE, or SBE firms used, Multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

10. Block “i” – The percentage of actual MBE utilization calculated on the Base Bid only. (Divide the sum of Estimated MBE Usage Dollar Amount (Column “f”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “f” divided by Base Bid (*) x 100 = MBE usage as a percentage of the Base Bid.)

11. Block “j” – The percentage of actual WBE utilization calculated on the Base Bid only. (Divide the sum of Estimated WBE Usage Dollar Amount (Column “g”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “g” divided by Base Bid (*) x 100 = WBE usage as a percentage of the Base Bid.)
12. Block “k” – The percentage of actual SBE utilization calculated on the Base Bid only. (Divide the sum of Estimated SBE Usage Dollar Amount (Column “h”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “h” divided by Base Bid (*) x 100 = SBE usage as a percentage of the Base Bid.)

It is the prime contractor's responsibility to check the status of **Certified Businesses** prior to bid opening. Call the EIC Office at 253-591-5826 or email at EICOffice@cityoftacoma.org for additional information.
TACOMA WATER
SUBSTITUTION REQUEST FORM

This request shall be submitted to the engineer listed below no later than 3:00 p.m., PST, Tuesday, July 12, 2022 per 1.33.23 Shop Drawings, Product Data, and Samples and 16.91.2 Diesel Engine Generator Set. Substitution requests not received by the engineer will not be considered.

ATTN: Carol Powers P.E. Date: _______________________

PROJECT: TW22-0084F Bonney Lake 950 Zone Tank and 950/1010 Zone Pump Station Transmittal No. __________

(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: __________________________________________________________________________

Specified Item: ________________________________________________________________________________

Proposed Substitution: __________________________________________________________________________

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes, changes to drawings, and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? □ Yes □ No
   If yes, provide detail: __________________________________________________________________________

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? □ Yes □ No

C. What effect does substitution have on other trades?
   __________________________________________________________________________________________

D. Difference between proposed substitution and specified item?
   __________________________________________________________________________________________

E. Manufacturer’s guarantees of proposed and specified items are? □ Same □ Different*
   *Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution?
   □ Yes □ No

G. Will the proposed substitution have any effect on compliance with applicable codes? □ Yes □ No
   If yes, explain: __________________________________________________________________________

H. Name, address, and current phone number of the Project Lead for one (1) similar project where the proposed product was used, along with the Project name and date of installation:
   __________________________________________________________________________________________

I. Contract completion date is? ________________________ □ Same □ Different*
   *Explain differences on attachment(s).
TACOMA WATER
SUBSTITUTION REQUEST FORM

This request shall be submitted to the engineer listed below no later than 3:00 p.m., PST, Tuesday, July 12, 2022 per 1.33.23 Shop Drawings, Product Data, and Samples and 16.91.2 Diesel Engine Generator Set. Substitution requests not received by the engineer will not be considered.

Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Name

Firm

Address

City, State, Zip

Phone No.

Signature Date

FOR USE BY TACOMA WATER

☐ Accepted ☐ Accepted as Noted

☐ Not Accepted ☐ Received Too Late

By: Carol Powers P.E. (Project Lead/Manager)

Signature:

Date:

REMARKS:

REVISED 7/9/14
How to Use this Calculator:

Get Steel Materials Index Values

Base Steel Materials Index Value (BV) - The index value published on the BLS website on the day of bid opening. *This Number Does NOT get revised.*

Initial Steel Materials Index Value (MV) - The index value published on the BLS website on the date of the original purchase agreement between the Contractor and the Supplier.

If the Steel Cost Adjustment is ELIGIBLE:

Step 2: Determine Steel Cost Adjustment:

Initial Cost Basis (ICB) - The Owner has determined that the ICB of steel to be $1.00 per pound. This cost basis is reflected in the steel cost adjustment calculations below. This is the fixed value for the duration of the contract.

Weight of Steel (WS) - The weight in pounds of eligible steel, as identified in the Owner approved submittal(s) and as confirmed by collected bills of lading from the delivery trucks, or other confirmation approved by the Owner.

Note: *Only those items included in the contract provisions are eligible for adjustment, as specified in Section 1.21.55.*

Step 1. Determine Percentage Change:

Get Steel Materials Index Values

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Base Steel Materials Index Value (BV)</td>
<td>1</td>
</tr>
<tr>
<td>Initial Steel Materials Index Value (MV)</td>
<td>1</td>
</tr>
<tr>
<td>Gross Percentage Change</td>
<td>0.0%</td>
</tr>
<tr>
<td>Contractor/Owner Percentage Change</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Steel Cost Adjustment is NOT ELIGIBLE

Step 2: Determine Steel Cost Adjustment

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Initial Cost Basis (ICB)</td>
<td>$1.00</td>
</tr>
<tr>
<td>Weight of Steel in pounds (WS)</td>
<td>0</td>
</tr>
<tr>
<td>Gross Cost Adjustment (Payment/Credit)</td>
<td>$0</td>
</tr>
<tr>
<td>Contractor/Owner (Payment/Credit)</td>
<td>$0</td>
</tr>
</tbody>
</table>

Steel Cost Adjustment Calculation

- If the Percentage Change is ten percent or more:
  \[ CA = (\frac{MV - BV}{BV}) \times (ICB \times WS) \]
CONTRACT

This Contract is made and entered into effective as of [Month], [Day], [Year] ("Effective Date") by and between the City of Tacoma, a Municipal Corporation of the State of Washington ("City"). and [supplier name as it appears in Ariba, including dbas or trade names] ("Contractor").

That in consideration of the mutual promises and obligations hereinafter set forth the Parties hereto agree as follows:

I. Contractor shall fully execute and diligently and completely perform all work and provide all services and deliverables described herein and in the items listed below each of which are fully incorporated herein and which collectively are referred to as "Contract Documents":

1. Specification No. [Spec Number] [Spec Title] together with all authorized addenda.
2. Contractor's submittal [or specifically described portions thereof] dated [Enter Submittal Date] submitted in response to Specification No. [Spec Number] [Spec Title].
3. Describe with specific detail and list separately any other documents that will make up the contract (fee schedule, work schedule, authorized personnel, etc.) or any other additional items mutually intended to be binding upon the parties.

II. If federal funds will be used to fund, pay or reimburse all or a portion of the services provided under the Contract, the terms and conditions set forth at this Appendix A are incorporated into and made part of this Contract and CONTRACTOR will comply with all applicable provisions of Appendix A and with all applicable federal laws, regulations, executive orders, policies, procedures, and directives in the performance of this Contract.

If CONTRACTOR’s receipt of federal funds under this Contract is as a sub-recipient, a fully completed Appendix B, “Sub-recipient Information and Requirements” is incorporated into and made part of this Contract.

III. In the event of a conflict or inconsistency between the terms and conditions contained in this document entitled Contract and any terms and conditions contained the above referenced Contract Documents the following order of precedence applies with the first listed item being the most controlling and the last listed item the least controlling:

1. Contract, inclusive of Appendices A and B.
2. List remaining Contract Documents in applicable controlling order.

IV. The Contract terminates on xxxxx, and may be renewed for xxxxxxx

V. The total price to be paid by City for Contractor’s full and complete performance hereunder, including during any authorized renewal terms, may not exceed: $[Dollar Amount], plus any applicable taxes.

VI. Contractor agrees to accept as full payment hereunder the amounts specified herein and in Contract Documents, and the City agrees to make payments at the times and in the manner and upon the terms and conditions specified. Except as may be otherwise provided herein or in Contract Documents Contractor shall provide and bear the expense of all equipment, work and labor of any sort whatsoever that may be required for the transfer of materials and for constructing and completing the work and providing the services and deliverables required by this Contract.

VII. The City’s preferred method of payment is by ePayables (Payment Plus), followed by credit card (aka procurement card), then Electronic Funds Transfer (EFT) by Automated Clearing House (ACH), then check or other cash equivalent. CONTRACTOR may be required to have the capability of accepting the City’s ePayables or credit card methods of payment. The City of Tacoma will not accept price changes or pay additional fees when ePayables (Payment Plus) or credit card is used. The City, in its sole discretion, will determine the method of payment for this Contract.
VIII. Failure by City to identify a deficiency in the insurance documentation provided by Contractor or failure of City to demand verification of coverage or compliance by Contractor with the insurance requirements contained in the Contract Documents shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.

IX. Contractor and for its heirs, executors, administrators, successors, and assigns, does hereby agree to the full performance of all the requirements contained herein and in Contract Documents.

It is further provided that no liability shall attach to City by reason of entering into this Contract, except as expressly provided herein.

IN WITNESS WHEREOF, the Parties hereto have accepted and executed this Contract, as of the Effective Date stated above, which shall be Effective Date for bonding purposes as applicable.

CITY OF TACOMA:                               CONTRACTOR:

Signature:                                  Signature:

Name:                                      Name:

Title:                                     Title:

(City of Tacoma use only - blank lines are intentional)

Director of Finance: ______________________________________________________________

Deputy/City Attorney (approved as to form): _________________________________________________

Approved By: ___________________________________________________________________

Approved By: ___________________________________________________________________

Approved By: ___________________________________________________________________

Approved By: ___________________________________________________________________

Approved By: ___________________________________________________________________

Approved By: ___________________________________________________________________
That we, the undersigned, as principal, and as a surety, are jointly and severally held and firmly bound to the CITY OF TACOMA, in the penal sum of, $____________________, for the payment whereof Contractor and Surety bind themselves, their executors, administrators, legal representatives, successors and assigns, jointly and severally, firmly by these presents.

This obligation is entered into in pursuance of the statutes of the State of Washington, the Ordinances of the City of Tacoma.

WHEREAS, under and pursuant to the City Charter and general ordinances of the City of Tacoma, the said City has or is about to enter with the above bounden principal, a contract, providing for

Specification No.

Specification Title:

Contract No.

(which contract is referenced to herein and is made a part hereof as though attached hereto), and

WHEREAS, the said principal has accepted, the said contract, and undertake to perform the work therein provided for in the manner and within the time set forth.

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 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.

No suit or action shall be commenced hereunder by any claimant unless claimant shall have given the written notices to the City, and where required, the Contractor, in accordance with RCW 39.08.030.

The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of claims which may be properly filed in accordance with RCW 39.08 whether or not suit is commenced under and against this bond.

If any claimant shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment and attorney fees as provided by RCW 39.08.030, shall also pay such costs and attorney fees as may be incurred by the City as a result of such suit. Venue for any action arising out of or in connection with this bond shall be in Pierce County, WA.

Surety companies executing bonds must be authorized to transact 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. Department of the Treasury.
One original bond shall be executed, and be signed by the parties’ duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed power of attorney for the office executing on behalf of the surety.

Principal: Enter Vendor Legal Name

__________________________________________________________
By: ___________________________________________________________________

Surety:

__________________________________________________________
By: ___________________________________________________________________

By: ___________________________________________________________________

Agent’s Name: _________________________________________________________

Agent’s Address: ________________________________________________________
That we, the undersigned, 

as principal, and 

as a surety, are jointly and severally held and firmly bound to the CITY OF TACOMA, in the penal sum of $__________, for the payment whereof Contractor and Surety bind themselves, 

their executors, administrators, legal representatives, successors and assigns, jointly and severally, firmly by these presents. 

This obligation is entered into in pursuance of the statutes of the State of Washington, the Ordinances of the City of Tacoma. 

WHEREAS, under and pursuant to the City Charter and general ordinances of the City of Tacoma, the said City has or is about to enter with the above bounden principal, a contract, providing for 

Specification No. 

Specification Title: 

Contract No. 

(which contract is referenced to herein and is made a part hereof as though attached hereto), and 

WHEREAS, the said principal has accepted, the said contract, and undertake to perform the work therein provided for in the manner and within the time set forth. 

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 increase. 

If the City shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgement, shall pay all costs and attorney's fees incurred by the City in enforcement of its rights hereunder. Venue for any action arising out of in connection with this bond shall be in Pierce County, Washington. 

Surety companies executing bonds must be authorized to transact 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. Department of the Treasury. 

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

Principal: Enter Vendor Legal Name 

By: 

Surety: 

By: 

Agent's Name: 

Agent's Address: 

Form No. SPEC-100A 04/09/2020
City of Tacoma

City of Tacoma Contract No.: _______________ Specification No.: ________________

General Release to the City of Tacoma

The undersigned, named as the Contractor in a certain agreement between contractor name and the City of Tacoma, dated __________, 20___, hereby releases the City of Tacoma, its departmental officers, employees, and agents, from any and all claim or claims known or unknown, in any manner whatsoever, arising out of, or in connection with, or relating to said contract, excepting only the equity of the undersigned in the amount now retained by the City of Tacoma under said contract, to-wit: the sum of $__________________.

Signed on this ______ day of _______________, 20__.  

___________________________________________
Contractor Name

___________________________________________
Contractor Authorized Signature

___________________________________________
Title

___________________________________________
Type or Print Signature Name
PART II

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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]

The City of Tacoma Department of Public Utilities shall be referred to as the “City” or “Owner” throughout this document. The successful contractor to whom this contract is awarded shall be referred to as “Contractor” throughout this document. The City’s representative for all matters pertaining to this contract shall be the “Engineer”. The “Standard Specifications”, where referenced, shall mean the 2020 edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction unless noted otherwise.

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, process, 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.

Booster Station Supplier: The supplier of the 950/1010 Zone packaged booster pump station, which will be installed by the Contractor.

1.11.00 Summary of Work

[CSI 01 11 00]

This project includes construction of a five million gallon, welded steel reservoir; installation of a City pre-purchased booster pump station; on-site emergency generator and associated communications building on site; site utilities; and on-site stormwater pond. The project also includes construction of approximately 1,330 linear feet of 24” water main, 115 linear feet of
12” water main, and 320 linear feet of 8” water main. The estimated total value for the work is $8.9 million. To accomplish this goal several phases must be completed, including but not limited to the following:

A. Installation of off-site water main.

B. On-site piping improvements to include: 24-inch diameter steel inlet/outlet piping, 12-inch diameter steel overflow and drain piping, 6-inch diameter perimeter drain piping, 12-inch and 8-inch ductile iron piping discharging from booster pump station, and other miscellaneous piping associated with site drainage, cathodic protection and flow meters.

D. Construction of five million gallon, welded steel reservoir.

E. Installation of pre-purchased booster pump station.

F. Site improvements including some access road construction, site drainage features, and minor landscaping

G. Electrical, site lighting and telemetry

H. Other minor work as necessary to affect the above improvements

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 Owner will secure and pay for the following permits:

- Architectural Design Review – Brookfield Properties
- Building Permits, including Mechanical (communications building) – Pierce County
- Conditional Use Permit – Pierce County
- Site Development Permit – Pierce County

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

- Construction Stormwater General Permit (CSGP) and active permit compliance/submittals during construction – Contractor can opt for partial transfer of coverage of the Newland/Brookfield CSGP for the Tehaleh Development and would need to coordinate with Brookfield and the Owner to do so.
- Electrical Permit
- Disposal Permit

The Owner has applied for but needs information from the Contractor to obtain the following permits:

- Diesel Tank Permit
- Commercial Building Permits for the tank and communications building

A copy of the Owner acquired permits 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.
1.14 Work Restrictions

[CSI 01 14 00]

1.14.19 Use of Site

[CSI 01 14 19]
The Contractor shall not perform work activities, store materials or equipment, move equipment through, or disturb in any way the areas outside the “Construction Limits” shown unless approved by the Owner in writing.

The Contractor shall provide, maintain and adjust erosion control fencing, surface covering, and sediment traps for storm-water runoff as shown on the plans prior to beginning any work activities within this area.

1.14.22 Cold Weather Work

[CSI 01 14 22]
If the Contractor wishes to work during weather where the maximum daily temperature does not exceed 40 degrees Fahrenheit, the Contractor must submit a cold weather work plan and obtain permission from the Owner. Owner permission is not guaranteed and refusal will not be cause for claim. Any costs associated with cold weather work which may include but not be limited to: tenting; heating of workspace or materials; wind protection; snow/ice removal; testing; and removal/replacement of frozen work will be borne by the Contractor with no additional cost to the Owner.

If temperature at any time drops below freezing, the Contractor must provide freeze protection for temperature sensitive work. All costs are incidental.

1.20 PRICE AND PAYMENT PROCEDURES

[CSI 01 20 00]

1.21.29 Quantity Allowances

[CSI 01 21 29]
If more or fewer materials are needed when the construction quantity is within plus or minus 25 percent of the bid quantity, costs for restocking of unused materials, or handling and delivery costs on additional materials shall be incidental to the bid price and no additional payment will be made.

1.21.55 Cost Increases for Materials

[CSI 01 21 55]
All material prices are firm at the time and date of bid opening. No price adjustments will be considered apart from steel as listed below.
Steel Cost Adjustments

To address market cost fluctuation related to the bid item below, a calculation between the steel price index on the date of bid opening and the steel price index on the date of the original purchase agreement between the Contractor and the Supplier will be determined. Steel cost adjustment is not full compensation or full refund for changes to the cost of steel items; not eligible for all items with steel; and any adjustment provided by this provision will not obligate the Owner for any costs beyond the amount calculated by this provision.

Steel Index Values: The Owner will use the U.S. Bureau of Labor Statistics (BLS) producer price index (PPI) Series Id: WPU101707 index value for cold rolled steel sheet and strip price cost adjustments. The BLS index values for cold rolled steel sheet and strip price adjustments are available at the BLS website at:

https://beta.bls.gov/dataViewer/view/timeseries/WPU101707

The Base Steel Materials Index Value (BV) will be the most recent value published on the BLS website for PPI Series Id: WPU101707 on the date of bid opening. This value will be fixed even if the BLS lists this as a preliminary value.

The Initial Steel Materials Index Value (MV) will be the most recent value published on the BLS website for PPI Series Id: WPU101707 on the date of the original purchase agreement between the Contractor and the Supplier.

The Contractor will provide the “Reservoir Steel” submittal to the Owner no later than twenty-eight calendar days after the Owner issues Notice to Proceed. The Contractor will execute a purchase agreement with the Supplier no later than fourteen calendar days of Owner approved submittals for the bid item. Any delays beyond this date will not be accepted.

Measurement: The Owner has determined the initial cost basis (ICB) of steel to be $1.00 per pound. This cost basis is reflected in the steel cost adjustment calculations below. This is the fixed value for the duration of the Contract. Steel cost adjustments will be based on the steel price index, as indicated above, on the date of bid opening (BV) and at the date of the original purchase agreement (MV). This single cost adjustment will be calculated at the time specified above.

The steel cost adjustment will only apply to the weight of steel (WS) material allowed in the bid item. The WS is the weight in pounds of eligible steel, as identified in the Owner approved submittal(s) and as confirmed by collected bills of lading from the delivery trucks, or other confirmation approved by the Owner. In the event, that the weight on the bills of lading does not equal the weight and shipment to the Owner, the Owner shall reduce the WS to the total weight delivered to the project site.

Steel Cost Adjustment Calculation: A cost adjustment will only be applied if the MV is more than 110 percent or less than 90 percent of the BV. Steel price index percentage changes will be calculated using the following formula:

Percentage adjustment (%) = ((MV – BV) / BV) x 100

If the percentage change is less than ten percent, there will be no steel cost adjustment. If the percentage change is ten percent or more, the steel cost adjustment will be calculated using the following formula:
Cost Adjustment ($) = ((MV – BV) / BV) x (ICB x WS)

The cost adjustment will be made as follows:

Fifty percent of Cost Adjustment ($) the responsibility of the owner
Fifty percent of Cost Adjustment ($) the responsibility of the Contractor

Steel added to a Contract as part of a Value Engineering Change Proposal will not be eligible for steel cost adjustment. Steel cost adjustments made in accordance with this Specification will not be reflected on payments made to the Contractor until after the index value required for the calculation becomes final on the BLS website for PPI Series ID: WPU101707 as confirmed by the Owner. Preliminary index values may be used to establish the BV but will not be used to establish the MV in calculations.

Steel cost adjustment shall be considered for the following bid item only:

“Reservoir Steel”

1.30 ADMINISTRATIVE

[CSI 01 30 00]

1.31 Project Management and Coordination

[CSI 01 31 00]

Unless otherwise modified in writing to the Contractor, the Engineer shall be Carol Powers, P.E., who can be reached at (253) 381-0200. This office phone shall be used as the primary means of communication between the Contractor and the Engineer. The Contractor may also attempt to reach the Engineer at email cpowers@cityoftacoma.org. All official correspondence or information that is time sensitive shall be forward to the office phone above, or if required in writing, shall be sent to:

Tacoma Water
Attn: Carol Powers, P.E.
3628 South 35th Street
Tacoma, WA 98409-3192

Within seven (7) calendar days of the notice to proceed, the contractor shall identify in writing to the Engineer the following:

1. Phone number by which the proposed Superintendent can be reached. This phone number shall be capable of taking voice messages when the Superintendent is not available.

2. A description of any limitations on the authority of the Superintendent and the name and phone number of an officer of the Contractor’s company who will act on behalf of the Contractor in any circumstance that exceeds the Superintendent’s authority. If no limitations are noted, the Superintendent shall be responsible for timely decisions on all matters relating to this contract.

3. The address to which all official correspondence shall be sent.

Changes to the above shall be made only in writing to the Engineer.
Any and all communication regarding this specification prior to bid opening will be coordinated through Tisha Rico, Senior Buyer at trico@cityoftacoma.org.

The City reserves the right to request additional information, particularly on non-demonstrated devices to ascertain acceptability prior to awarding the contract. Failure to supply requested information may be cause to reject bid as non-responsive. If there is additional information or changes regarding these Specifications, an addendum will be sent to each bidder.

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. Due to the nature of the project, it is the intent of these Specifications to obtain a product with emphasis on overall safety, quality and quality control, both during and after the construction process. Only Contractors experienced in the construction of welded steel reservoirs will be considered “responsive” and “responsible” bidders for this welded steel reservoir. The Owner will determine the responsiveness of bidders in accordance with the General Provisions Section 1.08 Evaluation of Bid. A primary criteria will include Contractors who have completed at least five welded steel reservoirs in the last ten years with at least one five million gallon reservoir as detailed below. If the reservoir construction is subcontracted, the Reservoir Subcontractor shall be required to meet the above specified experience qualifications.

In order to meet the experience benchmark referenced above, the five reservoirs shall be similar (i.e. concrete footing, cast in place concrete stemwall, etc.) in design to the specified reservoir. Experience with reservoirs having bolted steel walls shall not be considered in meeting the required experience requirements.

The proposed Reservoir construction superintendent shall be currently employed by the qualified Contractor and shall have been the reservoir construction superintendent on no less than five welded steel reservoirs in the last ten years with at least one five million gallon reservoir. The qualified reservoir superintendent will be required to be on the project site in responsible charge, full-time, during all reservoir welding construction activities. 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.

The information required in this section shall be submitted with the bid package on the Statement of Qualifications Form. Failure to submit such information will be deemed a material irregularity which may cause the bid to be rejected as nonresponsive.

The successful bidder shall provide a performance and payment bond in the amount of 100% of the project.
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 shall be responsible for managing, coordinating, and overseeing his subcontractors, suppliers, manufacturers' representatives, or any other persons performing Work. The Contractor shall have a competent representative, familiar with the project and work being performed, on-site at all times.

### 1.31.10 COVID-19 Health and Safety Plan (CHSP)

The Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP). The CHSP shall be prepared and submitted as a Type 2 Working Drawing prior to beginning physical Work. The CHSP shall be based on the most current State and Federal requirements. If the State or Federal requirements are revised, the CHSP shall be updated as necessary to conform to the current requirements.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the look ahead schedule required under Section 1-08.3(2)D. If the conditions change on the project, or a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including State workers in the field, Contractor personnel, consultants, project staff, subcontractors, suppliers and anyone on the project site, staging areas, or yards.

### 1.31.11 COVID-19 Health and Safety Plan (CHSP) Inspection

The Contractor shall grant full and unrestricted access to the Engineer for CHSP Inspections. The Engineer (or designee) will conduct periodic compliance inspections on the project site,
staging areas, or yards to verify that any ongoing work activity is following the CHSP plan. If the Engineer becomes aware of a noncompliance incident either through a site inspection or other means, the Contractor will be notified immediately (within 1 hour). The Contractor shall immediately remedy the noncompliance incident or suspend all or part of the associated work activity. The Contractor shall satisfy the Engineer that the noncompliance incident has been corrected before the suspension will end.

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]

It is the intent of the City to award this contract and begin work as soon as possible.

The contractor shall have 395 calendar days (approximately 13 calendar months) to complete the work based on the date of the notice to proceed, including punch list items. Installation of the generator is exempt from this contract time, but everything shall be ready for generator installation within the contract time.
Liquidated damages may be levied against the Contractor for each calendar day the work remains uncompleted beyond the 395th calendar day after the issuance of the notice to proceed. Liquidated damages shall be $1,500/ day. 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.

All work shall be performed Monday through Friday from 7:30 a.m. to 7:00 p.m. No work shall be performed on site on Saturday, Sunday, or holidays as defined by Paragraph 2.14 of the General Provisions without the written authorization of the Engineer. The contractor may request from the Engineer permission to work on Saturdays, Sundays, or holidays and such requests may be favorably considered if efforts to minimize the impact to the community are taken into account and efforts are taken to minimize these and other impacts. Extended periods of off-hour work may require the Contractor to pay for the overtime charges of the City’s inspector at $80 per hour, and shall be noted by the Engineer upon approval of Saturday, Sunday, or holiday work.

1.32.16 Construction Progress Schedule

[CSI 01 32 16]

The Contractor shall have a plan and schedule of his/her work. The Engineer must approve this plan and schedule. The Contractor shall give a minimum of three working days’ notice to the Engineer prior to commencing work.

The plan shall cover but shall not be limited to the following points:

A. Sufficient work detail to show the major tasks being performed for each week of the work.

B. Planned beginning and ending dates for each pay line item.

C. The total number of personnel expected on the site (rounded to the nearest 5 people increment) during each week of construction activity.

D. Planned beginning and ending dates of subcontractors who will work on-site.

E. Any other significant activities that the contractor determines are important.

If extreme weather conditions or other unforeseen circumstances are deemed by the Engineer to be unsuitable for proper installation of improvements in accordance with these provisions, then the work shall not start or shall be interrupted until conditions have improved sufficiently as to allow the work to progress without delay until completed. The Contractor shall not be responsible for those days, nor have any claim against the City for an extension in project time due to poor weather unless such delays total more than 20 days. If delays total more than 20 days, the contract shall be paid for each day in addition to 20 days of delay due to weather his direct overhead costs or $1000 per day (whichever is less) for each additional day of weather delays beyond 20 days. The Contractor shall submit an updated schedule to Owner each time the schedule is modified.
1.32.29 Periodic Work Observation

[CSI 01 32 29]

The Owner may elect to have an inspector 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 Owner’s inspector to address neither means and methods issues on site nor direct safety issues on site. The Owner’s inspector 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]

When the statement “Engineer Approved Equal” is made on the drawing or in the Specification, it shall mean a like product, of equal or better quality, suitability, reliability, performance, and dimension to the specified item or product. If the Engineer does not consider the proposed substitute item or product an approved equal or better, it may be rejected. The decision of the Engineer is final.

Prior to Bid Opening

In order for alternate equipment to be considered an Engineer Approved Equal, the Bidder shall make a prebid submittal.

When the Bidder chooses to offer an alternate item or product, he shall submit complete supporting technical and physical data, including drawings, diagrams, catalog cuts, manufacturer’s specification sheets, laboratory tests, photographs, samples, the address and phone number of the nearest representative, and any other information which will allow the Engineer to accurately evaluate the item or product as equal.

Substitutions and alternate equipment will be considered prior to the bid opening if the Bidder submits his request for substitution not less than ten (10) working days prior to the date set for bid opening.

All substitution requests shall be submitted using the Substitution Request Form included in this specification and shall be sent to Tisha Rico, Senior Buyer, at trico@cityoftacoma.org. Substitution requests not received by the named individual will not be evaluated and not be allowed as a substitution prior to bidding. An addendum listing such approvals will be issued prior to bidding.

Bidders who do not receive prior approvals, in writing, of Engineer Approved Equals must base their bids on the items specified.

Post Award

Submittals are required for all items installed on this contract. Address submittals to:
Before any material is fabricated or shipped, the Contractor shall furnish to the Engineer two complete sets of subcontractor documents, equipment brochures, technical data, full details, dimensions, catalog cuts, schematic (elementary) diagrams, and other descriptive matter as required to fully describe the exact equipment proposed to be included in this contract. The names, addresses, and phone numbers for the representative of each item shall also be included.

Should any item which deviates from these Specifications be included, the deviation shall be clearly indicated and explained at the time of submittal.

The Contractor shall provide two complete copies of submittal information. Submittals shall be complete, neat, orderly, and indexed. The Contractor shall check submittals for number of copies, adequate identification, correctness, and compliance with the Plans and Specifications. The Contractor shall revise and/or resubmit all submittal information until it is acceptable to the Engineer. The City shall not be liable for any costs, either direct or indirect, incurred by the Contractor in obtaining materials that have not been submitted and approved.

Review of submittal information by the Engineer shall not relieve the Contractor of responsibility for meeting the requirements of the Plans and Specifications, or for errors and omissions in submittals. Reviews by the City do not constitute an undertaking on the part of the City to assure or determine compliance with the Plans and Specifications.

No changes may be made in any submittal after it has been reviewed except with written notice and approval from the Owner.

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]

Work under this contract shall be performed in accordance with applicable sections of the current Standard Specifications for Road, Bridge and Municipal Construction, Washington State Chapter, American Public Works Association, and Washington State Department of Transportation, hereafter referred to as the Standard Specifications.

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

- Pierce County 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 guarantee all work, materials and equipment provided under this contract to be free of defects in design, materials and workmanship for a period one year following the date of acceptance. This warranty shall include all parts, labor and other expenses, so that no cost to the City from any warranty related problem will result.

The warranty shall not apply to incidental supplies or consumables such as lights and batteries. The City will agree to repair or replace light bulbs, batteries, and other incidentals at no cost to the Contractor.

Warranties and guarantees by suppliers of various components in lieu of a single source responsibility by the Contractor will not be accepted. The Contractor shall be solely responsible for the warranty of the station and all components; mechanical, electrical, physical or otherwise except as noted below. S&B Inc. of Bellevue has agreed to warranty their provided equipment and work for two (2) years, so if failure results from S&B’s work, the Contractor shall require S&B to correct said work in accordance with the requirements herein.

NOTE: Where the manufacturer/supplier’s warranty for a specific piece of equipment extends beyond that of the pump station warranty, that warranty shall also be supplied, and shall be fully transferable to the City.

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), freezes below minus 10 degrees Fahrenheit (Eastern Washington), governmental restrictions, vandalism, utility power failures, or utility power surges (unless due to Contractor provided surge suppressor failure).

1.45.16 Field Quality Control Procedures

[CSI 01 45 16]

Unless otherwise noted on the plans or within these specifications, 48-hour prior notice shall be given to the Owner and appropriate reviewing agency for all inspections required for the construction of the project. Forty-eight-hour notice is defined as two complete working day notice. 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 48 hours 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.

- Special Inspections as required per IBC Division 17 and as noted on the drawings
- Any additional inspections required by the Building Department, or other approval agency
- Soils and crushed rock compaction
- Asphalt materials and compaction
• Steel tank welds
• Steel tank coatings
• Paint thickness and finished quality
• Pressure testing
• Water quality testing

1.50 TEMPORARY FACILITIES AND CONTROLS

[CSI 01 50 00]

Provide all necessary water for construction-related fire protection and utilities required by this contract, or by laws and regulations. Sanitary facilities adequate for all workers shall comply with all codes and regulations.

At the close of this contract, the Contractor shall pay all utility bills that are outstanding, remove all temporary electrical, sanitary, gas, telephone and water facilities, and any other temporary service equipment that may remain. In addition, the Contractor shall arrange for the transfer of electrical and water accounts to the Owner’s name.

A field office building is not required, but if the Contractor elects to have one, it shall be provided by the Contractor. Remove building from site on completion of contract, or sooner if directed. None of the buildings on site may be used by the Contractor for any purpose unless prior arrangements are made with the Engineer.

The Contractor shall be responsible for an adequate temporary electrical system. This system shall be arranged by and all costs paid by the Contractor.

There is residential pressure water service available at this site from the hydrants around the cul-de-sac at 196th Street East as shown on the plans. The Contractor shall apply for a permit and shall obtain a backflow prevention device (at the Contractor’s expense) for use at the site. The Contractor will not be charged for the permit or for any water used.

The Contractor shall provide adequate chemical toilet facilities for all those connected with the work. The facility shall be located where directed when work is started and kept in sanitary condition. The facility shall be removed when directed.

Toilet facilities shall be provided for each working party but not less than one unit per 20 workers. They shall be approved portable units serviced on a regular basis by a reputable rental agency.

There is no compressed air service available at this site. The Contractor shall provide their own compressed air, as required.

1.52.00 Construction Facilities

[CSI 01 52 00]

Construct and locate all field offices, all necessary gates and barricades, fences, handrails, guard rails, and securities required by this contract, or by laws and regulations. Provide shelters and dry facilities for the workers as required. Provide all guards, marks, shields, protective clothing,
rain gear, and other equipment required by law, ordinance, labor contracts, Occupational Safety and Health Administration (OSHA) regulations, and other regulations for the maintenance of health and safety. Provide first aid kits and equipment as required by law.

1.52.13 Field Offices and Sheds

[CSI 01 52 13]

Provide one field office trailer for exclusive use by the Owner’s field inspection personnel. This office trailer is to be installed on site at the construction location shown on the plans or as directed by the Owner. The office trailer is to be delivered, leveled, and securely blocked in position by the end of the first week that the Contractor mobilizes to the site. Parking for four vehicles to be provided adjacent to the office trailer. The office trailer is to remain on site until final acceptance of the project or earlier if directed by the Owner.

The office trailer is to be a minimum of 8 feet wide, 10 feet long, and provide a minimum of 8 feet interior height. The floors, walls, and ceiling shall be built to provide secure, rigid protection from environmental conditions and unauthorized personnel. The office trailer shall be constructed and installed to meet the State Department of Factory Assembled Structures Standards and all other State and local building standards. There shall be stable stairs with handrail provided at the entrance. There shall be one door with a dead bolt lock and four keys and round design opening handle. The floor covering shall provide non-skid hard flat surface that is easily cleaned. There shall be a minimum two 3 foot by 3-foot windows and screens capable of being opened. The windows shall be located on the walls with the longer dimension to provide cross ventilation and visual sight of the project site. There shall be two LED or fluorescent switched light fixtures capable of providing adequate lighting for the interior of the office trailer. The office trailer shall be insulated and equipped with electric heating and cooling units to provide sufficient heating and cooling capability to maintain a temperature of 68 degrees Fahrenheit. Two 120-volt electrical outlets shall be provided with power.

The Contractor is to provide a single unit, multifunction printer/copier/scanner capable of connecting to a laptop for use of the Owner’s field personnel.

The Contractor to provide password protected internet access for use of the Owner’s field personnel.

Office furniture shall be provided with the office trailer. This furniture shall consist of one metal office desk, two desk chairs, one drafting table, one drafting stool, and one metal file cabinet. The metal desk shall have a hard, flat, level writing surface that is 30 inches by 60 inches and have three desk drawers for the storage of miscellaneous office supplies. The drafting table shall have a hard, flat, adjustable sloping writing surface that is 30 inches by 60 inches. Each desk chair and drafting stool shall be capable of supporting a 300-pound person comfortably. The metal file cabinet shall have four individual drawers capable of supporting letter and legal-sized file folders.

Contractor shall provide additional items as follows: Top loading, freestanding water dispenser with two temperatures, hot (185 - 203 degrees Fahrenheit); two trash cans; weekly janitorial service; and designated field staff sanitary services, including hand washing area.
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.

All devices requiring locks, including but not limited to doors, electrical enclosures, etc. shall be configured to match Owner standard lock and keys. The Contractor shall provide and install the mortise cylinders. The Owner/Contractor shall provide the cores. The Owner uses a Best 1E series mortise cylinder and Best 7-penny interchangeable core.

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior door</td>
<td>Handle / Knob</td>
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<tr>
<td>Fence gate</td>
<td>Padlock</td>
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<tr>
<td>Vehicle gate</td>
<td>Multi-User Padlock System</td>
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<tr>
<td>Ladder shield</td>
<td>Padlock</td>
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<tr>
<td>Roof hatch</td>
<td>Padlock</td>
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<tr>
<td>Meter vault hatches</td>
<td>Padlock</td>
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<tr>
<td>Reservoir roof vent</td>
<td>Padlock</td>
</tr>
<tr>
<td>Booster Pump Station hatches</td>
<td>Padlock</td>
</tr>
</tbody>
</table>

Provide and install multi-user padlock system equal to Tayhope Multi-Latch for 5 locks, including shield for 5 multi-latch lock, and set of 4 spare pins.

If the Owner provides a key to the Contractor for existing Owner locks, the Contractor will be responsible for the key until returning it to the Owner. If the Contractor loses the key, the Contractor will pay for re-coring of all Owner locks that use that key.

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 or obstruction)
- Picking holes (plug)
- Intermediate or shipping bracing (remove)
- Protective shipping adhesives, coatings or covers (remove and clean residue)
1.60 PRODUCT REQUIREMENTS

[CSI 01 60 00]

1.61 Common Product Requirements

[CSI 01 61 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 include but are not limited to the following (when specified as packaged or integrated).

- Pre-packaged below grade booster pump system
- Control systems

1.70 EXECUTION AND CLOSEOUT REQUIREMENTS

[CSI 01 70 00]

1.71 Examination and Preparation

[CSI 01 71 00]

1.71.23.16 Construction Surveying

[CSI 01 71 23 16]

The Contractor is responsible for surveying and staking and shall stake out the locations of the permanent easements, temporary easements, rights-of-way, and all major facilities shown on the Plans and establish bench marks at locations designated by the Owner. The Contractor shall protect all stakes and marks in their original conditions. If stakes and markings are destroyed or defaced before their use is ended, the cost of replacing them will be at the Contractor's expense. All stakes, points, and marks shall be administered and approved by a registered professional land surveyor licensed in the State of Washington. Provide approved and stamped survey notes, and control points to the Owner for as-built purposes.

Contractor to survey the station line(s) and install pins or offset stakes every 50 feet within areas that will not be disturbed by construction. For utility work, 5-foot and 10-foot offset stakes must be provided for major components including, but not limited to: tees, valves, manholes, catch basins, changes in angle 45-degrees or more, and vaults larger than 4-foot square.

Replace all damaged survey monuments in accordance with WAC 332-120.
1.71.23.20 Surveying Requirements for Reservoir Site

[CSI 01 71 23 20]

The Contractor shall locate a benchmark a minimum of 100 feet and maximum of 500 feet from the reservoir shell.

Provide notification to the Owner when subgrade is prepared and ready for crushed surfacing. Owner will inspect subgrade and may elect to provide their own survey of the subgrade to check elevation. The Owner will have 24 hours, scheduled for a standard working day, to perform their inspections.

Prior to placement of any foundation form work, the subgrade elevation shall be surveyed by a licensed Professional Surveyor hired by the Contractor to confirm the subgrade is at the proposed elevation as shown on the plans. The reservoir subgrade shall be within a tolerance of plus or minus one inch (± 1 inch). Provide written results of the elevation confirmation to the Owner prior to formwork and rebar placement of the reservoir foundation. If tolerance exceeds the limits specified, the Contractor shall regrade the subgrade to within these limits at their expense.

Contractor shall permanently mark four places on the top of the reservoir foundation at quarter-points. Contractor shall hire a licensed Professional Surveyor to survey the elevation of the four reservoir foundation marks relative to the benchmark before and after filling the reservoir. Contractor shall issue a report to the Owner describing the location of the benchmark and reservoir foundation marks with an accurately scaled vicinity map and the results of the survey.

1.74 Cleaning and Waste Management

[CSI 01 74 00]

1.74.13 Progress Cleaning

[CSI 01 74 13]

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.

If an area of the project will be left idle, or minimal work performed for more than two weeks, the Contractor shall clean up the area prior to moving. In this context, clean-up means: stockpiles and materials shall be removed so as not to be obstructions or hazards; surfaces graded smooth as to their purpose; traffic control systems removed, and traffic restored to the satisfaction of the local road agency.

1.74.23 Final Cleaning

[CSI 01 74 23]

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 other areas back track with dozer or excavator and repair to proposed 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.

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]

See the Automatic Control section for control system startup.

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.

Technically qualified factory 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 machinery are functioning correctly.

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

- Telemetry equipment
- Meters
- Packaged below grade Booster Pump Station

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 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. Control system
   B. Panel factory testing
   C. Meter calibration
   D. Emergency power system
   E. Water main
   F. Pump and motor
2. Detail 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 and shall provide for 21 calendar days advance notice in order to reserve Engineer’s and/or Owner Representatives’ time.

The Contractor shall make arrangements 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 160% of test pressure)

- Air compressor
- Voltmeter
- Amp meter.
- Load Bank (generator testing)
- Sound Level (dB) measuring device (generator testing)

Work under other contracts will occur concurrently with this project. The Contractor shall incorporate the schedules of the other work. Work by others includes:

- SCADA programming and testing: 2 weeks.
- Delivery of pre-packaged, below grade Booster Pump Station.
Tacoma Water needs to make system changes prior to startup of the pre-packaged, below grade Booster Pump Station. Tacoma Water shall provide written approval that they are accepting of the Booster Pump Station startup schedule prior to the startup taking place. Startup of the pre-packaged, below grade Booster Pump Station and the Emergency Generator shall be complete prior to startup of the reservoir.

A suggested sequence of testing has been provided below. Contractor shall provide a detailed startup and testing plan for review and approval as listed above.

- Pressure test and purity test all 950 and 1010 zone water mains. Mains shall pass purity test prior to connections to the existing system.
- Connect to the existing 1010 zone piping at Overlook Drive.
- Connect to the existing 1010 zone piping at 196th Drive E.
- Connect to the existing 950 zone piping at 198th Ave E.
- Fill the reservoir for the leak test and water quality test.
  - The reservoir flow meter may be tested at this time.
- Obtain successful reservoir leak and water quality test
- Coordinate with Owner to isolate the 1010 zone from the Prairie Ridge pump station during startup of the 1010 pump station.
  - Close the 24” main isolation valve along the easement at approximate station 450A.
- Start up the 1010 zone pump station with supply from the 950 Reservoir.
  - This could be done by starting up the 1010 pump station with a discharge target of 1015 or back down Prairie Ridge to 1005 or 1000 HGL.
  - The pump station meter can be tested at this time.
- Close the isolation valve(s) to separate the 1010 zone from Prairie Ridge pump station.
- Owner to reduce Prairie Ridge discharge pressure to a hydraulic gradient of 950.
- Open up the isolation valve along the easement 24” piping to allow Prairie Ridge pump station to feed the 950 Reservoir.
- Owner to adjust PRV setting as necessary to allow Prairie Ridge to pump directly into the 950 Zone.

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, the work shall not be tested or covered up 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. Where work is to be tested, all necessary equipment shall be set up and the work given a preliminary test so that any and all defects may be discovered and repaired prior to calling out the Owner for the test.
Final testing shall consist of individual tests and checks made on equipment intended to provide proof of performance of unit and proper operation of unit control together with necessary tests to show system operation in the presence of the Owner. Assure proper alignment, size, condition, capability, strength, proper 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 by 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, such as pipelines, structures, controls, and other items 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:

- Packaged Pump Station
- Generator

Additional representatives required may be identified elsewhere in these specifications.

Qualified product representatives are to be on site for startup and testing of specific pieces of equipment. Representatives required are listed in the relevant specification sections.

1.75.16.22 Scheduling of Owner Review for Testing

[CSI 01 75 16 22]

See Division 1.75.16.10 for scheduling and notification requirements.

In addition, the Contractor shall provide further notification two working days and two working hours (to confirm schedule) of the scheduled test 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 shall 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 at the project site. 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 1 hour 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 is required to have all systems pre-tested to their satisfaction prior to calling the Owner for formal testing.

Schedule shall include 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, or pump station. Testing shall not start on a Thursday, Friday or the day before an Owner identified holiday.

1.75.16.32 Pump Testing

[CSI 01 75 16 32 or 33 08 00]

See the applicable pump sections 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
- Flow sensors and alarms
- Temperature sensors and alarms
- Intrusion sensors and alarms
- Motion sensors
- Photovoltaic sensors
- HVAC controls
- Local control
- Automatic control

1.75.16.50 Reservoir Testing and Disinfection

[CSI 01 75 16 50 or 33 08 10 or 33 01 10.59]

It is estimated that it may take 5 days to fill and 3 days to drain the reservoir. These time periods are included in the contract timeframe, assuming that the initial testing passes. Should a leak test or disinfection test fail and require draining, the contractor must anticipate these time periods during scheduling and understand that they may result in liquidated damages.

Prior to disinfection, hose down surfaces with potable water and sweep up debris and sediment. Do not wash debris into the drain pipe.

Follow the procedures of AWWA C652 Chlorination Method 2, as modified herein, before placing the facility in service. All interior surfaces, including walls, floor, piping, ceiling, columns, ladders/stairs and appurtenances, shall be disinfected. Apply a chlorine solution
containing not less than 200 PPM of chlorine using spray equipment or brushes. Chlorine solution may be re-circulated during disinfection unless it becomes contaminated or drops below 100 PPM. All valves shall be opened and closed several times during the chlorination. Liquid chlorine, sodium hypochlorite, or calcium hypochlorite may be used for disinfection purposes. Disinfected surfaces shall remain in contact with the strong chlorine solution for at least 30 minutes. Fill drain pipe with 10 ppm solution.

A safety plan shall be submitted to the Owner for review and approval prior to the use of high strength chlorine for disinfection.

At no time shall equipment previously used in wastewater applications be used in cleaning or disinfection of the reservoir and appurtenances.

After the disinfection has been accomplished, potable water shall be admitted and filled to overflow. Purge the water in the drain pipe prior to complete filling of the reservoir (dechlorinated if necessary). Water with a chlorine residual shall be stored and aerated or otherwise neutralized until it can be safely disposed of in accordance with all applicable regulations. All disposal shall be the responsibility of the Contractor. Water containing a chlorine residual shall not be disposed of into the water system, stormwater system, or any surface watercourse.

Let the water sit for 24 hours. A water sample will then be taken by the Owner from the reservoir and from the existing water supply for reference. A laboratory certified by the Washington State Department of Ecology will be retained by the Owner to perform a bacteriological test of the sample. Results from the bacteriological test will not be available for at least 24 hours after the Owner collects the samples. The reservoir shall not be placed in service until passing test results have been received and approved by the Owner and the necessary documents have been submitted to the Washington State Health Department. Test for the following parameters, minimum.

- Chlorine residual (tested at the site).
  - After 24 hours, the water must have a chlorine residual no less than 1.0 ppm, or 50% of the chlorine residual present in the distribution system when the tank was filled, whichever is less. If the value is less, the reservoir shall either be re-dosed with chlorine, or drained and re-sterilized, at the Owner’s discretion.

- Coliform (absence required)

- pH (6.5-8.5)

- Alkalinity

- Turbidity

- Conductance (700 Umhos/cm max)

- See Reservoir Soak Test section for additional test parameters.

Alkalinity and turbidity do not have fixed values to meet, but should be near those of the distribution system water used for filling. The Owner will determine if the values are acceptable.
The Owner will provide water for the initial testing of the reservoir at no cost to the Contractor. Should the initial test not pass, or the water is allowed to sit in the reservoir and become unusable, the costs for additional water and tests shall be the responsibility of the Contractor. The Contractor shall exercise special care when draining the reservoir to avoid damage to surrounding properties.

1.75.16.54 Steel Reservoir Leakage Test

[CSI 01 75 16 54 or 33 08 10]

A leakage test of the completed tank installation shall be performed by the Contractor in accordance with AWWA D100. It is the intent of the specifications for the Owner to receive a watertight tank installation. There shall be no leakage rate of the tank specified herein. Any water appearing at tank seams, bolts, foundation/wall junction, appurtenances, or under the foundation shall not be accepted. If any leaks, running water, wet spots, etc., appear within the warranty period, the Contractor shall be responsible for correcting any and all deficiencies in the final product.

The Owner will provide water for the initial testing of the tank delivered through the tank inlet piping at no cost to the Contractor. The Contractor will be charged for additional water at the Owners unit rate for service. Disposal of test water, if required, shall be the responsibility of the Contractor.

1.75.16.56 Reservoir Soak Test

[CSI 01 75 16 56 or 33 08 10]

A soak test shall be performed to check the level of chemical contaminants in the field, in compliance with the Washington State Department of Health Water System Design Manual Appendix H (Appendix G in the 2019 draft Manual).

Following a 7-day soaking period, the water in the reservoir shall be sampled by the Owner to determine the level of any leached chemicals. Samples of the water shall be analyzed by a laboratory certified by the Washington State Department of Ecology. Cost of initial test shall be borne by the Owner. The samples shall be tested for normal domestic water quality plus the following additional constituents.

- Complete Inorganic Chemical sample (IOC)
- Volatile Organic Chemical analysis (VOC)

A report of the test results shall be sent to the Washington Department of Health regional office for evaluation and approval before delivering water from the reservoir. The report shall include the word “Investigative” in the title or purpose section.

Re-testing is required when contamination exceeding the maximum contaminant level or trigger level is found. At the Owner’s discretion, the Owner may elect to put the facility in operation if the trigger level is exceeded but the maximum contaminant level is not.

The soaking period shall imitate actual operating conditions. Therefore, in some cases, longer or shorter soaking periods may be specified, depending upon an evaluation of field conditions encountered.
The Contractor shall pay for the water wasted due to soak test failure. Labor, expenses and laboratory certification for soak re-test shall be borne by the Contractor.

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 O&M manuals and as-built drawings will result in non-payment of the appropriate bid item in the schedule of prices.

See also the Automatic Controls section for additional requirements for automatic control systems manuals. Detailed requirements for specific equipment and systems may also be included in their respective specification sections.

The Contractor shall remove and preserve all tags and instructions that come packaged with or attached to equipment used on the project. Deliver all such documents to the Owner bound in a three-ring binder or with the Operation and Maintenance Manual. Insert documents in sleeves if they cannot be punched. Scan all such documents to Adobe PDF format and provide with the Operation and Maintenance (O&M) Manual.

Prior to the receipt of payment for more than 90 percent of the work, the Contractor shall deliver to the Owner acceptable manufacturer’s operating and maintenance instructions covering equipment and systems installed on the Project requiring operational and/or maintenance procedures and for any additional items indicated by the Owner, including coatings furnished under this contract.

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

**Products**

A. Equipment 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 for the owner.

**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.

Provide 3 hard copies of O&M manuals. A duplicate CD or thumb drive copy shall be provided but shall not substitute a hard copy unless approved by the Owner.

Each set of instructions shall be bound into multiple volumes; each volume to be complete with an index and bound in a suitable, hard-covered binder. Binders shall be of hardback construction with full-length metal hinge. Capacity shall be 3-inch to 5-inch as appropriate for the quantity of O&M documentation. More than one binder may be required for large projects. Binders shall be equal to Wilson-Jones WLJ344 series or WLJ369 series or Specialty Loose Leaf models 87784, 98085, 98086, or 98984.

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

Progress payments for the total contract work in excess of 90 percent completion may not be made until the operation and maintenance manual has been delivered and approved by the Owner, at their discretion.

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, the Contractor shall deliver a complete set of acceptable “As-Constructed” records to the Owner. Plans shall be made on clean, unmarked prints for this project in accordance with the following standards:

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

The Contractor shall provide “as-built” 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]
See the Automatic Control section for automatic control systems training.

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 date(s) as a startup.

Operation of the facility shall commence immediately after completion of testing, startup, and owner 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 architectural components, equipment, tanks, 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 = 0.966  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.

Contractor shall 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. All 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 Function

<table>
<thead>
<tr>
<th>Equipment Function</th>
<th>Working Pressure</th>
<th>Test Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir Inlet and Outlet Pipe and 950 Zone Piping</td>
<td>30 psi</td>
<td>225 psi</td>
</tr>
<tr>
<td>Overflow and Drain Discharge Pipe</td>
<td>35 psi</td>
<td>100 psi</td>
</tr>
<tr>
<td>Booster Pump Station Discharge Pipe and 1010 Zone Piping</td>
<td>60 psi</td>
<td>225 psi</td>
</tr>
</tbody>
</table>

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

**Test Pressure:** Pressure during project specific testing.

### 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.
2.00 GENERAL

[CSI 32 00 00]

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

2.05 Common Work for Exterior Improvements

[CSI 32 05 00]

This division covers that work necessary for providing materials and performing all sitework as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

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

- Erosion and Sedimentation Control Plan
- Erosion Control Fence Fabric
- Erosion Control Mat
- Dewatering Plan
- Shoring Plan and Calculations (if necessary)
- General Fill
- Structural Fill
- Pipe Bedding
- Trench Backfill
- Gravel Backfill for Drains
- Crushed Surfacing
- Rock; Rip Rap; Quarry Spalls
- Paving
- Plants
- Hydroseed
- Planting Schedule
- Fencing
- Fertilizers
• Topsoil
• Organic Compost
• Mulch
• Anti-Desiccant, if needed.

Other Items listed in this section or required by the Owner.

2.07 Geotechnical Investigations

[CSI 02 32 00]

An exploration of subsurface soil and groundwater conditions at the project site were performed by RH2. The results of the investigation are included in this document as an appendix.

2.08 Special Inspections for Earth Work

[CSI 31 08 20]

Part 3 – Execution

Field Quality Control

Special inspections including visual, probing of subgrade and compaction effort (nuclear densometer) are required for the following locations:

• Trench backfill crossing roads and site access road and parking areas (visual, probe and nuclear densometer testing)
• Access road and parking area fill and native subgrade (visual, probe. Nuclear densometer testing.)
• Native subgrade of Reservoir (visual and probe)
• Native (and fill if any) subgrade of Booster Pump Station (visual and probe)
• Finished excavation of detention pond (prior to hydroseed) (visual and probe)
• Pond berm construction (native subgrade and fill placement and compaction) (visual, probe and nuclear densometer testing)
• Roadway embankment cut native subgrade (visual and probe)
• Roadway fill embankment subgrade (visual, probe and nuclear densometer testing at various lifts)

Areas where fill (either native or non-native) is being placed shall be tested for compaction compliance by a special inspector. The owner will pay for the initial testing. If tests indicate failure of compaction requirements, the Contractor shall pay for subsequent tests until tests indicate compliance with the specifications. Areas of native undisturbed subgrade shall be visually inspected by the Owner prior to placement of any material overtop. Contractor shall
coordinate with the Owner a minimum of two (2) full working days prior to inspection being needed.

The Contractor shall fully cooperate with the special inspector, including providing safe access to the testing areas. No extra compensation will be provided for cooperation with and facilitation of inspections.

**Utility Trench Testing**

Testing will occur at the following locations at a minimum:

- One test within 30 feet of start.
- One test every 300 feet or at road intersections, whichever comes first.
- One test whenever soil conditions change, per the direction of the Owner.

The Contractor shall schedule with Owner for visual and probe review of earthwork activity. Contractor shall schedule with Owner and special inspection agency for nuclear densometer testing. Results of the tests shall be delivered to the Owner. If testing and review is required for roadway owned by another Jurisdiction, copies of testing results shall also be provided to that Jurisdiction.

## 2.10 SITE PREPARATION

### 2.10.2 Clearing and Grubbing

**[CSI 31 11 00]**

**Part 3 - Execution**

**Construction**

Clearing and grubbing shall be performed by the Contractor to remove and dispose of unwanted debris, vegetative matter, and other items noted on the Plans within the construction limits and shall conform to Section 2-01 of the Standard Specifications.

Protect trees and tree roots, structures and foundations, utilities, fences, and all other improvements not to be removed regardless if shown to be protected on the Plans.

Remove and relocate permanent improvements that are within the construction limits, such as traffic signs. Return facilities to original location, or plan location, at completion of local work.

Do not remove organic material including plants, grasses, trees and native topsoil unless directed by the Plans. In instances where the Contractor is allowed to clear areas to facilitate construction but is not required to, any areas disturbed by construction shall be surface restored to existing or better condition including matching surface restoration with hydrosed or plantings as shown in adjacent areas required to be modified by the Plans. Where the Contractor is allowed to clear areas to facilitate construction, surface restoration shall be completed at no additional cost to the owner.
2.10.4 Dewatering

[CSI 31 23 19]

Part 3 - Execution

Installation/Construction

The Contractor is to determine the scope, type, size, quantity, method of installation, operation, and removal of the dewatering system necessary to keep all excavations de-watered to an elevation below the base of the excavation sufficient to stabilize the soils in the excavation and the surrounding areas, and to prevent flotation of partially completed structures. Any dewatering systems must be positioned away from all building and utility construction so as to not become a part of the permanent facility.

The Contractor shall furnish, install, and operate all necessary machinery, appliances, and equipment to meet these water control requirements, and shall dewater and dispose of the water so as not to cause injury to public or private property or to cause a nuisance to the public. The Contractor shall maintain sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages, and shall have available at all times competent workmen for the operation of the pump equipment. The dewatering system shall not be shut down between shifts, on holidays or weekends, or during work stoppages.

Field Quality Control

The Contractor shall control groundwater and surface water to prevent the softening of the bottom of excavations, or formation of quick conditions or boils during excavation. Ground water shall be lowered to 3 feet below the base of the excavation at all times. Determination of unsuitable soil conditions for supporting the improvements shall be determined by the Owner. Determination of unsuitable soil conditions for performing work, placing materials, and proceeding with construction activities shall be determined by The Contractor. When the dewatering system does not meet the specified requirements, and as a consequence there is a loosening or disturbance of the foundation soils, instability for the slopes, or damage to the foundation or structures occur, the Contractor shall at its own expense, supply all materials, labor, and equipment, and perform all work required for the restoration of foundation soil, slopes, or structure to the satisfaction of the Owner.

The quality of all surface and ground water discharged from the site shall meet all State and local requirements. The Contractor shall employ all means necessary to remove suspended solids, oils, trash, and other deleterious materials from surface and ground water prior to discharging.

Restoration

Any dewatering wells installed by the Contractor shall be removed and backfilled in accordance with applicable Federal and State regulations.
2.10.5 Temporary Access Roads

[CSI 01 55 13]

Part 1 - General

Summary

The Contractor shall provide for all temporary site access and shall maintain vehicular site access at all times. Access shall be of a quality to permit Contractor’s forces and outside inspector’s safe and convenient ingress/egress. Unless specifically provided for in other bid items, the cost of building and maintaining construction access shall be incidental and no separate payment shall be made. Any bid items for aggregate materials (e.g. crushed rock, ballast, etc.) shall not relate to construction access unless the description of that bid item specifically states inclusion of the construction access.

Part 3 - Execution

Repair/Restoration

The Contractor is responsible for maintaining all construction accesses during construction and the cost of such maintenance shall be incidental to the bid price. Maintenance includes repairing settled and damaged areas, and providing dust control. Cost for maintenance due to rain, snow, wind, or other weather conditions shall be incidental to the bid price.

Cleaning

Wherever construction vehicle access routes intersect paved roads, provisions must be made by the Contractor to minimize the transport of sediment onto the paved road. The Contractor shall remove all dirt, mud, rocks, vegetation, or other deleterious material from all construction equipment prior to leaving the site. This may include spray washing, sweeping, or other physical methods as necessary to remove materials.

If sediment or other debris is transported onto a paved road surface, the road shall be cleaned thoroughly by the end of the work day. Debris shall be removed from roads by shoveling or sweeping. Street washing shall be allowed only after debris has been removed in this manner.

2.11 Earthwork Materials

2.11.1 Common Work for Earthwork Materials

[CSI 31 05 00]

Part 1 - General

Acceptance at Site

In order to document the quantities and amounts to be paid on monthly billing statements, the Contractor shall provide the Owner with copies of all trucking tickets indicating quantities of materials delivered to complete the contract. A representative of the hauling company shall sign the truck tickets. The scales used to weigh materials shall be calibrated and certified on a quarterly basis. Certifications of such calibrations shall be given to the Owner. One shall be sent prior to beginning of the project and as construction progresses on a quarterly basis.
Part 2 - Products

Source Quality Control

All imported fill material shall be free of hydrocarbons (e.g. gasoline, diesel, oil, etc.), pesticides, herbicides and other hazardous volatile organic compounds (VOCs) and synthetic organic chemicals (SOCs). The Contractor shall provide certification to the owner that the fill is free of these chemicals.

2.11.2 General Fill

[CSI 31 23 23.51]

Part 1 – General

Summary

All fill required for this project that is not specifically defined as another type shall be “General Fill”.

References


Part 2 – Products

Components

General fill shall be soil free of organics, debris, and other deleterious materials with no individual particles having a maximum dimension larger than 5 inches. The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as general fill.

Part 3 – Execution

Installation/Construction

All general fill shall be compacted in uniform layers not exceeding 12 inches in loose thickness and compacted to at least 90 percent maximum dry density based on the ASTM D-1557 (modified).

2.11.3 Structural Fill

[CSI 31 23 23.52]

Part 1 – General

Summary

All fill placed below, beside and against building components, building structures, vaults, manholes, handholes, slabs, sidewalks, and drives shall be “Structural Fill” unless other fill materials are specifically shown on the Plans. The structural fill material has been selected to support the weight of the structure in combination with the existing native material and to prevent adverse movement during an earthquake. The Contractor must take particular care to maintain the integrity of the design by using structural fill where shown.
References

Where free draining material for use as structural fill is required as indicated on the Plans or needed to maintain compaction in adverse weather conditions, it shall conform with Section 9.03.14(1), “Gravel Borrow” of the Standard Specifications.

Structural fill for foundation subgrades or where free drainage is not required through the structural fill shall conform with 9.03.14(2) “Select Borrow” of the Standard Specifications.

Part 2 – Products

Components

Structural fill shall be soil free of organics, debris, and other deleterious materials. The Owner shall determine if native on-site materials are suitable for use as structural fill.

Part 3 – Execution

Installation/Construction

The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as structural fill. Structural fill shall bear on firm base and be placed in uniform layers not exceeding 12 inches in loose thickness. The backfill area must be free of standing water and the subgrade soils must be stable. Each layer of structural fill shall be compacted to at least 90 percent of its maximum dry density based on the ASTM D-1557 (modified) test procedure.

2.11.4 Pipe Bedding

[CSI 31 23 23.53]

Part 1 – General

Summary

All fill placed below and around buried utilities, including adjacent to reservoir foundation, shall be “Gravel Backfill for Pipe Bedding”. The pipe bedding material has been selected to support the weight of the utility by distributing the load so that the completed utility and backfill system does not weigh more than the native material. In addition, the grain size has been selected so that the bedding will not migrate into the bottom of the trench. The Contractor must take particular care to maintain the integrity of the utility design by using the appropriate pipe bedding material where shown.

References

For Ductile Iron or Concrete Pipe larger than 4-inch diameter: Bedding material shall conform with Section 9.03.9(3) “Crushed Surfacing” of the Standard Specifications.

For PVC and HDPE water piping regardless of diameter: Bedding shall conform with Section 9.03.13 “Backfill for Sand Drains” or as approved by the Inspector.

For PVC Sewer and Storm Piping, Conduit, Side Service Lines, and all other piping 4-inch in diameter or less: Bedding shall conform with Section 9.03.13 “Backfill for Sand Drains” or as approved by the Inspector.
For Steel pipe: Bedding material shall be screened sand conforming to the requirements for fine aggregate in Section 9-03.1(2) “Fine Aggregate for Portland Cement Concrete” Class 2 or as approved by the Inspector.

Pipe bedding used around restrained joint pipe must be a well graded cohesive material with fines. Rounded gravels and pea gravel are not acceptable.

**Part 3 – Execution**

**Installation/Construction**

Bedding material shall surround the pipe and conduits to the limits shown on the Plans and provide uniform support along the entire length without allowing concentrated loading at joints or bells or that results in any bridging of the pipe. All bedding material shall bear on firm subgrade and be compacted to firm and unyielding condition.

### 2.11.5 Trench Backfill

*CSI 31 23 23.54 or 31 23.33*

**Part 1 – General**

**Summary**

All fill placed above the pipe bedding in a trench shall be “Trench Backfill”. The trench backfill material has been selected to distribute surface loads over the utility. In addition, the grain size has been selected so that the trench backfill will not migrate into the pipe bedding or trench walls. The Contractor must take particular care to maintain the integrity of the utility design by using the appropriate trench backfill material where shown.

**References**

Trench backfill shall consist of materials conforming to Section 9-03.19 “Bank Run Gravel for Trench Backfill” of the Standard Specifications or as approved by the Owner.

**Part 3 – Execution**

**Installation/Construction**

Trench backfill shall follow the requirements of 7-09.3(10) and 7-09.3(11) of the Standard Specifications.

### 2.11.6 Gravel Backfill for Drains

*CSI 31 23 23.55*

**Part 1 – General**

**Summary**

All fill placed around drain pipes in a trench shall be “Gravel Backfill for Drains”. Gravel backfill for drains shall provide drainage for stormwater runoff.

**References**

Gravel backfill for drains shall conform with Section 9-03.12(4) of the Standard Specifications.
2.11.7 Gravel Base Course

[CSI 32 11 23.10]

Part 1 – General

Summary
All fill placed under paving, foundations or structures and next to native material shall be “Gravel Base Course” unless otherwise called out on the Plans.

References
Aggregate for gravel base course under structures, and foundations shall conform to Section 9-03.10 Aggregate for Gravel Base of the Standard Specifications.
Aggregate for gravel base course under roadways, paved areas, sidewalks and gravel areas shall conform to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications.

2.11.8 Gravel Top Course

[CSI 32 11 23.11]

Part 1 – General

Summary
Gravel surface paving as shown on the Plans shall be “Gravel Top Course”.

References
Aggregate for gravel top course shall conform to Section 9-03.9(3) Crushed Surfacing Top Course and Keystone of the Standard Specifications.

2.11.20 Geotextile Fabric

[CSI 31 32 19.16 or 31 34 19.16]

Part 1 – General

Delivery, Storage, and Handling
All fabrics shall be shipped, stored, placed, overlapped and secured based on manufacturer requirements.

Part 2 – Products

Materials
Geotextile Fabric shall be chosen by the Contractor to meet the requirements based on place of use.

For geotextile fabric called out on the Plans to separate drain rock or French drains from surrounding soils, it shall be equal to Tencate Mirafi 140N.

For geotextile fabric placed between quarry spalls and fill to separate soil fines, it shall be equal to Tencate Mirafi 160N.
For geotextile fabric called out to drain behind a wall without the use of drain rock, it shall be equal to Tencate Mirafi G100W.

For Embankment stabilization, if a geotextile fabric is called out, it shall be equal to Mirafi Miramat TM8.

For geotextile fabric placed below crushed rock in road subgrade it shall be equal to Tencate Mirafi 500X.

Other locations may require a specialized geotextile fabric and if so shall either be identified in the Plans or geotechnical report.

2.12 Road Surfacing

[CSI 32 10 00]

2.12.3 Hot Mix Asphalt (HMA) / Asphalt Concrete Pavement (ACP)

[CSI 32 12 16]

Part 1 – General

Definitions

The Plans and specifications may call out Hot Mix Asphalt (HMA) or Asphalt Concrete Pavement (ACP). The terms are synonymous.

References

Hot Mix Asphalt (HMA) shall comply with Section 5-04 of the Standard Specifications. All HMA shown on the Plans shall be Commercial HMA unless otherwise noted. Furnish, place, spread, and compact HMA to the thickness shown on the Plans.

2.13 Tree and Shrub Preservation

[CSI 32 01 90.33]

Part 1 - General

Warranty

Trees which are to be protected that become damaged or die within one year of acceptance shall be repaired or replaced by the Contractor at the discretion of the Owner with trees of the same species and equal size.

