



City of Tacoma, WA

**TACOMA WATER
REQUEST FOR BIDS
PORTLAND AVE SLEEVE VALVE
SPECIFICATION NO. TW23-0023N**

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**City of Tacoma
Tacoma Water**

**REQUEST FOR BIDS TW23-0023N
Portland Ave Sleeve Valve**

Submittal Deadline: 11:00 a.m., Pacific Time, Friday, March 3, 2023

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, sendbid@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: Submittals will be received as follows:

By Email:

sendbid@cityoftacoma.org

Maximum file size: 35 MB. Multiple emails may be sent for each submittal.

Bid Opening: Submittals in response to a RFB will be opened at the time listed in the submittal deadline.

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 not be held.

Project Scope: The Work of this project shall include the design, manufacture, and delivery of one 18" x 20" in-line horizontal multi-jet sleeve valve, fixed element energy dissipator, and electric actuator.

Estimate: \$420,000.00 plus any applicable taxes.

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 Becky Lewis, Buyer by email to rlewis4@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 Procurement and Payables Division by the date and time specified in the Request for Bids page.

The following items make up your submittal package:	
Signature Page (Appendix A)	
Bid Proposal Form (Appendix A)	
Statement of Qualifications Form (Appendix A)	
After award, the following documents will be executed:	
Supplies Contract	
Certificate of Insurance and related endorsements	
Performance Bond	

1. BACKGROUND

The City of Tacoma (City) / Tacoma Public Utilities (TPU) is soliciting bids to establish one or more contracts with qualified vendors to fulfill the City's needs for the design, manufacture, and delivery of one 18" x 20" in-line horizontal multi-jet sleeve valve, fixed element energy dissipator, and electric actuator. Work performed under this contract excludes any services as defined by [RCW 18.43.020](#). Contract(s) will be awarded to the lowest responsive and responsible bidder(s) based on price, product quality and availability.

Vendors may be required to submit samples of their product for evaluation prior to award. Products that fail to meet City standards or any of the specifications herein may be rejected. Should a contracted vendor fail to meet quality and/or availability requirements contained in these specifications, the City may move to terminate the contract with 10 days written notice.

1.1 Project Estimate: \$420,000.00 plus any applicable taxes.

1.2 Project is not federally funded.

2. CALENDAR OF EVENTS

This is a tentative schedule only and may be altered at the sole discretion of the City.

The anticipated schedule of events concerning this RFB is as follows:

Approved Equivalent Deadline:	2/22/2023
Question Deadline:	2/22/2023
City response to Questions:	2/24/2023
Submittal Due Date:	3/3/2023
Anticipated Award Date:	3/15/2023

3. INQUIRIES

3.1 Questions should be submitted to Becky Lewis, Buyer via email to rlewis4@cityoftacoma.org.

Subject line to read: TW23-0023N – Portland Ave Sleeve Valve – VENDOR NAME

3.2 Questions are due no later than 3:00 p.m. on the date indicated in the Calendar of Events.

3.3 Questions marked confidential will not be answered or included.

3.4 The City reserves the discretion to group similar questions to provide a single answer or not to respond when the requested information is confidential.

3.5 The answers are not typically considered an addendum.

3.6 The City will not be responsible for unsuccessful submittal of questions.

3.7 Written answers to questions will be posted in the event approximately one week after the question deadline.

4. PRE-BID MEETING

4.1 No pre-proposal meeting will be held; however, questions and request for clarifications of the specifications may be submitted as stated in the inquiries section.

5. DISCLAIMER

The City is not liable for any costs incurred by the Respondent for the preparation of materials or a proposal submitted in response to this RFB, for conducting any presentations to the City, or any other activities related to responding to this RFB, or to any subsequent requirements of the contract negotiation process.

6. DELIVERY

6.1 Delivery shall be to the City of Tacoma, 3506 South 35th Street, Tacoma, WA, 98409. Each vendor will be required to submit a delivery timeline they can commit to on the bid proposal form. Purchase order delivery dates will reflect this timeline. In the event a purchase order deliver date is not met, the City reserves the right to purchase these products elsewhere if they are in a time constraint. If constant late deliveries occur, the City may terminate the contract.

6.2 Hours of operation shall be Monday through Friday, 9:00 a.m. to 3:30 p.m., excluding legal holidays, as referred to in the Standard Terms and Conditions or as otherwise approved by the City.

7. CONTRACT TERM

The contract will be for a two-year period and is subject to the price increase/decrease provisions per the [Price Adjustments](#) section. The City reserves the right to cancel the contract for any reason, by written notice, as stipulated in the contract.

8. RESPONSIVENESS

Bid submittals must provide ninety (90) days for acceptance by City from the due date for receipt of submittals. All submittals will be reviewed by the City to determine compliance with the requirements and instructions specified in this RFB. The Respondent is specifically notified that failure to comply with any part of this RFB may result in rejection of the submittal as non-responsive. The City reserves the right, in its sole discretion, to waive irregularities deemed immaterial. The City also reserves the right to not award a contract or to issue subsequent RFB's.

9. AWARD

Award will be made to the lowest responsive, responsible bidder. All bidders shall provide unit or lump sum pricing for each line item. Each line item will be added up for a subtotal price.

The subtotal price will be compared amongst each bidder, including any payment discount terms offered twenty (20) days or more. The City may also take into consideration all other criteria for determining award, including evaluation factors set forth in Municipal Code Section 1.06.262.

All other elements or factors, whether or not specifically provided for in this specification, which would affect the final cost to and the benefits to be derived by the City will be considered in determining the award of the contract. The final award decision will be based on the best interests of the City.

The City reserves the right to let the contract to the lowest responsible bidder whose bid will be the most advantageous to the City, price and any other factors considered. In evaluating the proposals, the City may also consider any or all of the following:

1. Compliance with specification.
2. Proposal prices, listed separately if requested, as well as a lump sum total
3. Time of completion/delivery.
4. Warranty terms.
5. Bidder's responsibility based on, but not limited to:
 - a) Ability, capacity, organization, technical qualifications and skill to perform the contract or provide the services required.
 - b) References, judgment, experience, efficiency and stability.
 - c) Whether the contract can be performed within the time specified.
 - d) Quality of performance of previous contracts or services

10. PROGRESS PAYMENTS

Progress payments will be made in accordance with the following owner approved completion of milestones as listed below:

- 10.1** 15% of the contract price will be eligible for payment following owner's approval of all required submittals listed in the Technical Specifications.
- 10.2** 75% of the contract price will be eligible for payment following delivery (F.O.B. the address listed in Section 6.1) and owner's acceptance of the equipment as specified in the contract.
- 10.3** 10% of the contract price will be eligible for payment following delivery of training materials and the completion of manufacturer's field services as approved by the owner.

11. PERFORMANCE BOND

11.1 A performance bond is required for this project. Bonds will include a power of attorney, will be for 50% of the Contract total and is subject to the following requirements:

11.2 The City's performance bond form must be used.

11.3 The performance bond must be executed by a surety company licensed to do business in the State of Washington.

11.4 The cost of a performance bond must be included in submittal prices. Bonds will not be paid as a separate line item.

12. PRICE ADJUSTMENTS

Bid submittal prices will establish a base against which Contractors may request price adjustments per the following terms:

12.1 Any proposed price increase to Contract line items must be beyond the control of the contractor and supported by written documentation from the manufacturer or wholesale distributor, indicating new higher cost adjustments in effect

13. STANDARD TERMS AND CONDITIONS

City of Tacoma [Standard Terms and Conditions](#) apply.

14. INSURANCE REQUIREMENTS

Successful proposer will provide proof and maintain the insurance coverage in the amounts and in the manner specified in the City of Tacoma Insurance Requirements document applicable to the services, products, and deliverables provided under the solicitation. The City of Tacoma Insurance Requirements document is fully incorporated into the solicitation by reference (Appendix B).

15. WARRANTY

Parts: Manufacturer's warranty or minimum one-year warranty whichever is greater.

Contractor shall arrive on-site at the Portland Avenue Reservoir within 48 hours of notification for all warranty repairs during normal work hours of 8:00 a.m. to 5:00 p.m. Monday through Friday. Repairs shall include free pick-up and delivery. Repairs must be completed and vehicle returned within 48 hours of pick-up.

Contractor agrees to allow City to make minor warranty repairs where that is most cost effective and, if requested, contractor will credit City for cost of parts, but not labor.

Vendor will warrant goods according to the manufacturer's warranty guidelines. The start of the warranty commences once the goods are delivered and accepted by the City.

16. INSPECTION

All goods are subject to final inspection and acceptance by the City. If any inspection fails, the vendor shall be required to make arrangements to exchange the goods at their own expense and replace it in a timely manner acceptable to the City.

Material failing to meet the requirements of this contract will be held at Vendor's risk and may be returned to Vendor. If so returned, the cost of transportation, unpacking, inspection, repackaging, reshipping, or other like expenses are the responsibility of the Vendor.

17. REPORTS

After the conclusion of the contract, upon request from the City to facilitate a new bid process, contractor shall furnish a list that cross references the manufacturer model numbers specified in this bid to the current model numbers.

18. APPROVED ITEM EQUIVALENT

A specific manufacturer for almost all line items has been listed in the Technical Specifications because this is the current manufacturer accepted. For those line items, bidders shall provide the technical specifications for the manufacturer they are offering using the Substitution Request Form (Appendix A). The City may request, after the bid due date, a sample of that product for review and approval by the City. The City reserves all rights to be the sole judge as to whether any other manufacturer can meet or exceed the current specifications they use. Unless an item is indicated "No Substitute", approved equivalents shall be submitted by the date listed in the Calendar of Events section. Equivalents will be approved by addendum to the solicitation.

19. COMPLIANCE WITH SPECIFICATIONS

All products shall be new and unused. Any product that does not comply with any part of these technical specifications shall be rejected and the vendor shall, at its own expense, including shipping, replace the item.

20. MATERIALS AND WORKMANSHIP

The successful bidder shall be required to furnish all materials necessary to perform contractual requirements. Materials and workmanship for this contract shall conform to all codes, regulations and requirements for such specifications contained herein and the normal uses for which intended. Material shall be manufactured in accordance with the best commercial practices and standards for this type of goods. All literature and products must be packaged and labeled to sell in the United States.

21. DAMAGED GOODS

The vendor shall replace any orders that are damaged in transit. They will be notified by the City and they must arrange to have damaged orders picked up within 48 hours' notice (excluding weekends and holidays). Vendor will pay all expenses incurred to ship damaged goods back to manufacturer or their own warehouse.

22. UPDATED PRODUCTS

During the contract term, if items on the contract are being replaced and updated by the manufacturer, the supplier may submit the manufacturer information, technical specifications and pricing to the City for consideration. The supplier shall provide this updated product information to the City as soon as it becomes available by the manufacturer. The City will work with the Procurement and Payables Division to review the information submitted and either accept or reject the product. If the replacement product is not approved, the vendor will be notified and the current item on the contract will be removed. Because of fixed pricing, the replacement item must be offered at the same price.

23. PRODUCT DISCONTINUED

During the contract term, if the supplier discontinues carrying any of the contracted items, they must notify the City and the Procurement and Payables Division within 30 calendar days. The City reserves the right to seek other suppliers to supply those items or purchase directly from the manufacturer or their designated distributor until the contract term ends.

24. CONTENT TO BE SUBMITTED

24.1 The City cannot legally accept a substantial deviation from the Specification. Bids containing any substantial deviation may be rejected as non-responsive. It is agreed that you will perform according to the highest standard indicated.

24.2 Prices shall be quoted F.O.B. the delivery address in Section 6.1, freight prepaid and allowed.

24.3 Only bidders experienced in this type of work as defined in Division 40 05 73 of the Technical Specifications will be considered. Each bidder shall complete the Statement of Qualifications Form (Appendix A).

25. ENVIRONMENTALLY PREFERABLE PROCUREMENT

In accordance with the City of Tacoma's [Sustainable Procurement Policy](#), it is the policy of the City of Tacoma to encourage the use of products or services that help to minimize the environmental and human health impacts of City Operations. Respondents are encouraged to incorporate environmentally preferable products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, products, manufacturing, packaging, distribution reuse, operation, maintenance or disposal of the product or service.

The City of Tacoma encourages the use of sustainability practices and desires any awarded contractor(s) to assist in efforts to address such factors when feasible for:

- Reduction of pollutant releases
- Toxicity of materials used

- Waste generation
- Greenhouse gas emissions, including transportation of materials and services
- Recycle content
- Comprehensive energy conservation measures
- Waste management reduction plans
- Potential impact on human health and the environment

26. EQUITY IN CONTRACTING

The City of Tacoma is committed to encouraging firms certified through the [Washington State Office of Minority and Women's Business Enterprise](#) to participate in City contracting opportunities. See the **TMC 1.07 Equity in Contracting Policy** at the City's [Equity in Contracting Program website](#).

27. PROPRIETARY OR CONFIDENTIAL INFORMATION

The Washington State Public Disclosure Act ([RCW 42.56 et seq.](#)) requires public agencies in Washington make public records available for inspection and copying unless they fall within the specified exemptions contained in the Act, or are otherwise privileged. Documents submitted under this RFB shall be considered public records and, with limited exceptions, will be made available for inspection and copying by the public.

Information that is confidential or proprietary must be clearly marked. Further, an index must be provided indicating the affected page number(s) and location(s) of all such identified material. Information not included in said index will not be reviewed for confidentiality or as proprietary before release.

28. TECHNICAL SPECIFICATIONS

05 10 05	Stainless Steel Surface Treatments, Protection and Maintenance
05 43 00	Mechanical Fasteners and Hardware
40 05 57.10	Mechanical Valve Operators, Drives and Accessories
40 05 57.26	Electric Motor Driven Valve Actuators
40 05 73	Horizontal Multi-Jet Sleeve Valves

SECTION 05 10 05

STAINLESS STEEL SURFACE TREATMENTS, PROTECTION AND MAINTENANCE

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Work of this Section includes treatment, protection and maintenance of stainless steel surfaces on Supplier furnished and installed stainless steel piping, valves, equipment and all accessories as specified herein. The Supplier shall furnish all labor, materials, equipment, and incidentals required to apply and maintain surface treatments as specified herein.
- B. The Supplier shall be advised to read the detailed fabrication and installation requirements included in Part 3 of this Section. These requirements shall apply to the Suppliers and will be strictly enforced by the Engineer during execution of the Work.

1.2 SUBMITTALS

- A. The Supplier shall submit Shop Drawings including Supplier cut-sheets for products used in surface treatment application and maintenance having printed text written in English, and all numerical data shall be in the foot-pound-second system of units.
- B. Corrections, comments or lack thereof, made relative to Shop Drawings during review by the Engineer and/or Owner shall not relieve the Supplier from compliance with the requirements of the Contract. The Supplier shall be responsible for the final piping system and requirements specified herein. Selection of fabrication processes, techniques of construction, coordinating the Work with all trades, and performing the Work in a safe and satisfactory manner shall be the responsibility of the Supplier.

1.3 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
- B. NSF International (NSF)
 - 1. NSF Standard 61 Drinking Water System Components
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. The Supplier shall use care during loading of stainless steel pipe, fittings, valves, equipment and accessories prior to transporting products to the Site. The Supplier shall use care, when unloading products delivered to the Site, to prevent injury to the surface treatments applied at the factory. Slings, hooks, and pipe tongs used for unloading and handling at the Site shall be padded to prevent iron contamination on stainless steel surfaces. Parts shall not be secured with metal band clamping in such a way to cause iron contamination from the bands and hardware.

PART 2 - PRODUCTS

2.1 SPRAY-APPLIED PICKLING SOLUTION

- A. Spray-applied lean pickling cleaner for factory and field application on large surfaces shall be applied in accordance with the product manufacturer's instructions. Pickling spray shall be NSF-61 certified for surfaces to be in contact with drinking water. The spray-applied lean pickling solution shall be:
1. Avesta Classic Cleaner 401®, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
 2. Derustit SS-3, Manufactured by Bradford Derustit, Yorba Linda, California
 3. Antox® 75E Pickling Cleaner, manufactured by Chemetall US, New Providence, New Jersey.
 4. Kytex® Brightener 123, manufactured/distributed by Harvard Chemical Research, Atlanta, Georgia.

2.2 PICKLING PASTE

- A. Stainless steel pickling paste used to clean welds, and heat-affected-zone near welds, shall be applied in accordance with the product manufacturer's instructions. Cleaner shall be NSF-61 certified for surfaces in contact with drinking water. The pickling paste product shall be one of the following:
1. BlueOne® Pickling Paste 130, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
 2. Wonder Gel, manufactured by Bradford Derustit, Yorba Linda, California
 3. Antox® 71E Plus Pickling Paste, manufactured by Chemetall US, New Providence, New Jersey.
 4. Kytex® Pickling Paste 316, manufactured by Harvard Chemical Research, Atlanta, Georgia.
- B. The Supplier shall use a neutralizing rinse to remove the pickling paste and a follow-up water rinse using purified bottled water shall be used to remove all residuals. The neutralizing rinse product shall be one of the following:

1. Neutralizing Agent 502®, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
2. Antox® NP, manufactured by Chemetall US, New Providence, New Jersey.
3. Kytex® Neutralizer 408, manufactured by Harvard Chemical Research, Atlanta, Georgia.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Rust spots on new products are nearly always due to surface contamination of free iron from shop or field contamination, and shall not be allowed. Stainless steel surfaces shall be inspected by the Resident Project Representative and Supplier upon delivery, and stored in a location that will prevent entry of contamination from iron-bearing and other corrosive contaminants prior to installation. Rust stains shall be recorded by the Resident Project Representative as Defective Work and the Supplier shall correct these surface defects and maintain their finishes at the factory, during loading, shipping, unloading, storage, and installation through substantial completion and punch list for final payment. Correction of these defects shall be performed at no change in Contract Price or Contract Time.
- B. Welding scale and residual metal tints on weld surfaces and adjacent heat-affected-zones shall be recorded as Defective Work by the Resident Project Representative. The Supplier shall clean and passivate welding scale and heat tint defects on welds in the heat-affected-zone on the pipe exterior after welding, using a chemical cleaning system, in accordance with ASTM A967. The system shall include a pre-cleaning solution, pickling paste, and neutralizing rinse. The cleaning system shall be applied in accordance with the manufacturer's instructions. The Supplier shall only use pickling and passivation products from the same manufacturer. No mixing of chemicals from different manufacturers shall be allowed.
- C. The Supplier SHALL NOT use abrasive blasting for passivation of the Work, nor shall he/she request this or similar physical processes as a substitute for the procedures specified herein.
- D. The Supplier shall be responsible for protection of all pipe, tube, fittings and valves, and adhere to the following mandatory requirements, and others specified in the paragraphs below:
 1. The Supplier shall protect stainless steel surfaces from contact with carbon steel including but not limited to hoisting and rigging equipment, steel tables, storage racks and hand tools.
 2. The Supplier shall not bundle pipe and fittings using ferrous metal banding at the factory or Supplier's facility.
 3. The Supplier shall not allow contact between wear surfaces of tools used for carbon steel fabrication and the surfaces of stainless steel pipe, tubes and fittings. These tools shall include abrasive grinding and cutting wheels, wheel cutters and rollers, threading taps and dies, tube bending equipment and all other bearing edge tools.

