CITY OF CALISTOGA

Public Works Department
414 Washington Street - Calistoga, CA 94515
Ph: 707.942.2828
Fx: 707.942.9472
www.ci.calistoga.ca.us

December 18, 2025.

Re: CONN CREEK WATER LINE Project No. 25-5564

Bid Proposal ADDENDUM NO.1

Dear Sir/Madam:

Enclosed herein is Addendum Number 1 for the above referenced project. Addendum Number 1 and its attachments form a part of the contract documents, and modifies the original plans and specifications. All other conditions remain the same.

ADDENDUM NUMBER 1 (35 pages including this page)

ITEM 1: Responses to Bidder's Questions

QUESTION A. Your bid bond form appears to have a formatting error. Would you kindly correct and re-issue?

RESPONSE: Please see attached Bid Bond Form

QUESTION B. Your list of required submissions with the bidder's proposal includes a requirement for "Skilled and Trained Workforce Certification." Can you direct our attention to where we can find this form, or otherwise re-issue it?

RESPONSE: This is not required for this bid. Remove "8. Skilled And Trained Workforce Certification" from Required Contents of Bid Submittal on page 6 of the project specifications.

QUESTION C. Given the current political climate and federal policies, please confirm that DBE good faith efforts are required.

RESPONSE: Yes, the "Good Faith Effort" is still required.

QUESTION D. Just a question on the good faith requirements for this project, what is the time frame for when the advertisement has to be posted or initial contact with DBE's has to be made? Its normally

either 30 Days before bid opening or 10 but I don't see either called out in the specs. If you could let us know what the time frame is or if there is one please.

RESPONSE: There is no requirement for initial contact timing on the "Good Faith Effort" for this project.

QUESTION E. Can you issue a new bid bond form to attach the data on pg 38 to the data on pg 39?

RESPONSE: Please see attached Bid Bond Form.

QUESTION F. What is the address of the jobsite for the 12/10 pre-bid meeting?

RESPONSE: The meeting took place at the intersection of Conn Creek Rd and The Silverado Trail, just west of the Conn Creek bridge.

QUESTION G. I'm reaching out to inquire if there are any additional details available regarding the cathodic protection portion of this project. Could you please provide the plans and specifications for the existing cathodic protection system?

RESPONSE: The attached Cathodic Protection Plan Sheets (4) to be added to the bid set plans. Replace bid set specification Section 77-3.03B(10) in its entirety, and replace with attached Cathodic Protection Specification Section 13 47 13.

QUESTION H. Is the City looking for a corrosion monitoring system only or a cp system to provide corrosion protection? Please review, clarify cp scope, and provide drawings of existing cp system.

RESPONSE: The project will require the replacement of the existing Cathodic Protection system with a new CP system. The attached Cathodic Protection Plan Sheets (4) to be added to the bid set plans. Replace bid set specification Section 77-3.03B(10) in its entirety and replace with attached Cathodic Protection Specification Section 13 47 13.

QUESTION I. Bid Item Sheet #1 – Mobilization Bid Schedule shows (+ 5% of Construction Costs), SC-27 BI #1 states mobilization shall not exceed 5%. Please clarify Bid Schedule item #1.

RESPONSE: Mobilization shall not exceed 5% of the total Bid price.

QUESTION J. Bid Item Sheet #20 Tribal Monitoring Allowance. Bid Schedule shows 10 days at $10,000/day total bid $10, 000. Please clarify the allowance.

RESPONSE: The Unit Price for Tribal Monitoring should be $1,000 per day for 10 days, totaling $10,000.

QUESTION K. Section GC-2 item L DBE Requirements states that the 3 low bidders are to submit DBE Outreach Forms and GFE Package within 10 working days after bid opening. Does this 10-day requirement include the DBE Subcontractor Utilization Form and the DBE Subcontractor Performance Forms? These forms are difficult to get prior to bid and with enough time to get them into the bid package. Please confirm that these forms can be submitted by the 3 low bidders within 10 days after bid opening.

RESPONSE: Yes, all DBE forms can be submitted within 10 days after bid opening.

QUESTION L. I cannot find copies of the Caltrans or Napa County permits in the bid documents. Will you provide copies of the permits? What is the cost of each permit? Is the City paying the costs of the permits or reimbursing the contractor as CCO for the permit fees?

RESPONSE: The City has initiated the process of permits with both Caltrans and Napa Co. Copies of the permits will be issued in a subsequent addendum. The City is paying for the permits.

QUESTION M. Spec Section GC-14 Temporary Facilities and Controls states needing a "weather-tight enclosure" with "temporary telephone service", "facsimile machine", and "internet connection in the Contractor's field office". Please confirm if this project will require a temporary Contractor's field office with all the listed Temporary Utilities per GC-14 A.

RESPONSE: a "weather-tight enclosure" with "temporary telephone service", "facsimile machine", and "internet connection in the Contractor's field office" are not required on this project.

QUESTION N. Spec Section GC-14 C. a. 2. Temporary Water states "The Owner will make available at the corporation yard all water needed for construction, at no cost to the Contractor." Technical Specifications 77-2.02K Water for Compaction states "Water must be supplied by the Contractor at no additional expense to the City. Water must be drawn from a hydrant meter." Please confirm which of these statements is correct and where construction water can be obtained.

RESPONSE: The City will provide construction water at no cost to the Contractor through access at the Corporation yard, access to recycled water at the Dunaweal WWTP, and allowing the Contractor to connect to nearby existing 6" blow off valves at Conn Creek for pressure testing.

QUESTION O. Plan Sheet C-1 Bubble note 4 calls for "Restrained Mechanical Joint" tees associated with the butterfly valves. Please confirm flanged tees are acceptable as most of the larger diameter butterfly valves (over 12") are more readily available as flanged.

RESPONSE: Flanged tees will be allowed in lieu of RMJ per plan sheet C-1 Bubble note 4. Connection type will be reviewed and confirmed during the submittal review process.

QUESTION P. The alignment of the pipeline at the curve (Southeast or Down Valley of bridge) is shown transitioning off the pavement and into the shoulder. This creates constructability issues. Can this be adjusted?

RESPONSE: Prior to construction, the alignment will be modified to remain completely within the pavement without transitioning into the shoulder.

QUESTION Q. Plan sheet C-7 has a leader callout for "Remove and Replace Existing Guardrail". Please confirm this callout is intended to mean disassembly/unbolting and reassembly of existing guardrail to facilitate the install of waterline beneath existing guardrail.

RESPONSE: This is correct. Also see bullet item #4 under ITEM 2: Other Modifications and Clarifications to Bid Documents at the end of this document.

QUESTION R. Regarding Technical Spec Section 77-3.03 B (9) Flanged Coupling Adapters. Do the FCAs need to be epoxy coated?

RESPONSE: Liquid epoxy coating inside an outside of the FCA to prevent corrosion. Fully NSF 61 certified.

QUESTION S. Please confirm creek access window as times differ between plans & spec sections.

RESPONSE: Permits allowing work in the creek have slightly different time spans. For bidding this project, use the most restrictive window which is August 1 through September 30. This window will satisfy all agencies.

QUESTION T. What is the maximum amount of time that the City water can be out of service for connection purposes?

RESPONSE: Eight (8) hours

QUESTION U. Technical Specifications 77-2.03G Location of Excavated Material states "Until permanent AC paving can be replaced, the Contractor must backfill the trench to grade and maintain the subgrade and surface in a condition that is suitable to support and safely carry traffic." Please confirm if it is acceptable to have trench surface temporarily restored with cutback until final paving is installed.

RESPONSE: This will be discussed as a part of the City's permit with Napa County

QUESTION V. Technical Specifications 77-3.02C(1) General 2. states, "Do not use flanges or unions for underground piping." Most of the larger diameter butterfly valves (over 12") are only readily available as flanged. Please confirm if flanged connections are acceptable for underground piping.

RESPONSE: Particular connections where fittings are only available as flanged, such as butterfly valves are acceptable per 77-4.02B. Connection type will be reviewed and confirmed during the submittal review process.

QUESTION W. Technical Specification 77-3.02C(3) Joints 2. states, "Restrained Push-on Joints must be integrally cast restrained joint bell consisting of positively locking segments with a factory-welded bead and/or rings types such as American "Flex-Ring"; U.S. Pipe "TR Flex", or approved equal." Technical Specification 77-3.03B Installation of Pipe and Fittings states, "All new water pipeline joints must be fully restrained." U.S. Pipe does not produce TR Flex anymore. Please confirm other forms of mechanically restraining waterline are acceptable.

RESPONSE: Acceptable Restrained Push-on Joint Pipe are: American "Flex-Ring", McWane Ductile "TR Flex", and U.S. Pipe "HDSS".

QUESTION X. The top note of the profile on plan sheet C-3 calls for 295LF Restrained Length. Technical Specification 77-3.03B Installation of Pipe and Fittings states, "All new water pipeline joints must be fully restrained." Please confirm if only pipe between Flex-Tend's on the bridge crossing needs to be American "Flex-Ring"; U.S. Pipe "TR Flex", or approved equal or if other forms of mechanically restraining waterline are acceptable.

RESPONSE: All above ground pipe requires restrained push on joint pipe. Buried pipe does not specifically require the use of restrained push on joints. Other types of mechanically restrained pipe will be reviewed and confirmed during the submittal review process.

QUESTION Y. Technical Specification 77-3.03B(10) Corrosion Protection – Corrosion Test Stations states, "The existing test stations must be removed and replaced by new test stations." Plans show "Remove Existing CTS" and Bid Item 18 states, "demolish and remove existing CTS". Please confirm the existing CTS called to be removed in the plans are not to be replaced.

RESPONSE: Existing CTS are to be removed. The project will require the replacement of the existing Cathodic Protection system with a new CP system. The attached Cathodic Protection Plan Sheets (4) to be added to the bid set plans. Replace bid set specification Section 77-3.03B(10) in its entirety, and replace with attached Cathodic Protection Specification Section 13 47 13.

QUESTION Z. Plan sheets call for removal of various existing CTS, BO Valve, PWR & Telemetry Conc. Pad, and Water System Vaults. Most of these appear to be in existing asphalt sections. Please provide details on desired restoration at these removal sites.

RESPONSE: Follow SR Standard 215 for all trenching paving restoration.

QUESTION AA. Provided staging yard at future Rutherford Hill Pump Station appears to be inundated with existing foliage. Bid Item 3 – Clearing, Grubbing, & Stripping states "vegetation or obstructions along the

water line alignment". Please confirm if we are to figure clearing, grubbing, & stripping the staging yard/future Rutherford Hill Pump Station under this bid item or if the City will clear existing foliage and denote staging yard perimeter before contractor mobilization.

RESPONSE: The provided staging area will be available to the Contractor in as-is condition.

QUESTION BB. Please confirm when Notice to Proceed will be issued and when desired start of work shall be.

RESPONSE: A Notice to Proceed will be issued prior to March 2026. The City will pause the counting of working days in order to ensure that the Contractor has time to enter Conn Creek during the allowable period.