Part 3 – Execution

Installation/Construction

Individual trees and areas shown to remain shall be protected by six (6) foot high orange construction fence. Install fencing before site preparation, grading and clearing and grubbing operations. Under no circumstances shall the Contractor, for convenience, or ease of
construction, or any other reason not approved by the Owner, remove existing trees that are not designated to be removed.

No work can commence until complete erosion control and temporary fencing is in place and approved by Owner’s Representative. Prior to installation, stake the location of protection fencing for approval by the Owner. Location stakes or marking shall be placed not greater than 20 (twenty) feet on center.

Fencing shall be constructed and located to protect vegetation from physical or chemical damage, flame, smoke, heat, and damage to, or compaction of roots.

Construction access, vehicle or equipment parking, material storage or material disposal will not be allowed within drip lines of existing trees to remain.

Excavate within drip line of trees only where shown. Where trenching for utilities is required within drip line, tunnel under or around roots by methods that do not tear or compromise the health of the roots. Do not cut main lateral roots or tap roots.

Where pruning is shown on the plans, or allowed by the Owner, cut branches with sharp and clean pruning instruments and do not break or chop. Prune flush with trunk surface.

Field Quality Control

Engage a National Arborist Association Certified tree surgeon to perform Class II pruning on trees as indicated on Plans and as directed in the field. Extents of pruning shall be approved by the Owner.

The Contractor shall notify the Owner prior to cutting roots over 4 inches in diameter. Treat cut roots over 1-inch in diameter with asphaltic pruning paint.

Repair/Restoration

After construction, orange construction fencing shall be removed from site by Contractor.

2.13.3 Selective Tree and Shrub Removal

[CSI 31 13 13]

Part 3 – Execution

Installation/Construction

Trees and shrubs which are to be removed or relocated as indicated on Plans shall be removed completely including roots, stumps, branches, and stems, or as directed by Owner’s Representative unless shown otherwise on the Plans. Plant material shall be transplanted immediately or stockpiled and sufficiently protected/watered until transplanting occurs, to ensure plant material remains healthy in transition. Thoroughly water all transplanted trees and shrubs immediately after planting and in sufficient quantity thereafter to minimize transplant shock.
2.20 EARTH MOVING

[CSI 31 20 00]

2.23 Excavation

[CSI 31 23 16]

Part 1 – General

Summary

The Contractor shall excavate as necessary to construct the improvements shown.

Part 2 – Products

Materials

All excavated material below the organic layer can be re-used as backfill as long as it is properly protected from water saturation, meets the specification for the backfill purpose, and is approved by the Owner. Approval of material as backfill will be made the moment before placement of the material as backfill. Weather conditions may make previously approved material unsuitable for backfill requiring the material to be removed from the project site.

Excavated material that is not used as backfill shall be disposed off-site. All permits for the disposal of excavated material shall be obtained by the Contractor. A copy of all permits and the locations of each disposal site shall be submitted to the Owner.

Part 3 – Execution

Installation/Construction

Excavation shall include the digging, scraping, and removing existing native material, abandoned or interfering utilities, abandoned or interfering structures and any other obstacles necessary for the construction of the improvements shown on the Plans. Excavation includes utility excavation, structural excavation, and grading excavation.

Utility excavation shall be performed to the depths necessary to complete the utility construction work shown.

Structural excavation shall be performed to the limits shown and established by the Owner. The base of the excavation shall extend laterally a minimum of 2 feet beyond the structure unless specified otherwise on Plans.

Excavated material may be stockpiled on site. Temporary stockpiling of excavated material will not be permitted outside the construction limits at any time.

Examination

The base of the excavation shall be evaluated by the Owner to determine if it is suitable for backfilling. The Owner will evaluate the stability of the base of excavation by determining if all significant organic soils or other unsuitable materials have been removed.
Construction

Excavation required by the Owner that is beyond the depth shown shall be performed by the Contractor per the direction of the Owner. The Contractor will be reimbursed for additional excavation as specified in Division 18, “Measurement and Payment”.

2.23.26 Rock Removal in Utility Trenches

[CSI 31 23 16.27]

Part 1 – General

References

Rock removal within utility trenching shall comply with Section 7-09.3(7)B of the Standard Specifications, except as supplemented herein and in Division 18 Measurement and Payment.

Part 3 – Execution

Site Tests

If the Inspector determines that laboratory strength testing is necessary for rock classification, testing lab costs will be paid by the Owner. The Contractor shall provide safe access and work to extract samples.

2.25 Temporary Erosion and Sedimentation Control

[CSI 01 57 13]

2.25.2 Contractor Provided Certified Erosion and Sedimentation Control Lead

[CSI 01 57 13.10]

Part 1 – General

Summary

The Contractor shall provide a Certified Erosion and Sedimentation Control Lead (CESCL) as part of their regular work force for the project. This person shall be a site superintendent, project manager or site laborer regularly on the project site during earthwork operations.

Submittals

Documentation of the Certification shall be provided to the Owner and reviewing authority if applicable with a copy of such certification always available in the job shack. Washington State Department of Ecology Certification shall be valid and up to date for this person throughout the duration of the earthwork operations of the project.
2.25.3 Temporary Erosion and Sedimentation Control (SWPPP Reference)

[CSI 01 57 13.12]

Part 1 – General

See Section 2.25.3 in Appendix B for Temporary Erosion and Sedimentation Control requirements.

2.25.4 Soils Management

Part 1 – General

See Section 2.25.4 in Appendix B for Soils Management Requirements.

2.30 SITE IMPROVEMENTS

[CSI 32 30 00]

2.31 Fencing and Gates

[CSI 32 31 00]

2.31.1 Common Work for Fencing

[CSI 32 31 05]

Part 1 – General

Related Sections

- Division 1.52.20 Locks and Keys
- Division 3 Concrete

Part 3 – Execution

Preparation

Clear the area along the fence path, remove surface irregularities and grade earth smooth and continuous prior to fence installation.

2.31.2 Temporary Construction Security Fence

[CSI 01 56 26]

Part 1 – General

Related Sections

- Division 10.14.7 Signage
Part 2 – Products

Materials

Chain link shall be 13-gauge minimum. Top and bottom wire shall be used for fencing with posts directly driven into the ground. Top and bottom rail shall be used for modular fencing using concrete block bases.

All vehicle access gates shall be locked with a padlock provided by the Contractor. Extra keys shall be provided to the Owner prior to construction.

Part 3 – Execution

Installation/Construction

The Contractor shall provide a 6-feet tall temporary construction fence surrounding the construction site. Fence posts shall be spaced at a maximum of 12 feet on center. Contractor shall be responsible for maintaining fence during construction and securing fence after each workday. Posts shall be securely installed directly into the ground or set in temporary concrete base blocks. Chain link shall be securely attached to the fence posts. The construction fence may be used in combination with the permanent fence provided that the fence is continuous around the site perimeter.

2.31.3 Chainlink Fence

[CSI 32 31 13]

Part 1- General

Summary

This section describes the requirements for the chainlink fence located as shown and detailed on the Plans and these specifications.

Related Sections

- Division 2.31.1 Common Work for Fences
- Division 3.31.30 Thrust Blocks, Driveways, Curb, Gutter, Sidewalks, Equipment Pads, and Fence Posts

References

Chainlink Fence Manufacturers Institute Product Manual Specifications

DOT Standard Specifications Section 8-12

ASTM F626, A392, A817, F1083, A121, F567

Submittals

Galvanizing information, steel quality standards, hardware quality standards.

Dimensional drawings including details, finishes, accessories and foundations.
Part 2 - Products

Materials

Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

Chain-Link (woven wire fabric) fencing shall be commercial grade, as detailed on the Plans and in accordance with Section 8-12 of the Standard Specifications of the Standard Specifications except as modified herein.

Components

Fence Fabric: Polymer coated galvanized wire: ASTM F668 class 2b, fused and adhered.

Size: Helically wound and woven to height of as indicated on drawings with 5/8-inch diamond mesh and core wire gauge of 9. Polymer coating gauge of 8 shall not be included in the wire size measurement.

Selvage of fabric: twisted and barbed at top and twisted at bottom unless noted otherwise on the Plans.

Steel Fence Framing: Steel pipe - Type I: ASTM F1083, standard weight schedule 40; minimum yield strength of 30,000 psi. Outside diameter (OD) sizes as shown on the Plans. Hot-dipped galvanized with minimum average 1.8 oz./ft² of coated surface area.

Steel Fence Framework Coating: Polymer coated pipe shall have a PVC or polyester coating fused and adhered to the exterior zinc coating of the galvanized pipe in accordance with ASTM F1043; minimum thickness of the PVC coating shall be 10-mils, for polyester 3 mils.

Accessories

Chain link fence accessories per ASTM F626 Provide items required to complete fence system. Galvanzie each ferrous metal item and finish to match framing.

Post caps: Formed steel weather tight closure cap for pipe posts. Provide one cap for each post. Cap to have provision for barbe wire when necessary.

Top rail and rail ends: Pressed steel per ASTM F626, for connection of rail and brace to terminal posts.

Top rail sleeves: 6-inch (178 mm) expansion sleeve with a minimum 0.137-inch wire diameter and 1.80-inch length spring, allowing for expansion and contraction of top rail.

Wire ties: 9-gauge galvanized steel wire for attachment of fabric to line posts. Thirteen gauge for rails and braces.

Brace and tension (stretcher bar) bands: Pressed steel, minimum 300-degree profile curvature for secure fence post attachment.

Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16 inch by 3/4-inch. Provide tension (stretcher) bars where chain link fabric meets terminal posts.

Tension wire (used when top rails are not required): Galvanized coated steel wire, 6 gauge, with tensile strength of 75,000 psi. Hog ties are permissible.
Tie rod, truss rods, and tightener: Steel rods with minimum diameter of ⅜-inch. Capable of withstanding a tension of minimum 2,000 lbs.

Barbed wire: ASTM A121 Class 3, zinc coated steel wire double-strand, 14 gauge twisted line wire with galvanized steel, 4 point barbs spaced approximately 5 inches on center.


Nuts and bolts are galvanized.

**Finishes**

Colors shall be available for owner selection black in compliance with ASTM F934. All fence components shall be coated including mesh, posts, caps, clips, and rails.

**Fabrication**

Fence frames that require welding shall be hot dipped galvanized in the shop unless approved otherwise by the owner.

**Part 3 - Execution**

**Installers**

Installers shall have a minimum of two years of experience. References from three previous projects shall be submitted for review during shop drawing submittal.

**Examination**

Verify areas to receive fencing are completed to final grades and elevations.

Ensure property lines and legal boundaries of work are clearly established.

Perform complete utility locates within the areas of fencing to verify conflicting utilities. Fence posts may require adjustment to avoid utilities by a minimum of 2-feet.

**Installation/Construction**

Chainlink Fence Framing Installation:

A. Install chain link fence in accordance with ASTM F567 and manufacturer’s instructions.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.

C. Space line posts uniformly at 10-feet on center maximum and to avoid utilities by 2-feet minimum.

D. Concrete set terminal and gate posts: Drill holes in firm, undisturbed or compacted soil. Trowel finish around post. Slope to direct water away from posts. Footings shall be sized per schedule on the Plans.

E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
F. Bracing: Install horizontal pipe brace at mid-height for fences 8-feet tall and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

G. Tension wire: If shown on the Plans, install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12½ gauge hog rings 24 inches O.C.

H. Top rail: If shown on the Plans, install lengths, 21-feet. Connect joints with sleeves for rigid connections for expansion/contraction.

I. Brace Rails for fabric height 8-feet and over. Install brace rails between terminal posts and adjacent line posts with fittings and accessories. Install brace rails at each gate post and each corner post with angle change exceeding 30 degrees.

J. Bottom Rails: If shown on the Plans install bottom rails between posts with fittings and accessories.

Chain Link Fabric Installation

A. Fabric: Install fabric on side facing outward from site and attach so that fabric remains in tension after pulling force is released. Leave no more than 3-inches between finish grade and bottom selvage. Attach fabric with wire ties to line posts and tension wire at 15-inches on center and to rails and horizontal braces at 24-inches on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15-inches on center. Hog ties are allowed.

Accessories

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

C. Barbed wire: Uniformly space parallel rows of barbed wire on security side of fence. Pull wire taut and attach with clips or in slots of each extension.

2.50 EXCAVATION SUPPORT AND PROTECTION

[CSI 31 50 00]

2.51 Contractor Designed Shoring

[CSI 31 50 10]

Part 1 - General

Summary

Where shoring, sheet piling, sheeting, bracing, lagging, or other supports are necessary to prevent cave-ins or damage to existing structures, it shall be the responsibility of the Contractor to design, furnish, place, maintain, and remove supports in accordance with applicable laws, codes, and safety requirements.
References

OSHA

Quality Assurance
Where the Contractor is required to provide the shoring design, it shall be prepared by a competent person as defined by WAC 296-155-650. Before beginning any excavation that is governed by the shoring requirements, the Contractor shall submit his stamped shoring plan and calculations to the Owner for approval. The stamp must be present on all Plans and calculations, and all submittals must be approved by the Owner prior to starting work.

Part 3 - Execution
Installation/Construction
Design, planning, installation, and removal of sheeting, shoring, sheet piling, lagging, and bracing shall be accomplished in such a manner as to maintain the undisturbed state of soil below and adjacent to excavation.

2.60 CONTAMINATED & WASTE MATERIALS HANDLING

2.60.2 Waste Material Control

Part 1 – General

Quality Assurance
Adhere to all requirements of federal, state, and local statutes and regulations dealing with pollution. Permit no public nuisances.

Use only dump sites that are approved by the regulatory agency having jurisdiction, and present proof of approval upon request.

The Contractor shall follow all requirements and guidelines of the Puget Sound Air Pollution Control Agency (PSAPCA) and other associated agencies.

Part 3 – Execution

Installation/Construction
The Contractor shall take precautions to warn, protect, and prevent the public from all hazards that exist on site due to any demolition or construction operations. Stockpiled debris shall be surrounded with yellow warning tape attached to lath, stakes, poles, or fencing to warn the public of any potential hazard.

Use water sprinkling, temporary enclosures, or other methods to limit dust and dirt from rising and scattering in the air. Surface water runoff that is contaminated with site debris, silt, or other material that adversely affects water quality shall be collected and cleaned prior to
discharge. On site collection ponds may not be used to keep silt laden water from entering the storm water collection system.

Do not use water to control dust when its use may create hazardous or objectionable conditions such as ice formation, flooding, and pollution.

The Contractor shall minimize the amount of dust and other airborne particles caused by any demolition, excavation, stockpiling, or removal activities. Dust control measures shall be implemented by the Contractor prior to the beginning of work activities. Exposed soil may be wetted with water or covered to minimize dust creation. Water runoff from the wetting procedure shall be accumulated and cleaned prior to disposal. Water runoff accumulation shall be removed from the site prior to project completion.

Cleaning

At all times, keep the construction area clean and orderly and upon completion of the work, leave buildings broom clean and all parts of the work clean and free of rubbish and excess material of any kind. Leave fixtures, equipment, walls, and floors clean and free of stains, paint or roofing splashes, or other marks or defects. Upon completion, restore site of all work or equipment and material storage areas to their original conditions. Remove all miscellaneous unused material resulting from work and dispose of it in a manner satisfactory to the Owner. The site, through the progress of construction, shall be kept as clean as possible and in a neat condition.

2.61 Contaminated Materials

2.61.2 Toxic Spill or Release Contact Requirements

[CSI 02 61 40]

Part 3 - Execution

Field Quality Control

During construction, if there is any toxic substance spill or release discharged into the environment, report the location, quantity, date and time of the spill or release to Washington State Emergency Management at 1 (800) 258-5990 and the Owner’s representative. Spills shall be monitored, contained, and cleaned up to applicable codes at the Contractor’s expense.

2.90 LANDSCAPING

[CSI 32 90 00]

2.90.1 Common Work for Landscaping

[CSI 32 90 05]

Part 1 – General

Submittals

In addition to Division 2.05, provide the following information.

Samples of compost.
Written maintenance instructions recommending proper procedures for maintenance of plant materials.

Topsoil - The Contractor shall submit the data for topsoil to be used as determined by an approved testing lab. Data shall include percentage of organic content as determined by incineration process and recommendations on type and quality of additives required to establish satisfactory pH factor, organic content, and supply of nutrients to bring the soil to a satisfactory level for planting.

Nursery Material Plant Lists with quantities and sizes (pot volume and/or tree height) and planting schedule indicating approximate planting date.

**Delivery, Storage, and Handling**

Deliver fertilizers in original, unopened and undamaged containers that list weight, analysis, and name of manufacturer. Store in such a manner as to prevent wetting and deterioration. Take all precautions customary in good trade practice in preparing plants for transplanting. Spray deciduous plants in foliage with an approved “Anti-Desiccant” immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner. Water plantings as necessary to keep them alive and in healthy condition. Provide dry, loose topsoil for planting bed mixes.

**Project/Site Conditions**

Prevent damage to existing features, existing plantings, pavement, utility lines, areas to receive planting and other features remaining as part of final landscaping and/or site improvements.

**Quality Assurance**

The Contractor, with the approval of the Owner will select a qualified testing laboratory to test and inspect operations under this Section at the Contractor’s expense. Notify testing laboratory of times for inspections.

Notify Owner if any undesirable conditions are met during construction so that supplemental recommendations can be made.

Comply with all applicable federal, state and local codes and safety regulations.

Comply with sizing and grading standards of the latest edition of “American Standard for Nursery Stock.” A plant shall be dimensioned as it stands in its natural position.

**Warranty**

Warrant trees, shrubs and ground cover for the period as stated in the Plans and/or Warranty section of Division 1 against defects including death and unsatisfactory growth, except for defects resulting from negligence by Owner, abuse or damage by others or unusual phenomena or incidents beyond the Contractor’s control.

Replace, in size and kind and in accordance with the Plans and Specifications, all plants that are dead or, as determined by the Owner, in an unhealthy or unsightly condition, or have lost
their natural shape due to dead branches or other causes due to the Contractor's negligence. Such replacement(s) will be at Contractor's expense.

Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, unusual floods, freezing rains, lightning storms, winds over 75 miles per hour or other catastrophic events. Winter kill caused by extreme cold and severe winter conditions not typical of planting area, unanticipated acts of vandalism or negligence on the part of the Owner, or damage caused by wildlife shall not be covered under this warranty.

**Maintenance**

The plant establishment period shall be 365 days in duration.

Maintenance of landscaping installed as part of this contract is fully the responsibility of the Contractor during the plant establishment period.

During the plant establishment period, it shall be the Contractor's responsibility to ensure the continued growth of all plant materials. This care shall include, but not be limited to, the following: labor and materials necessary for removal of foreign materials, weeds, dead or rejected plant materials; the replacement of all unsatisfactory plant materials planted under this Contract in kind and size; ensuring plantings are receiving adequate water for establishment; replacing/reaffixing staking or mulch; and fertilizing to maintain a healthy growing condition and visually pleasing site.

Water plantings within the first 24 hours of initial planting, and in sufficient amounts thereafter to keep plant materials in a healthy growing condition.

Provide maintenance reports to Owner’s Authorized Representative quarterly, indicating procedures, fertilization, defective material, plant establishment, etc.

**Part 2 – Products**

**Materials**

A complete list of plants, including a schedule of sizes, quantities and other requirements are shown on the Plans. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting Plans shall govern.

All plants shall be nursery grown under climatic conditions similar to those in the project locale for a minimum of 2 years. All potted plants shall be grown in the containers in which they are sold for a minimum of one year.

Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25 percent are of the minimum size indicated and 75 percent are of the maximum size indicated.

**Part 3 – Execution**

**Examination**

Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected and approved by the Owner’s Authorized Representative.
Notify Owner’s Authorized Representative at least 7 working days prior to installation of plant material.

Final inspection to determine acceptance of planted areas will be made by the Owner upon Contractor’s request. Provide notification at least 10 working days before requested inspection date. Planted areas will be accepted, provided all requirements, including maintenance, have been complied with and plant materials are alive and healthy after final acceptance of the project.

Upon one year after Substantial Completion, the Owner will assume plant maintenance.

**Installation**

Install plants and transplanted material per the Plans. Work with the Owner and Developer for transplanting of existing trees and shrubs as needed to accommodate the proposed improvements. Protect existing trees and shrubs to the maximum extent practicable.

**Correction of Defective Work**

All dead plant materials shall be replaced within thirty (30) days of discovery.

Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

Tighten and repair guy wires and stakes as required.

Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.

**Field Quality Control**

Provide planting as-built Plans legibly recording actual construction indicating horizontal and vertical locations, referenced to permanent surface improvements. Identify field changes of dimension and detail any changes.

**Cleaning**

During landscape work, keep pavements clean and work area in an orderly condition.

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris and equipment as instructed by Owner’s Authorized Representative. Repair damage resulting from planting operations.

**2.90.2 Landscape Grading**

[CSI 32 91 19]

**Part 3 – Execution**

**Installation/Construction**

Perform fine grading within Contract limits, including adjacent transition areas, to new elevations, levels, profiles and contours indicated. Provide subgrade surfaces parallel to finished surface grades, unless specified otherwise. Provide uniform levels and slopes between new elevations and existing grades. All fills required to achieve subgrades shall be compacted per requirements of the fill type as noted above. For landscaping areas, all fill shall be...
compacted between 80 to 85 percent of modified proctor (ASTM D-1557) unless noted otherwise on the Plans.

Perform grading, within branch spread of existing trees scheduled to remain, by hand methods to elevations indicated. Cut roots cleanly to depth 3 inches below proposed finish grade. Treat cut roots over 1-inch in diameter with asphaltic pruning paint.

2.90.3 Soil Amendments

2.90.3.1 Commercial Fertilizer

[CSI 32 93 10]

Part 2 – Products

Materials

Each tree and shrub shall receive “AgSafe Tabs” (or equal). Plant tablets at the time of planting at the following rate:

<table>
<thead>
<tr>
<th>Plant Size</th>
<th>Tablet Size</th>
<th>No. of Tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallon</td>
<td>10 gram</td>
<td>1-2</td>
</tr>
<tr>
<td>Gallon</td>
<td>21 gram</td>
<td>2-3</td>
</tr>
<tr>
<td>Cal. Inch of tree</td>
<td>21 gram</td>
<td>2 per inch</td>
</tr>
<tr>
<td>Height of tree</td>
<td>21 gram</td>
<td>2 per foot of height</td>
</tr>
</tbody>
</table>

For application to tree/shrub beds three months after initial planting:

Provide fertilizer with not less than 18 percent total nitrogen, 8 percent available phosphoric acid and 9 percent total potash.

P and K to come from Controlled Release Polymer Coated-based nitrates.

2.90.3.3 Mulch

[CSI 32 91 13.16]

Part 2 – Products

Materials

Mulch for planting beds shall be medium-fine bark mulch, containing a blend of fir and/or hemlock bark, ranging from 1½ to 3 inches and smaller particle size.

Mulch for slopes less than 2H:1V: Shredded plant waste as described above or commercially available straw. Straw shall not include Reed Canary grass, Timothy grass or other invasive or noxious grass species.

Mulch for slopes 2H:1V or steeper: Nutramulch compost or approved equal. Mulch shall follow the requirements of WSDOT 9-14.5(2)C Short-Term Mulch.
Part 3 – Execution

Installation

Medium-fine bark mulch: Spread around proposed and transplanted trees and shrubs to form a watering basin as shown on the Plans. Spread to uniform thickness of 4-inches thick.

Plant Waste or Straw: Spread to a uniform thickness of 2-inches unless otherwise shown on the Plans. Blend into the soil.

Nutramulch: Premix with soil at 1/3 mulch to 2/3 soil ratio for 3-inch depth or apply 1.5-inch depth and till into the soil.

2.90.3.4 Mulch and Amendments - Post-Construction Soil Quality and Depth (Source: 2019 Stormwater Management Manual for Western Washington)

[CSI 32 91 13.16]

Part 1 – General

Soil Retention

Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1) A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2) Mulch planting beds with 4 inches of organic material.

3) Use compost and other materials that meet the following organic content requirements:
   a) The organic content for “pre-approved” amendment rates can be met only using compost meeting the Compost for Post-Construction Soil Quality and Depth listed below.
   b) Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.
The resulting soil should be conducive to the type of vegetation to be established.

**Compost for Post-Construction Soil Quality and Depth**

To ensure that the BSM will support healthy plant growth and root development, contribute to biofiltration of pollutants, and not restrict infiltration when used in the proportions cited herein, the following compost standards are required.

- Meets the definition of “composted material” in WAC 173-350-100 and complies with testing parameters and other standards in WAC 173-350-220.
- Produced at a composting facility that is permitted by the jurisdictional health authority. Permitted compost facilities in Washington are included in a spreadsheet titled Washington composting facilities and material types – 2017 at the following web address: [https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials/Managing-organics-compost](https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials/Managing-organics-compost)
- The compost product must originate a minimum of 65 percent by volume from recycled plant waste comprised of “yard debris,” “crop residues,” and “bulking agents” as those terms are defined in WAC 173-350-100. A maximum of 35 percent by volume of “post-consumer food waste” as defined in WAC 173-350-100, including biosolids or manure, may be substituted for recycled plant waste.
- Stable (low oxygen use and CO2 generation) and mature (capable of supporting plant growth) by tests shown below. This is critical to plant success in bioretention soil mixes.
- Moisture content range: no visible free water or dust produced when handling the material.
- Tested in accordance with the U.S. Composting Council “Test Method for the Examination of Compost and Composting” (TMECC), as established in the Composting Council’s “Seal of Testing Assurance” (STA) program. Most Washington compost facilities now use these tests.
- Screened to the following size gradations for Fine Compost when tested in accordance with TMECC test method 02.02-B, Sample Sieving for Aggregate Size Classification.”
- Fine Compost shall meet the following gradation by dry weight:
  - Minimum percent passing 2": 100%
  - Minimum percent passing 1": 99%
  - Minimum percent passing 5/8": 90%
  - Minimum percent passing ¼": 75%
- pH between 6.0 and 8.5 (TMECC 04.11-A). “Physical contaminants” (as defined in WAC 173-350-100) content less than 1% by weight (TMECC 03.08-A) total, not to exceed 0.25 percent film plastic by dry weight.
- Organic matter content of 40% to 65% (TMECC 05.07-A “Loss on Ignition)
- Soluble salt content less than 4.0 dS/m (mmhos/cm) (TMECC 04.10-A “Electrical Conductivity, 1:5 Slurry Method, Mass Basis”)
• Maturity indicators from a cucumber bioassay (TMECC 05.05-A “Seedling Emergence and Relative Growth) must be greater than 80% for both emergence and vigor”)

• Stability of 7 mg CO2-C/g OM/day or below (TMECC 05.08-B “Carbon Dioxide Evolution Rate”)

• Carbon to nitrogen ratio (TMECC 05.02A “Carbon to Nitrogen Ratio” which uses 04.01 “Organic Carbon” and 04.02D “Total Nitrogen by Oxidation”) of less than 25:1. The C:N ratio may be up to 35:1 for plantings composed entirely of Puget Sound Lowland native species and up to 40:1 for coarse compost to be used as a surface mulch (not in a soil mix).

**Part 3 - Execution**

Implementation Options

The Soil Quality guidelines listed above can be met by using one of the methods listed below:

1. Leave undisturbed native vegetation and soil and protect from compaction during construction.

2. Amend existing site topsoil or subsoil either at default “pre-approved” rates, or at custom calculated rates based on tests of the soil and amendment.

3. Stockpile existing topsoil during grading and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default “pre-approved” rate or at a custom calculated rate.

4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

**2.90.10 Topsoil**

[32 91 19.20]

**Part 2 – Products**

**Materials**

Protect existing topsoil in seeding/planting areas or remove and stockpile for later use. Existing topsoils that are contaminated or degraded due to the Contractor’s activities shall be replaced by the Contractor at no cost to the Owner.

Import topsoil shall be naturally occurring surface soil with a minimum sand content of 60 percent. Topsoil shall have no evident rocks or debris over ½-inch. Acidity pH range shall be between 5.0 and 6.5. Organic matter content shall be 10 to 20 percent by dry weight. Add dolomite limestone, if required, to obtain pH. Limestone, if used, shall be finely ground, passing a minimum of 90 percent through the U.S. Standard No. 8 sieve and 20 percent through the U.S. Standard No. 100 sieve. Add approved nutrients, if required, to bring nutrients to a satisfactory level for planting as recommended by a qualified testing laboratory (exclude nitrogen, potassium, and phosphorus).
Part 3 – Execution

Installation

In planter areas, the planting soil shall be a result of mixing on-site or imported topsoil and organic compost at a rate of 40 percent compost and 60 percent topsoil.

In seeding areas, place topsoil and rake or blade to a smooth, consistent surface. Do not compact. Lawn area planting soil shall be a result of mixing topsoil and organic compost at a rate of 25 percent compost and 75 percent topsoil. Install planting soil to 2-inch depth.

Excess soil shall be disposed of as per Owner’s Authorized Representative’s instructions.

2.90.11 Hydroseed

[CSI 32 92 19.16]

Part 1 – General

Related Sections

- Division 2.90.21 Erosion Control Matting

Scheduling

The Contractor shall apply hydroseed within the optimum seeding windows whenever possible. Hydroseed may be used for temporary erosion control only with the approval of the Engineer. Construction practices shall be timed to minimize bare, cleared and excavated areas so that surfaces are hydroseeded and seed germinates and grows stabilizing surfacing as soon as possible. The optimum seeding windows are April 1 through June 30 and September 1 through October 1. Seeding that occurs between July 1 and August 30 will require irrigation until 75 percent grass cover is established. Seeding that occurs between October 1 and March 30 will require a mulch layer 2-inches thick until 75 percent grass cover is established.

Maintenance

The Contractor shall provide temporary irrigation, mulch or plastic sheeting (plastic sheeting for short term protection only, 7 days maximum) to hydroseeded areas as required for establishment and to protect the seed from construction activities at no additional cost to the Owner.

Part 2 – Products

Materials

Hydroseed applications shall include a minimum of 2,000 pounds per acre of mulch with 3 percent tackifier. Mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, and kenaf; compost; or blends thereof. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer’s instructions.
Any areas that have seed applied by hand shall have a minimum 2-inch thick layer of planting soil per Division 2.90.10. Slow-release fertilizers shall be used. Fertilizer shall not be agitated more than 20 minutes in the hydromulch machine before it is to be used.

On 2:1 slopes and less, Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products may be used in lieu of erosion control mat. BFM/MBFM products are applied with approximately 10 percent tackifier. BFM/MBFM shall be allowed to cure 24-36 hours before rainfall and shall not be installed on wet or saturated soils.

Western Washington Hydrosed Mix

Install seed, fertilizer, and mulch for hydrosed mix at the following application rates:

Seed 180 pounds per acre
Fertilizer 90 pounds per acre, 10-4-6 Nitrogen-Phosphorus-Potassium (N-P-K)
Mulch 2,000 to 3,500 pounds per acre
BFM/MBFM 3,500 pounds per acre (for 2:1 slopes and steeper)

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<tr>
<th>Name</th>
<th>Proportion by Weight</th>
<th>% Purity</th>
<th>% Germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall or Meadow Fescue (Festuca arundinacea or Festuca elatior)</td>
<td>75-80%</td>
<td>98%</td>
<td>90%</td>
</tr>
<tr>
<td>Seaside/Creeping Bentgrass (Agrostis palustris)</td>
<td>10-15%</td>
<td>92%</td>
<td>85%</td>
</tr>
<tr>
<td>Redtop Bentgrass (Agrostis alba or Agrostis gigantea)</td>
<td>5-10%</td>
<td>90%</td>
<td>80%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Proportion by Weight</th>
<th>% Purity</th>
<th>% Germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwarf Tall Fescue (several varieties) (Festuca arundinacea var.)</td>
<td>45%</td>
<td>98%</td>
<td>90%</td>
</tr>
<tr>
<td>Dwarf Perennial Rye (Barclay) (Lolium perenne var. Barclay)</td>
<td>30%</td>
<td>98%</td>
<td>90%</td>
</tr>
<tr>
<td>Red fescue (Festuca rubra)</td>
<td>20%</td>
<td>98%</td>
<td>90%</td>
</tr>
<tr>
<td>Colonial Bentgrass (Agrostis tenuis)</td>
<td>5%</td>
<td>98%</td>
<td>90%</td>
</tr>
</tbody>
</table>
Part 3 – Execution

Preparation
Install 2-inches of planting soil per Division 2.90.10 over areas that will be seeded. The seedbed should be firm and rough. All soil should be roughened regardless of slope. If compaction is required, slopes must be track walked before seeding. Backblading or smoothing of slopes greater than 4:1 is not permitted if they are to be seeded.

Installation
All disturbed surfaces within the project not otherwise covered by asphalt, gravel, quarry spalls, concrete, or other plant material/landscape items shall be hydroseded, except ditches and swales may have seed applied by hand. Apply seed prior to installing erosion control blankets.

Field Quality Control
The aforementioned specifications are the minimum requirements for the anticipated conditions. It will be the responsibility of the Contractor to ensure seeded areas establish ground cover and to provide any additional measures necessary to establish ground cover in seeded areas. Any seeded areas that fail to establish at least 75 percent cover (100 percent cover for areas that receive sheet or concentrated flows) shall be reseeded at no additional cost to the Owner. Contractor should expect to provide a temporary irrigation system for dry season work or any work in Eastern Washington. Temporary irrigation systems shall be removed by the Contractor when no longer required.

2.90.12 Potted Plants and Trees

Part 1 – General

Scheduling
Plant evergreen material between September 1 and December 1 or in the spring before new growth begins. If project requirements require planting at other times, plants shall be sprayed with anti-desiccant prior to planting operations and the Contractor shall ensure irrigation is fully operational for seasonal temporary irrigation. Plant bare root material between November 1 and March 1.

Planting shall be performed only by experienced workers familiar with planting procedures under the guidance of a certified landscape Contractor with a minimum of 5 years of experience.

Locate plants as indicated or as approved by the Owner in the field after staking by the Contractor. If obstructions are met that are not shown on the Plans, do not proceed with planting operations until alternative plant locations have been selected or approved by the Owner.
Part 2 – Products

Materials
Provide plants typical for their species or variety with normal, densely developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sun scald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers and all forms of infestation. All plants shall have a fully developed form without voids and open spaces.

Plants planted on rows shall be matched in form.

Source Quality Control
No pruning wounds shall be present with a diameter of more than 1 inch and such wounds must show vigorous bark on all edges.

Evergreen trees shall be branched to the ground; double trunk trees are not acceptable.

Part 3 – Execution

Installation
Bare root stock shall be dug and the earth removed without injury to fibrous root system necessary for full recovery of plant. Cover roots with thick mud coating by puddling and/or wrapping in wet straw, moss or other suitable packing material immediately after digging. Keep plant protected until planted.

Set plant material in the planting pit to proper grade and alignment, as shown on the planting details. Set plant material 2-3 inches above the finish grade. Filling will not be permitted around trunks. Backfill planting pit with planting soil per Division 2.90.10. Form a ring of soil around the edge of each planting pit to retain water, except on slopes greater than 2 to 1. Provisions shall be made to allow drainage of excess water from ponding in planting pits to an approved source, if soil conditions are such that free drainage is not possible.

Cleaning
After plants are set, muddle planting soil mixture around bases of balls and fill all voids. Remove all wrapping from the tops of root balls. Remove completely all non-biodegradable wrapping from root balls.

2.90.20 Landscape Accessories

[CSI 32 94 00]

Part 2 – Products

Materials
Stakes and guys shall be made from new hardwood, treated softwood or redwood, free of knot holes and other defects. Provide and install wire ties and guying hose as shown on Plans and as specified for evergreen trees. Provide and install guying for deciduous trees as shown on the Plans.
Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces, permeable to permit transpiration; mixed and applied in accordance with manufacturer’s instructions.

2.90.21 Erosion Control Matting

[CSI 32 91 16.16]

Part 1 - General

Related Sections

- Division 2.90.11 Hydroseed

Submittals

Contractor shall submit erosion control blanket information for approval by the Owner prior to shipment of product to the job site.

Part 2 – Products

Manufacturers

Erosion control blanket shall be equal to that manufactured by American Excelsior Company, Arlington, Texas or North American Green of Evansville, Indiana.

Materials

Disturbed areas with slopes 3H:1V to 2H:1V shall be equal to American Excelsior Curlex I or North American Green S150.

Disturbed areas with slopes 2H:1V to 1.5H:1V shall be equal to American Excelsior Curlex II or North American Green SC150.

Swales and storm drainage ponds shall be covered with American Excelsior Curlex I, North American Green S150, or equal.

Part 3 – Execution

Preparation

Hydroseeding shall be applied prior to the application of the erosion control matting.

Installation

All areas disturbed during construction with final slopes at 3H:1V or steeper as shown on the plans including swales and storm drainage pond surfaces shall be covered with an erosion control blanket. Blanket shall be installed per the manufacturer’s written recommendations including the use of landscape nails as necessary.

2.92 Landscape Irrigation

[CSI 32 80 00]
2.92.2 Contractor Designed Irrigation System

[CSI 32 84 00]

Part 1 – General

Summary

The existing irrigation system on the site, installed by developer, Brookfield Properties, has been confirmed to be operational. Contractor to coordinate with Brookfield and the Owner to ensure existing irrigation system is fully functional and will service existing and proposed plantings. Supplement the existing system as needed.

Submittals

Submit shop drawings of supplemental system layout to Owner for approval.

Performance Requirements

System to be designed to provide irrigation water from a minimum 30 psi at the point of connection (elevation 870 feet). Field verify existing supply pressure and adjust irrigation system design as necessary.

Irrigation system to be designed and installed by Contractor (with approval by owner’s representative) based on current industry standards to uniformly apply irrigation to newly planted vegetation at a rate of approximately one to two inches per week during the growing season depending on species’ needs and expected evapo-transpiration rates.

All valves shall be brass ball valves unless shown otherwise on the plans.

Part 2 – Products

Materials

At a minimum, systems shall include:

- Automatic electronic controller. Rainbird ESP-Me, SST-1200s or approved equal.
- Solenoid-operated control valves. Hunter PGV or equivalent
- Pipe and tubing
- Drip emitters (one per plant or tree) with 6-inch riser stake for each.
- Spray heads. Hunter PGJ or approved equal.
- Pressure reducing valve
- Double check valve assembly
- Adequate drain valves to assure removal of all water for winterizing.
- Handholes or boxes as required (valves and other appurtenances shall not be directly buried). Drain valves shall be easily accessible through 6-inch PVC sleeve and key.
- Unions to be installed on each side of valves
All electrical valve wiring shall be irrigation control cable type “UF” direct burial. Control wires shall be a different color than ground wire. All wires shall be laid in mainline trenches. All wire size is #14 unless otherwise approved.

**Part 3 – Execution**

**Installation**

Location of mainline shown on the plans is diagrammatic. Main line shall be 5 feet from top or toe of slope in landscape beds. Irrigation lines and wiring under roadways, walls or walks shall be enclosed in schedule 40 PVC sleeves. Maintain construction activity within clearing limits shown on civil plans. Care shall be taken to not damage existing finish grading. Damage to existing grading shall be repaired by the Contractor.

No rocks, boulders or extraneous materials to be used in backfilling of trenches.

Layout of irrigation lines within areas containing existing plant material shall be approved by Owner. Irrigation lines shall be installed as to minimize damage and maximize irrigation efficiency. Notify Owner that the layout has been staked for approval prior to installation.

Contractor shall provide controller and a 120 VAC power hookup. Coordinate with Owner for installation location of controller, clock, back flow prevention device and meter.

Valve boxes to be installed in landscaped areas with all necessary operational electrical wiring connections.

Each valve shall be connected to a separate control wire.

Control valves shall be installed in a valve box.

**Field Quality Control**

All lines shall be thoroughly flushed prior to installation of heads. Pressure test mainline and prove entire irrigation system functional after planting and prior to installation of mulch.

All control valves to be properly adjusted for correct operating pressure, using factory kit. Adjust and relocate irrigation lines with Owner’s approval as necessary to obtain full water coverage.

**2.92.30 Weed Control**

[CSI 32 01 90.41]

**Part 1 – General**

**Definitions**

Weeds are defined as the common definition. An undesired plant.

Grasses (other than ornamental grasses) growing within planter areas shall also be considered a weed.

Weed Control means eradication of weeds by mechanical, chemical or biological means that prevents regrowth for no less than 12 months.
Performance Requirements
The contractor shall control weeds within the construction limits and any areas disturbed by construction activities.

Submittals
Submit on any chemicals or biological processes proposed for weed control.

Scheduling
Intermittent weed control activities may be needed during construction. Final weed control shall occur after final site cleanup and prior to project acceptance.

Part 3 – Execution

Installers
Products used that are not consumer-purchasable at public retail stores may only be applied by an applicator with a Commercial Applicator or Commercial Operator license.

Field Quality Control
The Contractor is responsible for confining weed control products to the site.
3.00 GENERAL

Sections in these specifications titled “Common Work for . . .” shall 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 C-150
- Coarse aggregate - ASTM C-33
- Fine aggregate - ASTM C-33
- Admixtures - ASTM C-494
- Air-entraining admixtures – ASTM C-260
- Fly Ash – ASTM C-618
- Admixture and products in contact with potable water – NSF 61

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
- Special placement procedures for hot or cold weather
- Construction Joint Plan
- Concrete anchors
- Concrete anchor installer certification per ACI/CRCI Adhesive Anchor Installer Certification Program.
- Schedule of surface finishes
- Rebar mill certifications
- Rebar placement shop drawings
- Precast concrete items
- Schedule of form inserts
• Grouts
• Embedded items

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.

Any products that will be applied to the surface of the concrete and will be in contact with potable water must carry NSF 61 certification. Any concrete admixtures used in potable water storage structures must also carry NSF 61 certification.

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 1903 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 C 1231.

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.

**3.06.30.71 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-release agent for interior of potable water storage structures shall be National Sanitation Foundation Standard (NSF) No. 61 approved for use in direct contact with potable water.

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.

Form ties for use in liquid containment structures shall be standard plastic cone snap-ties with ¾-inch diameter neoprene waterstop washer or removable taper ties. Use Greenstreak X-plugs with removable taper ties or equal. Contractor shall submit to the Engineer form ties to be used for review prior to installation.

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]

3.15.02 Premolded Joint Filler

[CSI 03 15 30 or 07 91 26]

Part 1 – General

References

Premolded joint filler for expansion or through joint applications shall conform to the specifications for “Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction”, AASHTO M 213, except the requirement for water absorption is not applicable.

Part 2 – Products

Materials

The thickness and width of premolded joint filler shall be as indicated on the Plans. Where no premolded filler thickness is indicated, the thickness shall be ¾-inch.

3.15.05 Pipe Penetrations through Concrete

[CSI 03 15 35]

Part 1 - General

Summary

Water holding structures and structures buried and subject to groundwater contact: As shown on the Plans.

Structures not holding water or unburied structures: Unless identified on the Plans, all pipes larger than two inches passing through poured-in-place concrete floors and walls shall be isolated from the concrete.
Part 2 - Products

Materials

Provide a Link-Seal system (or approved equal).

Part 3 - Execution

Examination

Wrapping must be inspected and approved by Engineer prior to concrete pour. Gaps, tears, or looseness in wrapping will be cause for rejection.

Installation

Install Link-Seal per manufacturers instruction either within a cast-in-place sleeve or core drill a clean hole.

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, Simpson SET-XP, or Powers PE1000+ Adhesive Anchors.

CMU Anchors shall be Simpson SET-XP Adhesive Anchors.

Anchorage into non-grouted, hollow masonry cells is not allowed unless specifically called out on plans. Where allowed, anchors in unreinforced masonry cells shall be Simpson SET-XP epoxy adhesive in conjunction with the Simpson Optimesh screen.

For wall mounted equipment weighing less than 250 pounds, Simpson Titen-HD Screw Anchors may be used in grouted or non-grouted CMU cells.

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

**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

The following shall be discussed at the meeting:
- Safety (Contractor’s sole responsibility)
- Batching and Delivery, Adjustments to Mix; Site Dosing
- Placement Rates and Anticipated Schedule of Placing and Finishing
- Site Layout –Holding Area; Pump Truck Location; Truck Wash-out Area; Parking area
• Equipment – Pumps and Appurtenances; Vibrators; Spare Equipment
• Concrete Testing Procedures
• Curing

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 C-171 and liquid membrane-forming compounds shall conform to ASTM C-309. 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 the beginning of the concrete pour for walls taller than 8 feet, place a 1½ to 2½-inch thick grout pad prior to placing the concrete for the wall. Grout mix shall consist of fine aggregates, concrete and water in the same ratios as used in the wall concrete. The placement of the concrete shall proceed immediately after the grout placement so as to prevent any cold joints.

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 3.06.30.71.

*Placement for mass concrete structures:*

Place no concrete when the air temperature exceeds or is expected to exceed 70 degrees within 4 days of the concrete placement unless concrete precooling procedures have been submitted and approved by the owner.

Mass concrete temperatures shall be monitored for a minimum of 10 days following placement. Thermometers must have the ability to measure temperatures up to 180 degrees Fahrenheit. Insulating blankets shall be placed over all exposed surfaces and kept in place until the hottest portion of the concrete is within 35 degrees of the average air temperature. This may require that the insulation be left in place for several weeks.

*Curing*

See section 3.39.
3.31 Structural Concrete

[CSI 03 31 00]

3.31.13 Heavyweight Structural Concrete

[CSI 03 31 13]

Part 1 - General

Summary

All concrete as shown on the Plans except liquid containment, below-grade structures, mass concrete or items called out as otherwise. Use water reducers as required to achieve slump. Hydraulic Concrete may be substituted.

Performance Requirements

28-day compressive strength - 4500 psi minimum

Slump - Without plasticizers; 4 inches for floor and roof slabs, 7 inches for walls. With plasticizers, maximum 9 inches or as desired for placement.

Part 2 - Products

Mixes

Water/cement ratio - 0.40

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

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

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 – 4500 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

3.31.32 Hydraulic Concrete

[CSI 03 31 13.12]

Part 1 - General

Summary

All concrete as shown on the Plans for below-grade walls. Also use for tank ringwalls. Use water reducers for all concrete. Use super-plasticizers to achieve required slump.

Performance Requirements

28-day compressive strength – 4500 psi minimum

Slump – Without plasticizers; 4 inches for floor and roof slabs, 7 inches for walls. With plasticizers, maximum 9 inches and as desired for placement.

Part 2 - Products

Mixes

Water/cement ratio - 0.38 maximum

Nominal maximum aggregate size – 1½-inch

Combined Grading Limits: Limits shown are for all course and all sand mixed together, (combined).

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<th>Sieve Sizes</th>
<th>Combined Grading Limits</th>
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</thead>
<tbody>
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<td></td>
<td>1½&quot; Max.</td>
</tr>
<tr>
<td>2&quot;</td>
<td>-100</td>
</tr>
<tr>
<td>1⅛&quot;</td>
<td>95 - 100</td>
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<tr>
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<td>65 - 85</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>55 - 75</td>
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<tr>
<td>1/2&quot;</td>
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<tr>
<td>3/8&quot;</td>
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<td>0 - 3</td>
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<tr>
<td>No. 200</td>
<td>0 - 2</td>
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</tbody>
</table>

Entrained air ratio – 3.0 percent minimum to 6.0 percent maximum

3.34 Low Density Concrete

[CSI 03 34 00]
3.34.13 Controlled Density Fill (CDF)

[CSI 03 34 13]

Part 1 - General

Submittals

Revisions to the mix design shall be submitted to the Engineer for approval.

Performance Requirements

CDF as shown on the Plans or as directed by the Engineer shall be proportioned to be flowable, non-segregating, and excavatable, and shall conform to the following requirements:
• Maximum Compressive Strength 300 (psi).
• Minimum 28-day compressive strength 100 (psi).

Part 2 - Products

Mixes
• Pounds of cement per cubic yard (approx.) 50.
• Pounds of fly ash per cubic yard (approx.) 250.
• Pounds of dry aggregate per cubic yard (approx.) 3,200.

If air containing or water reducing admixture is used for flowability, total water and aggregates may be adjusted for yield. Weights may be adjusted for flowability and pumpability.

Part 3 - Execution

Field Quality Control

The Contractor shall protect CDF for at least 24 hours after placement or for a duration as necessary to prevent displacement by construction equipment or traffic. CDF 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, CDF must have a temperature of at least 40 degrees Fahrenheit. Placing shall stop when the temperature is 38 degrees Fahrenheit or less and falling. CDF shall not be placed on frozen ground.

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:

- Foundation (exterior) - Ordinary Wall
- Foundation (interior) - Ordinary Wall
- Interior Floors - Floated
- Exterior Walls - Ordinary Wall
- Equipment Pads - 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.

3.35.50 Ordinary Wall Finish

[CSI 03 35 50]

Part 2 Products

Materials

Ordinary Wall Finish requires the use of like-new forms and linings that will produce a uniform surface.

Part 3 - Execution

Construction

After points have set sufficiently, grind or fill form marks and pointings to give a smooth surface even with flat wall surface. Fill all holes greater than ¼-inch with 1:2 mortar floated to an even, uniform finish.
3.35.54 Floated Finish

[CSI 03 35 54]

Part 3 - Execution

Construction

Consolidate, strike off, and level concrete; but do not work further until ready for floating. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit floating operations. Consolidate surface with power-driven floats. Hand floating may be used if area is small or inaccessible to power units.

Field Quality Control

Check surface planeness during or after first floating. Cut down high spots and fill low spots to produce surface with tolerance of ¼-inch in 10 feet in any direction. Refloat to a uniform, smooth, sandy texture immediately after leveling.

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, 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.

Water holding structure floors and bases to be cured by water flooding. Where a continuous waterstop is installed around the perimeter, fill up against the waterstop. Where a waterstop is not part of the final product or is not tall enough, provide temporary barriers. Outside the waterstop, water cure using soaker hoses and plastic or burlap covers. Use of curing
compounds outside the water stop may only occur with the approval of the Owner, approval should not be assumed.

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.

All exposed surfaces of mass concrete structures shall be cured using an approved curing compound. Curing compound shall be sprayed on the concrete surface in a uniform manner and according to the manufacturer’s recommendations immediately after the concrete has reached sufficient strength to support a person’s weight without creating a visible footprint.

### 3.40 PRE-CAST CONCRETE

*CSI 03 40 00*

#### 3.48 Pre-Cast Concrete Specialties

*CSI 03 48 00*

#### 3.48.50 Utility Structures

*CSI 03 48 50, 33 05 61, 33 05 63*

**Part 1 - General**

**Design Requirements**

All concrete structures identified on the Plans as being pre-cast, prefabricated, or not specifically detailed with reinforcing steel shall be pre-cast concrete.

Pre-cast vaults shall conform to ACI 318 and be constructed to the equivalent dimensions and functional characteristics of the specific product identified on the Plans.

Unless shown otherwise on the plans, round structures larger than 30-inch inside diameter, or rectangular structures with longest interior side 30-inches or longer, that utilize riser sections, shall be cast with an integral keyway for interlocking the riser sections.

**Performance Requirements**

Pre-cast structures shall be constructed to withstand anticipated construction loads that occur during transport, handling, and placement as well as the anticipated design loads. Design loads shall include the anticipated soil pressures, hydrostatic loads, and HL-93 traffic loading.
Part 2 - Products

Materials

Additional reinforcement shall be provided within the pre-cast concrete structure at all penetrations, openings, joints, and connections. The additional reinforcement shall be provided to prevent damage during shipping, handling and installation. All damaged units shall be rejected.

All precast structures that consist of sections (base, riser, lid, etc.) shall have the joints sealed with rubber gaskets or mastic, of a material appropriate for the installation.

Part 3 - Execution

Cleaning

Fill picking holes with grout flush to the structure surface, including those in vault lids. Cut, remove, and grind smooth shipping lifting hooks on the vault interior, unless directed otherwise by the Engineer.

3.48.52 Precast Gravity or Thrust Blocks

[CSI 03 48 52]

Part 1 - General

Design Requirements

Concrete for precast gravity and precast thrust blocks shall be 4,000 psi minimum strength. Concrete must be cured 28 days prior to applying any load or thrust.

Part 2 - Products

Materials

Unless specified otherwise, precast concrete gravity blocks shall be “Ecology Block” style with interlocking tongue and groove on top and side. 2 feet wide by 2 feet tall. 4 foot or 6-foot length as shown on the plans or directed by the Engineer. Minimum block weight of 600 pounds per foot of length.

Precast thrust blocks may be “Ecology Blocks” or custom reinforced concrete blocks provided they meet the minimum bearing area specified in the plans or the standard construction details. Custom reinforced blocks must meet the following minimum criteria:

- 36 inches or less per side: 9-inch minimum thickness. (5) #6 rebar @ 6-inch OC EW.
- 36 to 48 inches per side: 10-inch minimum thickness. (7) #6 rebar @ 6-inch OC EW.
- 48 to 72 inches per side: 12-inch minimum thickness. (9) #6 rebar @ 6-inch OC EW.

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 C 109-90-Modified): 3500 psi (24 MPa) at 1 day, 7500 psi (52 MPa) at 28 days.

B. Passes ASTM C 1107 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 C 939 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 C 469): 3.0 x 10⁶ psi (20.7 GPa) minimum, 3.9 x 10⁶ (27.0 GPa) maximum.

D. Coefficient of Thermal Expansion for fluid consistency (ASTM C 531): 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 C 78): 1300 psi (7.9 MPa).
F. Resistance to rapid freezing – thawing (ASTM C 666, Procedure A): 300 cycles- min RDF 90 percent.

G. Split tensile strength at 28 days at fluid consistency (ASTM C 496): 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 C 1107, 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.
4.00 GENERAL

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

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

4.05 Common Work for Masonry

[CSI 04 05 00]

This division covers that work necessary for providing materials and performing all masonry as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

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

- Masonry Mortar
- Masonry Grout
- Reinforcing Steel Shop Drawings – Include plan view showing blocks and exact location of all vertical reinforcing.
- Concrete Masonry Units (CMU) – Provide certification for all units. Provide samples for all colored and/or faced units.
- Color Scheme
- Waterproofing materials
- Masonry Insulation
- Masonry Accessories

4.20 UNIT MASONRY

[CSI 04 20 00]

4.22 Concrete Unit Masonry

[CSI 04 22 00]

Part 1 - General

Summary

This division covers that work necessary for furnishing and installing all Concrete Unit Masonry as described in these specifications and as shown on the Plans. Masonry mortar shall be used to properly level, position, bond together, seal irregularities, and provide a
weather-tight joint between the concrete masonry units (CMU). Masonry grout shall be used to fill all CMU cells that contain reinforcing steel.

Related Sections
- Division 7.21.30 CMU Wall Insulation
- Division 9.97.23 Concrete and Masonry Coatings
- Division 9.97.23.09 Concrete and CMU Wall: Interior, Non-Immersion, Mild Condition
- Division 9.97.23.11 Anti-graffiti Coating and Water Repellent on CMU and Concrete Exterior

References
- 2018 International Building Code
- TMS 602/ACI 530.1/ASCE 6 Specifications for Masonry Structures
- TMS 402/ACI 530/ASCE 5
- ASTM A-615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM C-33, Standard Specifications for Concrete Aggregates
- ASTM C-90, Standard Specification for Loadbearing Concrete Masonry Units
- ASTM C-150, Standard Specification for Portland Cement
- ASTM C-270, Standard Specification for Mortar for Unity Masonry
- ASTM C-476, Standard Specification for Grout for Masonry
- ASTM C-744, Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units

Design Requirements
Compressive strength shall be determined using the unit strength method or the prism test method in accordance with IBC Section 2105. Net Area compressive strength shall be a minimum of 1500 psi.

Mortar shall conform to section 2103.2 of the IBC for type “S” mortar with a minimum compressive strength of 1800 psi at 28 days.
Masonry grout shall comply with Article 2.2 of TMS 602/ACI 530.1/ASCE 6.

**Storage, Delivery, and Handling**

All blocks shall be covered and protected against wetting prior to use.

Stockpile and handle grout and mortar to prevent contamination from foreign materials; store admixtures to prevent contamination or damage from excessive temperature changes. Water to be used in mixing the grout shall be free from foreign materials.

**Part 2 - Products**

**Materials**

**Concrete Masonry Units**

Concrete Masonry Units shall be hollow load-bearing type, conforming to ASTM C-90, Grade N, Type 1, 1900 psi minimum. Provide aggregates meeting ASTM C33. All units, unless otherwise noted, shall have normal weight aggregate having a uniform quality, texture, and color. Unit sizes and shapes shall be 8 inches high by 16 inches long by 8 inches wide (nominal).

Masonry shall be split face and smooth face as shown on the drawings.

Exterior face of masonry units upon which electrical panels will mount may be smooth face or ground smooth in the field. Measure locations and size of electrical panels carefully. Smooth face may extend no more than 1-inch past the panels and must result in consistent, parallel lines.

All concrete masonry units exposed to weather shall have an integral water repellant added to the block and mortar. Repellant admixture equal to Dry-Block as manufactured by W.R. Grace and Co.

**Masonry Mortar**

Cement shall meet ASTM C-150, lime shall meet ASTM C-207 and aggregates shall meet ASTM C-144.

Proportion mortar by volume and mix in a standard mortar mixer operated in accordance with manufacturer’s recommendations. Mix ingredients thoroughly in dry form and add water to bring the mixture to the proper consistency for use. Do not hand-mix mortar.

Mortar proportioned in accordance with ASTM C270, Table 1 need not be tested. Where testing is required, mortar shall be laboratory tested prior to use in accordance with ASTM C270.

Provide mortar pigment to match owner-selected color of concrete masonry units.

**Masonry Grout**

Masonry grout components shall comply with ASTM C-150 for Portland cement and ASTM C-404 for aggregates.

Per ASTM C-476 Fine Grout Standards, masonry grout shall consist of one-part Portland cement to three parts masonry sand and one-tenth part lime and shall have a minimum compressive strength of 2000 psi.
Compressive strength of masonry grout shall be determined in accordance with ASTM C1019.

**Reinforcement**

Joint reinforcing shall conform to Article 2.4 of TMS 602/ACI 530.1/ASCE 6.

**Components**

Provide vertical reinforcement at all corners, on each side of openings 24 inches and larger than and at the intervals shown. Provide horizontal reinforcing at bond beams as shown on the Plans, and above and below all openings larger than 24-inches.

**Accessories**

Where called out, anchors shall be dovetail anchor slots and anchors. Anchor slots shall be equal to Burke “Fleming” masonry anchor slot and anchors shall be equal to “AA Wire Products Dovetail Flex-O-Look Channel and Ties”, or equal.

**Finishes/Colors**

If Owner The Owner shall develop a color schedule of colored CMU and grout after award of the contract unless already shown on the Plans. Block colors shall be limited to two in a pattern decided by the Owner unless otherwise shown on the Plans.

Mortar color shall match one of the adjacent block course colors unless shown otherwise on the Plans.

Coat the following surfaces with the products identified under “Related Divisions” above.

- Exterior walls
- Interior walls

**Part 3 - Execution**

**Preparation**

When joining fresh masonry to set or partially set masonry construction, the Contractor shall clean the exposed surface of set masonry and remove loose mortar prior to laying fresh masonry.

The Contractor shall protect sills, ledges, and offsets from mortar drippings or other damage during construction. The Contractor shall protect the adjoining work from mortar droppings, and newly-laid masonry from damage and from rain until the mortar has set.

**Installation**

Masonry construction shall comply with the requirements of IBC 2104 and with TMS 602/ACI 530.1/ASCE 6.

The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees Fahrenheit (4 degrees Celsius).

The hot weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 D, shall be implemented when the ambient air temperature exceeds 100 degrees Fahrenheit.
(37.8 degrees Celsius), or 90 degrees Fahrenheit (32.2 degrees Celsius) with a wind velocity greater than 8 mph (12.9 km/hr).

The Contractor shall lay only dry masonry units. When masonry needs to be sawed, only masonry saws shall be used to cut and fit masonry units. All units shall be set plumb, true to line, and with level courses accurately spaced. The masonry unit shall be adjusted to final position while the mortar is soft and plastic. If the units are displaced after the mortar has stiffened, the Contractor shall remove the units, clean the joints or mortar, and relay with fresh and clean units.

All joints shall be tooled and concave unless otherwise specified.

The Contractor shall remove mortar protruding into cells of cavities to be reinforced.

All un-grouted concrete masonry units with an exterior face shall be insulated as shown on the Plans and detailed in Division 7.

All masonry reinforcement and accessories shall be installed as shown on the Plans and submitted details. The Contractor shall not splice reinforcing except as shown on the Plans. The minimum splice, where not indicated, shall be 32 bar diameters or 24 inches, whichever is greater. All accessories shall be cleaned of all dirt, grease, oil, loose mill scale, excessive rust, or other foreign matter which may reduce bond with grout or mortar.

Fill all vertical and horizontal cells that contain reinforcing and as detailed on the Plans with grout. Cells shall have an unobstructed vertical alignment. The Contractor shall provide grouted bond beams where required. Provide lintels made up of reinforced, grouted lintel sections over all wall openings as shown on the Plans. The Contractor shall install horizontal and vertical reinforcing and hold in position as the work progresses to maintain the following clearance between the reinforcing and the block surface: 1½ exterior, ¾-inch interior.

The maximum lift for grout pours shall be 4 feet. The Contractor shall make sure that the grout is consolidated with a vibrator immediately after pouring and re-consolidate after excess moisture has been absorbed; but before plasticity is lost. Provide clean-outs at the bottom of all grouted courses. Contractor may eliminate clean-outs at the Owner’s discretion, if the bottoms of all cells are free of knocked-off mortar fins and dirt. The Contractor shall hold grout 1½ inches below the top of the upper most units when work stops for over one hour, and thoroughly clean and roughen the joint before proceeding with the work.

The Contractor shall grout full-space-around door frames and other built-in items. Build in all work with the masonry including anchor bolts. Build in wall plugs, doors, windows, and accessories and plumbing appurtenances as erection progresses.

At the stoppage of work at any time, the work shall be covered with tarpaulins or boards to prevent rain or snow from entering the cores of the block. The walls shall be adequately braced to support masonry. If mortar or grout has been misplaced, the Contractor shall have it immediately removed.

Shore reinforced lintels a minimum of 14 days after grout placement or until a 28-day strength is achieved.
Prior to completion, fill all holes in joints. All defective joints shall be cut out and repointed. At the end of each day’s work and after final pointing, dry-brush the masonry surface.

**Field Quality Control**

Variations from plumb, specified grade, conspicuous lines, and walls shall be plus or minus ¼ inch in any 10-foot length, not to exceed plus or minus 1 inch overall. Variations from dimension shall not exceed plus or minus ½ inch.

Special Inspection shall be in accordance with Table 1.18.3 (Level C Quality Assurance) of TMS 402/ACI 530/ASCE 5.

Also see Statement of Special Inspections on the Drawings. Provide 48-hour notice to Owner prior to needing the required inspections.

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.

The Contractor shall provide verification to the Engineer that site-produced mortar meets the required proportions using visual observations. Engineer reserves the right to require additional testing in accordance with ASTM C 270.

Field testing of grout shall be meet the requirements of ASTM C1019. The testing agency shall take a minimum of three grout samples for every 5,000 square feet of wall placed (and a minimum of four per week); 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 at the Contractor’s expense.
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 . . .” shall 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 9.90.05 Common Work for Painting and Coating
- Division 9.91.13.01 Exterior metals
- Division 9.91.13.12 Metals in contact with Concrete
- Division 9.91.23.01 Metals interior
- Division 9.91.23.04 Galvanized iron and nonferrous
- Division 9.91.33 Submerged metals
- 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

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.

Welding of steel and stainless-steel fluid transport pipe that is not a structural member shall be performed by operators qualified for AWS B2.1, AWS D10.18 or the ASME Boiler and Pressure Vessel Code Section IX part A. Welders may also provide other certifications for review and approval by the Owner, though approval of other certifications should not be assumed.

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

Pipe Columns - ASTM A53, Grade B Type E or S, Fy ≥ 35 ksi (see Division 15.22 for steel pipe carrying fluids).

Structural Tubing - ASTM A500, Grade B, Fy ≥ 46 ksi

Stainless Steel

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

Plates - ASTM A240

Fasteners - ASTM F593

Extruded Structural Shapes - ASTM A276

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

See Section 15.22.04 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.

**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 or other masonry materials shall have surfaces coated per Division 9.

**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.

**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**

All steel fabrications shall be surface prepped, shop primed and field coated in accordance with Division 9. Shop priming shall be protected as required to prevent damage to the coating during shipping. Hold back shop priming from areas to be field welded.

Isolate and coat dissimilar metals to prevent galvanic corrosion.

Non-exposed structural steel: Mill finish or as shown on Plans

Exposed structural steel (damp or wet locations): Division 9

Aluminum: Division 9

Galvanized steel: Division 9

Stainless steel: Uncoated if not within the reservoir or Division 9 if within the reservoir.
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 chlorination 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.

Aluminum Fabrications: Connection bolts shall be ASTM A307 galvanized. Aluminum fasteners may be allowed where high strength is not needed (e.g. mounting expanded metal screens, or louver fins), confirm with Engineer prior to use. Steel screws must be galvanized, or zinc plated. 300 Series stainless steel fasteners allowed only with the use of isolating washers.

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 and CMU 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 pre-fabricated 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

All ladders and ladder accessories shall be hot-dipped galvanized steel, aluminum, or fiberglass as indicated on the Plans.

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 1/8-inch bearing bars with cross bars spaced at 4-inch on center, or as required to meet loading requirements.

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 1/4-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(c)(1)). Safety chains shall not be used unless specifically shown on the Plans.

**Finishes**

Steel rail systems shall be painted as described in Division 9.98.02.03.

### 5.53 METAL GRATINGS

[CISI 05 53 00]

#### 5.53.05 Common Work for Gratings

[CISI 05 53 05]

**Part 1 - General**

**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.

5.53.13 Bar Gratings

[CSI 05 53 13]

Part 2 - Products

Materials

Steel grating shall be welded rectangular bar grating, maximum 4-inch by 1\(\frac{3}{16}\) inch bar spacing unless otherwise noted on the Plans. Grating shall have a minimum bearing bar thickness of \(\frac{3}{16}\) inch. All edges of metal grating shall be banded with \(\frac{3}{16}\) inch banding matching the depth of the grating. Depth of bars shall be as shown, or as required for loads and spans.

Aluminum grating shall be swaged grating, maximum 4-inch by 1\(\frac{3}{16}\) inch bar spacing, unless otherwise noted on the Plans. Grating shall have a minimum bearing bar thickness of \(\frac{3}{16}\) inch. All edges of metal grating shall be banded with \(\frac{3}{16}\) inch banding matching the depth of the grating. Depth of bars shall be as shown, or as required for loads and spans.
6.00 GENERAL

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

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:

- Structural Panels
- Structural Lumber
- Preservative Wood Treatment
- Shop Fabricated Structural Wood
- Millwork
- Wood Trim
- FRP Data Sheets verifying specification requirements

Part 3 - Execution

Construction

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 fastened to compensate for all loads during construction.

No permanent fastening shall be performed until the structure has been properly aligned.

6.10 ROUGH CARPENTRY

[CSI 06 10 00]
6.11 Wood Framing

[CSI 06 11 00]

Part 1 - General

References


Part 2 - Products

Components

Structural lumber shall be of the nominal dimensions shown on the Plans and shall not exceed 19 percent moisture content when installed. All pieces shall be Kiln Dried Hem Fir or Spruce-Pine-Fir No. 2 grade or better unless otherwise specified on the Plans.


Accessories including bolts with necessary nuts and washers, timber connectors, drift pins, dowels, nails, screws, spikes, and other metal fastenings shall conform to ASTM A-307. Washers shall be malleable iron. Bolts shall be provided with washers under nuts.

Nails shall be round wire of standard form. Spikes shall be button-head boat spikes. Galvanize bolts, dowels, washers, spikes, and other hardware, including nails, in accordance with ASTM A-153.