4. The Supplier shall use manual or powered wire brush tools for surface repair and joint preparation manufactured from stainless steel. No brushes with carbon steel wire shall be used for fabrication of stainless steel.
 5. The Supplier shall shield stainless steel pipe, tube and fittings from all on-site carbon steel pipe and structural steel cutting and blasting operations.
 6. The Supplier shall remove all exterior surface scratches; surface contamination by ferrous metal grinding kerf; contamination by paint markers and crayons etc.; and labels after installation.
- E. The Resident Project Representative shall examine exterior surfaces of pipe, tube and fittings at the Site for free iron contamination by the ferroxyl test or other method. The Supplier shall clean all contaminated surfaces at the Site by pickling using a lean spray-applied pickling cleaner suitable for large surfaces system.
 - F. All impurities including grease, organic solvents and other combustible materials shall be removed. The pipe shall be OD and ID immersion pickled and passivated at the mill, capped and wrapped prior to delivery to the site as specified above.
 - G. The Supplier shall perform field cutting of stainless steel pipe by mechanical wheel cutter or abrasive saw, leaving a smooth cut at right angles to the axis of the pipe. Abrasive cutting wheels to be used for stainless steel pipe and tube shall be new and designed to prevent iron, sulfur or chlorine contamination to the surface under preparation or repair, and the surfaces of adjacent piping. Pipe and tube shall be deburred as part of preparation for all joint configurations.
 - H. The Supplier shall perform field grinding of stainless steel pipe and tube, including root pass and enter-pass weld grinding using new grinding wheels. Grinding wheels shall be designed to prevent iron, sulfur or chlorine contamination to the surface under repair or the surfaces of adjacent piping.
 - I. The Supplier shall use wire wheels, to remove defects on the pipe surface after installation, constructed of the same material as the pipe wall or Type 316 stainless steel for super austenitic and duplex stainless steel piping. The surface finish on the pipe shall meet the specified mill-applied surface finish or better.

END OF SECTION

SECTION 05 43 00
MECHANICAL FASTENERS AND HARDWARE

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Work of this Section shall include material, dimensional and surface finish requirements for mechanical fasteners and used in the field assembly and installation of pipe hangers, supports and structural attachments; modular channel strut framing systems; rotating machinery; valves, valve actuators, operators, intermediate drives; and mechanical accessories as specified in all Sections making reference this Section. The Work of this Section does not apply to Code regulated structural fasteners and anchors.
- B. Fastener components are specified below by use of a "Grade" or "Type" designation, which are also used to identify them in the details.
- C. Specifications describing products and installation requirements for the Work of standard and technical bolting of pressure pipe flanges, at the Site by the Contractor, are not covered under this Section.

1.2 SUBMITTALS

- A. Submit a list of products to be furnished, the names of the suppliers, and the date of delivery of materials to the site. Submittals shall include the following:
 - 1. Shop Drawings of all items to be furnished under this Section. Submittals shall include complete layouts and schedules; location plans and complete total bill of materials for all mechanical fasteners and anchors to be used for field installation on the project.
 - 2. Shop Drawings shall include product data sheets for all fasteners and anchors used in field erection at the site.
 - 3. Where standard hangers and supports are not suitable, submit detailed drawings showing materials and details of construction for each type of special hanger and support.
 - 4. Submittals shall include complete piping drawings indicating type of hanger and support, location, magnitude of load transmitted to the structure and type of anchor, guide and other pipe supporting appurtenances. Submittals shall use detail numbers as shown on the Drawings to indicate type of support proposed wherever possible.
 - 5. Types and locations of pipe hangers and supports shall also be shown on the piping layouts.

- B. Assembly torque calculations for all bolting and assembly of mechanical equipment and components in the field. These calculations shall be furnished regardless of whether a detail of the mechanical assembly is shown on the drawings or not. In some cases the design tension necessary to achieve the clamping force and elongation of fasteners and anchors will be specified by the Engineer herein, or by an equipment manufacturer. Where no tension requirement is provided for an assembly the Supplier shall be required to determine the tension requirements. However, in all cases the Supplier shall be responsible for calculating the assembly torque required to achieve the necessary design tension, and for the selection of the method of assembly to be implemented in the field.

1.3 REFERENCE STANDARDS

- A. Manufacturing and assembly of products specified shall be in accordance with, but not limited to, the published standards specified herein.
- B. American Society of Mechanical Engineers (ASME)
1. ASME B1.1 – Unified Inch Screw Threads (UN and UNR form)
 2. ASME B18.2.1 – Square and Hex Bolts and Screws: Inch Series
 3. ASME B18.2.2 – Square and Hex Nuts
 4. ASME B18.3 – Socket Cap, Shoulder and Set Screws – Inch Series
 5. ASME B18.6.2 – Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series.
 6. ASME B18.22.1 – Plain Washers
 7. ASME Y14.5M-1994 – Dimensioning and Tolerancing
- C. American Society for Testing and Materials (ASTM)
1. A36 – Standard Specification for Carbon Structural Steel
 2. ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
 3. ASTM A194 – Standard Specification for Carbon Alloy Steel Nuts for Bolts for High Pressure or High-Temperature Service or Both
 4. ASTM A240 – Standard Specification for Heat Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels
 5. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength
 6. ASTM A320 – Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service
 7. ASTM A480 – Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip
 8. ASTM A575 – Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
 9. ASTM A576 – Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
 10. ASTM A635 – Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for
 11. ASTM A653 -Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

12. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 13. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
 14. ASTM A1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)
 15. ASTM A1018 – Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 16. ASTM B221 – Standard Specification for Aluminum Alloy and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
 17. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
 18. ASTM D5363 – Anaerobic Single-Component Adhesives
 19. ASTM F606 – Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets
 20. ASTM F467 – Standard Specification for Nonferrous Nuts for General Use
 21. ASTM F468 – Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
 22. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws,
 23. ASTM F594 – Standard Specification for Stainless Steel Nuts
- D. American National Standardization Institute (ANSI)
1. ANSI H35.1 – Alloy and Temper Designation Systems for Aluminum
- E. Society of Automotive Engineers (SAE)
1. SAE J924 – Thrust Washers – Design and Application
 2. SAE J995 – Mechanical and Material Requirements for Steel Nuts
 3. SAE J429 – Mechanical and Material Requirements for Externally Threaded Fasteners
- F. United States Military Specification (MIL)
1. MIL-A-907E – Anti-Seize Thread Compound
- G. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 - PRODUCTS

2.1 MECHANICAL FASTENERS AND HARDWARE – GENERAL REQUIREMENTS

- A. The sizing and selection of mechanical fasteners and anchors for non-structural equipment and supports shall be determined by the Manufacturer. The configuration and material requirements for each type of fastener and surface treatment process required are included in the paragraphs below.

- B. Although the equipment, supports for piping and valves, and accessories covered under this section are considered non-structural, the anchors used for their installation shall be designed in accordance with the building code requirements included in the most recent version ACI 381.
- C. This specification uses the term “screw”, “stud”, “bolt”, “stud-bolt”, “threaded rod”, “nuts” and “washers” based on their traditional use, and shall be substituted by the word “fasteners” when discussing requirements for all. The term “anchor” shall refer to an assembly of “fasteners” and accessories used to anchor equipment and non-structural supports to concrete structures.
- D. The Supplier and Manufacturer shall become familiarized with the following terms for reference while reviewing this Section. The following terms define how the fasteners and anchors specified below shall be used.
 - 1. Screws shall refer to fasteners and anchors installed in holes tapped with internal matching threads to attach one component to another. Studs have the same use except they’re fully threaded across their entire length, or at each end (plain rod in the middle), and used with nuts.
 - 2. The requirements specified for machine and cap screws shall apply to studs and nuts constructed of the same material and having the same the same thread form.
 - 3. Bolts shall be used to join two or more components using nuts, by installation through plain holes and clamping the components together. Stud-bolts and threaded rod shall have the same use, except they’re either double-ended having limited threads on each end and have a solid shank between, or they’re fully threaded across their entire length.
 - 4. The requirements specified for bolts shall also apply to stud-bolts, threaded rod and nuts constructed of the same material and having the same the same thread form.
 - 5. Selection and size of mechanical anchors shall be for non-structural equipment and supports, such as those for pipe supports. Anchors for non-structural equipment and supports shall still be sized, selected and installed in accordance with the codifying agencies in the jurisdiction of the Site.
- E. The length of all bolts, studs, stud-bolts, threaded rod and anchors shall be selected by the Supplier and Manufacturer such that three circumferentially full threads, at a minimum, protrude from the top of the nut after assembly.
- F. Fasteners and anchors shall be furnished plain or with special surface treatments according to the finish or coating system described for each type of fastener, except those that receive shop applied coating systems specified in the pipe and equipment specifications or field applied coatings specified. In those cases zinc-plated fasteners and anchors shall be furnished.

2.2 MACHINE SCREWS AND STUDS

- A. Standard machine screws shall have dimensions as specified in ASME B18.6.3, and threads shall have dimensions specified in ASME B1.1 UNC Class 2A fit.

- B. Pan-head, button-head, fillister-head, and cheese-head machine screws shall have dimensions specified in ASME B18.6.3 and threads shall have dimensions specified in ASME B1.1 UNC or UNF, Class 2A fit. Screws shall be furnished in slotted head; drilled slotted head, for wire secured screws; Type 1 and Type II cross recessed head (Phillips); and/or hexalobular internal (Torx) head pattern.
- C. Oval head and flat head countersunk screws shall have dimensions specified in ASME B18.6.3 and threads shall have dimensions specified in ASME B1.1 UNC or UNF, Class 2A fit. Oval and flat heads shall be configured for a 100 degree countersink. Screws shall also be furnished in slotted head; drilled slotted head, for wire secured screws; Type 1 and Type II cross recessed head (Phillips); and/or hexalobular internal (Torx) head pattern.
- D. Tamper-resistant screws shall have dimensions specified in ASME B18.6.3 and threads shall have dimensions specified in ASME B1.1 UNC or UNF, Class 2A fit. Tamper-resistant screws shall be button head or configured for a 100 degree countersink flat head. Tamper-resistant screws shall have drilled spanner heads; a one-way slotted button head pattern; and/or a pin-drilled hexalobular internal (Pin-in-Torx) head pattern.
- E. Hex machine screws and studs shall have dimensions specified in ASME B18.2.1, and threads shall have dimensions specified in ASME B1.1 UNC Class 2A fit.
- F. Socket head machine screws and set screws shall have dimensions specified in ASME B18.3 and threads shall have dimensions specified in ASME B1.1 UNC Class 2A fit.
- G. Studs shall be fully threaded shall have dimensions specified in ASME B1.1, and threads shall have dimensions specified in ASME B1.1 UNC Class 2A fit.
- H. All carbon steel machine screws and studs shall be furnished plain. Carbon steel machine screws and studs shall be furnished with one of the following finishes:
 - 1. Zinc-plated by electroplating process with a Type III supplemental clear chromate satin finish, Class SC3 thickness, in accordance with ASTM B633 and F1941.
 - 2. Hot-dipped galvanized in accordance with ASTM A153 and F2329.
- I. GRADE 5 STL carbon steel machine screws and studs, shall be manufactured of SAE J429, Grade 5 medium carbon steel, having minimum proof load strength of 85,000 psi; minimum yield strength of 92,000 psi; minimum tensile strength of 120,000 psi; and finished Brinell hardness of 253 to 319 BHN.
- J. GRADE 8 STL carbon steel machine screws and studs shall be manufactured of SAE J429, Grade 8 medium carbon alloy steel, quenched and tempered, having minimum proof load strength of 120,000 psi; minimum yield strength of 130,000 psi; minimum tensile strength of 150,000 psi; and Brinell hardness of 311 to 362 BHN.

- K. TYPE 304 SSTL stainless steel machine screws and studs shall be manufactured to F593, Alloy Group 1, condition CW, Supplementary Condition S8. Type 304 stainless steel hex head machine screws shall be furnished with a plain finish, chemically passivated in accordance with the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 70 μinch Ra all over in accordance with ASME B46.1 as a minimum.
- L. TYPE 316 SSTL stainless steel cap screws and studs shall be manufactured to F593, Alloy Group 2, condition CW, Supplementary Condition S8. Finished cap screw hardness shall be Rockwell B70. Type 316 stainless steel hex head cap screws and nuts shall be furnished chemically passivated in accordance with the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 70 μinch Ra all over in accordance with ASME B46.1 as a minimum.

2.3 NUTS FOR MACHINE SCREW AND STUDS

- A. Nuts for machine screws and studs shall meet the dimensions of ASME B18.2.2 and have ASME B1.1, UNC threads, Class 2B fit; or manufacturer's preferred or proprietary design. Hex nut and channel nut materials shall match that of the connecting material.
- B. GRADE 5 STL nuts for use with Grade 5 machine screws and studs shall be manufactured of SAE J995, Grade 5 medium carbon steel, having a minimum proof load strength of 120,000 psi; and finished Brinell hardness of 301 BHN.
- C. GRADE 8 STL nuts for use with Grade 8 machine screws and studs shall be manufactured of SAE J995, Grade 8 medium carbon steel alloy steel, having minimum proof load strength of 150,000 psi; and Brinell hardness of 247 to 336 BHN.
- D. TYPE 304 SSTL nuts used with Type 304 stainless steel machine screws shall be manufactured to ASTM F594, Alloy Group 1, Type 304.
- E. TYPE 316 SSTL nuts used with Type 316 stainless steel machine screws shall be manufactured to ASTM F594, Alloy Group 2, Type 316.

2.4 HIGH-STRENGTH CAP SCREWS, BOLTS AND STUDS

- A. GRADE B7 ferritic hex-head and heavy hex-head high-strength cap screws, bolts and studs, shall be used with carbon steel pipe in high temperature service (>100 degrees F). Cap screws bolts and studs shall be constructed of ASTM A193, Grade B7, chromium-molybdenum steel, carbide solution treated. Cap screws, bolts, studs and threaded rod shall be marked "B7". Grade B7 fasteners shall have the following mechanical properties:
 - 1. Cap screws, bolts and studs up to 2.5 inch nominal size shall have minimum yield strength of 105,000 psi; minimum tensile strength of 125,000 psi; and maximum Brinell hardness of 321 BHN (35 HRC).
 - 2. Cap screws, bolts and studs 2.5 inch to 4.0 inch nominal size shall have minimum yield strength of 95,000 psi; minimum tensile strength of 115,000 psi; and maximum Brinell hardness of 321 BHN (35 HRC).
 - 3. Cap screws, bolts and studs 4.0 inch to 7.0 inch nominal size shall have minimum yield strength of 75,000 psi; minimum tensile strength of 100,000 psi; and maximum Brinell hardness of 321 BHN (35 HRC).

- B. GRADE L7 ferritic steel hex-head and heavy hex-head high-strength cap screws, bolts and studs shall be used with carbon steel and ductile iron pipe in low temperature service (-150 degrees F to 100 degrees F). Cap screws, bolts and studs shall be constructed of ASTM A320, Grade L7, Class 1, chromium-molybdenum steel, carbide solution treated. Cap screws, bolts, studs and threaded rod shall be marked "L7". Grade L7 Bolts up to 2.5 inch nominal size shall have minimum yield strength of 105,000 psi; minimum tensile strength of 125,000 psi; and maximum Brinell hardness of 321 BHN (35 HRC).
- C. GRADE F593U, stainless steel heavy hex-head high strength cap screws, bolts and studs shall be used with carbon steel pipe in low temperature service (0 to 100 degrees F). Cap screws, bolts and studs shall be constructed of ASTM F593, Alloy Group 7 (Alloy 603), condition AH precipitation hardening stainless steel, solution annealed and aged, having a minimum yield strength of 105,000 psi; minimum tensile strength of 135,000 psi; and, maximum hardness of Rockwell C28 to C38 up to 1½" nominal diameter.
- D. For applications requiring F593U hex-head bolts greater than 1½" nominal diameter, custom designed cap screws, bolts and studs shall be furnished, with a designated nut or nut pair as specified below. Custom cap screws, bolts and studs shall be furnished.
- E. One additional custom cap screws, bolts and studs, and a designated nut or nut pair shall be manufactured for every 10 flange kits furnished, or a minimum of one representative specimen in cases where less than 10 kits are furnished, for use as a specimen for proof testing. Each specimen shall be proof tested in accordance with ASTM F606 to Supplier's calculated clamping load for each stud. Acceptance criteria shall be no permanent during and following application of the proof load.
- F. Grade F593U heavy hex heads on cap screws, bolts and studs shall be marked "F593U" on the top of the head in raised characters suitable for visual inspection during installation. Threaded rod studs shall be marked "F593U", machine-struck using character dies, on the plain metal face at the tip of each threaded end in recessed characters.

2.5 INTERMEDIATE-STRENGTH HEX HEAD BOLTS AND STUD-BOLTS

- A. GRADE B6 ferritic steel hex-head and heavy hex-head high-strength bolts and stud-bolts, shall be used with carbon steel pipe in high temperature service (>100 degrees F), shall be constructed of ASTM A193, Grade B6, chromium-molybdenum steel, carbide solution treated. Bolts and stud-bolts shall be marked "B6". Grade B6 bolts up to 4.0 inch nominal size shall have minimum yield strength of 85,000 psi; minimum tensile strength of 110,000 psi; and maximum Brinell hardness of 321 BHN (35 HRC).

- B. GRADE B8, CLASS 2 stainless steel heavy hex head intermediate strength bolts, stud bolts and threaded rod shall be ASTM A193, Grade B8 (Type 304), Class 2, carbide solution treated and strain hardened SSTL, in accordance with supplementary requirement S1; and have a minimum yield strength of 50,000 psi; minimum tensile strength of 100,000 psi; and maximum finished Brinell hardness of 321 BHN. Grade B8, Class 2 heavy hex heads on bolts shall be marked "B8" on the top of the head in raised characters suitable for visual inspection during installation. Stud bolts shall be marked "B8" machine-struck on the plain metal face at the tip of each threaded end in recessed characters.
- C. GRADE B8M, CLASS 2 stainless steel heavy hex-head intermediate strength bolts, shall be ASTM A193, Grade B8M (Type 316), Class 2, carbide solution-treated and strain hardened SSTL, in accordance with supplementary requirement S1; and have a minimum yield strength of 50,000 psi; minimum tensile strength of 90,000 psi; and maximum finished Brinell hardness of 321 BHN. Grade B8M, Class 2 heavy hex heads on bolts shall be marked "B8M" on the top of the head in raised characters suitable for visual inspection during installation. Stud bolts shall be marked "B8M" machine-struck on the plain metal face at the tip of each threaded end in recessed characters.

2.6 LOW-STRENGTH HEX HEAD BOLTS AND STUD-BOLTS

- A. GRADE B, ferritic steel hex-head and heavy hex-head low-strength bolts and stud-bolts, shall be used with ductile iron pipe in low temperature service (0 to 100 degrees F). Bolts and stud-bolts shall be constructed of ASTM A307, Grade B, stress-relief-annealed. Bolts and stud-bolts shall be marked "B". Grade B bolts up to 4.0 inch nominal size shall have a tensile strength of 60,000 to 100,000 psi; and maximum Brinell hardness of 121 to 212 BHN (69 to 95 HRC).
- B. GRADE B8, CLASS 1 stainless steel heavy hex-head low strength bolts and stud-bolts, shall be constructed of ASTM A193, Grade B8, Class 1, carbide solution treated, (Type 304) SSTL, having a minimum yield strength of 30,000 psi; minimum tensile strength of 75,000 psi; and maximum Brinell hardness of 223 BHN. Grade B8, Class 1 heavy hex-heads on bolts shall be marked "B8" on the top of the head in raised characters suitable for visual inspection after installation. Stud bolts and threaded rod shall be marked "B8" machine-struck on the plain metal face at the tip of each threaded end in recessed characters.
- C. GRADE B8M, CLASS 1 stainless steel heavy hex-head low strength bolts and stud-bolts, shall be ASTM A193, Grade B8M, Class 1, carbide solution treated, (Type 316) stainless steel, having a minimum yield strength of 30,000 psi; minimum tensile strength of 75,000 psi; and, maximum Brinell hardness of 223 BHN. Hex heads on bolts shall be marked "B8M" on the top of the head in raised characters suitable for visual inspection during installation. Stud bolts and threaded rod shall be marked "B8M" machine-struck on the plain metal face at the tip of each threaded end in recessed characters.