QUESTION CC. At the job walk yesterday, I did not see any nearby fire hydrants or other water sources that would be capable enough to flush the new waterline as required per specification. Would likely need a 6" diameter source to flush the 16" WL. The nearest hydrant is roughly 2,000 feet away and across the highway. This would be an impracticable source for testing and flushing the line. Would the City allow or provide a six-inch (6") hot tap onto the existing 12" WL near one of the 2 connections? The hot tap could be on the to be abandoned side of the connection if the city does not want the tap to become a permanent fixture on the waterline.

RESPONSE: There is an existing 6" Blow Off valve on the NBA line at the top of the bank on Conn Creek that the Contractor can use for this work.

ITEM 2: Other Modifications and Clarifications to Bid Documents

- Plan Sheet C-2 – the location of the blow-off valve as shown in the profile is correct. The location of the blow-off valve in the plan should be modified to match the profile location.
- Plan Sheet C-2 Bubble Note 2 should indicate 16" x 45° RMJ elbow.
- Plan Sheet C-4 - The blank dimensions in the note at approximately STA C4+00 are identified in Detail 3/SHT C-9.
- Plan Sheet C-7 - The leader line of the note on the plan at approximately STA C-17+50 regarding removal and replacement of the existing guardrail should be directed to Detail A on this sheet. The removal and replacement of the guardrail is only required where needed to install the new pipeline at the guardrail crossing.

PLEASE MAKE THESE CHANGES IN THE CONN CREEK WATER LINE PROJECT BID DOCUMENTS AND PROJECT PLANS IN YOUR POSSESSION BEFORE YOU SUBMIT YOUR BID.

It is your responsibility to furnish copies to any subcontractors you furnished with Project Plans and Specifications.

If you have any questions regarding this addendum, please call **David Fradelizio** at (707) 942-2828 or email at dfradelizio@calistogaca.gov .

Enclosures:

Addendum Number 1	(7 pages)
Bid Schedule	(2 pages)
Bid Bond Form	(1 page)
Replacement sheets 169 – 171 in the Technical Specifications Volume II	(3 pages)
Section 13 47 13 Cathodic Protection System Technical Specification	(18 pages)
Cathodic Protection System Details	(4 pages)

Bidders must complete the Addendum Acknowledgement in the Contract Proposal acknowledging receipt of this addendum.

END ADDENDUM NUMBER 1

Thank you for your interest in this project. If you have any questions regarding this addendum, please contact Hamid Heidary (hheidary@calistogaca.gov), David Fradelizio (dfradelizio@calistogaca.gov), and Linda Scroggs (linda.scroggs@consoreng.com). All questions regarding this addendum must be e-mailed no later than 72 hours prior to the bid opening date. Please include project reference in your correspondence.

Sincerely,
Derek Rayner, P.E.
Public Works Director

By: David Fradelizio
David Fradelizio P.E.
Deputy Public Works Director

CONN CREEK WATER LINE PROJECT

NO. PJ0402

BID SCHEDULE – ADDENDUM #1

BASE BID

Item	Description	Est. Qty	Unit	Unit Cost	Amount
1	Mobilization (± 5% of Construction Cost)	1	LS		
2	Traffic Control	1	LS		
3	Clearing, Grubbing, & Stripping	1	LS		
4	16" DIP class 350, includes fittings, etc. (Buried)	2671	LF		
5	16" DIP class 350, includes fittings, etc. (Exposed)	145	LF		
6	16" Force Balanced Flex-Tends	2	EA		
7	Pipe Support (misc metals, drill/bond)	1	LS		
8	Concrete Anchor Block	2	EA		
9	2" Combo Air Release Valve Assembly (Buried)	1	EA		
10	2" Combo Air Release Valve Assembly (Exposed)	2	EA		
11	Blow Off Valve ~~(Full Size)~~ 4"	2	EA		
12	16" Butterfly Valve and Valve Box	6	EA		
13	**Pump Station Connections**	**1**	**LS**		
14	**Cathodic Protection**	**1**	**LS**		
15	Pressure Testing and Disinfection	1	LS		
16	Demo Concrete Cap and Remove Pipe	1	LS		
17	Creek Restoration	1	LS		
18	Demolish/Remove CTS, Telemetry Box, and Salvage Existing Valves	1	LS		
19	Connect to Existing 12" Water Line at Each End	1	LS		
18	Demolish/Remove CTS, Telemetry Box, and Salvage Existing Valves	1	LS		
19	Connect to Existing 12" Water Line at Each End	1	LS		
20	Tribal Monitoring Allowance	**10**	Days		

TOTAL BASE
BID AMOUNT: _____

Total Base Bid: _____ Dollars
Written Amount

_____
Company Name

_____ _____
Signature of Bidder **Title** **Date**

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS that, _____ hereinafter called the PRINCIPAL, and _____, a corporation duly organized under the laws of the State of _____ having its principal place of business at _____ in the State of _____ and authorized to do business in the State of California, hereinafter called the SURETY, are held and firmly bound unto the City of Calistoga, hereinafter called the OBLIGEE, on order, in the sum of _____ Dollars ($_____) (being at least ten percent (10%) of the total amount of PRINCIPAL 's Base Bid proposal) lawful money of the United States, for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these present.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the PRINCIPAL has submitted its Proposal for the project **CONN CREEK WATER LINE PROJECT** to the OBLIGEE, said Proposal, by reference thereto; being hereby made a part hereof.

NOW, THEREFORE, if said Proposal is rejected or, in the alternate, if said Proposal is accepted and the PRINCIPAL timely signs and delivers a Contract and furnishes a Performance Bond and Payment Bond, and Certificates of Insurance in the form and within the time required by the Proposal and the Contract Documents, then this obligation shall become null and void, otherwise the same shall remain in full force and effect and upon default of the PRINCIPAL shall be forfeited to the OBLIGEE, it being expressly understood and agreed that the liability of the SURETY for any and all default of the PRINCIPAL shall be the amount of this obligation as herein stated, as liquidated damages. Such forfeiture and liquidated damages under this bond shall be without prejudice to the OBLIGEE'S right to pursue any excess actual damages from the PRINCIPAL for breach of contract or otherwise.

The SURETY, for value received, hereby agrees that the obligations of said SURETY and its bond shall not be impaired or affected by any extension of the time within which the OBLIGEE may accept such Proposal, and the SURETY hereby waives notice of any such extension.

In the event suit is brought upon this bond by the OBLIGEE and judgment is recovered, the SURETY shall pay, in addition to the sum set forth above, all costs incurred by the OBLIGEE in such suit, including reasonable attorney's fees and expert witness fees, to be fixed by the court.

Signed this _____ day of _____, 2025

_____
PRINCIPAL

_____

_____

_____

Note: Signature of person executing for SURETY must be notarized and evidence of corporate authority attached.

Restrained bell joints must be fully extended after they are assembled to minimize further take-up. Field closure pieces must be located at least one joint away from the bends beyond the length over which joints are to be restrained.

77-3.03B(6) Mechanical Joints

Mechanical joints and mechanical joint restraints must be carefully assembled in accordance with the manufacturer's recommendations. If effective sealing is not obtained, the joint must be disassembled, thoroughly cleaned, and reassembled.

77-3.03B(7) Push-On Joints

The pipe manufacturer's instructions and recommendations for proper jointing procedures must be followed. All joint surfaces must be lubricated with heavy vegetable soap solution immediately before the joint is completed. Lubricant must be suitable for use in potable water, must be stored in closed containers, and must be kept clean. Each spigot end must be suitably beveled to facilitate assembly. Pipe ends for restrained joint pipe must be prepared in accordance with the pipe manufacturer's recommendations.

77-3.03B(8) Flanged Joints

Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There must be zero leakage through the threads at a hydrostatic test pressure of 350 psi without the use of the gasket.

When bolting flanged joints, care must be taken to avoid restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress in the flanges. One end of the flanged pipe must be free to move in any direction while the flange bolts are being tightened. Bolts must be tightened gradually and at a uniform rate, to ensure uniform compression of the gasket.

77-3.03B(9) Flanged Coupling Adapters

Flanged coupling adapters must be installed in accordance with the coupling manufacturer's recommendations. After the pipe is in place and bolted tight, the proper locations of holes for the anchor studs must be determined and the pipe must be field-drilled. Holes for anchor studs must be drilled completely through the pipe wall. Hole diameter must be not more than 1/8 inch larger than the diameter of the stud projection.

The inner surfaces of couplings must be prepared for coating in accordance with instructions of the coating manufacturer and must then be coated with liquid epoxy in accordance with ANSI/AWWA C210. The remaining surfaces, except flange mating surfaces, must be cleaned and shop primed with universal primer.

77-3.03B(10) Corrosion Protection

The existing pipeline has an active corrosion monitoring system for the exterior surfaces of an underground pipeline. The existing corrosion monitoring system has reached the end of its useful life. The Contractor must replace the corrosion protection system, in kind, and provide continuity for connecting into the existing corrosion monitoring system. The existing test stations must be removed and disposed of properly. The Contractor must install new test stations and provide bonded joints on the newly installed pipeline, to form a complete system when connections are accomplished.

The materials and equipment installed on the pipeline must be new, undamaged, and in the original packaging marked with the manufacturer's name or trademark. The equipment must be fully compatible to provide a complete and functional corrosion monitoring system.

Addendum 1

Replace sections with Cathodic Protection System, Specification 13 47 13

The installation must conform to the National Electrical Code, applicable local codes, and the Recommended Practice of NACE International.

The Contractor must provide all materials, equipment, labor and supervision necessary for the completion of the installation and testing of the newly constructed portion of the pipeline and must employ a corrosion construction supervisor, with experience in the installation of at least five similar type systems, to supervise the corrosion monitoring system installation. The Contractor must coordinate with the City's Corrosion Engineer, NACE certified Cathodic Protection Specialist, or a NACE certified Corrosion Specialist. The corrosion construction supervisor must instruct the Contractor on site during the installation and must revisit the site for final testing.

Submittals: The Contractor must submit the following items in accordance with the requirements specified in Section 77-1.01C, "Submittals".

- The Contractor must develop a plan for providing a fully compatible and complete corrosion monitoring system that will be tied into the existing system. Contractor must match, in kind, the materials for the existing system. Plans and specifications for the existing corrosion protection system will be provided by the City.
- Manufacturer's information for each item to be installed. Include sufficient information to show that the materials meet the requirements, including references to specific sections and details shown on the Drawings.
- Qualifications of the NACE certified Corrosion Technician, materials, installation method, testing methods and testing equipment.
- Certification by the professional Corrosion Engineer or the NACE certified Corrosion Specialist stating that the corrosion monitoring system has been completed and is in working order.

The equipment must be fully compatible to provide a complete and functional corrosion monitoring system. Items that must be installed and connected to the existing corrosion protection and monitoring system may include:

1. Exothermic welds and weld coating
2. Pipe Flange isolating kits (includes insulating gasket, insulating sleeves, insulating washers)
3. Wax-tape coating for buried insulated pipe flanges

Features of the existing corrosion protection and monitoring system that will form a completed system:

Test Wire Connections: ensure that test wire connections provide continued operation of the system under all weather conditions

Corrosion Monitoring Test Stations: the existing test stations are mounted directly over the pipeline to which they are connected. The Contractor must identify the nearest test station on each end of the new pipeline at the connection point and ensure that the new pipeline connections are functionally secured into the existing system. The existing wires must be welded to the pipelines at the nearest pipe joint to the existing test station.