Preservative Treated Wood

All wood members which contact concrete or masonry shall be naturally durable wood or preservative-treated wood using water-borne preservatives, in accordance with AWPA U1 (Commodity Specifications A or F) for above-ground use. Coat cut ends of pressure treated wood with copper naphthenate based wood preservative.

- All fasteners in contact with preservative treated wood shall be hot-dip galvanized
- All connectors in contact with preservative treated wood shall be hot-dip galvanized
- Interior connectors in contact with preservative treated wood that are not exposed to the elements may be G185 galvanized.

Part 3 - Execution

Construction

Accurately cut and frame all lumber so that joints will have a close fit over entire contact surface. Secure lumber and piles in their proper alignment. No shimming will be permitted in making joints, nor will open joints be accepted. Bore holes in small timbers for boat or wire spikes with a bit of the same diameter or smallest dimension of the spikes, when necessary,
to prevent splitting. Counterboring for counter-sinking shall be done wherever smooth faces are required.

Connectors and fasteners shall comply with the applicable provisions of IBC Sections 2304.9.1 through 2304.9.7. The number and size of fasteners connecting wood members shall not be less than that set forth in IBC Table 2304.9.1.

6.12 Wood Structural Panels

[CSI 06 12 00, 06 16 00]

Part 1 - General

Design Requirements

Wood structural panels shall conform to the requirements of Performance Standard for Wood-Based Structural Use Panels, DOC PS1 or PS2, United States Department of Commerce, National Institute of Standards and Technology. Thickness shall be as shown on the Plans. Composite panels are not allowed.


Part 3 - Execution

Construction

Provide blocking at unframed panel edges where noted on the Plans. Nail sheathing as shown on the Plans. If not shown, provide nailing as follows, at a minimum: 8d nails at 6 inches on center at framed panel edges, trusses, and diaphragm boundaries and 12-inches on center elsewhere.

6.17 Shop Fabricated Structural Wood

[CSI 06 17 00]

6.20 Finish Carpentry

[CSI 06 20 00]

6.20.05 Common Work for Finish Carpentry

[CSI 06 20 05]

Part 1 - General

Summary

Furnish all architectural woodwork shown on the Plans and specified herein. Architectural woodwork includes all exterior and interior non-structural woodwork exposed to view in finished project including shelving, millwork, trim, and plastic laminates.
Related Sections

- Division 9.90.05 Common Work for Paint and Coating
- Division 9.91.23.12 Interior Paint

References

The “Quality Standards” of the Architectural woodwork institute (AWI) shall apply and, by reference, are hereby made a part of this specification. Any reference to premium, custom, or economy in this specification shall be defined as the latest edition of the AWI “Quality Standards”.

Part 2 - Products

Quality Control

Discard material with defects which might impair the quality of work, and units which are too small to fabricate the work with minimum joints or optimum joint arrangement. Finish trim boards are to be selected for straight and un-warped / un-curl ed shape.

Part 3 - Execution

Installation

Set carpentry work accurately to required levels and lines, with member plumb and true and accurately cut and fitted. All exposed trim work is to be mitered at corners. Where long runs require more than one board, ends to be cut at 45 degrees.

Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails or finishing screws, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required. Fill nail holes with putty prior to painting. Provide adequate end and edge distances.

Install hardware specified or required to complete the project. Adjust movable parts to operate perfectly at time of final acceptance. Make further adjustments required during the guarantee period.

6.22 Millwork

[CSI 06 22 00]
6.22.13 Standard Pattern Wood Trim

[CSI 06 22 13]

Part 2 - Products

Materials
Trim board material shall be as shown on the Plans. If not shown on the Plans, trim board shall have a smooth, untextured finish. Board shall be high density fiberboard (HDF), oak or fir.

Part 3 - Execution

Installation
Trim board shall be installed straight and true. All corners shall be mitered. Where gaps between the trim and the mating surface are unavoidable, such gaps shall be caulked.
Division 7
Thermal and Moisture Protection

7.00 GENERAL

This division covers furnishing all labor, materials, and equipment for providing a structure that is completely weather-tight.

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

7.05 Common Work for Thermal and Moisture Protection

[CSI 07 05 00]

Part 1 - General

Submittals

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

- Foundation drainage
- Sheet waterproofing
- Thermal insulation
- Ceiling insulation
- CMU wall insulation
- Piping insulation
- Air barrier
- Roofing System
- Flashing and sheetmetal
- Vents
- Joint sealants
- Caulk

Warranty – Roofing System

The roofing Contractor shall warrant the roof system provided under this contract against leakage, and defects in materials and workmanship for a period of two years after date of project acceptance. The roofing system manufacturer shall provide a warranty for the roof system against leakage and defects in materials for a period of eighteen years after the roofing Contractor warranty expires.

Following roof installation, supplier shall furnish services of a qualified manufacturer’s representative to inspect the roof and inform Owner of any defects or concerns regarding condition of roofing system at the job site. Contractor shall provide repair as necessary to the satisfaction of the manufacturer representative at Contractor’s expense. Upon resolution of
any defects or concerns (if any), manufacturer’s warranty shall then be in full effect. The finished roofing system shall be free from leaks, warps, permanent discoloration, and coating degradation for the warranty period.

The roofing system manufacturer’s warranty shall be non-prorated and in full effect (100 percent covered) for the full 2 years following project acceptance.

The manufacturer’s warranty shall be prorated from 100 percent covered from year 2 to year 5 and linearly decreasing to 10 percent at year 20.

7.20 THERMAL PROTECTION

[CSI 07 20 00]

7.21 Thermal Insulation

[CSI 07 21 00]

7.21.16 Blanket Insulation

[CSI 07 21 16]

Part 1 – General

Performance Requirements

Insulation shall be Kraft-paper-faced batt with a minimum R value of 49

Part 2 – Products

Manufacturers

Ceiling insulation shall be equal to Owens Corning.

Part 3 – Execution

Installation

Provide and install ceiling insulation as shown on the project Plans. Place insulation with craft paper face down and as recommended by the manufacturer. Insulation shall be placed to the extents possible to cover the attic. Place baffles above the insulation as the slope of the roof meets the building edge.

Part 3 – Execution

Installation

Work covered in this section consists of furnishing all labor, material, and equipment for rigid insulation as shown on the Plans and as specified herein.

The abutting joints shall be staggered so that no joint from the bottom layer of insulation lies directly below a joint from the top layer of insulation. The insulation shall be fastened using mechanical fasteners to the metal roof support deck as recommended by the manufacturer. Fasteners shall penetrate only the top ridges of the steel roof support deck.
7.21.13.13 Foam Board Insulation

[CSI 07 21 13.13]

Part 1 – General

Performance Requirements

Provide a minimum R value of 10. Insulation for foundations shall be suitable for direct bury application.

Storage and Handling

Protect insulation stored on the jobsite from physical damage and direct sunlight. Store off the ground and cover with a light color polyethylene film. Make sure the covered insulation is well ventilated to prevent excessive temperature build-up.

Part 2 – Products

Manufacturers

Insulation shall be Foamular 150 as manufactured by Owens Corning or equal.

Part 3 – Execution

Installation

Extruded polystyrene insulation shall be placed as shown on the Plans. Do not damage insulation during installation and take adequate care to backfill soils to meet compaction standards while not damaging insulation. For foundations, finish top edge of insulation 1-inch to 2-inches below finished ground elevation.

Install only as much insulation as can be covered, at least temporarily, during the same day.

7.21.30 CMU Wall Insulation

[CSI 07 21 30]

Part 1 – General

Performance Requirements

All non-grouted exterior exposed CMU walls to be filled with vermiculite, or equivalent fill.

Part 2 – Products

Materials

Vermiculate or perlite may be used.

Part 3 – Execution

Installation

Insulation shall be installed by methods and personnel approved by the block manufacturer.
7.24 Exterior Insulation and Finish Systems
[CSI 07 24 00]  
7.24.32 Exposed Small Piping Insulation
[CSI 07 24 32]  
Part 2 – Products  
Manufacturers  
Insulation shall be equal to S and S Industries.  
Part 3 – Execution  
Installation  
All exposed piping 1-inch and less used to distribute hot, tepid, cold, potable, and non-potable water shall be insulated with closed-cell polystyrene insulation pre-slit and installed per manufacturer's written information. Insulation shall be sized to match the diameter of the piping.  

7.26.30 Roof Vapor Retarders
[CSI 07 26 30]  
Part 1 – General  
Submittals  
Submit vapor barrier, including methods for attachment, for approval by the engineer.  
Performance Requirements  
The membrane shall be 45 Mils thick, uniform in appearance, and free from defects.  
Part 2 – Products  
Manufacturers  
Vapor barrier shall be equal to GenFlex EPDM Elastomeric Membrane.  
Part 3 – Execution  
Installation  
Work covered in this section consists of furnishing all labor, material, and equipment for vapor barrier membrane as shown on the Plans and as specified herein. Vapor barrier shall be attached below the insulation using GenFlex EPDM Fully Adhered Mechanical system or equal, attached as recommended by the manufacturer. Vapor barrier shall be applied in dry weather only.  
Follow all manufacturer’s recommendations regarding product delivery, storage, and handling of materials.
7.27 Air Barrier

[CSI 07 27 00, or 01 83 16]

Part 1 – General
Performance Requirements

A continuous air barrier shall be provided throughout the building thermal envelope. The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8 of the 2012 Washington State Energy Code, Commercial Provisions.

Part 3 – Execution
Field Quality Control

The completed building shall be tested by the Contractor. The air leakage rate of the building envelope shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge in accordance with ASTM E 779 or an equivalent method approved by the Code Official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the Code Official. If the tested rate exceeds that defined here, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived.

7.40 ROOFING AND SIDING PANELS

[CSI 07 40 00]

7.42.93 Soffit Panels

[CSI 07 42 93]

Part 1 – General
Design Requirements

The panels shall be able to withstand the wind loading identified in the Plans.

Finishes

Finish all panels as recommended by the manufacturer. Color shall be chosen by the owner from a minimum of 15 colors.

Part 2 – Products
Materials

Steel panels shall be equal to AEP Span Prestige Series (PS-12) soffits. Panels shall have a Zincalume or Kynar finish. Vented and non-vented soffit panels shall have matching beads or groove widths and matching finishes. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.
Fiber Cement soffit panels shall be James Hardie Hardiesoffit or of equal. Install and finish all panels as recommended by the manufacturer. The panels shall be able to withstand the wind loading identified in the Plans. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.

**Part 3 – Execution**

**Installation**

Panels shall run perpendicular to rafters. Install panels next to transition between wall and eave as recommended by the manufacturer.

**7.60 FLASHING AND SHEET METAL**

[CSI 07 60 00]

**7.61 Sheet Metal Roofing**

[CSI 07 61 00]

**7.61.05 Common Work for Metal Roofing**

[CSI 07 61 05]

**Part 1 – General**

**General**

Work covered in this section consists of furnishing all labor, material, and equipment for preformed metal roofing as shown on the Plans and as specified herein.

**Submittals**

Submit shop drawings detailing all edges, hips, valleys, eaves, rakes, other flashing and include fastener schedule and in accordance with Division 1.33. Prior to Engineer review, Contractor shall have the shop drawings reviewed and approved by the system manufacturer.

The Roofer shall submit a list of a minimum of five (5) successfully completed projects with owner references, total roofing system square footage and roofing cost. The Roofer shall be regularly engaged in construction of metal roofing systems and approved to install metal roofing by the accepted system manufacturer. Such approval shall be submitted in writing along with the shop drawings as specified below.

**Storage and Handling**

The Contractor is responsible for continuously maintaining materials subject to precipitation or weather damage in new condition. Replace warped or weathered plywood, insulation, or other materials damaged by climatic conditions.

Follow all manufacturer’s recommendations regarding product delivery, storage, and handling of materials.
Part 2 – Products

Materials

Materials shall be purchased directly from the manufacturer’s commercial department to verify that the Contractor is approved by the system manufacturer to install the roofing system specified.

All materials shall be provided by one manufacturer and conform to the current IBC.

Roofing felt shall be 30-pound asphalt-saturated felt, conforming to ASTM D-226, Type 1 and 2, plain, unperforated.

Fasteners shall be as recommended by the roofing manufacturer; lengths as required. Other miscellaneous exposed fasteners shall be stainless steel or ZAC (exposed head of zinc/aluminum alloy). Fasteners shall be of the length to penetrate the top ridges of the steel decking only. Fasteners shall be inserted to penetrate only the top ridges of the steel roof support decking.

Finishes

The Owner shall select the roofing color from manufacturer’s standard offering of not less than 15 colors. Color options shall be provided with the submitted shop drawings.

Part 3 – Execution

Examination

Verify that work of other trades which penetrates the roof deck, or requires workers and equipment to traverse roof deck, has been completed.

Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness which will prevent the execution and quality of application of roofing system as specified. Do not proceed with application of roofing until these defects are corrected.

Preparation

Provide temporary roof during inclement weather. Requests for use of alternate structural and/or base materials with superior weathering resistance, if approved by the Engineer, may be made in lieu of temporary roof replacement. Submit a description of each temporary roof system or alternate material schedule proposed.

Provide special protection from heavy traffic on completed work. Restore to original condition, or replace work or materials damaged during handling of roofing materials.

Installation

Apply roofing felt below waterproof roof paneling, single-ply, lapped shingle fashion, 3-inch head laps and 6-inch side laps. Install no more roofing felt than can be covered by metal roofing in the same day. Roof underlayment shall be dry and free of defects prior to the installation of metal roofing.

Apply roofing only in dry weather and when the ambient temperature is above 40 degrees Fahrenheit.
Except as otherwise shown or specified, comply with recommendations and instructions of metal roofing manufacturer.

Form and fabricate sheets, seams, strips, cleats, clips, hips, ridges, edge treatments, integral flashings, and other components of specified metal roofing to profiles, patterns, and drainage arrangement shown, and as required for permanent leak-proof construction. Provide for thermal expansion and contraction of work caused by ambient air temperature difference of 100 degrees Fahrenheit.

All openings shall be sealed from weather and to prevent recessed areas that may attract nesting animals. Panel corrugations shall be sealed with the manufacturer’s standard closed cell neoprene blocks conforming to the panel corrugation. Gaps created between corrugations and flashings shall be avoided whenever possible. Where such gaps occur, they shall be sealed with manufacturer’s low pitch closures, or equal. All closures shall be installed as close to the face of the opening as possible to minimize any recessed areas.

Provide uniform, neat seams with no exposure of sealant to ultraviolet light.

Flashing with a drip edge shall be installed on all edges, corners and angle points. Unless otherwise noted on the Plans extend roofing and flashing below fascia with drip edge hanging below wood supports and fascia. Valley gutters shall be provided at all valleys.

**Field Quality Control**

Metal roofing and its flashing shall be weather-tight. Exposed surfaces shall be free of dents, scratches, abrasions, or other visible defects.

Construction and fabrication of metal roofing shall comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) recommendations for fabrication and construction of details, expansion joints, and installation procedures, except as shown or specified.

Fabricate and install work true and accurate with lines and corners of exposed metal units. Form exposed faces and starter sections of seams flat and free of buckles, excessive waves, and avoidable tool marks considering temper and finish of metal. Hold-down attachments for roof shall be designed and spaced to resist uplift pressure due to Basic Wind Speed and Exposure as identified in the General Notes. Provide uniform, neat seams without tool marks or irregularities.

### 7.61.13 Standing Seam Sheet Metal Roofing

*CSI 07 61 13*

**Part 2 – Products**

**Materials**

Preformed metal roof paneling shall be equal to **Design Span HP as manufactured by AEP Span** or **Custom Bilt Metals, SL-1750 Snap-Lock Roof Panel**. The metal roofing system shall consist of 24-gauge, factory-formed, pre-finished panels with major ribs not less than 1⅝-inch in height.
Shop-fabricate metal in conformance with manufacturer’s pattern specifications to result in a minimum 1-inch effective water dam height on both edges. Standing seam interval shall not exceed 16 inches with no stiffening ribs.

Edges, hips, valleys, eaves, rakes, and miscellaneous flashing shall be finished with matching pre-finished pieces of 24-gauge minimum, to form a weather-tight roofing system.

Roofing panels shall be factory-prefabricated in accordance with manufacturer’s standard pattern and design.

**Finishes**

Color options shall be provided with the submitted shop drawings. All panels and flashing shall be treated with a protective coating of Zincoalum conforming to ASTM 792, AZ50, with factory-applied paint finish of Kynar 500 or Hylar 5000 with a total dry film thickness of 1 Mil. Reverse face shall be protected by a wash coat or primer.

**Part 3 – Execution**

**Installation**

Panels shall be held down to the structure with concealed clips and fasteners. The fastening schedule shall be designed by the manufacturer to resist the loads identified in the General Notes. System shall extend to full extent of fascia boards and include a drip edge unless otherwise noted on the Plans. Extend panels from eaves to ridge in one piece.

All final hand turning of seams at joints and junctions is to be of the same quality as the machine-produced seams. Practices and techniques described in the SMACNA Architectural Sheet Metal Manual are to be used as the standard of practice unless otherwise specified or shown on the Plans.

**7.62 Sheet Metal Flashing and Trim**

* [CSI 07 62 00] *

**Part 1 – General**

Flashing shall be factory coated steel equal to Construction Metals Inc. Professional Grade Flashing. Gauge shall match flashing to be replaced or 26-gauge minimum. Width shall match existing to be replaced. Provide color choices to Owner for approval. Minimum color choices are 10.

**Part 3 – Execution**

**Installation**

Install drip tight per manufacturer’s requirements.

**7.70 ROOF AND WALL SPECIALTIES**

* [CSI 07 70 00] *

**7.72 Roof Accessories**

* [CSI 07 72 00] *
7.72.05 Common Work for Roof and Wall Specialties

[CSI 07 72 05]

Part 1 – General

Design Criteria

Attic ventilation shall be installed in accordance with IBC 1203. Contractor shall certify in writing that attic ventilation meets the IBC specification during the submittal process.

Part 3 – Execution

Installation

Blocking shall be installed on all exterior eaves. Ventilation baffles shall be provided at all eave vents that provide a 1-inch minimum air gap between the attic insulation and the roof sheathing. Gable end vents or roof vents shall be provided.

7.90 JOINT PROTECTION

[CSI 07 90 00]

7.92.13 Elastomeric Joint Sealants

[CSI 07 92 13]

Part 1 – General

Submittals

Submit schedule for caulk used on the project for approval prior to application.

Part 2 – Products

Materials

Kitchen, Bath, Laboratory, and Other Wet Areas

DAP® KWIK SEAL PLUS® Premium Kitchen & Bath Adhesive Caulk w/MICROBAN® or equal.

Concrete and Masonry

DAP® Premium Polyurethane Concrete & Masonry Sealant or equal.

Wood or Concrete Board Siding

DAP® ALEX PLUS® Acrylic Latex Caulk Plus Silicone or equal.

Doors and Windows

DAP® DYNAFLEX 230® Premium Elastomeric Sealant or equal. Where necessary to provide a suitable backstop and bond breaker, tightly pack with polyethylene foam. Rope the back of grooves, leaving a minimum depth of ¼-inch for sealant. Prime surfaces as recommended by manufacturer.
Other Surfaces

Contractor shall provide caulk appropriate to surface and reason for caulk application. Caulk shall be the most durable available (longest warranty) by DAP®, or equal.

Part 3 – Execution

Installation

Caulk all joints and spaces necessary to provide a completely weather-tight product.

Apply caulking in strict accordance with manufacturer’s directions with regard to temperature at application and curing times, surface condition, moisture, and cleanliness.

Apply after surfacing prime and prior to final coatings if surface is to be coated. If surface will not be coated, provide color choices to the Owner for approval prior to application.

Clean all adjoining surfaces of excess sealant, smears, or marking due to application and leave joints with neat, uniformly-filled surfaces.
8.00 GENERAL

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

8.05 Common Work for Openings

*[CSI 08 05 00]*

Part 1 - General

Summary

This division covers furnishing all labor, materials, and equipment necessary for providing all interior and exterior doors, frames, and windows.

Related Sections

- Division 5.05.23 Bolts and Other Connectors

Submittals

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

- Doors
- Hatches
- Hardware
- Locks
- Keys

8.06 Schedules for Openings

*[CSI 08 06 00]*

See the contract Plans for schedule of doors and windows.

8.10 Doors and Frames

*[CSI 08 10 00]*

8.10.05 Common Work for Doors and Frames

*[CSI 08 10 05]*

Part 1 - General

Summary

This specification covers the doors, frames, accessories, and hardware for both interior and exterior man doors.
Related Sections

1.52.20 Locks and Keys

Submittals

Submittal information shall include the following:

Manufacturer’s product data and installation instructions for each type of door, frame, accessory, or hardware. Include both published data and any specific data prepared for this project.

Door and frame shop drawing for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

As requested by the Engineer, provide sample color chips representing specified colors and finishes.

Performance Requirements

Doors between rooms requiring a fire separation shall have a listed fire rating equal to or greater than the required room fire rating. See Plans for which rooms are required to be separated with a fire door. Doors and frames shall be listed and labeled for a minimum of 45 minutes.

Doors between rooms requiring an acoustical separation (soundproof or sound rated door) shall have a minimum STC rating of 45.

All exterior doors and frames shall be insulated for a maximum U-value of 0.60.

Quality Assurance

The manufacturer(s) shall be a minimum of ten (10) continuous years documented experience specializing in the manufacturing of doors, frames, accessories, and/or hardware of the type required for this project. At the request of the Engineer, the manufacturer shall provide testing and/or certification information demonstrating that the manufacturer shall design and construct all equipment to the latest applicable codes and standards. The manufacturer or their representative shall be available for consultation to all parties engaged in the project, including instruction to installation personnel.

Scheduling

The Contractor shall ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule. In addition, they shall ensure that templates and/or actual hardware requested by manufacturer are available in time for fabrication without affecting construction progress schedule.

Warranty

The Manufacturer shall provide a one (1) year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing. The Installer shall warrant installation procedures and performance for a minimum of two (2) years from the point of substantial completion against defects due to workmanship and materials handling.
Part 2 - Products

Components
Provide doors, frames, and accessories as noted on the Door Schedule. Provide door hardware as specified, as noted on the Door Schedule, and as required by the local building code.

Contractor shall provide weather tight trim around all doors whether shown on the Plans or not.

The frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads. Exterior door frames shall have an integral weather-strip at head and jambs. Frames shall be trimmed in the field to form a weather tight seal if shown on the Plans or not.

Accessories
Provide door accessories as noted on the Door Schedule.

Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable. The manufacturer shall provide door stops; no screw-on stops will be accepted.

Finishes
Prime doors and frames at the factory according to requirements for metals in Division 9.

Finishes shall be per the appropriate metal finishes in Division 9.

Part 3 - Execution

Installation
Install doors and frames in accordance with manufacturer’s instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer’s instructions. Seal metal-to-metal joints between framing members using good quality elastomeric sealant, and all doorjambs with caulking as specified.

Reinforce hinge and lock areas. Mount door using minimum of three (3) hinges.

Hang door in the frames and apply hardware in a neat, secure manner so that the doors will operate without dragging or binding.

Cleaning/Repair
Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609. Do not use abrasive, caustic, or acid cleaning agents.

Protect products of this section from damage caused by subsequent construction until substantial completion. If damage does occur, Contractor shall repair damaged or defective products to original specified condition in accordance with manufacturer’s recommendations. Replace damaged or defective products that cannot be repaired to Owner’s acceptance.
8.11 Metal Doors and Frames

[CSI 08 11 00]

8.11.13 Hollow Metal Doors and Frames

[CSI 08 11 13]

Part 2 - Products

Components

Doors and frames shall comply with ANSI/SDI A250.8 for level and model and A250.4 for physical performance level. All doors shall be 1¾-inch thick and insulated with a solid polyurethane or urethane foam core. Exterior doors shall be Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) and fabricated from 16 gauge steel minimum. Interior doors shall be Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) and fabricated from 18 gauge steel minimum.

Door frames shall be 14-gauge galvanized steel, as manufactured or recommended by the door supplier specifically for the door installed. Frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads.

Alternatively, door frames installed within CMU walls can be 16-gauge galvanized steel, tied to the CMU with masonry wire clips. Fully grout CMU block within one length of a full-sized block measured from door frame.

8.11.16 Aluminum Doors and Frames

[CSI 08 11 16]

Part 1 - General

Summary

This specification covers aluminum doors, frames, and accessories for both exterior and interior applications.

Performance Requirements

Aluminum doors shall be specifically designed for use in wastewater treatment facilities or other similarly corrosive environments.

Part 2 - Products

Manufacturers

The aluminum doors and frames supplied under this section shall be Series 100BE as manufactured by Cline Aluminum Doors, Inc. or approved equal.

Components

The manufacturer shall be responsible for selecting aluminum member alloy and temper as required for strength, corrosion resistance, and application of required finish.
Flush aluminum doors shall be a 1¾ inches (44 mm), 5-ply composite laminate system. No 3-ply doors will be accepted.

Face panels: Exterior and interior aluminum panels shall be one (1) piece of 0.040-inch (1.02 mm) smooth 5005-H14 stretcher-leveled aluminum alloy each laminated edge-to-edge to one-piece oil-tempered hardboard substrate.

Substrate: The door substrate shall include one (1) piece of 0.125-inch (3.18 mm) oil-tempered hardboard bilaterally laminated edge-to-edge to Class I prestabilized ISO-25 polyisocyanurate foam core and internal hardware backup tube. Neither pegboard nor non-tempered hardboard shall be accepted.

Core: Class I pre-stabilized ISO-25 polyisocyanurate formed foam shall be bilaterally bonded to facing substrate and to internal reinforcement system. The foam shall have a range of 750,000 – 1,000,000 closed cells per cubic inch, free of chlorofluorocarbon (CFC)/Hydrochlorofluorocarbons (HCFC), 2.0 pounds per cubic foot (32.4 kg/m3) density. No air pockets in core acceptable. No injected foams or poured-in-place foams acceptable to avoid air pockets and destabilization.

Hardware Backup: Provide 4¼ inches (108 mm) in width, 0.125-inch (3.18 mm) minimum wall thickness aluminum tube. The internal tube shall reinforce the full internal door perimeter to allow for all specified and non-specified hardware.

Beads and Trim: Wall Thickness of 0.050-inch (1.25 mm) minimum. Replaceable door edge caps of 6063-T5 extruded aluminum alloy shall be provided with integral weather stripping. Use of integral door edging not acceptable.

Bonding Agent: The bonding agent shall provide a minimum 350 pounds per square inch (24.6 kg/cm²) and meet EPA standards.

Door perimeter shall receive mechanically locked 6063-T5 extruded aluminum alloy beveled edge to protect flush door edges and permit field replacement. Only nonferrous, non-rusting members shall be acceptable, including tie rods, screws, and reinforcement plates. All doors shall have replaceable weather stripping. All components and agents to meet EPA standards.

Aluminum door frames shall consist of an extruded 6063-T5 aluminum alloy tubular or channel with minimum wall thickness of 0.125-inch (3.18 mm). Corners shall be cut square and joinery shall be mechanical with no exposed fasteners. Hinge and strike mounting plates shall be constructed of extruded aluminum alloy bar stock, 0.1875-inch (4.75 mm) thick mounted in a concealed integral channel with no exposed fasteners. The manufacturer shall provide all necessary anchors and other hardware necessary to install frame within wall penetration.

**Accessories**

All fasteners shall be aluminum, nonmagnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components. Do not use exposed fasteners. Manufacturer shall use high-strength aluminum units for brackets and reinforcements where feasible, otherwise, nonferrous stainless steel. Bituminous coatings shall be cold-applied asphaltic mastic, compounded for 30 Mil (0.76 mm) thickness per coat.
Finishes
Prime doors and frame with clear anodic coating; AA-M12C22A31 Class II mechanical finish, non-specular, with chemical medium-matte etch, minimum thickness 0.4 Mil (0.01 mm). Doors shall be finished per Division 9. Owner shall select color.

**8.30 SPECIALTY DOORS**

[Csi 08 30 00]

8.31 Access Doors and Panels

[Csi 08 31 00]

8.31.20 Vault Hatches

[Csi 08 31 20]

Part 1 - General

Summary
Access hatches shall be of the dimensions and type shown on the project Plans.

Related Sections
1.52.20 Locks and Keys

Performance Requirements
Door leaf (or leaves) shall be able to withstand a live load of 300 lb./ft² with a maximum deflection of 1/150th of the span.

Submittals
Provide manufacturer’s statement of load rating.

For aluminum frames to be cast in concrete, provide submittal for frame coating.

Locate gutter drain outlet location and routing of drain line to its intended location.

Finishes
Aluminum hatch frames shall be protectively coated prior to casting in concrete to prevent the accelerated corrosion that occurs when aluminum is in contact with concrete.

Warranty
Manufacturer shall guarantee against defects in material or workmanship for a period of five years.

Part 2 - Products

Manufacturers
Hatches shall be equal to USF Fabrications, Bilco, Halliday or LW Products.
Components

Access hatches shall have aluminum diamond plate door leaf (or leaves), stainless steel spring lift, neoprene weather seal, stainless steel hardware, self-latching stainless-steel slam lock, and recessed padlock hasp with cover. An unkeyed internal lever shall open the latch to prevent accidental entrapment. Any drainage provision provided by the hatch or frame shall be routed to the vault or building sump or drain system using Sch 40 PVC anchored to the walls and ceiling unless shown otherwise on the plans.

Frame shall be channel style with a full anchor flange around the perimeter and shall allow for controlled water drainage away from the opening.

Compression spring operator lift system enclosed in telescopic tubes, expansion spring, or torsion springs shall be provided for smooth, easy and controlled door operation throughout the entire arc of opening and closing. Operation shall not be affected by temperature. The door shall automatically lock in the vertical position by means of a heavy steel hold-open arm with release handle.

Access hatches in areas that receive regular vehicle traffic shall be provided with welded clips and hold down bolts to secure the hatch to the frame.

Part 3 - Execution

Installation

Installation shall be in accordance with manufacturer's instructions.

Hatch gutter drain shall be connected to 2.5-inch or larger Schedule 40 PVC pipe and routed to daylight or storm drain unless shown otherwise on the plans.

Field Quality Control

Frame shall be installed square and true without binding of door throughout the full arc of travel. Mis-operation of door shall be corrected by the Contractor.

8.70 HARDWARE

[CSI 08 70 00]

8.71 Door Hardware

[CSI 08 71 00]

8.71.05 Common Work for Door Hardware

[CSI 08 71 05]

Part 1 - General

Summary

This specification covers door hardware for interior and exterior doors. The Contractor shall provide all hardware necessary to install doors in a secure, weather-tight manner. Unless otherwise specified, all door hardware shall be according to this section.
Related Sections

1.52.20 Locks and Keys

Submittals

Door hardware submittal information shall indicate that hardware is suitable for fire- and sound-rated applications, where applicable.

Performance Requirements

All door hardware shall be selected to meet local building and fire codes.

Part 2 – Products

Components

Key cylinders shall utilize the Owner’s standard core and key. The key cylinder shall fit all exterior locking hardware and shall automatically lock when the door is closed. A vandal-resistant cover plate shall be provided at exterior surface of doors to prevent exterior access to deadbolts or slam latches at gap between door and frame.

All exterior, and fire- and sound-rated doors and frames shall have perimeter gasketing. Weather stripping shall consist of a vinyl, neoprene, or sponge neoprene strip mounted on an aluminum or stainless steel bracket which is fastened to the door or frame. Gasketing shall be Pemko or equal.

8.71.20 Hardware for Man-Doors

[CSI 08 71 20]

Part 2 - Products

Accessories

Dead Bolt: Doors with dead bolt locks shall use a 1-inch bolt throw, with concealed mounting screws, and a satin chrome finish. The dead bolt shall be thrown or retracted by a key on the outside and by a thumb knob on the inside. The dead bolt shall be equal to Schlage.

Exterior Door Lockset

Entrance Lock (Non-Emergency Exit): Non-emergency, exterior doors shall have an entrance lock (ANSI F20) with 3-inch-wide by 16-inch-high raised plate and rectangular pull with thumbpiece and deadbolt key cylinder hole on the exterior, and a lever and deadbolt thumbturn on the inside. The latchbolt shall be retracted by the thumbpiece/lever from either side. When locked, the outside key or inside knob/lever shall retract the deadbolt and latchbolt simultaneously. The outside knob/lever remains locked until the thumbturn is restored to vertical position. Throwing the deadbolt shall automatically lock outside knob/lever. The inside lever shall always be free for immediate egress.

Exit Device (Emergency Exit): Exit devices shall be provided for exterior doors at fire-rated doors, emergency exits, chemical/hazard rooms, and elsewhere as shown in the Door Schedule on the Plans. Unless otherwise noted, exit devices shall only be provided on the active door of a double door.
Exit devices shall be Dorma 9500 series mortise lock style with 3-inch wide by 16-inch high raised plate and rectangular pull with thumbpiece and cylinder hole, or equal. Panic exit hardware shall have a stainless steel satin finish and shall be equal to Von Duprin Series 98/99 panic bar.

- Key cylinders shall be interchangeable and compatible with the Owner’s preferred cylinder.
- Exterior doorknobs shall have brushed stainless steel finish, or equal.
- Exterior doorknobs shall be ANSI A156.13 Series 1000 Grade 1, Schlage or equal.

Closers: Door closers shall be provided for exterior doors, fire-rated doors, restroom, and locker room doors, and elsewhere as shown in the Door Schedule on the Plans. Door closers shall be surface mounted, parallel-arm type with an aluminum or stainless steel finish. Door closers shall be Dorma 8600 or equal. Closer shall be UL-listed for fire door rating.

Push/Pull Plates: The inactive door on a double door shall be equipped with push/pull hardware. The pull hardware shall be the rectangular pull style mounted on a 3-inch-wide by 16-inch-high plate. The push plate shall be 3-inches wide by 16-inches high. Push/pull hardware shall be fabricated from stainless steel. Doors with push/pull hardware shall be equipped with closer.

Door Hinges: Door hinges shall be fabricated using polished and stainless steel and shall be equipped with permanently lubricated ball bearings. Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable.

Thresholds: All interior and exterior doors shall have an extruded aluminum threshold. Thresholds shall be Pemko or equal.

Door Bottoms: All sound rated doors shall have a non-handed full-mortise automatic door bottom with neoprene seal that is fire and sound rated. Automatic door bottom shall be Pemko 434ANBL or equal. All exterior and fire rated doors shall have vinyl or neoprene door-shoe or door-bottom sweep, Pemko or equal.

Astragals: Provide flush extension bolts at the top and bottom of inactive double doors. Equip inactive doors with an overlapping astragal constructed of similar material to door. Astragals shall be Pemko or equal.

Door Stops: All doors shall have a doorstop and holder fabricated from aluminum or stainless steel. Strike shall be wall- or floor-mounted and provide automatic doorstop and hold with quick release. Doorstop for interior doors shall be a wall-mounted concave rubber bumper with a stainless steel or aluminum mounting plate.

Coordinator: All double doors shall have a coordinator to restrict the closing of one door before the other so that they close and lock properly. If not shown on the plans, Owner shall select which double door will be the primary and secondary door during the submittal stage of the project.
Rain Drip: All exterior doors shall be equipped with an aluminum door-top rain-drip weather strip, mounted to the top edge of the door frame to prevent water intrusion. Rain drips shall be Pemko or equal.

**Finishes**

All hardware shall have the same finish and shall be satin nickel.

### 8.90 LOUVERS AND VENTS

* [CSI 08 90 00]

#### 8.90.05 Common Work for Louvers and Vents

* [CSI 08 90 05]

**Part 1 – General**

**Related Sections**

- Division 17.08 - HVAC Functional Control

**System Description**

Ventilator shall be provided with explosion proof motors if noted in the Plans.

**Design and Performance Requirements**

See Louver and Damper Schedule on Plans and Functional Control description for design and performance requirements.

**Submittals**

Submit detailed product information including specifications, sizing information, dimensional drawings, coating systems, and available colors, and other information relevant to this project.

**Part 2 – Products**

**Manufacturers**

The following manufacturers are considered to be acceptable “or equals” unless otherwise noted on the Plans or elsewhere herein.

- Pottorff
- Cesco
- Louvers & Dampers, Inc.

**Accessories**

Provide all accessories needed for a complete installation including wall and roof thimbles, backguards, and mounting sleeves.
Components

A filter frame and an insect screen shall be provided on the interior side of all intake louvers. The filter frame shall allow for easy installation and removal of standard size filters. Provide one set of filters.

A rodent/bird mesh shall be provided on the exterior side of all louvers. Mesh shall not impede rotation of dampers, if any. Mesh shall be factory coated to match louver/damper color. The screen shall be corrosion resistant with maximum ¼-inch openings.

In chemical rooms or other corrosive environments, all materials in contact with the room air shall be fully resistant to corrosion attack from the atmosphere.

Finishes

All louvers shall be coated with factory Kynar, or powder coat finish, color to match exterior color scheme.

In chemical rooms or other corrosive environments, all materials in contact with room air shall be fully resistant to attack from the interior environment.

Part 3 – Execution

Install per manufacturer’s recommendations.

Louver assembly shall be set flush with the wall exterior

Operate all moving parts prior to installation. Any non-functional or binding parts shall be repaired or replaced prior to installation. Install so that blade linkages are accessible after installation to permit service and lubrication without requiring removal of wallboard or other structures.

8.91 Louvers

[CSI 08 91 00]

8.91.19 Fixed Louver

[CSI 08 91 19]

Part 1 – General

Provide fixed louver(s) as shown on the Plans.

Part 2 – Products

Components

Louver shall include channel frame mounted to the inside face of the wall.

Height and width of louver and damper shall be as shown on the Plans. Depth of louver, filter, and screen assembly shall be set flush with the wall exterior and any intrusion into the interior wall supported by the frame.
8.91.19.13 Fixed Acoustical Louver

[CSI 08 91 19.13]

Part 1 – General

Provide fixed acoustical louver to all exterior faces in front of the louvers as shown on the Plans. Frame to hold interior protrusion of complete unit shall match dimensions of the louver and damper.
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 . . .” shall apply to all following subsections whether directly referenced or not.

9.20 PLASTER AND GYPSUM BOARD

9.21.23 Gypsum Board for Low Occupancy Areas

[CSI 09 21 23]

Part 1 - General

Summary

This section covers work within infrequently occupied facilities, process or industrial buildings. This section includes the following areas:

1. Communications Building Ceiling

Related Sections

• Division 9.91.23.10 Interior Painting – Gypsum Wallboard

Part 2 - Products

Components

Gypsum board shall be selected based on the installed application (see below) and as recommended by the Gypsum Association GA-223-96. Gypsum board shall be ⅝-inch thick, unless otherwise noted.

<table>
<thead>
<tr>
<th>Type</th>
<th>Application</th>
<th>ASTM</th>
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<tbody>
<tr>
<td>Regular</td>
<td>Interior Walls and Ceilings</td>
<td>C 1396</td>
</tr>
<tr>
<td>Type X or C</td>
<td>Fire-Rated Construction</td>
<td>C 1396</td>
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<tr>
<td>Soffit Board</td>
<td>Exterior Soffits and Ceilings</td>
<td>C 931</td>
</tr>
<tr>
<td>Water-Resistant Gypsum Backing Board</td>
<td>Tile Base</td>
<td>C 630</td>
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Joint treatment: U.S. Gypsum Company Perm-a-Tape or equivalent. Protect exposed corners with U.S. Gypsum Company Perm-a-Tape or equivalent moldings embedded in joint compound per manufacturer’s recommendations.

Finishes

Finish-sand all areas to smooth, even surfaces suitable for paintings.
Part 3 - Execution

Installation

Provide and install all necessary components, including furring, as necessary to install gypsum board in accordance with local building code and Gypsum Associations standards (GA-216 and GA-600). Install gypsum board in such a manner as to maintain fire and sound transmission rating.

Apply square edge with the long dimension parallel with supports. Abut sides and edges to vertical framing members, top and bottom plates or headers. Attach using nails spaced at 8 inches O.C. at all edges, and 8 inches O.C. on intermediate support.

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 intended for use 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 to be used including solvents. Provide NSF certification for all finishes in potential contact with potable water. Submit this information in accordance with the requirements regarding shop drawings included herein.

Provide owner with 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 product being used are manufactured by a company other than the specified reference standard, provide complete comparison of proposed products with specified projects including application procedures, coverage rates, and verification that product is designed for intended use. Information must also be provided that demonstrates that the manufacturer’s 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) 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. Contractor shall be responsible for verifying all 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 shall be 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 shall be 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 shall be 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 Engineer 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 shall be 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

The Contractor shall be responsible for the collection, containment, transportation, and disposal of 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 acceptable containers for collection and disposal of waste materials, debris, and rubbish.
Site Conditions

Contractor shall take any and all 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 that occurs as a result of over-spray.

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. Or Equal

The specified coating shall be understood as establishing the type and quality of the coating desired. Other manufacturers’ products will be accepted provided sufficient information is submitted to allow the Engineer 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, and such requests shall not be considered until after the Contract has been awarded.

Substitutions of the coatings of other manufacturers shall 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

Installers

Contractor shall be responsible for quality assurance including the retention of a coating applicator with experience necessary to complete the work as specified within this Division. 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 shall be approved to complete the coatings portion of the work. Submit list of a minimum of five completed projects of similar size and complexity to this project during the submittal process. Include for each project:

1. Project name and location.
2. Name and phone number of owner.
3. Name and phone number of Contractor.
4. Name and phone number of engineer.
5. Name and phone number of coating manufacturer.
6. Approximate area of coatings applied.

7. 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), the Association for Materials Protection and Performance (AMPP) and/or the National Association of Corrosion Engineers (NACE) as noted herein unless more strictly described by coating manufacturer.

Coatings shall only be applied during weather meeting the recommendations of the coating manufacturer. 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 here in or applied based on coverage rates of square feet per gallon (sq. ft./gal).

Installation/Construction

Paint application shall be 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.

Coating shall be done in a manner satisfactory to the Owner. The dry film thickness listed in the “Materials” section of this Division must be met, regardless of the applied film thickness or number of coats.

Carefully 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.

Pipe shall be emptied of water for a minimum of 24 hours prior to surface preparation and painting. Pipe shall not be filled with water until coating is dry. If, in the Engineer’s opinion it is not practical to drain the pipes, the water must stand for at least 48 hours to reach ambient temperature prior to coating the pipe. Do not allow water to flow for at least 24 hours after final coating.
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 Engineer when requested.

If coating inspector finds anomalies and/or defects requiring further testing or blasting and recoating, a meeting shall be held by all involved parties (coatings manufacturer representative, coating applicator, and primary coating inspector) to come to a complete resolution as to the cause of the defect. All such remedies to repair defects shall be paid for by the Contractor. If prime Contractor does not agree with coating inspector’s recommendations (i.e. there is no defect) they may hire a second coating inspector at Contractor’s expense to review the work. If second coating inspector agrees with first, the decision is final. If there is disagreement, a third coating inspector shall be hired and paid for at split 50 percent cost between prime Contractor and owner and that decision shall be final and all such remedies to defects shall be paid for by the Contractor.

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.

Contractor’s Record

The Contractor shall maintain daily records showing:

1. Start date of work in each area.
2. Date of application for each following coat.
3. Moisture content and surface temperature of substrate; weather conditions including ambient air temperature and dew point.
4. Provision utilized to maintain temperature and humidity of work area within coating manufacturer’s recommended ranges.

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.

Each coat shall be inspected 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 owner will be uncovered for inspection and approval at no additional cost to the owner.
Contractor shall inspect the completed and cured coating on metal surfaces in the presence of the Owner for pinholes and holidays with a tinker and rasor or other low voltage (under 100 volts) holiday detector. Areas found to contain pinholes shall be repaired or recoated in accordance with the manufacturer’s recommendations. Provide 72-hour notice to owner prior to performing test. For Special coatings the installed lining system shall be checked by high voltage spark detection in accordance with NACE SP0188-06 to verify a pinhole-free surface.

NACE Certified Inspector

A NACE Certified Inspector paid for by the Contractor shall inspect all shop/factory coatings related to:

- Steel pipe
- Steel Reservoir Panels

A NACE Certified Inspector paid for by the Owner shall inspect all field coatings related to:

- Steel pipe
- Steel Reservoir Interior
- Steel Reservoir Exterior

Provide 14 calendar days’ notice to the Owner’s representative to schedule the inspection. Initial inspection shall result in a written report. If defects are found not matching the specifications below for surface preparation, curing or coating type/thickness, remedies shall be completed by the contractor at their expense. After remedies are complete and approved by the NACE Inspector, shop coated items may be installed at the job site. If defects are found after the second inspection (initial and first defect remedy) for the same components by the NACE Certified Inspector, subsequent NACE Certified Inspector inspections shall be paid for by the Contractor.

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 Color Schedule

[CSI 09 06 90 or 09 90 06]

Colors used for finish coatings on process equipment, piping, and building surfaces shall conform to the following schedule. All finishes shall be semi-gloss unless otherwise specified. Finish coatings, which are applied in the shop by the manufacturer, shall conform to this section. Factory coatings which are damaged during shipment or installation shall be recoated in the field in accordance with these specifications.
Items of similar purpose shall be painted the same color. If items come from the factory with a shop applied coating that does not match said color, they shall be field coated to match.

The contractor shall allow no less than 15 working days from the time the Owner is provided with color selections for the Owner to make color choices.

The Owner will finalize the color schedule for painted items after award of the contract. The schedule outlined below shall be used for bidding purposes. Contractor shall provide a pallet of colors from the manufacturer of not less than 30 color choices.

9.90.13 Unpainted Items

[CSI 09 90 13]

Part 1 – General

Summary

Do not coat aluminum or stainless-steel items unless specifically directed otherwise below or on the Plans. Field painting is not required for factory prefinished equipment items (e.g. pumps, motors, blowers, etc.) unless otherwise specified. Do not coat shop epoxied meters or control valves unless noted otherwise on the Plans or herein. Do not coat small diameter pilot systems such as galvanized iron, copper, or brass pipe and fittings associated with control valves or sensors unless noted otherwise on the Plans or herein.

Do not coat over nameplates, labels, or identification tags.

9.91 Painting and Coating

[CSI 09 90 00]

Part 1 – General

Related Sections

Refer to 9.90.05 for coating application requirements.

9.91.13 Exterior Painting

[CSI 09 91 13]

9.91.13.01 - System 1: Metals – Exterior (Wet Conditions) including Doors, Windows, and Frames

[CSI 09 91 13 13]

Part 1 - General

Typical Application

This Section applies to all interior and exterior hollow metal doors, windows, and frames. All hollow metal doors, windows, and frames shall be bonderized, pickled, or phosphatized, which will serve as a primer for and shall be compatible with the finish coat to be applied in the field.
Part 2 - Products

1. Tnemec
   a. **Prime Coat**: Series 161 Fast Cure Epoxy (3 to 5 Mil DFT)
   b. **Finish Coat**: Series 1095 EnduraShield (3 to 5 Mil DFT)

2. Sherwin Williams
   For products that are supplied in bare (unprimed) metal:
   a. **Primer**: Corothane 1 Galvapac Zinc Primer B65G11 (2.5 to 3.5 Mil DFT)
   b. **Finish Coat**: Acrolon Ultra (3.5 to 5.5 Mil DFT)
   For products that are supplied with a shop prime coat:
   a. **Primer**: Shop
   b. **Intermediate**: Macropoxy 646FC B58-600 Series (5 to 8 Mil DFT)
   c. **Finish Coat**: Acrolon Ultra (3.5 to 5.5 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Clean, dry, and free of all dirt, oil, grease and other contaminants.
2. For new work: SSPC-SP1 solvent cleaned
3. For coating over existing painted surfaces: Remove all loose and damaged coatings. Prepare with SSPC-SP2 hand tool or SP3 power tool cleaning.

9.91.13.02 – System 2 - Powder Coating for Steel and Aluminum Handrail and Other Architectural Features

[CSI 09 91 13 14]

Part 1 – General

Performance Requirements

The powder-coat shall have the following properties:

1. **Adhesion**: No less than 100 percent (cross hatch/tape adhesion test per ASTM D3359-97).
2. **Color/Gloss Change**: None below 80 percent over-bake (test per ASTM D2454-79).
3. **Hardness**: No less than 1H minimum (pencil hardness test per ASTM D3363-00).
4. **Resistance to Impact**: No less than 160-inch lb. direct and inverted. (ASTM D2794)
5. **Resistance to Bending**: No visible cracking (¼-inch bending test per ASTM 522).
6. **Resistance to Salt Spray**: No more than ⅛-inch scribe creep in 1000+ hours (salt spray test per ASTM B117-73).
7. Resistance to Humidity: No visible red rust under 1,000+ hours (humidity test per ASTM D2247-68).

8. Degree of Gloss: No less than 60 percent (specular gloss test per ASTM D523-80).

Part 2 – Products

1. Polyester System
   a. Primer: 3M Scotchkote fusion bonded epoxy (2 to 4 Mil DFT)
   b. Finish Coat: Valmont polyester powder coating with UV stabilizers (2 to 4 Mil DFT)

2. Sherwin Williams Powder Coat System
   a. Primer: Powdura Gray Epoxy Primer (1.8 to 3 Mil DFT)
   b. Finish Coat: Powdura TGIC Powder Coating (2 to 3 Mil DFT)

Part 3 – Execution

Construction
Cure in an oven at temperatures required by the powder coating manufacturer.

Preparation
Sandblast all parts and treat with iron phosphate and seal with non-chromic process.

Field Quality Control
Finished coating shall be smooth to the touch with no visible lumps, bumps, or cracks.

9.91.13.12 - System 3: Metals - Metal in Contact with Concrete, Masonry or Dissimilar Metals.

[CSI 09 91 13 19]

Part 1 - General
This section applies to all non-submerged metal surfaces including aluminum, hot-dipped galvanized steel, or other metals, which are conducive to corrosion due to interaction of dissimilar metals or to chemical reaction due to embedment in concrete or masonry grout, and that are not covered as part of another coating system.

Part 2 - Products

1. Tnemec
   a. First Coat: Series N69 Hi-Build Epoxoline II (4 to 6 Mil DFT)

2. Sherwin Williams
   a. First Coat: 646 FC B58-600 Macropoxy (4 to 6 Mil DFT)
Part 3 - Execution

Surface Preparation

1. SSPC-SP1 Solvent Cleaning
2. Lightly sand to degloss and provide a surface profile.

9.91.13.13 - System 4: Ferrous Metal including Cast/Ductile Iron Pipe (Atmospheric Indoors and Outdoors)

[CSI 09 91 13 20]

Part 1 - General

This Section applies to all ductile/cast iron and ferrous metals, including bituminous coated pipe and materials unless specified otherwise. Do not coat stainless steel materials unless specified otherwise. This Section applies to all pipe materials and equipment, including manufacturer applied coating systems. For the purposes of this coating system, metals which are located below the top of the exterior wall within a water bearing structure or are located within a vault or manhole shall be considered as under immersion service conditions.

Part 2 - Products

1. Tnemec
   a. Primer option 1: Series 1 Omnithane (2.5 to 3.5 Mil DFT).
   b. Primer option 2: Series N69 or N140 (2.5 to 3.5 Mil DFT) may be used if the time between prime coat and intermediate coat is less than 60 days. If more than 60 days occurs, surface will need re-preparation per the manufacturer’s instructions.
   c. Intermediate Coat: Series N69 Hi-Build Epoxoline II (6 to 8 Mil DFT)
   d. Finish Coat: Series 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 (3.5 to 5.5 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Ferrous Metals
   a. SSPC-SP10 Near white blast cleaning

2. Ductile and Cast-Iron Materials
   a. Ductile iron or cast-iron pipe or materials to have a special exterior coating shall be purchased factory primed without the standard asphalt coating. Field removal
of asphalt coatings is extremely difficult and overly aggressive preparation can create a damaged surface unsuitable for coating.

b. All oils, grease, and other contaminants shall be removed using solvent cleaning prior to abrasive blasting or power tool cleaning. Blemishes or staining on the prepared surface are acceptable if such items cannot be removed by light scraping with a knife. SSPC-SP10 blue-gray with surface profile of 2.0 Mil, minimum. Do not burnish the surface. Clean all surfaces of dust and loose residue immediately prior to coating. See NAPF 500-03-04/05.

9.91.23 Interior Painting

[CSI 09 91 23]

9.91.23.01 – System 5: Metals Interior (Dry Conditions)

[CSI 09 91 23 13]

Part 1 - General

This Section applies to all interior metals located indoors, not factory coated and where the metal is not holding or in direct contact with a liquid and not exposed to weather.

Materials

1. Tnemec
   a. Primer: Series 1 Omnithane Prime (2.5 to 3.5 Mil DFT)
   b. Finish Coat: Series N69 Epoxoline II (4 to 6 Mil DFT)
2. Sherwin Williams
   a. Primer: Corothane 1 Galvapac Primer B65G11 (2.5 to 3.5 Mil DFT)
   b. Finish: Macropoxy 646FC B58-600 Series (4 to 6 Mil DFT)

Part 3 – Execution

Surface Preparation

SSPC SP1 followed by SP6 (commercial blast). Surface profile shall be 2.0 Mil, minimum.

9.91.23.03 - System 6: Galvanized Metal Surface Repair

[CSI 09 91 23 14]

Part 1 - General

This Section applies to all galvanized surfaces which have received minor damage to the galvanized surface during construction and which require repair.

Part 2 - Products

1. Tnemec
   a. First Coat: Series 90-97 Tneme-Zinc (2.5 to 3.5 Mil DFT)
2. Sherwin-Williams
   a. First Coat: Corothane 1 Galvapac B65G11 (2.5 to 3.5 Mil)

Part 3 - Execution

Surface Preparation

1. SSPC-SP3 Power tool cleaning

9.91.23.04 – System 7: Galvanized Iron and Non-Ferrous Metal (non-immersion)

[CSI 09 91 23 15]

Part 2 – Products

Materials

1. Tnemec
   a. Two coats Series 30 Spra-Saf (2 to 4 Mil DFT each coat)

2. Sherwin Williams
   a. Spraylastic B42 Series (2 to 4 Mil DFT each coat)

Part 3 – Execution

Preparation

Surface SSPC SP1 solvent clean.

9.91.23.10 - System 8: Gypsum Wallboard – Interior, Painted

[CSI 09 91 23 17]

Part 1 - General

1. Gypsum wallboard ceilings, walls, and other similar surfaces located in a conditioned environment (i.e. building).

Part 2 - Products

1. Tnemec
   a. Prime Coat: Series 151-1051 Elasto-Grip (180 to 400 square feet per gallon)
   b. Finish Coat: Series 113 Hi-Build Tnemec-Tufcoat (4 to 6 Mil DFT)

2. Sherwin Williams
   a. Primer: PrepRite ProBlock Int/Ext Latex Primer Sealer B51 Series (180 to 200 square feet per gallon)
   b. Finish Coat: Pro-Industrial Water Based Catalyzed Epoxy B73 Series (4 to 6 Mil DFT)
Part 3 - Execution

Surface Preparation

Surface clean, dry and free of contaminants.

9.91.23.12 - System 9: Wood – Interior, Painted

[CSI 09 91 23 19]

Part 1 - General

Interior painted wood surfaces, including, but not limited to trim and other similar surfaces.

Part 2 - Products

1. Tnemec
   a. **Primer**: Series 151-1051 Elasto-Grip (1.0 to 1.5 Mil DFT)
   b. **Intermediate Coat**: Series 1029 EnduraTone (2 to 4 Mil DFT)
   c. **Finish Coat**: Series 1029 EnduraTone (2 to 4 Mil DFT)

2. Sherwin Williams
   a. **Primer**: PrepRite ProBlock Int/Ext Latex Primer Sealer B51 Series (1.0 to 1.5 Mil DFT)
   b. **Intermediate Coat**: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)
   c. **Finish Coat**: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)

Part 3 - Execution

Surface Preparation

Surface clean, dry and free of contaminants.

9.91.33 Submerged and Buried Metals Painting

[CSI 09 91 33 or 09 97 00]

Part 3 – Execution

Surface Preparation

Ferrous Metal – SSPC SP1 followed by SP10 Near White Blast. Surface profile shall be 2.0 Mil, minimum.

Ductile Iron – SSPC SP1 followed by NAPF 500-03-04/05 Grey White Blast. Surface profile shall be 2.0 Mil, minimum.
9.97.23 Concrete and Masonry Coatings

[CSI 09 97 23]

Part 1 - General

Scheduling
Most coatings on concrete will require a 28-day concrete curing period prior to coating. Schedule the work accordingly. No additional monetary or time compensation will be given for failure to plan for the required curing duration.

9.97.23.07 – System 13: Concrete Vault Interior

[CSI 09 97 23 19]

Part 1 – General

Summary
Interior surface of concrete vaults.

Part 2 - Products

Materials
1. Tnemec
   a. **Prime Coat:** Series 1254 Epoxoblock (4 to 6 Mil DFT). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. **Finish Coat:** Series 27 FC Typoxy (4 to 6 Mil DFT)
2. Sherwin Williams
   a. Prime Coat: Cement-Plex 875 (60-80 square feet per gallon). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. Finish Coat: Macropoxy 646FC, B58-600 Series (4 to 6 Mil DFT)

Part 3 - Execution

Surface Preparation
1. Clean, dry and free of contaminants and passing a wet mat test in accordance with ASTM D4263 Plastic Mat test.

9.97.23.09 - System 14: Concrete and CMU Wall – Interior, Non-Immersion, Mild Condition

[CSI 09 97 23 19]

Part 1 - General

Summary
Interior surface of concrete and CMU walls in a conditioned environment (i.e. building).
Part 2 - Products

Materials
Concrete Masonry Unit (CMU) Walls

1. Tnemec
   a. **Prime Coat**: Series 1254 Epoxoblock (24 to 26 Mil DFT). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. **Finish Coat**: Series 27 FC Typoxy (4 to 6 Mil DFT)

2. Sherwin Williams
   a. **Primer**: Cement-Plex 875 (60-80 square feet per gallon). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. **Finish Coat**: Macropoxy 646FC, B58-600 Series (4 to 6 Mil DFT)

Concrete Walls

1. Tnemec
   a. **Prime Coat**: Series 1254 Epoxoblock (4 to 6 Mil DFT). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. **Finish Coat**: Series 280 Hi-Build Tneme-Glaze (6 to 8 Mil DFT)

2. Sherwin Williams
   a. Prime Coat: Cement-Plex 875 (60 to 80 square feet per gallon). Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
   b. Finish Coat: Macropoxy 646FC, B58-600 Series (4 to 6 Mil DFT)

Part 3 - Execution

Surface Preparation

2. Clean, dry and free of contaminants and passing a wet mat test in accordance with ASTM D4263 Plastic Mat test.

3. Substrate shall be grouted or otherwise filled prior to painting.

9.97.23.11 System 15: Anti-Graffiti Coating and Water Repellent on CMU and Concrete Exterior

*[CSI 09 97 23 21 or 09 96 23]*

Part 1 - General

Summary

Exterior surface of above grade concrete and CMU walls. This coating system is intended to function as a clear water repellent and aid in the removal of graffiti.
Part 2 – Products

Materials

1. Tnemec
   a. **First Coat**: Chemprobe Dur A Pell GS (6-9 Mil DFT)
   b. **Second Coat**: Chemprobe Dur A Pell GS (6-9 Mil DFT)

2. Sherwin Williams
   a. **First Coat**: Anti-Graffiti Coating (6-9 Mil DFT)
   b. **Second Coat**: Anti-Graffiti Coating (6-9 Mil DFT)

Part 3 – Execution

Preparation

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion. Refer to SSPC-SP13/NACE 6, or ICRI 03732, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days at 75 degrees Fahrenheit (24 degrees Celsius). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Cement-Plex 875 or equal. Weathered masonry and soft or porous cement board must be brush blasted or power tool cleaned to remove loosely adhering contamination and to get to a hard, firm surface. Laitance must be removed.

9.98 Steel Reservoir Coating

[CSI 09 97 13.24]

9.98.05 Common Work for Steel Reservoir Coating

[CSI 09 97 13.24]

Part 1 – General

Design Requirements

All interior coatings are to be certified for contact with potable water per NSF 61/600. This includes coatings above the water line.

Warranty

Steel Reservoir Coating System provided under this contract shall be warranted against defects in workmanship for a period of two (2) years after date of project acceptance. Coating manufacturer shall warrant coating system from the end of year two (2) to the end of year five (5).

Applicator shall warrant their work in full for two (2) years starting after project acceptance. The coatings manufacturer shall warranty the coating system in full, from the end of year two (2) to the end of year five (5). If defects are from application by applicator, the applicator shall pay for repair costs. If defects are from defective coating product the coating supplier shall
pay for repair costs. If agreement is not found, a third-party coating inspector shall review defects and determine cause. Third party inspector’s decision shall be considered final.

**Maintenance**

The Applicator shall provide, at no additional cost to the Owner, an inspection of the tank within the last month of the warranty period. Any defects, which are discovered during this inspection, shall be repaired by the Applicator in a manner acceptable to the Owner and coating supplier and at no additional cost to the Owner.

**Part 2 – Products**

**Mixes**

Materials shall be mixed, thinned, and applied according to the manufacturer’s printed instructions.

**Part 3 – Execution**

**Preparation**

Prepare surface and touch up welds, burned, and abraded areas on shop primed steel with specified primer before applying field coats.

**Construction**

Allow each coat to dry thoroughly before applying next coat. Provide adequate ventilation for tank interior to carry off solvents during dry phase.

**Field Quality Control**

Following surface preparation and coating application, Contractor shall furnish services of a qualified supplier/manufacturer’s representative to inspect the surface and coatings and inform Owner of any defects or concerns regarding condition of surface preparation or coating system at the job site. The Contractor shall repair any defects to the coating supplier/manufacturer’s satisfaction at Contractor’s expense. The finished painting system shall be free of flaking, peeling, bubbling, cracking, permanent discoloration, or other physical defect in the work for the warranty period.

The Certified Paint Manufacturer’s Technical Representative employed by the Paint Manufacturer shall be approved by the Owner. All test results shall be approved by the Paint Manufacturer’s Representative in writing (with Copy sent to the Engineer for review) prior to shop painting and field painting.

Allow a minimum of seven days at 70 degrees Fahrenheit curing or pass ASTM D 5402 test for assessing the solvent resistance of organic coatings using solvent rubs, after application of final coat to tank interior before flushing, sterilizing, or filling with water.

**9.98.02.02 New Welded Steel Reservoir Interior, Stainless Steel in Contact with Potable Water, and Steel in Contact with Potable Water**

[CSI 09 97 13.24]
Part 1 – General

Related Sections

- Division 1.75.16.50 Reservoir Disinfection
- Division 1.75.16.56 Soak Test
- Division 9.98.05 Common Work for Steel Reservoir Coatings

Submittals

Coating manufacturer shall submit documentation that interior coating system is certified for contact with potable water per the National Sanitation Foundation Standard No. 61.

Provide written documentation of shop primer application.

Coating systems shall be compatible with submittal information stating as such by the manufacturer. A single manufacturer coating system shall be supplied for interior and exterior coatings.

Standards

<table>
<thead>
<tr>
<th>Environment Control</th>
<th>Air and surface temperature, dew point, and RH (ASTM E337) must be taken at start of work and every four hours minimum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards for Abrasive Blast Cleaning</td>
<td>Referenced Standards and SSPC Vis 1 pictorial standard.</td>
</tr>
<tr>
<td>Profile Measurement</td>
<td>ASTM 4417 Method C Replica tape and micrometer.</td>
</tr>
<tr>
<td>Wet and Dry Film Thickness Measurement</td>
<td>WFT ASTM D4414 DFT SSPC-PA 2</td>
</tr>
<tr>
<td>Holiday detection of final application</td>
<td>ASTM D5162</td>
</tr>
</tbody>
</table>

Part 2 – Products

Materials (Shop)

Shop Primer Coating System

- Tnemec Series 91H20 or 94H20 One coat 2.5 to 3.5 Mil DFT

OR:

- Sherwin Williams Corothane 1 Galvapac One Pack Zinc Primer B65G11 One coat 2.5 to 3.5 Mil DFT

Materials (Field)

Prime all properly prepared new steel, holdbacks, welded and abraded areas of shop primed surfaces with:

- Tnemec Series 91H20 or 94H20 2.5 to 3.5 Mil DFT
OR:

<table>
<thead>
<tr>
<th>Sherwin Williams Corothane 1 Galvapac One Pack Zinc Primer B65G11.</th>
<th>2.5 to 3.5 Mil DFT</th>
</tr>
</thead>
</table>

Finish coat all properly prepared shop primed or field primed surfaces. Two-coat systems shall have two different colors to facilitate visually distinguishing between coats. Provide:

<table>
<thead>
<tr>
<th>Tnemec Series 22 Epoxoline</th>
<th>20 to 25 Mil DFT</th>
</tr>
</thead>
</table>

OR:

<table>
<thead>
<tr>
<th>Sherwin Williams Sherplate PW Epoxy</th>
<th>20 to 25 Mil DFT</th>
</tr>
</thead>
</table>

**Part 3 – Execution**

**Surface Preparation (Shop)**

Shop preparation: All surfaces shall be SSPC SP1 solvent cleaned followed by sandblasting in strict accordance with SSPC SP10 Near White Blast Cleaning, 2-3 Mil profile.

**Surface Preparation (Field)**

For Full Field Installation: Prepare all internal surfaces in accordance with SSPC-SP1, immediately followed by abrasive blast cleaning in accordance with SSPC-SP10 Near White Blast Cleaning, 2-3 Mil profile. Remove all surface contaminants prior to abrasive blasting.

For Shop Primed Internal Surfaces: All holdbacks, welded and abraded areas which have been prepared in accordance with SSPC-SP1, shall receive a blast cleaning in accordance with SSPC-SP10 Near White Blast Cleaning, 2-3 Mil profile. Remove all surface contaminants to areas previously shop primed.

Shop applied primers shall be evaluated for recoat window criteria and prepared in accordance with SSPC-SP7 if recoat window has elapsed for application of specified subsequent coating.

**Construction (Shop)**

Hold back coatings within 2 to 4 inches of edges or ends to be welded. Feather primer and paint out as required for a smooth finished product.

**Construction (Field)**

During application of either prime or finish coats, brush all welds seams with freshly sprayed paint.

*Contractor shall apply different coats utilizing different colors for ease of inspection.*

**9.98.02.03 New Welded Steel Reservoir Exterior Coating**

*CSI 09 97 13.24*

**Part 1 – General**

*Contractor shall be responsible for applying the appropriate coating system depending on weather conditions and submit on at least two options depending on field conditions at time of application.*
Submittals
Provide written documentation of shop primer application.

Part 2 – Products

Materials (Shop)
Includes interior ladder, plate, supports, anchor chairs and bolts, exterior handrails, stairs and platforms shall be hot dipped galvanized. For galvanized steel that will be coated, galvanneal in accordance with Division 5.05.

Prime all properly prepared surfaces with one coat:

1. Tnemec Series 91H2O or 94H2O (2.5 to 3.5 Mil DFT)
2. Sherwin Williams Corothane 1 Galvapac One Pack Zinc Primer B65G11 (2.5 to 3.5 Mil DFT)

Materials (Field)
For properly prepared External Surfaces: Prime all properly prepared new steel, holdbacks, welded and abraded areas of shop primed surfaces with the following series of coatings:

Minimum total dry film thickness shall be 9.5 Mil.