2.7 HIGH-STRENGTH HEX NUTS

- A. Nuts shall meet the dimensions of ASME B18.2.2 and have ASME B1.1, UNC threads, Class 2B fit; or manufacturer's proprietary design, where applicable.

- B. Grade 2H quenched and tempered medium carbon steel nuts shall be used with Grade B7 bolts and stud-bolts shall be manufactured of hot forged or cold punched ASTM A194, Grade 2H, ferritic steel, carbide solution treated, each nominal nut size having proof load tension capacity based on a proof load stress of 175,000 psi, and Brinell hardness of 248 to 327 BHN. Hex nuts shall be marked "2H" on a non-load bearing surface, with engraved or mechanically stamped characters, suitable for visual inspection after installation.

2.8 INTERMEDIATE STRENGTH HEX NUTS

- A. Grade 8 SSTL nuts used with Grade B8 fasteners and anchors shall be constructed of ASTM A194, Grade 8 (Type 304) stainless steel, having proof load tension capacity based on 80,000 psi proof stress across all nominal nut sizes, and Brinell hardness of 126 to 300 BHN. Hex nuts shall be marked "8" on a non-load bearing surface, with engraved or mechanically stamped characters, suitable for visual inspection after installation. Grade B8 fasteners and anchors and Grade 8 heavy hex nuts shall be furnished with a scale free bright finish by chemical passivation using the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 70 μ inch Ra all over as a minimum.
- B. Grade B8M SSTL nuts used with Grade B8M fasteners and anchors shall be hot forged or cold punched manufactured of ASTM A194, Grade 8M (Type 316) stainless steel, having proof load strength of 80,000 psi and Brinell finished hardness of 126 to 300 BHN. Hex nuts shall be marked "8M" on a non-load bearing surface, with engraved or mechanically stamped characters, suitable for visual inspection after installation.
- C. Grade 8M SSTL nuts used with Grade B8MSH fasteners and anchors shall be manufactured of ASTM A194, Grade 8M (Type 316) stainless steel, drawn or cold forged, strain hardened (finished hardness shall be manufacturers standard). Grade 8M nuts shall have proof load strength as follows:
 - 1. 110,000 psi, up to 0.75 inch nominal nut size
 - 2. 100,000 psi, 0.875 inch to 1.0 inch nominal
 - 3. 95,000 psi, 1.125 inch to 1.25 inch nominal
 - 4. 90,000 psi, 1.375 inch to 1.50 inch nominal

2.9 LOW STRENGTH HEX NUTS

- A. Grade 8 SSTL nuts used with Grade B8 fasteners and anchors shall be constructed of ASTM A194, Grade 8 (Type 304) stainless steel, having proof load tension capacity based on 80,000 psi proof stress across all nominal nut sizes, and Brinell hardness of 126 to 300 BHN. Hex nuts shall be marked "8" on a non-load bearing surface, with engraved or mechanically stamped characters, suitable for visual inspection after installation. Grade B8 fasteners and anchors and Grade 8 heavy hex nuts shall be furnished with a scale free bright finish by chemical passivation using the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 70 μ inch Ra all over as a minimum.
- B. Grade B8M SSTL nuts used with Grade B8M fasteners and anchors shall be hot forged or cold punched manufactured of ASTM A194, Grade 8M (Type 316) stainless steel, having proof load strength of 80,000 psi and Brinell finished hardness of 126 to 300 BHN. Hex nuts shall be marked "8M" on a non-load bearing surface, with engraved or mechanically stamped characters, suitable for visual inspection after installation.

- C. Grade 8M SSTL nuts used with Grade B8MSH fasteners and anchors shall be manufactured of ASTM A194, Grade 8M (Type 316) stainless steel, drawn or cold forged, strain hardened (finished hardness shall be manufacturers standard). Grade 8M nuts shall have proof load strength as follows:
 - 1. 110,000 psi, up to 0.75 inch nominal nut size
 - 2. 100,000 psi, 0.875 inch to 1.0 inch nominal
 - 3. 95,000 psi, 1.125 inch to 1.25 inch nominal
 - 4. 90,000 psi, 1.375 inch to 1.50 inch nominal

2.10 WASHERS

- A. Type A STL plain carbon steel washers shall be manufactured to the dimension included in ASME B18.22.1, Type A, Tables 1A and Tables 1B. SAE J924 washer configurations shall also be allowed.
- B. Carbon steel washers shall meet the requirements included in ASTM F844, and be fabricated from high strength and low-alloy carbon steel sheet stock conforming with the requirements of ASTM A568.
- C. Type A carbon steel washers shall be furnished with a plain descaled finish. Where noted, washers shall be furnished with one of the following factory applied finishes:
 - 1. Zinc-plated by electroplating process with a Type II supplemental yellow chromate satin finish, Class SC3 thickness, in accordance with ASTM B633.
 - 2. Hot-dipped galvanized in accordance with ASTM A153 and F2329.

2.11 TIE-ROD RESTRAINT ASSEMBLIES FOR BOLTED SLEEVE COUPLINGS

- A. Tie-rod restraints for bolted sleeve couplings for ductile iron pipe shall be installed. Tie-rod restraint assemblies shall consist of ASTM A36 steel lugs, ASTM A193, Grade B8 (Type 304) stainless steel tie-rods, ASTM A194, Grade 8 (Type 304) stainless steel hex heavy nuts and washers.
- B. The tie-rod lugs shall be fabricated in the materials, finish and dimensions shown on the Drawings, or manufactured lugs may be provided. Manufactured tie-rod lugs shall be:
 - 1. Romac Harness Lugs, manufactured by Romac Industries, Bothell Washington.
 - 2. Style 441 Tie-Plate manufactured by Dresser Industries, Addison, Texas.
 - 3. Item 364-4000 manufactured by Trumbull Industries, Youngstown, Ohio.

2.12 FORGED EYEBOLTS

- A. Type 2 lifting eyebolts shall be constructed ASTM F541 alloy steel forgings, having a minimum yield strength of 70,000 psi; minimum tensile strength of 95,000 psi; and maximum finished Brinell hardness of 197 to 248 BHN.
- B. Eyebolts shall have dimensions in accordance with ASME B18.15, Type 2, and shoulder pattern. Threads shall have dimensions specified in ASME B1.1 UNC Class 2A fit.
- C. Lifting eyebolts shall be furnished with a plain descaled finish. Where noted, lifting eyebolts shall be furnished with one of the following factory applied finishes:

1. Zinc-plated by electroplating process with a Type II supplemental yellow chromate satin finish, Class SC3 thickness, in accordance with ASTM B633.
2. Hot-dipped galvanized in accordance with ASTM A153 and F2329.

2.13 NICKEL ANTI-SEIZE THREAD LUBRICANTS

- A. Anti-seize thread lubricants shall be used with stainless steel fasteners and anchors used for assembly and installation of mechanical equipment, supports and hardware at the site. Fasteners used for the assembly of pressure piping flanges are not covered under this Section.
- B. Thread lubricants shall meet the requirements of MIL-A-907E withstand operating temperatures from -65 to 2400 degrees F, and prevent seizure and/or galling in steel and stainless steel fasteners and anchors under high tension clamping forces. The lubricant shall have colloidal nickel particles 4 to 7 microns in size; a static friction factor of no greater than 0.18; and dynamic friction factor of 0.12 in accordance with ASTM D2266. Thread lubricant shall permit disassembly of fasteners and anchors with minimal manual input. Nickel anti-seize compounds shall be:
 1. 772 Premium Nickel Anti-Seize Compound, manufactured by Chesterton Technical Products, Stoneham, Massachusetts.
 2. Nickel Anti-Seize, manufacturer by Permatex, Hartford, Connecticut.
 3. SAF-T-EZE Nickel Anti-Seize, manufactured by Saf-T-Lok, Lombard, Illinois.
 4. Never-Seez® Pure Nickel Special Lubricant, manufactured by Bostik, Wauwatosa, Wisconsin

2.14 THREAD-LOCKING COMPOUNDS – GENERAL REQUIREMENTS

- A. All thread-locking compounds shall be the anaerobic curing type and withstand temperatures -65 to 300 degrees F. The thread locker shall be used to maintain bolt and screw tension and clamping force when used with hex nuts and internal threaded holes in vibrating machinery.

2.15 LOW-STRENGTH LIQUID THREAD-LOCKER

- A. Low strength liquid thread-locker for fasteners and anchors less than ¼ inch diameter shall meet ASTM D5363, AN0311 having a thixotropic viscosity of 1200 -5000 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. Low strength thread-locker shall be:
 1. Loctite 222MS™ Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.
 2. T22® Thread-locker manufactured by Safe-T-Lok International, Lombard, Illinois.
 3. Low Strength thread-locker PURPLE, manufactured by Permatex, Hartford, Connecticut.

2.16 MEDIUM-STRENGTH LIQUID THREAD-LOCKER

- A. Medium strength thread-locker for fasteners and anchors ¼ inch to ¾ inch diameter shall meet ASTM D5363, Class AN321 having a thixotropic viscosity of 1200 to 6000 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. Medium strength Thread-locker shall be:
 1. Loctite 242® Liquid Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.

2. T42 Thread-locker manufactured by Safe-T-Lok, Lombard, Illinois.
3. Medium Strength thread-locker BLUE, manufactured by Permatex, Hartford, Connecticut.

2.17 HIGH-STRENGTH LIQUID THREAD-LOCKER

- A. High strength low viscosity thread-locker for fasteners and anchors up to 1 inch diameter shall meet ASTM D5363, Class AN0221 having a viscosity of 500 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. High strength Thread-locker shall be:
 1. Loctite 271® Liquid Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.
 2. T70 Thread-locker manufactured by Safe-T-Lok, Lombard, Illinois.
 3. High Strength thread-locker RED, manufactured by Permatex, Hartford, Connecticut.

2.18 HIGH-STRENGTH LIQUID THREAD-LOCKER

- A. High strength thread-locker for fasteners and anchors 7/8 inch diameter and larger shall meet ASTM D5363, Class AN0211 having a thixotropic viscosity of 1200 to 6000 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. High strength threadlocker for large fasteners and anchors shall be:
 1. Loctite 277™ Liquid Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.
 2. T77 Thread-locker manufactured by Safe-T-Lok, Lombard, Illinois.
 3. Large Diameter thread-locker RED, manufactured by Permatex, Hartford, Connecticut.

2.19 PENETRATING GRADE LIQUID THREAD-LOCKER

- A. Penetrating grade (wicking) thread-locker for fasteners and anchors less than ¼ inch diameter, already installed, shall meet ASTM D5363, Class AN0261 having a thixotropic viscosity of 12 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. Medium strength threadlocker shall be:
 1. Loctite 220™ Liquid Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.
 2. S90 Thread-locker manufactured by Safe-T-Lok, Lombard, Illinois.
 3. Penetrating Grade Thread-locker GREEN, manufactured by Permatex, Hartford, Connecticut.

2.20 PENETRATING LIQUID THREAD-LOCKER FOR DRINKING WATER EQUIPMENT

- A. Penetrating grade (wicking) thread-locker having NSF-61 certification for fasteners and anchors less than ½ inch diameter, already installed, shall meet ASTM D5363, Class AN0261 having a thixotropic viscosity of 12 cP, and shall be effective throughout a temperature range of -65 to 300 degrees F. Medium strength thread-locker shall be:
 1. Loctite 290™ Liquid Thread-locker, manufactured by Henkel Corporation, Rocky Hill, Connecticut.

2.21 U-BOLTS FOR PIPING AND INSTRUMENTATION HANGERS AND SUPPORTS

- A. U-bolts, used in pipe hanger and support assemblies, shall be configured to Type 24 specifications in accordance with MSS SP-69. Each U-bolt shall be furnished with four nuts of the same material and finish. MSS SP-24 U-bolts shall be:

1. Figure B3188 and Figure 3188C for plastic coated, by B-Line division of Eaton Corp., Highland, Illinois
2. Figure 137 and Figure 137C for plastic coated, by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
3. Figure 38 by Carpenter & Patterson, Woburn, Massachusetts
4. Figure 90 and Figure 90C for plastic coated manufactured by PHD Supports, Columbiana, Ohio.
5. Figure 137 and Figure 137PC for plastic coated by Empire Industries, Manchester, Connecticut

2.22 MALLEABLE IRON EYE SOCKET FOR PIPE HANGERS

- A. Malleable iron eye sockets, used in pipe hanger assemblies, shall be configured to Type 16 specifications in accordance with MSS SP-69. Eye sockets shall have ASME B1.1, UNC internal threads, Class 2B fit. MSS SP-16 malleable iron eye sockets shall be:

1. Figure B3222 by B-Line division of Eaton Corp., Highland, Illinois
2. Figure 110R by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
3. Figure 12 by Carpenter & Patterson, Woburn, Massachusetts
4. Figure 30 manufactured by PHD Supports, Columbiana, Ohio.

2.23 WELDLESS EYE NUT FOR PIPE HANGERS

- A. Weldless eye nuts, used in pipe hanger assemblies, shall be configured to Type 17 specifications in accordance with MSS SP-69. Weldless eye nuts shall have ASME B1.1, UNC internal threads, Class 2B fit. MSS SP-17 Weldless eye nuts shall be:

1. Figure B3200 by B-Line division of Eaton Corp., Highland, Illinois
2. Figure 290 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
3. Figure 279 by Carpenter & Patterson, Woburn, Massachusetts
4. Figure 35 manufactured by PHD Supports, Columbiana, Ohio.

2.24 FORGED STEEL CLEVIS FOR PIPE HANGERS

- A. Forged steel clevis', used in pipe hanger assemblies, shall be configured to Type 14 specifications in accordance with MSS SP-69. Clevis' rod sockets shall have ASME B1.1, UNC internal threads, Class 2B fit. Each clevis shall be furnished with a clevis pin having the same surface finish as the clevis and include type 316 stainless steel cotter pins for assembly. MSS Type 14 forged steel clevis' shall be:

1. Figure B3201 by B-Line division of Eaton Corp., Highland, Illinois
2. Figure 290 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
3. Figure 279 by Carpenter & Patterson, Woburn, Massachusetts
4. Figure 35 manufactured by PHD Supports, Columbiana, Ohio.

2.25 TURNBUCKLES FOR PIPE HANGERS

- A. Turnbuckles, used in pipe hanger assemblies, shall be configured to Type 13 specifications in accordance with MSS SP-69. Turnbuckles shall have ASME B1.1, UNC internal threads, Class 2B fit. MSS SP-13 turnbuckles shall be:
 - 1. Figure B3202 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 230 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 132 by Carpenter & Patterson, Woburn, Massachusetts
 - 4. Figure 960 manufactured by PHD Supports, Columbiana, Ohio.

2.26 SWIVEL TYPE TURNBUCKLES FOR PIPE HANGERS

- A. Swivel type turnbuckles, used in pipe hanger assemblies, shall be configured to Type 15 specifications in accordance with MSS SP-69. Swivel type turnbuckles shall have ASME B1.1, UNC internal threads, Class 2B fit. MSS SP-15 swivel type turnbuckles shall be:
 - 1. Figure B3224 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 114 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 38 by Carpenter & Patterson, Woburn, Massachusetts
 - 4. Figure 114 manufactured by PHD Supports, Columbiana, Ohio.
 - 5. Figure 114 by Empire Industries, Manchester, Connecticut

2.27 MALLEABLE IRON THREADED UPPER ATTACHMENT FOR PIPES

- A. Cast-in-place concrete threaded structural upper attachments for pipe hanger rod shall be configured to Type 18 specifications in accordance with MSS SP-69 and listed by Underwriters Laboratory and Factory Mutual. The insert shall be constructed of cast malleable iron. Each insert shall be furnished with a serrated adjustable nut, having ASME B1.1, UNC internal threads, Class 2B fit for threaded rod position correction during hanger installation. MSS Type 18 malleable iron threaded structural upper attachments shall be:
 - 1. Figure B3014 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 282 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 108 by Carpenter & Patterson, Woburn, Massachusetts

2.28 FABRICATED STEEL THREADED UPPER ATTACHMENT FOR PIPE HANGERS

- A. Cast-in-place concrete wedge-type threaded structural upper attachments for pipe hanger rod shall be configured to Type 18 specifications in accordance with MSS SP-69 and listed by Underwriters Laboratory and Factory Mutual. The insert shall be constructed of cast malleable iron. Each insert shall be furnished with an adjustable nut having ASME B1.1, UNC internal threads, Class 2B fit for position correction during hanger installation. MSS Type 18 wedge-type fabricated steel threaded structural upper attachments shall be:
 - 1. Figure B2500, 2503 or 2505 by B-Line division Eaton Corp., Highland, Illinois
 - 2. Figure 281 or 285 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 108 by Carpenter & Patterson, Woburn, Massachusetts

2.29 WELDED CLEVIS UPPER STRUCTURAL ATTACHMENTS FOR PIPE HANGERS

- A. Welded U-shaped upper structural attachments, used for attaching pipe hanger rod to structural steel, shall be configured to Type 22 specifications in accordance with MSS SP-69. The insert shall be constructed of ASTM A36 structural steel or equivalent.
- B. Each attachment shall be drilled on all sides to accept hanger rod, nuts and cross bolts. Shop and field welding of brackets to structural shapes shall be in accordance with the Supplier's submitted and approved welding procedure specifications. MSS Type 22 wedge-type fabricated steel threaded structural upper attachments shall be:
 - 1. Figure B3083 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 66 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 113A/B manufactured by Carpenter & Patterson, Woburn, Massachusetts
 - 4. Figure 900-1 manufactured by PHD Supports, Columbiana, Ohio.

2.30 SINGLE-LUG PLATE UPPER STRUCTURAL ATTACHMENTS FOR PIPE HANGERS

- A. Fabricated single-lug plate upper structural attachments used for pipe hanger assemblies shall be constructed of ASTM A36 structural steel or equivalent. Fabricated single-lug plate structural upper attachments shall be:
 - 1. Figure B3084 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 47 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire

2.31 CLEVIS PLATE UPPER STRUCTURAL ATTACHMENTS FOR PIPE HANGERS

- A. Fabricated clevis plate upper structural attachments used for pipe hanger assemblies shall be constructed of ASTM A36 structural steel or equivalent. Fabricated clevis plate upper structural attachments shall be:
 - 1. Figure B3086 by B-Line division of Eaton Corp., WE, Illinois
 - 2. Figure 49 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 904 manufactured by PHD Supports, Columbiana, Ohio.

2.32 ROD PLATE UPPER STRUCTURAL ATTACHMENTS FOR PIPE HANGERS

- A. Fabricated rod plate upper structural attachments used for pipe hanger assemblies shall be constructed of ASTM A36 structural steel or equivalent. Fabricated rod plate upper structural attachments shall be:
 - 1. Figure B3085 by B-Line division of Eaton Corp., Highland, Illinois
 - 2. Figure 52 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 - 3. Figure 903 manufactured by PHD Supports, Columbiana, Ohio.

2.33 C-CLAMP FOR BOTTOM OF STEEL BEAM STRUCTURAL ATTACHMENT

- A. C-clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 23 specifications in accordance with MSS SP-69. C-clamps shall be constructed malleable iron or carbon steel and have capacity to accept up to $\frac{3}{4}$ inch threaded rods. The clamp shall have ASME B1.1, UNC internal threads, Class 2B fit. Furnish a retaining clip as necessary. C-type bottom beam flange clamp structural attachments shall be:
1. Figure B3036L with retainer clips 3362 to 3365 by B-Line division of Eaton Corp., Highland, Illinois
 2. Figure 86 with retainer clip Figure 89 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 3. Figure 270 by PHD Supports, Columbiana, Ohio.
 4. Figure 193 by Carpenter & Patterson, Woburn, Massachusetts
 5. Figure 23L by Empire Industries, Manchester, Connecticut

2.34 C-CLAMP FOR TOP AND BOTTOM OF STEEL BEAM STRUCTURAL ATTACHMENT

- A. C-clamps used for top and bottom steel beam flange clamp structural attachments, in pipe hanger assemblies, shall be configured to meet Type 19 and 23 specifications in accordance with MSS SP-69. The clamp shall have ASME B1.1, UNC internal threads, Class 2B fit. C-clamps shall be constructed malleable iron or carbon steel and have capacity to accept up to $\frac{1}{2}$ inch threaded rods. C-type top and bottom beam flange structural attachments shall be:
1. Figure B3031 by B-Line division of Eaton Corp., Highland, Illinois
 2. Figure 92 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 3. Figure 350 by PHD Supports, Columbiana, Ohio.