Corrosion Test Stations: the locations of the existing corrosion test stations are marked "CTS" on the lid. The Contractor must coordinate with the Engineer and the City to locate and identify features of the existing system. The existing test stations must be removed and replaced by new test stations.

Addendum 1
Replace sections with Cathodic Protection System, Specification 13 47 13

Exothermal Welds: after the exothermal weld has been performed and the connection tested for strength, thoroughly coat the cleaned surface with a coating repair recommended by the coating manufacturer and allow to dry to a non-glossy appearance.

Installation of Flange Insulating Kit Materials: install the pipe flange insulating kits, as necessary, in accordance with the manufacturer's recommendations.

Pipe Joint Bonding Wires: During installation of the pipe, electrically bond across pipe joints which are not circumferentially welded. Install bond wires across buried metallic in-line valves, couplings, bolted flanges, and fittings, except for insulated pipe flanges. Install bond wires at minimum length. A minimum of two bond wires are required for each joint. Joint bonding details are shown on the Drawings.

Field Applied Coating: Field coat bare fittings and connections to the pipe with wax tape.

Coating of Buried Insulated Pipe Flanges: Coat buried insulated pipe flanges with an external wax-tape coating in accordance with AWWA C217.

Testing: Verify, by testing, that the entire system is functioning properly, and that the criteria for acceptance are met. Perform all testing in the presence of the Engineer. Retain a NACE certified Corrosion Technician to perform the testing. Perform tests under the supervision of a licensed professional Corrosion Engineer or a NACE certified Corrosion Specialist. Furnish test results including all pertinent readings, dates, times, and locations to the Engineer.

Final Inspection: Notify the Engineer when the corrosion monitoring system is completely installed. The system will be inspected and tested by the City's Representative. The Contractor must replace or repair any deficiencies in materials and installation that are revealed by these tests.

77-3.03B(11) Polyethylene Encasement

All buried ductile iron pipe, including all straight pipe, bends, tees, adapters, closure pieces, and other fittings or specials, and all valves, must be provided with at least one wrap of polyethylene encasement.

Polyethylene encasement must be installed in accordance with ANSI/AWWA C105/A21.5, as modified herein. Preparation of the pipe must include, but must not be limited to, removal of lumps of clay, mud, cinders, etc., prior to installation.

1. Apply a single wrapping, except where double wrapping is applied to the existing pipeline that is being replaced.

2. Install the polyethylene to completely encase the pipe and fittings to provide a watertight overlap, extending tape beyond and beneath circumferential seams.

3. Wrap bell-spigot interfaces, restrained joint components, and other irregular surfaces with wax tape or moldable sealant prior to placing polyethylene encasement.

4. Minimize voids beneath polyethylene. Place circumferential or spiral wraps of polyethylene tape at 2-foot intervals along the barrel of the pipe to minimize the space between the pipe and the polyethylene.

5. Overlap adjoining polyethylene tube coatings a minimum of 1 foot and wrap prior to placing concrete anchors, collars, supports, or thrust blocks. Hand wrap the polyethylene sheet, apply two complete wraps with no exposed edges to provide a watertight corrosion barrier, and secure in place with 2-inch-wide plastic adhesive tape.

Addendum 1
Replace sections with Cathodic Protection System, Specification 13 47 13

SECTION 13 47 13
CATHODIC PROTECTION SYSTEM

PART 1 - GENERAL

1.1 THIS SECTION INCLUDES

A. The WORK of this Section includes providing a complete cathodic protection (CP) system for the following structures as outlined in this Section and on the Drawings:

1. Approximately 712 linear feet of 16-inch Polyethylene Encased Ductile Iron Pipeline (DIP) west of the Conn Creek Bridge crossing and approximately 1,800 linear feet of DIP east of the Conn Creek Bridge crossing.

B. Electrical isolation of the pipeline from adjacent metallic structures, steel reinforced concrete structures, structures of dissimilar metal or dissimilar coatings, conduits, and all other metallic components that may impact the operation of the CP system.

C. Electrical bonding of all non-insulated, non-welded pipe joints and mechanical joints to provide electrical continuity.

D. Installation of galvanic anodes, insulating joints, test stations, other components associated with the CP system, and all other work described herein and on the Drawings.

E. Testing of CP system during installation.

F. Cleanup and restoration of work site.

G. System Commissioning: Testing of CP system after installation and backfilling.

1.2 REQUIREMENTS

A. If the products installed as part of this Section are found to be defective or damaged or if the WORK of this Section is not in conformance with these Specifications, then the products and WORK shall be corrected at the CONTRACTOR’s expense.

B. Any retesting required due to inadequate installation, failure to meet performance or acceptance criteria, or due to defective materials shall be paid for by the CONTRACTOR at no additional cost to the OWNER.

C. The WORK also requires that one Supplier or Subcontractor accept responsibility for the WORK, as indicated, but without altering or modifying the CONTRACTOR's responsibilities under the Contract Documents.

D. The WORK also requires coordination of assembly, installation, and testing between the pipeline contractor and any CP material supplier or subcontractor.

E. All electrical WORK shall be in accordance with NEC and local requirements.

1.3 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Site Safety and Regulatory Requirements
2. Excavation, Trenching, Backfilling, and Compacting
3. Piping
4. Cast-In-Place Concrete
5. Protective Coatings

1.4 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

A. The WORK of this Section shall comply with the current editions of the codes and standards referenced in this specification, including the following:

1. AASHTO American Association of State Highway and Transportation Officials
    a. H20 Specification for Highway Bridges
2. ANSI American National Standards Institute
    a. B1.1 Unified Inch Screw Threads, UN and UNR Thread Form
    b. B1.20.1 Pipe Threads, General Purpose (Inch)
3. ASTM ASTM International
    a. A197 Standard Specification for Cupola Malleable Iron
    b. A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
    c. B3 Standard Specification for Soft or Annealed Copper Wire
    d. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
    e. B80 Standard Specification for Magnesium-Alloy Sand Castings
    f. B187 Standard Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes
    g. B843 Standard Specification for Magnesium Alloy Anodes for Cathodic Protection

h. C94 Standard Specification for Ready-Mixed Concrete

i. D1000 Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications

j. D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

k. D1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

l. G97 Standard Test Method for Laboratory Evaluation of Magnesium Sacrificial Anode Test Specimens for Underground Applications

4. AWWA American Water Works Association

a. C217 Petrolatum and Petroleum Wax Tape Coatings for the Exterior of Connections and Fittings for Steel Water Pipelines

5. NSF National Sanitation Foundation

a. NSF 61 Drinking Water System Components

b. NSF 600 Health Effects Solvent Criteria

6. AMPP Association for Material Protection and Performance (Previously NACE)

a. NACE SP0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems

b. NACE SP0286 Electrical Insulation of Cathodically Protected Pipelines

c. NACE SP0375 Field-Applied Underground Wax Coating Systems for Underground Pipelines: Application, Performance, and Quality Control

d. NACE TM0497 Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems

e. SSPC SP2 Hand Tool Cleaning

f. SSPC SP3 Power Tool Cleaning

g. SSPC SP11 Power Tool Cleaning to Bare Metal

h. SSPC SP16 Surface Preparation

7. NEMA National Electrical Manufacturers Association

a. 250 Enclosures for Electrical Equipment (1,000 Volts Maximum)

b. NFPA National Fire Protection Association

c. NFPA 70 National Electric Code (NEC)

8. UL Underwriters Laboratories

a. 6 Rigid Metal Conduits

b. 467 Grounding and Bonding Equipment

c. 514B Fittings for Cable and Conduit

B. Whenever the Drawings or these Specifications require a higher degree of workmanship or better quality of material than indicated in the above codes and standards, these Drawings and Specifications shall prevail.

1.5 PERMITS AND JOB ACCESS

A. Within 30 days of Notice to Proceed the CONTRACTOR shall apply to the required authorities for permits required for installation of the CP system.

B. The CONTRACTOR shall contact Underground Service Alert prior to commencing construction to locate existing utilities in the area of construction. Existing utilities include, but are not limited to, water lines, gas lines, telephone, street lights, sewer and storm drains, and overhead and underground electric utilities.

C. If traffic control is necessary, it shall satisfy the requirements of the governing locality.

1.6 QUALITY ASSURANCE

A. Installation of the CP equipment shall be performed by individuals having at least five years of experience in the installation of the CP equipment described herein.

B. All testing required to be performed by a "Corrosion Technician" shall be performed by a AMPP/NACE certified Corrosion Technician under the supervision of a Corrosion Engineer. A Corrosion Technician is a minimum of a AMPP/NACE CP2 (CP Technician) with not less than five years of experience testing cathodic protection systems. A Corrosion Engineer is a Registered Professional Corrosion Engineer or a AMPP/NACE CP4 (CP Specialist).

1.7 SUBMITTALS

A. The following shall be submitted to the ENGINEER prior to any equipment installation.

1. A copy of this specification section, with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviations.

2. Catalog cuts, descriptive literature, bulletins, brochures, or data sheets for all materials specified herein.

3. Submitted data shall show where and for what use each product is proposed with cross-reference made to the Article or Paragraph of this specification section. Each product shall include data that shows that it meets the detailed requirements of these Specifications.

4. Statement that the equipment and materials proposed meet the Specifications and the intent of the Specifications.

5. Cathodic Protection Specialist and Technician meeting the experience requirements specified herein who will be performing the work and providing reports. Schedule, including the expected start date and planned completion date.

6. CONTRACTOR's System Commissioning Test Plan and Procedures. The test plan shall outline the organization, schedule, allocation of resources, and documentation requirements associated with the commissioning tests.

B. The following shall be submitted to the ENGINEER after completion of the WORK.

1. Wire connection testing.

2. Insulating joint testing, before and after backfilling.

3. Electrical isolation testing from structures or rebar.

4. System Commissioning Report documenting all test results. The test report shall include the findings, results, and comments derived from the commissioning tests.

5. Record drawings of the Cathodic Protection systems shall be prepared and maintained by the CONTRACTOR during construction and installation. Record drawings shall show exact locations through the use of GPS coordinates of all installations covered by this specification. All items of equipment and material shall be properly identified on the Record drawings. Record drawings shall be submitted to the OWNER after completion of construction.

6. Failure to submit the final report or record drawings will result in non-acceptance of the cathodic protection installation.

1.8 INTERFERENCE AND EXACT LOCATIONS

A. The locations of CP equipment, test stations, devices, outlets, and appurtenances, as indicated, are approximate only. Exact locations shall be determined by the CONTRACTOR in the field subject to the approval of the ENGINEER.

B. The CONTRACTOR shall field verify all data and final locations of work done under other Sections of the Specifications required for placing of the electrical work.

C. In case of interference with other work, foreign pipeline, or erroneous locations with respect to equipment or structures, the CONTRACTOR shall furnish all labor and materials necessary to complete the WORK in an acceptable manner to the OWNER. Deviations from the Drawings and Specifications shall be submitted to the OWNER for approval.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials installed must be new. All equipment and materials supplied shall be similar to that which has been in satisfactory service for at least 5 years.