1. Tnemec
   a. One coat: Tnemec Series 91H2O or 94H2O (2.5 to 3.5 Mil DFT)
   b. One coat: Tnemec Series 27 FC Typosy (4 to 6 Mil DFT)
   c. One coat: Tnemec Series 1095 Endura Shield (3 to 5 Mil DFT)

2. Sherwin Williams
   a. One coat: Corothane 1 Galvapac One Pack Zinc Primer B65G11 (2.5 to 3.5 Mil DFT)
   b. One coat: Sherwin Williams Macropoxy 646FC (4 to 6 Mil DFT)
   c. One coat: Sherwin Williams Acrolon Ultra (3.5 to 5.5 Mil DFT)

Part 3 – Execution

Surface Preparation (Shop)
All surfaces shall be SSPC SP1 solvent cleaned followed by sandblasting in strict accordance with SP10 Near White Blast Cleaning, 2-3 Mil profile.

Shop applied primers shall be evaluated for recoat window criteria and prepared in accordance with SSPC-SP7 if recoat window has elapsed for application of specified subsequent coating.

Exterior Containment

Containment for the reservoir exterior shall meet the following criteria, minimum:
1. Containment Type - Class 3A
2. Monitoring Method A
3. Containment Type A2, Flexible
4. Penetrability Type B2a minimum
5. Support Structure Type C1 – Rigid Support Structure
6. Treatment of Joints Type D2 – Partially Sealed Joints
7. Entryways Type E3 – Entryway Through Overlapping Door
8. Ventilation System Components Air Supply (Intake) Points – Type F2 – Open Air Supply
9. Input Air Flow - Type G2 – Natural Air Flow
10. Air Pressure Inside Containment – Type H3 – Not Required
11. Air Movement inside Containment – Type I2 Not specified
12. Exhaust Air flow/dust collection – Type J1 – Air filtration required

If Owner's inspector identifies visual monitoring showing preparation or overspray escaping off site or onto adjacent structures on site operations shall cease and a remedy provided by the Contractor. Any cleaning, adjustment or fines shall be provided and paid for by the Contractor at no additional cost to the Owner.

Surface Preparation (Field)

For External Surfaces with shop prime: Prepare all welded and abraded areas in accordance with SSPC-SP1 followed by a blast cleaning in accordance with SP10 Near White Blast Cleaning. Remove all surface contaminants to areas previously shop primed.
10.00 GENERAL

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

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

10.05 Common Work for Specialties

[CSI 10 05 00]

Part 1 - General

Submittals

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

- Equipment Signs
- Fire Extinguishers
- Pipe Markings
- Danger Signs
- Horizontal Lifeline

10.06.10 Schedules for Signage

[CSI 10 06 10.13,16]

Part 2 - Products

Materials

Unless otherwise specified, text shall be white on a background color shown below.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Plate Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Black</td>
</tr>
<tr>
<td>Electrical</td>
<td>Black</td>
</tr>
<tr>
<td>Domestic Water</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Part 3 - Execution

Installation

Install signs/markers directly on the devices in a location that does not interfere with the device operation or maintenance. If the device is too small or otherwise impractical to mount marker, locate marker as close as possible to the device on an adjacent surface.
10.10 INFORMATION SPECIALTIES

[CSI 10 10 00]

10.14.23 Panel Signage

[CSI 10 14 23]

Part 2 - Products

Materials

Equipment Signage

1. Equipment signs shall be plastic-laminated 1-inch high, by required length, by ⅛-inch thick, with ½-inch high letters in N-2 Standard Gothic characters.

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.

Door Labels

1. Door labels shall be 2-inch tall font, easily readable at 20 feet from door. Labels shall be engraved PVC, with blue plate and white lettering. Labels shall be securely attached to the exterior of all doors with stainless steel metal screws, at 5 feet from the bottom of the door.

Construction Fence Perimeter Signage

1. Signs shall be made of polyethylene and be ⅛-inch thick minimum. Sign shall have a white background with construction orange print. Font shall be readable from 100 feet.

2. During construction, if construction site is to be partially or completely enclosed, signs stating “Construction Area, Keep Out” shall be placed so that at any location around the construction site within 100 feet of a sign can be read from that distance. Upon removal of temporary construction fencing, remove signs from fencing and deliver to Owner.

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. Provide a nameplate for each control center unit door.
4. Electrical equipment name plates and service legends shall be phenolic-engraved, rigid, laminated plastic type with adhesive back. Letter height shall be \( \frac{5}{16} \)-inch unless specified otherwise on the Plans. Labeling shall clearly identify the associate component. Color shall be black background with white letters.

5. 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.

6. Tags shall be securely attached. Adhesive backed tags shall also have at least two brass screws for positive fastening.

7. 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.

10.40 SAFETY SPECIALTIES

[CSI 10 40 00]

10.44.16 Fire Extinguisher

[CSI 10 44 16]

Part 2 - Products

Components

Portable, wall-mounted, 10-pound, dry-chemical fire extinguisher shall be listed and approved by Underwriters Laboratories. The fire extinguisher shall contain a dry chemical agent which is effective in extinguishing Class A, B, and C fires (tri-class), and shall be rated 2A-10B-C or greater.

Part 3 - Execution

Installation

Install extinguisher no higher than 5-feet above floor and in accordance with applicable codes. Provide a fire extinguisher attached to the interior wall near each exit door to outside.

10.45 Facility Fall Protection

[CSI 11 81 00]

10.45.13 Ladder Safety Climb System

[CSI 11 81 29.13]

Part 1 - General

Performance Requirements

Manufacturer shall certify in writing that Safety Climb System is capable of holding 2-300 lb. loads at any two locations along the ladder run. Safety Climb System shall meet the

Part 2 - Products

Manufacturers

Fall Protection Equipment Kits shall be equal to Microwave Tower Service, Inc., Corrosion Control Products Company, or North Safety Products.

Components

Ladder Safety Climb System shall be provided as indicated on the Plans and shall comply with WAC Section 296-24-81. Safety Climb System shall be mounted to the ladder per manufacturer’s design and written recommendation. The system shall be fabricated to match the height and end locations as shown on the plans. Provide a shock absorbing Y-lanyard compliant with ANSI Z359.1 in addition to the fall prevention system as required by rail material type.

10.45.15 Horizontal Lifeline and Eyebolt

[CSI 11 81 29.15]

Part 1 - General

Performance Requirements

Full lifeline, including attachment hardware, must be rated, installed and certified for a 5,000 lb. tensile impact load in accordance with WAC 296-880-510.

Part 2 - Products

Manufactured Products

Horizontal lifelines shall be \( \frac{5}{16} \) inch minimum diameter stainless steel cable with a vinyl covering to prevent tank abrasion, and a double-locking snap at each end. Horizontal lifelines to be left in place on tanks. Length shall be set in order to prevent access beyond edge of tank roof. Contractor shall field verify lifeline length to meet these requirements.

The fall protection system shall consist of a stainless steel safety cable attached to the handrail per manufacturer’s recommendations. The cable shall be continuous or have swaged splices which allow the user to pass without unhooking from the system. The cable shall have a stainless steel entry terminal with a plastic spring gate swaged to the cable at each end.

A stainless steel, spring loaded line tension devise and turnbuckle will be provided at one or both ends.

The cable will be supports with stainless steel “D” rings at intervals recommended by the manufacturer and hangers designed to allow the user to pass without unhitching from the cable.
Part 3 - Execution

Installation

Provide and install horizontal lifelines as described in the specifications and identified on the plans. Provide and install a carbon steel eyebolt and fastening system to the reservoir access platform handrail. Eyebolt and connection shall be primed and painted to match adjacent coatings. Location of the eyebolt is as shown on the Plans.
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Division 11
Equipment

11.00 GENERAL

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

Sections in these specifications titled “Common Work for . . .” shall 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 Seismic Restraint Requirements

Submittals

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

• Sump Pumps
• Heaters
• Ventilators

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 install the pumps, complete with motors and accessories, described herein and as shown on the Plans. The Owner has pre-purchased the packaged booster pump station. Preliminary submittal information will be provided once it is available.

Part 3 - Execution

Preparation

Domestic water pumps shall be disinfected per AWWA A-100 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 packaged units in accordance with manufacturer’s specifications and direction. Installation shall be supervised and approved by manufacturer’s representative prior to operating or field testing units.

Connect suction and discharge piping to the pump in a manner which prevents strain on pump station flanges.

Field Quality Control

*See Division 1.75.16.12 Scheduling for scheduling and notification requirements.*

The packaged pump station supplier will provide a qualified and authorized representative of the pump supplier to conduct and/or supervise the field testing. Prior to acceptance of installed pumps, manufacturer’s representative shall demonstrate proper operation of pumps at capacities stated. The Contractor shall coordinate all activities with the manufacturer’s representatives and assist with modifications as necessary. Upon completion of pump installation and testing, manufacturer’s representative shall provide written certification that equipment is installed correctly and fully warranted.

11.12 Wastewater Pumps

11.12.3 Sump Pump

* [CSI 22 14 29.16]*

Part 1 - General

Performance Requirements

Minimum performance of 20 gpm at 20 foot lift.

Part 2 - Products

Manufacturers

Sump pump: equal to *Myers MS Series* sump pump, model MS33V.

Materials

Provide a sump pump with corrosion resistant material motor housing and an oil-filled motor with thermal overload protection. Solids handling up to ¼-inch solids. Dual ball-bearing motor and double lip shaft seal. Case iron volute case. Sump pump shall be controlled by integral float switch.

11.90 OTHER EQUIPMENT

11.95 Heating, Ventilating, and Air-Conditioning

* [CSI 23 00 00]*
11.95.05 Common Work for HVAC

[CSI 23 05 00]

Part 3 – Execution

Install per HVAC units per strict conformance with manufacturer recommendations. Brackets and support frames if needed shall be provided in order to properly install the HVAC equipment meeting manufacturer requirements.

11.95.34 HVAC Fans

[CSI 23 34 00]

11.95.34.1 Wall Ventilators

[CSI 23 34 13]

Part 1 – General

Design and Performance Requirements

See Ventilator Schedule and Fan Notes on Plans for design and performance requirements.

Submittals

Submit detailed product information including specifications, sizing information, performance curves, dimensional drawings, accessories, and other information relevant to this project.

Part 2 – Products

Manufacturers

The following manufacturers are considered to be acceptable “or equals” unless otherwise noted on the Plans or herein.

- ACME
- Fantech
- Penn Ventilation

Accessories

Provide all accessories needed for a complete installation including wall and roof thimbles, backguards, and mounting sleeves.

Finishes

In chemical rooms or other corrosive environments, all materials in contact with room air shall be fully resistant to corrosion from atmospheric conditions.

Part 3 – Execution

Install per manufacturer recommendations.

Provide a disconnect switch for each unit.
11.95.81.26 Split System Air Conditioner

[CSI 23 81 26]

Part 1 – General

Design and Performance Requirements

See schedule on Plans and Functional Control description for design and performance requirements.

Part 2 – Products

Manufacturers

The following manufacturers are considered to be acceptable “or equals” unless otherwise noted on the Plans or herein.

- Mitsubishi P-Series

Thermostat

Mini split shall be provided with a MHK2 wireless remote controller kit including a MRCH2 remote controller and MIFH2 wireless receiver to control cooling set points.

Part 3 – Execution

Install per manufacturer recommendations.
Division 12

Furnishings – This Division Not Used
13.00 GENERAL

This division covers that work necessary for supplying, fabricating and installing all furnishings and accessories as described in these specifications and as shown on the Plans.

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

13.05 Common Work for Special Construction

[CSI 13 05 00]

Part 1 - General

Submittals

Tank calculations

Tank shop drawings

Related Sections

• Division 5.05.23 Bolts and Other Connectors

13.30 SPECIAL STRUCTURES

[CSI 13 30 00]

13.31 Water Utility Storage Tanks

[CSI 33 16 00]

13.31.23 Ground Level Steel Water Storage Tank

[CSI 33 16 23]

13.31.23.05 Common Work for Steel Water Storage Tank

[CSI 33 16 23.05]

Part 1 - General

Related Sections

• Division 1.75.16.50 Reservoir Testing and Disinfection

• Division 1.75.16.54 Steel Reservoir Leak testing

• Division 1.75.16.56 Reservoir Soak testing

• Division 5.05 Common Work for Fabricated Metals and Plastics

• Division 9.98 Steel reservoir coatings
References

- AWWA D100-11  AWWA Standard for Steel Tanks for Water Storage.
- ANSI  American National Standards Institute
- ASTM  American Society for Testing and Materials
- NSF  National Sanitation Foundation
- UL  Underwriters’ Laboratories, Inc.

Submittals

The reservoir design, shop drawings, specifications and calculations must be stamped by a Washington State licensed Structural Engineer and must be submitted to the owner for review and approval prior to fabrication. Shop drawings shall clearly indicate all shop and field fabrication, sequences, and erection details.

Contractor-initiated changes shall be specifically noted on the shop drawings and be submitted in writing to the Engineer for approval prior to fabrication or construction. Details of all welded joints shall be submitted for approval.

Weld procedure specifications and welder qualifications shall be submitted for review and acceptance prior to any field welding.

Part 2 - Products

Materials

Reservoir Bottom, Shell and Roof Plates

Thickness less than or equal to ½-inch; ASTM A36; Fy 36 KSI or ASTM A131, GR A or ASTM A283, GR C

Thickness greater than ½-inch; ASTM A131, GR B or ASTM A573, Fy 58 KSI

Structural Shapes and Non-Tank Plates

ASTM A572 G.50; Fy 50 KSI

Foundation Holdown Rods

ASTM F-1554-55; Fy 55 KSI

Rods

ASTM A36; Fy 36 KSI

Pipes

ASTM A53, GR B; Fy 35 KSI
Components

Access Systems

Stairs, ladders, safety cages, railings, lanyards, or lifelines, and other access provisions must be constructed to meet the requirements of WAC 296-24-735 through WAC 296-24-81011 and WAC 296-880-510, as well as the requirements of AWWA D100-11.

Gasket for Reservoir Wall Access Hatch

Provide and install ¼-inch thick by 1-inch wide, 1-piece, white nitrile, pliable rubber gasket to reservoir access hatch as shown on the Plans. The FDA shall certify gasket for use with potable water. Gasket shall have a durometer rating of 60. Gasket shall be recommended in writing by the manufacturer for use as shown on the project Plans. A spare gasket in a labeled and sealed container shall be given to the Owner in addition to the gasket installed on the access hatch. Manufacturer shall also provide product information to the Owner as part of the Operation and Maintenance Manuals for reorder. Gasket shall maintain watertight seal of access hatch regardless of reservoir level.

Source Quality Control

Mill Testing: Test reports shall be submitted to the Engineer for review and approval prior to fabrication.

Shop inspection shall be provided by a commercial inspection agency, and paid for by the Contractor. Shop inspection shall consist of a visual inspection of the fabricating practices and operations to determine compliance with the standard of AWWA D100. Mill test reports shall be furnished to the Owner and Engineer.

An American Institute of Steel Construction (AISC) compliant shop does not require inspection by a commercial inspection agency or to reimburse the Owner if it is AISC compliant. The Owner and their inspector have the right to inspect at the AISC compliant shop and reject and/or approve the work.

Finishes

Shop Painting and Paint Preparation – See Division 9.

Part 3 - Execution

Construction

Floor: The tank floor shall be single continuous lap welded except that sections for the tank floor within 12-inches from the tank wall must be butt-welded (topside only, with a backing bar). Floor slope shall be as shown on the Plans.

All shell welds, except floor shell welds, shall be full penetration butt welds. Remove all inclusions in the steel shells by grinding. Any rough or weld-spattered areas must be smoothed by grinding or other means. Grind all weld surfaces in accordance with NACE RP0178, Weld Preparation Designation D “Ground smooth and blended.”

The roof shall be fully seal welded including all plate to plate, plate to rafter, and plate to purlin connections, including all connections to the shell.
Field Quality Control

The Engineer shall be furnished with copies of all inspection reports and test results for tests performed by the Contractor or the Contractor's testing agency. The following inspections must be performed:

Foundation Excavation, Surface Preparation, Completion:

To be performed by a representative of the Owner at the Owner’s expense.

Foundation reinforcing and concrete pour:

To be performed by a representative of the Owner at the Owner’s expense.

Tolerances for plumb/round/level:

To be performed by a representative of the Owner at the Owner’s expense.

Welding and Welding Inspection and testing shall be in conformance with AWWA, D100, and the following:

Special Inspections:

The Contractor shall provide the required equipment and labor to take the spot radiographs. The Contractor shall also provide labor and equipment for ultrasonic testing, section segment inspection and air carbon arc gouging testing. The constructor shall provide all testing results regardless of type to the Owner’s inspector for review. The Owner’s inspector shall review all the tests and both the constructor/manufacturer and the Owner’s inspector shall provide written documentation stating the tests meet AWWA D100-11 standards as well as the contract documents and shop drawings.

A full-time welding inspector shall be provided by the Contractor for tanks that are designed using AWWA D100, Section 14.

The Contractor’s welding inspector shall have prior tank inspection experience and shall be a certified welding inspector (CWI) in accordance with the provisions of AWS QC1. An “in-house” inspector is acceptable if they meet the experience and certification requirements. Submit inspection experience and certification for review and approval by the Owner.

The Owner is responsible for IBC special inspections. The Contractor is responsible for AWWA welding inspection. Owner may also inspect AWWA welds at Owner’s expense and reject and/or approve the work.

Field Inspection:

Inspection of welded tank shell joints shall be performed in accordance with the requirements of AWWA D100-11, using radiographic testing as described in AWWA D100-11, Section 11.6, or by ultrasonic testing as described in AWWA D100-11, Section 11.7.

Inspection of all complete joint penetration welded-shell butt joints shall be made by the radiographic method. Visual inspection using the sectional segment method will only be allowed by special approval by the Engineer.
Contractor’s Inspection Written Report:

The Contractor shall submit a written report at the conclusion of the work, prepared by the Contractor’s qualified personnel, certifying that the work was inspected as set forth in AWWA D100-11, Section 11.2. This report shall include the following:

- A copy of the welder performance qualifications.
- A summary of inspection of radiographs and section segments and inspection by air carbon arc gouging, if used.
- Identification of unacceptable radiographs and section segments and inspection by arc gouging and a statement of the action taken to rectify unsatisfactory welds.
- The constructor shall keep record of the welders on each joint as specified in AWWA D100-11, Section 8.4. This record shall be submitted as part of this report.
- The radiographs and inspection records shall be delivered to the Owner after acceptance of the structure.

13.31.23.13 Contractor Designed Welded Steel Water Tank

[CSI 33 16 23.13]

Part 1 - General

Design Criteria

The tank shall meet all requirements of AWWA D100-11 and the design loads of the 2018 IBC/ASCE 7-16. The tank shall also comply with recommendations in the geotechnical report. See plans for design criteria.

All materials shall be in accordance with AWWA D100-11.

Corrosion Allowance: On all wetted surfaces including the shell plates above the normal operating level and roof plate, but excluding the columns and roof supports, provide 1/16” corrosion allowance.

The Maximum Operating Level (MOL) is 6 inches below overflow elevation. Freeboard shall be calculated between the MOL and the bottom of the rafters or roof support structure.

The closest point of the piping connected to the bottom of the reservoir shall be a minimum of 12-inches beyond the unanchored bottom hold-down.

Per AWWA D100 13.3.3.7.2, provide sufficient freeboard to prevent detrimental effects of wave action. Provide documentation for Engineer’s review.

Seismic Detailing

Reservoir piping connected to the flat bottom of the reservoir shall have a minimum of 2-inches of flexibility in the vertical and tangential directions in either direction from the pipe centerline.

Access Systems

See Plans for access systems.
Part 2 - Products

Components

Roof: The tank shall have an umbrella shaped roof as shown on the plans. Roof shall be supported using 9 interior columns.

Section 14 of AWWA D100-11 may be used on this project providing that the Contractor certifies in writing that use on this project is appropriate and the Contractor’s methods meet all criteria as outlined in this section. All design issues relating to safety, building codes, and corrosion allowances shall remain intact as shown in the Plans and specifications.

Freeboard: Sufficient freeboard shall be designed so that maximum wave height during a seismic event will not hit and damage the reservoir roof or its supporting structure.

Alternate Foundation Design

The Alternate Foundation design shall meet the requirements provided in the Geologic Report and the design criteria as provided herein.

Foundation Design Criteria:

Maximum Static Bearing Capacity: 5000 PSF

Maximum Seismic Bearing Capacity: 6660 PSF

Overturning moment applied to the foundation should be calculated using formule provided in Reference 7 from the AWWA D100 Appendix A, or another rational method. A minimum factor of safety of three against overturning shall be provided.

Alternate foundation shall account for all piping and conduits and shall include adjustments required to accommodate alternate foundation.

Appurtenances

The reservoir appurtenances shall be as shown on the Plans.

Two manholes provided within the first ring of the reservoir shall be provided. The access manholes shall be 36-inch diameter minimum and shall be constructed with hinges to open and close the manholes. The manholes shall operate so that increasing water pressure will seal the manhole to the reservoir and be leak tight. Seamless gaskets shall also be provided to seal the manholes. The manholes shall be equipped with hasps for locking and padlocks that accept the owner’s standard key.

The piping inlet and outlet shall be a minimum of 4-inches above the floor height for use as a silt stop.

The piping shall be flexible near the reservoir connection to accommodate seismic movements. This includes a minimum of 2-inch flexibility vertically and tangentially to the axis of the pipe, up or down.

Ladders shall be provided and meet AWWA D100-11, OSHA, and WAC standards and applicable safety standards listed under Access Systems in this Division and Division 5.

Provide roof access ports per plan.
A vent shall be provided that is sized to exhaust or intake the maximum flow rate of water into or out of the reservoir. The vent shall be located at or near the center of the roof. The vent shall be designed and constructed to prevent the entrance of birds or animals. Vents placed on reservoirs located where snow accumulations of 6-inches or more are common during winter, shall be raised so that the intake of the vent is at least 1.5 feet above the reservoir roof elevation immediately adjacent from the roof vent.

Other appurtenances not specified by AWWA D100-11 are shown on the project Plans.

**Finishes**

All finished surfaces of appurtenances in potential contact with potable water shall comply with National Sanitation Foundation (NSF) Standard 61. All appurtenances shall meet as a minimum the standards of AWWA D100-11 and the requirements of the specifications.

**13.47 CATHODIC PROTECTION**

[CSI 13 47 13]

**13.47.13 Impressed Current Cathodic Protection**

**Part 1 – General**

**Related Documents**

The requirements of the Plans and all other sections and provisions of the Specifications are applicable to the work to be performed under this section.

**Description of Work**

Provide an impressed current cathodic protection system for the interior of the water tank in accordance with AWWA Standard D104-04 and as specified herein. Provide a cathodic protection system to include rectifier, anode array, reference cells, conduit, wire, hangers, grounding, and all additional components necessary for a complete installation.

These Specifications and Plans are intended to cover a complete cathodic protection system properly designed and installed, suitable for safe and satisfactory operation. Unless expressly excluded by these Specifications, any and all equipment, materials and/or labor not included, but which may be necessary to produce such a product in a proper, complete, substantial and workmanlike manner are to be furnished without extra cost to the Owner. Any unfulfilled requirements of this nature which become apparent upon installation and/or testing of the equipment will be corrected by the Owner or the Owner’s agent at the Contractor’s expense if, upon notice, the Contractor fails to promptly correct the deficiency.

All work shall be in accordance with local electric code.

**Qualifications**

Installation of the cathodic protections systems shall be done under the direct supervision of an installer with a minimum experience of 10 comparable installations.

The rectifier shall be adjusted by a corrosion expert, and that person shall be a Professional Engineer with education and training in cathodic protection, or a NACE Certified CP/Corrosion Control Specialist.
Tank Data

The following data are provided:

1. Standpipe approximate dimensions: 106-foot diameter, 82-foot height
2. Materials: Steel bottom, steel shell, steel roof
3. Interior Lining: zinc-urethane primer and high build epoxy top coat

It shall be the Contractor’s responsibility to request any additional information as may be required to assure satisfactory design and Installation.

Submittals

Provide personnel qualifications of the installer and corrosion expert, and provide catalog cuts and data sheets for all materials including rectifier, anodes, reference cells, wiring, insulation, handhole covers, hangers, and conduit. Provide drawings of proposed conduit routing and mechanical and electrical connections to structures.

Warranty

In addition to other warranties required by the specifications, the entire cathodic protection system provided under this contract shall be warranted against defects in materials and workmanship for a period of two (2) calendar years after date of project acceptance.

Part 2 – Products

Suppliers include the following, among others, that advertise on the internet and in the NACE publication Material Performance, typically under corrosion control and/or cathodic protection.

1. Farwest Corrosion Control Company: www.farwest.com
2. Norton Corrosion: www.nortoncorrosion.com
3. Corrpro Companies: www.corrpro.com
4. MESA: www.mesaproducts.com

General

All materials shall be new and shall conform to the applicable portions of these specifications. The materials to be furnished under these specifications shall be the standard product of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer’s latest design. All materials and equipment supplied shall reflect the best and latest standard and practice for the intended application.

The supplier of the cathodic protection rectifier system, anodes and other special cathodic protection materials and equipment shall have a minimum of five (5) continuous years of successful experience in the manufacture, installation and service of cathodic protection systems for similar structures.
A.C. Power Service

Connect power supply circuit per electrical drawings. Locate rectifier inside Electrical and Communications Building.

Impressed Current Rectifiers

The impressed current cathodic protection rectifier shall be both manual mode, and fully automatic, with “ON” potential control, and automatic “IR-Free” (instant off) potential control, to 100% rated output. The rectifier meter shall be digital with an LED display and shall show voltage, current and potentials. The rectifier shall have automatic current limiting control and an automatic shut down for loss of reference cell.

The rectifier system shall have a rated output of 30VDC and 16ADC. The transformer shall be 25 steps and the rectifier shall be SCR/diode. Overload and short protection shall include an AC circuit breaker, DC fuse, and AC/DC surge/lightning protection.

The CP rectifier shall be CSA or NEC approved with a NEMA 4X stainless steel enclosure and a padlock hasp. The rectifier shall be CP Sentinel Aqua-Line by Integrated Rectifier, or T.A.S.C. VIII rectifier by Corrpro, or equal.

Provide 3 copies of the rectifier operating manual for each rectifier supplied.

Anodes and Anode Header Cable

Provide platinized niobium anodes with 40% niobium cross-section clad on a copper core. The anode shall be 0.125 inches diameter, 0.013 inch Nb, 100 micro-in Pt. Anodes shall be Anomet-40 2X by Anomet or equal.

Anodes shall be 15 ft length with silver soldered, epoxy potted connections to the lead wire. The lead wire shall be #8 AWG stranded copper wire with HMWPE insulation. The bottom ends of the anode assembly shall be weighted with a ceramic insulator.

The anode header cable shall be #8 AWG stranded copper wire with HMWPE insulation. The header shall be unspliced to the conduit junction box.

Anode splices to the header cable shall be made with copper/bronze compression C-clamps or copper/bronze split bolt connectors with epoxy or heat shrink insulating kits, or C-clamps with 2 layers of half-lapped self-annealing butyl rubber tape and an outer wrap of 2 layers half lapped vinyl tape.

Reference Cells and Structure Sensing Leads

Reference cells shall be copper/copper sulfate permanent reference cells for submerged fresh water use. Reference cells shall maintain plus/minus 10 mV potential with 3 microA current draw.

Reference cell leads shall be #14 AWG wire with HMWPE or RHW leads. Each reference cell shall have a dedicated conductor. The leads shall be continuous length to the conduit junction box and the lead connection to the reference cell shall be silver-soldered and insulated.
Conduit

The wiring between the rectifier and the under-roof anode feeders shall be run in rigid steel conduit of a type and size conforming to N.E.C. and all other applicable codes.

Provide a service entrance with watertight conduit connections at the connection between conduit and underroof wiring.

Part 3 – Execution

General

All work shall be accomplished in strict accordance with the plans and specifications and shall be subject to the terms and conditions of the contract. All work shall be of the highest quality and shall be conducted in a workmanlike manner.

Route all DC and reference cell/structure sensing wiring along the conduit run as shown.

Connections to the tank shall be made above the water line or onto welded appurtenances; do not damage the tank coating.

Impressed Current Rectifier Installation

Connect the AC/DC power, and reference cell/structure sensing wiring. Label the reference cells and use the manufacturers preferred reference cell location for rectifier control. Label and terminate the other reference cells on a block or rotary switch within the rectifier cabinet. Adjust the rectifier in the automatic IR Free potential control mode, and set the tap setting to the minimum current output required for the adjustment. Turn off rectifier after adjustment and temporarily disconnect anode wires until system is turned back on.

Handholes

Provide handholes at the locations shown on the drawings. Handhole covers shall be stainless steel with a fiberglass clamping bar. The clamping bar shall have an NC stainless steel bolt threaded through the rod with an end retainer. The cover shall be NSF-61 approved and equal to GMC. Handhole penetrations shall have a water-tight grommet seal, NSF-61 approved.

Provide porcelain insulator hanger with hot dipped galvanized pin, nut, and washer.

Anodes and Anode Header Cable Installation

Provide anodes at the hand-holes as shown on the drawings. Anode shall be hung vertically, at the elevations shown. The anode lead wire shall be continuous, uncut, from anode to header cable. The header cable shall be continuous, uncut, with both ends connected to the rectifier lead in the service entrance. Do not cut the anode header cable at the anode splice connections.

Reference Cells and Structure Sensing Leads

Provide reference cells at the handholes where shown on the drawings. Reference cells shall be hung vertically, with a hanger and hand-hole similar to that for anodes. The reference cell wiring shall be continuous, uncut, and connected to the rectifier lead in the service entrance.
The reference cell and structure sensing wiring from the rectifier to the tank shall be run in a dedicated conduit and the wiring shall be shielded and grounded at one end.

**Conduit**

Provide separate conduit for DC and for reference cell/structure sensing wiring. The CP system shall be routed in conduit separate from the instrumentation wiring. Conduit runs shall be as shown on the drawings and attached in a manner that does not interfere with safe use of the staircase and walkways and does not damage the tank coating.

**Startup and Testing**

The rectifier shall be adjusted by a corrosion expert, and that person shall be a Professional Engineer with education and training in cathodic protection, or a NACE Certified CP/Corrosion Control Specialist.

Record the potential of each reference cell prior to energizing. Do not set the rectifier over (-)1.0 V versus copper-copper sulfate reference cell, and record the polarized, instant-off potential of each reference cell at this setting.

Set the tap setting to the minimum current output required for the adjustment. Turn off rectifier after adjustment and temporarily disconnect anode wires until system is turned back on.

Record and submit a stamped letter report of the rectifier settings and resulting IR Free potentials. Include a set of readings of the ON potentials of all reference cells at the final setting.

**Maintenance and Operating Instructions**

Maintenance and operating instructions shall be provided with sufficient detail to permit the Owner’s operator to properly maintain and adjust the system. The instructions shall include a description of the main components and their function as well as a schematic drawing of the power/unit controller.
Division 14
Conveying Systems – This Division 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

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
- Steel pipe and fittings
- PVC pipe and fittings
- Isolation valves
- Level sensors
- Other mechanical components listed in this division or required by the Engineer
Part 2 – 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 160% of the test pressure. For example, for a 250-psi test, the gauge scale shall not exceed 1.6 x 250 = 400-psi. The Owner has the right to reject any gauges that are suspect in their accuracy.

15.10 BURIED PIPE INSTALLATION

[CSI 33 05 05]

Part 1 – General

Site Conditions

Existing soils are unclassified except where specifically identified on the Plans or specification.

Part 3 - Execution

Preparation

Stringing of pipes in advance of pipelaying may occur but may not create a traffic hazard or block access to roads, driveways, or private property without approval from the local traffic authority and affected property owners. Pipe shall not be strung out more than two weeks in advance of installation. Any pipe or materials that will not be installed for two weeks must be stockpiled at a site procured by the Contractor or as provided in this contract.

Contractor shall pothole ahead of pipe-laying a sufficient distance at known utility crossings and where noted on the plans to allow room to make vertical adjustments as necessary to avoid existing utilities. Should the Contractor fail to pothole identified utility crossings, any subsequent adjustments necessary shall not be cause for cost or time claim. If the area potholed is in a travelled area and will be reopened to traffic more than one day in advance of pipelaying through the zone, the hole shall be patched with hot or cold mix, the cost of which shall be incidental.

Provide the results of potholing to the Owner no less than two working days in advance of utility installation. Contractor shall provide a written record of size, materials, and locations for found utilities to an accuracy of 0.5 foot horizontal and 0.1 foot vertical. Failure to record locations clearly and legibly will result in non-payment.
Installation

Install pipes to the depth shown on the trench detail, unless superseded by depth shown on the profile.

All non-metallic pipe, including service and air valve lines, shall include a tracer wire taped every 5 feet to the top of the pipe. Loop tracer wire to the surface in accessible locations such as valve boxes, meter vaults, or other surface access. If no access is available for a distance of more than 1,500 feet, provide a valve box specifically for the tracer wire. Wire shall be solid UF, 12AWG minimum for 2,000 foot runs and less, or 10AWG for runs longer than 2,000 feet.

Keep openings in pipe closed during the progress of work. Install plugs to prevent water and debris from entering pipe. No payment will be made to clean pipes.

15.11 Open Trench Pipe Installation

[CSI 33 05 05]

15.11.05 Common Work for Pipe Installation

[CSI 33 05 05.11]

Part 3 - Execution

Installation

For push-on joint PVC pipe, joints shall not be pushed home. Stop the assembly when the marked insertion line is at the face of the bell. This is to allow for thermal expansion if the pipe is installed in cold weather. If the pipe has been pushed home, pull back to expose the insertion line.

15.11.11 Water Main Installation

[CSI 33 05 05]

Part 1 - General

References

Use materials and installation methods in accordance with the latest edition of the Uniform Plumbing Code and local codes and regulations that are applicable. Install ductile iron water mains in accordance with the American Water Works Association (AWWA) C600. Install PVC water mains in accordance with AWWA C900 and C905.

Scheduling

Connections to existing mains shall be made only after contacting the Engineer or agency inspector ten working days prior. Connections to existing mains may only be performed on Tuesdays, Wednesdays, or Thursdays unless permission is obtained otherwise from the Engineer. Connections shall not be performed on Owner recognized holidays.

Service to customers shall not be interrupted for more than 8 hours and must occur between the hours of 8:00 AM and 5:00 PM. The Owner will notify customers no less than 24-hours
in advance of service interruption. If, in the opinion of the Owner, the Contractor has not adequately scheduled the work to occur within these timeframes, the Owner may cancel the service interruption. No time or monetary compensation will be provided for such cancellation.

**Part 3 - Execution**

**Installation**

Install pipes in accordance with the manufacturer's recommendations. Use types and sizes of pipes as specified herein and/or as shown on the Plans. Where small pipe sizes are omitted from the Plans and not mentioned in the specifications, use sizes corresponding to code requirements and as required by equipment and plumbing fixtures and appurtenances. Properly size any undesignated pipe sizes for the functions to be performed.

Carefully lay pipe and supports at proper lines and grades. Follow the piping runs shown on the Plans as closely as possible, except for minor adjustments to avoid architectural and structural features. Make major relocations, if required, in a manner acceptable to the Engineer.

Keep openings in pipes closed during progress of work.

Form thrust blocking so that bolts, joints, gaskets, and flanges of adjacent joints are clear of concrete allowing bolts and joints to be dismantled without removing concrete. All concrete blocking shall have a minimum compressive strength of 4,000 psi unless identified otherwise in Division 3.31.3 or on the Plans.

Pipe passing through concrete walls or slabs shall be made watertight.

Trench shall be excavated to a sufficient width to allow for pipe installation, compaction equipment, and shoring when necessary. Maximum trench width will not exceed 36-inch plus OD for 4-inch and larger pipe, or 24-inch plus OD for 3-inch and smaller pipe for pay items or related materials including but limited to crushed surfacing, patching, import bedding, import backfill, and rock excavation.

Bedding shall be mechanically compacted in lifts no greater than 12-inches from base to springline and from springline to top of pipe using a jumping jack or sheepsfoot. Hoe-packs, sheepfoot, and vibratory rollers shall not be used within 12-inches directly above the pipe. Trench backfill shall be compacted in lifts not exceeding 18-inches loose-thickness.

**Field Quality Control**

No permanent connections to the existing water system shall be made until the new water main has been tested and approved by the Engineer. No temporary connections of the untested, unapproved new water main to the existing water system shall be made without the installation of a double check valve assembly between the new water main and the existing water system. The Contractor shall verify the size, material, and location of the existing main at the connection point prior to installing the new water main.
15.18 Buried Piping Inspection and Testing

[CSI 33 05 05]

15.18.02 Buried Water System Inspection and Testing

[CSI 33 05 05, 33 05 05.31]

Part 3 - Execution

Preparation

The Contractor shall provide all required personnel and equipment and complete all tests required to demonstrate the integrity of the finished installation for the approval of the Owner and all agencies having jurisdiction.

The pipeline trench shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and sufficiently cured to reach design strength before testing. The Contractor shall furnish and install temporary blocking where permanent blocking is not required and remove it after testing.

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the Contractor. Gauges used in the test may be required to be certified for accuracy at a laboratory by the Owner.

Tests/Inspection

Water Main Flushing

The water main, valves and other components not already flushed by polypig shall be flushed or swept clean. Flushing shall allow four complete exchanges of water and remove any obvious debris.

The following blow off or hydrant sizes are the minimum required for flushing with a supply pressure of 40 psi minimum and no more than 20 feet of hose is used, unless stated otherwise.

<table>
<thead>
<tr>
<th>Main Diameter</th>
<th>Flow at 2.5 fps</th>
<th>Blowoff and Backflow Device Diameter</th>
<th>Hydrant Ports &lt;= 20’ Hose</th>
<th>Hydrant Ports 21’ – 100’ Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>8”</td>
<td>400 gpm</td>
<td>(1) 2”</td>
<td>(1) 2.5”</td>
<td>(2) 2.5”</td>
</tr>
<tr>
<td>12”</td>
<td>900 gpm</td>
<td>(2) 2” or (1) 3”</td>
<td>(2) 2.5” or (1) 4”</td>
<td>(1) 4”</td>
</tr>
<tr>
<td>24”</td>
<td>3,600 gpm</td>
<td>(4) 3” or (2) 4”</td>
<td>(2) 4”</td>
<td>(2) 2.5” and (2) 4”</td>
</tr>
</tbody>
</table>

Hydrostatic Pressure Testing

All water mains and appurtenances shall be tested under a hydrostatic test pressure equal to that specified under Division 1.81.40 of these Specifications. The Contractor is to develop a detailed testing plan for the water main for Owner approval that facilitates bringing the proposed facilities online with minimal impact to the existing customers. The Owner has the right to require more stringent test criteria than stated in this Specification or in the pressure rating section if it is determined that field conditions warrant such measures.
An acceptable test of pipe and fittings buried under or adjacent to proposed concrete slabs or other structures must be performed prior to construction of the structure.

The mains shall be filled with water and allowed to stand under pressure for a minimum of 24 hours to allow air to escape and/or allow the lining of the pipe to absorb water. The Owner will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation. The Contractor is responsible for the proper disposal of any waste, including water.

Pipe joints, fittings, and valves shall be exposed for inspection as is practical. Any visible leakage detected shall be corrected by the Contractor to the satisfaction of the Owner regardless of the allowable leakage specified above. Should the test section fail to meet the specified pressure test successfully, the Contractor shall locate and repair the defects and then retest the pipeline at his own expense.

Prior to calling out the Owner or Engineer to witness the pressure test, the Contractor shall have all equipment completely set up and ready for operation, and shall have successfully performed the test to assure that the pipe is in a satisfactory condition. The Owner shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness another test shall be done at the Contractor’s expense.

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.

The test shall be accomplished by pumping the main up to the required pressure; stop the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the engineer, and then pump the main up to the test pressure again. During the test, the section being tested shall be observed to detect any visible leakage. A clean container shall be used for holding water for pumping pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l (ppm).

Sections to be tested shall normally be limited to 1,500 feet. The Owner may require that the first section of pipe, not less than 1,000 feet in length, installed by each of the Contractor’s crews be tested in order to qualify the crew and/or the material. Pipe laying shall not continue more than an additional 1,000 feet until the first section has been tested successfully.

Sections to be tested shall be isolated and pumped to test pressure. Test pressure shall be sustained for a minimum of 60 minutes with less than 3 psi loss in pressure throughout the test duration with Engineer present and on site throughout test duration. If test results show drop of more than 3 psi, Contractor shall repair leaks and retest until testing is passed in presence of Engineer. Engineer shall bleed off pressure from pump to piping connection once test is passed to verify system piping was tested.

Cleaning

After preliminary purging of the system, chlorinate entire potable water system in accordance with AWWA C651 for flushing and disinfecting water mains, and in accordance with all other pertinent rules and regulations. Operate each valve during chlorination period to provide contact. Upon completion of sterilizing, thoroughly flush the entire potable water system at a velocity of 3 feet per second, allowing four complete exchanges of contents. Do not discharge chlorinated material to storm or surface water systems without thoroughly neutralizing the
chlorine residual remaining in the water in accordance with AWWA C655 for field dechlorination.

After final flushing and before the water pipe is connected to or placed in service, the Contractor shall request that the Owner arrange to have samples collected for bacteriological testing. At least one sample will be collected from each branch of the pipe. A copy of the test results shall be delivered to the Contractor for review. The Contractor shall not connect the water pipe to the existing distribution system prior to acceptance of the bacteriological test by the Engineer.

The Owner will pay the laboratory fee for the initial bacteriological test. The Contractor will pay for future testing if the initial test results are unsatisfactory.

15.18.03 Valve Testing

Part 3 - Execution

Testing

All valves shall be pressure tested. Do not exceed the rated working pressure of the valve when operating the valve. Bleed off test pressure prior to operating. Test all valve bonnets for tightness.

Test all valves for water tightness under differential working pressure. To perform this test, pressurize pipe section with valve in place, close valve and relieve pressure on seat side of the valve. The valve shall not pass water during a 5-minute test period.

Operate all valves at least once from closed-to-open-to-closed positions while valve is under working (not test) pressure.

15.20 PIPE AND FITTINGS

15.21 Common Work for Pipe and Fittings

[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. In the event that 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.

For submerged conditions, connection bolts shall be Nitronic 60 steel. Nuts and washers shall be Stainless Steel, minimum grade 304 in raw domestic or treated domestic water and minimum grade 316 in treatment processes and sewage applications. Minimum grade 317 for
acidic transport. Bolts and nuts shall meet ASTM F593 and F594. Stainless steel shall not be used where in contact with chlorine or chlorine solutions. Stainless steel bolts may be used in lieu of Nitronic but must be assembled using appropriate lubricant or tape. For installations in domestic water, lubricant, or tape must be approved for domestic water service. Cobas Stainless Steel Thread Sealing Tape or approved equal.

**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.

**Part 3 - Execution**

**Construction**

All piping and related equipment 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.

Steel and stainless steel threads shall be protected against galling using steel thread sealing tape equal to Cobas steel thread sealing tape. Tape shall be specific to the steel type used.

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 52 pipe.

The pipe thickness for fire hydrant runs shall not be less than Class 52.

**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.

Approved manufacturers:

**Tyton Joint:**

- Griffin Pipe Company
• Pacific States Cast Iron Pipe Company
• U.S. Pipe and Foundry Company

Fastite Joint
• American Cast Iron Pipe Company

Where identified on the plans, Tyton joint restraint shall be made with Field-Lok 350® restraining gaskets or approved equal. Fastite joint restraint shall be made with Fast-Grip® restraining gaskets or approved equal.

Flanged joints shall conform to ANSI Standard B16.1.

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.

Approved manufacturers of mechanical joints:
• American Cast Iron Pipe Company
• Griffin Pipe Company
• Pacific States Cast Iron Pipe Company
• U.S. Pipe and Foundry Company

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 neoprene, buna-n, chlorinated butyl, SBR, or cloth-inserted rubber. Gaskets shall be full-face type. Gaskets shall be a minimum ⅛-inch thick.

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

Restained joints shall be provided by a wedge restraint gland. Approved wedge restraint products:
• EBAA Iron, Inc. “MEGALUG”
• Romac “RomaGrip”
• Uniflange “Series 1400”
• Stargrip® “Series 3000”
• Or approved equal

Finishes
For above grade and exposed pipes, including those inside structures, prepare surfaces and coat the exterior per Division 9.91.13.13.

Part 3 - Execution
Installation
The Contractor shall provide tools and equipment, including any special tools required for installing each particular 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.

15.22.03 Steel Pipe and Fittings
[CSI 33 05 24.23 or 40 05 24.23]
Part 1 - General
Design Requirements
The Contractor shall supply written certification that flanged ends welded to the steel pipe and welded pieces shall be capable of the hydrostatic testing pressure as noted in Division 1.81.40.

Welded steel pipe shall be constructed as shown in the Plans and steel pieces shall be constructed as dimensioned to exact tolerances of ± $\frac{3}{32}$-inch.

Steel pipe shall be constructed in accordance with AWWA C200. Steel pipe shall be fabricated from steel manufactured to meet the requirements of ASTM A53, Type E or S, minimum Grade B. Design stress shall be half the yield stress of the steel.

Steel pipe and fittings 26 inches in diameter and smaller shall conform to ANSI Standard D36.10 and ASTM A53, Type SE or Grade B with a thickness to meet the pressure rating section of these specifications.

Steel flanges smaller than 4-inch per ANSI B16.5, Class 150 or Class 300. Steel flanges 4-inches and larger per AWWA C207. All flanges rated for the specified working and hydrostatic testing pressures, but in no case shall be less than Class D.

<table>
<thead>
<tr>
<th>Flange Class</th>
<th>Diameter</th>
<th>Working Pressure</th>
<th>Maximum Test Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>4-inch to 12-inch</td>
<td>175 psi</td>
<td>218 psi</td>
</tr>
<tr>
<td>D</td>
<td>14-inch and larger</td>
<td>150 psi</td>
<td>187 psi</td>
</tr>
<tr>
<td>E</td>
<td>4-inch and larger</td>
<td>275 psi</td>
<td>343 psi</td>
</tr>
</tbody>
</table>
Submittals
Shop drawings shall be submitted to the Engineer for review and approval prior to material order. Shop drawings shall clearly indicate wall thickness and diameter.

The Contractor shall submit previous experience of a minimum of two steel welding projects similar to this one. As part of the submittal, the Contractor shall supply specification of previous projects and written documentation that the construction met the specification.

Part 2 - Products
Finishes
Coat exterior and interior per the following.
- Pipe exterior: 9.98.02.02
- Pipe interior: 9.98.02.02

Source Quality Control
Welds shall be constructed in accordance with ASME Welding Code. The Contractor shall be responsible for compliance to this tolerance and correct any dimensions or welding that does not meet this specification at their expense.

Internal bracing shall be provided for shipment if needed to maintain pipe shape.

Part 3 - Execution
Field Quality Control
The Contractor shall provide tools and equipment, including any special tools required for installing each particular type of pipe used. Pipe that is out-of-round shall be reshaped using methods provided by the pipe manufacturer. The Engineer reserves the right to reject pipe that is excessively out-of-round or damaged during reshaping.

Trench Backfilling
Screened Sand for Pipe Zone Backfill: Screened sand for pipe zone backfill for pipe installed in dry trenches shall be sound, screened, washed, naturally occurring material, free from humus, clay, or deleterious material. Screened sand for pipe zone backfill shall meet the requirements for fine aggregate Class 2 as described in the 2008 Standard Specifications, including but not necessarily limited to Section 9-03.1(2).

Screened sand shall be compacted by methods approved by the Engineer to 90 percent relative compaction as measured in accordance with ASTM D1557. Moisture content shall be within plus or minus two percent of optimum.

Gravel Borrow Incl. Haul: Trench backfill shall meet the requirements of the 2008 Standard Specifications, including but not necessarily limited to Sections 2-03 and 9-03.14.

General: Following backfilling of the trench, all disturbed areas shall be cleaned of debris, rocks, and excess excavated material, and graded to their original condition.
Compaction

All trench backfill shall be compacted to 95 percent of the maximum density as determined by the Washington Densometer Method outline in the Washington State Department of Transportation Construction Manual or as designed by the Engineer. Backfill for mechanical compaction shall be placed in successive horizontal layers of loose material not more than what is specified in each compaction method.

The sand bedding around the pipe shall be compacted by water settling and/or mechanical equipment. The remaining trench section shall be compacted with mechanical equipment, and if the fill material contains less moisture than required for proper compaction, water shall be added in the amounts order by the Engineer.

All compaction equipment shall be in good working condition and approved by the Engineer prior to use. If the equipment does not achieve the necessary compaction results for the particular type of soil the Contractor shall furnish other equipment that will achieve satisfactory compaction.

The pay classifications for the different types of compaction equipment are as follows:

**Type I – Water Settling**

Type 1 compaction shall be used on pipe zone sand. Approved jet pipes shall be used so that each backfill layer is saturated and consolidated to its full depth before the next layer is placed. The first lift of pipe zone sand shall not be above 1/3 the height of the pipe (that is, above the invert but significantly below the centerline of the pipe). Jetting of pipe zone sand shall not be done in such a manner that the pipe or nearby utilities are damaged, in areas of poorly draining or expansive soils. Water shall be safely and promptly removed from the trench. Jet pipes shall be kept at least 6 inches away from the pipe where the backfill is being consolidated and 2 feet away from other pipes or utilities. This method of compaction shall include a water source under pressure either from a water tank with a pump or pumping from hydrants, a suitable hose with a 1-inch minimum jet pipe, and an operator. Jetting will be at the direction of the Engineer. In areas where Type 1 compaction is not feasible, Type II compaction shall be used.

**Type II – Hand Tampers**

Type II compaction shall be used around chambers, utility crossings, or other areas where mobile compaction equipment cannot be operated. Equipment shall be hand-operated mechanical tampers, with gas or air power. Backfill material shall be placed in 6-inch loose lifts and compacted to the relative compaction specified herein.

**Type III – Vibratory Rollers**

Type III compaction shall be used from a point at least one foot above the pipe to the underside of surface restoration materials. Equipment shall be Hoe-pac or small self-propelled or towed vibratory rollers or sheepsfoot rollers. Backfill material shall be placed in maximum 24-inch loose lifts and compacted to the relative compaction specified herein.
Slings for Laying Steel Pipe

Pipe slings shall be used for laying pipe. They shall be made of nylon or other material satisfactory to the Engineer. Slings shall be designed so as to have a safety factor of not less than four and be of sufficient width so as not to exceed a pressure of 15 pounds per square inch of bearing; providing that single belt slings used for handling the pipe shall be a minimum of 12-inches wide or two slings 8-inches wide may be used.

The use of slings made of wire, cable, chains, rope, or steel straps will not be permitted; nor the use of bridles and hooks in the ends of the pipe.

Laying Steel Pipe

A suitable crane or backhoe with ample capacity shall be used for laying the pipe sections.

Prior to lowering any pipe into the trench the Contractor shall remove any foreign matter or coating of any nature from the surfaces that have metal to metal contact at joints to be welded.

The inside of the pipes shall be cleaned out by sweeping or other approved method before laying. No pipe known to be defective in any way shall be laid or lowered into the trench. The exterior coating shall be inspected for damage and any required repairs made prior to lowering the pipe into the trench.

Any pipe known to be contaminated with sewage, decaying organic matter, or other infectious material shall be thoroughly cleaned and given an approved antiseptic wash before being placed in the pipeline.

If it should become necessary to move a pipe longitudinally along the trench, the manner of moving shall be such as not to injure the pipe coating. Pipe shall not be rolled or dragged on the ground. Any pipe becoming damaged shall be repaired as directed by the Engineer if, in his/her opinion, a satisfactory repair can be made, otherwise the pipe shall be replaced by an undamaged section. All expense for labor, material and equipment necessary to make such repairs shall be borne by the Contractor.

Each pipe section shall have a firm bearing for its entire length in the trench except at bell holes where field joints are to be made. In addition shallow holes shall be provided under the pipe slings to permit their removal without damage to the pipe coating. If any blocking is necessary to support the pipe laterally during the laying, it shall be placed at the ends where the pipe sections have not been coated. Such lateral bracing shall be removed after the pipe has been cradled.

Open ends of the pipe laid shall be closed at the end of each day’s work. Manholes and other openings such as blowoff and air valve connections and drop holes shall be kept closed while not in use. Watertight pipe plugs will be required when necessary to prevent trench water from entering the pipe.

When laying the pipe not less than six inches of screened sand bedding shall be provided below the bottom of the pipe. An additional six inches of sand shall be carefully screeded by means of a template shaped to the outside radius of the pipe to provide firm bearing for the full length of each pipe section except at bell holes. A string and/or laser beam must be used to guide the template. The Contractor shall keep the bell holes open until after the testing and coating of the field joints have been completed and accepted by the Engineer.
After the pipe has been laid and adjusted to specified line and grade, it shall be carefully cradled before welding. Cradling shall be carried on, on both sides of the pipe simultaneously and thoroughly tamped under and around the pipe or water settled to secure a uniform bedding for the lower one-half of the pipe. Great care shall be exercised not to damage the protective coating. Backfilling shall be continued when necessary to prevent movement and/or flotation of the pipe.

After the pipe in the trench has been welded and tested, and the field joints coated and accepted, the Contractor shall backfill all bell holes in the same manner as specified for cradling pipe.

The Contractor shall place a protective covering of sand bedding not less than six inches in thickness to cover the entire upper half of the pipe before the trench is backfilled by mechanical equipment. See Standard Drawing No. 940-A showing Typical Trench Sections.

Protection of Pipe

No person employed on the job shall step or walk upon the inside of the pipe for any purpose, unless equipped with rubber heel and sole foot gear. The Contractor shall furnish mats, rags or other means of cleaning foot gear which must be used before entering or walking on coated pipe.

Crews working on the inside of the pipe shall carry all tools and miscellaneous equipment. No dragging, throwing or dropping will be permitted. The Contractor shall provide a container for leftover electrode ends when welding inside of the pipe. Coatings and linings shall be protected at all times from abrasion and hot spatter from the welding. The Contractor shall provide fire and heat resistant mats a minimum of 18 inches wide to cover the top half of the pipe on each side of field joints to protect the exterior coating from weld spatter. The Contractor shall also provide mats to protect the interior lining each side of field joints from damage when welding inside the pipe. Utmost care will be insisted upon on the part of the contractor and all employees to protect the coating and lining of the pipe and appurtenances from abrasions or damage and any such abrasion or damage shall be repaired at the Contractor’s expense as directed by the Engineer.

15.22.04 Stainless Steel Pipe and Fittings

[CSI 33 05 23 or 40 05 23]

Part 1 - General

Related Sections

- Division 5.05 Common Work for Metals

Design Requirements

Welding shall withstand the hydrostatic testing pressure as stated in Division 1.81.40 without leakage.

The pipe wall thickness shall be as required by Division 1.81.40 and the following table.
Pipe Wall Thickness (inches)
Nominal Pipe Diameter

<table>
<thead>
<tr>
<th>Working Pressure</th>
<th>1&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>14&quot;</th>
<th>16&quot;</th>
<th>18&quot;</th>
<th>24&quot;</th>
<th>30&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100 psi</td>
<td>0.109</td>
<td>0.109</td>
<td>0.120</td>
<td>0.120</td>
<td>0.134</td>
<td>0.148</td>
<td>0.165</td>
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<td>0.188</td>
<td>0.188</td>
<td>0.188</td>
<td>0.250</td>
<td>0.312</td>
</tr>
<tr>
<td>101 - 200 psi</td>
<td>0.133</td>
<td>0.154</td>
<td>0.216</td>
<td>0.237</td>
<td>0.280</td>
<td>0.322</td>
<td>0.365</td>
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<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
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</tr>
<tr>
<td>201 - 400 psi</td>
<td>0.179</td>
<td>0.218</td>
<td>0.300</td>
<td>0.337</td>
<td>0.432</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.625</td>
</tr>
</tbody>
</table>

(1) Per Schedule 10s; (2) Per Schedule 40s; (3) Per Schedule 80s

Part 2 - Products

Materials

All stainless-steel pipe and fittings shown on the Plans in direct bury applications shall meet ASTM A312, Type 304L or 316L, Welded. All heat tints and chromium depleted layers caused by welding shall be removed by pickling prior to on-site delivery.

Above-ground stainless steel piping and fittings shall meet ASTM A778 and A774 respectively, welded. ASTM A312 is also acceptable. Piping systems shall be pickled after welding and prior to on-site delivery. Fittings shall be beveled plain-end for welding, mechanical joint connection, or flange as shown on the Plans.

Part 3 - Execution

Installation

Welding of pipe shall be per ASME Welding Code.

Passivate field welds per Division 5.05.

Installation shall be per 15.22.03.

15.22.05 Galvanized Steel Pipe

[CSI 33 05 24.26 or 40 05 24.26]

Part 1 - General

Design Requirements

Galvanized steel pipe shall conform to ASTM A53/A53M. Hot dip galvanizing shall be completed in conformance with ASTM A123/A123M. Piping shall be sized as shown on the Plans and capable of the hydrostatic working and testing pressures as indicated in the pressure section above. If pipe is to be coated, pipe shall be galvannealed in accordance with Division 5.05.
Part 2 - Products

Components

Wrap pipe if buried below grade. Provide dielectric couplings and bonding as shown on the Plans or as required by the Owner’s standard details. Provide dielectric coupling for any connection between galvanized steel and brass, bronze or copper.

15.23 Non-Metal Pipe and Fittings

15.23.05 PVC Pipe and Fittings – Solvent Weld

[CSI 33 05 31.13 or 40 05 31.13]

Part 2 - Products

Materials

Polyvinyl chloride (PVC) material for pipe fittings and couplings shall conform to ASTM D-1784, Type 1, Grade 1, with 2,000 psi design stress. Pipe shall be Schedule 40 or 80 in accordance with ASTM D-1785, as shown on the Plans.

All pipe shall be white unless shown otherwise on the Plans.

Part 3 - Execution

Installation

For exposed locations that will not be painted, primer and glue must be applied carefully and not allowed to run. Areas where primer/glue has run more than ¼-inch past the joint will be cleaned, painted, or replaced by the Contractor at the discretion of the Owner.

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

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. Ends to be as specified. 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.

15.40 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 \( \frac{1}{4} \)-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.

Thermal Expansion: Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, with rolling or sliding supports, anchors, guides, pivots and restraints. They shall permit the piping to expand and contract freely in directions away from the anchored points and shall be structurally suitable to withstand all loads imposed.

Heat Transmission: Supports, hangers, anchors, and guides shall be designed and insulated so that excessive heat shall not be transmitted to the structure or other equipment.

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.

Submerged Supports: Submerged piping shall be supported with hangers, brackets, clips, or fabricated supports and stainless-steel anchors.

Point Loads: Any meters, valves, heavy equipment and other point loads on PVC, fiberglass and other plastic pipes shall be supported on both sides according to the manufacturer’s recommendations to avoid pipe stresses. Supports on plastic and fiberglass piping shall be equipped with extra wide pipe saddles or stainless-steel shields. No support shall have metal pieces in contact with plastic process piping.

Noise Reduction: To reduce noise transmissions in the piping systems, copper tubes shall be wrapped with a 2-inch-wide strip of rubber fabric at each pipe support, bracket, clip, and hanger.
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 9.91.13.1.

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.

15.40.04 Dielectric Fittings and Adapters

[CSI 40 05 06.17]

Part 2 – Products

Dielectric Isolating (Insulating) Flange Joints

Flange insulation shall include a full-face insulating gasket, a full-length insulating sleeve for each bolt, and two insulating washers and two steel bearing washers for each flange bolt.

Sleeves and Washers

Insulating sleeves and washers shall be Pyrox G-10. Both the insulating washers and the steel washers shall fit over the outside diameter of the sleeve and shall fit within the bolt facing of the flange.

Gaskets

Gaskets shall be full faced Styrene Butadiene Rubber (SBR), Nitrile (Buna-N), Neoprene, polytetrafluoroethylene (PTFE), or compressed vegetable fiber. Gaskets shall have adequate dielectric properties, 200V/mil minimum, and shall be suitable for the operating and test pressures of the pipe system. Gaskets shall NSF-61 approved. No hard rigid gasket (e.g. phenolic or epoxy-fiberglass (G-10)), even if full-faced elastomeric coated (e.g. neoprene-coated phenolic) or with elastomeric sealing element such as an O-ring or flat band.

For gaskets used at ductile iron pipe flange joints, provide American Toruseal Flange Gasket (yellow only) which has sufficient dielectric characteristics to meet the 200V/mil minimum requirement.

Dielectric Isolation Joint Assembly

An insulating joint assembly shall consist of 2 flange by plain end or 2 flange by mechanical joint (FLG x PE or FLG x MJ) adapters, a full face insulating gasket, with full length insulating sleeves, 2 insulating washers, and 2 steel bearing washers for each flange bolt.

Flange Connection

Submittals for flange connections shall address suitability of gasket, bolts, washers, nuts, and flange characteristics for the specified pipe type and pressure, considering gasket compression, bolt strength, and required torque.

Part 3 - Execution

Installation

Provide dielectric adapters between dissimilar types of metal pipes, valves and fittings (e.g. copper to stainless steel). Flange isolating kits shall be used when dissimilar metal flanged pipe is connected. The following connections do NOT require dielectric isolators.
### 15.40.06 Above-ground Sampling Station

_[CSI 40 05 81.35]_

#### Part 2 - Products

**Manufacturers**

Sampling station shall be equal to Eclipse No. 88 Sampling Station.

**Manufactured Units**

Sampling stations shall be above-ground, with ¾-inch FIP inlet and necessary piping and tap for complete and functioning station installed per manufacturer’s written recommendations. Station shall be enclosed in a lockable, non-removable, aluminum cast housing. The station shall require no key for operation. The waterway shall be brass. All working parts shall also be brass and removable from above ground with no digging. A copper vent tube shall enable each station to be pumped free of standing water to prevent freezing and minimize bacteria growth. The exterior piping shall be galvanized. Provide the Owner key compatible padlock with station.

### 15.40.12 Sacrificial Corrosion Control for Buried Metal Structures

_[CSI 13 47 13.13]_

#### Part 1 – General

**Description**

This work consists of requirements for galvanic corrosion control materials and construction methods for buried piping where noted per plan and the prefabricated booster pump station. *Impressed current corrosion protection systems are covered in Division 13.*

**Abbreviations**

AMPP – Association for Materials Protection and Performance.

mdft - Mils Dry Film Thickness, referring to coating applications.

NACE - National Association of Corrosion Engineers.

**Definitions**

**Exothermic Welding and Pin Brazing** - A specialized process used for electrical connections to the exterior of pipe and fittings.

**Submittals**

1. **Products** - Provide submittals for all products referenced in this section.
2. **Testing** - Submit written documentation of experience as a professional engineer regularly performing cathodic protection work or certification as a NACE Cathodic Protection Specialist for all personnel performing field testing.

3. **Test reports** - Submit 3 copies of all field test reports.

**Part 2 - Materials**

**Exothermic Welds and Pin Brazing**

*_Weld Materials*_

Molds, cartridges, and all required materials for exothermic (copper) welding shall be as produced by “Cadweld”, Erico Products, Inc., or approved equal. Provide molds and cartridges of a size and material as recommended in writing by the manufacturer. Molds for exothermic welding shall be graphite; ceramic molds are not acceptable.

1. **Ductile Iron Pipe** - For connection to ductile iron pipe, use “Cadweld” XF-19 alloy weld metal or approved equal.

2. **Steel** - For connection to steel, use "Cadweld" F-33 alloy weld metal alloy or approved equal.

*_Terminals*_

All wires used with exothermic welds shall have formed sleeve terminals and shall be welded using the reduced weld size and special weld mold for formed terminals, as specified in writing by the manufacturer. The formed terminals may be factory fabricated or may be field formed using sleeves and a hammer die. Connections to mortar coated steel or concrete cylinder pipe shall be exothermically welded to a 1/2 inch diameter steel rod preinstalled on the pipe by the pipe manufacturer.

*Pin Brazing*

Pin Brazing - Pins, studs, lugs and ferrules shall be as recommended in writing by the manufacturer for the wire size, pipe material, and pin braze machine settings.

*Weld Caps*

Furnish weld caps of high-density plastic, 10 mils (minimum) thickness Handy Cap IP, as manufactured by Royston Laboratories, or approved equal. Provide caps that incorporate a dome for the weld, a tunnel to contain the lead wire from the weld connection, and a base plate to cover the prepared pipe surface. Weld caps shall be provided pre-filled with mastic/adhesive and have an integral primer for adhesion to the pipe or structure. Weld caps shall be sized for the exothermic or pin brazed connection.

*Galvanic Anodes*

Supply galvanic anodes of the quantity, composition, dimensions, metal weight, and packaged backfill as shown or noted on the drawings.

*Magnesium Anodes*

Provide magnesium anodes, nominal 20 inches long and nominal 30 pound bare metal weight. Magnesium anodes shall meet the requirements of ASTM B-843-M1C High Potential
Magnesium Alloy and ASTM G97 with an open circuit potential of (-1.7VDC) to CSE and a current efficiency of 50%. The anodes shall be prepackaged in a permeable cloth bag containing the manufacturer's prescribed backfill and the packaged anode shall be a nominal of 2.5 times the bare anode weight. The anode lead wire shall be solid copper wire, AWG #12 or #10, with TW-, THHN-, or USE-type insulation, and the connection to the anode shall be silver soldered by the manufacturer and shall be of an un spliced length specific to the application but not less than 15 feet.

**Test Stations and Coupons**

Supply test stations of the quantity and type as shown or noted on the drawings.

*Test Station*

Flush-mounted test stations shall be traffic-rated cast iron valve boxes and cover.

*Cathodic Protection Monitoring Coupons*

Provide coupons, steel or ductile iron, to match the pipe material type. The coupon shall have 2 wires connected with a silver soldered potted connection, and with a minimum length of 10 feet. Provide MC Miller IR-Free coupons or approved equal. The coupon access drop tube shall be Schedule 40 PVC pipe, 2 inches in diameter.

**Wire**

Wire for test stations and joint bonds larger than AWG #10 shall be single-conductor, stranded copper, with USE-type insulation. Wire AWG #10 or smaller shall be solid not stranded, with TW-, THHN-, or USE-type insulation. Provide the wire size as specified or shown.

**Split Bolts and Insulation for Split Bolt Connections**

Provide bronze split bolts, sized for the wire to be joined; insulating putty, 3M Scotchfill or approved equal; and vinyl electrical tape, 3M Scotch Super 33 or approved equal.

**Ground Rods and Clamps**

Provide hot-dipped galvanized ground rods, 5/8 inch diameter 8 foot length. Provide bronze clamps, and AWG #6 or #4 stranded copper wire with USE-type insulation for connections between pipe and ground rod.

**Insulation for Dielectric Isolation**

*Insulating Flange Joints*

See 15.40.04 above.

**Polyethylene Encasement and Tape Wrap**

*Polyethylene Encasement for DI Pipe*

Furnish 4 mil Type 2 high density cross laminated polyethylene film in accordance with AWWA C105 tube type encasement. Polyethylene sheet is not acceptable. Furnish polyethylene encasement from the same manufacturer that supplies the ductile iron pipe.
Tape Wrap Coating for Specials

When specified provide petrolatum wax tape system per AWWA C217 with an auxiliary thin film equal to Trenton.

Part 3 - Execution

Corrosion Protection

Buried Piping

Anodes shall be installed where noted per plan.

Booster Pump Station Structure

Anodes shall be installed where noted per plan.

Exothermic Welding and Underground Electrical Connections

Unless otherwise specified, all electrical connections to the pipe shall be by exothermic welding or pin brazing. Properly cover exothermic or pin brazed welds with weld caps. Provide sufficient space between adjacent exothermic welds to install a full sized weld cap on each weld. Repair all damaged pipe coating in accordance with the manufacturer's recommendations. Prior to coating, test all exothermic or pin brazed welds by striking with a hammer in a manner approved by the professional engineer or specialist in cathodic protection.