2.35 C-CLAMP FOR TOP OF STEEL BEAM FLANGE STRUCTURAL ATTACHMENT

- A. C-clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 19 specifications in accordance with MSS SP-69. C-clamps shall be constructed malleable iron or carbon steel and have capacity to accept up to $\frac{3}{4}$ inch threaded rods. The clamp shall have ASME B1.1, UNC internal threads, Class 2B fit. The clamp shall be furnished with a locknut and retaining clip as necessary. C-type top beam flange clamp structural attachments shall be:
1. Figure B3033 by B-Line division of Eaton Corp., Highland, Illinois
 2. Figure 94 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 3. Figure 360 by PHD Supports, Columbiana, Ohio.
 4. Figure 192 by Carpenter & Patterson, Woburn, Massachusetts

2.36 CENTER BEAM CLAMP STRUCTURAL ATTACHMENT

- A. Center beam clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 21 specifications in accordance with MSS SP-69, depending on the hinge configuration. Center beam clamps shall be constructed of carbon steel strip. MSS Type 21 center beam clamp structural attachments shall be:
1. Figure B3050 by B-Line division of Eaton Corp., Highland, Illinois

2. Figure 134 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
3. Figure 192 by Carpenter & Patterson, Woburn, Massachusetts
4. Figure 620 by PHD Supports, Columbiana, Ohio.
5. Figure 150-2 by Empire Industries, Manchester, Connecticut

2.37 THREADED MALLEABLE IRON BEAM CLAMP STRUCTURAL ATTACHMENT

- A. Threaded malleable iron steel beam clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 30 specifications in accordance with MSS SP-69. The clamp shall have ASME B1.1, UNC internal threads, Class 2B fit. MSS Type 30 threaded malleable iron beam clamp structural attachments shall be:
 1. Figure B3054 by B-Line division of Eaton Corp., Highland, Illinois
 2. Figure 218 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 3. Figure 82 by Carpenter & Patterson, Woburn, Massachusetts
 4. Figure 630 by PHD Supports, Columbiana, Ohio.
 5. Figure 218 by Empire Industries, Manchester, Connecticut

2.38 THREADED STEEL BEAM CLAMP STRUCTURAL ATTACHMENT

- A. Threaded steel beam clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 28 and Type 29 specifications in accordance with MSS SP-69, depending on the hinge configuration. The clamp shall have ASME B1.1, UNC internal threads, Class 2B fit. C-clamps shall be constructed of forged carbon steel and have capacity to accept up to 1 ½ inch threaded rods. MSS Type 28 and Type 29 threaded beam clamp structural attachments shall be:
 1. Figure 282 by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 2. Figure 293 by Carpenter & Patterson, Woburn, Massachusetts

2.39 STEEL BEAM CLAMP WITH WELDLESS EYE NUT STRUCTURAL ATTACHMENT

- A. Weldless eye nut beam clamps used for steel beam bottom flange structural attachments, in pipe hanger assemblies, shall be configured to Type 28 and Type 29 specifications in accordance with MSS SP-69, depending on the hinge configuration. Weldless eye nut beam clamps shall be constructed of forged carbon steel and have capacity to accept up to 2 inch threaded rods. MSS Type 28 and Type 29 weldless eye nut beam clamp structural attachments shall be:
 1. Figure B329# by B-Line division of Eaton Corp., Highland, Illinois
 2. Figure 292 and 292L (left hand threads) by Anvil International division Mueller Water Products, Portsmouth, New Hampshire
 3. Figure 297 by Carpenter & Patterson, Woburn, Massachusetts
 4. Figure 450R by Empire Industries, Manchester, Connecticut

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 40 05 57.10

MECHANICAL VALVE OPERATORS, DRIVES AND ACCESSORIES

PART 1 - GENERAL

1.1 DEFINITION OF TERMS

- A. Terms defined below shall supplement those included in the City of Tacoma Standard Terms and Conditions and apply to the technical content and services specified herein.
1. *Basic Drive* – shall refer to non-rising stem (NRS) or outside-screw-and-yoke (OS&Y) drives, which are integral to gate and globe valves, upon which they're connected directly to the valve stem.
 2. *Intermediate Drive* – shall refer to enclosed single and multi-stage bevel, spur or worm gear Drives mounted on the Basic Drive and applies torque directly to the valve stem or shaft. This term shall also apply to jack screw drives used with fixed-cone (Howell-Bunger) valves and multi-jet sleeve valves.
 3. *Operator* – shall refer to AWWA standard 2 inch nut Operators and handwheel Operators used to manually position the valve disc from the Basic Drive directly connected to the valve stem, and for declutched operation through the power transmission system of a powered Actuator.
 4. *Actuator* – shall refer to a powered driven device mounted directly on the Basic Drive and directly connected to the valve stem; or the powered actuator installed on the input shaft of an Intermediate Drive, which is mounted directly to the Basic Drive or connected directly to the input shaft. This combination may also include a manual handwheel Operator for declutched manual operation. The combination of all three components is call the "Actuator." This specification only applies to the intermediate drives and operators.
 5. *Supplier* – shall refer to the valve manufacturer responsible for the purchase and mechanical integration of the Actuator with the valve.
 6. *Supplier's Field Installation Technician* – shall refer to technicians and engineering personnel, who are employed by the Supplier and have been trained at the Supplier's factory for start-up and commissioning services at the Site.
 7. *Original Equipment Manufacturer (OEM)* – shall refer to the Actuator manufacturer who shall be responsible for the design and manufacture of Actuators specified herein, to be purchased by the Supplier who shall mechanically integrate them on the valve.
 8. *OEM Installation Technician* – shall refer to installation technicians and engineers employed by OEMs and trained to install, configure, and commission these devices in the field and perform training of the Owner's operations and maintenance personnel. The OEM Installation Technician shall only be allowed to perform their services under the supervision of the Supplier's Field Installation Technician.

1.2 SCOPE OF WORK

- A. The Work of this Section shall include all labor, materials, equipment, and incidentals required to design, manufacture, install and commission mechanical Operators, Drives and accessories as specified herein.
- B. The Supplier shall be advised to read the detailed fabrication requirements included in this Section. These requirements shall be strictly enforced by the Engineer during execution of the Work.
- C. The location of piping, connecting valves and Actuators are intended to be approximately correct to scale. The dimensions shown on the Supplier's approved Shop Drawings showing the Actuators configured on the valves shall be followed in every case.
- D. The Work shall meet the intent and purpose of the system. All Work necessary to deliver a complete working system, within the limits of Work, ready for static testing and energized use at commissioning.

1.3 RELATED WORK

- A. The Work of mechanical fasteners and accessories used for valve assembly and mounting OEM accessories in the field, and their dimensional and finish requirements, are included in Section 05 43 00.
- B. The Work of surface treatment for stainless steel fabrications is included in Section 05 10 05.
- C. The Work of electric motor-driven valve actuators are included in Section 40 05 57.26.

1.4 SUBMITTALS

- A. The Supplier shall submit Shop Drawings including Supplier cut-sheets, operation and maintenance data for valve Drives and Operators having printed text written in English, and all numerical data shall be in the foot-pound-second system of units. Cut-sheets for products specified herein shall be submitted with those required under the Specifications making reference to this Section.
- B. The Supplier shall submit Shop Drawings including all data and information required for the manufacture of Actuators and accessories. All dimensions shall be based on the actual equipment to be furnished.

1.5 REFERENCED STANDARDS

- A. American Society of Mechanical Engineers (ASME)
 - 1. ASME B1.1 – Unified Inch screw Threads, UN and UNR Thread Form
 - 2. ASME B1.20.1 – Pipe Threads, General Purpose (Inch)
 - 3. ASME B1.5 – ACME Screw Threads (Inch)
 - 4. ASME B18.2.1 – Square and Hex Bolts and Screws: Inch Series
 - 5. ASME B18.2.2 – Square and Hex Nuts
 - 6. ASME B18.22.1 – Plain Washers
 - 7. ASME B46.1 – Surface Texture, Surface Roughness, Waviness and Lay
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A48 – Standard Specification for Gray Iron Castings
 - 2. ASTM A53 – Standard Specification for Pipe, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - 3. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes

4. ASTM A536 – Standard Specification for Ductile Iron Castings
 5. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 6. ASTM A1040 - Standard Guide for Specifying Harmonized Standard Grade Compositions for Wrought Carbon, Low-Alloy, and Alloy Steels
 7. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings
 8. ASTM B505 – Standard Specification for Copper Alloy Continuous Castings
 9. ASTM D92 – Standard Specification for Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
 10. ASTM D97 – Standard Specification for Standard Test Method for Pour Point of Petroleum Products
 11. ASTM A967 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 12. ASTM B130 – Standard Specification for Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
 13. ASTM D2270 – Standard Specification for Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C
 14. ASTM D4052 – Standard Specification for Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
 15. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 16. ASTM F594 – Standard Specification for Stainless Steel Nuts
- C. American Water Works Association (AWWA)
1. AWWA C542 – Electric Motor Actuators for Valves and Slide Gates
- D. International Organization for Standardization
1. ISO 9001 – Quality management systems—Requirements
- E. Manufacturer's Standardization Society (MSS)
1. MSS SP-101 – Part-Turn Valve Actuator Attachment – Flange and Driving Component Dimensions and Performance Characteristics
 2. MSS SP-102 – Multi-Turn Valve Actuator Attachment – Flange and Driving Component Dimensions and Performance Characteristics
- F. National Electrical Manufacturers Association (NEMA)
1. NEMA 250 – Enclosures for Electrical Equipment (1000V Maximum)
 2. NEMA MG1 – Motors and Generators
- G. Society of Automotive Engineers (SAE)
1. SAE J534 – Lubrication Fittings
- H. Underwriters' Laboratories (UL)
1. UL 758 – Appliance Wiring Material

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Mechanical Operators and Drives shall be positioned and have the ability for re-orientation in the field where adjustments are necessary. All valves shall OPEN LEFT (counterclockwise). Each Operator shall have cast or engraved thereon the word "OPEN" and an arrow indicating the direction to open the valve.

- B. Mechanical Operators and Drives shall be furnished and installed by the valve Manufacturer on each production valve in the valve manufacturer's facility wherever possible. It is the valve Manufacturer's responsibility to coordinate torque output and cycle time with the actuator manufacturer.
- C. Enclosed gear drives for valves installed in underground manholes and vaults subject to flooding shall be furnished with permanently lubricated housings and coatings suitable for below grade installation. The maximum input to the Operator, necessary to unseat the valve, shall be 40-lb rim pull using a 24 inch long handle on an 2 inch nut T-Wrench.
- D. All exterior fasteners shall be constructed of stainless steel. Hex head and socket head cap screws, studs, hex head bolts, and stud bolts used by the OEM to assemble the Operators, Drives and Actuators and mount them to valves shall meet the dimensions of ASME B18.2.1 and have ASME B1.1, UNC or UNF threads. Washers shall have dimension in accordance with ASME B18.22.1.
- E. Cap screws and bolts shall be manufactured of Type 316 stainless steel meeting ASTM F593, Alloy Group 2, condition CW, Supplementary Condition S8.
- F. Hex nuts shall meet the dimensions of ASME B18.2.2 and have ASME B1.1, UNC threads, Class 2B fit. Hex nuts shall be manufactured of Type 316 stainless steel meeting ASTM F594, Alloy Group 2.
- G. Stainless steel exterior fasteners shall be furnished chemically passivated in accordance with the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 63 µinch RMS all over in accordance with ASME B46.1, as a minimum.

2.2 BEVEL GEAR DRIVES

- A. Enclosed bevel gear Drives shall be furnished for valves having manual and/or powered operation. Bevel gear Drives have a gear case constructed of ASTM A48, Class 35B or 40B gray cast iron or ASTM A536, Grade 65-45-12 ductile iron. The gear case shall be permanently lubricated and sealed with O-ring gaskets constructed of Nitrile (Buna-N) rubber. Enclosed gear Drives for valves installed in underground manholes and vaults subject to flooding shall be furnished with sealed permanently lubricated housings and coatings suitable for direct burial installation.
- B. Gear shafts shall be constructed of A576, Grade 1010 or 4340 steel. The spur and bevel gears shall be constructed of ASTM A536, Grade 100-70-03 ductile iron, or equivalent. Shaft sleeve and thrust bearings shall be constructed of ASTM A576, Grade 1023/1040/1055 carbon steel, or equivalent.
- C. Thrust and sleeve bearings shall be angular contact anti-friction ball bearings. The output sleeve shall be constructed of ASTM B505, alloy C95800 aluminum bronze or A576, Grade 1023 steel.
- D. Bevel gear Drives shall be furnished with stem covers constructed of ASTM A53, Grade B welded steel pipe, having Schedule 40 wall thickness, covered with a pipe cap internally threaded with NPT threads in accordance with ASME B1.20.1.
- E. The maximum input to the Operator, necessary to unseat the valve, shall be 40-lb rim pull using a 24 inch long handle on an AWWA 2 inch nut T-Wrench.
- F. Enclosed bevel gear Drives for use with manual Operators shall be:
 1. HOB Range; IB Range manufactured by Rotork Gears, Houston, Texas.
 2. Limitorque Model B320 manufactured by Flowserve, Lynchburg, Virginia
 3. Model CML manufactured by Mastergear Worldwide, Clinton, Wisconsin.

4. Dynatorque BG Series manufactured by Cameron, Houston, Texas.
 5. Star Gears manufactured Powell Valve
- G. Enclosed bevel gear Drives used for powered operation shall be:
1. Model IB manufactured by Rotork Gears, Houston, Texas.
 2. Limitorque Model B320 manufactured by Flowserve, Lynchburg, Virginia
 3. Model CML manufactured by Mastergear Worldwide, Clinton, Wisconsin.
 4. Dynatorque BG Series manufactured by Cameron, Houston, Texas.
 5. Star Gears manufactured Powell Valve

2.3 WORM GEAR DRIVES

- A. Worm gear Drives shall have a gear case constructed of ASTM A48, Class 35B or 40B gray cast iron or ASTM A536, Grade 65-45-12 ductile iron. The gear case shall be sealed with O-ring gaskets constructed of Nitrile (Buna-N) rubber. The worm shaft shall be constructed of ASTM A576, Grade 1010 steel or equivalent. The worm shall be constructed of ASTM B505, alloy C95800 aluminum bronze. The worm gear shall be constructed of ASTM A536, Grade 100-70-03 ductile iron, or equivalent. Shaft sleeve and thrust bearings shall be constructed of ASTM A576, Grade 1023/1040/1055 carbon steel. Thrust and sleeve bearings shall be angular contact anti-friction ball bearings.
- B. Worm gear Drives can be combined with spur gear Drives to achieve the required maximum output torque. Worm gear Drives shall have a gear case constructed of ASTM A48, Class 35B or 40B gray cast iron. Spur gears shall be constructed of ASTM A536, Grade 100-70-03 ductile iron, or equivalent. The output sleeve shall be constructed of ASTM B505, alloy C95800 aluminum bronze or ASTM A576, Grade 1023 steel.
- C. Worm gear Drives for valves installed in underground manholes and vaults subject to flooding shall be furnished with permanently lubricated housings and coatings suitable for below grade installation.
- D. Worm gear Drives for use with manual Operators shall be:
1. Model IW manufactured by Rotork Gears, Houston, Texas.
 2. HBC Series
 3. Models WO and WB manufactured by EIM Controls, Missouri City, Texas.
- E. Worm gear Drives for use with manual Operators shall be:
1. Model IW manufactured by Rotork Gears, Houston, Texas.
 2. HBC Series
 3. Models WO and WB manufactured by EIM Controls, Missouri City, Texas.

2.4 SPUR GEAR DRIVES

- A. Enclosed spur gear Drives shall have gear cases constructed of ASTM A48, Class 35B or 40B gray cast iron or ASTM A536, Grade 65-45-12 ductile iron. The gear case shall be grease lubricated and sealed with O-ring gaskets constructed of Nitrile (Buna-N) rubber.
- B. The bearing housing shall be drilled and tapped with a minimum ¼ inch FNPT threads in accordance with ASME B1.20.1, for installation of Type 316 stainless steel high-pressure grease injection and relief fittings meeting SAE J534. The location of lubrication connections and selection of fitting types shall be by the OEM. The location shall allow ease of lubrication with commercially available manual grease guns.

- C. The spur gears shall be constructed of ASTM A536, Grade 100-70-03 ductile iron, or AISI/SAE 4340 steel. Gear shafts shall be constructed of ASTM A576, Grade 1010 or 4340 steel. Shaft sleeve and thrust bearings shall be constructed of ASTM A576, Grade 1023/1040/1055 carbon steel or equivalent. Thrust and sleeve bearings shall be angular contact anti-friction ball bearings. The output sleeve shall be constructed of ASTM B505, alloy C95800 aluminum bronze or A576, Grade 1023 steel or equivalent.
- D. Enclosed gear Drive manufacturer shall be:
 - 1. Model IW manufactured by Rotork Gears, Houston, Texas.
 - 2. Model SG manufactured by Mastergear Worldwide, Clinton, Wisconsin.

2.5 JACK SCREW DRIVES

- A. Jack screw drives used with linear energy dissipating valves, requiring synchronized operation of parallel drives, shall be the machine screw type, flange-mounted, designed with a gear housings constructed of ASTM A351, Grade CF8M, Type 316 stainless steel.
- B. The gearing shall be comprised of a driven worm and worm gear. The worm shall be constructed of ASTM A 276, Type 316 stainless steel. The worm gear shall be constructed of ASTM B505, alloy C95800 aluminum bronze, or equivalent. The jack screw shall be configured with ASME B1.5, 29 degree ACME threads. Jack screw drives shall be:
 - 1. Model DM9006 manufactured by Duff-Norton division of Columbus-McKinnon, Charlotte, North Carolina.
 - 2. Or equal.

2.6 HANDWHEEL OPERATORS

- A. Handwheels shall be constructed of cast aluminum, ductile iron, or fabricated steel. Handwheel Operators shall be furnished with a secure field locking device capable of locking using lock-out/tag out hasps. Locking devices shall be constructed of coated or zinc plated carbon steel. Gearing shall be designed to require no greater than a 40 pound rim pull on the handwheel to operate the valve.
- B. Iron handwheels shall be constructed of ASTM A536, 65-45-12 ductile iron. The handwheel shall receive the same liquid epoxy protective coating system applied to the valve or actuator; or fusion-bonded epoxy.
- C. Aluminum handwheels shall be constructed of ASTM B85, Grade G8A die cast aluminum or equivalent. Handwheels shall receive a Type A anodized engineering hard coat finish in accordance with ASTM B580. Coating thickness shall be no less than 0.002 inches.
- D. Fabricated steel handwheels shall be constructed of ASTM A513, Grade 1040 welded carbon steel mechanical tube. The handwheel shall receive the same liquid epoxy protective coating system applied to the valve or; or fusion-bonded.

2.7 CHAIN WHEEL OPERATORS

- A. Operators and Drives installed more than 6 feet above the operating floor shall be equipped with chain wheel Operator assemblies attached. Chain wheels shall be the same diameter as the handwheel.