B. Where materials are not specified, the CONTRACTOR shall provide corrosion-resistant materials suitable for long-term service life.

C. All materials in contact with potable water shall be NSF 61 and NSF 600 approved.

2.2 GALVANIC ANODES

A. High-potential magnesium anodes: Cast magnesium anodes shall conform to ASTM B843 Type M1C. Anodes shall have an open circuit potential of −1.70 volts or more electronegative and a current efficiency of at least 48% when tested in accordance with ASTM G97. Anodes shall have the following size, form, and shape. Anodes shall be supplied by Farwest, Corrpro, Mesa, Matcor, or an approved equivalent.

Ingot				Packaged		
Weight (lb)	**Width (inch)**	**Height (inch)**	**Length (inch)**	**Weight (lb)**	**Diameter (inch)**	**Length (inch)**
60	4 to 5	4	60	126 to 130	6 to 7	64

B. Galvanic anodes shall be pre-packaged in a cloth bag containing backfill of the following composition: 75% gypsum, 20% bentonite, and 5% sodium sulfate. The anodes shall be of the size indicated on the Drawings and placed where indicated on the Drawings.

C. Anode lead wire:

1. The wire attached to the anodes shall be of the size and type indicated on the Drawings. The anode lead wire shall conform to the specifications given for “Wires” in this specification.

2. Connection of wire to the anode shall have a pulling strength that exceeds the wire’s tensile strength.

3. Anode lead wires shall be of one continuous length, without splices, unless otherwise indicated on the Drawings, from the anode connection to the test station.

2.3 READY-MIXED CONCRETE

A. Ready-mixed concrete shall be in accordance with ASTM C94, permit requirements, and the Specification section for cast-in-place concrete.

B. Ready-mixed concrete used to install flush-mounted shall achieve a 21-day compressive strength of 3,000 psi.

2.4 REINFORCING STEEL

A. Reinforcing steel shall be in accordance with ASTM A615, permit requirements, and the Specification section for reinforcing steel.

2.5 FLUSH-MOUNTED TEST STATION

A. Flush-mounted test station boxes shall be traffic boxes rated to withstand AASHTO H20 traffic loading and as shown in the Drawings.

B. Acceptable traffic boxes shall be G05 Utility Boxes, as manufactured by Christy Concrete Products, Inc.; No. 3RT Traffic Valve Box, as manufactured by Brooks Products; or an approved equivalent.

C. Traffic box covers for test stations shall be cast iron with welded bead legend and labeled “CP TEST” or “ANODE”, as required.

2.6 TERMINAL BOARDS

A. Terminal boards shall be made of 1/4-inch thick phenolic plastic and sized as indicated on the Drawings.

B. Connection hardware shall be brass, bronze, or copper. All connections shall be double nutted bolts with serrated lock washers.

C. Copper bus bar shall be 1/8-inch thick and sized to fit. The copper bus bar shall be per ASTM B187 with 98% conductivity.

2.7 MECHANICAL LUGS

A. Mechanical lugs shall be brass or copper with a brass, copper, or stainless steel set screw. Tin plating on the lugs is optional. Aluminum lugs shall not be permitted. Zinc-plated steel set screws shall not be permitted. The lug shall be listed per UL 467, suitable for direct burial, and appropriately sized for the incoming wires. The lug shall be ILSCO Type XT6DB, Burndy GKA8C, or an approved equivalent.

2.8 SHUNTS

A. Shunts shall be selected by the size indicated on the Drawings.

B. 0.01-ohm, 6-amp shunts shall be manganin wire type, as indicated. Shunts shall be Type RS, as manufactured by Holloway, or an approved equivalent.

2.9 CONDUIT AND FITTINGS

A. The conduit size shall be as indicated in the Drawings. Refer to NFPA 70 (NEC) for additional conduit size requirements.

B. Conduit and fittings placed below grade shall be Schedule 80 PVC in accordance with NEMA TC2 and NEMA TC3.

C. Conduit and fittings placed above grade shall be rigid steel. Rigid Steel conduit shall be galvanized and conform to UL 6.

D. Conduit clamps shall be galvanized steel.

E. Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal, with gasketed covers, Crouse Hinds Condulets, Appleton Unilets, or an approved equivalent. Rigid metallic conduit fittings shall be galvanized, conform to NEMA FB 1, and listed to UL 514B.

F. Union couplings for conduit shall be Erickson or Appleton Type EC, 0Z Gedney 3-piece Series 4, or an approved equivalent.

G. Non-metallic insulating end bushings shall be used at conduit terminations regardless of the conduit material used and shall conform to NFPA 70 (NEC). Insulating bushings shall be Emerson Type A for threaded ended conduits, Arlington fit-in for non-threaded conduits, or approved equivalents.

2.10 CAUTION TAPE

A. The caution tape shall be an inert plastic film designed for prolonged underground use. The caution tape shall be a minimum of 3 inches wide and a minimum of 4 mils thick.

B. The caution tape shall be continuously printed over the entire length with the wording "CAUTION: CATHODIC PROTECTION CABLE BURIED BELOW."

C. The wording shall be printed using bold black letters. The color of the tape shall be red.

2.11 WIRES

A. Conductors shall consist of stranded copper of the gauge indicated on the Drawings. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall be in conformance with ASTM B3 and ASTM B8.

B. Insulation Type and Colors: As shown on the Drawings.

C. High molecular weight polyethylene (HMWPE) wires shall be rated for 600 volts and shall conform to ASTM D1248, Type 1, Class C, Grade 5.

D. Wires shall not have sharp bends measuring less than the minimum bend radius calculated in accordance with the NEC standards.

2.12 WIRE IDENTIFICATION TAGS

A. Wire identification tags shall be the wrap-around type with a high resistance to oils, solvents, and mild acids. Wrap-around markers shall fully encircle the wire with imprinted alphanumeric characters for pipe identification. The height of the letters and numbers shall be 3/16 inch at a minimum.

2.13 EXOTHERMIC WELDS

A. Exothermic welds shall be in accordance with the manufacturer's recommendations. Exothermic welds shall be Cadweld manufactured by Erico, Thermoweld manufactured by Burndy, or an approved equivalent.

B. Prevent molten weld metal from leaking out of the mold, where necessary, by using Duxseal packing manufactured by Johns-Manville, Thermoweld packing material manufactured by Burndy, Cadweld T403 Mold Sealer manufactured by Erico, or an approved equivalent.

C. The shape and charge of the exothermic weld shall be chosen based on the following parameters and based on manufacturer recommendations:

1. Pipe material

2. Pipe size

3. Pipe wall thickness

4. Wire size and requirement for sleeves

5. Number of wires to be welded

6. Orientation of weld (vertical or horizontal)

D. Cartridges

1. Cast iron exothermic weld cartridges shall be used for cast and ductile iron pipe and fittings. The maximum cartridge size shall be 32 grams for cast iron and ductile iron.

2. Steel exothermic weld cartridges

2.14 EXOTHERMIC WELD COATING

A. After exothermic welding, repair coatings and linings in accordance with the coating and lining manufacturer's recommendation.

B. For ductile iron pipe, weld caps with integrated primer shall be used to cover the exothermic weld connecting the wire to the pipe. The weld cap shall be a 10-mil thick durable plastic sheet that has a dome filled with a moldable compound to assure complete encapsulation of the exothermic weld and a layer of elastomeric adhesive with integrated primer. The adhesive and primer shall be compatible with the pipe material and pipe coating material. Adhesion to steel shall be at least 10 lb/in per ASTM D1000. Weld cap with integrated primer shall be Handy Cap IP manufactured by Royston or an approved equivalent for wire size up to 8 AWG and Handy Cap XL IP manufactured by Royston or an approved equivalent for wire size up to 2 AWG.

2.15 INSULATING FLANGE KITS

A. For purposes of this specification, the terms "Pipe Flange Insulating Kit," "Insulated Flange," "Insulated Joint," and "Dielectric Flange" are used synonymously.

B. Insulating flange kits shall include full-faced gaskets, insulating sleeves and washers, and 316 stainless steel bolts, nuts, and washers. The complete assembly shall have a pressure rating equal to or greater than the flanges between which it is installed. Sleeves, gaskets, and insulating washers shall have a minimum dielectric constant of 300 volts per mil. Stainless steel washers shall fit well within the bolt facing on the flange. Insulating washers shall fit within the bolt facing the flange over the outside diameter of the sleeve.

C. Insulating gasket shall be full-faced, Type E, and 1/8-inch thick. Acceptable gasket materials include nitrile faced phenolic, G-10, or a material with approved equivalent or increased performance. Acceptable seal materials include EPDM, PTFE, or a material with approved equivalent or increased performance. When used in potable water systems, gasket and seal shall be NSF 61 and NSF 600 approved.

D. Insulating sleeves shall be 1/32-inch thick and equal the number of bolts on the flange. Acceptable materials include Mylar, G-10, or a material with approved equivalent or increased performance. The length of the sleeve is a critical requirement. The required length is equal to the distance from one flange to the other (including gasket thickness) plus twice the insulating washer thickness plus the thickness of two steel washers minus 1/16 inch. Provide four extra insulating sleeves in case some are cracked during installation.

E. Insulating washers shall be 1/8-inch thick and equal to twice the number of bolts on the flange. Acceptable materials include phenolic, G-10, or a material with approved equivalent or increased performance. Dielectric insulating flange kits shall be manufactured by Pipeline Seal and Insulator, Inc., Advance Products & Systems Inc., GPT Industries, or an approved equivalent.

F. For bell and spigot pipe, provide electrical isolation through the installation of the following materials:

1. Flange connection to lock joint bell adapter.

2. Flange connection to lock joint spigot adapter.

2.16 DIELECTRIC UNION

A. Dielectric unions shall be captured O-ring sealed, threaded cast malleable iron conforming to ASTM A197 and ANSI B1.1 & B1.20.1, and rated to match or exceed the pipeline pressure rating. The insulating material shall be integral one-piece construction of nylon molded to the metal body. The insulation barrier shall limit galvanic current to less than 1 percent of the short-circuit current in a corresponding welded joint. Furnish Central Plastics, Watts, or an approved equivalent.

2.17 INSULATING CORPORATION STOP

A. The insulating corporation stop shall be designed to provide electrical isolation between the main pipeline and copper service lateral.

B. The insulating corporation stop shall have the same or better pressure rating and hydrostatic performance as the pipeline where it will be installed.

C. The insulating corporation stop shall be brass with nylon insulating material. The seal shall be accomplished with an O-ring.

D. Insulating corporation stops shall be manufactured and tested in accordance with AWWA C800 and certified to NSF 61 and NSF 600.

E. Insulating corporation stops shall be manufactured by Mueller Co. or an approved equivalent.

2.18 PETROLATUM WAX TAPE

A. Petrolatum wax tape shall meet or exceed the requirements of AWWA C217 and shall consist of three parts: Surface primer, wax tape, and outer covering. All three parts shall be the product of a single manufacturer and suitable for their operating environment.