Pipe Joint Bonds

Provide pipe joint bonds to assure electrical continuity except where electrical isolation is specified. Connections to the pipe shall be by exothermic welding or by pin brazing. Bond wires shall be un-spliced wire with field connections made in the trench. Alternatively, "pig tails" can be pre-welded or pin brazed to the pipe; then the pigtails will be spliced together in the trench with split bolt connectors. Joint bonds with lug terminals can be field connected to pin brazed threaded studs. To permit inspection of the welds and pin brazing and to prevent damage to the weld caps, apply all protective coating after the joint is in place and complete. Insulate the split bolt and all exposed copper wire by encapsulating with electrical insulation putty, Scotchfill® Insulating Putty or approved equal, molding the connection smooth, and then wrapping the connection at 50% overlap with vinyl electrical tape, Scotch Super 33 or approved equal.

Joint Bond Configuration

There shall be a minimum of 2 parallel joint bond wires, AWG #2, at each pipe joint. Valves and fittings may be bypassed by bond wires, but the valve or fitting must be made electrically continuous with the pipeline by a single wire, AWG #2 or AWG #4 that connects directly to a pipe section or connects to a joint bond wire (header run) with a split bolt connection. An assembly of valve and fittings may have a single bond wire (tap) from each component piece split bolt connected to a header run (AWG #2) that connects at each end, directly to a pipe section by exothermic weld or by split-bolt connection to a joint bond wire.
Wiring

All wiring is to be splice-free, except where splices are specified or shown or as approved. Coil or snake all buried wire with sufficient slack to prevent stress from backfill operations and earth settlement. Extend all wire at test stations a minimum of 30 inches above finished grade or install in rigid conduit. Repair any damage to the wire insulation with self-adhering butyl rubber electrical tape, Scotch No. 130C or approved equal, and over wrap with vinyl electrical tape, Scotch No. 33 or approved equal. Spirally apply each layer at 50% overlap. This repair method is not applicable to repair of any wire in an impressed current system.

Split Bolt Connections

Split bolt connections shall be limited to the connection of two wires. Three or more wires at one split bolt are not allowed. Connection of taps to header runs may be accomplished by stripping an appropriate length of insulation from the header without cutting the wire and connecting the tap at that point with a split bolt for each tap.

Galvanic Anode Installation

Unless specified otherwise, install anodes 5 feet below the pipe invert, positioned under the pipe or up to 3 feet perpendicular from the pipe edge. Do not place the anodes within 3 feet of a neighboring metallic structure. When anodes are distributed along the pipeline, alternate the perpendicular offset from one side of the pipe to the other.

Location

Install the anode in clean, native backfill and not in the select bedding material. Locate anodes a minimum of 5 feet apart. Thoroughly soak the anode in water prior to installation. Compact the backfill to 95% of maximum density to 1 foot above the anode. Evenly distribute anodes along main and branch line installations. Anodes may be grouped at the ends of casings and short runs of pipe; maintain 5-foot minimum distance between anodes.

Connection

The anode lead wire shall be exothermically welded to the pipe. Alternatively, the anode shall be connected to a joint bonding wire by using a split-bolt connection. Distances between anodes are nominal lengths and anode connections shall be made at pipe joints. Unless otherwise specified, for ductile iron water mains and steel pipe and casings, provide anodes as shown.

Dielectric Isolation

Provide pipe isolation with insulating flange joints or insulating flexible couplings. Insulating joints shall be separate assemblies and not incorporated into joints with valves or other appurtenances. Copper services shall be isolated with meter stops designed with integral insulation. Use insulating wall seals at all concrete wall penetrations.

Insulating joints

Mechanical joint assemblies of flange coupling adapters may be assembled above grade complete with attached test wires. Tape the flange edge of insulating joints with PVC tape to prevent particle bridging across the flange faces. Insulating flexible couplings shall have an insulating boot on each pipe end. Reducing insulating flexible couplings shall have a boot on
one pipe end and restraining bolts on the other. Transition couplings are not acceptable. Use reducing couplings to accommodate differing pipe size. Joint restraint at flexible couplings shall only use hot-dip galvanized rod and nuts and shall be insulated from the non-cathodically protected side of a joint, or insulated from the mortar coated side of a joint, or insulated on one side of the joint if both sides are cathodically protected.

**Polyethylene Encasement Sleeve Wrapped and Tape Wrapped**

**Polyethylene Encasement Installation**

Install polyethylene encasement, tube type, on all ductile iron pipe and appurtenances where shown or specified. Install one length of polyethylene tube encasement for each length of pipe in accordance with AWWA C105, Method A. Every 6 feet along the pipe, secure the polyethylene tube encasement with tape full circumference. The use of polyethylene sheets will not be allowed.

Install 40 mil geo-membrane around mechanical joints and similar connections where the polyethylene can be punctured or ripped. Tape the ends and seams of the geo-membrane with PVC tape and then cover the pipe joint with the adjoining polyethylene encasement.

**Testing and Verification**

**Quality Assurance**

The portion of the work that involves the installation and testing of the galvanic cathodic protection system shall be conducted by a professional engineer regularly performing cathodic protection work or by an individual who is registered or certified by the National Association of Corrosion Engineers (NACE) as a cathodic protection specialist. Submit verification of registration or certification for written approval prior to the start of the work.

**Field Verifications**

The professional engineer or specialist in cathodic protection shall field verify the adequacy of the Contractor's personnel in handling and placing anodes and monitoring coupons, performing exothermic welding, installing split bolt connectors, repairing coatings including weld caps, and measuring dielectric isolation and bonding.

The professional engineer or specialist in cathodic protection shall at the start of the work provide a list of qualified Contractor personnel and only these listed individuals shall perform such work for the Contractor.

**Testing During Construction**

Test all isolation joints after installation and prior to backfilling.

**Continuity and Isolation Testing**

Perform testing as follows:

1. General - Test all sections of piping that are cathodically protected and dielectrically isolated for electrical continuity and dielectric isolation after all Contractor connections have been made.

2. Test Current Response - Measure the response of the pipe to the application of cathodic protection test current. If the application of the test current causes the pipe-to-soil
potential to become more negative, electrical continuity of the pipeline, service runs, and appurtenances is indicated between that point and the point at which the test rectifier negative connection was made. The response of the potential shall be of a magnitude to demonstrate low resistance joint bonds. Electrical isolation across insulating fittings shall be indicated by the pipe-to-soil potential being more positive or only slightly negative in relation to the structure connected to the test rectifier.

Lack of Continuity or Isolation

If electrical continuity or electrical isolation is not achieved, locate the deficiency and complete the necessary repairs. The Contractor’s corrosion control specialist shall retest the system before final acceptance.

Repairs

Make all repairs necessary to correct any deficiencies and repair any joint not passing the electrical continuity or isolation test at no cost to the City.

Final System Testing

Final system testing shall be performed prior to the hydrostatic testing of each segment and prior to the substantial completion. Final testing shall be performed directly by the professional engineer or specialist in cathodic protection and witnessed by the Owner and shall include the following as a minimum:

1. Test and Service Locations - Provide pipe-to-soil potential measurements for all test stations and for all service connections. Include date of measurement taken.
2. Continuity and Isolation Measurements - Provide a report consisting of continuity and isolation measurements and other data for all cathodically protected sections of pipe, appurtenances, and for all service connections.
3. Documentation - Submit report documenting all testing and installation of cathodic protection system. The cathodic protection specialist shall sign the report. Include the specialist’s NACE registration or certification number.

Warranty

A 2-year warranty period specified in the Contract shall apply to the entire corrosion control system installed.

15.40.20 Hydrodynamic Mixing System

Part 1 - General

The Hydrodynamic Mixing System (HMS) is defined as a supplemental system installed within a potable water storage reservoir which passively utilizes the energy provided by the inlet water supply (via pumped or gravity head) and generates a sufficient inlet momentum to achieve a complete homogeneous blending of the water volume within the reservoir with the inlet supply flow. Determination of Complete Homogeneous Blending shall be defined by the modeling requirements and supporting hydraulic analysis as conducted by each individual manufacturer for their specific system configuration as defined within these specifications. System submittals not providing this validation shall not be considered as a viable
Hydrodynamic Mixing System (HMS) and shall not be accepted as an equivalent to this system specification.

The specifications in this section include all components of the Reservoir Hydrodynamic Mixing System (HMS) consisting of a bi-directional flow manifold equipped with variable orifice duckbill inlet nozzles and outlet flow check valves that are NSF61 certified. The HMS manufacturer shall be responsible for designing the system in accordance with the hydrodynamic criteria defined within these specifications and submit design calculations verifying compliance in accordance with the submittal requirements. The following is a description of the Hydrodynamic Mixing System.

All modeling and hydraulic and mixing calculations pertaining to the HMS shall originate from the duckbill valve manufacturer. Modeling and calculations provided by parties other than the duckbill valve manufacturer are not allowed.

The complete Hydrodynamic Mixing System shall be supplied by the variable orifice nozzle manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, variable orifice duckbill check valves, and any other equipment specified within this section of the specifications. The approved manufacturer for this system to be included within the Base Bid shall be manufactured by Red Valve Company/Tideflex Technologies, Pittsburgh, PA 15220. Local Equipment Supplier is Antec Corporation.

Manufacturer’s and/or contractors submitting an alternative to the named Red Valve/Tideflex Technologies mixing system shall be responsible for obtaining any and all proprietary rights, license fees, royalties, technology licenses, and/or permissions required to provide such a system. The Manufacturer shall indemnify and hold harmless the Owner and Engineer against all claims, damages, losses, and expenses arising out of any infringement of patent rights or copyright incident relating to this system. Alternate mixing systems, even if listed by name, shall comply with the performance specifications in this section.

**Referenced Standards**

**American National Standards Institute (ANSI)**

B16.1 – Cast Iron Pipe Flanges and Flanged Fittings

B16.5 – Pipe Flanges and Flanged Fittings

B36.10 – American National Standard Weights and Dimensions of Welded and Seamless Wrought Steel Pipe

**American Society for Testing and Materials (ASTM)**

A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A234 – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A351 – Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts
A536 – Standard Specification for Ductile Iron Castings
C110 – Ductile Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
D1330 – Standard Specification for Rubber-Sheet Gaskets
D1784 – PVC/CPVC Pipe Compounds
D1785 – PVC Pipe, Schedules 40, 80 & 120
D2466 – PVC Solvent Cement
D2855 – PVC Solvent Joints
D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Fittings
D3915 – PVC Pipe Fitting Compounds
American Iron and Steel Institute (AISI)
AISI 304 – 304 Stainless Steel Plate
AISI 316 – 316 Stainless Steel Plate
AISI 1040 – Carbon Steel Plate
American Water Works Association (AWWA)
C104 – Cement-Mortar Lining of Ductile Iron Pipe and fittings for Water
C110 – Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
C115 – Flange Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
C200 - AWWA Standard for Steel Water Pipe 6” and Larger
C207 – Standard for Steel Pipe Flanges for Waterworks Service – Size 4 In. to 144 In.
C220 – AWWA Standard for Stainless Steel Pipe, 4” and Larger
C900 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution
C905 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In Thru 48 In. for Water Transmission and Distribution
C906 – AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution
American Water Works Association Research Foundation (AwwaRF)
Project No. E20-J08 – Physical Modeling of Mixing in Water Storage Tanks (Forthcoming)
National Sanitation Foundation (NSF)
NSF Standard 14 – Plastic Piping System Components and Related Materials
NSF Standard 61 – Drinking Water System Components – Health Effects
Submittals

Independent CFD Modeling Validation

The mixing system designer/supplier must supply data or report from at least one project where an independent company conducted CFD modeling on their mixing system design and the modeling results verified the design achieved complete mixing.

Full Scale Tracer Study Validation

The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on a circular reservoir and the tracer study results verified the mixing system design achieved complete mixing.

The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on an elevated tank and the tracer study results verified the mixing system design achieved complete mixing.

Inlet Nozzle and Outlet Valve Testing and Validation

Verification of independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2” through 48”.

Verification of Independent Laboratory Testing for Manufacturing Consistency - the duckbill valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing where multiple duckbill valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability and consistency of the manufacturing process to produce the same hydraulic characteristics.

Report of independent testing that studied the flow distribution characteristics of duckbill valves installed on multiport manifolds. The manufacturer must have been in the business of manufacturing duckbill valves at the time the report was published.

Verification of Finite Element Analysis (FEA) of duckbill valves. The duckbill valve manufacturer shall provide summary documentation of Finite Element Analysis modeling on representative duckbill nozzle sizes to determine deflection, stress and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

Verification of independent hydraulic testing to determine headloss characteristics on a minimum of three (3) sizes of perforated disc/elastomeric membrane check valves ranging from 6” through 36”. Testing must have been conducted with and without the membrane installed. At least two (2) sizes shall have tested two (2) different membrane thicknesses.

Verification of Finite Element Analysis (FEA) modeling on a perforated disc/elastomeric membrane check valve to determine stress and deflection characteristics under reverse differential pressure.
Validation of Long-term performance

The mixing system designer/supplier must supply at least one inspection report showing proper operation of, and no deterioration of, the duckbill valves after being in service in a water storage tank mixing application for a minimum of 10 years.

NSF61 Certification

Copy of the NSF61 Certified listing for the valves used in the Hydraulic Mixing System (HMS). The valves themselves must be NSF61 certified, not just the elastomer used in construction of the valves. NSF61 approved/certified materials will not be accepted in lieu of valve certification.

The NSF61 Certification for the valves must be for a minimum volume of 2,000 gallons. Valves with NSF61 Certification for minimum volume of greater than 2,000 gallons are not acceptable.

Test Report on Elastomer Exposure to Chlorine and Chloramine

Copy of test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 “Standard Test Method for Rubber Property – Effect of Liquids.”

System Installation Drawings

The duckbill valve manufacturer shall be responsible for providing engineering installation drawings of the complete manifold piping system as supplied by the manufacturer. These drawings shall include plan view piping arrangement, sections and elevations as required, support bracket installation details, duckbill nozzle orientation details, and all dimensions required for locating the system within the specified dimensions of the tank.

Three (3) sets of plans shall be provided to the Engineer for review and approval.

Two (2) sets of final fabrication and installation drawings shall be included with the shipment of the manifold piping equipment.

Design Calculations

All Design Calculations, curves, and reference information listed below must originate and be submitted by the duckbill valve manufacturer. Calculations, curves, and reference information provided by contractors relating to the HMS are not allowed. The duckbill valve manufacturer MUST include within the submittal package the following design calculations, curves, and reference information:

• Calculations showing the fill time required, under isothermal conditions, for the HMS system to achieve complete mix of the reservoir volume at minimum, average and peak fill rates. Complete mixing defined as 95% homogenous solution. The theory and equations used in calculating the mixing times must be from a published AWWA reference manual or paper. The reference document(s) must be submitted with the equations and calculations.

• Calculations showing the water level drawdown required to achieve complete mixing on the fill cycles at minimum, average, and peak flow rates.
• Calculations of average storage tank water age for both fill-then-draw, and simultaneous fill and draw scenarios. Theory used in calculating water age must be submitted with the calculations.

• A representative Computational Fluid Dynamics (CFD) model evaluation of the proposed HMS system configuration applied within a reservoir of similar geometry. Model output documentation shall include all design variables applied for the simulation, plot of the 3-D geometry showing the mesh definition, velocity magnitude vector and contour plots at different cross-sections throughout the water volume, simulated tracer animations showing the spatial and temporal distribution of inlet water in real time during the fill cycle.

• Hydraulic calculations showing the resulting jet velocities of each inlet nozzle at minimum, average, and peak fill rates.

• Hydraulic calculations showing the flow distribution among all inlet ports at minimum, average, and peak fill rates.

• Manifold hydraulic calculations showing the total headloss of the HMS at minimum, average, and peak fill and draw rates. Headloss shall include all minor losses and headloss of nozzles and outlet check valves.

• Hydraulic curves showing thrust vs. flow for the inlet nozzles.

• Hydraulic curves for each outlet check valves showing headloss vs. flow.

• Calculations showing the terminal rise height of the jets that discharge at an angle above horizontal. The terminal rise height shall be calculated assuming 10°F and 20°F colder inlet water and calculated at minimum, average and peak fill rates. The theory and equations used to calculate the terminal rise height shall be included.

• Hydraulic curves for each inlet nozzle of Densimetric Froude number vs. flow.

• If the calculations and supporting data provided do not show compliance with the hydrodynamic requirements of the system as interpreted by the Engineer or Owner then the submittal shall be rejected.

Part 2 - Products

Variable Orifice Duckbill Inlet Nozzles

Inlet ports/nozzles shall be duckbill-style check valves that allow fluid to enter the reservoir during fill cycles and prevent flow in the reverse direction through the nozzle during draw periods. Inlet ports/nozzles may not be fixed-diameter ports or pipes.

The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The duckbill valve shall be furnished with stainless steel 316 back-up rings for installation.

The duckbill valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.
Inlet ports/nozzles shall have a variable diameter vs. flow hydraulic profile that provides a non-linear jet velocity vs. flow characteristic and a linear headloss vs. flow characteristic. The hydraulic characteristics of the duckbill valves shall be defined by “Hydraulic Code”.

The inlet ports/nozzles shall discharge an elliptically shaped jet. The nozzle must have been modeled by an independent laboratory using Laser Induced Fluorescence (LIF).

Manufacturer shall have conducted independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2” through 48”. The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

Manufacturer shall have conducted an independent hydraulic test where multiple valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability of the manufacturing process to produce the same hydraulic characteristics.

Manufacturer shall have conducted independent hydraulic testing to study the flow distribution characteristics of duckbill valves installed on multiport manifolds.

Manufacturer to have conducted Finite Element Analysis (FEA) on various duckbill valves to determine deflection, stress, and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

Manufacturer must have conducted in-house backpressure testing on duckbill valves ranging from ¾” to 48”.

Manufacturer shall have at least fifteen (15) years’ experience in the manufacturing of “duckbill” style elastomeric valves.

Manufacturer must have duckbill valves installed on manifold piping systems in at least 100 distribution system reservoirs.

Manufacturer must have representative inspection videos showing the duckbill valves discharging water into the reservoir during an initial fill (unsubmerged). Manufacturer must also have representative underwater inspection videos showing the operation of the valves when submerged. Representative videos can be submitted upon request from the engineer.

The duckbill style nozzles shall be one-piece elastomer matrix with internal fabric reinforcing designed to produce the required discharge velocity and minimum headloss requirements as stipulated in the Submittals section. The flange portion shall be an integral portion of the nozzle with fabric reinforcing spanning across the joint between the flange and nozzle body.

The elastomer used in construction of the duckbill valves must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 “Standard Test Method for Rubber Property – Effect of Liquids.”

The manufacturer’s name, plant location, serial number and product part number which designates nozzle size, material and construction specifications shall be bonded onto the surface of the nozzle.
Outlet Check Valves

The outlet flow valves shall be perforated disc type with elastomeric membrane. The valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.

The perforated disc shall be fabricated of stainless steel 304 plate with or without welded support gussets depending on maximum backpressure. The disc shall be flanged and drilled to mate with ANSI B16.1, Class 125/ANSI B16.5 Class 150 flanges. The disc shall have three (3) tapped holes used for fastening the membrane and support rod to the disc with stainless steel 304 bolts, nuts, and lock washers. The top of the disc shall be tapped and supplied with lifting eyebolt for installation.

The membrane shall be circular, one piece rubber construction with fabric reinforcement. The diameter of the membrane shall allow adequate clearance between the membrane O.D. and the pipe I.D. The membrane shall be vulcanized with a specified convex radius to produce a compression set to allow the membrane to seal against the perforated disc at low reverse differential pressure.

The support rod shall be stainless steel 304 and drilled with three (3) longitudinal holes to allow fastening of rod to membrane and perforated disc.

When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through the perforations in the disc. When backpressure exceeds the line pressure, the membrane seats on the perforated disc preventing backflow.

The valve allows flow out of the reservoir during draw cycles and prevents flow into the reservoir during fill cycles.

The elastomer used in construction of the membrane must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 “Standard Test Method for Rubber Property – Effect of Liquids.”

The manufacturer’s name, plant location, serial number and product part number which designates membrane size, material and construction specifications shall be bonded onto the surface of the membrane.

Carbon Steel Pipe and Fittings

Carbon steel pipe and fittings shall conform to the associated standards listed in Section 2.0: Reference Standards.

Dimensions for carbon steel fittings shall conform to AWWA C110, unless otherwise specified.

Pipe and fittings shall be Schedule Standard wall thickness conforming to ANSI B36.10-1985. All flanges shall be carbon steel ring flanges conforming to AWWA C207 Class D, unless otherwise specified on the drawings. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.
Ring flanges shall be continuously welded on both sides.

Welding of carbon steel pipe and fittings shall be in accordance with the Reference standards.

All butt welds shall be fully penetrated with gas shielding to the interior and exterior of the joint.

Welded cross-sections shall have a thickness equal to or greater than the welded material.

Field welding of carbon steel pipe and fittings will not be allowed unless approved by the Engineer.

All welded joints shall be free of sharp edges and burrs.

Coating of the inside of carbon steel pipe and fittings is not required, unless otherwise specified.

Coating of the outside of carbon steel pipe and fittings shall be performed in the field, by the contractor, following installation of the manifold piping system. Surface preparation and coating procedures shall be in accordance with standards listed in Coatings specification.

**Flange Gaskets**

Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330.

Flange gasket drilling pattern shall conform to ANSI B16.1/B16.5.

Flange gaskets shall be 1/8” thick.

Gasket material shall be EPDM.

**Fasteners**

Hex head bolts and nuts shall be stainless steel 304 conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2.

Plastic insulating sleeve/washers shall be utilized to isolate dissimilar bolt and flange metals where required.

**Pipe Supports**

For field welded, plain end, carbon steel pipe, the pipe supports shall be carbon steel in accordance with the associated standards and be welded directly between the tank floor, shell, access tube, or wet riser and the carbon steel piping. The pipe supports shall be flat plates, structural angle iron or channel.

The pipe supports shall consist of four components:

- A base plate (when required).
- For carbon steel supports, a top-works weldment that consists of structural channel and angle iron. The angle iron has predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe.
- U-bolt with four hex nuts.
- An 1/8” thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.
For steel tanks, the channel of the top-works weldment shall be field fit and modified to the required length. The channel shall then be field welded to the base plate.

For steel tanks, the base plate shall be field welded to the tank floor or shell. The location of the base plate shall avoid welded joints in the floor/shell plates.

Plastic insulating sleeve/washers shall be utilized to isolate dissimilar metals where required.

Coatings

Following installation of the manifold system, all carbon steel and ductile iron pipe, fittings, bolted connections, pipe supports, and appurtenances shall be coated according to the interior tank paint specification as specified in Division 9.

Tideflex and Waterflex Valves shall not be coated. The valves shall either be masked or be mounted after coating of the tank and piping. Contractor to ensure masking materials are removed after coating.

Part 3 - Execution

Delivery, Storage, and Material Handling

Individual nozzles and outlet valves shall be packaged separately from the piping equipment.

All flanges shall be protected by using plastic inserts or plank wood, pipe sections are to be fully supported to prevent pipe deflection or damage to fittings or connections.

All equipment shall be shipped on pallets capable of fully supporting the pipe sections across their entire length. Pallets should be accessible for fork lift transport or strap and hoist means without causing any load to the pipe equipment.

All stainless steel components shall be stored separately away from any carbon steel components or other materials that could stain or deface the stainless steel finish from run-off of oxidized ferrous materials.

All pipe equipment should be covered and stored in areas free from contact with construction site sediment erosion to prevent accumulation of materials within the pipe and fittings.

Duckbill nozzles should be protected from contact with rigid objects during handling and storage. The contractor shall be responsible for replacing any duckbill nozzles or elastomeric components that are damaged after arrival on the site through installation and start-up of the system.

Installation, Operation and Maintenance Manuals

Within thirty (30) days of final approval of the installation drawings by the Engineer, the HMS valve manufacturer shall provide four (4) sets of the installation portion of the Installation Operation and Maintenance (IOM) Manuals for the applicable system. Within thirty (30) days of final approval by the Engineer of the installed system the manufacturer shall provide five (5) copies of the complete IOM Manual for final review and approval.

The manuals shall be in the following format and include the listed required information as a minimum:

Enclosed in a 3-ring binder with project title and system designation shown on the front cover and side of binder.
• Table of contents
• Copy of design calculations for the manifold system as defined in the previous section.
• Copy of complete set of the installation plans.
• Copies of NSF61 Certification listing for the valves
• Parts and equipment list with specification numbers for ordering of replacement parts.
• Product specification sheets for nozzles, outlet valves, expansion joints, concrete
  anchors, and any other specialized items supplied with the system.
• Installation guidelines for the HMS manifold system.
• Operational procedures for the HMS manifold system.
• Guidelines for repair of system components.
• Schedule for suggested periodic maintenance of the manifold system.

Installation

Installation of the manifold system shall be in accordance with the installation plans and
guidelines provided by the HMS manufacturer, and as specified in the installation section of
the IOM manual, and the requirements defined in these specifications.

Installation Inspection and Start-Up Testing Procedures

The HMS manufacturer’s authorized representative shall provide one (1) day inspection to
verify that the system has been installed in accordance with the design specifications and
installation drawings.

The inspection representative shall provide signed inspection documents confirming the date
of the inspection and approval of the installation.

Start-Up Flow Testing

• Following installation of the complete manifold piping system, the contractor shall open
the upstream isolation valve to allow flow into the tank through the manifold system. The
isolation valve must be opened slowly to prevent surge or over-pressurization of the
manifold system. The isolation valve must be fully opened to inspect the flow
characteristics of the manifold system.

• The contractor and factory representative shall visually inspect the entire piping system
for leakage.

• The contractor and factory representative shall visually inspect all of the inlet nozzles to
ensure flow is being discharged into the tank through all nozzles.

Warranty

The complete manifold piping system shall be supplied by the HMS manufacturer to maintain
single source responsibility for the system. The complete system shall be defined as all piping
and appurtenances within the tank, downstream of the tank penetration. Appurtenances
include pipe, fittings, horizontal and vertical pipe supports, expansion joints, duckbill valves, and any other equipment specified within this section of the specifications.

All piping, pipe supports, expansion joints, and anchors shall be warranted by the HMS manufacturer against failure under design conditions for a period of one (1) year from the date of final installation certification.

Duckbill inlet nozzles and perforated disc/elastomeric membrane outlet check valves shall be warranted by the manufacturer against failure under design operating conditions for a period of one (1) year from the date of final installation certification. Elastomer components damaged as a result of maintenance activities, foreign debris, or excessive exposure to direct ultraviolet and thermal radiation shall be excluded warranted coverage.

15.50 FLOW METERS

[CSI 33 19 00 or 40 71 00]

15.50.05 Common Work for Flow Meters

[CSI 33 19 05 or 40 71 05]

Part 1 - General

Design Criteria

Meter body and register shall have a pressure rating in accordance with Division 1.81.40. Materials, coatings and components shall be appropriate for the fluid being measured. Meters will be installed inside a concrete vault with an anticipated ambient temperature range between 40- and 110-degrees Fahrenheit.

Submittals

Meter shall fit in the space provided on the Plans. Meters that do not fit in the spacing provided must be approved by the Engineer for acceptance.

Provide information on meter assembly, available and selected options, direct read head, remote transmitter, coatings, and dimensions of all equipment.

Part 2 - Products

Components

Each meter shall be equipped with an indicator-totalizer device.

- Reservoir flow meter with Direct readout head with electronic output per Division 15.51.03
- Booster pump station flow meter with Digital readout head with electronic output per Division 15.51.05

Part 3 - Execution

Installation

Install the meter in strict accordance with the manufacturer’s recommendation.
Field Quality Control

Installation shall be inspected by manufacturer’s representative prior to operating or field testing units. A field test shall be conducted and/or supervised by the meter manufacturer’s representative after the piping and controls have been installed. Flow meters shall be inspected and verified by factory trained technicians. Upon completion of installation and testing, manufacturer’s representative shall provide written certification that equipment is fully warranted installed.

Testing

Meter shall be rated for working pressure and testing pressure as required in Division 1.81.40. If the meter assembly cannot take the test pressure, a temporary spool or cap(s) must be installed in place of the meter. A visual leak test will then be performed under working pressure with the meter in place.

The Contractor shall prove correct meter and transmitter performance to the Engineer. Should performance not be acceptable, adjust or replace the unit at the Contractor’s expense.

15.51 Flow Meter Readout Head

[CSI 33 09 01, 33 19 90 or 40 71 90]

15.51.05 Digital Read Head with Electronic Output

[CSI 33 09 01.33, 33 19 94 or 40 71 94]

Part 2 - Products

Components

The totalizer shall read in units of thousands of gallons.

Readout shall register in gallons per minute (gpm) for instantaneous flow.

The transmitter shall provide a contact closure (digital pulse) switch and a loop-powered current output (analog) for connection to the instrumentation system. The pulse output shall be plus or minus 2 percent of actual flow with the range specified for each meter.

The current output shall be a 4-20 mA signal that represents the rate of flow through the meter. Scale the transmitter as follows: 0 gpm minimum and 5,000 gpm maximum. The current output shall be plus or minus 0.5 percent of full scale of the instrument the transmitter is controlling.

Transmitter electronics shall consist of easily accessible printed circuit boards for convenient maintenance in a wall mountable NEMA 4X (standard) enclosure and connected to the transducer by cable. The meter manufacturer shall supply an unspliced cable run from the transmitter to the meter tube.

Provide an enclosure with window, that does not negate the enclosure NEMA rating, for viewing the flow rate and totalizing counter on an LCD readout. The transmitter shall display flow rate in gallons per minute, totalized gallons and an empty pipe indicator.
The electronics shall be NEMA 4X rated. Output shall be 4-20 mA into 800 Ohms with an isolated ground and non-interacting zero and span adjustments. Separate 24 VDC pulse outputs for forward and reverse flow shall also be provided. The display and output shall be user scalable for GPM, CFS, or MGD, and shall be password protected. All software shall be battery powered with a battery that has a 10-year service life.

***Indicate reverse flow and battery power only if applicable.***

The meter, electronics, and transmitter shall be RFI shielded to prevent interference from adjacent high noise electrical equipment such as variable frequency drives, electromagnetic starters, transformers, or transfer switches.

Provide the necessary interface between remote instrumentation and the transmitter. Provide a meter with power and signal wiring as recommended by the manufacturer. Ground instrumentation shall be as recommended by the manufacturer.

For compound meters with two separate heads, provide compatible unit for each head.

**Part 3 - Execution**

**Installation**

Connect outputs to telemetry or data logging system.

Install the remote readout head where shown on the Plans. If not shown on the Plans, confirm location with Engineer prior to installation.

**15.53 Electronic Flow Meters**

**15.53.03 Electromagnetic Flow Meters**

[CSI 33 19 23 or 40 71 13.13]

**Part 1 - General**

**Related Sections**

- 15.51.05 Digital Read Head with Electronic Output

**Design Requirements**

Provide an electromagnetic flow metering system suitable for measuring and transmitting flow rate in a full-flowing pipe. The meter shall be suitable for either horizontal or vertical mounting. The system shall operate within the accuracy required over an ambient temperature range of -10 to +120 degrees Fahrenheit and a process temperature range of +15 to +120 degrees Fahrenheit. Meter and electronics shall be rated for Class 1 Division 2 service.

**Performance Requirements**

The flow meter system shall be microprocessor based, utilizing a DC bipolar pulsed coil that automatically re-zeroes after each pulse cycle. System accuracy shall be ± 1 percent of actual flow rate over a fluid velocity range of 1 to 30 feet per second (fps), and within 0.01 fps for velocities less than 1 fps. Repeatability shall be 0.1 percent of full scale or better. System accuracy shall be traceable to NIST using prototype meters of the same configuration.
Part 2 - Products

Manufacturers

The flow meter shall be Endress and Hauser Proline Promag W 400, Siemens Sitrans model FM MAG 5100W, ABB Watermaster, or approved equal.

Manufactured Units

The meter tube and coil shall be mounted on the pipe between ANSI B16 pipe flanges and rated for working and test pressures as indicated in Division 1.81.40. The meter tube shall be 304 or 316 stainless steel. The meter and cable connection(s) shall be capable of complete submergence without damage. The meter shall include integral grounding electrodes, or 316 stainless steel or Hastelloy C grounding rings for installation at the inlet. The manufacturer shall verify that the grounding system is appropriate for the proposed use. All wetted parts shall be 316 stainless steel.

Finishes

The meter liner shall completely encapsulate all wetted areas except for electrodes. The liner shall be certified by the manufacturer as appropriate for the proposed use. The liner shall be Siemens - Ebonite for model 5100. For Endress and Hauser Hard Rubber, Poly, or PTFE, the manufacturer shall review the liner material specified and confirm that it is appropriate for this project fluid and process. Provide submittal information that the liner material is fully compatible with the liquid it is carrying.
Division 16
Electrical

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.

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 8.90 Motorized louvers/dampers
- Division 10.14.23 Panel Signage
- Division 11.95.34 Fans
- Division 15.30 Valves with position indication and controls
- Division 15.51 Flow meter transmitters
- Division 17 Automatic Control

Codes and Standards

Provide all electrical work in accordance with latest edition of National Electrical Code, National Electrical Safety Code, Washington State Electrical Code, 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.

Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Plans.

Damp Locations: 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.

Corrosive Locations: Areas where chlorine gas under pressure, sulfuric acid, or liquid polymer are stored or processed. These areas are identified 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. Class 1, Division 1 and 2 Locations: NEMA Type 7
2. Indoors Unclassified Locations: NEMA Type 12
3. Corrosive Locations: NEMA Type 4X
4. Outdoors and/or Wet Locations: NEMA Type 4X
5. Electrical Rooms: NEMA Type 1

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. This plan or plans shall include all of the 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. This diagram shall show all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. References shall be shown to all connection diagrams which interface to the interconnection diagrams. Interconnection
diagrams shall be of the continuous line type. Bundled wires shall be shown on a single line with the direction of entry/exit of the individual wires clearly shown. All devices and equipment shall be identified. Terminal blocks shall be shown 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. Spare wires and cables shall be shown.

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

1. Underground Marking Tape
2. Utility Meter Enclosure
3. Current Transformer Enclosure
4. Service Disconnect
5. Distribution Panelboard
6. Distribution Transformers
7. Branch Circuit Panelboard
8. Circuit Breakers
9. Conduit and Fittings
10. Outlet and Junction Boxes
11. Electrical Handholes and Vaults
12. Wire and Cables
13. Switches and Receptacles
14. Light Fixtures
15. Automatic Transfer Switch
16. Engine Generator Set
17. Load Bank Tap Box
18. Portable Generator Tap Box
19. Portable Generator Connection Box
20. Motion Detectors
21. Clean Water Float Switches
22. Other Electrical Components listed in this Division and/or required by the Engineer.

**Construction Power**

See Division 1.50.
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 Engineer.

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. On the basis of 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 Engineer for review at the completion of the project 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. Exercise care at all times 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.

16.10 ELECTRICAL SITE WORK

16.10.1 Common Work for Electrical Site Work

Part 1 – General

Summary

The work included in this section consists of furnishing and installing conduit, fittings, handholes, pull vaults, warning tape, cables, wires, and related items, complete as specified herein and as indicated on the Plans for a complete and functional underground electrical system. Special vaults, grounding, trench backfill requirements may be specified with the particular equipment or electrical system involved.

Related Sections

Raceways and conduit shall be provided per Section 16.70.

Wire and cable shall be provided per Section 16.60.

Design Requirements

Materials and equipment shall conform to the respective specifications and standards; and to be the specifications herein. Electrical rating shall be as indicated on Plans.
Part 3 – Execution

Construction

Provide all excavation, trenching, backfill and surface restoration required for the electrical work.

Trenching shall be to depths as required by Code, particular installation, or as shown on the Plans. Trench width and length as required by the installation or as shown. Trench bottom shall be free of debris and graded smooth. Where trench bottom is rock or rocky or contains debris larger than 1 inch or material with sharp edges, over excavate 3 inches and fill with 3 inches of sand. Separation between new electrical utilities and other utilities shall be 12 inches minimum, except gas line separation shall be 12 inches both vertical and horizontal. Perform crossing of concrete or asphalt only after surface material has been saw cut to required width and removed.

Backfill around raceways shall be 3-inches of pea gravel or sand for systems of 600 volt or less. Provide red marker tape over raceways below grade. Place backfill material to obtain a minimum degree of compaction of 95 percent of maximum density at optimum moisture content. Moisten backfill material as required to obtain proper compaction. Do not use broken pavement, concrete, sod, roots or debris for backfill.

16.10.2 Underground Marking Tape (Detectable Type)

[CSI 33 05 97.23]

Part 2 – Products

Manufacturers

Tape shall be Brady “Detectable Identoline – Buried Underground Tape”, or equal.

Materials

Underground marking tape shall be for location and early warning protection of buried power and communication lines. Tape shall be detectable by a pipe/cable locator or metal detector from above the undisturbed ground. Tape shall be nominally 2 inches wide with a type B721 aluminum foil core laminated between two layers of 5 Mil thickness polyester plastic. The plastic color shall be red for electrical lines and orange for telephone lines.

Part 3 – Execution

Installation

Unless noted otherwise on Plans, approved underground marking tape shall be installed in the trench 12 inches above and directly over the conduit or raceway.
16.10.3 Handholes and Pull Boxes

[CSI 33 71 19.13]

Part 2 – Products

Manufacturers

Handholes and Pull boxes shall be Utility Vault Co. or approved equal unless specified otherwise on the Plans.

Materials

Provide handholes of reinforced precast concrete, or injection molded composite plastic material. Handholes shall include a base, a body, extensions and a cover. Handholes with a perimeter of 10 feet or more (e.g., 3 feet by 2 feet) shall have both pulling irons and cable racks. All hardware shall be stainless steel, or hot-dip galvanized after fabrication; cable racking and hardware, however, shall be non-metallic and corrosion resistant. If no handhole size is shown on the Plans, size units per NEC or provide 12 inches by 24 inches by 18 inches deep, whichever is larger.

All handholes located in areas subject to vehicular traffic or where identified on Plans shall be ASSHTO, H-20 rated in accordance with ASTM C857.

The lids to all pull boxes and vaults shall be permanently marked for its intended use, “signal” for all signal and instrumentation handholes and “electrical” for all power handholes. Letter shall be a minimum of 3-inches high.

Part 3 – Execution

Installation

Conduits entering handholes shall have grounding bushings installed and the conduit ends shall be sealed with Permagum sealing compound. Where conduits enter through sides of handholes, the penetration shall be made watertight. Use a core drill wherever it is necessary to drill through concrete. Perform patch work with the same materials as the surrounding area and finish to match.

Pull boxes shall be provided at least every 150 feet on long straight runs. Spacing shall be reduced by 50 feet for each 90-degree bend.

Install handholes flush with finished grade in all paved areas, roadways and walkways. All handhole edges shall be flush with final surface.

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 2 - Products

Components

The grounding systems shall consist of the ground rods, grounding conductors, ground bus, ground fittings and clamps, and bonding conductors to water piping and structural steel as shown on the Plans.

System components shall be as allowed in the NEC unless specified otherwise below:

1. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods conforming to ASTM B228. The welded copper encased steel rod shall have a conductivity of not less than 27 percent of pure copper.

2. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded. Coat all ground connections except the exothermic welds with electrical joint compound, non-petroleum type, UL listed for copper and aluminum applications.

3. Ground Rod Boxes: Boxes shall be a 9-inch diameter precast concrete unit with hot-dip galvanized traffic cover. Boxes shall be 12-inches deep minimum. Covers shall be embossed with the wording “Ground Rod”.

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.

Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

Provide a ground rod box for each ground rod to permit ready access to facilitate testing.

Provide a ground wire in every conduit carrying a circuit of over 110 volts to ground.

Make embedded or buried ground connections, taps and splices with exothermic welds. Coat ground connections.

Bond metallic water piping at its entrance into each building.

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.
Vault and Handhole Grounding

Exposed non-current-carrying metal parts of equipment, conductor supports or racks, conduits and other metal appurtenances, including any metal cover and its supporting ring, shall be bonded together and connected to a common ground. The size of the grounding means shall be as prescribed in the NEC. Where the grounding means is exposed, the grounding conductor shall be not smaller than #8 AWG copper.

Ground Connections

Above grade ground connections shall be exothermic weld, mechanical, or compression-type connectors; or brazing.

Below grade ground connections shall be exothermic weld.

Install all ground connections is strict accordance with connector manufacturer’s recommendations and methods.

Testing

Following completion of the grounding electrode system, if installed, measure ground resistance at each ground rod using the three-rod method. Submit results to engineer prior to final acceptance by the Owner.

Perform testing per NETA Standard ATS paragraph 7.13. Testing methods shall conform to NETA Standard ATS using the three-electrode method for large systems. Conduct tests only after a period of not less than 48 hours of dry weather.

Furnish to the Engineer a test report with recorded data of each ground rod location. See Division 16.95.4.

16.20 UTILITY SERVICE

16.21 Electrical Service

[CSI 26 21 00]

Part 1 – General

Description of Work

Work consists of installation of a new 400 amp, 480-volt, 3 phase underground service, pad-mounted transformer and service entrance equipment.

Scheduling Work with the Utility Company

The Contractor shall be fully and completely responsible for all scheduling and coordination with the utility company. The Contractor shall coordinate and schedule power outages, power service for operation and construction, and power service as may be required prior to Certification of Occupancy.

The Contractor shall make all necessary applications for service with the utility and shall notify the Owner in writing of any obligations that the Owner must fulfill for service to be started, installed, or modified.
Contractor/Utility Interface Responsibilities

The electrical utility providing service to these facilities is Puget Sound Energy.

During design, contact was made with Project Manager, Lonnie Adams, who can be contacted by telephoning (360) 764-6738. The division of responsibilities stated below has been determined by coordination with the serving utility. The Contractor shall comply with all utility company standards and requirements.

All utility charges for and related to the final permanent service to the facility will be paid by the Owner, directly to the utility company and shall not be included in the Contractors bid price.

Contractor shall notify the Engineer/Owner of any changes to the responsibilities between the electrical utility and the Contractor as outlined in these specifications prior to submitting a bid. Any change(s) in responsibilities not brought to the attention of the Engineer prior to bidding will not be cause for additional payment.

The Contractor shall notify the Owner (in writing) of any obligations or forms that the Owner is responsible to provide for service.

The Contractor shall:

Install new raceway and conductors for secondary service from the proposed pad-mount transformer location to the proposed current transformer enclosure and service disconnect including trenching, backfill and restoration. Terminate service conductors at the service entrance disconnect.

Install utility meter enclosure, raceway, and conductors for utility revenue metering as shown on the Plans.

Provide trench, backfill, and restoration for installment of the underground primary power from the existing conduit stub-up to the proposed pad-mount transformer including excavation for the utility workpit.

Provide excavation, backfill, and restoration required for installment of the pad-mount transformer vault along with other electrical handholes and vaults.

The Contractor shall meet all the standard requirements for working in the right-of-way which includes a utility representative on site during work within the right-of-way. The Contractor shall be responsible for paying all cost for the representative to be on site.

The Utility Company shall:

Install new primary raceway and conductors from the primary service to the proposed pad-mount transformer including all raceways, conductors, and cable terminators. Trench, backfill, and restoration shall be provided by the Contractor.

Install new pad-mount transformer and transformer base with vault. Excavation and restoration shall be provided by the Contractor.

Terminate conductors on the primary and secondary side of the transformer.

Install current transformers (CT) in CT cabinet installed by the Contractor.
Install a utility revenue meter in the proposed main revenue metering enclosure installed by the Contractor.

Project Conditions
Before submitting a bid, the Contractor shall become familiar with all the electrical service requirements that may affect the execution of their work.

Standards and Codes
Work involving service installation shall be done in accordance with the service utilities standards and the NEC.
Service equipment shall be listed and labeled by UL as “suitable for use as service equipment”.

16.21.2 Electrical Utility Meter Enclosure
[CSI 26 27 13]
Manufacturers
Meter enclosure shall be a Circle AW or equal and as required to meet the requirement of the serving utility. Installation shall be in vandal proof NEMA 3R enclosure with a lockable hinged door. Meter shall include a metal vandal screen that can be purchased from serving utility.

Materials
Contractor shall coordinate with Puget Sound Energy on the type of metering required and shall provide all labor and material necessary to meet Puget Sound Energy requirements.

16.21.4 Circuit Breaker Service Disconnect Switch
[CSI 26 28 16.13]
Design
The switch shall be heavy duty type, shall be quick-make, quick break, and shall be horsepower rated. The switch shall have blades as required to open all ungrounded conductors. The disconnect shall have a minimum available fault current withstand rating of 42,000 amperes unless noted otherwise on the Plans.
Service equipment shall meet the requirements of the serving utility and shall be suitable for use as service equipment. Service entrance disconnect shall be furnished with a UL service entrance label.

Manufacturers
Materials, equipment, and accessories specified in this section for the service disconnect switch shall be products of:

- Eaton (Cutler Hammer)
- ABB (General Electric)
- Schneider Electric (Square D)
- Siemens
• Or approved equal

**Materials**

The switch shall be pad-lockable in both the OFF or ON position.

The enclosure shall be NEMA 4X rated unless noted otherwise on the Plans. The enclosure shall have interlocking cover to prevent opening door when switch is closed. The interlock shall include a defeating scheme. The enclosure shall be pad-lockable.

Circuit breakers shall be molded case electronic trip type and meet molded case circuit breaker specifications covered in Division 16.55.16.

**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.

**16.32 Sensors and Controls**

*[CSI 40 70 00]*

**16.32.1 Common Work for Sensors and Controls**

*[CSI 40 70 05]*

**Part 1 - General**

**Design Requirements**

Provide sensors and controls scaled and rated for their intended 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, central to the room unless allowed otherwise by the Engineer.

**16.32.2 Pressure and Level Sensors and Controls**

*[CSI 40 72 00, 40 73 00]*
16.32.2.4 Clean Water Level Float Switches

[CSI 40 72 76.15]

Part 2 – Products

Manufacturers

The float switch shall be an NSF Standard 61 rated Model SJE MilliAmpMaster Float as manufactured by SJE Rhombus, or equal.

Manufactured Units

Float switch body shall be constructed of high impact, corrosion resistant, polypropylene housing measuring not less than 2¾-inch in diameter. A long life, high reliability, potted SPST magnetic reed switch rated for not less than 100 VA at up to 250 Volts shall be mounted inside the float and connected to a multi-stranded, two (2) conductors plus ground, 18 gauge, CPE jacketed cable. The cord shall have fine strand conductors (Not more than 34 Gauge) made especially for heavy flexing service. The cable connection point shall be potted in epoxy providing a strong bond to the float and reed switch forming a water/moisture tight connection.

Part 3 – Execution

Installation

Level switches shall be normally closed type and provided for the following:

- Overflow Pond High Level
- Reservoir High Level
- Reservoir High-High Level

The Contractor shall provide a high level backup float. A flexible Neoprene sleeve, not less than ⅛-inch thick, shall be provided over the CPE jacketed cable extending not less than 5 inches from the top of the mounting bracket extending down through the cable mounting bracket hinge point to the top of the float switch body, providing cable stress point relief and extended operational life.

16.35 Control Panel Accessories

16.35.2 Nameplates

[CSI 26 05 53, 10 14 23]

Part 2 – Products

Manufactured Units

Standard nameplates shall be made of ¼-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.

16.50 PANELBOARDS

[CSI 26 24 00]

16.52 Panelboards

[CSI 26 24 16]

Part 1 - General

Description of Work

This section covers the furnishing and installation of all panelboard equipment complete.

Quality Assurance

Provide products specified in this Section that are listed and labeled as defined in NEC Article 100.

Standards and Codes

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.
All material and equipment specified herein shall conform with all applicable NEMA, ANSI, and IEEE standards.

All materials and equipment specified herein, and their installation methods shall conform to the latest published version of the NEC.

**Part 2 – Products**

**Manufacturers**

Materials, equipment, and accessories specified in this section shall be products of:

- Eaton/Cutler-Hammer
- Schneider Electric/Square D Company
- Siemens

Panelboards shall be of the same manufacturer as equipment furnished under Section 16.50, Low Voltage Motor Control.

**Components**

**Panelboard Type**

1. Panelboards shall be rated at proper voltage and current for intended use with bus bars of copper. Panels shall be 3-phase, 4-wire, 100 percent neutral, with equipment ground bar unless noted otherwise. Panelboards shall be dead front.

**Wire Terminations**

1. Panelboard assemblies, including protective devices, shall be suitable for use with 75 degrees Celsius or greater wire insulation systems at NEC 7 degrees Celsius conductor ampacity in accordance with UL 486E.

**Load Current Ratings**

1. Unless otherwise indicated, load current ratings for panelboard assemblies, including bus and circuit breakers, are non-continuous as defined by NEC. Continuous rating shall be 80 percent of non-continuous rating.

2. Where indicated “continuous”, “100 percent”, etc., selected components and protective devices shall be rated for continuous load value shown.

3. The following interrupting capacity shall be considered minimum. Other ratings shall be as specified on the Plans.

   - 240V and 208Y/120V Panelboards  \(22,000\) AIC symmetrical
   - 480V/277V Panelboards  \(40,000\) AIC symmetrical

**Overcurrent Protective Devices**

1. In accordance with NEMA AB 1, NEMA KS 1, UL 98 and UL 489, protective devices shall be adapted to panelboard installation.

2. Panelboards shall be capable of device replacement without disturbing adjacent devices and without removing main bus.
3. **Spare Spaces:** Cover openings with easily removable cover.

4. **When not identified on Plans,** provide minimum of 18 single-pole breaker spaces.

**Circuit Breakers**

1. Provide thermal-magnetic unless otherwise indicated, quick-make, quick-break, molded case, of indicating type showing ON/OFF and TRIPPED positions of operating handle. Mount breakers in all panelboards so that the breaker handles operate in a horizontal plan.

2. The bus connection shall be bolt-on circuit breakers in all panelboards. In power distribution panelboards, 225-ampere frame sizes and greater may be plug-in type where individual positive locking device requires mechanical release for removal.

3. **Trip Mechanism:**
   
   a) Individual permanent thermal and magnetic trip elements in each pole.
   
   b) Test button on cover.
   
   c) Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
   
   d) Two and three pole breakers shall have common trip.
   
   e) Automatic opens all poles when overcurrent occurs on one pole.
   
   f) Calibrated for 40 degrees C ambient, unless shown otherwise.

**Ground Fault Circuit Interrupter (GFCI)**

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 5-mA ground fault with 0.025 second (UL 943, class A sensitivity, for protection for personnel).

2. Ground fault sensor shall be rated same as circuit breaker.

3. GFCI shall have a push-to-test button and a reset button.

**Equipment Ground Fault Interrupter (EGFI)**

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 30-mA ground fault (UL listed for equipment ground fault protection).

**Cabinets for Each Panelboard**

1. Cabinets shall be flush, or surface mounted as indicated on the Plans with tight closing doors without play when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of the same height.

2. Provide cabinets of sufficient dimensions to allow for future expansion and addition of circuit breakers within the panelboards as indicated on the Plans.

3. Provide locks for each cabinet door. All electrical distribution equipment locks are to be keyed identically.

4. Fasten panelboard with machine screws with oval countersunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps assessable only when dead front door is open are acceptable. Surface mounted panelboards with fronts greater than
48 inches vertical dimension shall have trim hinged at the right side in addition to the hinged door over dead front.

5. Material for Type 1, Type 3R, and Type 3S cabinets shall be code-gauge, hot-dip galvanized sheet steel with reinforced steel frame.

6. Finish all enclosures with rust inhibitor primer followed by manufacturer’s standard gray baked enamel or lacquer.

**Bus**

1. Material for internal bus shall be full size copper throughout length. Provide for mounting of future protective devices along full length of bus regardless of number of units and spaces shown. Machine, drill and tap as required for current and future positions.

**Feeder Lugs**

1. Main and neutral feeder lugs shall be replaceable, bolted mechanical or crimp compression type.

**Equipment Ground Terminal Bus**

1. Provide copper equipment ground terminal bus with suitably sized provisions for termination of ground conductors. The terminal bus shall be bonded to the enclosure.

2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.

3. Provide individual termination points for all other grounding conductors such as feeder, grounding electrodes, etc.

**Neutral Terminal Bus**

1. Provide copper neutral terminal bus with suitably sized provisions for termination of neutral conductors. The neutral bus shall be isolated from the enclosure.

2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.

3. Provide individual termination points for all other neutral conductors.

4. Termination points shall be bolted crimp compression lugs for conductors 6 AWG or larger.

**Part 3 – Execution**

**General**

Install in accordance with NECA 407, NEMP PB 1.2 and manufacturers’ written installation instructions.

**Installation**

Install securely, plumb, in-line and square with walls.

Install top of panelboard trim 72 inches above floor, unless otherwise shown. Install panelboard so tops of protective device operating handles are no more than 72 inches above the floor.
Install filler plates in unused spaces.

**System of Numbering and Bus Arrangement**

System numbering and bus arrangement shall be as shown on the panel schedule on the Plans.

**Panelboard Nameplate**

Provide engraved plastic nameplate with ½-inch high characters for panel identifications (for panel name) attached with screws to each panelboard front. Include voltage, phase and wire (i.e., 208Y/120, 3-phase, 4-wire) in ⅜-inch characters.

**Circuit Index**

Provide as-built information for each branch circuit panelboard by circuit with its proper load designation.

**Ground Fault Protection**

Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289.

**16.55 Switches and Protective Devices**

*[CSI 26 28 00 (low voltage)]*

**16.55.1 Common Work for Switches and Protective Devices**

*[CSI 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 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.

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.
16.55.17 Instantaneous Magnetic Trip Breakers

[CSI 26 28 16.15]

Part 1 - General

Design Requirements

The magnetic trips shall be adjustable and accessible from the front of all these breakers.

Part 2 - Products

Manufactured Units

Breakers in motor circuits which are indicated but not sized, shall be provided with Manufacturer’s recommended size based on the actual motor installed. Where indicated on the Plans and in the combination motor starter/motor control center schedule, furnish instantaneous magnetic trip only circuit breakers for motor short circuit protection.

16.55.18 Disconnect Switches

[CSI 26 28 16.17]

Part 1 - General

Design Requirements

Furnish and install disconnect switches conforming to NEMA KS 1, type HD, sized for the ampere and voltage as shown on the Plans and as required by the NEC and nameplate requirements of the equipment served.

Part 2 - Products

Manufactured Units

The switches shall be 600-volt type and horsepower rated. Auxiliary contacts shall be provided as indicated on the Plans.

Part 3 – Execution

Installation

Provide additional disconnects if required by Code.

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. 120/208 Volt, 3 Phase: Red, black and blue.

2. 277/480 Volt, 3 Phase: Yellow, brown and orange.

3. 120/240 Volt, 1 Phase: Red and black.
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. Contractor may use solid copper conductors for lighting and receptacle circuits using screw-type terminals. Size as noted on the Plans.
3. 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.
2. Underground Splices: All underground outdoor splices when approved by Engineer shall be completed in an accessible pullbox or handhole using an approved watertight epoxy resin splice kit rated for the application up to 600 volts. Splices will not be allowed to be direct buried.

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.

Fiber Optic Cable

1. Fiber optic cable shall be OM3 50/125 multimode fiber cable. Cable jacketing shall be orange and OFNR riser rated for vertical-run and general use. Provide cable with high grade PVC molded strain relief. Each fiber optic cable shall have an LC type connector for termination at Ethernet switches and fiber optic patch panels. Cables shall be listed and marked in accordance with the requirements of the NEC.

Cat 5E Ethernet Cable

1. The Ethernet cable shall be shielded 600V UL rated. The use of a 300V rated cable is not acceptable. All Ethernet cable terminating outside of a telemetry panel shall be grounded at the telemetry panel only.

2. Ethernet cables shall be industrial type Ethernet cable and UL listed for installation in the Motor Control Center. Ethernet cables shall be Allen-Bradley Ethernet Cable with metal In-cabinet RJ45 Connectors, 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.

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. PVC Coated Rigid Steel Conduit (PVC-GRS): PVC coated conduit shall meet the GRS standard above plus have a 40 Mil PVC factory applied PVC coating.

3. Nonmetallic Conduit: Nonmetallic Conduit shall be rigid PVC, Schedule 40 (PVC-40) or 80 (PVC-80). PVC conduit installed above grade shall be Schedule 80 extra heavy wall 90 degree Celsius. UL listed for aboveground use and UV resistant. Conduit shall be gray in color. Fittings shall be of the same material as the raceway and installed with solvent per the Manufacturer’s instructions. Conduit, fittings, and solvent shall all be manufactured by the same Manufacturer.
4. 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.

5. Electrical Metallic Tubing (EMT): EMT shall be UL 797 and ANSI C80.3; steel tubing, hot dipped galvanized. EMT fittings shall be ANSI/NEMA FB 1; steel, rain tight, insulated throat, compression type.

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.
4. EMT for above-grade lighting circuits.

ABOVE GRADE CONDUITS (wet or corrosive areas, NFPA 70 hazardous areas) shall be:

1. PVC-GRS for power and control wiring.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.
CONCEALED ABOVE GRADE CONDUITS shall be:
1. GRS for all wire and cable types in wood stud frame walls.
2. PVC-40 for power and control wiring in concrete block or brick walls.
3. PVC-40 for instrumentation and telecommunications wiring in CMU or brick walls.
4. GRS for motor leads from VFDs in CMU or brick walls.

BELOW GRADE CONDUITS IN DIRECT EARTH (not under slabs-on-grade) shall be:
1. PVC-40 for power and control wiring.
   a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

UNDER SLABS-ON-GRADE CONDUIT shall be:
1. PVC-40 for power and control wiring
   a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

CONCRETE-ENCASED CONDUITS shall be:
1. PVC-40 for power and control wiring
   a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-40 for instrumentation and telecommunications wiring.
   a) Sweeps and risers for transition of PVC from concrete-encasement to above grade shall be PVC-GRS.
3. PVC-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.
2. Connection to equipment outdoors or in corrosive areas shall be with non-metallic liquidtight flexible conduit (except for motor leads from VFDs shall be flexible metallic.)

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
   b) Wireway: 4-inch by 4-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.

Conduit encasement or embedment in the earth shall be separated from the earth by at least 3-inches of concrete unless otherwise shown on the Plans. Plastic conduit spacers shall be located five feet on centers. The spacers shall be secured to the conduits by wire ties. The conduits shall be watertight.

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.

Install explosion-proof seal-offs in hazardous areas shown on the Plans and as required by the NEC.

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.

16.72 Boxes and Enclosures

16.72.2 Outlet and Junction Boxes

[CSI 26 05 33.16]

Part 1 – General

Design Requirements

In corrosive areas, all junction boxes shall be NEMA 4X.

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.

All junction boxes and enclosures shall have tamper resistant screws.

Finishes

Where only cast aluminum is available for certain types of fixture boxes, an epoxy finish shall be provided.
16.72.3 Watertight Enclosures

[CSI 26 05 33.17]

Part 2 – Products

Manufacturers

The watertight enclosure shall be equal to Hoffman.

Materials

Watertight enclosures for vault electrical outlets shall be molded from fiberglass reinforced polyester material. A hinged cover shall be gasketed and opened with quick release latches. The conduit penetrations shall be sealed watertight.

All enclosures shall have tamper resistant screws.

Part 3 – Execution

Installation

An epoxy plug shall be installed in the conduit to prevent the migration of water into the conduit. The enclosure shall be NEMA rated and installed per all applicable codes.

16.75 Wiring Devices

[CSI 26 27 26]

16.75.1 Common Work for Wiring Devices

[CSI 26 27 26]

Part 3 - Execution

Installation

Wiring Devices

1. Position of Outlets: All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room or outside the structure. Device outlets shall be set plumb and shall extend flush to the finished surface of the wall, ceiling or floor without projecting beyond the same.

2. Unless otherwise noted, wall mounted outlet devices shall generally be 24-inches above the floor, 18 inches in architecturally treated areas, above process piping near process valve boards. Switches shall be 48 inches above the finished floor unless otherwise noted.

Installation of Wall Plates

1. Interior Dry Locations: Install plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filled will not be permitted. Do not use oversize plates or sectional plates.

2. Exterior and/or Wet Locations: Install plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. For receptacle devices, these
plates shall maintain the weatherproof rating with an attachment plug inserted and be rated extra-duty. Cover type shall match box type.

Testing

After installation of receptacles, circuits shall be energized, and each receptacle tested for proper ground continuity, reversed polarity, and/or open neutral condition.

GFI receptacles shall be tested with the circuits energized. Devices shall be tested with a portable GFI receptacle tester capable of circulating 7.5 milliamperes of current, when plugged in, between the “hot” line and “ground” to produce tripping of the receptacle. Resetting and tripping shall be checked at least twice at each GFI receptacle.

Submit results of all field testing to the Engineer for review.

16.75.2 Receptacles

[CSI 26 27 19]

Part 1 – General

Design Requirements

Receptacles shall be heavy duty, high abuse, grounding type conforming to NEMA configurations, NEMA WD1 and UL 514 Standards.

Part 2 – Products

Materials

Single and Duplex Receptacles

1. Indoor Clean Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-15P plug caps. Receptacles shall be Hubbel 5362, General Electric 4108-2, or equal. Color shall be brown in industrial areas and ivory or white in office and laboratory areas.

2. Outdoor, Process, or Corrosive Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant, marine duty with yellow polycarbonate weatherproof lift covers. Receptacles shall be Hubbell 53CM62/53CM21 or equal.

GFI Receptacles

1. Device shall be rated 20 amp, 2-pole, 3-wire, 120-volt, conforming to NEMA WD1.10 configuration. Device shall have a test and reset push buttons. GFI device shall be Hubbell 5362 or equal.

Surface Multiple Outlet Assemblies

1. Units shall have outlets on center-to-center spacing as shown on the Plans. Assembly shall conform to Article 353 of the NEC.
16.75.3 Line Voltage Switches

[CSI 26 27 26.21]

Part 2 – Products

Manufacturers

- Sierra Electric
- Monumental Grade, Catalog No. 5721
- Daniel Woodhead 1900 series
- Or Equal

Materials

Line Voltage Types: Switches shall be rated 20 amps at 120 or 277 volts AC only. Units shall be flush mounted, self-grounding, quiet operating toggle devices. Handle color shall be brown in industrial areas and white or ivory in office or laboratory areas. Units shall conform to Federal Specifications W-S-896 D and E, UL 20, and NEMA WD1 standards.

16.75.4 HOA (Hand-Off-Auto) Lighting Switches

[CSI 26 27 26.23]

Part 2 – Products

Manufacturers

- Bryant No. 4925 or Equal

Materials

HOA Switch (Lighting): Switches shall be rated 20 amps at 120 volts AC, 3-position toggle, positive action with “center-off” maintained contact, double pole.

16.75.5 Plates

[CSI 26 27 26.31]

Part 1 – General

Design Requirements

Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform to NEMA WD1, UL 514, and ANSI C73. In noncorrosive indoor areas, device plates shall be made of sheet steel, zinc electroplated with chrome finish.

Device plates in corrosive or outdoor areas shall be corrosion-resistant/marine-duty type with weather protective double doors. Device plates for explosion-proof equipment shall be factory provided with the equipment.
Part 2 – Products
Manufacturers
As manufactured by
- Crouse-Hinds
- Appleton
- Or Equal

Components
Device plates shall be provided with engraved laminated phenolic nameplates with \( \frac{1}{8} \)-inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single-phase.

16.85 Lighting
[CSI 26 50 00]

16.85.1 Common Work for Lighting Fixtures
[CSI 26 50 05]
Part 1 - General
Design Requirements
Fixtures shall be a standard, cataloged item general description as called for on the Plans. All fixtures shall be UL approved and so labeled. Provide suitable supports and mountings.

Part 2 – Products
Manufacturers
As shown on Plans. Equals will be accepted.

16.85.2 Lamps
[CSI 26 06 50 or 26 50 06.13]
Part 1 - General
Design Requirements
Provide all lamps as specified. Refer to the Lighting Fixture Schedule on the Plans for the ordering information on lamps. Fluorescent lamps shall be standard type, not energy efficient type due to low temperature conditions. Lamps shall be new at the time of acceptance. Lamps shall be provided for all lighting fixtures.
Warranty
Lamps that fail within 90 days after acceptance by the Owner shall be replaced at no cost to the Owner.

Part 2 – Products
Manufacturers
Approved manufacturers:

- Westinghouse
- Sylvania
- G.E.

16.85.3 Fixtures
[CSI 26 06 50.16 or 26 50 06.16]

Part 1 - General
Design Requirements
Fixtures shall be of the types, wattages, and voltages shown on the Plans, comply with UL 57, and shall be UL classified and labeled for intended use. Fixtures for use in hazardous locations shall be UL listed per UL Standard 844.

16.85.4 Ballast
[CSI 26 50 06.18]

Part 1 - General
Design Requirements
Fluorescent lamp ballast shall be UL “P” rated. Ballast shall be CBM certified and bear the UL label. Ballast shall be General Electric Maxi-Miser II, Advance Mark II, or equal.

Ballasts in luminaries for exterior use shall provide reliable starting of lamps at 0 degrees Fahrenheit at 90 percent of the nominal line voltage. All locations, other than totally enclosed rooms, shall be considered exterior.

Warranty
Ballasts producing excessive noise (above 36 dB) or vibration will be rejected and shall be replaced at no expense to the Owner.

16.90 POWER GENERATION
[CSI 26 30 00]

16.91 Engine Generator
[CSI 26 32 13]
16.91.2 Diesel Engine Generator Set

[CSI 26 32 13.13]

Part 1 - General

Scope of Work

The work covered by this specification consists of furnishing, delivering, and installation of a diesel-driven 300kW stand-by generator. The unit will be a 480/277 volt, three-phase, four-wire, 60 Hz, stand-by generator with an outdoor enclosure and internal double-walled with electronic leak detection fuel tank. The generator will be used for stand-by power for the Bonney Lake 950 Zone Tank & 950 Zone/1010 Zone Booster Pump Station. Tacoma Water requests that bids be submitted in accordance with these specifications for the provision of a stand-by engine generator unit that has been prototype tested, factory built, production tested, and that is of the latest commercial design, together with all necessary accessories, for a complete installation.

General

All equipment shall be new and unused and of the latest models.

The generator set (genset) shall include a diesel engine, double-walled with electronic leak detection fuel tank, generator/alternator, control panel, starting batteries, regulated battery charger, critical exhaust silencer, sound attenuated and weather protection enclosure, inlets/receptacles and extension cords, etc., as specified herein.

The system in its entirety shall be designed, built, tested and shipped by the Manufacturer, as to provide a single-source responsibility. Components of different manufacturers will be accepted in the assembly of the genset; however, the successful bidder shall bear the responsibility for the entire genset units. The Manufacturer shall also provide all other work items not specifically mentioned but reasonably inferred for a complete operational electrical genset.

The genset shall meet or exceed all applicable rules and regulations of the UL, NFPA, NEMA, DOT, CSA, EPA, entity having jurisdiction, but in no case shall be contrary to the laws of the State of Washington and/or the Federal Government.

Any part of the work not specifically covered by these Specifications shall comply with applicable sections of the latest American Public Works Association (APWA) Standard Specifications, including the City of Tacoma Supplement, and the latest American Water Works Association (AWWA) Standard Specifications, National Electric Code (NEC), The Uniform Fire Code (U.F.C.), Underwriter's Laboratories (UL), the laws of the State of Washington and Tacoma Power and Tacoma Water Standards.

Engineer Approved Equal

When the statement “or Engineer approved equal” is made on the Drawings or in the Specification, it shall mean a like product, of equal quality, suitability, reliability, performance, and dimension to the specified item or product.

If the Engineer does not consider the proposed substitute item or product an approved equal, it may be rejected. The decision of the Engineer is final.
Pre-Bid Submittal

In order for alternate equipment to be considered an Engineer Approved Equal, the Bidder shall make a prebid submittal.