- B. Chain wheel attachments for ductile iron and fabricated steel valve hand wheel Operators shall be constructed of ASTM A536, 25-45-12 cast ductile iron. The handwheel shall receive the same liquid epoxy protective coating system applied to the valve or actuator; or fusion-bonded epoxy. Attachment sets for ductile iron chain wheels shall be constructed of ASTM A276, Type 304 stainless steel and furnished stainless steel hardware in accordance with Section 05 43 00.
- C. Chain wheel attachments for aluminum handwheels shall be constructed of ASTM B85, Grade G8A die cast aluminum or equivalent. Handwheels shall receive a Type A anodized engineering hard coat finish in accordance with ASTM B580. Coating thickness shall be no less than 0.002 inches.
- D. Chain wheel attachments for handwheel Operators shall be:
 - 1. Model DIRG-X manufactured by Babbitt Steam Specialty Company., New Bedford, Massachusetts.
 - 2. E-Series manufactured by Roto Hammer Industries, Tulsa, Oklahoma.
 - 3. Or equal.

2.8 LEVER OPERATORS

- A. Lever type manual actuators for quarter turn valves 3-inch to 6-inch diameter valves shall be constructed of break-formed stainless steel, carbon steel or cast ductile iron. The Operator shall include a direction arrow having the words "OPEN" and "CLOSED" in their designated positions.
- B. Break-formed carbon steel levers shall be zinc plated by electroplating process with a Type III supplemental clear chromate satin finish, Class SC3 thickness, in accordance with ASTM B633. The lever handle shall be encapsulated in a vinyl or other soft plastic material.
- C. Stainless steel quarter turn valves shall be furnished with stainless steel levers. Break-formed stainless steel levers shall be constructed of ASTM A276, Type 316 stainless steel sheet. The lever handle shall be encapsulated in a vinyl or other soft plastic material.
- D. Iron levers shall be constructed of ASTM A536, 65-45-12 ductile iron. The lever shall receive the same protective coating system applied to the valve.
- E. Where called out in the valve schedule the Operator shall have an integral locking mechanism to hold the lever in any position between fully opened closed for an indefinite period without vibration or chattering. A lock release shall be incorporated into the lever allowing the lever lock to be manually disengaged.

2.9 AWWA 2-INCH SQUARE NUT OPERATORS

- A. Valves to be furnished with an AWWA 2-inch square nut Operator shall be furnished with one of the three Drive mechanisms specified below and noted in the Valve Schedule comments column.
 - 1. Nut Operators shall be constructed of AISI 1018 steel. The nut shall be attached to the input shaft to the Drive using a Type 316 stainless steel spring pin or equivalent.
 - 2. All extended-shafts furnished for gate valves shall be Type 316 stainless steel, with stainless steel cotter pins installed through the input shaft pin at the Drive. Universal joints used for shaft offsets shall be constructed of Type 316 stainless steel.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 40 05 57.26
ELECTRIC MOTOR-DRIVEN VALVE ACTUATORS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Work of this Section shall include all labor, materials, equipment, and incidentals required to design, manufacture, test, install and commission Actuators, as specified herein.
- B. The Supplier shall be advised to read the detailed fabrication and installation requirements included in Part 3 of this Section. These requirements shall apply to the Subcontractors, Suppliers and OEMs, and will be strictly enforced by the Engineer during execution of the Work.
- C. The location of piping, connecting valves and Actuators are intended to be approximately correct to scale. The dimensions shown on the Supplier's approved Shop Drawings showing the Actuators configured on the valves shall be followed in every case.
- D. The Work shall meet the intent and purpose of the system. All Work necessary to deliver a complete working system, within the limits of the Work, ready for static testing and energized use at commissioning. The Supplier shall be responsible for coordination of the installation of Operators and Drives with the Work of all trades.

1.2 RELATED WORK

- A. Specifications describing the materials, configuration and surface finish requirements for fasteners used in the Work required to integrate Drives with Actuators and valves at the factory, and at the Site by the Supplier are included in Section 05 43 00.
- B. Specifications for thread lubricants and locking compounds to be used with fasteners in the Work required to integrate Drives with valves and Actuators at the factory, and at the Site by the Supplier are included in Section 05 43 00.

1.3 DEFINITION OF TERMS

- A. Terms defined below shall supplement those included in the City of Tacoma General Terms and Conditions and apply to the technical content and services specified herein.
 - 1. Basic Drive – shall refer to non-rising stem (NRS) or outside-screw-and-yoke (OS&Y) drives, which are integral to gate and globe valves, upon which they're connected directly to the valve stem.
 - 2. Intermediate Drive (Drive) – shall refer to enclosed single and multi-stage bevel, spur or worm gear drives mounted on the Basic Drive and applies torque directly to the valve stem or shaft.

3. Actuator – in this Section shall refer to an electric motor-driven device mounted directly on the Basic Drive and connected directly to the valve stem; or installed on the input shaft of and Drive, which is mounted directly to the Basic Drive or connected directly to the input shaft.
4. Operator – shall refer to AWWA standard 2 inch nut operators and handwheel operators used to manually position the valve disc from the Basic Drive directly connected to the valve stem; Drive directly connected to the valve stem or shaft; and for declutched operation through the power transmission system of a powered Actuator.
5. Supplier – in this Section shall refer to the valve manufacturer responsible for the purchase and mechanical integration of the Drive and/or Actuator with the valve.
6. Supplier's Field Installation Technician – shall refer to technicians and engineering personnel, who are employed by the Supplier and have been trained at the Supplier's factory for start-up and commissioning services at the Site.
7. Original Equipment Manufacturer (OEM) – shall refer to the Actuator manufacturer who shall be responsible for the design and manufacture of Actuators specified herein, to be purchased by the Supplier who shall mechanically integrate them on the valve.
8. OEM Installation Technician – shall refer to installation technicians and engineers employed by OEMs and trained for installation, configuration, commissioning services and training of the Owner's operations and maintenance personnel. The OEM Installation Technician shall only be allowed to perform their services under the supervision of the Supplier's Field Installation Technician.

1.4 SUBMITTALS

- A. The Contractor shall submit Shop Drawings including Supplier cut-sheets, operation and maintenance data, test reports, etc., having printed text written in English, and all numerical data shall be in the foot-pound-second system of units.
- B. The Contractor shall submit Shop Drawings including all data and information required for the manufacture of Actuators and accessories. All dimensions shall be based on the actual equipment to be furnished.
- C. The Contractor shall submit Shop Drawings including a project-specific Quality Assurance Plan (QAP), prepared by the Supplier, including the following minimum information:
 1. An outline of Contractor and Supplier certified field and factory testing reports including factory testing procedures, factory testing results, and a comparison of the factory testing results to the requirements of the referenced standards and this Section.
 2. An outline of Contractor and Supplier factory testing reports to show the data provided meets the minimum requirements stated in the standards referenced herein. Test reports shall outline the grade and number of tests, testing results, and comparison of the test results to the requirements published in the standard.
- D. The Contractor shall submit Shop Drawings including assembly drawings showing the Drive and Actuator mounted to the valve in plan, front elevation and side elevation views; and a cross section of the assembled valve, Drive (where required) and Actuator.

- E. The Contractor shall submit Shop Drawings including a tabulated list of parts showing materials of construction for each part identified with the corresponding mark numbers, codes or serial numbers, and refer to the appropriate ASTM standard or non-US standards recognized in the United States. Where non-US standards are proposed the Contractor shall provide the chemical composition and other key parameters required to allow the Engineer to verify whether the materials are equivalent. The Supplier shall include copies of the non-US standards translated into the English. In addition, The Contractor shall submit Shop Drawings including the following:
1. A complete bill of materials.
 2. Descriptive literature, bulletins and/or catalog cut sheets.
 3. Calculations showing operating torque and/or thrust and Actuator selection data.
 4. Electric motor performance data.
 5. Detailed shop drawings for all custom designed and fabricated accessories, i.e. yokes and mounting hardware to be furnished by the Contractor.
 6. Assembly drawings showing all details of construction and dimensions.
 7. The weight of each Actuator assembly.
 8. Description of surface preparation and application of protective coatings.
 9. Shop testing procedures.
 10. Shop testing results.
 11. Supplier's certification that shop testing and verification requirements herein have been met.
- F. The Contractor shall submit Shop Drawings including resume(s) for the Supplier's Field Installation Technicians and OEM's Installation Technicians who shall provide the installation, startup and training services specified in PART 3 of this Section. Resumes shall be submitted 30 days, or earlier, prior to scheduled installation.
- G. The Contractor shall submit Shop Drawings including installation operation and maintenance manuals (IOMs) for actuators that will be used by the Supplier, and for training the Owner's operations and maintenance personnel. IOMs shall be prepared by personnel familiar with the specific equipment proposed for this project. The Shop Drawings shall be used for the purpose of educating operations and maintenance personnel unfamiliar with such equipment. Valve number and identification data from the Drawings shall be used to identify specific valves in the IOMs. The IOMs shall be provided in three-ring binders and in electronic format on DVD. The manual shall contain the following information as a minimum:
1. Procedures for long-term storage of the valves, Operators, Drives (as specified in Section 40 05 57.10) and actuators.
 2. Installation instructions and startup procedures, for immediate installation after delivery to the Site; and, following long-term storage, include instructions for rigging, supporting, checking alignment and functional testing.
 3. Instructions for field-application of touch-up high-performance protective coatings following installation and testing.
 4. Maintenance instructions shall include preventive and corrective maintenance procedures, and troubleshooting procedures. Schedules for maintenance shall also be included.
 5. Provide a list of tools required to service the equipment.

- H. The Contractor shall submit Shop Drawings including a Training Plan consistent with the requirements included in PART 3 of this Section. The training plan shall include a breakdown of the overall training requirements into half-day modules. The training plan shall have separate modules, first for mechanical maintenance and then electrical/instrumentation maintenance. Each training module document shall include the following as a minimum:
1. Title page.
 2. Brief overall description.
 3. Training objectives that briefly describe what the trainee should know at the completion of the module.
 4. Written training materials.
 5. A test of the training materials sufficient to indicate whether the training objectives were adequately captured by the trainee, or not.
- I. In general, corrections, comments, or lack thereof, made relative to Shop Drawings during review shall not relieve the Contractor from compliance with the requirements of the Contract Documents. Shop Drawings shall be used for review of general conformance with the design of the project, and general compliance with the Contract. The Contractor shall be responsible for the final equipment selection conforming to the operating conditions specified.

1.5 REFERENCED STANDARDS

- A. American Society of Mechanical Engineers (ASME)
1. ASME B1.1 – Unified Inch screw Threads, UN and UNR Thread Form
 2. ASME B1.20.1 – Pipe Threads, General Purpose (Inch)
 3. ASME B1.5 – ACME Screw Threads (Inch)
 4. ASME B18.2.1 – Square and Hex Bolts and Screws: Inch Series
 5. ASME B18.2.2 – Square and Hex Nuts
 6. ASME B18.22.1 – Plain Washers
 7. ASME B46.1 – Surface Texture, Surface Roughness, Waviness and Lay
- B. American Society for Testing and Materials (ASTM)
1. ASTM A48 – Standard Specification for Gray Iron Castings
 2. ASTM A53 – Standard Specification for Pipe, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 3. ASTM A536 – Standard Specification for Ductile Iron Castings
 4. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 5. ASTM A1040 - Standard Guide for Specifying Harmonized Standard Grade Compositions for Wrought Carbon, Low-Alloy, and Alloy Steels
 6. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings
 7. ASTM B505 – Standard Specification for Copper Alloy Continuous Castings
 8. ASTM D92 – Standard Specification for Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
 9. ASTM D97 – Standard Specification for Standard Test Method for Pour Point of Petroleum Products
 10. ASTM A967 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 11. ASTM B130 – Standard Specification for Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
 12. ASTM B505 – Standard Specification for Copper Alloy Continuous Castings

13. ASTM D2270 – Standard Specification for Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C
14. ASTM D4052 – Standard Specification for Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
15. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
16. ASTM F594 – Standard Specification for Stainless Steel Nuts
- C. American Water Works Association (AWWA)
 1. AWWA C542 – Electric Motor Actuators for Valves and Slide Gates
- D. International Organization for Standardization
 1. ISO 9001 – Quality management systems—Requirements
- E. Manufacturer's Standardization Society (MSS)
 1. MSS SP-101 – Part-Turn Valve Actuator Attachment – Flange and Driving Component Dimensions and Performance Characteristics
 2. MSS SP-102 – Multi-Turn Valve Actuator Attachment – Flange and Driving Component Dimensions and Performance Characteristics
- F. National Electrical Manufacturers Association (NEMA)
 1. NEMA 250 – Enclosures for Electrical Equipment (1000V Maximum)
 2. NEMA MG1 – Motors and Generators
- G. Underwriters' Laboratories (UL)
 1. UL 758 – Appliance Wiring Material
- H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Actuators shall be delivered installed on the designated valve crated, wrapped, and otherwise protected from damage during shipping as specified in the valve specification. Care shall be taken during loading, transporting, and unloading to prevent injury to the Actuators, appurtenances and protective coatings.
- B. All enclosure penetrations for primary power, monitoring and control shall be shipped with plugs installed to prevent the entry of moisture, dust, salt spray and other contaminants into the terminal compartment.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Operators and Drives shall be positioned and oriented and have the ability for re-orientation in the field where adjustments by the Contractor are necessary. All valves shall open left (counterclockwise) in de-clutched handwheel operation. Each Operator shall have cast or engraved thereon the word "OPEN" and an arrow indicating the direction to open the valve. This requirement shall include Operators used for declutched manual operation through the power transmission system of Actuator.
- B. The Actuator shall be furnished and installed by the Supplier on each production valve in the valve Suppliers' factory wherever possible. It is the Suppliers' responsibility to coordinate torque output and stroke-time with the OEM.

- C. In all cases where an actuator is installed at an elevation 8 feet or greater from finished floor or finished grade a remote push-button station shall be furnished and installed at an elevation 60 inches above the operating finished floor or finished grade.
- D. The Actuator shall be dust-tight, watertight, non-breathing and double-sealed. The entire Actuator enclosure, including housings for the electric drive motor, terminal compartment, and control circuitry compartment, shall have a rating of 4, 4X, 6 and IP 68 in accordance with NEMA 250, based on the classification of the space at the installation location. Actuators shall be suitable for reliable operation in ambient temperatures from -30 to 150 degrees F.
- E. The Actuator shall operate on 480V, three-phase, 60 Hz power, unless otherwise specified. Actuators shall be capable of starting and achieving the nominal rated speed with a maximum voltage drop of 15 percent.
- F. The Actuator shall have a guaranteed torque rating based on a minimum cycle time history of 10,000 open-close-open cycles at the rated seating torque at the end of stroke, and an average run torque of 33 percent of the rated seating torque across the required stroke length. The motor shall be capable of 60 starts per hour at a not-to-exceed rate of 600 starts per hour under a one-time stress cycle.
- G. The Actuator shall not generate noise in excess of 65 dbA during operation. Actuators shall be capable of operating under plant induced and seismic vibration conditions where vibration severity does not exceed the following:
 - 1. Cumulative plant induced vibration within the frequency range of 10 to 100 Hz, or less than 1g RMS; and shock of 5g peak acceleration.
 - 2. Seismic frequency range of 1 to 50 Hz, 2 g acceleration for operation through an event. For resistance to structural failure only, through a seismic event having acceleration not exceeding 5g.

2.2 ELECTRIC MOTORS

- A. The Actuator shall have integral torque-rated electric drive motors. The motor shall be the induction type having a squirrel-cage design. The motors shall be designed and manufactured specifically for valve actuation. The motor shall be easily removed by an electric plug-in connector and disconnection of the drive coupling.
- B. The electric drive motor shall have a nominal duty cycle of 15 minutes, unless otherwise shown. The motor shall have a cyclic duration factor of 25 percent at 33 percent of the rated output torque. The temperature rise shall not exceed that permitted for Class B insulation at standard nominal voltage.
- C. The electric drive motor windings shall have Class F insulation, Class B rise, in accordance with NEMA MG1. The motor shall have solid state thermistors within the windings for thermal protection, independent of ambient temperature variation and motor current. The thermal contacts shall disengage the control circuit, disconnecting the motor from the current source if the maximum permitted winding temperature is reached. The thermal contacts shall reset automatically on motor cooling.
- D. The electric drive motor shall meet all of the basic design and performance requirements specified above within a voltage stability tolerance of plus-or-minus 10 percent, and the frequency stability tolerance of plus-or-minus 5 percent.

2.3 MECHANICAL POWER TRANSMISSION

- A. The mechanical power transmission shall transfer torque from the electric drive motor to the valve stem drive sleeve by a bearing supported single-stage worm gear set. The worm gear shall be constructed of ASTM B505, Grade C95800 nickel aluminum bronze or equivalent. The worm-shaft shall be constructed of ASTM A576, Grade 1010, 4340 or equivalent, close-coupled with the motor shaft. The motor shall be fitted with a disc spring pack to provide cushioned resistance to lateral thrust from the worm shaft during operation.
- B. The mechanical power transmission system shall be enclosed in a gear case constructed of ASTM B85, OEM's standard grade, die-cast aluminum or equivalent. The transmission system shall be oil lubricated. The gear case shall have a lubricating oil splash bath, permanently lubricated and O-ring sealed against leakage, dust and moisture entry.
- C. The power transmission system shall be furnished filled with premium quality synthetic gear oil suitable for use with low efficiency, high ratio worm gear sets. Gear oil shall not contain any paraffin or viscosity modifying additives. Gear oil shall contain corrosion inhibitors and antioxidants to resist thermal-oxidative and chemical degradation. Gear oil shall be suitable for use with fluorocarbon (FKM or Viton®) and acrylonitrile butadiene (Buna-N) elastomer seals. Gear oil shall have a high viscosity index capable of meeting the specified operating temperature range under high loads. Gear oil shall meet the following minimum properties and performance specifications:

ISO Viscosity grade	320
Viscosity Index, ASTM D2270	320
Pour Point, (degrees F) ASTM D97	-40
Flash Point, (degrees F) ASTM D92	236
Specific Gravity, ASTM D4052	0.87
Copper Corrosion, (24 hours @ 250 degrees F) ASTM D130	1B

- D. The mechanical power transmission system used for thrust-duty Actuators shall be furnished with a thrust base constructed of ASTM A48, Grade 40B cast iron; ASTM A536 Grade 65-45-12 ductile iron; or equivalent. The thrust base shall absorb all valve thrust preventing the need for it being taken up by the gear case. The thrust base shall be fitted with a grease lubricated thrust bearing. The thrust base shall allow opening of the gear case without releasing the valve stem. The Actuator mounting base output drive coupling dimensions and configuration shall be in accordance with MSS SP-102.
- E. Thrust-duty Actuators shall be fitted with a drive sleeve constructed of ASTM B505, Grade C95800 nickel aluminum bronze or equivalent; or, ASTM A1040, Grade 1023 alloy steel or equivalents. The sleeve shall be machined with internal threads to match the stem. Thread form shall be 29 degree ACME in accordance with ASME B1.5.
- F. Thrust-duty Actuators shall be furnished with stem covers constructed of ASTM A53, Grade B welded steel pipe, having Schedule 40 wall thickness, covered with a pipe cap internally threaded with NPT threads in accordance with ASME B1.20.1. The valve interface on torque duty Actuators shall have mounting base drilling and output drive coupling configuration and dimensions in accordance with MSS SP-102.

- G. Direct-mounted quarter-turn actuators shall be fitted with a drive bushing constructed of ASTM B505, Grade C95800 nickel aluminum bronze or equivalent; ASTM A1040, Grade 1023 alloy steel; or equivalents. The valve interface on torque duty Actuators shall have mounting base drilling and output drive coupling configuration and dimensions in accordance with MSS SP-101.
- H. The Actuator power train shall include a declutching lever allowing transfer of powered operation to manual operation via an auxiliary handwheel Operator. The lever shall disengage the electric drive mechanism and stopping valve motion while under powered operation. Manual handwheel Operators shall be constructed of aluminum or powder coated steel. Handwheel Operators shall be keyed to the input shaft.