B. The primer shall be a blend of petrolatums, plasticizers, and corrosion inhibitors having a paste-like consistency. Primer shall be Wax-Tape Primer manufactured by Trenton, Denso Paste manufactured by Denso, or an approved equivalent.

C. The wax tape shall be synthetic-fiber felt, 45 to 90 mils thick, saturated with a blend of micro-crystalline wax, petrolatums, plasticizers, and corrosion inhibitors that are capable of easy conformability over irregular surfaces. Wax tape shall be #1 Wax-Tape manufactured by Trenton, Denso Tape manufactured by Denso, or an approved equivalent.

PART 3 - EXECUTION

3.1 MATERIAL AND EQUIPMENT STORAGE

A. All materials and equipment to be used in construction shall be stored in such a manner as to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or another method, as appropriate.

3.2 EXCAVATION AND BACKFILL

A. Buried wires shall have a minimum cover of 36 inches.

B. Caution tape shall be installed above the buried wire. Caution tape shall be installed a minimum of 6 inches above underground wires and conduits.

C. Wire identification tags shall be placed on the wires prior to placing the wire in conduit or backfilling.

3.3 SURFACE GROUND BED FOR GALVANIC ANODES

A. Prepackaged anodes shall be installed at the locations indicated on the Drawings.

B. Plastic or paper wrapping shall be removed from the anode prior to lowering the anode into the hole. Anodes shall not be suspended by the lead wires. Damage to the canvas bag, anode-to-wire connection, copper wire, or wire insulation before or during installation will require replacement of the entire anode assembly. Anodes shall be inspected and approved prior to backfilling.

C. Anodes shall be backfilled with native soil. Do not place tree roots, wood scrap, vegetable matter or refuse in the backfill. Backfilling with native soil shall proceed in 6-inch lifts, compacting the soil around the anode during each lift, until the backfill has reached grade. Upon completion of compaction of backfill to the top of the anode, and prior to filling the hole and compacting the backfill to the surface, a minimum of 10 gallons of fresh water shall be poured into the hole to saturate the prepackaged anode backfill and surrounding soil.

D. Anode lead wires shall be routed and terminated on the panel board as shown in the Drawings.

E. Upon completion of anode installation, test the open-circuit potential of each anode with a copper sulfate reference electrode. High potential magnesium anode has a potential more electropositive than −1.7 V, the anode is to be replaced at the CONTRACTOR's expense. All testing procedures and results are to be verified by the OWNER before acceptance.

3.4 TEST STATIONS

A. Test stations shall be installed at the approximate locations shown on the Drawings. The CONTRACTOR shall field verify all final locations, subject to acceptance by the ENGINEER. Test stations shall be located within the pipeline easement. Test stations shall be located in areas not subject to vehicular traffic, such as sidewalks, unless otherwise approved by the ENGINEER.

B. For flush-mounted test stations, place the bottom of the test box on native soil. Do not place rock, gravel, sand, or debris in the box. Install 3,000 psi concrete collar with reinforcement after placement of the test box to finished grade. Provide sufficient sloping in the concrete pad or surrounding pavement to provide drainage away from the test box.

C. Connect wires to the terminal board as shown on the Drawings. Provide sufficient slack in wires (12 inches at minimum) to allow for pipe settlement, removal of the terminal board for testing, and future maintenance. Each wire shall be identified with a permanent wire identifier within 4 inches of the termination. After installation, all wire connections in the test station shall be tested by the Contractor to ensure they meet the requirements herein.

D. Apply duct seal to inside of the PVC conduit where it penetrates the test box after all wires have been routed through.

E. The CONTRACTOR shall provide global positioning system (GPS) coordinates for each test station location with a minimum accuracy of 1 meter or 3 feet. The CONTRACTOR shall submit proposed GPS coordinates for test stations to the ENGINEER and OWNER prior to installation, and the finalized GPS coordinates of the test stations to the ENGINEER after installation.

3.5 WIRES

A. Buried wires shall be laid straight without kinks. Each wire run shall be continuous in length and free of joints or splices unless otherwise indicated. Care shall be taken during installation to avoid punctures, cuts, or other damage to the wire insulation. Damage to insulation shall require replacement of the entire length of wire at the CONTRACTOR's expense.

B. Wire shall not be bent into a radius of less than eight times the overall wire diameter.

C. The wire conduits must be of sufficient diameter to accommodate the wires. This shall be determined by the number and size of wires in accordance with the applicable codes and standards.

D. Conduit shall be installed to a minimum depth of 36 inches below grade.

E. Install caution tape a minimum of 6 inches above buried wire and conduits. Every 3 feet, double over the tape for a distance of 8 inches to increase the apparent flexibility of the tape.

F. Use PVC conduit underground and galvanized rigid steel conduit above grade. The portion of galvanized steel conduit that is underground before it transitions to PVC shall be primed and tape wrapped along the entire length with half-lap, 10-mil polyethylene tape.

3.6 WIRE IDENTIFICATION TAGS

A. All wires shall be coded with wire identification tags within 4 inches of the wire end indicating diameter and type of pipe, structure, anode type and size, or reference electrode.

B. Wire identification tags shall be placed on all wires prior to backfilling and installation of test stations.

3.7 JOINT BONDS

A. Joint bonding shall be provided across all metallic in-line valves, couplings, flexible couplings, fittings and all non-welded joints to ensure electrical continuity, except where insulating joints have been installed to provide electrical isolation. Joint bonds shall be of the type, size, length, and number shown on the Drawings and installed as indicated.

B. Bonding wires shall allow at least 2 inches of movement in the pipe joint. The wire shall be attached by exothermic welding. At least 2 bond wires shall be provided between all discontinuous joints.

C. For ductile iron pipe, the CONTRACTOR may, at his or her own expense, provide weld plates that are installed by the pipe manufacturer at the spigot end of the pipe. Provision of the weld plates does not relieve the CONTRACTOR from responsibility for repair of damage to the coating or lining as a result of exothermic welding of the pipe. Coating repairs shall be performed in accordance with the coating manufacturer's recommendations.

3.8 WELD CONNECTIONS

A. Exothermic weld connections shall be installed in the manner and at the locations indicated in the Drawings. Exothermic welds shall be spaced at least 6 inches apart from other exothermic welds, fittings, and circumferential welds.

B. Coating materials shall be removed from the surface over an area of sufficient size to make the connection as indicated on the Drawings. The surface shall be cleaned to bare metal per AMPP/SSPC SP11 prior to welding the conductor. The use of resin-impregnated grinding wheels will not be allowed.

C. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold. If the wire conductor diameter is not the same as the opening in the mold, then a copper sleeve shall be fitted over the conductor.

D. The CONTRACTOR shall be responsible for testing all test lead and bond wire welds. The ENGINEER, at his or her discretion, shall witness these tests. After the weld has cooled, all slag shall be removed and the metallurgical bond shall be tested for adherence by the CONTRACTOR. A 22-ounce hammer shall be used for adherence testing by striking a blow to the weld. A weld that can be removed or compromised by the hammer blow shall be rejected. Care shall be taken to avoid hitting the wires. All defective welds shall be removed and replaced in a new location at least 6 inches away from the original weld location.

E. All exposed surfaces of the copper and steel shall be covered with insulating materials.

1. For polyethylene encased pipes, a plastic weld cap with integrated primer shall cover the weld and surrounding area. All surfaces must be clean, dry, and free of oil, dirt, loose particles, and all other foreign materials prior to application of the weld cap.

3.9 INSULATING FLANGE KITS

A. Insulating flange kits shall be installed as shown on the Drawings and as recommended by the manufacturer.

B. All insulating components of the insulating flanged gasket set and mating surfaces shall be cleaned of dirt, grease, oil, and other foreign materials immediately prior to assembly. If moisture, soil, or other foreign matter contacts any portion of these surfaces, disassemble the entire joint and clean with a suitable solvent. Dry the entire joint. Once completely dry, reassemble the joint.

C. Care shall be taken to prevent any excessive bending or flexing of the gasket. Creased or damaged gaskets shall be rejected and removed from the job site at the CONTRACTOR’s expense.

D. Bolt holes in mating flanges shall be properly aligned at the time bolts and insulating sleeves are inserted to prevent damage to the insulation. Follow the manufacturer's recommended bolt tightening sequence. Center the bolt insulating sleeves within the insulation washers so that the insulating sleeve is not compressed and damaged.

E. After flanged bolts have been tightened, each insulating washer shall be inspected for cracks or other damage. All damaged washers shall be replaced.

F. When the flange is determined to be properly functioning to the full satisfaction of the OWNER, approval will be granted to proceed with the installation. Do not proceed with coating, lining, or backfilling the insulating joint prior to gaining approval to proceed. If the coating or lining is applied prior to gaining approval to proceed, the coating or lining shall be completely removed and replaced to the satisfaction of the OWNER at the CONTRACTOR’s expense. If the insulating joint is backfilled prior to gaining approval from the OWNER, the CONTRACTOR shall completely excavate the insulating joint at the CONTRACTOR’s expense.

G. After testing and acceptance by the OWNER, coat the exterior of the insulating flange with the petrolatum wax tape system specified herein for a minimum of three feet beyond the gasket with a minimum of six inches of overlap with the factory-applied coating on the pipeline.

H. After testing and acceptance by the OWNER, line the interior of the insulating flange with the lining system that is compatible with the existing factory lining and recommended by the existing lining manufacturer. The coating shall comply with NSF 61 and NSF 600. Follow the manufacturer's surface preparation and application procedures.

3.10 PETROLATUM WAX TAPE

A. Petrolatum wax tape systems shall be applied on insulating joints, all non-welded flange connections, and non-cathodically protected metallic appurtenances and fittings, regardless of whether they are bare or factory coated, as indicated in the Drawings. Extend the petrolatum wax tape coating system over any adjacent pipe coating by a minimum of 12-inches. Petrolatum wax tape systems shall be applied in accordance with AMPP/NACE SP0375, AWWA C217, these Specifications, and the Manufacturer's recommendations.

B. Surfaces shall be cleaned of all dirt, grease, oil, and other foreign materials immediately prior to coating. Loose rust, loose paint, and other foreign matter shall be removed in accordance with AMPP/SSPC SP2 or SP3.

C. A prime coating shall be applied in a uniform coating over the entire surface to be wrapped. A liberal coating shall be applied to threads, cavities, shoulders, pits, and other irregularities. A filler putty or profiling mastic may be used for complex fittings to produce an acceptable surface for the application of the wax tape system.

D. Petrolatum wax tape shall be applied immediately after applying the primer using a 1-inch overlap. A spiral wrap shall be used, and slight tension shall be applied to ensure that there are no air pockets or voids. For bolts, nuts, and other irregular shapes, cut strips of wax tape and apply them by gloved hand so that there are no voids or spaces under the tape. Apply a sufficient amount of tape to completely encapsulate all exposed steel surfaces. After applying the tape, the applicator shall firmly press and smooth out all lap seams and crevice areas. The tape shall be in tight intimate contact with all surfaces. The minimum wax tape thickness shall be 70 mils over smooth surfaces and 140 mils over sharp and irregular surfaces, or more as required to fill all voids.