When the Bidder chooses to offer an alternate item or product, he shall submit complete supporting technical and physical data, including drawings, diagrams, catalog cuts, manufacturer's specification sheets, laboratory tests, photographs, samples, the address and phone number of the nearest representative, and any other information which will allow the Engineer to accurately evaluate the item or product as equal.

Substitutions and alternate equipment will be considered prior to the bid opening if the Bidder submits his request for substitution not less than ten (10) working days prior to the date set for bid opening.

All substitution requests shall be submitted using the Substitution Request Form included in this specification and shall be sent to Tisha Rico, Senior Buyer, at trico@cityoftacoma.org. Substitution requests not received by the named individual will not be evaluated and not be allowed as a substitution prior to bidding. An addendum listing such approvals will be issued prior to bidding.

Bidders who do not receive prior approvals, in writing, of Engineer Approved Equals must base their bids on the items specified.

Submittals

Before any material is fabricated or shipped, the Manufacturer shall electronically submit (or five (5) paper copies) to the Engineer a set of submittals as part of bid package including a complete set of equipment brochures, technical data, full details, shop Drawings, dimensions, catalog cuts, schematic (elementary) diagrams and other descriptive matter as required to fully describe the exact equipment proposed to be included in this contract. The names, addresses, and phone numbers for the representative of each item shall also be included.

Should any item that deviates from these Specifications be included, the deviation shall be clearly indicated and explained at the time of submittal.

Submittals shall be complete, neat, orderly and indexed. The manufacturer shall check submittals for number of copies, adequate identification, correctness and compliance with the Specifications.

The City shall be notified at least one (1) week prior to starting fabrication. The City reserves the right to have an inspector present during fabrication.

Complete information must be provided for individual components. Review of submittal information by the Engineer shall not relieve the Manufacturer of responsibility for meeting the requirements of the Specifications, or for errors and omissions in submittals. Reviews by the City do not constitute an undertaking on the part of the City to assure or determine compliance with the Specifications.

Manufacturers

It is the intent of these Specifications to obtain a “high quality” stand-by generator set. Only bids from Manufacturers with substantial experience and a successful performance record will
be considered in awarding the contract(s). The Manufacturer shall have at least ten (10) years of experience and have manufactured 50 units of similar design. Manufacturers must present evidence at the time of opening bids that they have had experience in the kind of work to be performed. The Manufacturer must have a nationwide distribution network through a distributor/dealer organization. Diesel generator sets assembled by local engine distributors will not be accepted. The Manufacturer may be asked to provide a list of generator units and clients served.

The City reserves the right to consider the qualifications of the Manufacturer, based upon their Construction Record, and to check references prior to making an award.

**Compliance with Specifications**

Components that do not comply with any part of these specifications shall be rejected and the vendor shall, at its own expense including shipping, replace the rejected components with components that comply with these specifications. If these specifications are not satisfied, the Water Division may terminate the contract.

**Workmanship**

Work shall be performed in a quality manner, by craftsmen skilled in the particular trade, according to the best method known for each craft and the most current engineering practices. Work shall be performed in accordance with the engineer-approved specifications, manufacturer's recommendations, and the best practices of the trade. Completed work shall present a neat and finished appearance. Workmanship that does not comply with these specifications or violations of safe labor practices may result in termination of the contract.

**Warranty (Modifies General Provision 2.09)**

Warranty on all component parts of the generator unit, except batteries and other incidentals (e.g. bulbs, fluids, etc.) shall be extended for a total of five (5) years unless extended pursuant to General Provisions 2.09B and C.

**Start-up/Training Session**

The Manufacturer shall include as part of their lump sum bid a start-up/training session for the City of Tacoma operating personnel. The Manufacturer shall have a representative for the generator set present at this session to cover all start-up, operation and maintenance procedures. The session shall last a minimum of 4 hours for each generator.

All defects in materials, workmanship or functionality which appear during start-up shall be immediately corrected by the Manufacturer as required.

**General Design Criteria**

The Manufacturer shall provide a skid-mounted Stand-by Diesel Generator with outdoor sound attenuated enclosure and internal double-walled fuel tank with electronic leak detection set to be used for stand-by power. The Diesel Generator shall be a 4-cycle, 1800 rpm, diesel genset with a low reactance brushless alternator, with PMG three-phase sensing and automatic torque-matching regulator to prevent engine overload and stalling. The generator set shall include a set-mounted control panel, high ambient radiator cooling system for operation at full load up to 50 degrees centigrade, 122 degrees Fahrenheit. The genset supplier shall provide and include four-point lifting eyes mounted on the skid base or fuel tank assembly for
the attachment of a single point lifting assembly. The gensets shall be Cummins, Caterpillar, Kohler, or Engineer approved equal.

The genset dimensions shall not be larger than the scaled generator shown on the plans.

**Operation and Maintenance Manuals**

Before any material is fabricated or shipped, the Manufacturer shall provide an electronic copy of an Operation and Maintenance manual to the Engineer for approval. The manual shall include operating and maintenance manuals, maintenance and repair instructions and a complete and detailed parts list with complete part numbers for exact equipment furnished. The Contractor shall remove any language from the manual that is not pertinent to the exact equipment the City is receiving. The Manufacturer shall also furnish the city with full details, shop Drawings, catalog cuts, electrical schematic Drawings and wiring diagrams in the electronic submittal. Once the City has approved the electronic copy, the Manufacturer shall provide the city with four (4) hard copies of the Operations and Maintenance manual and 1 copy of the manual electronically for each generator. The manual shall be complete, orderly, indexed and neatly bound in a hard-covered, three (3) ring binder. The Manufacturer shall check the manuals for number of copies, adequate identification, correctness and compliance with the Specifications and shall initial all copies. A copy of this Specification shall be included with each manual.

Each manual shall also include a copy of the Manufacturer’s Warranty and a Certified Operational Test Report as required in this Specification.

If revisions to the manuals are required, the Manufacturer shall return to the City all revised pages for each manual so the City may update its remaining manuals.

The Manufacturer shall provide data and configuration register maps for the generators Modbus TCP/IP or PROFINET interface.

**Provisions and Requirements**

The intent of this specification is to specify an integrated self-contained generator. The purpose of the gensets is to provide stand-by power for the Bonney Lake 950 Zone Tank & 950/1010 Zone Booster Pump Station. It shall start, run and operate at the rated load as needed.

**Rating**

The generator sets shall be rated to deliver 300kW at 0.8 PF, continuous stand-by for the duration of any normal power outage. The generator sets shall operate at a voltage of 480/277, three-phase, four-wire, 60 Hz. Each genset shall operate at 100% output at any elevation from zero (0) to twenty-five hundred (2500) feet and at ambient temperatures from zero (0) to one hundred (100) degrees Fahrenheit. The gensets shall start, accelerate to governed speed and voltage, and accept full load in one step in accordance with NFPA 110 Level 1. During a power outage, the genset shall deliver its rated output continuously as the sole source of power. The genset shall be designed for safe refueling under full load operation.

The generator specified for this project was sized using Caterpillar Specsizer software. Due to variations by generator manufacturers and the software used by manufacturers for determining the size of a generator, it is the Contractor’s and generator supplier’s responsibility to verify
the size of the generator to ensure that the generator will perform as specified. All sizing reports shall be submitted by the Contractor and approved by the Owner prior to equipment order. If the supplier/Contractor prepared sizing report requires a larger generator than what is specified, the larger generator shall be provided at no additional cost to the Owner. Refer to the table below for load step information and the Plans for electrical load details.

<table>
<thead>
<tr>
<th>Load Step</th>
<th>Load Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>One (1) 3 kW heaters, One (1) 15 kVA three-phase transformer, One (1) 30 kVA three-phase transformer.</td>
</tr>
<tr>
<td>2.</td>
<td>One (1) 125 HP SSRVS Operated Booster Pump</td>
</tr>
</tbody>
</table>

**Coordination**

Coordinate size and location of concrete bases for package engine generator set and fuel tanks. Cast anchor-bolt inserts into concrete bases. Concrete, reinforcement and formwork requirements are specified with concrete.

Coordinate size and location of roof curbs, equipment supports, roof penetrations and wall penetrations for exhaust systems.

**Extra Materials**

A set of specialty tools necessary for routine maintenance of the equipment shall be furnished.

The following spare parts shall be furnished:

- 3 - Sets of fuel filter elements and gaskets
- 3 - Lubricating oil filter elements and gaskets
- 3 - Air cleaner filter elements
- 2 - Complete sets of V-belts including fan and alternator drive belts

**Part 2 – Products**

**Engine**

The engine shall be four (4) cycle, diesel driven, with fan and radiator cooling. The diesel engine shall be Cummins, Caterpillar, Kohler, or Engineer approved equal.

The engine shall perform its rated output and a satisfactory performance on standard diesel fuel No. 2.

**Cooling System**

A mounted radiator and cooling system, complete with cooling fan, shall be furnished as an integral part of the genset. There shall be a flexible ducting between the radiator and the powered discharge louver and powered damper. The discharge duct shall be designed to limit airflow restriction at the design flow in CFM of not greater than 0.5 inches of water. Discharge louver and damper restrictions shall be considered in the duct design. The Manufacturer must include all airflow requirements of the generator set at the specified ambient temperatures.
The cooling system shall be supplied with corrosion inhibitor and ethylene glycol base antifreeze that meet the specified percentage mixture required by the engine manufacturer to protect the engine to a temperature of 0 degrees Fahrenheit.

**Engine Lubrication System**

The engine shall be furnished with a mechanical full pressure oil pump which will provide sufficient oil under pressure to all moving parts. Full flow lube oil filters shall be provided in addition to a bypass valve which allows lube oil circulation in the event of a failure of the filtering system.

**Engine Governing System**

The generator set shall be provided with an electronic governing system which will provide automatic and precise frequency regulation. The governor shall be capable of maintaining a steady state band with variation better than plus or minus 0.25% at any constant load from zero to one hundred percent load. The governor shall include adjustment controls for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while starting.

**Engine Starting System**

The engine shall include an electric 12 or 24 VDC starting motor, sufficient to complete three cranking periods without overheating. Each cranking period shall be 15 seconds with a 15-second rest period. The engine control switch shall be with the control panel and equipped with three positions: automatic, off, and manual.

**Water Jacket/Lubrication Oil Heater**

A unit-mounted, adjustable, thermostatically-controlled water jacket heater shall be provided. To assure rapid starting, the heater shall maintain a temperature of 70 to 100 degrees Fahrenheit at the specified ambient temperature. Coolant heater shall be single-phase, 60 Hz and rated for 208 volts, 1-phase. The coolant heater shall be specifically designed for proper ventilation.

**Generator**

The AC generator shall be synchronous, four pole, 2/3-pitch winding and directly connected to the engine with flexible drive disc. The temperature rise of the alternator at full load shall meet NEMA MG1-1.65 standards for Class H insulation systems and shall not exceed 120 degrees centigrade. The generator must meet UL, NEMA and other regulatory requirements.

A Permanent Magnet Generator (PMG) shall provide an enhanced motor starting and fault-clearing short circuit performance. The PMG shall be capable of sustaining and regulating current supplied to a single-phase or three-phase fault at approximately three (3) times rated current for 10 seconds.

**Voltage Regulation**

An automatic voltage regulation shall be included with the genset to match the generator characteristics. The regulator shall have a solid-state design, temperature compensated type with over-voltage and over-excitation protection. Regulation shall provide a minimum of plus or minus 0.5% for any load from no load to the rated load. Random voltage variation shall
not exceed plus or minus 0.5% with any steady state load. A voltage adjust potentiometer with a range of plus or minus five percent of the output voltage shall be included with the generator.

Three-phase RMS sensing shall be included with the voltage regulator. A permanent magnet generator shall supply excitation power and coordinate with system overcurrent devices. Voltage wave form deviations shall be equal to or less than that as defined by NEMA standards.

**Output Circuit Breaker**

The unit shall be provided with a Power Terminal Cabinet with an installed three pole circuit breaker rated for the full output of the unit. The output terminals of this circuit breaker shall be of the type to accept single or parallel copper conductors sized for full load operation. The Power Terminal Cabinet shall be oversized for the speed and ease of terminating the output conductors.

**Controls**

All engine controls, signal lights, gauges and generator instruments shall be incorporated in a single NEMA 1 enclosure for simplicity and convenience of operating personnel. It shall be shock mounted over the alternator, or other suitable location. The control panel shall include an Ethernet switch for remote communications to the generator control panel and battery charger.

A. The genset shall include the following control:

2. Emergency stop switch, mushroom push-button
3. Reset switch
4. Panel Lamp switch
5. Test button/switch for indicating lights

B. The genset shall have the following metering:

1. A digital meter set displaying generator RMS voltage and current, frequency, output current, kilowatt hours and power factor. It shall also include engine oil pressure, engine coolant temperature, engine oil temperature, engine speed, number of operating hours, battery voltage, and number of starting attempts.

C. The control panel shall provide an alarm and status display to indicate non-automatic generator status, and existing warning and shutdown condition for the following:

1. Low oil pressure (alarm and shutdown)
2. Low coolant temperature (alarm)
3. High coolant temperature (alarm and shutdown)
4. Low coolant level (alarm)
5. Fail to start/overcrank (shutdown)
6. High, low and weak battery voltage (alarm)
7. Over speed (shutdown)
8. Over current (alarm and shutdown)
9. Short circuit (shutdown)
10. Over load (alarm)
11. Low fuel (alarm)
12. Engine run indicator
13. Fuel-in-rupture-basin (alarm)

D. The genset shall allow remote monitoring and control through Modbus TCP/IP or PROFINET of, at minimum, the following:
   1. Genset mode select switch (Automatic - Off - Manual) position (read)
   2. Genset operating state (both read and control)
   3. Fault code/type
   4. Engine oil pressure
   5. Engine coolant temperature
   6. Engine speed
   7. Engine run time
   8. Engine battery charger fault
   9. Genset output voltage, current, kW/kVA and power factor.
  10. Genset output frequency
  11. Engine battery voltage and alarms
  12. Fuel level

Sound Enclosure and Exhaust System

The generators will be located in a residential area in the City of Bonney Lake. The enclosure shall provide complete containment and protection of all equipment and components. It shall be constructed at minimum of 14 gauge steel and have sound attenuation that reduces the sound level to a maximum of 75 dB seven meters from the genset operating at full load. It shall have lockable hinged doors on three sides. The access doors shall allow convenient, easy entry to all components on both sides and one end of the housing. The access doors shall be secured by three point padlocking handle devices. The padlock locking shall accept a 3/8” diameter padlock shackle.

The enclosure shall include an exhaust silencer mounted inside the enclosure providing the generator set package proper sound level requirements. The silencer and exhaust system shall include rain cap and rain shield.
Cooling air shall be drawn into the enclosure along the engine and discharged out through a ducted fan discharge at the other end of the enclosure. The inlet shall be filtered so excessive dust, airborne seeds, insects, etc., are not drawn in.

The Manufacturer’s standard color may be used for the coating. All surfaces of metal parts shall be painted and primed and all fasteners shall be corrosion resistant.

**Fuel System**

The Manufacturer shall provide a sub-base fuel tank with the genset. Fuel capacity shall be such that the genset will have a minimum runtime of 72 hours at full load. Fuel tank frame shall have a removable end plate for access to stub-up area. The fuel tank material shall be double walled with electronic leak detection, weatherproof, and coated galvanized steel. A locking fill cap, vent, flexible fuel lines, flexible fuel oil supply and return lines and low fuel level contacts to indicate 20% fuel remaining shall be provided. The fuel tank shall be designed and manufactured with fill cap and vent pipe that allows the genset to be transported with the tank full of fuel without spilling.

The fuel storage tank, fittings, gages and piping shall be supplied and installed in accordance with NFPA applicable codes. The fuel tank shall meet all applicable Underwriters Laboratories (UL), Uniform Fire Code (UFC) and Uniform Mechanical Code (UMC) standards for double walled fuel tanks utilized in this type of application.

The fuel system shall be designed and manufactured for safe refueling while the genset is in operation, without having to shut down the system.

**Battery/Charging System**

The starting batteries shall be of the sealed, lead acid type and shall include electrolyte and hydrometer. Batteries shall be sized to sustain three cranking cycles at zero degrees Fahrenheit. Flexible battery cables shall be provided. The batteries shall be secured in a non-metallic, non-corrosive container.

The battery container shall be equipped with a thermostatically controlled insulated heating system.

The battery charger shall be mounted in the genset enclosure. The charger shall be supplied to maintain the starting batteries in a ready state, to start the generator. The charger shall have overcurrent protection in both the input and output. The charger shall automatically disconnect from the battery while the engine is starting. The charger shall be self-regulating. The current shall be adjustable from 0.05 to at least 15 Amps. There shall be a battery digital display of voltage, current, other status and alarms. Output voltage of the charger shall be matched to the requirement of the genset starting motor.

Input voltage of the charger shall be 120 VAC, supplied from an external source. There shall be an approved weatherproof male receptacle, on the outside of the enclosure, where the battery charger and the battery heating pad will receive their power sources.

Battery Charger shall be a SENS MicroGenius S2 with Modbus TCP/IP network protocol via RJ-45 Port. Connect battery charger to Ethernet switch in generator control panel.
Vibration Isolation

The most common and effective method of vibration elimination in large gensets shall be employed. The engine and generator shall be isolated from the noise silencer, the control cabinet and fuel tank.

Performance Assurance Certification

Three copies of the factory test report shall be provided. The project engineer shall be notified in advance of the testing. The project engineer may be present at the time of the testing.

The generator sets shall be tested, and Performance Assurance Certification shall be completed at the factory on the unit. The test metering shall have an accuracy of 1% or better, and metering used in testing shall be regularly calibrated and traceable to the National Bureau of Standards. The certified test of the engine-generator performance shall be provided and shall include the following (in accordance with MIL STD 705):

1. Full load at rated power factor will be applied
2. Full load at unity, 1.0 PF
3. Recordings of the maximum load carrying capability of the engine generator set
4. Single step load pickup capability
5. Time
6. Amperes
7. Voltage
8. Kilowatts
9. Frequency (and voltage transients at ½ and full rated load)
10. Frequency; at no load, full load rated, and maximum output
11. Short circuit performance (minimum of 5 tests)
12. Regulator range adjust
13. Phase sequence on three-phase
14. Phase voltage balance
15. Rated load at (0.4 PF) to verify the motor starting capability of the engine generator set
16. Resistance of exciter field and stator
17. Insulation test, generator field, exciter armature, exciter field, generator armature
18. Dielectric test, generator armature, generator field, exciter armature, exciter field
19. Safety shutdowns and automatic controls
20. Lube oil pressure
21. Water temperature
22. Battery charge rate
23. Heaters: water jacket, lube oil and battery case
24. Accessories (annunciator panel, chargers, pumps as supplied)
25. Oscillography recording of NFPA 110 single step pickup test

Part 3 - Execution

Installation

Install engine in conformity with the Plans and manufacturer’s instructions and under manufacturer’s direct supervision.

Install ancillary circuits for battery charger, engine heaters, etc. in conformance with the Plans.

Field Testing

The stand-by power system shall be tested after installation in the presence of the Manufacturer’s representative and the Engineer. All functions of the stand-by power system shall be tested to the Engineer’s satisfaction. The system shall be tested under simulated power failure conditions, operated under stand-by power conditions for a minimum period of four hours while connected to the actual load as well as full load testing under simulated load with a load bank provided and connected by the manufacturer. The Manufacturer shall supply all personnel, instrumentation and all other miscellaneous items required to conduct this test and provide a final test report detailing test loads and run times. The Engineer and factory representative shall be notified in writing at least seven working days in advance of the test date.

At the conclusion of the full load test, the system shall be demonstrated to operate in fully automatic mode and all timers and functions verified by simulating a power outage.

Contractor shall provide sufficient fuel for engine generator on-site testing; following completion of testing Contractor shall fill engine generator fuel tank full prior to project acceptance. Supplier shall be responsible for calibration, startup, and initial performance to meet the specifications herein. Supplier shall provide a trained, qualified representative to check installation and connection, perform field tests as indicated, and certify to Owner its performance does meet the specifications.

16.92 Transfer Switches

[CSI 26 36 23]

16.92.2 Automatic Transfer Switch

[CSI 26 36 23]

Part 1 - General

Design Criteria

The transfer switch shall be NEMA 1, 400 Amp rated, and equipped with four poles for normal and emergency service of 480 volts, 60 hertz, 3-phase.

The transfer switch shall be mechanically and electrically held and rated to 480 volts for all classes of load and continuous inductive duty.
The transfer switch shall conform to UL 1008 provisions for Withstand Current Ratings and Closing Ratings. The transfer switch shall be rated at a minimum Withstand Rating of 42,000 Amps.

The switch shall be capable of enduring 6,000 cycles of complete opening and closing at rated current and voltage at a rate of 6 cycles per minute without failure.

The switch shall be double throw inherently interlocked mechanically and electrically to prevent supplying the load from both sources simultaneously. The operating current shall be obtained from the source to which the load is to be transferred. The transfer mechanism shall be of the double break design with solid silver cadmium surface contacts and individual heat resistant arc chambers.

Arc barriers and magnetic blowout coils will also be acceptable if single break contacts are used. The contacts shall be capable of carrying 20 times the continuous rating for interrupting current.

All contacts, coils, etc. shall be readily accessible for replacement from front of panel without major disassembly of associated parts.

**Part 2 – Products**

**Manufactured Units**

The automatic transfer switch shall be supplied by the Manufacturer of Engine generator system and shall either be an ASCO or Cummins Transfer Switch meeting the specification requirements below.

**Components**

The transfer switch shall include the following accessories:

**Undervoltage Sensor**

1. Adjustable solid-state low voltage sensing relays (pick up 85 to 98 percent of normal voltage set at 98 percent; drop out 75 to 100 percent set of 90 percent of pickup setting). Provide for each phase on both utility and backup power sources.

**Time Delay Start and Stop on Drop Out**

1. Solid state adjustable time delay on start (0 to 15 seconds). Set start delay for 15 seconds. Timer will send start signal to gen set CP, where louver timer will allow 15 second delay for louvers to open prior to starting gen set.

**Time Delay Stop**

1. Solid state adjustable time delay (0 to 10 minutes) to allow generator cooldown after normal power is restored and retransfer occurs. Set at 5 minutes.

**Time Delay Transfer and Retransfer**

1. Solid state time delay relay adjustable 2 to 120 seconds for transfer to emergency and 0 to 30 minutes for retransfer to normal. Set at 5 minutes for retransfer to normal. Set at 3 seconds for transfer to emergency.
**With or Without Load Selector Switch**

1. Switch to select exercise with or without station load.

**Normal-Test Switch**

1. Switch such that in the “Normal” mode the transfer switch will operate automatically and in the “Test” mode the generator will start for test purposes. This switch shall work in conjunction with the “With” or “Without” load switch.

**Exerciser Clock**

1. Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide “With” or “Without” load selector switch for the exercise period.

**Closed Transition/Programmed Transition**

1. The load transfer control shall be a passive closed transition capable closed transition switching without hunting to match utility power. The transfer switch shall also have programmed transition capabilities for remaining in the neutral position for an adjustable time of 0.5 to 60 seconds when transferring from on-line power source to the other to allow residual voltages to decay before application of the source. Set at 60 seconds.
   
   a) Position lights for normal and emergency positions indication and for normal and emergency power available.
   
   b) Switch position indication limit switches for normal and generator positions.
   
   c) Provide dry contacts wired to terminal strip for 1) ATS in emergency position, 2) ATS common trouble alarm, 3) Normal Position, 4) ATS Pre-Transfer.

**Power Meters**

A digital 3-phase power monitor with remote capabilities and associated sensors shall be provided as indicated on the Plans. The digital power meter shall be capable of measuring at a minimum the following parameters:

1. Voltage (line-neutral)
2. Voltage (line-line)
3. Voltage unbalance
4. Current
5. Current unbalance
6. Neutral amps
7. Real power
8. Reverse and single-phase detection
9. Reactive power
10. Apparent power
11. Power factor
12. Frequency

13. Auxiliary voltage

Power meter shall have an RJ-45 Ethernet port for communicating with the facility control system. Power meter shall communicate with the control system via either a Modbus TCP/IP or PROFINET communications protocol. An industrial Ethernet switch and 24 VDC power supply shall be installed in the ATS for connecting the power meter, ATS controller, and facility control system communications network to the power meter.

Operator Interface Display

1. Provide operator interface display that allows operators to adjust all settings and see all values.

Control Board

1. Provide current generation hardware and firmware for the control board.

Communications

1. Provide ATS with Modbus TCP/IP or PROFINET communications connection for communicating to the telemetry system. Provide communication interface card or protocol converters as necessary to supply the ATS with Modbus TCP/IP or PROFINET communications.

Provide manual override switch to bypass the control system and transfer load from source to source when control is disabled.

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, and including alarm conditions, and demonstrate satisfactory interfacing with the data acquisition and alarm systems.
# 16.95.3 Conductor Test Report

[CS2 6 08 13]

<table>
<thead>
<tr>
<th>Conductor Test Report</th>
<th>Page 1 of 1</th>
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<tbody>
<tr>
<td>PROJECT:</td>
<td>OWNER:</td>
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<tr>
<td>Contractor Co. Name:</td>
<td>Phone Number:</td>
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<td>Tested by:</td>
<td>Test Date:</td>
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<tr>
<td>Race-way Label</td>
<td>Operating Load Voltage</td>
</tr>
<tr>
<td>(1) (2) (3) VAB VCB VCA VAN VBN VCN A-B B-C C-A A-G B-G C-G</td>
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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
# 16.95.4 Ground Electrode Resistance Test Report

**[CSI 26 08 15]**

<table>
<thead>
<tr>
<th>Ground Electrode Resistance Test Report</th>
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<td>PROJECT:</td>
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<th>Soil Conditions:</th>
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<th>Measured Resistance:</th>
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**DESCRIPTION OF TEST PROCEDURE, CONDITIONS, RESULTS:**
17.00 GENERAL

This division covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting-up the Instrumentation and Control (I&C) and Telemetry System. Programmable logic controller (PLC) shall provide local, automatic control of on-site pumps and control valves. Computer-based telemetry system will provide remote control, alarm presentation, and data logging activities at the Owner’s headquarters location.

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

These specifications are an integral part of the contract documents for the I&C and Telemetry portion of this contract. The written descriptions of system performance contained herein are given to assist the Contractor in interpreting the contract plans but are not intended to be all-inclusive. The Contractor shall be aware that all automatic control systems do not require the same components and accessories for complete system operation. Therefore, these specifications do not include all accessories and appurtenances required for a complete system. The Contractor shall, however, provide all accessories and appurtenances to result in a completely operational system as required to meet the functional requirements of these documents. Where specific equipment specifications are given, they are used to represent the level of quality required by these documents.

17.05 Common Work for Automatic Control

[CSI 40 60 05]

Part 1 - General

Summary

The work under this division covers construction specifically described in these specifications. Project Plans will be provided for this project. All work incidental and necessary to the completion of the project described herein shall be completed under the bid item listed in the bid proposal, and no other compensation will be allowed. The work generally consists of the following:

- Detailed system layout and design for the particular equipment bid in accordance with these functional specifications.
- Furnishing of I&C equipment including delivery, storage, software, programming, installation, testing, startup, and documentation.
- Providing operator maintenance manuals for all equipment and devices provided by this Contract.
- Providing system training to the operators of the proposed equipment.

Related Sections

- Division 16 Electrical
References
The project Plans are based on Instrument Society of America (ISA) standards numbers S5.1, S5.2, S5.3, and S5.4. The Contractor is encouraged to be familiar with these standards since the project plans do not contain wiring or ladder diagrams, but are based on the functional requirements of the ISA format.

All equipment and materials shall conform to the latest revised editions of applicable standards published by the following organizations:

- American National Standards Institute (ANSI).
- Institute of Electrical and Electronic Engineers (IEEE).
- National Electrical Manufacturers Association (NEMA).
- Underwriters' Laboratories (U/L).
- Instrument Society of America (ISA)

All equipment and materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the National Electrical Code (NEC), the Occupational Safety and Health Act (OSHA), and any applicable Federal, State, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of Underwriter’s Laboratory (UL) examination services, be approved by the UL for the purpose for which they are used and shall bear the UL label.

All control panels shall bear a label by UL or by an approved testing authority for the completed assembled panel.

Definitions
Contractor: The Contractor, as distinct from the Control System Integrator, shall install panels and other materials furnished by the Control System Integrator and provide all materials and work necessary and thereby, satisfy all requirements that are within the scope of this section.

Control System Integrator: A single firm preselected by the Owner and subcontracted by the Booster Pump Station Contractor, who shall design and furnish the system, provide the instrument panels; provide the PLCs, RTUs, Motor Control Center, VFDs, ventilation control panel, blower control panel, assemble and test the control panel equipment, and program PLCs, computers, and other instrument components and provide start-up and training services. The Control System Integrator for this contract shall be: S&B Inc.

Part 3 - Execution
Installers
Installation shall be performed by the workers who are skilled and experienced in the installation of I&C and Telemetry systems.
Installation

Installation and testing procedures shall be as specified in these and subsequent sections of this division.

The control system shall be installed in accordance with the installation plans and instructions prepared by the Control System Integrator.

Installation shall include all elements and components of control system and all conduit and interconnecting wiring between all elements, components, sensors, and valve operators.

Equipment shall be located so that it is readily accessible for operation and maintenance.

Field Equipment

Equipment shall be provided as specified on the Plans such that ports and adjustments are accessible for in-place testing and calibration. Where possible, equipment shall be located between 48 inches and 60 inches, unless specified otherwise on the Plans, above the floor or a permanent work platform. Instrumentation equipment shall be mounted for unobstructed access, but mounting shall not obstruct walkways. Equipment shall be mounted where shock or vibration will not impair its operation. Support systems shall not be attached to handrails, process piping or mechanical equipment except for measuring elements and valve positioners. Instruments and cabinets supported directly by concrete or concrete block walls shall be spaced out not less than $\frac{3}{8}$-inch by framing channel between instrument and wall.

Steel used for support of equipment shall be hot-dip galvanized after fabrication. Support systems including panels shall be designed in accordance with the Seismic Restraint and Anchorage section of Division 1.81 of these specifications and to prevent deformation greater than $\frac{3}{8}$-inch under the attached equipment load and an external load of 200 pounds in any direction.

Electrical Power Connection

Electric power wiring and equipment shall be in compliance with Division 16. Power disconnect switches shall be provided within sight of equipment and shall be labeled to indicate opened and closed positions and specific equipment served. “Within sight of” is defined as having a clear unobstructed view from the equipment served and within 50 feet of the equipment served. Disconnect switches shall be mounted between 36 inches and 72 inches above the floor or permanent work platform. Where equipment location is such that the above requirements cannot be met by a single disconnect switch, two switches, one at the equipment and one at the work platform, shall be provided.

Signal Connection

Electrical signal connections to equipment shall be made on terminal blocks or by locking plug and receptacle assemblies. Jacketed flexible conduit shall be used between equipment and rigid raceway systems except that flexible cable assemblies may be used where plug and receptacle assemblies are provided and the installation is not subject to mechanical damage in normal use. The length of flexible conduit or cord assemblies shall not exceed 2 feet. Flexible cable, receptacle and plug assemblies shall be used only where specified.
17.06 Control System Integrator

[CSI 40 61 13]

Part 1 - General

Division of Responsibility

All instrumentation and industrial electronic systems shall be provided under the supervision of a single Control System Integrator, chosen by the Owner, which is regularly engaged in the design and installation of such systems of similar scope and complexity. The Control Systems Integrator shall be enjoined by the Booster Pump Station Contractor as a Subcontractor. The assignment of specific responsibilities herein to the Control System Integrator shall not, in any way and under any conditions, diminish the Contractor's full and complete responsibility for all work performed and all materials installed under the contract.

Control System Integrator’s Responsibility

The Control System Integrator shall be solely and completely responsible for the final design and assembly of the entire control system. Responsibilities include:

- Provision of, and the detailed design of, custom control panels and the motor control center. The plans show general layout of the control panels. The Integrator shall provide detailed scaled design of all components on and in the control panels and determine specific requirements.

- The design of all interconnecting wiring of control equipment including remote control panels, packaged equipment panels, mechanical equipment with control components, etc.

- Testing of the control panels in the Control System Integrator's shop.

- Coordinate with the Contractor for specific requirements and locations of raceway penetrations and field wiring in control panels.

- The Control System Integrator shall supply the Contractor with all necessary detailed installation plans and/or written instruction for installation of all control components and sensing devices for proper system operation.

- Provide installation assistance.

- Programming of the PLC’s.

- Programming of the graphical touch screen operator interfaces (OI) on the control panels.

- MTU and Human Machine Interface (HMI) programming at the Owners Headquarters.

- Provide Startup and Training Services.

General and Electrical Contractor’s Responsibilities

The General and Electrical Contractor shall be responsible for the following equipment and services:

- Review of the Control System Integrator's submittals and wiring diagrams for coordination with space requirements, raceway requirements of field wiring, etc.
• Supply the Integrator with submittals of equipment related to the control system that the Integrator must include in their submittals and integrate. Such as motors, packaged control panels that the Integrator does not build, etc.

• Installation of the control panels provided by the Control System Integrator.

• Installation of the interconnecting wiring in accordance with these documents and the Control System Integrators wiring diagrams.

• Installation of I&C and Telemetry System components in accordance with these documents and plans or instructions of the Control System Integrator.

Part 3 – Execution

Installers

The Control System shall be designed, constructed, programmed and commissioned by full time employees with a minimum of 5 years of experience (minimum of 1 year with Integrator).

Integrators List

The Control System Integrator shall be:

• Stead and Associates (S&B Inc.), Bellevue, Washington

17.08 System Description

[CSI 40 61 96]

Part 1 – General

Summary

The I&C and Telemetry system functions required are specified on the Plans and in subsequent sections of this Division.

Design and Performance Requirements

The system shall be designed to provide the control capabilities and functions indicated and implied by the Plans and these Specifications and to provide trouble-free operation with minimum maintenance. The system shall readily enable manual operation of any and all functions in the event of failure of any one component.

The control system shall be designed and assembled by the Control System Integrator to provide:

• Control of motor driven pumps, equipment, and processes.

• Monitoring of operation of motor driven pumps, equipment, and processes.

• Indication of operating status of motor driven pumps, equipment, and processes.

• Monitoring and indication of pressures, temperatures, levels, and flows, as indicated and implied by the Plans and Specifications.

• The capabilities indicated and implied by the Plans and Specifications.
The I&C and Telemetry System shall be designed and assembled by the Control System Integrator to be an integrated system composed completely of components which are specifically designed and used for and in conjunction with control and operation of motor-driven pumps and process control equipment. The Control System Integrator shall supply all interfacing equipment, appurtenances and accessories and all such devices that may be required for proper interfacing as part of the control system.

**Part 2 – Products**

**Manufacturers**

The telemetry components of the RTU shall be manufactured by Siemens to be consistent with the Owner’s existing system.

**Components**

The I&C and Telemetry System shall include the instruments, control devices, Remote Telemetry Unit, Human Machine Interface, input and output devices, sensors, interfacing devices, cabinets, enclosures and other components indicated and implied by the Plans and Specifications.

The following is a list of the RTUs, Control Panels, Pressure and Level Assemblies, and Motor Control Centers to be provided by the Control System Integrator:

- Telemetry Panels
- Pump 1 Motor Starter Panel
- Two (2) Pump Station Discharge Pressure Assembly
- Pump Station Suction Pressure Assembly
- Reservoir Inlet/Outlet Pressure Assembly
- Ventilation Control Panel
- Blower Control Panel
- Motor Control Center

**Part 3 – Execution**

**Preparation**

The Control System Integrator shall be responsible for the coordination and integration of control system with the motor control and other related equipment. The Control System Integrator shall communicate directly with the Manufacturer(s) and Supplier(s) of all related equipment to determine all details of the equipment, which may influence or affect the control system. The Control System Integrator shall determine all requirements for and shall cause integration of the control system into a unified operating system. The Control System Integrator shall define all requirements for all interfacing equipment and shall supply all appurtenances, accessories and all such devices, which may be required for proper interfacing as part of the control system.
The Control System Integrator shall be responsible to obtain submittal information on equipment supplied by other disciplines and to integrate them into the control system to form a complete working package as outlined by the contract documents.

**Installation**

The system shall be completely assembled in the shop by the Control System Integrator. All components and equipment shall be prewired to the maximum extent possible.

All Process Control shall be done within the control panels unless specifically listed on the Plans as other.

**17.09 Installation of Equipment by Others**

**Part 3 - Execution**

Installation of Booster Pump Station Contractor Provided Telemetry Panels, Motor Control Center, Control Panels, and Instrumentation

**Description**

This section specifies the installation of a telemetry panel, motor control center, pump motor starter panel, ventilation control panel, and instrumentation devices at the Electrical and Communications Building, Reservoir, and Vaults.

**Coordination**

The Booster Pump Station Contractor will be responsible for furnishing the telemetry panel, motor control center, pump 1 motor starter panel, ventilation control panel, reservoir level transmitter, reservoir inlet/outlet pressure transmitter, intrusion proximity switches, reservoir high level float switch, smoke detector, operator-in-trouble pushbuttons, flood switches, heating thermostats, and cooling thermostats as shown on the Plans. The Contractor shall be responsible for installing this equipment as shown on the Plans.

**Delivery**

The Contractor shall pick up the Booster Pump Station Contractor provided equipment from the Control System Integrator’s facility in Bellevue, WA. Contractor shall coordinate with the Control System Integrator on pick up schedule. Contractor shall provide all equipment necessary for loading and unloading the equipment at the project site.

**Installation**

The Booster Pump Station Contractor provided equipment shall be installed in accordance with the installation of the drawings and Control System Integrators instructions. Workers who are skilled and experienced in the installation of electrical and control system equipment shall perform installation.

The City’s Control System Integrator will perform all programming work at the RTU and Master Telemetry Unit to establish a functioning telemetry system.

**Testing**

Testing and inspection of the telemetry, motor control, and instrumentation components shall include all components. All components shall be interconnected to the field devices and...
powered with rated incoming voltage. The Contractor shall verify that all interconnections and work completed by them is functioning properly.

After completion of the initial testing, the Control System Integrator will conduct subsequent testing to verify that all connections and work completed by the Contractor was performed correctly.
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 in the proposal, but required according to the plans and specifications and general practice, shall be included in Contractor’s bid price.

Bid Item 1 – Mobilization, Demobilization, Site Preparation, and Clean-up

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; 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. Payment shall be lump sum.

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.

Bid Item 2 – Temporary Erosion and Sedimentation Control

Lump sum price shown shall cover the complete cost of providing all temporary erosion and sedimentation control relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: silt fence, temporary trenching, temporary mulching, plastic sheeting, hydroseed, construction sedimentation control ponds and/or tanks; control of water; dewatering and restoration of damage caused by storm events, and all other work necessary, for a complete installation of all temporary sedimentation and erosion control facilities. Payment shall be lump sum.

Bid Item 3 – Trench Safety and Shoring

Lump sum price shown shall cover the complete cost of trench safety and shoring including: all labor, materials, and equipment for the installation of the trench safety and shoring work as shown on the Plans, and detailed in the contract specifications, or as required by governing safety codes. Price includes design of the shoring system as required by applicable codes and standards, whether shown on the Plans or not. Payment shall be lump sum.

Bid Item 4 – Site Work

Lump sum price shown shall cover the complete cost of providing all site work relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: structure excavation, backfill, and compaction; pond excavation, liner installation, and berm installation; gravel walkway; site grading and paving; concrete slab for booster pump station; temporary construction fencing; disposal of excess material; control of
water; trenching; excavation; removal of unsuitable materials; select bedding; backfill; appurtenances; dewatering; restoration for underground utilities; and all other work necessary for a complete installation of all site work. Payment shall be lump sum.

**Bid Item 5 – Site Utilities**

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for construction of the underground utilities as shown on the Plans and specified herein. Work includes, but is not limited to: trenching; disposal of excess material; control of water; select bedding; backfill; compaction; vaults for water utilities and associated appurtenances; manholes; catch basins; materials and appurtenances for water between connections to steel piping and extents of what is detailed in the mechanical plans, stormwater, other underground utilities; and all other work necessary for a complete installation of all underground utilities. The cost associated with coordination with utility companies shall be included in this bid item. Payment shall be lump sum.

**Bid Item 6 – Installation of Pre-Purchased Booster Pump Station**

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for installation of the Pre-Purchased Booster Pump Station as shown on the Plans and specified herein. Work includes, but is not limited to: piping connections; bolting booster pump station to concrete pad; connection to grounding system; attendance of booster pump station representative on site for installation; and all other work necessary for a complete installation of Pre-Purchased Booster Pump Station. Payment shall be lump sum.

**Bid Item 7 – 24-Inch Ductile Iron Water Main**

Unit price shown shall cover the complete cost of providing all materials, equipment and labor necessary for the installation of the water main as detailed in the civil plans. Work includes: pipe; fittings; valves; valve box and appurtenances; marker post for valves outside of pavement; joining; trenching; thrust restraint; import bedding and backfill; compaction; restoration; temporary surface patching; disinfecting; testing and all other work for a complete installation. Payment shall be per lineal foot as measured through the fittings.

Payment for pipe will be paid no more than 90-percent of the length installed if it has not yet passed both pressure and purity testing.

**Bid Item 8 – 12-Inch Ductile Iron Water Main**

Unit price shown shall cover the complete cost of providing all materials, equipment and labor necessary for the installation of the water main as detailed in the civil plans. Work includes: pipe; fittings; valves; valve box and appurtenances; joining; trenching; thrust restraint; import bedding and backfill; compaction; restoration; temporary surface patching; disinfecting; testing and all other work for a complete installation. Payment shall be per lineal foot as measured through the fittings.

No payment will be made until installed pipe has passed pressure and purity testing.
Bid Item 9 – 8-Inch Ductile Iron Water Main

Unit price shown shall cover the complete cost of providing all materials, equipment and labor necessary for the installation of the water main as detailed in the civil plans. Work includes: pipe; fittings; valves; valve box and appurtenances; marker post for valves outside of pavement; marker post for valves outside of pavement; joining; trenching; thrust restraint; import bedding and backfill; compaction; restoration; temporary surface patching; disinfecting; testing and all other work for a complete installation. Payment shall be per lineal foot as measured through the fittings.

No payment will be made until installed pipe has passed pressure and purity testing.

Bid Item 10 – Connection to Existing Water Main

The unit price shall cover the complete cost for providing all labor, materials, equipment and incidentals necessary to connect the proposed water main to the existing water main as shown on the plans and detailed in the contract specifications. Work includes but is not limited to: coordinating with Tacoma Water; trenching; disposal of excess material; control of water; select bedding, pipe and fitting disinfection; thrust restraint; trench backfill; compaction; and all other necessary labor equipment, and materials, and appurtenances necessary for connection to existing water utilities. Measurement and payment shall be per each.

Bid Item 11 – Air Vacuum Valve Assembly

Unit price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for an air vacuum release valve assembly as shown in the Plans and specified herein. Work includes, but is not limited to tapping proposed pipe, minor pipe to and from air vacuum release valve vault, vault, air vacuum release valve, gooseneck assembly, excavation, backfill, surface restoration, and testing. Payment shall be per each.

Bid Item 12 – Landscaping

Lump sum price shown shall cover the complete cost of providing all landscaping shown on the project Plans, including all landscaping maintenance, until the project is accepted by the Owner. Payment shall be lump sum.

Bid Item 13 – Irrigation System

Lump sum price shown shall cover the complete cost of providing all design and materials necessary for a complete, installed, tested, and functional contractor design irrigation system as detailed in these specifications. Including all maintenance, until the end of the plant establishment period. Payment shall be lump sum.

Bid Item 14 – Unscheduled Excavation

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for excavation and disposal that is beyond the limits shown on the project plans and is performed at the Owner’s request.

Price includes haul and disposal of excavated material. Measurement shall be per cubic yard as measured in place.
Bid Item 15 – Unscheduled Import Structural Backfill

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for unscheduled backfill that is beyond the limits shown on the project plans and is performed at the Owner’s request.

Payment shall be per ton of material as measured in place.

Bid Item 16 – Cathodic Protection

The lump sum price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for installing the impressed current cathodic protection system at the 950 Zone Tank and galvanic corrosion protection systems at the 950 Zone site piping and the 950/1010 Zone Booster Pump Station complete as shown on the plans and detailed in the contract specifications, including startup and testing. Payment shall be lump sum.

Bid Item 17 – Shop Drawings Preparation and Reservoir Components Structural Calculations

Lump sum price shown shall cover the complete cost of providing all labor and materials, necessary for a complete and PE stamped approved shop drawings and structural calculations of the tank reservoir as shown on the Plans, and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 18 – Reservoir Foundation

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for construction of the reservoir foundation as shown on the Plans and detailed in the specifications including foundation, concrete, rebar, seismic anchors, select backfill as shown on the Plans and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 19 – Reservoir Structure

Lump sum price shown shall cover the complete cost of providing all labor, and equipment necessary for construction of the reservoir structure as shown on the Plans, and detailed in the contract specifications including floor, walls, roof, roof rafters, purlins, interior columns, and other structural support members, seismic anchors, weld testing, as shown on the Plans and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 20 – Reservoir Steel

The Lump Sum price shown shall cover the complete cost of all steel materials necessary for construction of the reservoir structure as shown on the plans and detailed in the contract specifications, including floor, walls, roof, roof rafters, purlins, interior columns, and other detailed structural support members. Payment shall be lump sum.
Bid Item 21 – Steel Cost Adjustment

The unit price Bid for Steel Cost Adjustment shall be per Calculation (CALC). Payment for the cost adjustment to Reservoir Steel will not modify that bid item directly but will instead be paid under this bid item. An estimated dollar amount for Steel Cost Adjustment has been entered into the Bid Proposal by the Owner, to provide a common proposal for all Bidders.

Bid Item 22 – Reservoir Appurtenances

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the reservoir appurtenances shown on the Plans, and detailed in the contract specifications, including all access ladders and platforms, overflow piping, steel inlet/outlet piping, hydrodynamic mixing system, sample lines including sample lines casing, pipe supports, water quality analyzer and shelter, vent, railing, hatches, and all other appurtenances shown on the Plans and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 23 – Reservoir Finishes

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for painting and coating all surfaces of the improvements as shown on the Plans and detailed in the technical specifications. Payment shall be lump sum.

Bid Item 24 – Reservoir Coating Containment and Environmental Control

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for containing the coating of the reservoir, including any heaters or dehumidifiers required, as shown on the Plans and detailed in the technical specifications. Payment shall be lump sum.

Bid Item 25 – Communications Building and Electrical Generator Enclosure

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for constructing the communications building and electrical generator enclosure structure complete as shown on the Plans and detailed in the contract specifications including: cast-in-place concrete, masonry, miscellaneous metal work, doors and windows, ceilings, insulation, carpentry, roof, waterproofing, patching, repairing, HVAC, and testing. Payment shall be lump sum.

Bid Item 26 – 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 27 – 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 28 – Construction Records and O&M Manuals**

Lump sum price shown shall cover the complete cost of providing all mark-up plans necessary for the Owner to create accurate as-built records as detailed in the specifications. The work includes surveying all structures and utilities to determine their as-constructed locations and elevations, records of all mechanical and electrical equipment for maintenance purposes, and operation and maintenance manuals. The price for this work will be $15,000. Failure to comply with the as-built requirements and furnish acceptable as-built 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.

**Bid Item 29 – Testing, Startup, and Training**

Lump sum 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 lump sum. Partial payment of up to 50 percent of the total bid item cost is allowed no earlier than first Contractor initiated testing date. Final 50 percent of payment shall not be paid until testing of the reservoir and booster pump station is complete, and the booster pump station is completely operational, and staff trained as determined by the Owner and Engineer. Minimum cost for this bid item shall be $10,000.

**Bid Item 30 – Minor Change**

The unit price Bid for Minor Changes shall be per Calculation (CALC) in accordance with Section 1 04.4(1) of the Standard Specifications and has been included for any additional work associated with minor changes. An estimated dollar amount for Minor Changes Item has been entered in the Bid Proposal by the Owner, to provide a common proposal for all Bidders which have been figured into the Contract Sum.

Payments or credits for changes amounting to $50,000 or less may be made under the bid item “Minor Changes”, at the discretion of the Owner, and in accordance with Section 1-04.4(1) of the Standard Specifications. The actual amount paid under this item may vary from no payment to the full amount of the bid item. At the time of authorization, the Engineer and Contractor will agree to the basis of compensation for that work, by one of the following methods:

1. By an accepted lump sum proposal from the Contractor;
2. By Bid prices already established in the Bid Proposal;
3. By Bid prices mutually agreed upon by the Contractor and the Owner; or
4. By force account, as set forth in Section 1-09.6.
The Owner will provide the Contractor a copy of the request for a minor change and will require the Contractor to provide a cost estimate for the Engineer’s review and approval prior to the work being performed. Approved minor change work performed under this bid item will be performed only after a work directive is issued by the Engineer. Any additional work performed prior to the work directive issued by the Engineer will not be compensated under this bid item.
BONNEY LAKE 950 ZONE TANK &
950/1010 ZONE BOOSTER PUMP STATION

SPRING 2022
CALL 48 HOURS BEFORE YOU DIG
ONE CALL 1-800-424-5555
REPORT ALL SPILLS
DEPT. OF ECOLOGY 1-800-258-5990
GENERAL NOTES

CONTRACTOR SHALL HAVE ALL UTILITIES LOCATED BY THE APPROPRIATE UTILITY LOCATING PROFESSIONALS PRIOR TO AND DURING CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND THE UTILITY COMPANY WHEN A CONFLICT OCCURS.

TESC GENERAL NOTES

CONTRACTOR SHALL CLEAN UP ALL AREAS AFFECTED BY THEIR ACTIVITIES TO THE SATISFACTION OF THE ENGINEER BY THE END OF EACH WORKDAY OR MORE FREQUENTLY IF REQUIRED BY THE INDIAN TRIBES OR ANY OTHER PARTY. THE CONTRACTOR SHALL REMOVE, BY SHOVELING OR OTHER MEANS, ALL MATERIAL, DEBRIS OR REFUSE FROM STREET, SIDEWALKS, DRIVEWAYS, AND ANY OTHER PROPERTY AFFECTED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF MATERIALS ENCOUNTERED DURING THE COURSE OF THE WORK.

All streets used by the Contractor during the erection of this structure shall be cleaned daily to maintain them in a clean condition. A stabilized construction entrance is required for the details shown and shall remain in place throughout the construction period. The contractor shall use shoveling and a hard broom to remove debris that may be caused by concrete cuts, etc. when not connected to services.

All quarry products shall be maintained and augmented as needed. Additional TESC measures shall be installed as directed by the Engineer or Project Inspector. The Contractor shall ensure that sediment and sediment-laden water do not leave the site (e.g. additional sump pumps, relocation of ditches and silt fences, etc.) may be required.

The Contractor shall immediately notify the Engineer and Project Inspector of any situation that could result in water pollution. Water pollution prevention, water quality standards, and RCW 70.47.280, Water Pollution Control, and RCW 173-201A, Water Quality Standards for Surface Waters of the State of Washington, are subject to enforcement action. No discharge of sediment laden or other pollutants to the surface of the State in violation of Chapter 48, Water Pollution Control, and RCW 70.47, Water Quality Standards for Surface Waters of the State of Washington, are subject to enforcement action.

In accordance with the Department of Ecology WAQ 173-201A, Water Quality Standards for Surface Waters of the State of Washington, the Contractor shall ensure that sediment and sediment-laden water do not leave the site (e.g. additional sump pumps, relocation of ditches and silt fences, etc.) may be required.

The Contractor shall be responsible for controlling all fugitive dust that may be generated by the construction project.

The Contractor shall conform to the TESC construction limits as illustrated in the plans.

Where newly constructed paving meets existing paving, the Contractor shall saw cut or overlay and feather new pavement.

Traffic control shall be provided at all times in accordance with the Traffic Control Plan. Contractor to submit a Traffic Control Plan for necessary construction.

All excavations shall be secured at the end of each working day.

EXISTING UTILITIES

Utilizes all existing utilities located by the approximate utility locating professionals prior to and during construction. The Contractor shall immediately notify the Engineer and the Utility Company when a conflict occurs.

TESC GENERAL NOTES

The Contractor shall prepare all areas affected by their activities to the satisfaction of the Engineer the end of each working day or more frequently if required by the Contractor. The Contractor shall remove, by shoveling or other means, all materials, debris or refuse from streets, sidewalks, driveways, and any other property affected by the Contractor. The Contractor shall be responsible for the removal of materials encountered during the course of the work. The Contractor shall preserve, protect and support all existing utilities encountered during construction.
EXISTING LANDSCAPING

LEGEND

- DECIDUOUS & CONIFER TREE
  - Acer Macrophyllum (4 ft tall)
  - Pseudotsuga Menziesii (4 ft tall)

- DECIDUOUS & CONIFER TREE
  - Acer Macrophyllum (1.5" caliper)
  - Pseudotsuga Menziesii (10-12 ft tall)

- SHRUBS
  - Mahonia Aquifolium, Gaultheria Shallon, Holodiscus Discolor,
    - Symphoricarpos Albus, Ribes Sanguineum, Rosa Nutkana,
    - Vaccinium Ovatum, Typ.
    - (3' to 6' O.C. in groups of 3 to 7 depending on species)

- DEAD DECIDUOUS & CONIFER TREE
  - To be replaced in-kind by others
  - Acer Macrophyllum
  - Pseudotsuga Menziesii (4 ft tall)

SURVEY NOTES

- EXISTING SITE PLAN
- BONNEY LAKE 950 ZONE TANK & 950/1010 ZONE BOOSTER PUMP STATION
- TACOMA WATER

FILE: TACOMA PUBLIC UTILITIES

EXISTING LANDSCAPING

LEGEND

- DECIDUOUS & CONIFER TREE
  - Acer Macrophyllum (4 ft tall)
  - Pseudotsuga Menziesii (4 ft tall)

- DECIDUOUS & CONIFER TREE
  - Acer Macrophyllum (1.5" caliper)
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    - (3' to 6' O.C. in groups of 3 to 7 depending on species)

- DEAD DECIDUOUS & CONIFER TREE
  - To be replaced in-kind by others
  - Acer Macrophyllum
  - Pseudotsuga Menziesii (4 ft tall)
1. Surface water that does not infiltrate in the excavation may need to be pumped by the contractor from the excavation and dispersed on the vegetated areas of the site for sediment removal. Dispersion to prevent erosion shall be designed by the contractor and can be through dispersion trenches, level spreaders, lengths of perforated pipes, or other means.

2. Install inlet protection for all onsite catch basins and catch basins immediately downstream of the site until construction is complete.

3. Review and adhere to the Bonney Lake 950 Reservoir and 950/1010 Booster Pump Station Construction Stormwater Pollution Prevention Plan (CSWPPP). The CSWPPP is included as an appendix to the project specifications.

4. Existing vegetation shall remain undisturbed to the maximum extent feasible. Soils disturbed by the project and not stabilized with crushed rock surfacing, pavement or roofs shall be amended per Pierce County's Stormwater Management and Site Development Standards (PCSSDM) Section 3.1 Soil Preservation and Amendment (ECOLOGY BMP T5.13) and seeded as follows. Refer to DWG NO. G002 for seeding mix tables.
   4.1 For the proposed pond bottom, ditches and intermittently wet areas use the bioswale seed mix.
   4.2 For other areas use the low-growing turf seed mix.
EXCAVATION SECTION - RESERVOIR TO BOOSTER PUMP STATION

EXISTING GRADE
RESERVOIR SHELL
RESERVOIR FOOTING
PROPOSED EXCAVATION GRADE
PROPOSED BOOSTER STATION

EXISTING GRADE
RESERVOIR SHELL
RESERVOIR FOOTING
PROPOSED CONSTRUCTION ACCESS RAMP

SEE DWG NO. C005 FOR CRUSHED ROCK BACKFILL

PROPERTY LINE

EXCAVATION SECTION - RESERVOIR TO CONSTRUCTION RAMP

EXISTING GRADE
RESERVOIR SHELL
RESERVOIR FOOTING
PROPOSED EXCAVATION GRADE

SEE DWG NO. C005 FOR CRUSHED ROCK BACKFILL

PROPERTY LINE

EXISTING GRADE
RESERVOIR SHELL
RESERVOIR FOOTING
PROPOSED CONSTRUCTION ACCESS RAMP

SEE DWG NO. C005 FOR CRUSHED ROCK BACKFILL

PROPERTY LINE
**Proposed Site Sections**

**Reservoir East-West**
- Reservoir Shell
- Existing Grade
- Parking Area (in foreground)
- Undisturbed Native, Proof Roll Prior to Rock Placement

**Reservoir North-South**
- Reservoir Shell
- Reservoir Footing
- Property Line
- Parking Area (in foreground)
- Undisturbed Native, Proof Roll Prior to Rock Placement

**Pond Liner Section Through Manhole**
- Stainless Steel Banding with Gasket
- Primary Boot
- Secondary Boot
- Pond Liner
- Pond Liner Boot
- Pond Liner Pipe Penetration

**Typical Pipe Penetration Seal**
- 1/2" Stainless Steel Banding
- 1/2" Gasket, Full Circumference
- 1" Gasket, Full Circumference
- Stainless Steel Banding
- Gasket

**Notes:**
- Install 40 mil textured HDPE liner, SOLMAX HDPE 40T2 or equal.
- HDPE liner shall be covered by 12" of topsoil and hydroseeded.
- Extend HDPE liner to an elevation of 867.0' on all sides of pond.
- See details this sheet for typical pond liner section through manhole and pond liner pipe penetration.
EXISTING CONFIGURATION

TESTING CONFIGURATION

FINAL CONFIGURATION

Connection to Existing 950 Zone
Water Main on 198th Ave E

Connection to Existing 1010 Zone
Water Main on Overlook Dr E

EXISTING 8" DI WATER MAIN AND THRUST RESTRAINT, TO BE REMOVED, TYP.
EXISTING 8" PLUG (MJ) WITH CONCRETE BLOCK, TO BE REMOVED
EXISTING 8" X 6" DI TEE (MJxMJ)
EXISTING 6" GATE VALVE (MJxMJ)
EXISTING 6" DI PIPE TO HYDRANT ASSEMBLY
EXISTING 6" DI PIPE (MJxMJ)
EXISTING 6" DI PIPE TO HYDRANT ASSEMBLY
PROPOSED WATER MAIN FROM RESERVOIR, PER PLAN
12" DI FLANGE ADAPTER (FLxFL)
12" DI PIPE (RJxRJ)
12" DI PIPE (RJxRJ), LTF
12" DI LONG BODY SLEEVE (RJxRJ)
8" GATE VALVE (FLxFL)
8" GATE VALVE (FLxFL)
8" DI PIPE (RJxRJ)
8" DI PIPE (RJxRJ), LTF
8" DI LONG BODY SLEEVE (RJxRJ)

PROPOSED WATER MAIN FROM RESERVOIR, PER PLAN
12" DI FLANGE ADAPTER (FLxFL)
12" DI PIPE (RJxRJ)
12" DI PIPE (RJxRJ), LTF
12" DI LONG BODY SLEEVE (RJxRJ)
8" GATE VALVE (FLxFL)
8" GATE VALVE (FLxFL)
8" DI PIPE (RJxRJ)
8" DI PIPE (RJxRJ), LTF
8" DI LONG BODY SLEEVE (RJxRJ)
PROVIDE TEMPORARY CAP AND THRUST RESTRAINT TO MAINTAIN SERVICE DURING CONSTRUCTION AND TESTING OF PROPOSED MAIN
FIELD DETERMINE TEMPORARY BLOW-OFF ASSEMBLY LOCATION. SUBMIT TESTING AND FLUSHING PLAN TO THE OWNER FOR APPROVAL, TYP.

PROPOSED WATER MAIN FROM BOOSTER PUMP STATION, PER PLAN
12" DI PIPE (RJxRJ)
12" DI PIPE (RJxRJ), LTF
12" DI LONG BODY SLEEVE (RJxRJ)
8" GATE VALVE (FLxFL)
8" GATE VALVE (FLxFL)
8" DI PIPE (RJxRJ)
8" DI PIPE (RJxRJ), LTF
8" DI LONG BODY SLEEVE (RJxRJ)

FIELD DETERMINE TEMPORARY BLOW-OFF ASSEMBLY LOCATION. SUBMIT TESTING AND FLUSHING PLAN TO THE OWNER FOR APPROVAL, TYP.

GENERAL WATER MAIN NOTES:
ALL RESTRAINED JOINT FITTINGS SHALL HAVE WEDGE RESTRAINT GLAND, MEGALUG OR EQUAL.

CONNECTION NOTES:
CONTRACTOR SHALL COORDINATE WITH TACOMA WATER CREWS TO HAVE THE WATER MAIN SHUT DOWN TO MAKE ALL CONNECTIONS. THE CONTRACTOR SHALL NOTIFY TACOMA WATER TWENTY-ONE DAYS IN ADVANCE OF WHEN THIS WORK IS REQUIRED.

FIELD DETERMINE TEMPORARY BLOW-OFF ASSEMBLY LOCATION. SUBMIT TESTING AND FLUSHING PLAN TO THE OWNER FOR APPROVAL, TYP.

VERIFY ALIGNMENT AND DEPTH OF EXISTING MAIN BAYS OF CONSTRUCTION. ADJUST PROPOSED MAIN ALIGNMENT AND PROVIDE FITTINGS AS NECESSARY TO MAKE A FULLY RESTRAINED CONNECTION.

SEE SITE PLAN FOR LOCATION

SEE SITE PLAN FOR LOCATION

SEE SITE PLAN FOR LOCATION

SEE SITE PLAN FOR LOCATION

VERIFY ALIGNMENT AND DEPTH OF EXISTING MAIN BAYS OF CONSTRUCTION. ADJUST PROPOSED MAIN ALIGNMENT AND PROVIDE FITTINGS AS NECESSARY TO MAKE A FULLY RESTRAINED CONNECTION.

FIELD DETERMINE TEMPORARY BLOW-OFF ASSEMBLY LOCATION. SUBMIT TESTING AND FLUSHING PLAN TO THE OWNER FOR APPROVAL, TYP.

PROVIDE TEMPORARY CAP AND THRUST RESTRAINT TO MAINTAIN SERVICE DURING CONSTRUCTION AND TESTING OF PROPOSED MAIN

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FIELD DETERMINE TEMPORARY BLOW-OFF ASSEMBLY LOCATION. SUBMIT TESTING AND FLUSHING PLAN TO THE OWNER FOR APPROVAL, TYP.
PROPOSED DRAINAGE AND STORM SITE PLAN

PERIMETER DRAIN, HIGH POINT SLOPE AT 1%). 1% AROUND HALF PERIMETER, TYP. BOTH SIDES, ROUTE TO STORM FOND.
SEE PAVING PLAN, ENG NO. 950/1010 FOR ELEVATIONS.

APPROX. 345' OF 6" PERFORATED PVC
APPROX. 345' OF 6" PVC @ 2.00%
APPROX. 46' OF 12" PVC @ 0.12%
APPROX. 6' OF 12" PVC @ 1.33%
APPROX. 82' OF 8" PVC @ 0.71%
### Point Table - Pond

<table>
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<th>Northing</th>
<th>Easting</th>
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<th>Elevation</th>
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</table>

**Description**
- **CB #1**: Pond bottom, Nom. El. = 865.00'
- **CB #2**: Pond, approx. 133,600 gallon capacity
- **CB #3**: Pond
- **CB #4**: Control structure
- **CB #5**: Air gap manhole
- **CB #6**: Emergency overflow spillway

**Other Elements**
- Storm pipe outlet, typ.
- Storm pipe outlet, typ.
- Storm pipe inlet, typ.
- Storm pipe outlet, typ.
- Storm pipe outlet, typ.
- Drain perimeter
- Sump pump piping, typ.
- Emergency overflow spillway

**Scale**
- 1" = 20' 2" = 20'
EXISTING DECIDUOUS & CONIFER TREE - TRANSPLANT TO INTERIOR OF TRACT E OR G. FIELD LOCATE WHERE SPACE EXISTS AVOIDING IMPACTS TO EXISTING TREES, SHRUBS, AND IRRIGATION COMPONENTS. PROVIDE MIN. 6'-O.C. AND 10'-O.C. SPACING BETWEEN TRANSPLANTED TREES AND EXISTING AND PROPOSED SHRUBS AND TREES, RESPECTIVELY. PROVIDE MIN. 5'-O.C. BETWEEN PROPOSED FENCE AND TRANSPLANTED TREES.

EXISTING DECIDUOUS & CONIFER TREE - TRANSPLANT AS NEEDED TO ACCOMMODATE PROPOSED WATER MAIN, ENSURE MIN. 5'-O.C. SPACING BETWEEN PROPOSED PIPE EDGE, PROPOSED FENCE, AND TREE TRUNK AS WELL AS MEETING MIN. SPACING REQUIREMENTS DESCRIBED ABOVE FOR EXISTING AND PROPOSED SHRUBS AND TREES.

SHORE PINE
PINUS CONTORTA
30
4' TALL
CONTAINER GROWN TREE

APPROX. EXTENT OF ROCKY COMPACTED SOIL REQUIRING AMENDMENT PRIOR TO TREE PLANTING. FIELD ADJUST PROPOSED TREE LOCATIONS TO AVOID IMPACTS TO EXISTING TREES, SHRUBS, AND IRRIGATION COMPONENTS. PROVIDE MIN. 6'-O.C. AND 10'-O.C. SPACING BETWEEN EXISTING AND PROPOSED SHRUBS AND TREES, RESPECTIVELY. PROVIDE MIN. 5'-O.C. BETWEEN PROPOSED FENCE AND PROPOSED TREES.

APPROX. LOCATION OF EXISTING IRRIGATION SYSTEM. RELOCATE IRRIGATION PIPING AND ADJUST LOCATION OF PLANTINGS TO ACHIEVE THE PROPOSED LANDSCAPING THAT CAN BE ADEQUATELY IRRIGATED.

HYDROSEED POND WITHIN GRAVEL WALKWAY
REPAIR/REPLACE EXISTING IRRIGATION LINES IMPACTED DURING STORM INSTALLATION AS NECESSARY.
PLANTING NOTES

GENERAL PLANTING:

1. The landscape contractor shall be responsible for coordinating a pre-planting meeting. Successful plant installation, acceptance post-planting, and care of the landscape area for the first year plant establishment period. Following the plant establishment period, the owner or its assignee will assume care of the site.

2. The contractor shall handle and care for plant stocks on-site for longer than one week. This includes but is not limited to watering plantings and protected plants from damage by elements, vandalism, etc.

PLANTING IS PREFERRED WHEN PLANTS ARE DORMANT (FALL TO SPRING) TO MINIMIZE TRANSPLANT SHOCK AND SUPPLEMENTAL CARE FOR NEW PLANTINGS. WATER-IN ALL NEW PLANTINGS FOLLOWING INSTALLATION. TOPSOIL REQUIREMENTS FOR PLANTING BEDS

SEQUENCING:

1. Landscaping shall be completed in the following sequence:
   a. Landscaping shall be completed in the following sequence:
   b. The contractor shall handle and care for plant stock on-site for longer than one week. This includes but is not limited to watering plantings and protecting plants from damage by elements, vandalism, etc.
   c. Planting is preferred when plants are dormant (fall to spring) to minimize transplant shock and supplemental care for new plantings. Water-in all new plantings following installation and in sufficient quantity to establish plantings.
   d. The contractor shall handle and care for plant stock on-site for longer than one week. This includes but is not limited to watering plantings and protecting plants from damage by elements, vandalism, etc.
   e. Planting is preferred when plants are dormant (fall to spring) to minimize transplant shock and supplemental care for new plantings. Water-in all new plantings following installation and in sufficient quantity to establish plantings.

3. Amend soils for planting areas to the extent practical to avoid impacts to existing shrubs, trees, and irrigation components.

4. Amend soils with topsoil and mulch the lower 4 inches of native soil to the upper 4 inches of native soil or fill material.