2.4 ACTUATOR ASSEMBLY HARDWARE

- A. All exterior fasteners shall be constructed of stainless steel. Hex head and socket head cap screws, studs, hex head bolts, and stud bolts used by the OEM to assemble the Actuators and mount them to the valves shall meet the dimensions of ASME B18.2.1 and have ASME B1.1, UNC or UNF threads. Washers shall have dimension in accordance with ASME B18.22.1. Cap screws and bolts shall be manufactured of Type 316 stainless steel meeting ASTM F593, Alloy Group 2, condition CW, Supplementary Condition S8.
- B. Hex nuts shall meet the dimensions of ASME B18.2.2 and have ASME B1.1, UNC threads, Class 2B fit. Hex nuts shall be manufactured of Type 316 stainless steel meeting ASTM F594, Alloy Group 2.
- C. Stainless steel exterior fasteners shall be furnished chemically passivated in accordance with the Nitric 1 or Nitric 2 process in accordance with ASTM A967. Surface finish shall be 63 μ inch RMS all over in accordance with ASME B46.1, as a minimum.

2.5 CONTROL MODULE

- A. The Actuator shall be “non-intrusive”, meaning adjustments to its settings without the need of opening the control module. The actuator shall have a non-breathing, control module including a sealed terminal compartment, and protection and control compartment; or separate modules for terminals and controls. The control module shall house the power and logic circuit boards, control power transformer, power protection fuses, encoders, torque limiting devices and reversing contactors. Each compartment shall be double O-ring sealed and include a heater for control of condensation.
- B. Circuit boards shall be mounted to a steel support plate and attached to the control module using captive screws. The module shall be easily removed through the use of secure plug-in connectors. All internal wiring shall be flame-resistant, rated at 221 degrees F and meet UL 758. Conduit entries to the control module terminal compartment shall include one 1 ½ inch and two 1 ¼ inch diameter ports, as a minimum, with internal NPT threads in accordance with ASME B1.20.1.
- C. Reversing contactors shall be mechanically and electrically interlocked to prevent simultaneous firing the OPEN and CLOSE coils. The control module shall include an instantaneous reversal protection system that will automatically engage and cause a delay when the Actuator control is instantaneously reversed, to protect the contactor from experiencing high current switching transients from rapid motor reversals. Contactors shall be fuse protected by fast acting primary fuses.

- D. The control power transformer shall supply standard 24 VDC. The control power transformers shall include vacuum impregnated coils, dual primary fuses, and be optical-isolated to prevent magnetic interference with the controls.

2.6 PROTECTION, CONTROL AND MONITORING

- A. Valve position shall be measured by an 18-bit optical absolute position encoder with redundant position sensing circuits used for diagnostics. Each of the position sensing circuits shall be redundant, permitting up to 50 percent fault tolerance before the position is incorrectly reported. The self-diagnostic circuit shall determine which failures signal a warning only, and which require a warning followed by a safe shutdown of the Actuator. OPEN and CLOSED positions shall be stored in permanent, nonvolatile memory. The encoder shall measure valve position at all times, including both motor and handwheel operation, whether the Actuator is energized or not, and without the use of a battery. The Actuator encoder shall be capable of resolving plus-or-minus 7 degrees of output shaft position over 10,000 output drive rotations, as a minimum.
- B. An electronic torque sensor shall be included in the transmission system, having torque limit adjustable from 40 to 100 percent of the output rating in 1 percent increments. The motor shall be de-energized if the torque limit is exceeded. A hammer-blow function shall be programmed in the firmware to prevent torque trip during initial valve unseating and during extreme low temperature operation (-50°C).
- C. A jammed valve protection feature shall be included in the controls, with an automatic reverse/forward cycle to free a jammed valve. The controls shall sense and compare torque and valve movement (position). While unseating a valve, if the Actuator cannot overcome the required unseating torque, and several reverse/forward cycles have completed, a JAMMED VALVE condition shall be signaled and the firmware shall de-energize the motor and the monitor relay coil shall be fired. Likewise, if the valve is closing and an obstruction is detected the same procedure shall be followed in the firmware.
- D. Four latched contacts, each rated 125VAC, 0.5A and 30VDC, 2A, shall be included to provide remote indication of valve position at the end-of-stroke. Two contacts shall be configured as normally-open and normally-closed for indication of OPEN; and the other two normally-open and normally-closed for indication of CLOSED position.
- E. A monitor relay shall be provided that will trip when the Actuator is not available for remote operation. Both normally-open and normally-closed contacts shall be included, rated 5A at 250VAC, 30 VDC, resistive; and 2A at 125VAC, and 30 VDC inductive. The monitoring relay shall be configurable for three additional fault indication signals including loss of phase, valve jammed and motor OVER-TEMPERATURE. The monitor relay configuration shall allow it to be disabled by operations personnel.
- F. A phase rotation correction system shall be included that will automatically rotate the Actuator in the proper direction in case the phase wires are incorrectly terminated. The system shall also detect loss of phase and disable motor operation. When loss of phase occurs the monitor relay shall trip and an error message shall be displayed on the LCD screen indicating the FAULT.

- G. Remote external interlocks/inhibits terminations shall be provided in the terminal compartment for connection to remote dry contacts for interlocks with other process equipment that will prevent powered operation of the Actuator. The signals shall be capable in both REMOTE and LOCAL control modes, and only be overridden by the emergency shutdown monitoring system when programmed to do so.
- H. Emergency shutdown shall be controlled by an emergency shutdown and monitoring system capable of overriding any process control command signal, and sending the valve to a preselected and programmable shutdown position. The emergency shutdown monitoring system shall have capacity to receive up to three external independent event signals, programmable to take specific actions in response to each event. Provision for an isolated common shall be provided in the terminal compartment for these signals. The emergency shutdown system shall be capable of overriding any interlock/inhibit signal, the local selector switch, the STOP switch, over-torque condition, lost phase or jammed valve.
- I. A self-diagnostics system shall be provided for data acquisition and reporting of performance of the motor, encoder, contactor, cycle time, handwheel operations, Actuator ID, firmware revision, and number-of-turns.
- J. A circuit protection system shall be included capable of monitoring and coordinating solid-state output driver signals with voltage levels in the starting contactor circuit. The system shall be sensitive to open circuits, short circuits, and other component failures, and shutdown the motor in the event of a fault. Alarms shall be signaled via the monitoring relay.

2.7 NON-INTRUSIVE CONTROLS AND NETWORKING

- A. Valve position shall be measured by an 18-bit position feedback control.

PART 3 - EXECUTION

3.1 QUALITY CONTROL AND QUALITY ASSURANCE

- A. The Supplier shall furnish the Work in new and unused condition. The Work shall include products and services from Suppliers having a successful record of manufacturing and servicing the Work specified herein for a minimum of 10 years prior to the Effective Date of the Agreement. The Suppliers shall utilize factories, foundries and machine shops, holding a current ISO 9001 Certificate of Quality System Registration, and furnish all documentation necessary to verify the Supplier's certification and registration, upon the request of the Owner, Engineer or Resident Project Representative.
- B. The Supplier shall perform and document all quality control (QC) and quality assurance (QA) procedures performed during manufacturing at the factory; during loading of the Work for transport at the factory; during transport to the Site; during unloading and storage of the Work at the Site; and during installation and commissioning at the Site. Inspection by the Owner, Engineer or Resident Project Representative(s), or failure to inspect, shall not relieve the Supplier of his responsibility to provide adequate materials and quality craftsmanship by every trade.

- C. The Supplier shall submit to the Engineer, four copies of all certified material test reports (MTRs) for chemical analysis, mechanical properties results for all materials used in the manufacture of the Work specified herein. MTRs shall identify the specific parts for which the material will be used, , coordinated with the bill of materials, and all information necessary to verify compliance with the requirements specified herein.
- D. If there are difficulties in commissioning of the Work of this Section due to poor performance of the OEM, Supplier, additional services performed by the Supplier to correct the defective Work and meet the acceptance testing requirements, shall be provided at no change in Contract Price or Contract Time.

3.2 ELECTRICAL SYSTEM TESTING

- A. The OEM shall perform electrical testing at the Actuator factory and the Suppliers' factory following mechanical integration with the valve. Actuator testing at the Supplier's factory shall be performed with the Actuator mounted to the valve it will be installed on at the Site. Performance testing shall be certified by the OEM for compliance with AWWA C542 performance testing. If the Actuator test results do not fall within the OEMs' published range of operation, or the acceptance criteria published in the referenced standard, the Actuator shall be repaired and re-testing performed by the Supplier until conforming Actuator performance is verified. The following tests shall be performed at the OEMs' factory to ensure Actuator operation:
 - 1. Voltage, phase, and frequency at rated horsepower and RPM
 - 2. Stroke time or output speed
 - 3. Seating (or maximum dynamic) torque
 - 4. Torque switch and limit switch function and calibration
 - 5. Motor current measured under maximum advertised torque and at advertised horsepower and RPM.
- B. The Suppliers shall be responsible for calibrating the torque and limit switches and mechanical stops. The Suppliers' shall perform the following tests with the Actuator mounted on the valve it will be integrated with for this project:
 - 1. The valve shall be operated 5 times throughout its full range of operation with motor current measurements taken at each 5 percent of opening interval. The motor amperage shall not exceed Actuator manufacturer's recommended maximum running torque or seating torque when the valve is running or seating respectively.
 - 2. The OEM Installation Technician representative shall check the installation and mounting of the Actuator on the valve as part of the testing procedure. If the Actuator is incorrectly installed or mounted, it shall be reinstalled and inspected until accepted.
 - 3. A hydrostatic test shall take place to demonstrate position switch accuracy. An Actuator indicating a position of 0% open shall correlate to a completely closed valve and shall be verified with a hydrostatic test. If the valve fails the hydrostatic test, the Actuator shall be repositioned to ensure full closure and the test repeated until accepted.
- C. Actuators shall not be shipped prior to the Engineer approval of factory testing and certification by the Supplier. Factory certification shall include Supplier's verification of limit and position switch functions.
- D. Certified test results shall be submitted in report format containing the following information at a minimum:
 - 1. Model number, serial number, size, and gear ratio.

2. Enclosure type.
3. Motor data including size (hp), phase, frequency, voltage and speed.
4. Motor rating.
5. Torque test results including measured torque, amperage and voltage, under no load, intermediate and maximum loads.
6. Stroke time (seconds) or output speed (RPM)
7. Seating (or maximum dynamic) torque
8. Torque and limit switch function and adjustment
9. Hydrostatic full closure test results
10. 5% opening interval test results

3.3 FIELD TESTS AND INSPECTIONS

- A. The Engineer shall be given a 30 day notice prior to field testing. Any material, equipment, instruments, and personnel required for the tests shall be provided by the Supplier. Testing shall be conducted in the presence of the Engineer and six copies of certified field test reports shall be submitted by the Supplier. Testing shall be done under the direction of the manufacturer's representative.
- B. A field functional test shall be performed to ensure Actuator operation. The valve shall be operated 5 times throughout its full range of operation with motor current measurements taken at each 5 percent of opening interval. The motor amperage shall remain within +/- 5 percent of the values recorded by the Supplier during the factory test.
- C. Refer to the individual valve specification Sections for QA/QC procedures relevant to valve Actuator field testing and services to be provided by the OEM and Supplier.

END OF SECTION

SECTION 40 05 73
HORIZONTAL MULTI-JET SLEEVE VALVES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Work of this Section shall include the design, manufacture, and delivery of one 20" x 18" x 20" in-line horizontal multi-jet sleeve valve, fixed element energy dissipator, and electric actuator which shall be furnished by the Owner to a contractor for installation under a separate contract.
- B. The sleeve valve furnished under this section shall function as an energy dissipating flow control valve for delivery of finished potable drinking water to the Portland Ave. Reservoir in Tacoma, Washington. Water is conveyed to the Portland Ave. Reservoir from the McMillin Reservoir located in South Hill, Washington. The total head from McMillin Reservoir will provide a maximum flow rate of 40 mgd at approximately 118 psi accounting for all losses throughout the upstream pipeline, and downstream piping at the Portland Avenue facility. The minimum continuous flow is 1 mgd.

1.2 RELATED WORK

- A. The Work of mechanical fasteners and accessories used for valve assembly and mounting OEM accessories in the field, and their dimensional and finish requirements, are included in Section 05 43 00.
- B. The Work of surface treatment for stainless steel fabrications is included in Section 05 10 05.
- C. The Work of jack screw and right angle gear drives are included in Section 40 05 57.10.
- D. The Work of Electric Motor Operators and Drives are included in Section 40 05 57.26.

1.3 QUALIFICATIONS

- A. Sleeve valves require custom design on the part of the Supplier. Supplier's minimum experience, necessary to meet the qualification requirements, shall be as follows:
 - 1. Production facilities and foundries owned by the Supplier, and other equipment manufacturer (OEM) foundries, fabrication shops, and manufacturing facilities commissioned to fabricate and assemble valve components, shall be ISO9000:2015 certified.
 - 2. The Supplier shall show proof of successful design, fabrication, testing, calibration and delivery of horizontal multi-jet sleeve valves, 8 inch and larger, as standard catalog products available to industry, during the past 25 years.

- B. Although other Suppliers may be submitted for consideration on the Substitution Request Form, candidates that may have the experience necessary to make them eligible for selection, and their relevant product designations, are as follows:

1. Model B10/B16, manufactured by Bailey Valve, Inc., Fresno, California.

1.4 SUBMITTALS

- A. Submittal documents, including cut-sheets, shop drawings, and operation and maintenance data shall have text written or translated into English. All numerical data shall be in the foot-pound-second system of units. Detailed mechanical and powered actuator data shall be submitted in accordance with the requirements of the referenced specification sections.
- B. Submit a list of references – Statement of Qualifications Form (Appendix A), showing a minimum of five (5) delivered horizontal multi-jet sleeve valves, in the nominal diameter and service categories specified herein during the past twenty five (25) years. Each reference shall include the installation location, end-user's (Owner's) name, a contact person and phone. Reference information shall be used by the Engineer and Owner for verification of performance and end-user satisfaction with the referenced order in regard to the following:
1. Product quality in regard to design, manufacturing and performance in the installed condition.
 2. Shop drawing review cycles and conformance with the technical specification for the referenced order.
 3. Supplier's commitment to meeting delivery schedules as they apply to contractor delay claims, impact to end user claims, profits, etc.
 4. Quality of service and support provided by the Supplier during installation, testing and training of end user personnel.
- C. Submit welding procedures and qualification records in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, and include the following:
1. Welding Procedure Specifications (WPS) for each proposed field and shop welding procedure or process (including overlay cladding process).
 2. Procedure Qualification Record (PQR) for each WPS submitted.
 3. Welders' and welding operators' certification records for each proposed WPS and each welder assigned to the work on the valves in the manufacturer's shop.
- D. Submit a detailed Production Schedule, in the Supplier's standard format. The schedule shall show a timeline for the processes shown in the example at a minimum. A separate schedule shall be submitted for each nominal valve size.
- E. Submit a Quality Assurance Plan (QAP) for the design, purchasing, manufacturing, inspection and testing of all valves specified herein. The QAP shall include a flowchart of production processes for manufacturing and assembling major components of each valve, and the quality control and quality assurance procedure milestones carried out through the manufacturing process. The plan shall include the following at a minimum:
1. ISO 9001:2015 certificate.
 2. Organizational and technical interface flow chart.
 3. Complete drawing list including all of the Supplier's forms used for internal engineering review, approval and verification of the design.

4. Purchasing management processes including the scope of OEM purchasing for all valves; procedures for evaluation and selection of suppliers; procedures for verification of specification compliance by suppliers; and receiving inspection procedures for OEM purchased items.
 5. A plan for control of the manufacturing process in the factory including travel card format; forms for dimensional record of machining; qualification of inspectors; and a traceability "roadmap" for the QA/QC documentation during manufacturing.
 6. Supplier's Inspection and Testing Plan for production and witnessed factor testing procedures, including forms and documentation procedures; a QC flowchart unique to each valve and model numbers for all major components; and QC plan sheets with corresponding flow chart identification numbers.
 7. Chemical, physical and non-destructive test procedures to be performed at the foundry and factory.
 8. Qualification credentials for all in-house and outsourced nondestructive examination (NDE) and destructive examination personnel performing the approved test procedures in the foundry and factory.
- F. For valves 54 inch nominal diameter and larger, submit a Design Report for each valve size in each service category. The Design Report shall be submitted after the Suppliers QAP has been approved by the Engineer. The Design Report shall include the following data as a minimum:
1. Results of a finite element analysis (FEA) of the assembled pressure containing components (inlet and outlet bodies) under the anticipated loads.
 2. A written summary narrative including the assumptions and confirmation that the allowable stresses used for each material of construction included in the FEA meet the design requirements.
 3. All rigging and handling restrictions based on the results of the FEA.
 4. The necessary clamping force for each flange bolt used in assembly of valve flanges to the connecting process piping flanges; and the proposed sealing configuration for the valve flanges.
- G. Submit descriptive literature, bulletins, and/or catalog cut sheets for OEM products utilized in the valve design.
- H. Submit a complete set of detailed shop drawings for each valve of a given nominal diameter and service category. Shop drawings shall be submitted after approval of the Suppliers design report. Shop drawings shall be prepared and show dimensions and tolerances in accordance with ASME Y14.5. Shop drawings shall include the following as a minimum:
1. Assembly drawings showing the operator, drive and powered actuator mounted to the valve in plan, front elevation and side elevation views; and a cross section of the assembled valve, including an enlarged cross section view of the body and disc seat assemblies.
 2. A drawing showing a tabulated list of parts having the part number, component description, materials of construction and weight of each part.
 3. Outline drawings of individual manufactured parts in multiple views including the referenced part number, overall dimensions and material of construction.
 4. A drawing showing the mounting pattern for the drive and/or powered actuator.
- I. Submit a certified Non-Destructive Examination Reports for each valve in accordance with the requirements specified in PART 3. The Non-Destructive Examination Plan shall include the following:

1. Visual examination procedures (VT).
 2. Radiographic examination procedures (RT) and results for cast ductile iron components at locations identified by the Engineer based on the FEA analysis included in the Design Report.
 3. Ultrasonic examination procedures (UT) and results for cast ductile iron components at locations identified by the Engineer and agreed upon based on the FEA analysis included in the Design Report.
- J. Submit a Protective Coating Application Plan including cut-sheets and application data for factory-applied prime and finish high-performance epoxy coatings as specified herein.
- K. Submit a Crating and Shipping Plan including the method of shipping, crating method, and rigging requirements for FOB delivery at the point of destination, for review and approval by the Engineer.
- L. Submit resume(s) for Supplier's Field Installation Technicians and OEM installation technicians that will provide the installation, startup and training services specified in PART 3 of this Section. Resumes shall be submitted 30 days or earlier prior to scheduled installation.
- M. Submit installation operation and maintenance (IOM) manuals that will be used by the installation contractor, and for training the Owners operations and maintenance personnel. IOMs shall be prepared by personnel familiar with the operation and maintenance information for this project for the purpose of educating operations and maintenance personnel unfamiliar with such equipment. The IOMs shall be provided in three-ring binders and in PDF electronic format, transmitted electronically. The manual shall contain the following information at a minimum:
1. Procedures for long-term storage of the valves, operators, drives and powered actuation equipment.
 2. Installation instructions and startup procedures, for immediate installation after delivery to the project site; and following long-term storage including rigging, supporting, checking alignment and functional testing.
 3. Instructions for field application of touch-up high-performance liquid epoxy coatings following installation and testing.
 4. Maintenance instructions shall include preventative and corrective maintenance and troubleshooting procedures. Schedules for maintenance shall also be included.
 5. Provide a list of tools required to service the equipment.
- N. Submit a Training Plan consistent with the requirements included in PART 3 of this Section. The training plan shall include a breakdown of the overall training requirements into half-day modules. The training plan shall have separate modules, first for mechanical/hydraulic maintenance and then electrical/instrumentation maintenance. Each training module document shall include as a minimum:
1. Title page.
 2. Brief overall description.
 3. Training objectives that briefly describe what the trainee should know at the completion of the module.
 4. Written training materials.
 5. A test of the training materials sufficient to indicate whether or not the training objectives were adequately captured by the trainee.