E. Apply two layers of outer covering over the wax tape coating by tightly wrapping it around the pipe such that it adheres and conforms to the wax tape. Secure the outer covering to the pipe with adhesive tape.

3.11 RESTORATION OF SERVICES

A. Compaction of backfill for anodes and trenches shall match the existing conditions and shall be in conformance with the EARTH MOVING Section.

B. RESTORATION OF SOD: Restore unpaved surfaces disturbed during the installation of anodes and wires to their original elevation and condition. Preserve sod and topsoil carefully and replace them after the backfilling is completed. Replace sod that is damaged using sod of quality equal to that removed. Where the surface is disturbed in a newly seeded area, re-seed the area with the same quality and formula of seed as that used in the original seeding.

C. RESTORATION OF PAVEMENT: Patch pavement, sidewalks, curbs, and gutters where existing surfaces are removed for construction in conformance with the ASPHALT PAVING Section and the CAST-IN-PLACE CONCRETE Section.

3.12 CONTINUITY TESTING

A. Continuity testing of joint bonds shall be performed by the CONTRACTOR's qualified corrosion technician as defined in this section after backfilling. The electrical continuity test may additionally be performed before backfilling at the CONTRACTOR's option.

B. The pipe shall be tested for electrical continuity. Continuity shall be verified using the linear resistance method. The pipe should be tested in spans that are no less than 250 feet, unless the pipe is shorter than 250 feet, and no more than 1,000 feet, if test station locations are available. Each test span shall have two test leads connected to the pipe at each end. Existing test stations can be used. A direct current shall be applied through the pipe using two of four test leads. The potential across the test span shall be measured using the other two test leads. The current applied and voltage drop shall be recorded for a minimum of three different current levels.

C. Contractor to supply to the OWNER'S Representative the following information: pipe wall thickness, number of bonds per pipe joint, length of pipe joints, bond wire AWG wire size, bond wire length, and number of pipe bonds in each pipe span. The theoretical resistance of the pipe shall be supplied by the CONTRACTOR to the OWNER'S Representative.

D. The average measured resistance shall be compared to the theoretical resistance of the pipe and bond wires. If the measured resistance is greater than 150% of the theoretical resistance, then the joint bonds shall be considered deficient and shall be repaired and retested at the CONTRACTOR's expense. If the measured resistance is less than 150% of the theoretical resistance, the pipeline has adequate electrical continuity for cathodic protection.

E. Bonded Joints Continuity: Measure resistance through select bonded joints with a digital low resistance ohmmeter (DLRO). Resistance of 0.001 ohms or less is acceptable.

F. Alternative pipeline continuity testing shall be as follows:

1. Position a Copper Sulfate Electrode (CSE) at a stationary location adjacent to a bonded pipeline. Impress a temporary current on pipe. Record static, current-applied, and instant "off" pipe-to-soil potential readings along the pipe relative to the stationary CSE.

2. Static potential measurements referenced to stationary CSE must be nearly identical along the pipe to indicate electrical continuity. Account for soil resistivity changes along the pipeline.

3. Instant "off" potentials referenced to stationary CSE must be nearly identical along pipe to indicate electrical continuity. Account for soil resistivity changes and attenuation along the pipeline.

4. The difference between the instant "off" and the static potential referenced to stationary CSE must be equal at each point of contact to pipe to indicate electrical continuity. Account for soil resistivity changes and attenuation along the pipeline.

G. Additional alternative continuity testing methods can be submitted to the ENGINEER for consideration and approval.

3.13 ISOLATION TESTING

A. The CONTRACTOR shall test the performance of insulating joints, insulating corporation stops, and casing insulators before and after backfilling. Insulating joints are used to electrically isolate two segments of the pipeline. Insulating corporation stops are used to electrically isolate the main pipeline from copper service laterals.

B. Before backfilling, the CONTRACTOR shall test the integrity of the insulators using an above-ground insulator tester. Acceptable above-ground insulator testers are Gas Electronics Model No. 601 Insulation Checker, Miller Insulation Checker (M.I.C.) by M.C. Miller, Model RF-IT by Tinker & Rasor, or an approved equivalent. If the testing results indicate less than 100% insulation, then the insulators shall be repaired and retested at the CONTRACTOR's expense.

C. After backfilling, testing shall be performed by measurement of native pipe to soil potentials on both sides of the insulator. If the difference in native pipe to soil potentials is greater than 100 mV, then the insulator shall be considered effective. If the difference in native pipe to soil potentials between pipe and casing is less than 100 mV, then additional testing shall be performed, as follows. Temporary CP current shall be applied to one side of the insulator. "On" and "Instant Off" pipe to soil potentials shall be measured on both sides of the insulator. If the "Instant Off" potential of the opposing side is more electronegative than its native potential, then the insulator is not effective and shall be repaired and retested at the CONTRACTOR's expense.

3.14 SYSTEM COMMISSIONING

A. Upon completion of the installation, but BEFORE energizing the cathodic protection system, the CONTRACTOR shall provide the ENGINEER and the OWNER a minimum of five days advanced notice of the scheduled date for taking native pipe-to-soil and casing-to-soil potentials at all test locations to allow the ENGINEER to witness the testing to allow for coordination and observation of these tests.

B. The CONTRACTOR shall provide testing of the completed system by a Corrosion Technician, and the data shall be reviewed by a Corrosion Engineer to ensure conformance with the Contract Documents, AMPP/NACE SP0169.

C. The testing described herein shall be in addition to and not a substitution for any required testing of individual items at the manufacturer's plant and during installation.

D. Before beginning each day of testing, calibrate portable copper sulfate reference electrodes with respect to a master reference copper sulfate reference electrode.

E. Testing shall be performed at all test leads of all test stations, junction boxes, and locations of the exposed pipe as soon as possible after installation of the CP system.

F. Testing shall include the following and shall be conducted in accordance with AMPP/NACE TM0497:

1. Measure and record native pipe-to-soil and anode-to-soil potentials at all test locations BEFORE the cathodic protection system is energized.

2. Measure and record native pipe-to-soil potentials on both sides of all insulating joints and insulating corporation stops. Verify electrical isolation per AMPP/NACE SP0286.

3. Where two wires are attached to the same pipeline, measure and record the native pipe-to-soil potentials for both wires. If the potential measurements for the same pipeline differ by more than 5 millivolts, investigate the cause. and correct the issue until the potential measurement differs by less than 5 millivolts.

4. Confirm electrical continuity of the cathodically protected pipeline in accordance with this Section.

5. Measure and record the "On" and "Instant Off" pipe-to-soil potentials at each location after the pipe has been given adequate time to polarize.

6. Measure and record the current output of each anode when the CP system is initially turned on and again after it has been given adequate time to polarize.

G. Test results shall be analyzed to determine compliance with AMPP/NACE SP0169

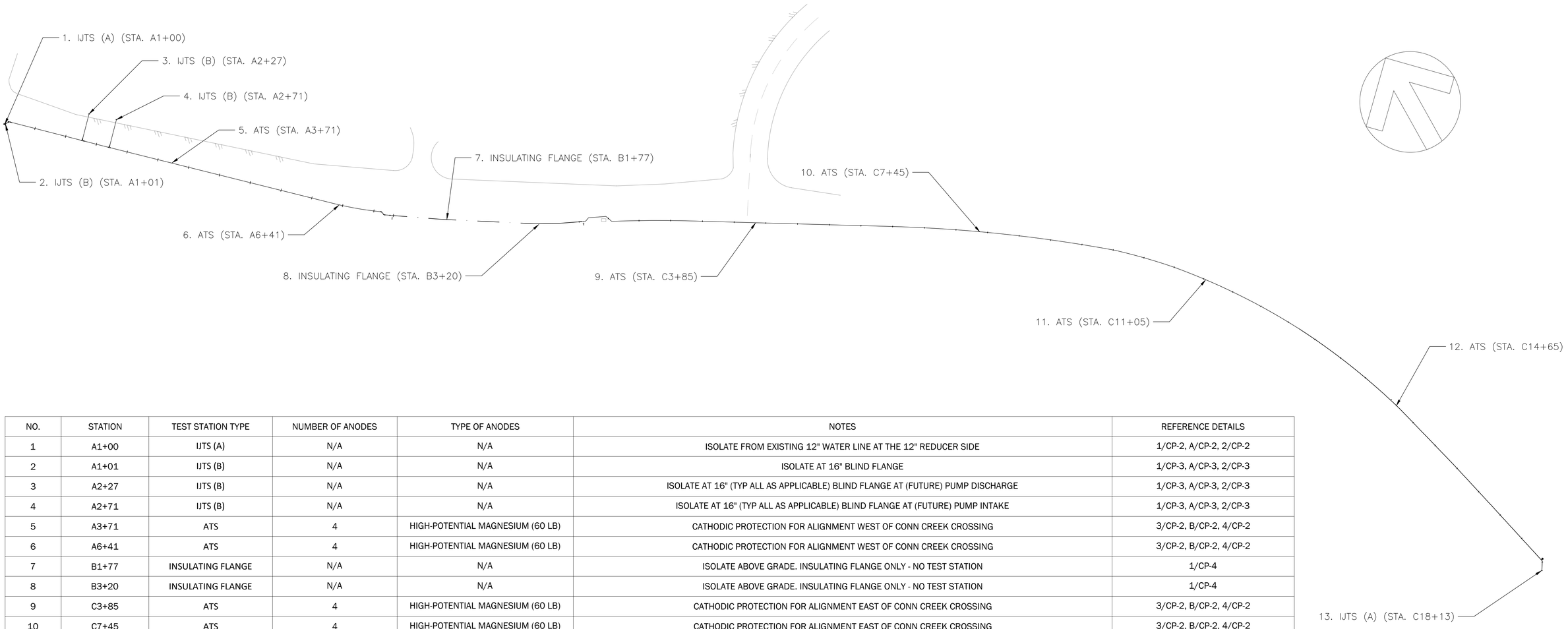
H. Test results shall be analyzed to determine if stray current interference is present. Stray current interference is defined as a ±50 mV shift in a pipeline's pipe-to-soil potential that is caused by a foreign current source. Stray current interference shall be tested on the project pipeline and foreign pipelines that have a reasonable chance of being affected by stray currents. Cooperative interference testing shall be coordinated with foreign pipeline and structure owners.

I. The CONTRACTOR shall provide a written report, prepared by the Corrosion Engineer, documenting the results of the testing and recommending corrective work, as required to comply with the Contract Documents. Any deficiencies of systems tested shall be repaired and re-tested by the CONTRACTOR at no additional cost to the OWNER.

3.15 RECORD DRAWINGS

A. Maintain record drawings for the cathodic protection system continuously throughout construction. Record drawings shall properly identify all items of equipment and material and shall show exact locations with dimensional ties to existing structures or survey monuments for all electrical resistance probes, anodes, test boxes, and buried wires.