5. Amend soils to facilitate areas to develop an acceptable root environment.

6. Install 4 inch depth of mulch within watering basin. Do not allow mulch to contact trunk.

7. Construct watering basin 4 inches above finished grade.

8. Install 4 inch depth of mulch within watering basin. Do not allow mulch to contact trunk.

9. Construct watering basin 4 inches above finished grade.

10. Form a watering basin 4 inches above finished grade.

11. Pour 4 inch depth of mulch within watering basin. Do not allow mulch to contact trunk.

12. Construct watering basin 4 inches above finished grade.

13. Amend soils for planting areas to the extent practical to avoid impacts to existing shrubs, trees, and irrigation components.
### SITE AND UTILITY DETAILS IV

#### CATCH BASIN TYPE 1

**STANDARD PLAN B-5.20-03**

**NOTES**

1. No steps are required when height is 9" or less.
2. The bottoms of the precipitator basin may be sloped to facilitate clearing.
3. The forming for the flange up or down.
4. The frame may be used for the adjustment required.
5. Precipitator boxes are made of "C" strap with an "H" bolt for connection. Dimensions in "C" strap are provided between the maximum and the outside of the face. For "C" strap, the "H" bolt with joint cavity in accordance with Standard Specifications Section 6-16.

**CATCH BASIN DIMENSIONS**

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<th>CATCH BASIN DIAMETER</th>
<th>WALL THICKNESS</th>
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**PIPE ALLOWANCES**

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<th>PIPE ALLOWANCES</th>
<th>CONCRETE</th>
<th>ALL METAL</th>
<th>ALL PVC</th>
<th>ALL CPVC</th>
<th>SOLID WALL</th>
<th>RINGLESS WALL</th>
<th>PEOPLE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
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<td>4&quot;</td>
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</tr>
</tbody>
</table>

#### YARD HYDRANT

**STANDARD PLAN B-10.20-02**

**REMOVABLE BOLLARD DETAIL**

- 1" UTILITY HYDRANT EQUAL TO WOODFORD MODEL U100M
- PROVIDE MINIMUM 5 CF DRAIN ROCK WRAPPED IN GEOTEXTILE FABRIC
- PROVIDE MINIMUM OF 3 FEET OF COVER AT DRAIN.

**HOT MIX ASPHALT PAVEMENT SECTION**

- 3" COMPACTED DEPTH 6" CRUSHED SURFACING TOP COURSE
- 2" COMPACTED DEPTH 8% COMPACTION SUBGRADE

**SUPPLEMENTARY SHEET**

- ROYCE R. STEVENS, PE
- BONITA W. WAGNER & PARTNERS
- 6-10 UTILITY HYDRANT & HANDHOLE PAVEMENT

**DRAWING SCALE**

- 1" = 1'-0""""
Table 4.3

**Required Special Inspections and Tests of Steel Construction**

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Special Inspection</th>
<th>Periodic Special Inspection</th>
<th>Referenced Standard (a)</th>
<th>BC Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>INSPECTION REQUIREMENT, INCLUDING PRESTRESSING BOLTS, NUTS AND WASHERS</td>
<td>X</td>
<td>X</td>
<td>ASTM A 706</td>
</tr>
<tr>
<td>2.</td>
<td>INSPECTION OF HIGH-STRENGTH BOLTING</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>INSPECTION OF WELDING</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>INSPECTION OF CONSTRUCTION DOCUMENTS</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>INSPECTION OF PERIMETER ROUNDS</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- A. MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS.
- B. PRETENSIONED AND SLIP-CRITICAL JOINTS.
- C. MANUFACTURER'S CERTIFIED TEST REPORTS.
- D. MANUFACTURER'S CERTIFICATE OF COMPLIANCE.
- E. STRUCTURAL STEEL AND COIL FORMED STEEL.
- F. AGGREGATE AND CONCRETE.
- G. INSPECTION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS.
- H. MATERIALS VERIFICATION OF HIGH-STRENGTH STEEL.
- I. INSPECTION OF REINFORCING STEEL OTHER THAN ASTM A 706.
- J. INSPECTION OF CONSTRUCTION DOCUMENTS.
- K. INSPECTION OF PERIMETER ROUNDS.
- L. INSPECTION OF CONSTRUCTION DOCUMENTS.
- M. STRUCTURAL STEEL AND COIL FORMED STEEL.
- N. MATERIALS VERIFICATION OF HIGH-STRENGTH STEEL.
- O. INSPECTION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS.
- P. MANUFACTURER'S CERTIFICATE OF COMPLIANCE.
- Q. STRUCTURAL STEEL AND COIL FORMED STEEL.
- R. INSPECTION OF REINFORCING STEEL OTHER THAN ASTM A 706.
- S. MANUFACTURER'S CERTIFICATE OF COMPLIANCE.
- T. INSPECTION OF CONSTRUCTION DOCUMENTS.
- U. INSPECTION OF PERIMETER ROUNDS.
**RESERVOIR STRUCTURAL SECTIONS**

1. **TYPICAL COLUMN FOOTING SECTION**
   - All column footings shall be supported on undisturbed native soil with CSTC layer as shown.
   - 4" sand fill, typ.
   - Structural fill compacted to 95% max dry density per modified Proctor.
   - Undisturbed native material, typ.

2. **SHELL FOOTING SECTION**
   - Column footing
   - Column base plate
   - Column
   - Inner rafter/column connection
   - Rafter/perlin connection
   - Wall/rafter connection

3. **TANK SHELL**
   - Vertical bars with standard end hook
   - 6" sand fill, typ.
   - Radial bars T&B
   - Annular ring
   - Anchor bolt notes:
     1) Field verify horizontal alignment of anchor bolts within tolerance required for connection to tank shell prior to placing concrete.
     2) Provide positive vertical support for bolt to eliminate vertical deflection during concrete placement.

4. **ANCHOR BOLT CHAIR**
   - 1" thick non-shrink grout as per paving plan.
**RESERVOIR STRUCTURAL DETAILS**

**ROOF JOINTS**

- **Typical Guardrail**
  - Carbon steel handrails, typical of 4 to 5'-0" max.
  - Balusters, one ea. step TYP. @ exterior edge of steps.

- **Typical Handrail**
  - 1'-0" std steel pipe, typical of 2 to 3'-0" max.

- **Guardrail**
  - 2'-9" O.C. max. vertical spacing.

**Spiral Stair**

- Stairs to be Mild Steel coated with Tank Shell.

**Typical Access Port Details**

- Supports shall be placed at 10'-0" O.C. max. spacing, TYP.

**Pipe Support**

- Steel plate, 1" dia. coated steel pipe, welded.

**TYPICAL LADDER DETAIL**

- Stainless steel handrail, TYP.

**ROOF SAMPLE HATCH**

- Stainless steel yoke, carbon steel hinges.

**TWO-RAIL GUARDRAIL**

- 2'-9" o.c. max. vertical spacing.

**TANK SHELL**

- Aluminized steel, 1/4" thick steel plate, 24" O.D.

**NOTES**

- Mild Steel coated with Tank Shell.

- Spiral Stair to be Mild Steel coated with Tank Shell.

- GUARDRAIL TO BE MILD STEEL COATED WITH TANK SHELL.

- SPIRAL STAIR TO BE MILD STEEL COATED WITH TANK SHELL.
PLACE CDF IN THE SPACE BETWEEN THE CONCRETE SLAB AND BOTTOM OF BPS

MIN 6" CRUSHED SURFACING TOP COURSE COMPACTED TO BPS MAX DRY DENSITY PER MODIFIED PROCTOR

BPS STRUCTURE SUPPLIED BY OTHERS

CONTRACTOR DESIGNED BPS FOUNDATION PAD

CONTRACTOR DESIGNED BPS FOUNDATION PADS

NOTE: SEE DWG NO. M203 FOR MECHANICAL PLAN AND SECTIONS

CAST IN PLACE HUNTED ANCHORS FOR BPS MANUFACTURER

THICKNESS PER CONTRACTOR DESIGN

NOTE: THE BOOSTER PUMP STATION PROVIDED BY OTHERS MAY HAVE DIFFERENT DIMENSIONS AND DIFFER IN ITS CONFIGURATION THAN SHOWN ON THESE PLANS. CONTRACTOR TO MAKE FIELD ADJUSTMENTS BASED ON PROVIDED BOOSTER STATION SHOP DRAWINGS WILL BE PROVIDED WHEN AVAILABLE.

DRAWING NO.: 119-107
FILENAME: TACOMA Water & BONNEVILLE 950 ZONE BOOSTER PUMP STATION FOUNDATION PLAN

DATE: May 10, 2022

REVISIONS:

TACOMA WATER

BOOSTER PUMP STATION FOUNDATION PLAN

BOOOSTER PUMP STATION "FOUNDATION SECTION"
## General Structural Notes

### Geotechnical Parameters
- **Excavation:**
  - **Max. Excavation:** 50 ft.
  - **Min. Excavation:** 10 ft.

### Geotechnical Reports
- **Geotechnical Report:**
  - Required for projects exceeding 1,000,000 cu. ft. of excavation.

### Other Geotechnical Parameters
- **Earthquake Zone:**
  - Zone 1 - Seismic Design Category C

### Fire Protection
- **Fire Protection:**
  - Minimum requirement for all buildings is 1-hour fire rating.

### Special Inspections, Tests, and Observations
- **Special Inspections:**
  - For projects requiring special inspections, see Table 1705.3.

### Abbreviations
- ** exited walls**:
  - **Excavated walls:**
  - **Terraced walls:**

- **Drawings:**
  - All drawings shall be coordinated with the structural engineer.
  - **Specifications:**
  - All specifications shall be prepared by the structural engineer.

### Table 1705.3 - Special Inspections, Tests, and Observations

<table>
<thead>
<tr>
<th>Type</th>
<th>Required Special Inspections and Tests of Concrete Construction</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Continuous Special Inspection</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Verify Reinforcement, Including stirrups and箍筋, is placed in accordance with the approved shop drawings.</td>
</tr>
<tr>
<td>2.</td>
<td>Reinforcing Bar Welding:</td>
</tr>
<tr>
<td>3.</td>
<td>Verify weldability of reinforcing bars other than ASTM A 706; or allowance made for the non-conforming bars.</td>
</tr>
<tr>
<td>4.</td>
<td>Verify the presence and testing of test specimens of concrete and/or aggregates.</td>
</tr>
<tr>
<td>5.</td>
<td>Verify the presence of test specimens of prestressed concrete.</td>
</tr>
<tr>
<td>6.</td>
<td>Verify the presence of test specimens of cast-in-place concrete.</td>
</tr>
</tbody>
</table>

### Table 1705.4 - Materials of Reinforcement

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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Continuous Special Inspection</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Verify materials below ground foundation are adequate to achieve the design bearing capacity.</td>
</tr>
<tr>
<td>2.</td>
<td>Verify materials are tested for the proper grade.</td>
</tr>
<tr>
<td>3.</td>
<td>Verify classification and testing of concrete.</td>
</tr>
<tr>
<td>4.</td>
<td>Verify use of proper materials, devices, and equipment for the proper development and anchorage of reinforcement.</td>
</tr>
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### Table 1705.5 - Special Inspections of Concrete Construction

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<td>Verify the stability of the spoil heap.</td>
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<td>3.</td>
<td>Verify the stability of the cut-off wall.</td>
</tr>
<tr>
<td>4.</td>
<td>Verify the stability of the soil wall.</td>
</tr>
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### Table 1705.6 - Special Inspections of Concrete Construction

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<td>Verify the stability of the soil wall.</td>
</tr>
</tbody>
</table>
RESERVOIR MECHANICAL PLAN

RESERVOIR MECHANICAL PLAN AND DETAILS

GALVANIC ANODE INSTALLATION

EXOTHERMIC WELD DI & STEEL PIPE

NOTES:
1. APPLY WELD CAP DIRECTLY TO PIPE, NOT TO PIPE WRAP. USE PRIMER AS REQUIRED BY THE MANUFACTURER.
2. COMPLETELY ENCLOSE WIRE WITHIN WELD CAP.
3. REPAIR ANY DAMAGED COATING NOT COVERED BY WELD CAP.

GALVANIC ANODE INSTALLATION

EXOTHERMIC WELD DI & STEEL PIPE

NOTES:
1. LOCATE ANODES A MAX OF 3 FEET HORIZONTALLY FROM CENTERLINE OF PIPE.
2. PLACE GALVANIC ANODE IN CLEAN NATIVE BACKFILL AND COMPACT TO 12" ABOVE ANODE.
3. ANODES MAY BE PLACED UPRIGHT OR HORIZONTALLY, HORIZONTAL ORIENTATION SHOWN.
4. ANODE WIRE SHALL BE EXOTHERMIC WELDED DIRECTLY TO PIPE OR INCORPORATED INTO THE JOINT BOND WITH A SPLIT-BOLT CONNECTION.
5. WATER SOAK ANODE PRIOR TO BURIAL.
BPS OUTLINE

CONNECTION TO BOOSTER PUMP STATION PLAN

NOTE:
CONFIGURATION SHOWN IS APPROXIMATE. CONTRACTOR TO PROVIDE FITTINGS AND PIPE AS NECESSARY TO MAKE CONNECTION TO THE OWNER PROVIDED BOOSTER PUMP STATION. HORIZONTAL AND VERTICAL ADJUSTMENTS FROM WHAT IS SHOWN MAY BE NECESSARY.

CONNECTION TO BOOSTER PUMP STATION SECTION
12" DI SPool (PExPE), APPROX. LENGTH 5'-0"  12" RJ DI PIPE (FLxRJ), LENGTH TO FIT
12" RJ DI PIPE (FLxRJ), LENGTH TO FIT  12" RJ DI PIPE (PExPE), APPROX. LENGTH 3'-9"
12" RJ DI PIPE (FLxRJ), APPROX. LENGTH 3'-9"
12" RJ DI PIPE (PExPE), APPROX. LENGTH 5'-3"
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BOoster pump station mechanical plan

Sump pump piping provided at sumps.

Route sump discharge to field, see site plan for continuation.

Cathodic protection system.

BOoster pump station section

Outline of concrete slab below.

Sump anchor bolts, typ.

Route sump discharge to pond, see site plan for continuation.

Cathodic protection system.

Booster pump station structure, pumps, mechanical and appurtenances have been purchased by owner via a separate contract and will be delivered to the project site for installation as part of this contract. Cathodic protection to be provided and installed as part of this contract per this sheet. See specifications for additional information.

Booster pump station section.

Corrosion protection for booster pump station.

Install eight (8) galvanic anodes equally spaced around the booster pump station 5' away. Anodes shall be installed vertically. 1/3 of anode shall be below the booster pump station bottom elevation. Anode wires shall be exothermically welded to exterior corrosion protection tabs on booster pump station. See details on DWG NO. M101 for additional information.

Sump pump piping from edge of BPS.

Casting in place concrete slab.
1. FOR PIPE SIZES THAT ARE NOT LISTED IN ABOVE TABLE, THE NEXT LARGER PIPE SIZE SHALL BE USED.

2. DESIGN WEIGHTS ARE BASED ON SCH 80 STEEL PIPE AT 10 FT SUPPORT SPACING.

3. CONTRACTOR SHALL PROVIDE ALL NECESSARY EQUIPMENT, MATERIALS, AND LABOR FOR STRUCTURAL AND PIPE ATTACHMENT, PIPE SUPPORT RACKS AND TRAPEZE HANGER COMPONENTS.

4. PROVIDE LATERAL AND SEISMIC BRACING AS SPECIFIED.

5. PROVIDE TURNBUCKLE WITH SUPPORT ROD FOR PIPES SUBJECT TO HORIZONTAL MOVEMENT.

6. PROVIDE LATERAL AND SEISMIC BRACING AS SPECIFIED.

7. DESIGN HEIGHTS ARE BASED ON THE APPLICATION.

8. ALL CONNECTIONS TO CONCRETE SHALL BE CONCRETE ANCHORS, SEE SPECIFICATIONS AND RELATED RECOMMENDATIONS.


PIPE SUPPORT NOTES:
- ALL STRUCTURAL AND PIPE ATTACHMENT PIPE SUPPORT RACKS AND TRAPEZE HANGER COMPONENTS SHALL BE HOT DIPPED GALVANIZED FOR ABOVE GRADE SERVICE AND STAINLESS STEEL FOR SUBMERGED SERVICE.
- CONTRACTOR SHALL PROVIDE ALL NECESSARY EQUIPMENT, MATERIALS AND LABOR FOR CONSTRUCTING PIPE SUPPORT SYSTEMS.

PUMP NOTES:
- CORE DRILL CONCRETE OVERIDES TO FIT MECHANICAL SEAL AND PIPE RADIUS.
- PROVIDE MECHANICAL SEAL BETWEEN PIPE AND CONCRETE (WATER LEVEL), VERIFY THE SEAL SIZE WITH MANUFACTURER.

CONCRETE WALL/FLOOR:
- ABOVE GRADE AND BELOW GRADE (NON-SUBMERGED) CONCRETE WALL AND FLOOR.
- ALL PENETRATIONS SHALL BE SEALED TO MAINTAIN FIRE AND SOUND RATING OF INTERIOR.
- MECHANICAL SEALS SHALL BE UNLESS SEALS ARE APPROVED EQUAL.
- MECHANICAL SEALS SHALL BE SELECTED BASED ON THE APPLICATION.
- WHERE PIPE PENETRATION IS LOCATED IN THE FLOOR OVER A POTABLE WATER BEARING STRUCTURE, PROVIDE MECHANICAL SEAL BETWEEN PIPE AND CONCRETE (MODEL LS-650).

GENERAL PIPE SUPPORT NOTES:
- TABLE A: PIPE SUPPORT DESIGN CRITERIA

VAULT LADDER DETAIL:
- PIPE SUPPORT NOTES:
- PIPE SUPPORT NOTES:
- CONCRETE WALL/FLOOR:
- ABOVE GRADE AND BELOW GRADE (NON-SUBMERGED) CONCRETE WALL AND FLOOR.
- ALL PENETRATIONS SHALL BE SEALED TO MAINTAIN FIRE AND SOUND RATING OF INTERIOR.
- MECHANICAL SEALS SHALL BE UNLESS SEALS ARE APPROVED EQUAL.
- MECHANICAL SEALS SHALL BE SELECTED BASED ON THE APPLICATION.
- WHERE PIPE PENETRATION IS LOCATED IN THE FLOOR OVER A POTABLE WATER BEARING STRUCTURE, PROVIDE MECHANICAL SEAL BETWEEN PIPE AND CONCRETE (MODEL LS-650).

VAULT THREAD BLOCK DETAIL:
- STAINLESS STEEL SCREWS
- PRESSURE TRANSMITTER
- PRESSURE GAUGE ASSEMBLY
- STELEMETRY CONDUIT USE FLUX CONDUIT BETWEEN WATERMARK AND WALL OR FLOOR

PRESSURE GAUGE AND TRANSMITTER ASSEMBLY:
- PURE BLACK POLYETHYLENE 1/2 OD TUBING.
- 3/8" TIGHT BRASS 1/2" OD TUBING (TYPE OF 2)
- 3/8" BRAKE PIPE PIPING SYSTEM DETAIL
RESERVOIR CATHODIC PROTECTION PLAN

RESERVOIR CATHODIC PROTECTION SCHEMATIC DIAGRAM

ELECTRICAL NOTES

- ANODE HANDHOLD TYP. OF 3. HANDHOLD VERSUS SUPPORT SAME AS TYP. FOR ANODES
- DECIDE ON UTILIZATION AND USE TYP. CONSTRUCTION
- CONDUCTORS AND CONDUITS ARE USED WITH RESERVE CELLS
- REFERENCE CELLS ARE USED FOR REFERENCE CELLS
- CONTINUOUS ANODE HEADER PIPE WITH CONTINUOUS CABLE (SEE NOTE 5)
- NEOPRENE GASKET WITH PORCELAIN INSULATOR WITH HOT DIPPED GALVANIZED PIN, NUT, AND WASHER
- STAINLESS STEEL HANDHOLE COVER 1/2" THICK x 1" W x 7 1/2" L G10 FIBERGLASS CLAMPING BAR

ANODE AND ANODE HEADER HANDHOLE

ANODE AND ANODE HEADER HANDHOLE SECTION
1. PROPOSED MAIN SERVICE DISCONNECT

2. PROPOSED NEMA 3R CURRENT TRANSFORMER ENCLOSURE PER UTILITY

3. SEE GROUNDING DETAIL, THIS SHEET.

4. GROUND ROD PER N.E.C. (TYPICAL).

5. EQUIPMENT SHOWN IN GREEN BOXES WILL BE PROVIDED BY BOOSTER PUMP STATION SUPPLIER.

6. SEE DWG NO. E006 AND E007 FOR CONDUIT AND CONDUCTOR SCHEDULES.

7. SEE DWG NO. E005 FOR ELECTRICAL EQUIPMENT SCHEDULE.

8. SEE DWG NO. E005 FOR HEATER SCHEDULE.

9. SEE DWG NO. E004 FOR DETAIL "MOTOR CONTROL CENTER, "MCC""

10. SEE DWG NO. E120 FOR GENERATOR CONNECTION.

11. SEE DWG NO. E130 FOR TRANSFORMER CONNECTION.

12. SEE DWG NO. E100 FOR ENCLOSEMENT.

13. SEE DWG NO. E110 FOR CONNECTOR.

14. SEE DWG NO. E120 FOR DISCONNECT.

15. SEE DWG NO. E130 FOR AUTOMATIC TRANSFER SWITCH, "ATS"

16. SEE DWG NO. E140 FOR DISTRIBUTION PANEL, "DP"

17. SEE DWG NO. E150 FOR MAIN REVENUE METERING.

18. SEE DWG NO. E160 FOR COMMUNICATIONS BUILDING GROUNDING.
1. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
2. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
3. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
4. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
5. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
6. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
7. PROPOSED PAD-MOUNT TRANSFORMER AND VAULT PROVIDED AND INSTALLED BY UTILITY. CONTRACTOR SHALL PROVIDE EXCAVATION, BACKFILL AND COMPACTION AND RESTORATION PER ELECTRICAL UTILITY REQUIREMENTS. CONTRACTOR SHALL PROVIDE BOLLARDS PER ELECTRICAL UTILITY REQUIREMENTS. ELECTRICAL UTILITY TO TERMINATE CONDUCTORS ON BOTH THE PRIMARY AND SECONDARY SIDES OF THE TRANSFORMER. EXCAVATION SHALL NOT EXTEND OUTSIDE EXISTING EASEMENT AND TACOMA WATER PROPERTY LINE.
8. EXISTING 4" CONDUIT STUB OUT. CONTRACTOR SHALL PROVIDE EXCAVATION, BACKFILL, COMPACTION, AND RESTORATION PER ELECTRICAL UTILITY STANDARDS FOR EXTENDING PRIMARY POWER.
9. PROPOSED SECONDARY POWER SERVICE BY CONTRACTOR.
10. PROPOSED PRIMARY POWER EXTENSION. CONTRACTOR SHALL PROVIDE TRENCHING, BACKFILL, COMPACTION, AND RESTORATION PER ELECTRICAL UTILITY STANDARDS. RACEWAY AND PRIMARY POWER CABLE TO BE PROVIDED AND INSTALLED BY ELECTRICAL UTILITY.
11. EXISTING 4" CONDUIT. UTILITY SHALL PROVIDE AND INSTALL PRIMARY POWER CABLE FROM EXISTING JUNCTION BOX TO EXISTING CONDUIT STUB OUT.
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13. SEE DWG NO. E006, E007 FOR CONDUIT AND CONDUCTOR SCHEDULES.

ELECTRICAL NOTES

ELECTRICAL SITE PLAN

196TH AVE E

RESERVOIR OVERFLOW POND

PORTABLE GENERATOR

CONNECTION BOX AND TOP BOX PERIODICAL

ELECTRICAL AND COMMUNICATIONS BUILDING

PROPOSED RESERVOIR

UPPER LANDING/ROOF ACCESS

SITE LIGHT

TANK STANDS TO TIE INTO PORTEX METER VAULT

BPS METER VAULT

BPS VALVE VAULT

WATER QUALITY ANALYZER EQUIPMENT SHELTER

CELL TOWER

HANDHOLE FOR FUTURE CELLULAR POWER, "HH-1"

HANDHOLE FOR FUTURE CELLULAR Power, "HH-2"

HANDHOLE FOR FUTURE CELLULAR POWER, "HH-3"

HANDHOLE FOR FUTURE CELLULAR POWER, "HH-4"

HANDHOLE FOR FUTURE CELLULAR POWER, "HH-5"

HANDHOLE FOR FUTURE COMMUNICATIONS, "HH-6"

HANDHOLE FOR FUTURE COMMUNICATIONS, "HH-7"

1. CENTERLINE OF 34", 36", 38", 40", 42" AND 44" CONDUCTS.
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13. SEE DWG NO. E006, E007 FOR CONDUIT AND CONDUCTOR SCHEDULES.
### Drawing Information

**DWG NO.:** SHOWN

**DATE:** May 13, 2022

**DESCRIPTION:** 119-107

**REVISIONS:**

- **ENGINEER:**
- **SAVE DATE:**
- **REVIEWED:**
- **PLOT DATE:**

**FILENAME:** TAC-D-ELEC13.DWG

**SHEET NO.:**

**JOB NO.:**

**CLIENT:** TACOMA PUBLIC UTILITIES

**FILENAME:** TACOMA WATER

**ELECTRICAL SCHEDULES**

1. **TACOMA WATER BONNEY LAKE 950 ZONE TANK & 950/1010 ZONE BOOSTER PUMP STATION**

### Electrical Schedules

#### Panel Schedule L1

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<th>No.</th>
<th>Location</th>
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### Electrical Equipment and Instrumentation Schedules

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### POWER CONDUIT AND CONDUCTOR SCHEDULE

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**CONDUIT AND CONDUCTOR SCHEDULE**

- Sheet 0
- Sheet 1
- Sheet 2

**POWER CONDUIT AND CONDUCTOR SCHEDULE**

1. GRAY BOXES SHOW CONDUITS AND CONDUCTORS TO BE PROVIDED BY BOOSTER PUMP STATION SUPPLIER. ALL OTHER CONDUIT AND CONDUCTORS TO BE PROVIDED BY RESERVOIR CONTRACTOR.

2. BOOSTER PUMP STATION SUPPLIER TO PROVIDE PRE-INSTALLED CONDUIT PENETRATIONS/SLEEVES IN BOOSTER PUMP STATION WALL FOR RESERVOIR CONTRACTOR TO USE FOR INSTALLATION OF CONDUITS ENTERING THE BOOSTER PUMP STATION FROM OUTSIDE THE BOOSTER PUMP STATION.
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1. See Electrical Site Plan DWG No. E003 for continuation.
2. Conduit continues from junction box and is routed in cable tray. See Reservoir Elevation View for details.
3. See DWG Nos. E006 and E007 for conduit and conductor schedules.
4. See DWG No. E005 for electrical equipment schedule and details of who will provide equipment. Reservoir contractor to install all equipment.
5. See DWG No. E005 for lighting fixture schedule.
7. See DWG No. E005 for Reservoir Control and Instrumentation Junction Box.
8. See DWG No. E005 for Reservoir Power Junction Box.
9. See DWG No. E005 for Reservoir Security Junction Box.
10. See DWG No. M105 for detail.
RESERVOIR INTERIOR ELECTRICAL DETAILS

VANDAL SHIELD INTRUSION PROXIMITY SWITCH DETAIL

LEVEL TRANSDUCER, SET BOTTOM OF TRANSDUCER 2' ABOVE RESERVOIR FLOOR, TYP.
END CONDUIT 1' ABOVE RESERVOIR FLOOR, TYP.

TRANSDUCER CABLE, TYP. PROVIDE ENOUGH CABLE FOR TRANSDUCER TO REACH BOTTOM OF RESERVOIR.

SET FLOAT TO ACTIVATE AT OVERFLOW ELEVATION.

SECURE CONDUIT TO INTERIOR LADDER IN 2 LOCATIONS WITH STAINLESS STEEL HARDWARE.

SECURE PVC PIPE TO RESERVOIR INTERIOR WALL WITH STAINLESS STEEL CLAMPS SPACED 8" APART, TYP. SEE PIPE SUPPORT DETAIL ON THIS SHEET.

INSTALL LEVEL TRANSDUCER BELLows IN JUNCTION BOX.

WEATHERPROOF LIGHT SWITCH. SECURE TO GUARD RAIL WITH STAINLESS STEEL HARDWARE.

LIGHT FIXTURE AND FIXE 4" "F. SEE LIGHTING SCHEDULE.

WEATHER PROOF LIGHT SWITCH. SECURE TO GUARD RAIL USING STAINLESS STEEL HARDWARE. FOR LOCATION SEE RESERVOIR ELECTRICAL PLAN DWG NO. E104.

CONDUIT CONTINUES DOWN RESERVOIR IN CABLE TRAY.

NEMA 4X 12" X 12" JUNCTION BOX SECURED TO SST PLATE WITH 1/4" STAINLESS STEEL HARDWARE FOR SPLashing FLOAT CABLE AND TRANSDUCER CABLE TO FIELD-WIRE CONTRACTOR SHALL ENSURE JUNCTION BOX IS ACCESSIBLE FOR MAINTENANCE PURPOSES.

2"OD X 48" PVC PIPE, TYP. LOCATE PIPE 30" THAT LEVEL. TRANSDUCER IS ACCESSIBLE FOR MAINTENANCE PURPOSES.

SECURE PVC PIPE TO RESERVOIR INTERIOR WALL WITH STAINLESS STEEL CLAMPS SPACED 8" APART, TYP. SEE PIPE SUPPORT DETAIL ON THIS SHEET.

RESERVOIR METER VAULT POWER JUNCTION BOX

ACCESS HATCH OUTLINE

VAULT LOWER ACCESS LADDER

RESERVOIR METER VAULT SUMP PUMP

LOWER LANDING INTRUSION PROXIMITY SWITCH DETAIL

SECURE CONDUIT TO EXTERIOR LADDER WITH STAINLESS STEEL HARDWARE.

EXTERIOR LADDER SPIRAL STAIRCASE

INSTALL OPERATOR PUSHBUTTON 2' ABOVE FLOOR AND SECURE TO SIDE OF LADDER.

INSTALL LEVEL TRANSDUCER BELLows IN JUNCTION BOX.

WEATHERPROOF DUPLEX GFI RECEPTACLE, SECURE TO GUARD RAIL WITH STAINLESS STEEL HARDWARE.

LIGHT FIXTURE AND POLE "A4", SEE LIGHTING SCHEDULE.

WEATHERPROOF DUPLEX GFI RECEPTACLE, SECURE TO GUARD RAIL WITH STAINLESS STEEL HARDWARE.

CONDUIT CONTINUES DOWN RESERVOIR IN CABLE TRAY.

NEMA 4X 6" X 6" JUNCTION BOX SECURED TO SST PLATE WITH 1/4" STAINLESS STEEL HARDWARE. CONTRACTOR SHALL ENSURE JUNCTION BOX IS ACCESSIBLE FOR MAINTENANCE PURPOSES.

2"OD X 12" PVC PIPE, TYP. LOCATE PIPE 30" THAT LEVEL. TRANSDUCER IS ACCESSIBLE FOR MAINTENANCE PURPOSES. INSTALL LEVEL TRANSDUCER BELLows IN JUNCTION BOX.

NEMA 4X 8" X 8" JUNCTION BOX SECURED TO SST PLATE WITH 1/4" STAINLESS STEEL HARDWARE. CONTRACTOR SHALL ENSURE JUNCTION BOX IS ACCESSIBLE FOR MAINTENANCE PURPOSES.

RESERVOIR METER VAULT CONTROL AND INSTRUMENTATION JUNCTION BOX

RESERVOIR METER VAULT CONTROL AND INSTRUMENTATION JUNCTION BOX

RESERVOIR METER VAULT CONTROL AND INSTRUMENTATION JUNCTION BOX

RESERVOIR ROOF

VANDAL SHIELD INTRUSION PROXIMITY SWITCH DETAIL

INTRUSION PROXIMITY SWITCH INSTALLED IN VENT INTERIOR. CONTACT SHALL BREAK WHEN HATCH IS OPENED.

SEAL CONDUIT PIERCING WATERPROOF, TYP.

VAULT UPPER ACCESS LADDER

RESERVOIR METER VAULT SUMP PUMP

LOWER LANDING INTRUSION PROXIMITY SWITCH DETAIL

SECURE CONDUIT TO EXTERIOR LADDER WITH STAINLESS STEEL HARDWARE.

EXTERIOR LADDER SPIRAL STAIRCASE

INSTALL OPERATOR PUSHBUTTON 2' ABOVE FLOOR AND SECURE TO SIDE OF LADDER.

LEVEL TRANSDUCER, SET BOTTOM OF TRANSDUCER 2' ABOVE RESERVOIR FLOOR, TYP.

END CONDUIT 1' ABOVE RESERVOIR FLOOR, TYP.

RooM FOR REMOVAL OF TRANSDUCER FROM ACCESS HATCH.

SECURE PVC PIPE TO RESERVOIR INTERIOR WALL WITH STAINLESS STEEL CLAMPS SPACED 8" APART, TYP. SEE PIPE SUPPORT DETAIL ON THIS SHEET.

SECURE CONDUIT TO INTERIOR LADDER IN 2 LOCATIONS WITH STAINLESS STEEL HARDWARE.

SECURE PVC PIPE TO RESERVOIR INTERIOR WALL WITH STAINLESS STEEL CLAMPS SPACED 8" APART, TYP. SEE PIPE SUPPORT DETAIL ON THIS SHEET.

SECURE CONDUIT TO INTERIOR LADDER IN 2 LOCATIONS WITH STAINLESS STEEL HARDWARE.

INSTALL LEVEL TRANSDUCER BELLows IN JUNCTION BOX.

WEATHERPROOF LIGHT SWITCH. SECURE TO GUARD RAIL WITH STAINLESS STEEL HARDWARE.

LIGHT FIXTURE AND FIXE 4" "F. SEE LIGHTING SCHEDULE.
1. SEE ELECTRICAL SITE PLAN DWG NO. E003 FOR CONTINUATION.

2. SEE DWG NO. E006 AND E007 FOR CONDUIT AND CONDUCTOR SCHEDULES.

3. SEE DWG NO. E005 FOR ELECTRICAL EQUIPMENT SCHEDULE AND DETAILS OF WHO WILL PROVIDE EQUIPMENT. RESERVOIR CONTRACTOR TO INSTALL ALL EQUIPMENT.
1. SEE DWG NO. E003 FOR CONTINUATION. RESERVOIR CONTRACTOR TO USE PRE-INSTALLED CONDUIT PENETRATIONS/SLEEVES IN BOOSTER PUMP STATION WALL FOR INSTALLATION OF CONDUITS.
2. STUB UP CONDUIT ABOVE GRADE AND CAP FOR FUTURE CATHODIC PROTECTION.
3. GROUND ROD PER N.E.C. (TYPICAL). USE EXOTHERMIC WELD CONNECTION AT THE GROUND ROD. SEE DWG NO. E004 FOR DETAIL. LOCATE GROUND RODS 2’ MINIMUM FROM BUILDING FOUNDATION.
4. BOND GROUND SYSTEM TO BOOSTER PUMP STATION ENCLOSURE.
5. BOOSTER PUMP STATION SUPPLIER IS RESPONSIBLE FOR INTERNAL GROUNDING CONNECTIONS. RESERVOIR CONTRACTOR IS RESPONSIBLE FOR EXTERNAL GROUND RODS AND ELECTRODE CONDUCTOR TO THE GROUND BUS IN THE BOOSTER PUMP STATION. BOOSTER PUMP STATION SUPPLIER TO PROVIDE CONDUIT PENETRATIONS/SLEEVES IN BOOSTER PUMP STATION WALL FOR GROUND ELECTRODE CONDUCTORS.
6. ALL EQUIPMENT SHOWN WITHIN THE BOOSTER PUMP STATION TO BE PROVIDED BY OTHERS.
7. SEE DWG NO. E003 AND E006 FOR CONDUIT AND CONDUCTOR SCHEDULES.
1. SEE ELECTRICAL SITE PLAN DWG NO. E003 FOR CONTINUATION.
2. SPACE FOR FUTURE MCC SECTION.
3. EQUIPMENT TO BE PROVIDED BY BOOSTER PUMP STATION CONTRACTOR. ALL OTHER EQUIPMENT TO BE PROVIDED BY RESERVOIR CONTRACTOR. ALL EQUIPMENT TO BE INSTALLED BY RESERVOIR CONTRACTOR.
4. CONDUIT CONTINUES TO LIGHT SWITCH. SEE DWG NO. E302 FOR CONTINUATION.
5. SEE DWG NOS. E006 AND E007 FOR CONDUIT AND CONDUCTOR SCHEDULES.
6. SEE DWG NO. E005 FOR ELECTRICAL EQUIPMENT SCHEDULE.
7. SEE DWG NO. E005 FOR HEATER SCHEDULE.

8. STANDBY GENERATOR. SEE DWG NO. E304 FOR DETAILS.
1. TRIPLE GANG BOX AND SWITCHES RECESSED IN WALL.
2. GROUND ROD PER NEC - TYPICAL; USE EXOTHERMIC WELD CONNECTION AT THE GROUND ROD, SEE DWG NO. E004 FOR DETAIL. LOCATE GROUND ROD 2' MINIMUM FROM BUILDING FOUNDATION.
3. CONNECTION TO REINFORCEMENT GRID (TYPICAL OF 2 LOCATIONS). SEE DWG NO. E004 FOR ADDITIONAL DETAIL.
4. PHOTOCELL SHALL CONTROL LIGHTING CIRCUIT WHEN SWITCH IS IN "AUTO" POSITION.
5. EQUIPMENT TO BE PROVIDED BY BOOSTER PUMP STATION CONTRACTOR. ALL OTHER EQUIPMENT TO BE PROVIDED BY RESERVOIR CONTRACTOR.
6. BOND SYSTEM TO GENERATOR ENCLOSURE.
7. TO SITE LIGHT. SEE ELECTRICAL SITE PLAN ON DWG NO. E003 FOR DETAILS.
8. SEE DWG NO. E005 FOR LIGHTING FIXTURE SCHEDULE.
9. SEE DWG NO. E005 FOR ELECTRICAL EQUIPMENT SCHEDULE.
10. PROVIDE AND INSTALL LABELS FOR ALL LIGHT SWITCHES; LABELS SHALL INDICATE THE DEVICE CONTROLLED BY THE SWITCH.
11. LOCATE ALL LIGHT FIXTURES, SWITCHES, AND DEVICES IN LOCATION SHOWN ON THE PLANS USING ENGINEERING SCALE. ADJUST LOCATION AS NECESSARY TO AVOID INTERFERENCE WITH OTHER EQUIPMENT.
**Diagram 1: Building Smoke Detector Circuit**

**Diagram 2: Exterior Building Lighting Circuit Diagram**

**Diagram 3: Site Lighting Circuit Diagram**

**Diagram 4: Ventilation Control Panel, "VCP"**
SECURE GENERATOR AND FUEL TANK TO CONCRETE PAD/FOR MANUFACTURER'S INSTRUCTIONS

SEE STRUCTURAL PLANS FOR GENERATOR SLAB DIMENSIONS AND REINFORCING

LOAD BANK TAP BOX

LOAD BANK TAP BOX

GENERATOR WITH SOUND ATTENUATED ENCLOSURE

GENERATOR WITH SOUND ATTENUATED ENCLOSURE

DUAL-WALL SUB BASE

FUEL TANK

DUAL-WALL SUB BASE

FUEL TANK

STANDBY GENERATOR CONTROL PANEL, EXTERNAL EMERGENCY PUSHBUTTON, AND CIRCUIT BREAKERS THIS END.

STANDBY GENERATOR CONTROL PANEL, EXTERNAL EMERGENCY PUSHBUTTON, AND CIRCUIT BREAKERS THIS END.

GENERATOR AND FUEL TANK - PLAN VIEW

GENERATOR AND FUEL TANK - ELEVATION VIEW
## INTRODUCTION

Tacoma Water (TW) selected RH2 Engineering, Inc., (RH2) to provide professional services to design and permit an approximately 5.0-million-gallon (MG) potable water reservoir, booster pump station (BPS), storm system, and on- and off-site improvements. The new reservoir and pump station are needed to serve the growing 950 and 1010 Zones and will be located at the northwest corner of the Tehaleh development in unincorporated Pierce County (County).

In addition, TW requested RH2 to design a driveway along with proposed transmission main and stormwater piping from 198th Avenue East to the site. The approximate proposed driveway alignment follows the existing dirt path on the northern side of the reservoir property, due east-southeast towards 198th Avenue East. The approximate length of the proposed driveway is 1,200 feet.

This technical memorandum summarizes the findings of a limited subsurface investigation to observe, characterize, and document earth and groundwater conditions of the proposed reservoir and BPS site and the driveway, identify potential geologic hazards, and provide recommendations for design and construction of the proposed reservoir, BPS, driveway, and other facility improvements.

The proposed reservoir and BPS site (the Site) is on a 1.84-acre parcel (Parcel No. 7002680451) that has been dedicated for these new water supply facilities, and currently is owned by the Tehaleh developer, NASH Cascadia Verde, LLC (NASH), and managed by the Newland Real Estate Group, LLC (Newland). The Site is in the SE ¼ of the NE ¼ of Section 16, Township 19 N, Range 05 E, centered at longitude
47.135650 degrees north and longitude 122.170461 degrees west at approximately 900 feet in elevation above mean sea level (amsl). The Site is located approximately 3 miles south of the center of the City of Bonney Lake. The general layout of the property is shown in the attached Proposed Site Plan.

The area of the proposed reservoir, BPS, and associated improvements is partially developed and has been cleared of vegetation. The surrounding area is used primarily for residences. The original slope for the reservoir and BPS site has been partially cut and filled to create a level surface as indicated by the topography shown on the attached Proposed Site Plan and on the attached Site LIDAR Imagery obtained from the Washington State Department of Natural Resources (WDNR). The site topography and LIDAR imagery indicate that the access driveway has been constructed on fill soil.

PROPOSED SITE DESIGN

Construction of the proposed reservoir and BPS will require excavating into native and fill soil to create a level surface to construct a spread-footing and ring-wall foundation that will support the reservoir and a slab-on-grade floor slab within a 10-foot-deep excavation to support the BPS. The reservoir and BPS excavations will be filled with imported structural fill. Trenches will be excavated to install the proposed transmission main and stormwater piping, valves, and connections. The fill soil will be graded to construct a crushed rock access road.

Stormwater generated on the site will be managed through detention and off-site discharge. A detention pond will be excavated into the fill and native soil to the north of the BPS site; the pond will detain runoff from the reservoir and the BPS roof before discharging into a pipe that will convey both stormwater and reservoir overflow following the same alignment as the water transmission main below the access road.

REGIONAL GEOLOGY

RH2 reviewed geologic maps and descriptions of regional geologic conditions on the WDNR website and reviewed the Natural Resources Conservation Service (NRCS) soil mapping website and descriptions of local soil conditions. RH2 reviewed the driller’s logs for borings and wells completed within 1 mile of the Site and recorded at the Washington State Department of Ecology (Ecology) well log website. RH2 reviewed geotechnical investigations completed for parcels to the southeast of the Site by Earth Solutions NW (2016) and for the telecommunications tower immediately south of the site by Adapt Engineering (2014).

Review of existing geologic information indicates that the area is underlain by dense gravelly sandy silt and gravelly silty sand identified as glacial till, which is commonly encountered as the surficial geologic unit in the area. Boring logs indicate that groundwater may exist at a depth of 100 feet or more beneath the surface. NRCS identifies the local soil as Alderwood gravelly loam, which is derived from weathered glacial till.

The WDNR Interactive Geologic Map, based on the United States Geological Survey National Earthquake Hazards Reduction Program, assigns a Seismic Site Class C, Hard Soil, and low risks of liquefaction, landslide, erosion, and flooding.
SITE INVESTIGATION

On May 13, 2020, RH2 observed the drilling of two soil borings to depths of 22 feet (SB-1) and 13 feet (SB-2) below ground surface (bgs) by Holocene Drilling, Inc., (Holocene) of Edgewood, Washington. The borings encountered very dense gravelly silty sand with cobbles and boulders. The initial attempt to drill at SB-1 and the first two attempts to drill at SB-2 encountered sufficiently large boulders that prevented drilling below a depth of 6 feet. After moving 5 to 10 feet from the initial attempts, the borings were able to be advanced deeper than 10 feet, until refusal occurred at the total completion depths of 22 and 13 feet, respectively. After completion of the soil borings, Holocene backfilled the borings with hydrated bentonite chips.

On May 14, 2020, RH2 observed the excavation of five exploration test pits (TP-1 through TP-5) by TW staff with a backhoe. Test pits were excavated at depths ranging from 8.5 to 10 feet bgs. The soil boring and test pit locations are shown on the attached Proposed Site Plan. Soil Boring Logs and Test Pit Logs are attached.

RH2 observed soil samples retrieved from the borings and excavations to identify stratigraphy, composition, texture, structure, and cohesion of native earth materials encountered in the borings and excavations.

The earth materials encountered in the excavations consisted of light brown to gray moderately dense to very dense gravelly sandy silt and gravelly silty sand with cobbles and boulders, which is interpreted as partially weathered to unweathered glacial till. A layer of fill was observed in the test pits at the BPS site (TP-1) and north of the BPS site (TP-2) ranging from 3 to 6 feet thick. The densely compacted fill was similar in composition to the native soil encountered in the soil borings and at greater depths in the test pits, indicating that the surface at the proposed reservoir and BPS site was regraded with compacted native soil, which is evident from historical photos of the site, topography shown on the Proposed Site Plan, and LiDAR imagery that indicates the topography of the cut-and-fill surface at the site. The Proposed Site Plan and LiDAR imagery also indicates that the access road was constructed of fill, and test pits TP-3, TP-4, and TP-5 encountered 3 to 9 feet of fill below the access road.

The excavated fill exhibited no stains, odors, fluids, distinct colors, or non-native materials.

No groundwater seepage was encountered in the soil borings or entered the test pit excavations.

GEOLOGIC HAZARDS

The WDNR website was reviewed for geologic hazards at the Site. The information that follows summarizes the geologic hazards and relative risk that they pose to the proposed reservoir and BPS.

- Risks from shallow and deep-seated landslides and flooding are negligible.
- An uncontrolled release or overflow of water from the reservoir or a break in the water main could cause significant erosion on the undeveloped steep slopes on the west and north side of the Site.
- The risk of earthquakes of magnitude 5 (M5) to 6 (M6) during the next 50 years is high (80 percent).
- Liquefaction risk is low due to the dense soil condition.
The risk of persistent groundwater seepage from surrounding native soil into site excavations during site development is low. Trace amounts of groundwater (less than 1 gallon per minute) may seep into excavations during late winter or spring months.

The risk of encountering soil or groundwater that potentially contains toxic or hazardous materials is negligible.

GEOTECHNICAL PROPERTIES

The following geotechnical properties for the native soil at the Site are estimated based on the observed soil composition and density of the moderately to very dense gravelly sandy silt unit at a depth of approximately 3 to 4 feet.

The native soil and in situ compacted fill may support a structure with an appropriately designed foundation that spreads a load that does not exceed a net allowable bearing capacity of 5,000 pounds per square foot (psf). This estimate may be increased by 33 percent for transient loading due to seismic or wind effects.

The following earth pressures are estimated assuming a friction angle of 35 degrees and a unit weight of 115 pounds per cubic foot (pcf) for the native soil and in-situ compacted fill:

- At rest: 49 psf per foot of depth.
- Active: 31 psf per foot of depth.
- Passive: 283 psf per foot of depth.

The design can assume a coefficient of friction of 0.45 between native soil and granular fill.

The native soil should be considered as a Site Class C, Hard Soil.

The low permeability native soil has an estimated design infiltration rate of 0.25 inches per hour or less.

PROPOSED SITE CONSTRUCTION

The ring wall and spread footing foundation for the proposed reservoir will be constructed by excavating to create a uniform level surface at a depth of 2 to 3 feet bgs. The ring wall will be filled with imported structural fill. The BPS will be constructed within a 10- to 12-foot-deep excavation that will either require shoring to stabilize the excavation sidewalls or a large excavation with sidewalls no steeper than 2H:1V. The BPS excavation will be backfilled with imported structural fill. The associated water transmission main and stormwater piping will be constructed by excavating 3- to 4-foot-deep trenches into native soil and in-situ compacted fill and placing piping with imported bedding material and imported structural fill.

The stormwater pond will be excavated into native soil and in situ compacted fill using maximum permanent slopes of up to 2H:1V.

The access road will be graded and covered with crushed rock.
RECOMMENDATIONS

EXCAVATION FOR FOUNDATIONS AND UNDERGROUND UTILITIES

- The native soil and in-situ compacted fill may be excavated readily with a backhoe or excavator. Large boulders may be encountered during excavation and may be removed by over-excavation and replaced with structural backfill. Excavation should proceed until a uniformly dense surface has been cut into native soil at or below the design depth. Excavation of the BPS and trenches below a depth of 4 feet will require shoring to maintain excavation sidewall stability for the safety of the workers.

SLOPES AND SHORING

- Excavations into native soil and compacted in-situ fill may hold vertical slopes temporarily.
- Shoring should be designed to protect workers inside excavations and to support slopes, particularly where native soil or backfill associated with existing utilities may be loose. All excavations should comply with all Occupational Safety and Health Administration (OSHA) safety requirements.
- All excavated slopes should be reviewed periodically for stability, including review of the top of the slope for tension cracks and the sidewalls and floors for evidence of seepage or saturated soil conditions.
- The native soil and fill is moderately erodible. All excavated slopes should be protected from erosion during precipitation events by plastic sheeting or other techniques that prevent rain splash erosion and rilling.
- The maximum permanent slope constructed in the native soil should be no steeper than 2H:1V.

INSPECTION AND TREATMENT OF SUBGRADE

- A Licensed Engineering Geologist (LEG) or Professional Engineer with geotechnical experience (PEG) should inspect the excavations to confirm whether the earth exposed during excavation is consistent with this technical memorandum and favorable for proceeding with the project as planned.

SUBGRADE PREPARATION

- The excavation subgrade for the reservoir and BPS site should be flat and free of loose earth materials. Any fill used to replace loose native soil or boulders at the subgrade of the reservoir and BPS site should consist of imported trench backfill placed in 8-inch lifts and compacted with a plate compactor or equivalent. Each lift should be compacted to a firm and unyielding surface to achieve 95 percent of maximum dry density (MDD), as determined by the modified proctor test (ASTM D-1557).
PIECE ZONE BEDDING

- Pipe zone bedding for utility trenches should be placed and compacted to a firm and unyielding condition at the base of the trench and with hand tools above the utilities.

USE OF EXCAVATED EARTH MATERIALS

- Excavated native soil and in-situ fill will contain a high percentage of fines, cobbles, and boulders and should be exported offsite and not used for structural fill. However, if the excavated material is screened of material larger than 3 inches in diameter, and is maintained at optimum soil moisture, the excavated material may be used for trench backfill above pipe zone bedding in areas that will not be covered by crushed rock.

COMPACCTION AND TESTING OF IMPORTED FILL

- Representative samples of imported fill should be tested to establish optimum moisture content and MDD.
- Imported trench backfill material should be tested for moisture content just prior to placement. Trench backfill should be within plus 3 percentage points of its optimum moisture content when placed.
- Trench backfill should be placed in lifts that are not more than 8 inches in thickness. Placement and compaction of the fill should be observed by an LEG or PEG.
- All imported fill used as backfill below reservoir and BPS foundations and below the access road should be compacted to 95 percent of MDD, as determined in accordance with the modified proctor test (ASTM D-1557).
- All imported fill not placed below foundations and access road should be compacted to 90 percent of MDD, as determined in accordance with the modified proctor test.

INFILTRATION CAPACITY

- The native soil and in-situ fill has very limited capacity to support stormwater infiltration using Low Impact Development (LID) methods, based on estimated infiltration rates of 0.25 inches per hour.
- Onsite stormwater should not be infiltrated within 100 feet of the top of slope at the Site.

ATTACHMENTS

1. Proposed Site Plan
2. Site LIDAR Imagery from WDNR
3. Soil Boring Logs
4. Test Pit Logs
PROPOSED SITE PLAN

NOTE: PLANS ARE FOR INFORMATIONAL PURPOSES TO SHOW THE LOCATION OF THE TEST PITS AND DO NOT REFLECT THE FINAL DESIGN.
NOTE: PLANS ARE FOR INFORMATIONAL PURPOSES TO SHOW THE LOCATION OF THE TEST PITS AND DO NOT REFLECT THE FINAL DESIGN.
NOTE: PLANS ARE FOR INFORMATIONAL PURPOSES TO SHOW THE LOCATION OF THE TEST PITS AND DO NOT REFLECT THE FINAL DESIGN.
Site Lidar Imagery from WDNR
LIDAR IMAGERY FOR 950 RESERVOIR SITE

Access Road and Proposed Water Main

Proposed Reservoir Site

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Soil Boring Logs
# Boring Exploration Log

**SB-1**

**Exploration Name**

950 Reservoir TAC 119-107

**Project**

Center of Proposed Reservoir Bonney Lake (Tahaleh), WA

**Location**

Sue Cook, LG

**Inspected by**

May 13, 2020

**Date**

**Hollow Stem Auger 6-in. OD**

**Holocene Drilling**

Drilling Equipment and Contractor

---

**Depth (ft)** | **Core/Recovery** | **Blow Counts*** | **Description** | **Lithology**
---|---|---|---|---
5 | | 22/50-4" | 0 to 4.0 ft: Silty Sandy Gravel to Silty Gravelly Sand (GM-SM); brown to gray; fine to coarse subrounded gravel, fine to coarse sand, non-plastic fines; moist; dense to very dense; abundant cobbles over cut surface. (glacial till) | ![Glacial Till](image)
10 | | 35/50-5" | 4.0 to 7.0 ft: Silty Gravelly Sand to Silty Sandy Gravel (SM-GM); gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines; moist; very dense. (glacial till) | ![Glacial Till](image)
15 | | 32/45/50-5" | 7.0 to 22.0: Silty Sand with Gravel (SM); gray; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel; moist; very dense. (glacial till) | ![Glacial Till](image)
22 | | | Boring Backfilled with hydrated bentonite chips. | ![Glacial Till](image)

---

**Initial boring met refusal at 6.5 feet on dense gravel-cobble. Final boring met refusal at 22 feet on dense gravel-cobble**

---

* SPT samples

**Surface Elevation = 900 feet amsl**
## Boring Exploration Log

**SB-2**

**Exploration Name**
950 Reservoir TAC 119-107

**Project**
East Rim of Proposed Reservoir Bonney Lake (Tahaleh), WA

**Location**

**Inspected by**
Sue Cook, LG

**Date**
May 13, 2020

**Drilling Equipment and Contractor**
Hollow Stem Auger 6-in. OD

### Holocene Drilling

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Core/Recovery</th>
<th>Blow Counts*</th>
<th>Description</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td></td>
<td></td>
<td>0 to 6.0 ft: Silty Sand with Gravel (SM); brown to gray; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel; few cobbles; trace boulders, moist; dense to very dense. (glacial till)</td>
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<tr>
<td>6-10</td>
<td></td>
<td>40/50-4”</td>
<td>6.0 to 10.0 ft: Silty Sandy Gravel (GM); gray; fine to coarse subrounded gravel, fine to coarse sand, non-plastic fines; moist to very moist; very dense; slight orange mottling. (glacial till)</td>
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<tr>
<td>10-13</td>
<td></td>
<td>27/50-5”</td>
<td>10.0 to 13.0: Silty Gravelly Sand to Silty Sandy Gravel (SM-GM); gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines; few cobbles; moist; very dense. (glacial till)</td>
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</tbody>
</table>

**Boring Backfilled with hydrated bentonite chips.**

- Initial boring attempt met refusal at 8.0 feet on dense gravel-cobble.
- Second boring attempt met refusal at 6.0 feet on dense gravel-cobble.
- Final boring met refusal at 13 feet on dense gravel-cobble

* SPT samples

**Surface Elevation = 900 feet amsl**
Test Pit Logs
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<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
<th>Sketch/Photo</th>
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<tbody>
<tr>
<td>0 to 3.5 feet</td>
<td>Silty Gravelly SAND (SM). Gray to dark gray; fine to medium sand, fine to coarse subrounded gravel, non-plastic fines, few cobbles; moist; dense; partially cemented (fill).</td>
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</tr>
<tr>
<td>3.5 to 4.0 feet</td>
<td>Silty SAND with Gravel (SM). Dark brown; fine to medium sand, non-plastic fines, fine subrounded gravel; moist; medium dense to dense; abundant roots (former topsoil?).</td>
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</tr>
<tr>
<td>4.0 to 5.0 feet</td>
<td>Silty SAND with Gravel (SM). Light brown; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel; moist; medium dense to dense; roots; orange staining (weathered glacial till?).</td>
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<tr>
<td>5.0 to 6.0 feet</td>
<td>Silty sandy GRAVEL (GM). Brownish gray; fine to coarse subrounded gravel, fine to coarse sand, non-plastic fines, with cobbles; moist; dense; cobble zone; trace roots; orange staining (weathered glacial till?).</td>
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<tr>
<td>6.0 to 9.5 feet</td>
<td>Silty sandy GRAVEL (GM). Gray; fine to coarse subrounded gravel, fine to coarse sand, non-plastic fines; moist; dense (unweathered glacial till).</td>
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<tr>
<td>Depth</td>
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<td>Sketch/Photo</td>
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<tr>
<td>9.5 to 11.0 feet</td>
<td>Silty Gravelly SAND to Silty Sandy GRAVEL (SM-GM). Gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines with cobbles; moist; dense to very dense (unweathered glacial till). No groundwater seepage. Minor caving 0 to 3 feet. Minor caving in cobble zone 5 to 6 feet. Sidewalls stable below 6 feet. Exploration backfilled with excavated soil.</td>
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Exploration backfilled with excavated soil.
<table>
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<tr>
<th>Depth</th>
<th>Description</th>
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<tbody>
<tr>
<td>0 to 3.0 feet</td>
<td>Silty SAND with Gravel (SM). Brownish gray; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel with cobbles, trace boulders; moist; medium dense; roots (fill).</td>
</tr>
<tr>
<td>3.0 to 6.0 feet</td>
<td>Silty SAND with Gravel (SM). Olive gray; fine to coarse sand, fine subrounded gravel, non-plastic fines with cobbles, trace boulders; moist; dense; roots (fill).</td>
</tr>
<tr>
<td>6.0 to 7.0 feet</td>
<td>Silty SAND with Gravel (SM). Dark brown; fine to medium sand, non-plastic fines, fine subrounded gravel; moist; medium dense to dense (former topsoil?).</td>
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<tr>
<td>7.0 to 8.0 feet</td>
<td>Silty SAND with Gravel (SM). Light brown; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel; moist; medium dense to dense; unsorted; orange staining (weathered glacial till?).</td>
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<tr>
<td>8.0 to 10.0 feet</td>
<td>Silty SAND with Gravel (SM). Gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines; moist to very moist; dense; unsorted (unweathered glacial till). No groundwater seepage. Minor caving 0 to 5 feet, sidewalls stable below 5 feet.</td>
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Exploration backfilled with excavated soil.
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<tr>
<th>Depth</th>
<th>Description</th>
<th>Sketch/Photo</th>
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<tr>
<td>0 to 2.0 feet</td>
<td>Silty sandy GRAVEL (GM). Brownish gray; fine to coarse subrounded gravel, fine to coarse sand, non-plastic fines, trace cobbles; slightly moist; dense to very dense; roots (fill).</td>
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<tr>
<td>2.0 to 4.0 feet</td>
<td>Silty SAND with Gravel (SM). Olive gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines, with cobbles; moist; dense to very dense; roots (fill).</td>
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</tr>
<tr>
<td>4.0 to 6.0 feet</td>
<td>Silty SAND to Sandy SILT with Gravel (SM to ML). Dark brown; fine to coarse sand, non-plastic fines, fine to coarse subrounded gravel, trace cobbles; moist; dense; trace roots (fill??).</td>
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<tr>
<td>6.0 to 9.0 feet</td>
<td>Silty SAND with Gravel (SM). Olive gray; fine to coarse sand, fine to coarse subrounded gravel, non-plastic fines, trace cobbles; moist; dense to very dense, trace roots (fill??). No groundwater seepage. Sidewalls stable below 2 feet.</td>
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Exploration backfilled with excavated soil.
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<tr>
<th>Depth</th>
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<tbody>
<tr>
<td>0 to 3.5 feet</td>
<td>Silty SAND with Gravel (SM). Light brown; fine to coarse sand, non-plastic</td>
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<tr>
<td></td>
<td>fines, fine to coarse subrounded gravel, trace cobbles; moist; medium</td>
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<td></td>
<td>dense; roots and organics (fill).</td>
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<tr>
<td>3.5 to 5.5 feet</td>
<td>Silty sandy GRAVEL (GM). Gray; fine to coarse subrounded gravel, fine to</td>
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<td></td>
<td>coarse sand, non-plastic fines, trace cobbles and boulders; moist; dense</td>
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<td></td>
<td>to very dense; unsorted; minor orange staining (weathered glacial till).</td>
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<tr>
<td>5.5 to 8.0 feet</td>
<td>Silty Sandy GRAVEL (GM). Gray; fine to coarse subrounded gravel, fine to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>coarse sand, non-plastic fines; very moist; dense; very poorly sorted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(unweathered glacial till?).</td>
<td></td>
</tr>
<tr>
<td>8.0 to 8.5 feet</td>
<td>Silty Sandy GRAVEL (GM). Gray; fine subrounded gravel, fine to coarse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sand, non-plastic fines, some coarse gravel; very moist; dense; very</td>
<td></td>
</tr>
<tr>
<td></td>
<td>poorly sorted (unweathered glacial till?).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possible minor seepage 6 to 7 feet on east trench wall, no visible water.</td>
<td></td>
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<tr>
<td></td>
<td>Minor caving 0 to 3.5 feet and 6 to 7 feet.</td>
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<tr>
<td></td>
<td>Exploration backfilled with excavated soil.</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>Description</td>
<td>Sketch/Photo</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>0 to 3.0 feet</td>
<td>Silty SAND to Sandy SILT (SM-ML). Brown; fine sand, non-plastic fines, trace subrounded gravel; moist; loose to medium dense; abundant roots; orange staining (fill?).</td>
<td></td>
</tr>
<tr>
<td>3.0 to 5.0 feet</td>
<td>Silty SAND with Gravel (SM). Brownish gray; fine to coarse sand, non-plastic fines, subrounded fine to coarse gravel, trace cobbles; moist; medium dense; orange staining (weathered glacial till?).</td>
<td></td>
</tr>
<tr>
<td>5.0 to 7.0 feet</td>
<td>Silty SAND with Gravel (SM). Gray; fine to medium sand, non-plastic fines, subrounded fine to coarse gravel; moist; dense; minor orange staining (weathered glacial till).</td>
<td></td>
</tr>
</tbody>
</table>
| 7.0 to 9.0 feet | Silty SAND with Gravel (SM). Gray; fine to coarse sand, non-plastic fines, subrounded fine to coarse gravel, trace cobbles; moist to very moist; dense to very dense (unweathered glacial till).

No groundwater encountered.

Sidewalls stable.

Exploration backfilled with excavated soil.
APPENDIX B

SOILS MANAGEMENT
SECTION 2.25.4 – SOILS MANAGEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

The activities in this section shall include all work that will require handling, storage, sampling, disturbance, removal, transportation, waste designation, and/or disposal of soils.

A. This section is to establish minimum practices to be used for the excavation, management, and disposal of soils that may be encountered, and/or generated by the contractor.

1. All soils that designate as non-hazardous solid waste and that are generated, stored, handled, transported, and disposed of shall be managed in accordance with the standards in WAC 173-350.

2. All soils that designate as a hazardous material and/or waste, and are generated, stored, handled, transported, and disposed of shall be managed in accordance with the standards in WAC 173-303.

B. The contractor shall assume the following:

1. Areas of excavation within the project area may contain contaminants. As such soils may require additional sampling and analysis by the contractor for determination of proper handling and disposal requirements as prescribed in paragraph B.2.

2. All areas where soils will be removed, must be evaluated for potential contaminants of concern prior to beginning excavation. Soil evaluation will be consistent with the guidance and requirements identified by the Department of Ecology or Tacoma-Pierce County Health Department (TPCHD) Waste Disposal Authorization (WDA) Required Analysis/Analysis Conducted (RA/AC) standards (https://www.tpchd.org/home/showpublisheddocument/946/637436342126170000), projects that occur within Pierce County.

3. The cost of removal, handling, storage, sampling, analysis, transportation, and disposal of contaminated soils and/or hazardous wastes as part of the execution of this contract shall be incidental to the specific proposal item.

1.2 MANAGEMENT AND ANALYSIS OF WASTES

A. SOILS

1. The contractor shall be responsible for the testing all soils that will be removed from the site following excavation activities to ensure appropriate handling, transportation, and disposal. Any deviation to this approach must be described in detail within the Contractor prepared “Soils Management Plan”. If an alternative soil handling method is proposed the City of Tacoma Project Manager and TPCHD, projects that occur within Pierce County, must review and approve the plan prior to any soil work starting.

2. Soils must be sampled in accordance with the TPCHD WDA RA/AC standards (https://www.tpchd.org/home/showpublisheddocument/946/637436342126170000), projects that occur within Pierce County.
3. All samples must be transported to a Washington State Department of Ecology accredited laboratory for analysis via EPA Method SW846 - 6010B. Supplemental sampling and analysis may be required if the contractor has reason to suspect that additional contamination may be present. Refer to the aforementioned TPCHD WDA RA/AC standards for parameters and required analytical methods, projects that occur within Pierce County.

4. Unless determined otherwise through laboratory sampling results, all soils must be managed as a hazardous waste and handled in accordance with the standards in WAC 173-303.

5. If determined to be non-hazardous, soils may be managed in accordance with the standards in WAC 173-350.

6. Permits, profiles or WDAs are the responsibility of the contractor and must be secured for any soils that are removed from the site and transported for disposal.

7. The contractor shall report all hazardous and non-hazardous waste determinations and proposed soil disposal locations with the engineer prior to any soil transportation and/or disposal efforts are performed.

1.3 CODES, LAWS AND REGULATIONS

The following laws, codes, and regulations shall be followed for the removal of soils, hazardous materials, and stormwater management:

A. Washington State Department of Labor and Industries Chapters 296-155 WAC, 296-24 WAC, 296-62 WAC


C. Code of Federal Regulations Chapters 29 and 40.

PART 2 EXECUTION

2.1 GENERAL

A. SOILS

1. The contractor shall develop a Soil Management Plan for each work area where soils will be excavated, managed, and/or disturbed. The Soil Management Plan shall include:

   a. An assessment of all potential contaminant sources (present and historical) and address all aspects of the environment local to the job site.

   b. Based upon the potential contaminant sources, the contractor shall submit a Sampling and Analysis Plan (SAP) identifying sampling locations and proposed laboratory analyses to the engineer prior to commencement of work.
c. All samples must be transported to a Washington State Department of Ecology accredited laboratory for analysis via EPA Method SW846-6010B. Supplemental sampling and analysis may be required if the contractor has reason to suspect that additional contamination may be present or requested by the Waste Disposal Authorization authority. Refer to the aforementioned TPCHD WDA RA/AC standards for parameters and required analytical methods, for projects occurring within Pierce County.

d. The contractor shall utilize all data generated via the Sampling and Analysis Plan to characterize any soils that may be reused or transported from the site for disposal. All proposed waste characterizations will be submitted to the Project Engineer prior to any waste transportation and/or disposal efforts are performed.

e. The contractor shall be responsible for the application and management of all necessary waste management, transportation, and disposal permits.

f. The contractor shall be responsible for all logistics and coordination with disposal vendors, transportation providers, and disposal locations.

g. Upon completion of work, including demobilization, the contractor shall prepare a Post-Soil Management Plan, which provides a summary of the actions performed, and identifies any issues encountered. The Post-Soil Management Plan shall be submitted to the engineer upon completion of operations.

h. The City will not make final payment for work until the engineer has received and reviewed the Post-Soil Management Plan.