- O. In general, corrections or comments or lack thereof, made relative to submittals during review shall not relieve the Supplier from compliance with the requirements of the Contract.

1.5 REFERENCE STANDARDS

- A. American Society for Nondestructive Testing (ASNT)
 - 1. ASNT CP-189 – Standard for Qualification and Certification of Nondestructive Testing Personnel
- B. American Society of Mechanical Engineers (ASME)
 - 1. ASME B46.1 – Surface Texture, Surface Roughness, Waviness and Lay
 - 2. ASME Y14.5 – Engineering Drawings and Related Documentation Practices – Dimensioning and Tolerancing
 - 3. ASME Boiler and Pressure Vessel Code – Section III – Rules for Construction of Pressure Vessels
 - 4. ASME Boiler and Pressure Vessel Code – Section V – Nondestructive Examination
 - 5. ASME Boiler and Pressure Vessel Code – Section VIII, Division 1 – Rules for Construction of Pressure Vessel
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM A36 – Standard Specification for Carbon Structural Steel
 - 2. ASTM A182 - Standard Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes
 - 3. ASTM A240 - Standard Specification for Heat Resisting Chromium and Chromium Nickel Stainless
 - 4. ASTM A516 - Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
- D. American Water Works Association (AWWA)
 - 1. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service-Sizes 100 mm through 3600 mm 4 in. through 144 in
- E. International Standardization Organization (ISO)
 - 1. ISO 6022 – Hydraulic Fluid Power – Mounting Dimensions for Single Rod Cylinders, 25 MPa (250 bar) Series
 - 2. ISO 9001 – Quality Management Systems - Requirements
- F. Supplier's Standardization Society (MSS)
 - 1. MSS SP-102 – Multi-Turn Valve Actuator Attachment – Flange and Driving Component Dimensions and Performance Characteristics
- G. The Society for Protective Coatings (SSPC)
 - 1. SSPC PA 2 – Measurement of Dry Coating Thickness with Magnetic Gages
 - 2. SSPC SP 1 – Solvent Cleaning
 - 3. SSPC SP10 – Near White Blast Cleaning
- H. Military Specifications and Standards (MIL)
 - 1. MIL-P-17667 – Paper, Wrapping, Chemically Neutral (Non Corrosive)
- I. NSF International

1. NSF 61 – Drinking Water System Components
- J. Society of Automotive Engineers (SAE)
 1. SAE J518 – Hydraulic Flanged Tube, Pipe and Hose Connections, Four Bolt Split-Flange Type
- K. United States Environmental Protection Agency (USEPA)
 1. 42 U.S.C 300f et seq. – Safe Drinking Water Act
- L. United States General Services Administration (USGSA)
 1. FTR §§ 300-304 – Federal Travel Regulation – Amendments
- M. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.6 SPECIAL TOOLS AND SPARE PARTS

- A. Special tools and the manufacturer's standard stock of spare parts, if required for normal operation and maintenance of the valve, shall be supplied with each size of sleeve valve. In general, they shall include:
 1. (2) Touch-up paint for all finishes, including actuator finishes.
 2. (2) Polypak sleeve gate seals

PART 2 - PRODUCTS

2.1 HYDRAULIC DESIGN REQUIREMENTS

- A. The information in the following Part 2 paragraphs shall be utilized by the supplier for preparation of his bid.
- B. The valve shall be designed and guaranteed for a minimum of five years to operate throughout its range without cavitation damage, excessive noise or vibration, for the design conditions described below.

Valve I.D.	Size (in.)	Q _{max} (gpm)	P _{in} psi. @ Q _{max}	P _{out} ft. @ Q _{max}	Q _{min} (gpm)	P _{in} psi. @ Q _{min}	P _{out} ft. @ Q _{min}
SV-1	18x20	27,778	112	8	694	139	8

- C. The valve coefficient C_v versus sleeve gate position in percent-of-stroke shall be as described in the table below:

C_v (mgd/psi ^{1/2})	
Stroke (%) Valve I.D.	SV-1 C_v
10	.35
20	.701
30	1.058
40	1.420
50	1.792
60	2.176
70	2.575
80	2.993
90	3.435
100	3.906

2.2 DESIGN CRITERIA

- A. Water quality data for the source water that will be conveyed by the valve is summarized below:

Source	pH (units)	Calcium	Magnesium	Sulfate	Chloride	Alkalinity as CaCO ₃	Sodium
Green River	8.35	14	<1.0	1.4	2.7	25.9	6.6
North Fork Wells	7.54	6	<1.0	1.8	2.1	30.8	7.8

- B. Two valve operating pressure service categories are covered in this Section for all valves, based on service pressure and temperature. They include Standard Service Valves and Heavy-Pressure Service Valves.
- C. Standard Service Valves shall include valves for process service up to 250 psi at 100 degrees F or less. Standard service valves shall be subjected to a seat leakage test of 250 psi; and a hydrostatic shell test at 500 psig.

- D. Heavy-Pressure Service Valves shall include valves for process service to 300 psi or higher, and to 100 degrees F. Heavy pressure service valves shall be subjected to a hydrostatic seat leakage test at the maximum operating pressure, and a shell test at two (2) times the maximum operating pressure.
- E. Copper alloys used in the valve construction shall have resistance to exfoliative and/or plug-type de-alloying of zinc and/or aluminum. Copper alloys containing up to 15 percent zinc shall contain no less than 57 percent copper. Alternative alloys containing zinc exceeding 15 percent shall contain no less than 79 percent copper.
- F. Pressure containing and non-pressure containing components in the assembled condition shall be designed with the following allowable stress requirements at ambient temperatures up to 100 degrees F:
 - 1. Allowable stress for ductile iron castings shall be no greater than 50 percent of the yield stress in tension and compression.
 - 2. Allowable stress for steel castings shall be no greater than 65 percent of the yield stress in tension and compression.
 - 3. Allowable stress for machined silicon-aluminum bronze castings shall be 65 percent of the yield stress in tension; and 50 percent of the compressive strength. All other copper casting alloys shall not exceed 40 percent of the yield stress in tension and compression.
 - 4. Allowable stress for rolled stainless steel shall be 65 percent of the yield stress in tension and compression.
 - 5. Allowable stresses for steel and stainless steel cap screws, bolts, nuts and other fastening components shall be 25 percent of the yield stress in tension and compression.
 - 6. Shear stress for the materials described above shall not exceed 0.4 times the allowable yield stress.
- G. Surface roughness for machined parts shall be defined on the shop drawings in micro-inches (μ in) root-mean-squared (RMS) in accordance with ASME B46.1. Machined finishes shall have surface roughness meeting or exceeding (finer) the following:
 - 1. Sealing surfaces for elastomer O-ring seals: 32 μ in RMS
 - 2. Valve stems and surfaces in sliding contact under load: 63 μ in RMS
 - 3. Sealing surfaces used with flat gaskets: 125 μ in RMS
 - 4. Sealing surfaces for flat flange gaskets at flanged connections: 250 μ in RMS
- H. The valve Supplier shall be responsible for determining the clamping force required for connecting flange assembly bolts to create a lasting seal with the connecting piping companion flange. Where significant clamping force is necessary for line flange bolts to maintain a seal, due to the pressure, diameter, line pressure and/or temperature, the Supplier shall be allowed to use an alternative sealing design utilizing O-ring face seals where clamping forces required to affect a lasting seal are excessive and impractical for standard flange bolting equipment. The size and number of O-rings shall be selected by the Supplier.

- I. Pipe flange O-rings shall be used with flat-face valve flanges. In cases where the valve Supplier selects this option, the Supplier shall furnish with the valve, a custom designed steel pipe flange for each port machined with the O-ring groove, of the same nominal size and material designation for the material of the connecting piping. The drilling shall match that of the valve. Under no circumstances shall the groove be machined into the valve flange. The pipe flange groove shall be configured to retain the O-ring during assembly.
- J. Actuators, operators and drives shall be positioned as necessary and have the ability for re-orientation in the field where unexpected adjustments are necessary. The mount drilling, pilot, shaft and key seat dimensions shall be in accordance with MSS SP-102, Group A. All valves fitted with multi-turn drives and actuators shall OPEN LEFT (counterclockwise).
- K. Intermediate drives (gearboxes) shall be sized by the Supplier, who shall be responsible for calculating and confirming the thrust and input torque requirements for each valve drive. Intermediate drives installed between operators or powered actuators and the basic drive, shall include a single-stage enclosed bevel gear or spur gear reducers; or multi-stage enclosed gear reducer sets utilizing bevel gears and spur gears or both. Intermediate drives shall be furnished where necessary to limit the manual rim-pull required for hand-wheel operators to no greater than 40-lbs for manual input. Intermediate drives are specified in Section 40 05 57.10.
- L. Valves furnished with electric-motorized operators shall be sized by the Supplier, who shall be responsible for calculating and confirming the thrust and input torque requirements for each basic valve drive. The Supplier shall be responsible for selecting the actuator model, motor size, intermediate drive (where required), and hand-wheel size for de-clutched manual operation. Electric motor-driven actuators are specified in Section 40 05 57.26.
- M. Hydraulically actuated valves shall be fitted with mill-style or ISO 6022 double-acting hydraulic cylinders, having a bore size and rod code entered into the Valve Schedule. The Supplier shall be responsible for determining the bolt pattern for connection of hydraulic cylinders to the valve yoke. All hydraulic cylinders shall be furnished with mechanically engaged rod clamps, which disengage under hydraulic pressure.
- N. The valve Supplier shall be responsible for mounting and assembling intermediate mechanical gear drives and powered actuators to the valve yoke for shop testing prior to shipping, and for disassembling the valve and powered actuator for shipping and reassembling the valve for installation at the Site. However, valves shall be shipped with actuators installed if not precluded due to shipping constraints.
- O. The Supplier shall refer to Section 05 43 00 for material, dimensional and finish requirements for valve assembly fasteners; and for thread lubricants and thread-locking compounds.
- P. Weldments shall be stress relieved after welding for dimensional stability prior to machining and attachment of seal assemblies and other appurtenant items. Carbon steel components shall be stress relieved by heat treating in a furnace in accordance with the ASME Boiler and Pressure Vessel Code Section VIII, Division I. Stainless steel weldments shall have stress relief by use of a commercially available vibratory stress relieving system. The vibratory system shall be:

1. Formula 62 Vibratory System, manufactured by Stress Relief Engineering Co., Costa Mesa, CA.
2. Meta-Lax Stress Relief and Weld Conditioning System, manufactured by Bonal Technologies, Inc., Royal Oak, Michigan.
3. VSR8000 manufactured by VSR Technology Group Division of Airmatic, Inc., Philadelphia, Pennsylvania.
4. Or equal.

2.3 VALVE BODY ASSEMBLY

- A. The sleeve valve body assembly shall consist of two carbon steel weldments, comprising the inlet and outlet bodies. The two body weldments shall be connected at a flanged cylindrical body section with an inner annular chamber formed by the body shell. The flanges on the upstream and downstream ends of the main body section shall have a 20 inch nominal diameter process connection. The flanges shall have AWWA C207, Class D, flat-faced. Sealing surfaces of the flange shall be delivered bare with Rust-veto corrosion preventing coating.
- B. The inlet and outlet body components shall be constructed of welded ASTM A516, Grade 70 carbon steel.
- C. The body shall have two bolted inspection/access manways each with davit or hinges and positioned vertically, allowing entry by maintenance personnel from each side of the valve for periodic cleaning of the valve trim.
- D. The valve will be installed on the top flat surface of a reinforced concrete pedestal. The pedestal dimensions will be based on the dimensions of mounting feet included in the approved submittal described in paragraph 1.4 above. The valve manufacturer shall design the feet to take the entire thrust resulting from seating the valve under the maximum static head. The design of these feet shall be included in the

2.4 STATIONARY SLEEVE

- A. The internal valve trim shall include a stationary perforated cylindrical sleeve, having tapered conical nozzles bored through the sleeve perpendicular to the direction of pipeline flow. The larger diameter end of the sleeve nozzles shall be on the outside diameter of the stationary sleeve (upstream side).

2.5 SLEEVE GATE

- A. A valve gate shall be concentrically mounted to the stationary sleeve. The sleeve gate shall be used to throttle the flow of water through the nozzles from the outer annular chamber into the inner downstream chamber within the stationary sleeve.
- B. The valve gate shall be constructed of ASTM A240, Type 304L stainless steel and be hard-faced on the upstream side with a cobalt based welded overlay cladding material, prior to machining the sealing surface to the surface finish specified in paragraph 2.2 above. The overlay cladding shall be:
 1. Stellite 6B, manufactured by Stellite Coatings, Goshen, Indiana.
 2. Or Equal.

- C. In the CLOSED position, the sliding sleeve gate shall be retracted in the upstream direction with a resilient sealing surface seated against the gate. In the fully OPEN position, the sliding sleeve-gate shall be fully-extended in the downstream direction to release water through the fixed sleeve.
- D. The sliding gate shall seal against the sleeve at its upstream end using the polypak seal specified in paragraph 2.7 below, or similar seal configuration and material, at its downstream end. The seal shall be retained by a scraper ring and gland machined from ASTM B271, Alloy C95200 centrifugally cast copper alloy rings. The upstream seat seal shall be attached to the inlet end of the fixed sleeve. The seat and seal shall be accessible through the inspection port(s) and shall be replaceable through the ports without removing the valve or sleeve from the connecting piping.

2.6 THREADED VALVE STEMS

- A. For all valves using threaded valve stems and nuts, as part of non-rising stem, multi-turn intermediate drives and direct mounted electric actuators, both components shall be machined at the same manufacturing facility and checked for fit and smooth operation across its length, in the presence of the Engineer prior to assembly with the valve. The stem and nut shall be machined with ASME B1.5, 29 degree ACME threads. The outside edge of the external threads on the stem shall be broken.
- B. For valves 54 inch nominal diameter and larger, all valve stems used for NRS gate valves configured for horizontal and vertical installation shall have a polymer modified electroless nickel coating applied to the threads. Coating shall be:
 - 1. Nedox SF2 by General Magnaplate Inc., Arlington, Texas.
 - 2. Or Equal.

2.7 PACKING, FLAT GASKETS AND ELASTOMER SEALS

- A. Valve packing shall be a dimensionally stable, braided polytetrafluoroethylene (PTFE) filament fiber type with PTFE dispersion. Packing shall be rated for process service up to 2000 psi and -450 to 500 degrees F. Packing shall be:
 - 1. Style 432 valve stem packing manufactured by Garlock Sealing Technologies, Palmyra, New York.
- B. The downstream edge of the sleeve gate shall be sealed using a square shaped symmetrical squeeze seal with a knife trim scraper lip. The sleeve gate seal shall be:
 - 1. Molythane™ standard loaded lipseal Polypack, manufactured by Parker Seals and O-rings, Lexington, Kentucky.
 - 2. Or equal.
- C. Elastomer O-rings used on applications where the joint seal will have direct exposure to drinking water treated with chloramines during most of the service life, shall be compounded from ethylene propylene diene monomer (EPDM) in accordance with ASTM D2000, call-out M4CA 710 A25 B35 C32, or equivalent.
- D. The EPDM O-ring elastomer shall be NSF-61 Certified. Product compounding shall enhance aging, heat stability, modulus and compression set properties by peroxide crosslinking. The elastomer shall have an operating temperature range of -30 degrees F to 300 degrees F. The product shall not swell in excess of 1 percent after prolonged exposure to chlorine or chloramines. EPDM O-ring elastomers shall be:
 - 1. Compound 5778, manufactured by Parco, Inc., Ontario, California

2. Compound E-7020 or E8002, manufactured by O-Rings, Inc., Los Angeles, California
 3. Compound E362-70, manufactured by Spec Seals, Anaheim, California
 4. Or equivalent.
- E. Elastomer O-rings, used on raw water and drinking water applications where chloramines are not used for disinfection, shall be constructed of Butadiene elastomer rubber (BUNA-N) in accordance with ASTM D2000 call-out M2BG714 EA14EF11 EO14 EA34. Buna-N O-rings shall have a durometer hardness of 70 in accordance with ASTM D7735. EPDM O-ring elastomer shall be NSF-61 Certified. BUNA-N O-rings shall be:
1. Compound 4900-70, manufactured by Parco, Inc., Ontario, California
 2. Compound N161-70, manufactured by Spec Seals, Anaheim, California
 3. Compound BN70, manufactured by O-Rings, Inc., Los Angeles, California
 4. Or equivalent.

2.8 HIGH-PERFORMANCE FUSION-BONDED EPOXY PROTECTIVE COATINGS

- A. The interior and exterior surface of the carbon steel valve components shall be fusion-bonded epoxy coating at the factory. The final color shall be applied directly to the fusion bonded epoxy without abrading or damaging the surface of the fusion bonded epoxy. The FBE coating and lining system shall be:
1. Scotchkote™ 206N LG at 16 to 40 mils DFT shall be applied as the exterior coating; and Scotchkote 206N™ XTRA LG to 16 to 40 mils DFT for the internal pipe lining, manufactured by 3M Corrosion Protection Products, Austin, Texas.
 2. Pipeclad® 2000 at 12 to 16 mils DFT shall be applied as the exterior coating; and IF1947T at 8 to 12 mils DFT for the internal pipe lining, manufactured by Valspar Industrial, North Kansas City, Missouri.
 3. Nap-Gard® 7-0014 at 10 to 20 mils DFT shall be applied as the interior and exterior coating, manufactured by DuPont Industrial Coatings, Wilmington, Delaware.

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

- A. All production facilities including factories, foundries, welded fabrication and machine shops utilized in the production of the valves specified herein shall be ISO 9001:2015 certified. Quality control (QC) and quality assurance (QA) for the design, fabrication, and installation of the valves specified herein shall be the responsibility of the Supplier, including all QC and QA procedures in the factory and field required to comply with this Section.
- B. QA verification inspections and witnessed factory testing are a requirement of this Section. All QA verification inspections, examination, and testing shall be completed after QC and QA procedures have been performed by the Supplier.

- C. The Supplier shall provide airfare (direct flights where available), hotel, taxi, and the current GSA per diem rate for the location of inspection (GSA region), and all other travel expenses, in accordance with latest amendment of USGSA FTR §§ 300-304. Flights over eight (10) hours shall be business class or better. The Supplier shall notify the Owner and Engineer three (3) weeks prior to scheduled factory inspection and testing.
- D. Testing and inspection of all valves and components shall be conducted on consecutive days in accordance with the QAP such that all HOLD POINT inspections of a particular part or accessory may be completed during a single trip. The Owner may retain the services of industry specialists and the Engineer to perform QA verification inspections. The Supplier will be notified a minimum of 30 business days prior to the visit, and shall allow unhindered access to the Engineer, inspection staff, and the Owner's personnel, including access for progress photographs and video documentation of the work. QA verification inspections shall be performed for all valves.
- E. If work is rejected after QA verification inspection, repeat QA verification examination or testing performed on corrected work shall be paid for by the Supplier. The Supplier shall provide travel arrangements for repeat QA verification inspections equal to those provided for the initial QA verification. In addition, reimbursement for Engineer's labor and expenses required for subsequent QA verification inspections. These expenses shall include all repeat testing and/or inspection related costs, including costs associated with all necessary inspection staff; laboratory analysis; and testing or inspection report review by the Engineer.
- F. If there are difficulties in operation of the equipment due to the Supplier's fabrication or, additional services in the factory or on site required to correct such deficiencies, shall be provided at no change in Contract Price or Contract Time to correct the problems.
- G. Inspection by the Owner's representative or failure to inspect shall not relieve the Supplier of responsibility to provide specified equipment and perform the work in accordance with the Contract documents.
- H. The Owner and Engineer reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.
- I. After the successful castings inspection and machining, and prior to assembly, valve components shall be subjected to a HOLD POINT inspection for dimensions and tolerances. The inspection shall be carried out and measurements recorded by the Supplier. The Engineer will perform a random crosscheck of each inspection carried out by the Supplier as part of the QA inspection and review of the Supplier's inspection documentation.
- J. Following a comparison of mark numbers and nameplate data, to verify they correspond, the valves shall have the following dimensions verified in accordance with the approved shop drawings:
 - 1. Outside diameter of the line flanges.
 - 2. Thickness of line flanges.
 - 3. Diameter of flange bolt holes.
 - 4. Flange bolt circle diameter.
 - 5. Valve port diameters.