** END OF SECTION **



NO.	STATION	TEST STATION TYPE	NUMBER OF ANODES	TYPE OF ANODES	NOTES	REFERENCE DETAILS
1	A1+00	IJTS (A)	N/A	N/A	ISOLATE FROM EXISTING 12" WATER LINE AT THE 12" REDUCER SIDE	1/CP-2, A/CP-2, 2/CP-2
2	A1+01	IJTS (B)	N/A	N/A	ISOLATE AT 16" BLIND FLANGE	1/CP-3, A/CP-3, 2/CP-3
3	A2+27	IJTS (B)	N/A	N/A	ISOLATE AT 16" (TYP ALL AS APPLICABLE) BLIND FLANGE AT (FUTURE) PUMP DISCHARGE	1/CP-3, A/CP-3, 2/CP-3
4	A2+71	IJTS (B)	N/A	N/A	ISOLATE AT 16" (TYP ALL AS APPLICABLE) BLIND FLANGE AT (FUTURE) PUMP INTAKE	1/CP-3, A/CP-3, 2/CP-3
5	A3+71	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT WEST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
6	A6+41	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT WEST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
7	B1+77	INSULATING FLANGE	N/A	N/A	ISOLATE ABOVE GRADE. INSULATING FLANGE ONLY - NO TEST STATION	1/CP-4
8	B3+20	INSULATING FLANGE	N/A	N/A	ISOLATE ABOVE GRADE. INSULATING FLANGE ONLY - NO TEST STATION	1/CP-4
9	C3+85	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT EAST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
10	C7+45	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT EAST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
11	C11+05	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT EAST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
12	C14+65	ATS	4	HIGH-POTENTIAL MAGNESIUM (60 LB)	CATHODIC PROTECTION FOR ALIGNMENT EAST OF CONN CREEK CROSSING	3/CP-2, B/CP-2, 4/CP-2
13	C18+13	IJTS (A)	N/A	N/A	ISOLATE AT FLANGE BEFORE 16" FLANGE PRIOR TO CONNECTION WITH EX. 12" W PIPE	1/CP-2, A/CP-2, 2/CP-2

TEST STATION LOCATION PLAN AND SCHEDULE

SCALE: NTS

V&A
1000 Broadway Suite 320
Oakland, CA 94607
Tel. (510) 903-6600, Fax (510) 903-6601
V&A Project No. 25-0349

NO.	DATE	BY	REVISION

NOTICE
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ACR DESIGNED
MA DRAWN
ACR CHECKED

REGISTERED PROFESSIONAL ENGINEER
GLENN H. WILLSON
NO. CR1076
CORROSION
STATE OF CALIFORNIA

consor

City of Calistoga
Incorporated Jan. 6, 1886

CONN CREEK WATER LINE PROJECT

CATHODIC PROTECTION
TEST STATION SCHEDULE

PROJECT NO.: V&A 25-0349 | SCALE: NTS | DATE:

SHEET CP-1

1 OF 4

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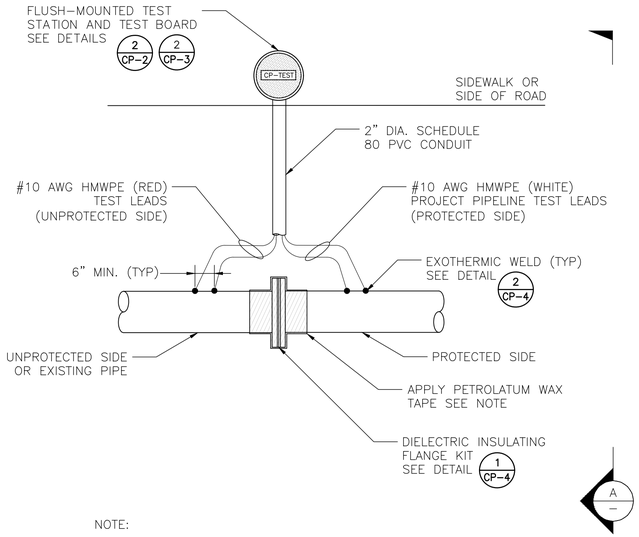
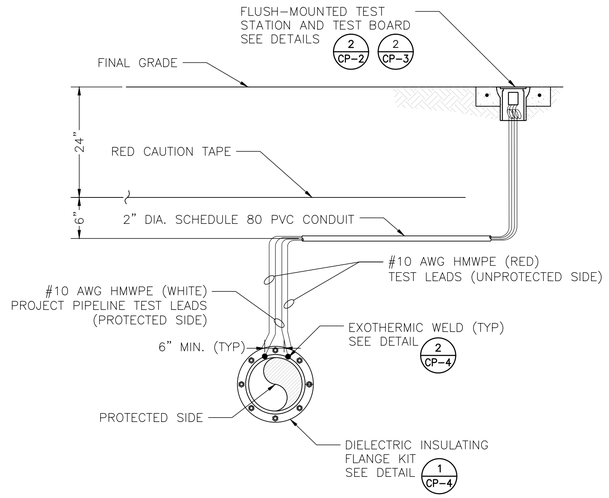


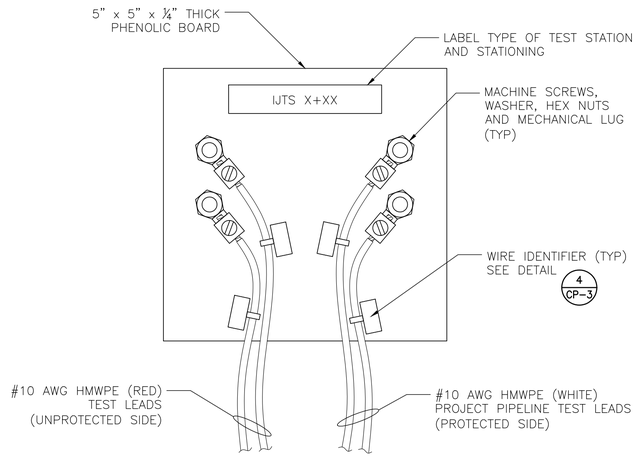
NOTE:

COAT THE EXTERIOR OF THE INSULATING FLANGE WITH PETROLATUM WAX TAPE FOR A MINIMUM OF 6 FEET BEYOND THE GASKET WITH A MINIMUM OF 6 INCHES OF OVERLAP WITH THE FACTORY-APPLIED COATING ON THE PIPELINE.

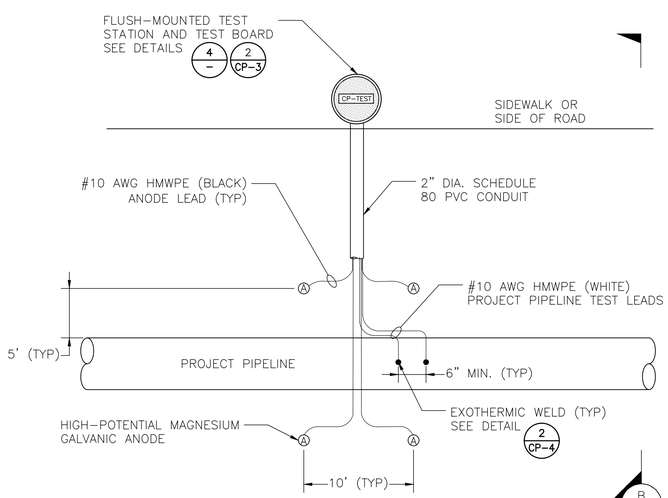
INSULATING JOINT TEST STATION TYPE A (IJTS (A)) PLAN VIEW — 1 —
SCALE: NTS



INSULATING JOINT TEST STATION TYPE A (IJTS (A)) SECTION VIEW — A —
SCALE: NTS



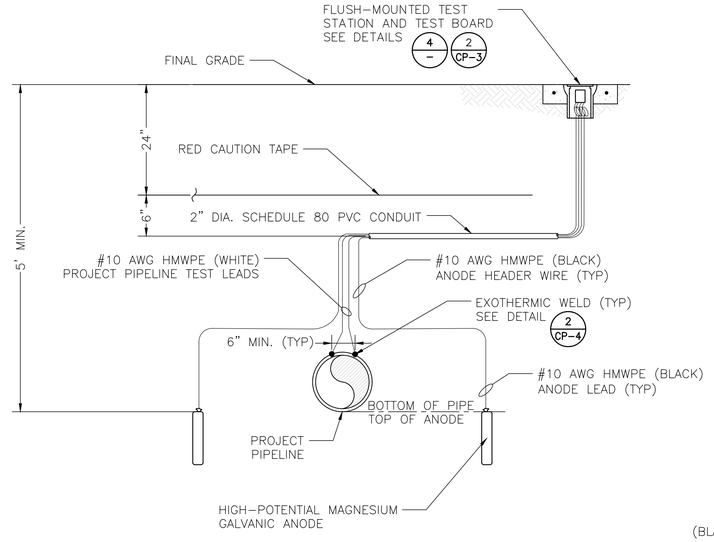
INSULATING JOINT TEST STATION TYPE A AND B (IJTS (A/B)) TERMINAL BOARD DETAIL — 2 —
SCALE: NTS



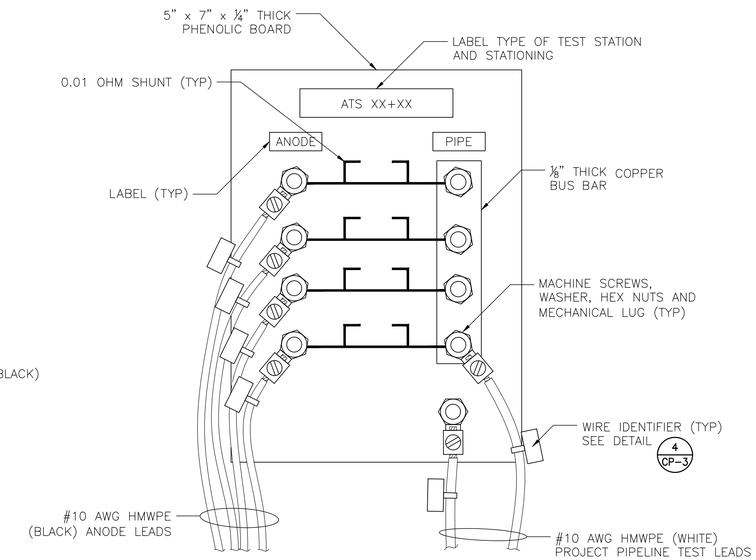
NOTE:

INSTALL ANODE IN NATIVE SOIL

ANODE TEST STATION (ATS) PLAN VIEW — 3 —
SCALE: NTS



ANODE TEST STATION (ATS) SECTION VIEW — B —
SCALE: NTS



ANODE TEST STATION (ATS) TERMINAL BOARD DETAIL — 4 —
SCALE: NTS

V&A
1000 Broadway Suite 320
Oakland, CA 94607
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V&A Project No. 25-0349