END OF SECTION
SECTION 2.25.3 – STORM AND WASTE WATER

PART 1 GENERAL

1.1 SECTION INCLUDES

The activities in this section shall include all work that will require stormwater permit coverage, or waste water management under Environmental Protection Agency, Department of Ecology, County or City of Tacoma regulation triggered by work performed by the contractor or under the direction of the contractor which may include but not limited to; ground disturbing activity of 1 acre or more, construction or maintenance activity on City of Tacoma owned property, construction dewatering, and/or waters generated during project process.

A. This section is to establish minimum responsibilities and requirements to be used when stormwater permit, stormwater management, construction dewatering, and/or process waste waters are generated by the contractor.

1. All ground disturbing activities shall be managed in accordance with the standards in WAC 173-220 and CFR 40.

2. All contract activities occurring on City of Tacoma owned property inside King and Pierce County shall be managed in accordance with the standards in City of Tacoma Municipal Code Title 12, Department of Ecology Phase I Municipal Stormwater Permit, and City of Tacoma Stormwater Management Plan.

3. All dewatering and waste waters generated, stored, handled, transported, and disposed of shall be managed in accordance with the standards in WAC 173-303 and WAC 173-350.

B. The contractor shall assume the following:

1. Responsible for securing permits/notice/registration and all associated permits/notice/registration requirements triggered by work performed by the contractor or under the direction of the contractor

2. Responsible for securing transfer/partial coverage for any existing permits/notice/registration triggered by work performed by the contractor or under the direction of the contractor

3. The cost of permits/notice/registration associated plan development, sampling, reporting and requirements shall be considered as part of the execution of this contract and shall be incidental to the specific proposal item

4. Additional sampling and analysis of materials and/or waste by the contractor may be necessary for the determination of proper handling and disposal requirements in accordance with the standards in WAC 173-303 and shall be incidental to the specific proposal item.
1.2 CONSTRUCTION STORMWATER GENERAL PERMIT

A. CONSTRUCTION STORMWATER GENERAL PERMIT

1. The contractor shall be responsible for securing coverage under the Department of Ecology Construction General Stormwater Permit for all construction activity that include; clearing, grading and/or excavation that results in the disturbance of one or more acres (including off-site disturbance acreage related to construction-support activity) or any size construction activity discharging stormwater that the Department of Ecology determines to be a significant contributor of pollutants to waters of the State of Washington or reasonably expects to cause a violation of any water quality standard.

2. The contractor shall be responsible for development, implementation, and management of all permit required plans, programs, and procedures.

3. The contractor shall be responsible for all permit required inspections.

4. The contractor shall be responsible for the sampling and analysis of all stormwater discharges required under the Permit.

5. Testing shall be performed by a Washington State Department of Ecology accredited laboratory using EPA approved Methodologies for all testing required for waste determination.

6. The contractor shall be responsible for all reporting required in permit.

7. The contractor shall be responsible for all Notices of Violation and agency enforcement actions resulting from the contractor activity or activity under the direction of the contractor.

8. The contractor shall report the results of all agency permit inspections and Notice of Violation to the designated City of Tacoma Project Manager within 5 business days of receipt.

9. The contractor shall develop a written Corrective Action plan describing in detail the Non-compliance event, current status of compliance and steps(s) and process(es), with a schedule of completion dates, that will be used to bring project activity into compliance for all City of Tacoma, Department of Ecology, and Environmental Protection Agency issued permit inspections and Notice of Violation identifying non-compliance status. The Corrective Action plan shall be provided to the City of Tacoma Project Engineer within 10 business days of receipt of permit inspections and Notice of Violation notice. The designated City of Tacoma Project Manager must review and approve the plan prior to any work resuming.

B. TRANSFER OF EXISTING GENERAL CONSTRUCTION STORMWATER PERMIT

1. The contractor shall be responsible for securing transfer of permit coverage ownership for all project activity covered under an existing Department of Ecology General Construction Stormwater Permit.

2. The contractor shall be responsible for taking over and updating or development, implementation, and management of all permit required plans, programs, and procedures at the time of permit transfer.

3. The contractor shall assume responsibility for all permit required inspections at the time of permit transfer.

4. The contractor shall assume responsibility for the sampling and analysis of all stormwater discharge required by the Permit at the time of transfer.
5. Analyses shall be performed by a Washington State Department of Ecology accredited laboratory using EPA approved Methodologies for all testing required for waste determination.

6. The contractor shall assume responsibility for all reporting required by the Permit at the time of permit transfer.

7. The contractor shall assume responsibility for all Notice of Violation and agency enforcement actions resulting from the contractor activity or activity under the direction of the contractor at the time of permit transfer.

8. The contractor shall report the results of all agency permit inspections and Notices of Violation to the City of Tacoma Project Engineer within 5 business days of receipt.

9. The contractor shall develop a written Corrective Action plan describing in detail the Non-compliance event, current status of compliance and steps(s) and process(es), with a schedule of completion dates, that will be used to bring project activity into compliance for all City of Tacoma, Department of Ecology, and Environmental Protection Agency issued permit inspections and Notice of Violation identifying non-compliance status. The Corrective Action plan shall be provided to the City of Tacoma Project Engineer within 10 business days of receipt of permit inspections and Notice of Violation notice. City of Tacoma Project Engineer must review and approve the plan prior to any work starting.

C. PARTIAL COVERAGE UNDER EXISTING GENERAL CONSTRUCTION STORMWATER PERMIT

1. The contractor shall be responsible for securing coverage under an existing Department of Ecology General Construction Stormwater Permit for all construction activity when permit is held by City of Tacoma or other contractor also requiring permit coverage.

2. The contractor shall be responsible for ensuring all permit required plans, programs, and procedures in place accurately reflect and address contractor activities and areas.

3. The contractor shall be responsibility for ensuring permit required inspections reflect and address contractor activities and areas

4. The contractor shall be responsibility for ensuring sampling and analysis of all stormwater discharge reflect and address contractor activities and areas

5. The contractor shall assume responsibility for all reporting required in permit at the time of permit transfer.

6. The contractor shall assume responsibility for all Notice of Violation and agency enforcement actions resulting from the contractor activity or activity under the direction of the contractor.

7. The contractor shall report the results of all agency permit inspections and Notices of Violation to the designated City of Tacoma Project Manager within 5 business days of receipt resulting from the contractor activity or activity under the direction of the contractor.
8. The contractor shall develop a written Corrective Action plan describing in detail the Non-compliance event, current status of compliance and steps(s) and process(es), with a schedule of completion dates, that will be used to bring project activity into compliance for all City of Tacoma, Department of Ecology, and Environmental Protection Agency issued permit inspections and Notices of Violation identifying non-compliance status resulting from the contractor activity or activity under the direction of the contractor. The Corrective Action plan shall be provided to the designated City of Tacoma Project Manager within 10 business days of receipt of permit inspections and Notice of Violation notice. The designated City of Tacoma Project Manager must review and approve the plan prior to any work starting.

1.3 WASHINGTON STATE PHASE I MUNICIPAL STORMWATER PERMIT

1. The contractor shall be covered under the Department of Ecology Phase I Municipal Stormwater Permit for all contract activity that occur on City of Tacoma owned property within the Counties of King and Pierce. These activities include but not limited to as described in; clearing, grading and/or excavation that results in the disturbance of soil of any size construction activity discharging stormwater that the Department of Ecology determines to be a significant contributor of pollutants to waters of the State of Washington or reasonably expects to cause a violation of any water quality standard.

2. The contractor shall be responsible for meeting all applicable City of Tacoma Stormwater Management Plan (SWMP) requirements triggered by work performed by the contractor or under the direction of the contractor.

3. The contractor shall be responsible for development, implementation, and management of all permit and SWMP required plans, programs, procedures, and Best Management Practices triggered by work performed by the contractor or under the direction of the contractor.

4. The contractor shall develop a written plan describing in detail each permit and SWMP requirement to be meet during the project, with a schedule of completion dates, responsible positions, and task description/function that will be used to meet the permit and SWMP requirements. City of Tacoma Project Engineer must review and approve the plan prior to any work starting.

1.4 CONSTRUCTION DEWATERING AND WASTE WATER

1. The contractor shall be responsible for appropriately handling, storage, transportation and disposal of all waste water (including dewatering activity) generated and/or encountered under this contract.

2. The contractor shall be responsible for the sampling and analysis of all waste water (waste streams) generated.

3. Wastes water must be sampled, analyzed, and profiled in accordance with waste designation and profiling requirements of planned disposal location. Additional testing may be required by city/county/state/federal oversight agency. This testing must be completed prior to any waste water transportation and/or disposal efforts are performed.

4. Analytical testing shall be performed by a Washington State Department of Ecology accredited laboratory using EPA approved Methodologies for all testing required for waste determination.
5. The contractor shall report all proposed waste water characterizations/profiling with the designated City of Tacoma Project Manager prior to any waste water transportation and/or disposal efforts are performed. The contractor may deviate from this approach only after providing a written work plan describing in detail the evaluation process and methods. If an alternative is proposed the City of Tacoma Project Engineer must review and approve the plan prior to any work starting.

6. The contractor shall report all proposed wastewater disposal locations with the Project Manager prior to any wastewater transportation and/or disposal efforts are performed. The contractor may deviate from this approach only after providing a written work plan describing in detail the handling, storage, and disposal location(s) and process(es) that will be used. If an alternative handling, storage, or disposal method is proposed, the City of Tacoma Project Manager must review and approve the plan prior to any work starting.

1.5 CODES, LAWS AND REGULATIONS

The following laws, codes, and regulations shall be followed when dealing with wastewater, and stormwater management:

A. Washington State Legislature 90.48 RCW and Department of Ecology Chapters 173-220 WAC, 173-303 WAC, 173-350 WAC,
B. Code of Federal Regulations Chapter 40.
C. City of Tacoma Municipal Code Title 12

PART 2 EXECUTION

1. N/A

END OF SECTION
APPENDIX C

INADVERTENT ARCHAEOLOGICAL AND HISTORIC RESOURCES DISCOVERY PLAN
Inadvertent Archaeological and Historic Resources Discovery Plan

In the event that any ground-disturbing activities or other project activities related to this development, or in any future development, uncover protected cultural material (e.g., bones, shell, antler, horn or stone tools), the following actions will be taken:

1. When an unanticipated discovery of protected cultural material (see definitions below) occurs, the property owner or contractor will completely secure the location and contact:
   a. The property owner and/or project manager;
   b. A professional archaeologist;
   c. Pierce County Planning & Public Works Department (253-798-7037);
   d. The Department of Archaeology and Historic Preservation (DAHP) (Stephanie Jolivette, State Archaeologist, 360-586-3088, 360-628-2755 cell);
   e. The Puyallup Tribe (Brandon Reynon, Cultural Regulatory Specialist, 253-573-7986, 360-384-2298);
   f. The Squaxin Island Tribe (Rhonda Foster, THPO, 360-432-3850, Stephenie Neil, Archaeologist, 360-432-3998);
   g. The Nisqually Tribe (Brad Beach, Cultural Resources, 360-456-5221, ext. 2180) and
   h. The Muckleshoot Tribe (Laura Murphy, Archaeologist, 253-876-3272).

2. If the discovery is human remains, the property owner or contractor will stop work in and adjacent to the discovery, completely secure the work area by moving the land-altering equipment to a reasonable distance, and will immediately contact:
   a. The property owner;
   b. The Pierce County Sheriff’s Department (253-798-4721); and
   c. The Pierce County Chief Medical Examiner, Karen Cline-Parhamovich, DO (253-798-6494) to determine if the remains are forensic in nature.
   d. If the remains are not forensic in nature the Department of Archaeology and Historic Preservation (DAHP) Guy Tasa, State Physical Anthropologist, 360-586-3534; will take the lead on determining the appropriate method of treatment for the remains and will consult with the affected tribes.

3. Cultural material that may be protected by law could include but is not limited to:
   a. Buried layers of black soil with layers of shell, charcoal, and fish and mammal bones (Figure 1);
   b. Non-natural sediment or stone deposits that may be related to activity areas of people;
   c. Stone, bone, shell, horn, or antler tools that may include projectile points (arrowheads), scrapers, cutting tools, wood working wedges or axes, and grinding stones (Figures 2 and 3);
   d. Stone tools or stone flakes (Figures 2 and 3);
   e. Buried cobbles that may indicate a hearth feature (Figure 4);
   f. Old ceramic pieces, metal pieces, tools and bottles (Figures 5 and 6); and
   g. Perennially damp areas may have preservation conditions that allow for remnants of wood and other plant fibers; in these locations there may be remains including: Fragments of basketry, weaving, wood tools, or carved pieces; and Human remains.

4. Compliance with all applicable laws pertaining to Archaeological Resources (RCW 27.53, 27.44 and WAC 25-48) and with human remains (RCW 68.50) is required. Failure to comply with these requirements could result in a misdemeanor and possible civil penalties and constitute a class C felony.
Figure 1: Shell midden

Figure 2: Example of stone tools

Figure 3: Example of stone flake

Figure 4: Example of hearth (oven) feature

Figure 5: Example of historic artifacts from debris scatter.

Figure 6: Example of bottle from historic debris dump
APPENDIX D

PSE ELECTRICAL DESIGN
**Customer-Supplied Excavation for Vault (V01)**

- **Excavated Dirt Pile**: 11'-0" x 5'-0"
- **Sand, 5/8" minus**: 6" or 12" as required

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**Customer-Supplied Excavation for Vault (V01)**

- **Vault**: 10'-0" x 6'-0"
- **Cable**: 5/8" minus, clean shading

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**MINIMUM CLEARANCES FOR PSE EQUIPMENT (V01)**

- **L/R/C**: 10'-0" from vault or pole
- **B**: 8'-0" from vault or pole
- **transformer**: 15'-0" from vault or pole
- **primary cable**: 10'-0" from vault or pole

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**OVERHEAD CIRCUIT MAP**

- **Transformers**: ABC, EJD353, EJD354, EJD355
- **Cables**: BØ - EHR630, CØ - EJD355
- **Fuses**: BØ - EHR627, CØ - EHR627

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**CIRCUIT LOADING TABLE**

- **Load**: 500kVA 277/480V
- **Phase**: 3
- **Primary Voltage**: 277/480V
- **Secondary Voltage**: 277V
- **Transformer**: 73kVA 277/480V
- **Switch**: 200A 3-PH

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**POWER GENERAL NOTES - COMMERCIAL PROJECT**

1. All materials to be installed in accordance with Project 1 Standards (PSE standards). Any deviation from these standards must be AUTHORIZED by PSE’s Project Manager and NOTED on the Site Plan.
2. All switching arrangements and/or outage arrangements are to be made with the Project Manager at least 3 working days in advance.
3. Contact the 205th Street Access Center at (206) 684-1000 at least 48 hours prior to commencing work to gain access to your work locations.
4. SEWER: The customer will provide all street connections, sewers, manholes, gravity flow, etc. The project area must be identified by the Project Manager.
5. SITE PREPARATION: The work area will be cleared of trees, stumps, rocks and underbrush. Trees will be cut to a height of 10 feet, or the tops will be trimmed or removed. Roads shall be paved or have a compacted, crushed rock base in place.
6. Materials shall be stored on site or hauled away from the job site.
7. FIELD CHANGES: Field changes are required in addition to those outlined in the Project Plan. The customer shall provide all necessary materials, labor, and equipment to facilitate the changes. The customer shall provide all necessary labor to facilitate the changes. The customer shall provide all necessary labor to facilitate the changes.
8. Customer/Contractor is responsible for all underground services, ducts, conduits, and appurtenances to the individual's meter box to the designated service panel.
9. Site plans, preliminary construction plans, and all other plans shall be submitted to the applicable authorities for approval at least 14 days prior to the start of work.
10. All work to be done in accordance with local and state requirements.
11. All work to be done in accordance with local and state requirements.
12. All work to be done in accordance with local and state requirements.
13. All work to be done in accordance with local and state requirements.
14. All work to be done in accordance with local and state requirements.
PART III

CITY OF TACOMA

EQUITY IN CONTRACTING (EIC) PROGRAM
CITY OF TACOMA EQUITY IN CONTRACTING (EIC) AND LEAP PROGRAMS

Bidders Special Instructions

As part of the City of Tacoma's ongoing work to address past disparities and to increase the City’s contracting with and utilization of historically underutilized businesses, the Equity in Contracting (EIC) Program places requirements on City contracts for utilization of businesses certified by the Washington State Office of Minority and Women’s Business Enterprise (OMWBE) and approved by the Equity in Contracting Program (“Certified Businesses”). The EIC Program also provides guidance and technical assistance to Certified Businesses who are interested in providing supplies, services and public works to the City of Tacoma.

The EIC Program requirements are contained in Tacoma Municipal Code Chapter 1.07.

Contractors bidding on City of Tacoma projects are required to meet the stated EIC requirements. Bids will be evaluated on an individual basis to determine EIC compliance. A contractor who fails to meet the stated EIC requirements will be considered non-responsible. Bidders are also subject to the City’s Equal Employment Opportunity policies prohibiting discrimination.

All EIC requirements are met by using certified companies from the OMWBE Directory.
• To fulfill SBEs requirements, bidders can use SBEs and/or DBEs from the OMWBE directory*.
• To fulfill WBE requirements, bidders can use WBEs from the OMWBE directory*.
• To fulfill MBE requirements, bidders will use MBEs from the OMWBE directory*.

*To consult the OMWBE Directory, click here: OMWBE website.
It is the bidder’s responsibility to ensure that their firm or identified subcontractors are certified by OMWBE and approved by the City of Tacoma EIC Program at the time of bid submittal. Business certification may be verified by contacting the EIC Office*.

For the OMWBE list, be sure to look for businesses in Pierce, King, Lewis, Mason, Grays Harbor, Thurston, or any counties adjacent to the county in which the work is performed per 1.07.050(2)(b-c). Contact the EIC Office* if you have any questions.

The Equity in Contracting (EIC) forms included in these bid documents must be fully completed (including attachments) and included with bid submittals. Failure to include the required forms will result in the submittal being rejected as non-responsive.
**Post-Award Important Information**
For all contracts that have requirements related to the EIC and LEAP policies, the City of Tacoma is utilizing two cloud-based software systems:

- **B2Gnow** - Contractors and subcontractors must report payment information in the B2Gnow System on a monthly basis. The EIC Staff will monitor/audit that retainage is paid by the prime contractor to the subcontractor(s) within 10 [working] days after the subcontractors’ work is satisfactorily completed. This will be monitored/audited using the B2Gnow System.

- **LCP Tracker** - This system must be used for submitting certified payroll(s) for both EIC and LEAP compliance.

Both systems are monitored/audited by EIC and LEAP staff to ensure contract compliance, proactively identify potential issues and track contract progress.

*EIC & LEAP STAFF Contact Information*

- For questions regarding Certifications, EIC Compliance and B2GNow support, contact EIC Staff:
  Malika Godo at (253) 591-5630, or via email at mgodo@cityoftacoma.org
  Gary Lizama at (253) 591-5826, or via email at glizama@cityoftacoma.org

- For questions in regards to LEAP compliance and LCP Tracker support, contact LEAP Staff:
  Deborah Trevorrow at (253) 591-5590, or via email at dtrevorrow@cityoftacoma.org
EIC REQUIREMENT FORM

EQUITY IN CONTRACTING REQUIREMENTS & PROCEDURES:

All bidders must complete and submit with their bid the following solicitation form contained in the bid submittal package:

City of Tacoma – EIC Utilization Form

IMPORTANT NOTE:

It is the bidder’s responsibility to ensure that the subcontractor(s) listed on the EIC Utilization Form are currently certified by the State of Washington’s Office of Minority and Women Business Enterprises (OMWBE) at the time of bid opening. This may be verified by contacting the EIC Office at 253-591-5826 between 8 AM and 5 PM, Monday through Friday or the OMWBE Office at (866) 208-1064. Please refer to the City of Tacoma EIC code.

<table>
<thead>
<tr>
<th>Equity in Contracting Requirements</th>
<th>Minority Business Enterprise Requirement</th>
<th>Women Business Enterprise Requirement</th>
<th>Small Business Enterprise Requirement</th>
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A list of EIC-eligible companies is available on the following web site addresses:

www.omwbe.diversitycompliance.com*

MATERIAL MISSTATEMENTS CONCERNING COMPLETED ACTIONS BY THE BIDDER IN ANY SWORN STATEMENT OR FAILURE TO MEET COMMITMENTS AS INDICATED ON THE EIC UTILIZATION FORM MAY RENDER THE BIDDER IN DEFAULT OF CITY ORDINANCE 1.07

CCD/SBE: 20000083740
Date of Record: 05/25/2022

*For the OMWBE list, be sure to look for businesses in Pierce, King, Lewis, Mason, Grays Harbor, Thurston, or any counties adjacent to the county in which the work is performed per 1.07.050(2)(b-c). Contact the EIC Office if you have any questions.
EQUITY IN CONTRACTING UTILIZATION FORM

This form is to document only the contractors, subcontractors, material suppliers or other types of firms that are intended to be used to meet the stated EIC requirements for the contract awarded from this solicitation. This information will be used to determine contract award. Additional forms may be used if needed.

- You must include this form with your bid submittal in order for your bid to be responsive.
- Prime contractors are required to solicit bids from Businesses that are "Certified" by the Office of Minority and Women's Business Enterprises (OMWBE) [www.omwbe.wa.gov] as a MBE, WBE, and SBE to be known as "Certified Business".
- It is the Prime contractor's responsibility to verify the certification status of the business(s) intended to be utilized prior to the submittal deadline.

Bidder’s Name: ____________________________

Address: ____________________________ City/State/Zip:__________________________

Spec. No. ______________ Base Bid * $ ______________

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<thead>
<tr>
<th>Business Name and Certification Number(s)</th>
<th>b. MBE, WBE, or SBE (Write all that apply)</th>
<th>c. NAICS code(s)</th>
<th>d. Contractor Bid Amount (100%)</th>
<th>e. Material Supplier Bid Amount (20%)</th>
<th>f. Estimated MBE Usage Dollar Amount</th>
<th>g. Estimated WBE Usage Dollar Amount</th>
<th>h. Estimated SBE Usage Dollar Amount</th>
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</table>

i. MBE Utilization %

j. WBE Utilization %

k. SBE Utilization %

By signing and submitting this form the bidder certifies that the OMWBE Certified Business(s) listed will be used on this project including all applicable change orders.

Type or Print Name of Responsible Officer / Title ____________________________

Signature of Responsible Officer ____________________________

Date ____________________________

CCD/EIC/BID DOCS revised March 4, 2022
INSTRUCTIONS FOR COMPLETING EIC UTILIZATION FORM

The purpose of these instructions is to assist bidders in properly completing the EIC Utilization Form.

This form when submitted with your bid, provides information to the City of Tacoma to accurately review and evaluate your proposed EIC usage.

1. * Base Bid is the prime contractor’s bid, plus any alternates, additives and deductibles selected by the City of Tacoma. Also, please refer to Items #10-12 below.

2. Column “a” – List all Certified Business(s) that you will be awarding a contract to if you are the successful bidder.

3. Column "b" – Identify if the Certified Business(s) is being utilized as an MBE, WBE, or SBE. (Businesses may count towards multiple requirements).

4. Column "c" – List the appropriate NAICS code(s) for the scope of work, services, or materials/supplies for each Certified Business.

5. Column “d” – The bid amount must be indicated for all listed Certified Businesses that you plan on doing business with. This quote is the price that you and the Certified Businesses have negotiated prior to bid opening.

6. Column “e” – The bid amount must be indicated for all listed Certified Businesses that you plan on doing business with. This quote is the price that you and the material supplier have negotiated prior to bid opening.

7. Column "f" – Estimated MBE Usage Dollar Amount: For all MBE firms used, multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

8. Column “g” – Estimated WBE Usage Dollar Amount: For all WBE firms used, multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

9. Column “h”– Estimated SBE Usage Dollar Amount: For all MBE, WBE, or SBE firms used, Multiply the amount in Column “d” by 1.0 plus the amount in Column “e” by 0.20. Insert the total amount in this column.

10. Block “i” – The percentage of actual MBE utilization calculated on the Base Bid only. (Divide the sum of Estimated MBE Usage Dollar Amount (Column “f”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “f” divided by Base Bid (*) x 100 = MBE usage as a percentage of the Base Bid.)

11. Block “j” – The percentage of actual WBE utilization calculated on the Base Bid only. (Divide the sum of Estimated WBE Usage Dollar Amount (Column “g”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “g” divided by Base Bid (*) x 100 = WBE usage as a percentage of the Base Bid.)
12. Block “k” – The percentage of actual SBE utilization calculated on the Base Bid only. (Divide the sum of Estimated SBE Usage Dollar Amount (Column “h”) by your Base Bid (*) then multiply by 100 to get a percentage: $ amounts from column “h” divided by Base Bid (*) x 100 = SBE usage as a percentage of the Base Bid.)

It is the prime contractor’s responsibility to check the status of **Certified Businesses** prior to bid opening. Call the EIC Office at 253-591-5826 or email at EICOoffice@cityoftacoma.org for additional information.
PART IV

CITY OF TACOMA

LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM (LEAP) REGULATIONS FOR PUBLIC WORKS CONTRACTS
LEAP

Documents and Submittal Schedule

In the attached packet, you will find the LEAP forms that are required to be submitted by the Prime and Sub Contractors.

- **LEAP Abbreviated Program Requirements**: brief overview of LEAP Program requirements
- **Prime Contractor LEAP Utilization Plan**: to be submitted at the Pre-Construction Meeting *(Required by Prime Contractor Only)*
- **LEAP Employee Verification Form**: to be submitted on an ongoing basis for each qualified LEAP employee
- **LEAP Weekly Payroll Report**: must be attached and filled out to the front of each certified payroll
- **Tacoma Public Utilities Service Area Map, Economically Distressed ZIP Codes Map**: for your reference on LEAP-qualified zoning areas

In addition, the City of Tacoma will also require from the Prime Contractor and all its Subcontractors:

- **Weekly Certified Payrolls**: to be submitted via LCP Tracker weekly, biweekly or monthly with the LEAP Payroll Report attached as scheduled by the Prime
- **Statement of Intent to Pay Prevailing Wages**: to be submitted prior to commencing work
- **Affidavit of Wages Paid**: to be submitted upon completion of each contractor’s work
- **Document Verification**: provide required information when requested from LEAP Office

Please submit above documents as instructed by the LEAP Coordinator.

If you have any questions or request further information, please feel free to contact the City of Tacoma’s LEAP Program at (253) 591-5590 or email dtrevorrow@cityoftacoma.org
LEAP LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM
ABBREVIATED PROGRAM REQUIREMENTS

LEAP is a mandatory City of Tacoma program adopted to provide employment opportunities for City of Tacoma residents and residents of Economically Distressed Areas of the Tacoma Public Utilities Service Area. It requires Contractors performing qualifying public works projects or service contracts to ensure that 15 percent of the total labor hours worked on the project are performed by LEAP-Qualified Pierce County apprentices approved by the Washington State Apprenticeship Council (SAC), youth, veterans, residents of Tacoma, residents of surrounding Economically Distressed Areas, and/or TPU Service Areas. Compliance may be met through any combination LEAP-Qualified employees. The Prime Contractor shall be solely responsible for meeting the LEAP Utilization Goal requirements.

Prime Contractors may obtain further information by contacting the City of Tacoma’s LEAP Coordinator, Deborah Trevorrow, at (253) 591-5590, or e-mail leap@cityoftacoma.org. The LEAP Coordinator can assist contractors in the recruitment of qualified entry-level workers to work on City of Tacoma Public Works projects. The LEAP Office is in the Tacoma Municipal Building, 747 Market Street, Rm 900.

LEAP PROGRAM REQUIREMENTS:
1. LOCAL EMPLOYMENT GOAL: The Contractor is required to ensure that 15 percent of the total Labor Hours worked on the project are performed by residents of the City of Tacoma or Economically Distressed ZIP Codes for the following projects:
   a) Civil Projects over $250,000
   b) Building Projects over $750,000

2. APPRENTICE GOAL: The Contractor is required to ensure that 15 percent of the total Labor Hours worked on any project over $1,000,000 are performed by Apprentices who are residents of the Tacoma Public Utilities Service Area. This is in addition to the Local Employment Goal.

3. SUBCONTRACTOR NOTIFICATION: Prime Contractors shall notify all Subcontractors of the LEAP Program requirement. Subcontractor labor hours may be utilized towards achievement of the LUG. Owner/Operator hours may be used for the Local Employment Goal.

4. FAILURE TO MEET LEAP UTILIZATION GOAL: Contractors shall be assessed an amount for each hour that is not achieved. The amount per hour shall be based on the extent the Contractor met its goal. The amount per hour that shall be assessed shall be as follows:
   • 100% achievement $0.00 penalty
   • 99% to 90% achievement $2.00 penalty *Penalty may be waived in the best interests of the City of Tacoma.
   • 89% to 75% achievement $3.50 penalty
   • 74% to 50% achievement $5.00 penalty
   • 49% to 1% achievement $7.50 penalty
   • 0% achievement $10.00 penalty
LEAP DOCUMENT SUBMITTALS**:

1. **PRIME CONTRACTOR LEAP UTILIZATION PLAN (PCLUP):** The Contractor is required to provide the PCLUP at the Pre-Construction meeting showing the goals to be achieved for the project. The Contractor must identify in the PCLUP the estimated labor hours to be worked on the project by trade/craft persons.

2. **LEAP EMPLOYEE VERIFICATION FORM:** The Contractor must provide the LEAP Office with a form for every person whom the contractor thinks will assist with attaining credit towards meeting the LUG with at least one piece of verifying documentation. The LEAP Office staff will respond regarding whether or not the employee is LEAP-Qualified.

3. **LEAP WEEKLY PAYROLL REPORT:** The Prime and Subcontractors must complete and attach this form to the front of each weekly certified payroll when submitting payrolls in LCP Tracker.

4. **WEEKLY CERTIFIED PAYROLL:** The Prime and Subcontractors must submit weekly Certified Payrolls that include, employee name, address, social security number, craft/trade, class, hours worked on this job, rate of pay, and gross wages paid including benefits for this job.

5. **DEPARTMENT OF LABOR & INDUSTRIES (L&I):** The Prime must enter the project in the L&I project site and notify the LEAP Office when this has been completed.

**WITHHOLDING PROGRESS PAYMENTS:** The LEAP Coordinator may withhold progress payments for failure to follow the above-outlined procedures.
CHAPTER 1.90  
LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM

Sections:
1.90.010 Purpose.
1.90.020 Scope.
1.90.030 Definitions.
1.90.040 LEAP goals.
1.90.050 Repealed.
1.90.060 Effect of program on prime contractor/subcontractor relationship.
1.90.070 Apprentice utilization requirements – Bidding and contractual documents.
1.90.080 Enforcement.
1.90.090 Compliance with applicable law.
1.90.100 Review and reporting.
1.90.105 Authority
1.90.110 Interpretation.

1.90.010 Purpose.

The purpose of this Chapter is to establish a means of providing for the development of a trained and capable workforce possessing the skills necessary to fully participate in the construction trades.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.020 Scope.

The provisions of this Chapter shall apply to all Public Works or Improvements funded in whole or in part with City funds or funds which the City expends or administers in accordance with the terms of a grant.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.030 Definitions.

As used in this chapter, the following terms shall have the following meanings:
A. “Apprentice” shall mean a person enrolled in a course of training specific to a particular construction trade or craft, which training shall be approved by the Washington State Apprenticeship and Training Council established pursuant to RCW 49.04.010.
B. “Building Projects” shall mean all Public Works or Improvements having an Estimated Cost greater than $750,000.00, and for which a building permit must be issued pursuant to Chapter 1 of the current edition of the state building code (Uniform Building Code).
C. “City” shall mean all divisions and departments of the City of Tacoma, and all affiliated agencies, provided, however, that the Tacoma Community Redevelopment Authority shall not be included within this definition.
D. “Civil Projects” shall mean all Public Works or Improvements that are not defined as a “Building Project,” provided that those projects having an Estimated Cost of less than $250,000.00 shall not be included in this definition.
E. “Contractor or Service Provider” means a person, corporation, partnership, or joint venture entering into a contract with the City to construct a Public Work or Improvement.
F. “Director” shall mean the Director of Community and Economic Development, or the Director’s Designee.
G. “Economically Distressed ZIP Codes” shall mean ZIP codes in the Tacoma Public Utilities Service Area that meet two out of three (2/3) of the thresholds of:
   1. High concentrations of residents living under 200% of the federal poverty line in terms of persons per acre (69th percentile)
   2. High concentrations of unemployed people in terms of persons per acre (45th percentile)
   3. High concentrations of people 25 years or older without a college degree in terms of persons per acre (75th percentile)

Said thresholds shall be updated within 30 days following any Prevailing Wage updates issued by the Washington State Labor and Industry. All updates are to be published on the first business day in August and in February of each calendar year.
H. “Electrical Utility” and “Water Utility” shall mean, respectively, the Light Division of the Department of Public Utilities of the City of Tacoma, and shall include the electrical and telecommunications services of that Division, and the Water Division of the Department of Public Utilities of the City of Tacoma.

I. “Estimated Cost” shall mean the anticipated cost of a Public Work or Improvement, as determined by the City, based upon the expected costs of materials, supplies, equipment, and labor, but excluding taxes and contingency funds.

J. “Estimated Labor Hours” shall mean the anticipated number of Labor Hours determined by the City to be necessary to construct a Public Work or Improvement and set forth in the specifications for the project, or as may be subsequently revised due to contract or project adjustment, or pursuant to an agreed upon change order.

K. “Existing Employee” shall mean an employee whom the Contractor or Service Provider can demonstrate was actively employed by the Contractor or Service Provider for at least 1000 hours in the calendar year prior to bid opening plus one month following bid opening, and who was performing work in the construction trades.

L. “Labor Hours” shall mean the actual number of hours worked by workers receiving an hourly wage who are employed on the site of a Public Work or Improvement, and who are subject to state or federal prevailing wage requirements. The term “Labor Hours” shall include hours performed by workers employed by the Contractor or Service Provider and all Subcontractors, and shall include additional hours worked as a result of a contract or project adjustment or pursuant to an agreed upon change order. The term “Labor Hours” shall not include hours worked by workers who are not subject to the prevailing wage requirements set forth in either RCW 39.12 or the Davis-Bacon Act - 40 U.S.C. 276 (a).

M. “LEAP Coordinator” shall mean the City of Tacoma staff member who administers LEAP.

N. “LEAP Program” or “Program” shall mean the City of Tacoma’s Local Employment and Apprenticeship Training Program, as described in this chapter.

O. “LEAP Regulations” or “Regulations” shall mean the rules and practices established in this document.

P. “LEAP Utilization Plan” shall mean the document submitted by the Contractor to the LEAP Coordinator which outlines how the associated goals will be met on the project.

Q. “Priority Hire Resident” shall mean any resident within the Economically Distressed ZIP Codes.

R. “Project Engineer” shall mean the City employee who directly supervises the engineering or administration of a particular construction project subject to this chapter.

S. “Public Work or Improvement” shall have the same meaning as provided in Section 39.04.010 RCW, as that Section may now exist or hereafter be amended.

T. “Resident of Tacoma” shall mean any person, not defined as a Resident of the Community Empowerment Zone, who continues to occupy a dwelling within the boundaries of the City of Tacoma, has a present intent to continue residency within the boundaries of the City, and who demonstrates the genuineness of that intent by producing evidence that the person’s presence is more than merely transitory in nature.

U. “Service Area - Electrical” or “Electrical Service Area” shall mean that area served with retail sales by the Electrical Utility of the City of Tacoma at the time a bid is published by the Electrical Utility for a Public Work or Improvement to be performed primarily for the Electrical Utility.

V. “Service Area - Water” or “Water Service Area” shall mean that area served with retail sales by the water utility of the City of Tacoma at the time a bid is published by the water utility for a Public Work or Improvement to be performed primarily for the water utility.

W. “Service Contract” shall mean all City contracts relating to a Public Work or Improvement which utilize labor at a City site and which are not within the exceptions to nor defined as “Building Projects” or “Civil Projects.”

X. “Subcontractor” means a person, corporation, partnership, or joint venture that has contracted with the Contractor or Service Provider to perform all or part of the work to construct a Public Work or Improvement by a Contractor.

Y. “Tacoma Public Utilities” means the City of Tacoma, Department of Public Utilities.

Z. “Tacoma Public Utilities Service Area” shall mean every ZIP code listed by Tacoma Public Utilities as an area that either receives services or maintains infrastructure to provide services.

AA. Washington State Labor and Industry Prevailing Wage shall mean the hourly wage, usual benefits and overtime, paid in the largest city in each county, to the majority of workers, laborers, and mechanics. Prevailing wages are established, by the Department of Labor & Industries, for each trade and occupation employed in the performance of public work. They are established separately for each county, and are reflective of local wage conditions.
1.90.040 LEAP goals.

A. Utilization Goals.

1. All Contractors constructing Civil Projects or Building Projects, and all Service Providers involved with the construction of a Public Work or Improvement, shall ensure that at least 15 percent of the total Labor Hours actually worked on the Project are performed by persons having their residence within the boundaries of the City of Tacoma or Economically Distressed ZIP Codes, whether or not any such person is an Apprentice.

   a. The thresholds for this section shall be $250,000.00 for Civil Projects and $750,000.00 for Building Projects.

   2. Fifteen percent (15%) of the Total Labor Hours on contracts above one-million dollars ($1,000,000.00) shall have work performed by Apprentices who are residents of the Tacoma Public Utilities Service Area consistent with RCW 39.04.320(1)(a), subject to waiver based on exceptions as specified in RCW 39.04.320(2)(a), (b), and (c).

   3. Labor Hours performed by non-residents of the State of Washington will be deducted from a project’s total Labor Hours for purposes of determining compliance with the requirements of this chapter.

4. All Contractors and Service Providers shall submit a LEAP Utilization Plan as provided for in the regulations adopted under this chapter, and shall meet with the LEAP Coordinator to review said Plan prior to being issued a Notice to Proceed. Failure to submit a LEAP Utilization Plan may be grounds for the City to withhold remittance of a progress payment until such Plan is received from the responsible Contractor or Provider. A meeting with the LEAP Coordinator prior to issuance of a Notice to Proceed shall be excused only when the LEAP Coordinator is unavailable to meet prior to the scheduled date for issuance of the Notice to Proceed and the Contractor and the LEAP Coordinator have otherwise scheduled a meeting for the coordinator to review the Contractor’s or Provider’s plan.

The Contractor or Service Provider shall be responsible for meeting the LEAP utilization goal requirements of the contract, including all amendments and change orders thereto, and shall be responsible for overall compliance for all hours worked by Subcontractors. To the extent possible, the Contractor or Service Provider shall recruit Apprentices from multiple trades or crafts.

B. Failure to Meet Utilization Goal.

1. Contracts for the construction of Building projects or Civil projects and Service Contracts shall provide that Contractors or Service Providers failing to meet the LEAP utilization goals shall be assessed an amount for each hour that is not achieved. The amount per hour shall be based on the extent the Contractor or Service Provider met its goal. The amount per hour that shall be assessed shall be as follows:

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<th>Percent of Goal Met</th>
<th>Assessment per unmet hour</th>
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<tr>
<td>100%</td>
<td>$ 0.00</td>
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<tr>
<td>90% - 99%</td>
<td>$ 2.00</td>
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<td>75% to 89%</td>
<td>$ 3.50</td>
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<td>50% to 74%</td>
<td>$ 5.00</td>
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<tr>
<td>1% to 49%</td>
<td>$ 7.50</td>
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<tr>
<td>0%</td>
<td>$10.00</td>
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When determining the percent of goal that is met, all rounding shall be down to the nearest whole percent. No penalty shall be waived by the City unless it is determined by the Director to be in the best interests of the City, which determination shall be made after consultation with the LEAP Coordinator.

2. Deposit of Assessments. All assessments imposed pursuant to this section shall be deposited into a separate account and utilized to support the City’s pre-apprenticeship and training program. The policies and regulations adopted by the City Manager and Director of Utilities pursuant to this chapter shall address issues pertaining to a Contractor’s existing workforce. Contributions need not be made for Labor Hours that have been adjusted in accordance with Section 1.90.040(E).

C. LEAP Reports.

Notwithstanding the provisions of TMC 1.90.100, the Director shall, not less than annually, publish a LEAP report setting forth Contractor compliance with this chapter. Said report shall include information on all contracts and all Contractors to which this chapter applies, and shall detail the level and nature of LEAP participation by contract and by Contractor, The
Director’s LEAP report may include such other information as may be helpful to assuring fair and accurate representation of the contracts, Contractors or projects covered in the report. The Director’s LEAP reports may be considered by the Board of Contracts and Awards in its determinations as to bidder responsibility.

D. LEAP Goal Adjustments.

1. LEAP utilization goals may be adjusted prior to bid opening and/or as a result of a contract amendment or change order on a Building Project, Civil Project, or Service Contract.

   a. If LEAP utilization goals are adjusted prior to bid opening, they shall be set forth in the bid or Request For Proposal advertisement and specification documents or in an addendum timely provided to prospective bidders, provided that such adjustment shall be based upon a finding by the Project Engineer that the reasonable and necessary requirements of the contract render LEAP utilization unfeasible at the required levels. The Director shall concur with the Project Engineer’s finding, provided that should the Project Engineer and the Director fail to reach agreement on the Project Engineer’s finding, then in that circumstance the matter shall be referred to the City Manager or the Director of Utilities, as appropriate, for ultimate resolution. Notwithstanding any other provision of this chapter to the contrary, the decision of the City Manager or the Director of Utilities with regard to LEAP goal adjustment may not be appealed.

   b. If LEAP utilization goals are adjusted due to contract amendment or change order, the amount of adjustment shall be consistent with the utilization goals set forth in this chapter and shall be determined pursuant to regulations adopted pursuant to this chapter for administration of LEAP utilization goal adjustments.

2. The methodology of determining the appropriate adjustments to LEAP utilization goals shall be determined in consultation with the LEAP Advisory Committee, established pursuant to this ordinance for so long as the LEAP Advisory Committee remains in existence.

3. LEAP utilization goals shall not apply to those portions of a project that are funded by sources other than (a) City funds, or (b) funds which the City expends or administers in accordance with the terms of a grant to the City, provided that the Project Engineer shall notify the Director of such non-application prior to bid advertisement. For the purposes of this paragraph, credits extended by another entity for the purpose of providing project funding shall not be considered to be City funds.

E. Utilization - Electrical Projects Outside Electrical Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by the City’s Electrical Utility, which are wholly situated outside the Electrical Service Area, and for which the estimated cost is less than $1,000,000.00, are exempt from the requirements of this chapter.

F. Utilization - Water Projects Outside Water Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by the City’s water utility, which are wholly situated outside the Water Service Area, and for which the estimated cost is less than $1,000,000.00 are exempt from the requirements of this chapter.

G. Utilization - Projects Outside Tacoma Public Utilities Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by Tacoma Public Utilities, which are wholly situated outside the retail service area of the Tacoma Public Utilities Service Area, and for which the estimated cost is less than $1,000,000.00 are exempt from the requirements of this chapter. Projects wholly situated outside the Tacoma Public Utilities Service Area, and for which the estimated cost is more than $1,000,000.00, shall be exempt from 15% utilization goal specified in subsection A1. of this section. The 15% utilization goal specified in subsection A2. of this section may be met if project work is performed by Apprentices who are enrolled in a course of training specific to a particular construction trade or craft, provided such training has been approved by the Washington State Apprenticeship and Training Council in accordance with Chapter 49.04, RCW.

H. Emergency.

This chapter shall not apply in the event of an Emergency. For the purposes of this section, an “Emergency” means unforeseen circumstances beyond the control of the City that either: (a) present a real, immediate threat to the proper performance of essential functions; or (b) will likely result in material loss or damage to property, bodily injury, or loss of life if immediate action is not taken.

I. Conflict with State or Federal Requirements.

If any part of this chapter is found to be in conflict with federal or state requirements which are a prescribed condition to the allocation of federal or state funds to the City, then the conflicting part of this chapter is inoperative solely to the extent of the conflict and with respect to the City departments directly affected. This provision does not affect the operation of the
remainder of this chapter. Administrative rules or regulations adopted under this chapter shall meet federal and state requirements which are a necessary condition to the receipt of federal or state funds by the City.

(Ord. 28520 Ex. A; passed Jul. 17, 2018; Ord. 28147 Ex. B; passed May 7, 2013; Ord. 27815 Ex. A; passed Jun. 30, 2009; Ord. 27368 § 2; passed Jun. 21, 2005; Ord. 26992 § 1; passed Oct. 15, 2002; Ord. 26698 § 2; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.050  Repealed by Ord. 27368. Good faith efforts.

(Ord. 27368 § 3; passed Jun. 21, 2005; Ord. 26998 § 3; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.060  Effect of program on prime contractor/service provider - subcontractor relationship.

The LEAP Program shall not be construed so as to modify or interfere with any relationship between any Contractor or Service Provider and Subcontractor. The LEAP Program shall not grant the City any authority to control the manner or method of accomplishing any construction work that is additional to any authority retained by the City in a Public Works contract.

(Ord. 26698 § 4; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.070  Apprentice utilization requirements – Bidding and contractual documents.

All packages of bid documents for every Building Project and every Civil Project shall incorporate provisions satisfactory to the City Attorney so as to allow enforcement of the provisions contained in this Chapter. Such contractual provisions may include liquidated damages, calculated to reimburse the City for the Contractor’s breach of these performance requirements, which shall be published with the City’s call for bids.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.080  Enforcement.

A. The Director shall review the Contractor’s or Service Provider’s and all Subcontractor’s employment practices during the performance of the work for compliance with LEAP Program requirements. On-site visits may be conducted as necessary to verify compliance with the requirements of the LEAP Program. The Contractor, Service Provider, or Subcontractors shall not deny to the City the right to interview its employees, provided that the Director shall make reasonable efforts to coordinate employee interviews with employers.

B. Any knowing failure or refusal to cooperate in compliance monitoring may disqualify the defaulting Contractor, Service Provider, or Subcontractor from eligibility for other City contracts.

C. The making of any material misrepresentation may disqualify the defaulting Contractor, Service Provider, or Subcontractor from eligibility for other City contracts.

D. Any action by the City, its officers and employees, under the provisions of this Chapter may be reviewed by the Board of Contracts and Awards, upon written application of the party so affected. Application shall be made within twenty (20) days of the date of the action upon which the appeal is based, and provided to the City by certified mail or by personal service. Any action taken by the Board of Contracts and Awards may be appealed to the City Council or Public Utility Board, as appropriate, and thereafter if desired, to the Superior Court of Pierce County, Washington, within fifteen (15) days of the previous decision.

(Ord. 26698 § 5; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.090  Compliance with applicable law.

Nothing in this Chapter shall excuse a Prime Contractor, Service Provider, or Subcontractor from complying with all relevant federal, state, and local laws.

(Ord. 26698 § 6; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.100  Review and reporting.

The City Manager and Director of Utilities shall review the Program on or before January 1, 2000, and every two (2) years thereafter, and shall report to the City Council and Public Utility Board the Manager’s and Director’s findings, conclusions, and recommendations as to the continued need for the Program, and any revisions thereto that should be considered by the Council and Board.
1.90.105 Authority.
The City Manager and the Director of Utilities shall have authority to jointly adopt policies and regulations consistent with this chapter to implement the LEAP program.

(Ord. 26698 § 7; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.110 Interpretation.
This Chapter shall not be interpreted or construed so as to conflict with any state or federal law, nor shall this Chapter be enforced such that enforcement results in the violation of any applicable judicial order.

(Ord. 26301 § 1; passed Oct. 6, 1998)
LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM (LEAP)

LEAP REQUIREMENTS & PROCEDURES:

The LEAP office enforces post-award mandatory requirements. Bidders do not have to submit any information in the bid submittal package to be in compliance with LEAP.

Post-award Submittals:

- **Prime Contractor LEAP Utilization Plan.** This form is to be completed and presented at the Pre-Construction Meeting.
- **LEAP Employee Verification Form.** This form is to be completed for every qualifying LEAP employee.
- **LEAP Weekly Payroll Report.** This form is to be completed and submitted with each certified payroll.

The City of Tacoma’s LEAP office enforces two mandatory requirements on City projects based on certain monetary thresholds.

Local Employment Utilization Goal - the Prime Contractor performing a qualifying public works project must ensure that 15 percent of the total labor hours worked on the project are performed by residents of the City of Tacoma or Economically Distressed Zip Codes whether or not any such person is an apprentice.

Apprenticeship Utilization Goal – for contracts above one-million dollars, the Prime Contractor performing a qualifying public works project must ensure that 15 percent of the total labor hours worked on the project are performed by Apprentices who are residents of the City of Tacoma or Tacoma Public Utilities Service Area. The accompanying LEAP Regulations, forms, and maps are included in these specifications.

*Exceptions: If the project is located outside of the retail service area of the Tacoma Public Utilities Service Area, then Apprentices may come from the county in which the work is performed.

This project is above $1 million and is thusly subject to the:

1. 15% Local Employment Utilization Goal
2. 15% Apprentice Utilization Goal

LEAP staff can assist contractors in the recruitment, screening and selection of qualified City of Tacoma residents, Economically Distressed Area residents, and Apprentices. Contractors may obtain further information by contacting the City’s LEAP Office at (253) 316-3057 or (253) 591-5590. The LEAP Office is located in the Tacoma Municipal Building, 747 Market Street, Room 900, Tacoma, WA 98402. www.cityoftacoma.org/leap
PRIME CONTRACTOR
LEAP UTILIZATION PLAN

Failure to submit this plan at the Pre-Construction Meeting may result in Progress Payments being withheld.

Part A

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Part B

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TOTAL hrs.

Part C

Provide a description of how the Contractor plans to ensure that the LEAP Utilization Requirements on the project will be met. (Use additional sheets if necessary)
General Instructions for completing Prime Contractor LEAP Utilization Plan

**Part A**

**Contractor/Contract Information Section:** The Prime Contractor is responsible for completing this section. Failure to submit this plan at the Pre-Construction Meeting may result in Progress Payments being withheld.

**Part B**

**Planned LEAP Hours Section:** This section should be completed by the Prime Contractor. The information required in Part B is described below.

**Trade or Craft:** Indicate the Trade or Craft being used.

**LEAP Employee Categories:** Indicate the number of hours that will be utilized by the Prime Contractor and all Sub Contractors for each craft and broken down by City of Tacoma Resident, City of Tacoma Apprentice, Youth, or Veteran, Pierce County Apprentice, Youth, or Veteran.

For Watershed Projects: King County Apprentice – Approved by Washington State and/or Seattle Renewal Community (CEZ) Resident.

For Hydro Projects: Area Residents (residing in either Pierce County or the County where the work is performed: Lewis, Mason, Grays Harbor or Thurston County), Tacoma Community Empowerment Zone Resident, City of Tacoma Residents.

**Totals:** Total the number of hours in each of the six (6) columns.

**Total Planned LEAP Utilization Hours:** This is the total number of hours planned on this project to satisfy the LEAP Utilization Requirement.

**Part C**

**Description of how the Contractor plans to ensure fulfillment of the LEAP Utilization Requirement:** This section is to be completed by the Prime Contractor. Please describe how you plan to satisfy the LEAP Utilization Requirement on this project. Provide a summary of your outreach and recruitment procedures to hire LEAP Qualified Employees to work on this project.
No Work Performed (NWP) Report

Prime/Sub Contractor: ___________________________________________________________

Specification Number: ___________________________________________________________

Project Description: _____________________________________________________________

Payroll Week Ending Date: __________________________           Payroll Number: __________

NO WORK PERFORMED

I, the undersigned, do hereby certify under penalty of perjury, that the information contained herein is true and correct.

_________________________         ______________________       __________
Signature of Responsible Officer     Title              Date
LEAP EMPLOYEE VERIFICATION FORM

Contractor/Sub:___________________________ Specification Number:___________________________

Project Description:__________________________________________________________

Employee Name:______________________________________ Craft:___________________________

Ethnic Group (optional): □ Asian/Pac Isl. □ Black □ Hispanic □ Native American □ White □ Other

Gender (optional): □ MALE □ FEMALE

Complete Physical Address (No PO Boxes):

City:__________ State:_______ Zip:_______ Telephone:__________ Date of

Hire:__________ Apprenticeship County:__________ Apprentice Registration I.D. (if applicable):__________

Age:__________ Copy of DD-214:_______

*******Please fill out entire form for tracking LEAP performance*******

LEAP qualified employee categories: (check all that apply and provide evidence for each check)

_____ a. Resident within the geographic boundaries of the City of Tacoma

_____ b. Resident within Economically Distressed ZIP Codes of the Tacoma Public Utilities Service Area

_____ c. WA State Approved Apprentice living in Tacoma Public Utilities Service Area

_____ d. WA State Approved Apprentice *(Only valid for contracts where 100% of work is performed outside of Pierce County)

Signature of Employee:_______________________________________________ Date:________________________

Contractor Representative:____________________________________________ Date:________________________
LEAP EMPLOYEE VERIFICATION FORM

To be Completed by Contractor or Subcontractor

Please attach a legible copy of the following document(s) showing the address of residence as proof of local (Tacoma) and/or Pierce County residency and apprentice status, youth status, or veteran status.

---------------------------------------------------------------

   For Youth - Copy of Birth Certificate or WA State ID or
   WA Driver's License (projects advertised after 05-20-13)
   
   For Veterans – Copy of DD-214(Projects advertised after
   05-20-13)
   
   Driver's License with current address
   
   Utility Bill/Phone Bill/Cell Bill/Cable Bill with current
   address
   
   Copy of current tax form W-4
   
   Rental Agreement/Lease (residential)
   
   Computer Printout From Other Government Agencies
   
   Property Tax Records
   
   Apprentice Registration I.D.
   
   Food Stamp Award Letter
   
   Housing Authority Verification
   
   Insurance Policy (Residence/Auto)

*Any of the above must have a complete physical address verified by the www.govme.org website.

No PO Boxes

Contractor Representative: _______________________________ Date: _____________

Title: _______________________________
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PART V

STATE PREVAILING WAGE RATES

AND

INSURANCE REQUIREMENTS
PREVAILING WAGE RATES

This project requires prevailing wages under 39.12 RCW. Any worker, laborer, or mechanic employed in the performance of any part of the work shall be paid not less than the applicable prevailing rate of wage.

The project site is located in Pierce County.

The effective date for prevailing wages on this project will be the submittal deadline with these exceptions:
   a. If the project is not awarded within six months of the submittal deadline, the award date is the effective date.
   b. If the project is not awarded pursuant to a competitive solicitation, the date the contract is executed is the effective date.
   c. Janitorial contracts follow WAC 296-127-023.

Except for janitorial contracts, these rates shall apply for the duration of the contract unless otherwise noted in the solicitation.

Look up prevailing rates of pay, benefits, and overtime codes from this link:
https://secure.lni.wa.gov/wagelookup/

REQUIRED FILINGS

The contractor and all subcontractors covered under 39.12 RCW shall submit to the Department of Labor and Industries (L&I) for work provided under this contract:

1. A Statement of Intent to Pay Prevailing Wages must be filed with and approved by L&I upon award of contract.

2. An Affidavit of Wages Paid must be filed with and approved by L&I upon job completion.

Payments cannot be released by the City until verification of these filings are received by the engineer. Additional information regarding these filings can be obtained by calling the Department of Labor & Industries, Prevailing Wage at 360-902-5335, https://www.lni.wa.gov/ or by visiting their MY L&I account.
The Contractor (Contractor) shall maintain at least the minimum insurance set forth below. By requiring such minimum insurance, the City of Tacoma shall not be deemed or construed to have assessed the risk that may be applicable to Contractor under this Contract. Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage.

1. GENERAL REQUIREMENTS

The following General Requirements apply to Contractor and to Subcontractor(s) of every tier performing services and/or activities pursuant to the terms of this Contract. Contractor acknowledges and agrees to the following insurance requirements applicable to Contractor and Contractor’s Subcontractor(s):

1.1. City of Tacoma reserves the right to approve or reject the insurance provided based upon the insurer, terms and coverage, the Certificate of Insurance, and/or endorsements.

1.2. Contractor shall not begin work under the Contract until the required insurance has been obtained and approved by City of Tacoma.

1.3. Contractor shall keep this insurance in force during the entire term of the Contract and for Thirty (30) calendar days after completion of all work required by the Contract, unless otherwise provided herein.

1.4. Insurance policies required under this Contract that name “City of Tacoma” as Additional Insured shall:
   1.4.1. Be considered primary and non-contributory for all claims.
   1.4.2. Contain a “Separation of Insured provision and a “Waiver of Subrogation” clause in favor of City of Tacoma.

1.5. Section 1.4 above does not apply to contracts for purchasing supplies only.

1.6. Verification of coverage shall include:
   1.6.1. An ACORD certificate or equivalent.
   1.6.2. Copies of all endorsements naming the City of Tacoma as additional insured and showing the policy number.
   1.6.3. A notation of coverage enhancements on the Certificate of Insurance shall not satisfy these requirements – actual endorsements must be submitted.

1.7. Liability insurance policies, with the exception of Professional Liability and Workers’ Compensation, shall name the City of Tacoma and its officers, elected officials, employees, agents, and authorized volunteers as additional insured.
   1.7.1. No specific person or department should be identified as the additional insured.
   1.7.2. All references on certificates of insurance and endorsements shall be listed as “City of Tacoma”.

Insurance Requirements
Template Revised 10/3/2019
1.7.3. The City of Tacoma shall be additional insured for both ongoing and completed operations using Insurance Services Office (ISO) form CG 20 10 04 13 and CG 20 37 04 13 or the equivalent for the full available limits of liability maintained by the Contractor irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract and irrespective of whether the Certificate of Insurance describes limits lower than those maintained by the Contractor.

1.8. Contractor shall provide a Certificate of Insurance for each policy of insurance meeting the requirements set forth herein when Contractor provides the signed Contract for the work to City of Tacoma. Contractor shall provide copies of any applicable Additional Insured, Waiver of Subrogation, and Primary and Non-contributory endorsements. Contract or Permit number and the City Department must be shown on the Certificate of Insurance.

1.9. Insurance limits shown below may be written with an excess policy that follows the form of an underlying primary liability policy or an excess policy providing the required limit.

1.10. Liability insurance policies shall be written on an “occurrence” form, except for Professional Liability/Errors and Omissions, Pollution Liability, and Cyber/Privacy and Security.

1.11. If coverage is approved and purchased on a “Claims-Made” basis, Contractor warrants continuation of coverage, either through policy renewals or by the purchase of an extended reporting period endorsement as set forth below.

1.12. The insurance must be written by companies licensed or authorized in the State of Washington pursuant to RCW 48 with an (A-) VII or higher in the A.M. Best's Key Rating Guide www.ambest.com.

1.13. Contractor shall provide City of Tacoma notice of any cancellation or non-renewal of this required insurance within Thirty (30) calendar days.

1.14. Contractor shall not allow any insurance to be cancelled or lapse during any term of this Contract, otherwise it shall constitute a material breach of the Contract, upon which City of Tacoma may, after giving Five (5) business day notice to 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 City of Tacoma by Contractor upon demand, or at the sole discretion of City of Tacoma, offset against funds due Contractor from City of Tacoma.

1.15. Contractor shall be responsible for the payment of all premiums, deductibles and self-insured retentions, and shall indemnify and hold the City of Tacoma harmless to the extent such a deductible or self-insured retained limit may apply to the City of Tacoma as an additional insured. Any deductible or self-insured retained limits in excess of Twenty Five Thousand Dollars ($25,000) must be disclosed and approved by City of Tacoma Risk Manager and shown on the Certificate of Insurance.
1.16. City of Tacoma reserves the right to review insurance requirements during any term of the Contract and to require that Contractor make reasonable adjustments when the scope of services has changed.

1.17. All costs for insurance shall be incidental to and included in the unit or lump sum prices of the Contract and no additional payment will be made by City of Tacoma to Contractor.

1.18. Insurance coverages specified in this Contract are not intended and will not be interpreted to limit the responsibility or liability of Contractor or Subcontractor(s).

1.19. Failure by City of Tacoma to identify a deficiency in the insurance documentation provided by Contractor or failure of City of Tacoma to demand verification of coverage or compliance by Contractor with these insurance requirements shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.

1.20. If Contractor is a State of Washington or local government and is self-insured for any of the above insurance requirements, a certification of self-insurance shall be attached hereto and be incorporated by reference and shall constitute compliance with this Section.

2. CONTRACTOR

As used herein, "Contractor" shall be the Supplier(s) entering a Contract with City of Tacoma, whether designated as a Supplier, Contractor, Vendor, Proposer, Bidder, Respondent, Seller, Merchant, Service Provider, or otherwise.

3. SUBCONTRACTORS

It is Contractor’s responsibility to ensure that each subcontractor obtain and maintain adequate liability insurance coverage. Contractor shall provide evidence of such insurance upon City of Tacoma’s request.

4. REQUIRED INSURANCE AND LIMITS

The insurance policies shall provide the minimum coverages and limits set forth below. Providing coverage in these stated minimum limits shall not be construed to relieve Contractor from liability in excess of such limits.

4.1 Commercial General Liability Insurance

Contractor shall maintain Commercial General Liability Insurance policy with limits not less than One Million Dollars ($1,000,000) each occurrence and Two Million Dollars ($2,000,000) annual aggregate. The Commercial General Liability Insurance policy shall be written on an Insurance Services Office form CG 00 01 04 13 or its equivalent. Products and Completed Operations shall be maintained for a period of three years following Substantial Completion of the Work related to performing construction services.

This policy shall include product liability especially when a Contract solely is for purchasing supplies. The Commercial General Liability policy shall be endorsed to include:

4.1.1 A per project aggregate policy limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.
4.2 **Commercial (Business) Automobile Liability Insurance**
Contractor shall maintain Commercial Automobile Liability policy with limits not less than One Million Dollars ($1,000,000) each accident for bodily injury and property damage and bodily injury and property damage coverage for owned (if any), non-owned, hired, or leased vehicles. Commercial Automobile Liability Insurance shall be written using ISO form CA 00 01 or equivalent. Contractor must also maintain an MCS 90 endorsement or equivalent and a CA 99 48 endorsement or equivalent if “Pollutants” are to be transported.

4.3 **Workers’ Compensation**
4.3.1 Contractor shall comply with Workers’ Compensation coverage as required by the Industrial Insurance laws of the State of Washington, as well as any other similar coverage required for this work by applicable federal laws of other states. The Contractor must comply with their domicile State Industrial Insurance laws if it is outside the State of Washington.

4.4 **Employers’ Liability Insurance**
Contractor shall maintain Employers’ Liability coverage with limits not less than One Million Dollars ($1,000,000) each employee, One Million Dollars ($1,000,000) each accident, and One Million Dollars ($1,000,000) policy limit.

4.5 **Professional Liability Insurance or Errors and Omissions**
Contractor and/or its subcontractor shall maintain Professional Liability or Errors and Omissions with limits of One Million Dollars ($1,000,000) per claim and Two Million Dollars ($2,000,000) in the aggregate covering acts, errors and omissions arising out of the professional services under this Contract.
If the policy limit includes the payment of claims or defense costs, from the policy limit, the per claim limit shall be Two Million Dollars ($2,000,000).
If the scope of such design-related professional services includes work related to pollution conditions, the Professional Liability policy shall include Pollution Liability coverage.
If provided on a “claims-made” basis, such coverage shall be maintained by policy renewals or an extended reporting period endorsement for not less than three years following the end of the Contract.

4.6 **Excess or Umbrella Liability Insurance**
Contractor shall provide Excess or Umbrella Liability Insurance with limits not less than Ten Million Dollars ($10,000,000) per occurrence and in the aggregate. This coverage shall apply, at a minimum, in excess of primary underlying Commercial General Liability, Employer’s Liability, Pollution Liability, Marine General Liability, Protection and Indemnity, and Automobile Liability if required herein.

4.7 **Pollution Liability Insurance**
Contractor shall maintain a Pollution Liability or Environmental Liability Insurance providing coverage, including investigation and defense costs, for bodily injury and property damage, including loss of use of damaged property or of property that has been physically damaged or destroyed.
Such coverage shall provide both on-site and off-site cleanup costs and cover gradual and sudden pollution, and include in its scope of coverage the City of Tacoma damage claims for loss arising out of Contractor’s work with limits not less than One Million Dollars ($1,000,000) each occurrence and Two Million Dollars ($2,000,000) aggregate.
This policy shall include Environmental Resource Damage coverage and Hazardous Substance Removal. If such coverage is provided on a “claims-made” basis, the following additional conditions must be met:

4.7.1 The policy must contain no retroactive date, or the retroactive date must precede the commencement date of this Contract.

4.7.2 The extended reporting period (tail) must be purchased to cover a minimum of Six (6) years beyond completion of work.

4.8 Installation Floater Insurance
Contractor shall maintain during the term of the Contract, at its own expense, Installation Floater Insurance covering Contractor’s labor, materials, and equipment to be used for completion of the work performed under this Contract against all risks of direct physical loss, excluding earthquake and flood, for an amount equal to the full amount of the Contract improvements.

4.9 Builder’s Risk Insurance
Contractor shall maintain during the term of the Contract and until final acceptance of the work by the City of Tacoma, a policy of Builder’s Risk Insurance providing coverage for all-risk of physical injury to all structures to be constructed according to the Contract. City of Tacoma shall be included as a named insured (not named as additional insured) on the policy. Builder’s Risk Insurance policy shall:

4.9.1 Have a deductible of no more than Five Thousand Dollars ($5,000) for each occurrence, the payment of which will be the responsibility of Contractor. Any increased deductibles accepted by City of Tacoma will remain the responsibility of Contractor.

4.9.2 Be on an ISO Special Form Causes of Loss or equivalent and shall insure against the perils flood, earthquake, theft, vandalism, malicious mischief, and collapse.

4.9.3 Include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site.

4.9.4 Be written in the amount of the completed value of the structures, with no coinsurance provisions exposure on the part of Contractor or City of Tacoma.

4.9.5 Contain a Waiver of Subrogation provision whereby each insured waives their subrogation rights to the extent the loss is covered by this insurance.

4.9.6 Grant permission to occupy, allowing the building or structure to be partially occupied prior to completion, without detrimental effect to the coverage provided.

4.9.7 Include coverage for the testing and startup of the building’s operating systems.

4.9.8 Include coverage for City of Tacoma’s loss of use or business interruption arising out of a covered loss which delays completion.

4.9.9 Include resultant damage coverage for loss due to faulty workmanship and defective material.

Contractor and City of Tacoma waive all rights against each other, their respective subcontractors, agents, and representatives for damages caused by fire or other perils to the extent covered by Builder’s Risk Insurance or other property insurance applicable to the work. The policies shall provide such waivers by endorsement or otherwise.
4.10 Owners and Contractors Protective Liability Insurance
Contactor shall maintain during the performance of all work pursuant to the Contract, an ISO form Owners and Contractors Protective Liability policy, on which City of Tacoma shall be a named insured. Said policy shall provide coverage for bodily injury and property damage arising from the work to be performed under the Contract, and shall have policy limits of no less than Ten Million Dollars ($10,000,000) combined single limit of liability with a dedicated aggregate limit of no less than Ten Million Dollars ($10,000,000).

4.11 Other Insurance
Other insurance may be deemed appropriate to cover risks and exposures related to the scope of work or changes to the scope of work required by City of Tacoma. The costs of such necessary and appropriate Insurance coverage shall be borne by Contractor.