6. Base of the body to valve port centerline.
- K. Valves having electric motor-driven actuators shall be performance tested at the factory to verify and record base-line operating parameters. This may be saved in the electric actuators data acquisition system depending on the Supplier and model. The parameters shall include the following at a minimum:
 1. For each electric motor phase, the current when seating and unseating the valve, and during disc travel.
 2. Stroke time for each CLOSE-OPEN-CLOSE cycle.
 3. Limit switch operation.
 4. Valve position.

3.2 DELIVERY, STORAGE, AND HANDLING

- A. Prior to crating, and after protective coated surfaces are dry and cured, coat all bare machined surfaces and bolt holes with rust preventive slush oil as described further herein. Valves shall be shipped to the site on wooden blocks to prevent movement during transport. Flanges shall be protected by bolted plywood covers on each flange after application of slush oil and wrapping with oil impregnated or corrosion inhibiting Kraft paper for corrosion protection.
- B. Oil impregnated Kraft paper shall be the neutral pH type manufactured in accordance with MIL-P-17667, and manufactured by Central Coated Products, Inc. or equivalent. Corrosion inhibiting craft paper shall be Cortec® VpCI®. Band clamps, wire rope, shackles and other metallic rigging devices used for securing the valve to the pallet, transport vessel, flat-bed trailer, or rail car shall be fitted with soft-padded chocks in a configuration that will prevent damage to the protective coatings.
- C. Where valves are shipped with heavy-duty hydraulic cylinders, the cylinders shall be shipped filled with the specified hydraulic oil, pre-filtered to 10 microns. Hydraulic cylinders and their electronic and hydraulic accessories shall have isolation ball valves (operator levers removed and packaged for delivery) installed at the SAE J518 Code 61 flanged ports on the cylinder head and cap, and have blind flanges installed at the opposite valve ports. All electrical and electronic components shall have all ports and termination enclosures plugged and covered with an impermeable plastic tarp to prevent exposure of sensitive electronics to foul weather.
- D. Valves planned for shipping by rail or destined for ocean crossings on cargo ships shall be shipped on heavy-duty structural steel and timber-framed pallets. Large valves not capable of shipping within a fully enclosed container or vessel compartment shall be wrapped with a thick film, marine grade, industrial heat shrink cargo wrapping material for protection from wind-blown contaminants, rain, and salt spray. This requirement shall apply to completely assembled valves and those shipped partially disassembled where applicable.
- E. The Supplier shall be responsible for protecting the valves while being transported to the site. Valves shall be crated, wrapped, and otherwise protected from damage during shipment. Care shall be taken in loading, transporting, and unloading to prevent injury to the mechanical components and the coating system.

- F. The Supplier shall submit written notice of shipping at least one week prior to shipment and include instructions regarding the necessary equipment required to receive and unload the valves. Unloading (hoisting equipment and rigging) and storage of the valves shall be the responsibility of the Owner, who shall inspect the components with the Engineer for damage at the time of delivery. Valves and/or components that are found to be damaged shall not be accepted until properly repaired or replaced by the Supplier, including reapplication of protective coatings.

3.3 SUPPLIER'S FIELD INSTALLATION SERVICES

- A. Supplier's services shall be provided by a Supplier's Field Installation Technician whose experience shall be submitted and approved by the Engineer. Tasks shall include assistance with location of support, leveling and alignment, coordination of power and control connections. The technician shall provide installation assistance for two 8-hour man days (exclusive of travel and preparation) for each valve supplied.
- B. For valves furnished with powered actuators, shall have additional startup services performed by the OEM Equipment Supplier's Installation Technician, including a complete review of their actuators and accessories as specified in the actuator specifications. Prior to the performance test, both Suppliers' Field Installation Technicians shall provide written certification that the installation is complete and operable in all respects and that no conditions exist that may affect the warranty.

3.4 FACTORY APPLICATION OF LIQUID EPOXY COATINGS

- A. The valve shall receive coatings by application in the factory or at a coating applicator's facility having environmental controls necessary to maintain the temperature and relative humidity required by the coatings manufacturer and specified herein.
- B. The valve shall be shop coated using the primer, intermediate and top coating system in accordance with the coating system manufacturers instructions, and the coating application equipment manufacturers instructions. The shop coating shall be maintained in good condition by cleaning and touching up of areas damaged during pump assembly and rigging. If pinpoint or general rusting appears, surfaces shall again be prepared and re-coated and inspected at no additional cost to the Owner. All repairs shall be completed and inspected prior to crating of the valve.
- C. All machined faces of sealing surfaces including the flange connections, casting mating surfaces and stuffing box interior surfaces shall be protected during coating application by masking. The flange faces shall remain bare following machining. However, all other surfaces of the flanges shall be coated including the interior surfaces of the bolt holes. The flange shall be shipped with a protective coating of slush oil and oil-impregnated Kraft paper for protection during shipping from the Manufacturer's shop to the Buyer's Point of Destination.

- D. After blasting and successful inspection of the surface preparation, surfaces shall be cleaned of dust and residual particles from blasting operations by dry (no oil or water vapor) air blast cleaning or other method prior to coating system application. Vacuum clean enclosed areas and other areas where dust settling is a problem and wiped with a tack cloth. Coatings shall be applied to surfaces the same day they are sandblasted. Surfaces having rust/corrosion initiated on the surface shall be re-blasted prior to application of the coating system. Each pump casting shall be solvent cleaned following abrasive blasting in accordance with SSPC-SP1. The surface to be coated shall be dry, clean, dull, and free from dirt, grease, oil, rust, mill scale, salts or any other surface contaminants that interfere with adhesion. The Manufacturer shall test the surfaces of the castings for salts and other contaminants in the presence of the Engineer to demonstrate compliance with this requirement.
- E. Coatings shall only be applied when the temperature of surfaces to be coated and ambient temperatures within the paint booth are between 50 and 95 deg F. Coatings Shall not be applied when the relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces. Coated pump castings shall be allowed to cure in an atmosphere having environmental controls that will maintain the conditions described above by heating, cooling and ventilation, as necessary, until each coat has cured.
- F. Chipped, peeled, or abraded coating shall be power-sanded to feather the edges. Spot primer shall be applied in those areas using the approved primer coating. Surfaces such as ribs, body flanges and others having angles, edges, corners etc., shall be stripe-coated. Stripe coat shall be an extra coat of the intermediate or topcoat material. The stripe coat shall be a separate coat of paint from those specified herein. The minimum number of coats shall be as specified, irrespective of the coating thickness. Additional coats may be required to obtain the minimum required DFT, depending on method of surface preparation and application, differences in Manufacturers' products, and atmospheric conditions. These factors shall be taken into account when purchasing coatings to avoid unnecessary delays in the equipment delivery schedule.
- G. The Manufacturer shall be responsible for performing all QC procedures necessary to be in compliance with this Section prior to QA verification inspections performed by the Owner and Engineer.

3.5 FACTORY COATINGS INSPECTION AND ACCEPTANCE CRITERIA

- A. All coated pump castings shall be inspected by the Manufacturer and the results submitted to the Engineer. The inspection shall be conducted at the Manufacturer's or coating applicator's shop. The coating system shall be visually inspected to ensure complete coverage has been attained in the target areas.

Particular attention shall be given to edges, angles, flanges, and other areas where insufficient DFT is often present. Holiday locations and DFT readings shall be recorded by the Manufacturer on a form having a graphic representation of each component and the surfaces under inspection. The Engineer will perform a random crosscheck of each inspection procedure carried out by the manufacturer as part of the Buyer's QA inspection and review of the Manufacturer's inspection documentation.

- B. The Manufacturer shall conduct a coatings holiday inspection of the primer, intermediate and top coats. The inspection shall be carried out after application of each coat has been applied and cured accordance with the coatings manufacturer's instructions. Each inspection shall be conducted with a low voltage, wet-sponge type holiday detector instrument designed to measure coating DFT up to 20 mils. The holiday detector shall be used with a wetting agent recommended by the instrument manufacturer. Locations of holidays shall be marked for repair on the valve and graphically recorded in the inspection documentation by the Manufacturer for review by the Engineer. Acceptance criteria for each coated part shall be 99 percent holiday free.
- C. Areas having holidays shall be power-sanded to feather the edges and spot-primed prior to reapplication of the coating layers under review. The areas having recorded holidays shall be re-inspected prior to the coatings thickness inspection.
 - 1. Positector 6000 manufactured by DeFelsko, Anaheim, California
 - 2. Model 456 manufactured by Elcometer, Rochester Hills, Michigan
 - 3. Or an equivalent instrument having the same accuracy and resolution as those specified.
- D. Areas of the coating system not meeting the minimum DFT as specified above shall be repaired by the Manufacturer or coatings applicator in accordance with the coatings manufacturer's recommendations. The designated deficient areas shall be re-tested by the Manufacturer, recorded and cross-checked by a random Engineer's inspection after the minimum cure/dry time.

3.6 FIELD PERFORMANCE TEST AND ACCEPTANCE CRITERIA

- A. All valves and accessories shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the valves or their accessories shall be repaired to their original condition and inspected by the Engineer before they're installed. Installation procedures recommended by the Supplier and related OEMs shall be closely followed.
- B. Install all wall brackets, stem extensions, guide bearings, operators and actuators as required. Before setting these items, check all plans and figures which have a direct bearing on the proper location of valves and their accessories.
- C. After proper installation and receipt of the Suppliers' certification that the installation has been properly completed, all valves and accessories shall be tested. Performance testing shall be identical to the testing performed at the factory. The parameters shall be recorded and compared to the original results. Acceptance criteria shall be results are similar the parameters that passed at the factory. Parameters shall be recorded and the data included in the QA/QC Report.

3.7 TRAINING OF BUYER'S OPERATION AND MAINTENANCE PERSONNEL

- A. The Contractor shall coordinate with the Manufacturer's Field Installation Technician to train/instruct the Owner's designated personnel in the operation, adjustment, and maintenance of the valves.

A portion of the training shall be carried out by the Manufacturer concurrently with the installation of each valve to allow some of the inspection work to serve as training. The Manufacturer's hours of training shall be used to the upper limit stated in the Bid Form. Some training shall be scheduled and held at times to accommodate the work schedules of Owner's personnel, including splitting the required training/instruction time into separate sessions and/or presented at reasonable times other than the Contractor's "normal working hours" or the Owner's normal day shift. Training during inspection shall occur based on the Installation Contractor's schedule. A minimum of two separate training sessions shall be scheduled for non-installation training. Schedule training with the Engineer a minimum of 4 weeks prior to expected training sessions.

- B. The Contractor shall use the approved O&M manuals as basis for instruction by the Manufacturer as supplemented by teaching aids, slide/video presentations, and/or models. Train/instruct the Owner's personnel, in detail, based on the contents of the manual explaining all aspects of O&M for the equipment. If the respective equipment is inter-related to the operation of other equipment, all interlock, constraints, and permissive logic shall be explained.
- C. The Contractor shall submit a schedule for the training, a detailed lesson plan, and representative material to be covered during the instruction for the Engineer's approval a minimum of two weeks prior to the scheduled training. A detailed lesson plan, representative of the material to be covered during instruction shall be included. Lesson plans shall consist of in-depth outlines of the training material, including a table of contents, materials to be covered, startup procedures, maintenance requirements, safety considerations, and shut-down procedures. All training materials, including presentations, teaching aids, slides/videos, models, etc. shall become the property of the Owner for future personnel training.

END SECTION

APPENDIX A

Bid Submittal Documents

SIGNATURE PAGE

CITY OF TACOMA TACOMA WATER

All submittals must be in ink or typewritten, executed by a duly authorized officer or representative of the bidding/proposing entity, and received and time stamped as directed in the **Request for Bids near the beginning of the specification**. If the bidder/proposer is a subsidiary or doing business on behalf of another entity, so state, and provide the firm name under which business is hereby transacted.

REQUEST FOR BIDS SPECIFICATION NO. TW23-0023N Portland Ave Sleeve Valve

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 Date
into Contracts for Bidder/Proposer

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

E.I.No. / Federal Social Security Number Used on Quarterly
Federal Tax Return, U.S. Treasury Dept. Form 941

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.

BID PROPOSAL SHEET

TW23-0023N Portland Ave Sleeve Valve

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	TOTAL AMOUNT
		Unit	No.		
1	Horizontal Multi-Jet Sleeve Valve	Lump Sum	1	Lump Sum	\$ _____
2	Training (Two Days)	Lump Sum	1	Lump Sum	\$ _____
Base Bid (Items 1-2)					\$ _____
WSST 10.3%					\$ _____
Total					\$ _____

Please respond to the following or your bid may be considered non-responsive.

State your proposed delivery time, in calendar days, following receipt of a fully-executed contract _____

Are warranties equal to or do they exceed those specified in this solicitation? Yes/No

Does your company provide a Prompt Payment Discount? Yes/No

Specify the Prompt Payment Discount percentage _____

Does your company accept a procurement card? 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 40 05 73 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) horizontal multi-jet sleeve valves, in the nominal diameter and service categories specified during the past twenty five (25) years.

Contractor:

Name: _____

Address: _____

Phone: _____ Contact Person: _____

Project Experience:

#1 Project Name: _____

Owner: _____ Contact Person/Phone No: _____

Description of Work: _____

Installation Location: _____

Completion Date: _____

#2 Project Name: _____

Owner: _____ Contact Person/Phone No: _____

Description of Work: _____

Installation Location: _____

Completion Date: _____

#3 Project Name: _____

Owner: _____ Contact Person/Phone No: _____

Description of Work: _____

Installation Location: _____

Completion Date: _____

#4 Project Name: _____

Owner: _____ Contact Person/Phone No: _____

Description of Work: _____

Installation Location: _____

Completion Date: _____

#5 Project Name: _____

Owner: _____ Contact Person/Phone No: _____

Description of Work: _____

Installation Location: _____

Completion Date: _____

TACOMA WATER SUBSTITUTION REQUEST FORM

This request shall be submitted to the engineer listed below no later than 3:00 p.m., PST, Wednesday, February 22, 2023. Substitution requests not received by the engineer will not be considered.

ATTN: Michel Peloquin P.E.

Date: _____

PROJECT: TW23-0023N Portland Ave Sleeve Valve 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, Wednesday, February 22, 2023. 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: Michel Peloquin P.E.

(Project Lead/Manager)

Signature: _____

Date: _____

REMARKS:

APPENDIX B

Insurance Requirements/Sample Documents



CITY OF TACOMA

INSURANCE REQUIREMENTS FOR CONTRACTS

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".



CITY OF TACOMA INSURANCE REQUIREMENTS FOR CONTRACTS

- 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.



CITY OF TACOMA

INSURANCE REQUIREMENTS FOR CONTRACTS

- 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:

- 4.2 A per project aggregate policy limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.



CITY OF TACOMA

INSURANCE REQUIREMENTS FOR CONTRACTS

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 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.

CONTRACT

Resolution No. [#####]
Contract No. [#####]

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"). [Contract date should match date of award letter and month should be formally spelled out]

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.
-

[Delete this highlighted sentence, paragraph III and sub-bullets #1 and #2 if there are no additional attachments to the contract (attachments would be things other than a spec, contract, or bonds)]

- II. If federal funds will be used to fund, pay or reimburse all or a portion of the services or deliverables provided under the Contract, the terms and conditions set forth at 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. [If the only contract documents are the specification and submittal and no exceptions are taken in the submittal, this section should be deleted]

- IV. The Contract terminates on [Termination Date], and may be renewed for [Renewal Term] [Complete as needed and as stated in the specification]

- 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 shall comply with all federal, state, municipal, and/or local laws and regulations in the performance of all terms and conditions of the Contract. Contractor shall be solely responsible for all violations of the law from any cause in connection with its performance of work under the Contract.
- X. 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:
Signature:

CONTRACTOR:
Signature:

Name:

Title:

Name:

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: _____

**APPENDIX A
FEDERAL FUNDING**

1. Termination for Breach

CITY may terminate this Contract in the event of any material breach of any of the terms and conditions of this Contract if 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. Prevailing Wages

- A. If federal, state, local, or any applicable law requires CONTRACTOR to pay prevailing wages in connection with this Contract, and CONTRACTOR is so notified by the CITY, then CONTRACTOR shall pay applicable prevailing wages and otherwise comply with the Washington State Prevailing Wage Act (RCW 39.12) in the performance of this Contract.
- B. 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 made of part of the Contract by this reference. If prevailing wages apply to the Contract, CONTRACTOR and its subcontractors shall:
 - i. 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.
 - ii. 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.
 - iii. 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.

3. COPELAND ANTI-KICKBACK ACT

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

- A. 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. CONTRACTOR or subcontractor shall insert in any subcontracts the clause above and such other clauses federal agencies 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.

4. 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. If the CONTRACTOR does over \$10,000 in business a year that is funded, paid or reimbursed with federal funds, CONTRACTOR will take specific and 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:

- A. 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. 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.
- B. 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.
- C. 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.
- D. 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.
- E. 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.

- F. In the event of 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 federally funded 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.
- G. CONTRACTOR will include the portion of the sentence immediately preceding paragraph (A) and the provisions of paragraphs (A) through (G) 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. 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 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.

5. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

- A. Overtime requirements. Neither 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.
- B. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (3)(A) 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 (3)(A) 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 (3)(A) of this section.

- C. 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 sub-contractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (3)(B) of this section.
- D. Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (3)(A) through (D) 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 (3)(A) through (D) of this section.

6. CLEAN AIR ACT

- A. 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.
- B. 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.

CONTRACTOR agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with federal funds.

7. FEDERAL WATER POLLUTION CONTROL ACT

- A. 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.
- B. 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 appropriate federal agency.
- C. CONTRACTOR agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with federal funding.

8. DEBARMENT AND SUSPENSION

- A. 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).
- B. 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.

- C. 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 CITY, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- D. 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 throughout the period of this Contract and to include a provision requiring such compliance in its lower tier covered transactions.

9. BYRD ANTI-LOBBYING AMENDMENT

- A. 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.
- B. If applicable, CONTRACTOR's certification required by Appendix A to 44 CFR Part 18 contained at Appendix A-1 to this Contract is incorporated into this Contract.

10. PROCUREMENT OF RECOVERED MATERIALS

- A. In the performance of this Contract, CONTRACTOR shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:
 - i. Competitively within a timeframe providing for compliance with the contract performance schedule;
 - ii. Meeting contract performance requirements; or
 - iii. At a reasonable price.
- B. 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>.
- C. CONTRACTOR also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

APPENDIX A-1

APPENDIX A to 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.

Supplier, by Contract signature, 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.



PERFORMANCE BOND TO THE CITY OF TACOMA

Resolution No.
Bond No.

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: _____