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REGISTERED PROFESSIONAL ENGINEER — GLENN H. WILLSON — NO. CR1076 — CORROSION — STATE OF CALIFORNIA

consor

City of Calistoga — Incorporated Jan 6 1886

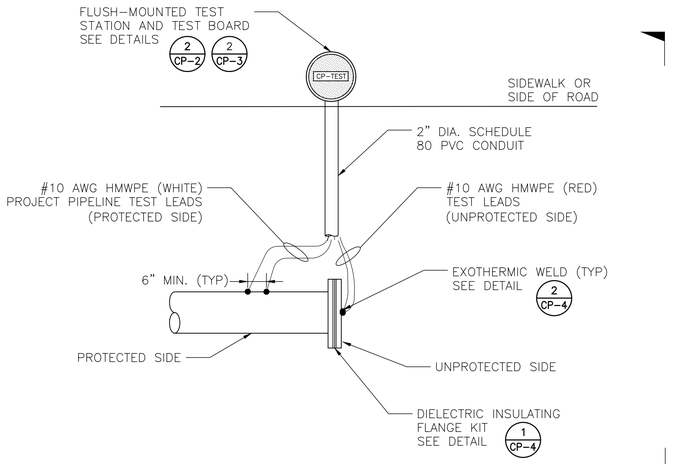
CONN CREEK WATER LINE PROJECT

CATHODIC PROTECTION DETAILS

PROJECT NO.:V&A 25-0349 | SCALE: NTS | DATE:

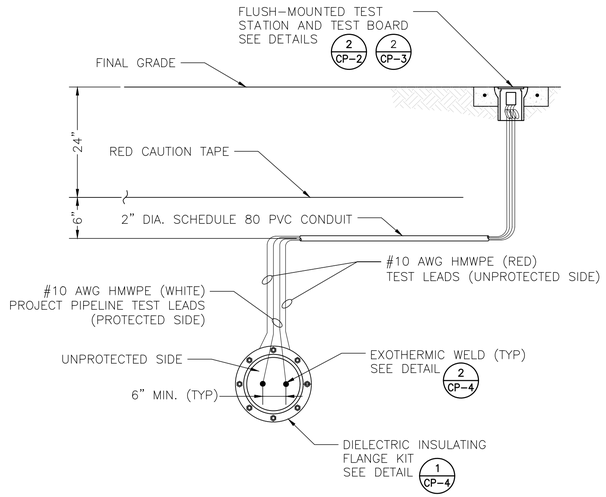
SHEET CP-2

2 OF 4



INSULATING JOINT TEST STATION TYPE B (IJTS (B)) FOR BLIND FLANGE PLAN VIEW 1/—

SCALE: NTS

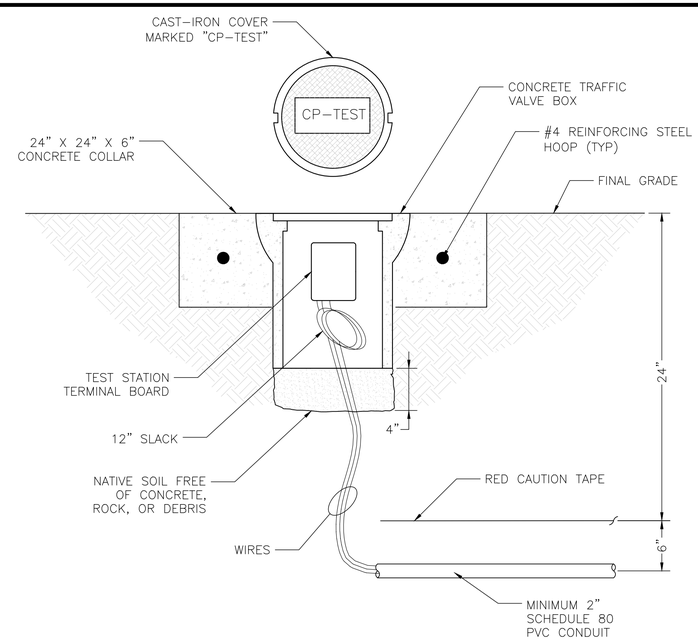


NOTE:

ATTACH RED WIRES ONTO THE FUTURE PIPE ONCE THE BLIND FLANGE IS REMOVED AS SHOWN IN DETAIL 1/CP-2. VERIFY ELECTRICAL ISOLATION AFTER CONNECTING FUTURE PIPELINE,

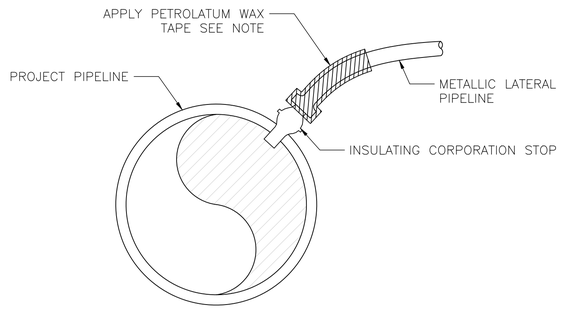
INSULATING JOINT TEST STATION TYPE B (IJTS (B)) FOR BLIND FLANGE PLAN VIEW A/—

SCALE: NTS



FLUSH-MOUNTED TEST STATION DETAIL 2/—

SCALE: NTS

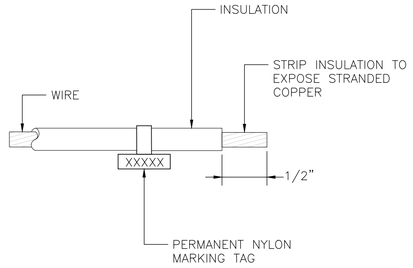


NOTE:

1. WRAP FIRST THREE FEET OF METALLIC LATERAL IN PETROLATUM WAX TAPE.
2. FAILURE TO ISOLATE CATHODICALLY PROTECTED PIPELINE FROM LATERAL CONNECTIONS MAY RESULT IN INSUFFICIENT CATHODIC PROTECTION AN EARLY ANODE DEPLETION.

LATERAL CONNECTION DETAIL 3/—

SCALE: NTS



WIRE IDENTIFIER SCHEDULE	
STRUCTURE	LABEL
16" DIP WATER	16" DI
GALVANIC ANODE	ANODE
XX" ADJOINING PIPE	XX" FP

WIRE IDENTIFIER DETAIL 4/—

SCALE: NTS

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Oakland, CA 94607
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V&A Project No. 25-0349

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REGISTERED PROFESSIONAL ENGINEER
GLENN H. WILLSON
NO. CR1076
CORROSION
STATE OF CALIFORNIA

consor

City of Calistoga Incorporated Jan 6 1885

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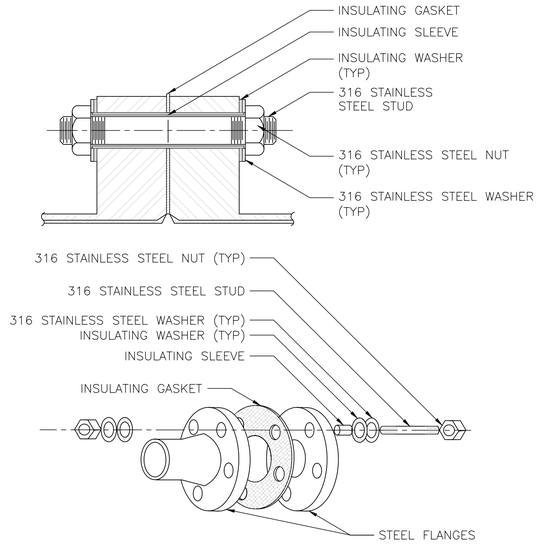
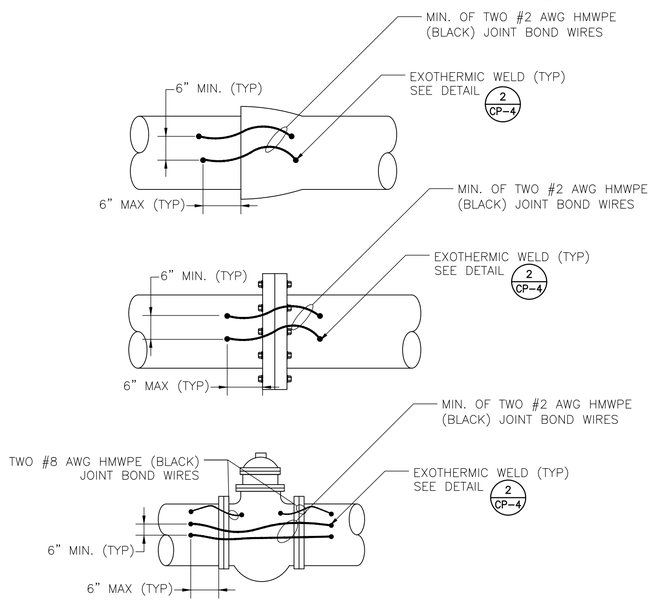


NOTE:

PETROLATUM WAX TAPE NOT SHOWN

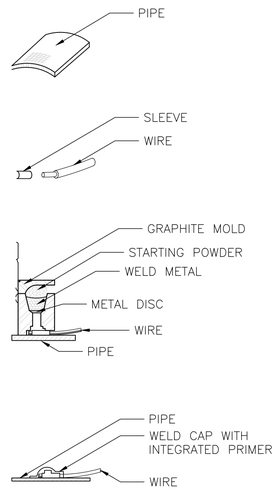
DIELECTRIC INSULATING FLANGE KIT DETAIL WITH SECTION VIEW — 1

SCALE: NTS



PIPE JOINT BONDING DETAILS FOR NON–INSULATED JOINTS — —

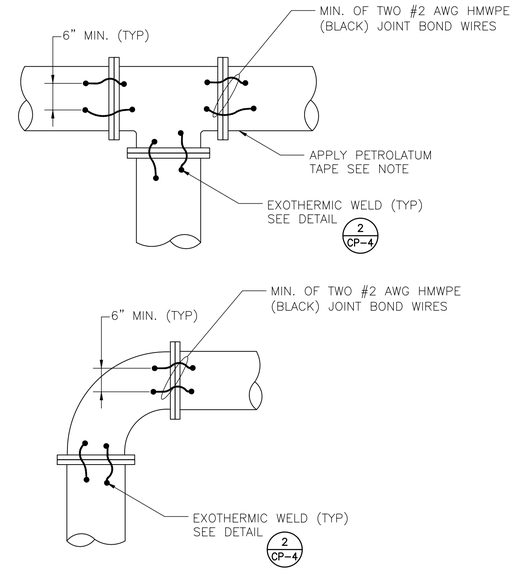
SCALE: NTS



1. ALL WELDS SHALL BE 6" APART AT MINIMUM.
2. GRIND PIPE TO BARE METAL AND CLEAN SURFACE. GROUND AREA SHALL BE LARGE ENOUGH FOR EXOTHERMIC WELD AND SMALL ENOUGH TO BE COMPLETELY COVERED BY WELD CAP.
3. STRIP INSULATION FROM WIRE AND ATTACH SLEEVE.
4. HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN. REMOVE SLAG FROM CONNECTION WITH CHIPPING HAMMER. TEST WELD WITH 22 OZ HAMMER.
5. COVER CONNECTION WITH WELD CAP WITH INTEGRATED PRIMER. REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH COATING AND LINING MANUFACTURER'S RECOMMENDATIONS.

EXOTHERMIC WELD DETAIL FOR DUCTILE IRON AND STEEL PIPE — 2

SCALE: NTS



PIPE JOINT BONDING DETAILS FOR NON–INSULATED JOINTS — —

SCALE: NTS

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CONN CREEK WATER LINE PROJECT

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