



Department of Veteran's Affairs
VA Medical Center
1898 Fort Road
Sheridan, WY 82801

SPECIFICATIONS

UPDATE MAIN WATER SUPPLY DESIGN MODIFICATIONS

Invitation No. VA 259-P-0484

Project No. 666-12-126

For Construction

August 13, 2013

Prepared by:



FourFront Design, Inc.
517 Seventh Street
Rapid City, SD 57701
(605) 342-9470

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UPDATE MAIN WATER SUPPLY DESIGN MODIFICATIONS

VA MEDICAL CENTER, SHERIDAN, WYOMING

VA Project #666-12-126

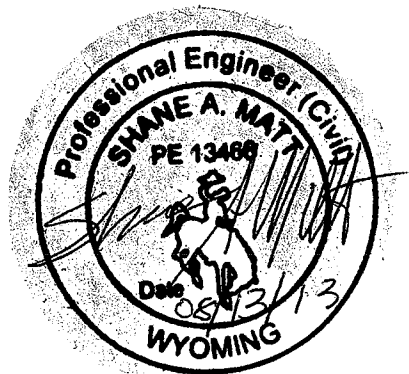
OWNER: VA Medical Center
1898 Fort Road
Sheridan, WY 82801

ENGINEER'S PROJECT NO.: 08-1542-019

DATE: August 13, 2013

ENGINEER: FourFront Design, Inc.
517 Seventh Street
Rapid City, SD 57701

CERTIFICATION: I hereby certify that these specifications were prepared by me
or under my direct supervision and that I am duly registered
under the laws of the State of Wyoming.




Shane A. Matt, PE

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**SPECIFICATIONS FOR CONSTRUCTION
VA MEDICAL CENTER - SHERIDAN, WYOMING
UPDATE MAIN WATER SUPPLY DESIGN MODIFICATIONS
VA #666-12-126
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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

- A. The Contractor shall furnish all labor and materials for the replacement of existing raw and potable water lines; construct two flow control structures including piping, valves, bends, air release manholes; install fire hydrants and valves; water service manhole reconnections and miscellaneous appurtenances at the Sheridan VA Medical Center, and perform the work as required by the drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Medical Center Engineering Officer.
- C. The office of FourFront Design, Inc., 517 Seventh Street, Rapid City, SD 57701 as Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. All employees of General Contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

1.2 CONSTRUCTION SAFETY

- A. Safety Submittals Required Prior To Commencing Work and/or Notice To Proceed:
 - 1. Prior to commencing work, General Contractor shall provide proof that an OSHA certified “competent person” (CP) (29 CFR 1926.20 (b) (2) will maintain a presence at the work site whenever the general or subcontractors are present. The CP will serve as the sole point of contact responsible for safety management on the project site. Competent persons are defined as those capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous, or dangerous, and who have the authority to take prompt corrective measures to eliminate them. This CP designation is a formal, required submittal that requires approval by the Contracting Officer’s Representative (COR).
 - 2. The contractor will submit proof of 30-hour OSHA safety course for prime contractor-designated competent persons as well as any subcontractor-designated competent persons that

will work on the site. This proof is a formal, required submittal that requires approval by the COR.

3. The Contractor will submit proof of 10-hour OSHA safety course for all other prime contractor employees as well as any subcontract employees that will work on the site. This proof is a formal, required submittal that requires approval by the COR.
 4. Submittals must include the names, qualifications, and training dates for the prime contractor-designated competent person (CP) designated to administer the site-specific safety program, as well as the CP (if different) for high risk activities as required by OSHA regulations, such as scaffolding, crane operations, excavations, trenching, etc.
 5. Federal acquisition regulation (FAR) 52.236-13, with alternate 1, requires submittal and approval of a safety plan, specific to the project and to the construction site. The contractor will submit a safety plan that includes detailed safety precautions and practices to mitigate identified hazards specific to this project and to this construction site. This plan is a formal, required submittal that requires approval by the contracting officer's technical representative (COR).
 - a. Refer to the end of these Specifications for VA provided Site Specific Safety Prevention Plan template to be modified as applicable by the awarded Contractor.
- B. Submit training records of all such employees for approval before the start of work.

1.3 STATEMENT OF BID ITEMS

- A. The Bid Proposal consists of a Base Bid and Seven (7) Add Alternates to replace the existing 8-inch raw water line and a section of the existing parallel 10-inch potable water line with 10-inch high density polyethylene pipe (HDPE) water lines with HDPE bends using butt-fused joints by way of the static pull and/or splitting methods of pipe bursting and some mechanical joint thrust restraint, ductile iron bends, a directional bore under Soldier Creek and some open cut excavation/backfill. In addition to the pipe installation, two precast concrete flow control structures, two air release manholes, two residential water service manholes, fire hydrants and isolation valves will be installed, complete and operational.

It is the intent to convert the majority of the newly constructed existing raw water line for usage as the Medical Center's potable water line. The existing potable water line will then become the line for raw water use to the Medical Center.

The work shall include, but is not limited to, pipe line disinfection, cathodic protection of metallic fillings, gravel surfacing, resetting of fences, seeding, fertilizing, mulching and other necessary or Owner required incidentals.

There are seven (7) Add Alternates to the Bid Proposal to give the Owner several construction options or priorities, depending upon the costs of the work and availability or access to the different property ownerships along the project route.

Each Add Alternate is for a different property owner as described below and shown on the plans. All Bidders shall complete and provide a Bid Proposal for the Base Bid and all seven Add Alternates. The Owner reserves the right to waive any informalities, and may choose to accept or reject any of the Bids or Add Alternates for whatever is advantageous or cost effective to the Owner.

- B. The Base Bid is for that portion of the water improvements across the VA Medical Center property at each end of the project using 10-inch HDPE pipe using butt-fused welded joints and bends or MJ ductile iron bends. The improvements would include the replacement of an existing air release manhole. There are also two (2) water service connections / reconnections that will be required with the Base Bid. At Stations 48+65 and 57+84 on the plans there are currently (two) water services connected to the existing 10-inch potable water line. The Base Bid will require that these water services be connected to both 10-inch water lines via the water service manhole and piping detail shown on plan detail Sheet CU504.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- C. Add Alternate No. One would increase the length and extent of the pipe bursting/splitting on the existing 8-inch raw water line for installation of new 10-inch HDPE pipe and bends through the property belonging to the Sheridan Heights Ranch, about 3,700 linear feet between approximate Stations 11+70 to 48+70. The improvements would include the replacement of an existing air release manhole.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- D. Add Alternate No. Two would increase the length and extent of the pipe bursting/splitting on the existing 8-inch raw water line for the installation of new 10-inch HDPE pipe with butt-fused joints and bends through the property belonging to the Double Eagle, LLC, about 920 linear feet between approximate Stations 48+70 to 57+90.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- E. Add Alternate No. Three would increase the length and extent of the pipe bursting/splitting on the existing 8-inch raw water line for the installation of new 10-inch HDPE pipe through the property belonging to William and Evelyn Ebzery, about 585 linear feet between approximate Stations 57+90 to 63+75 using butt-fused welded bends and joints.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- E. Add Alternate No. Four would replace the existing 10-inch potable water line for approximately 980 lineal feet between approximate Stations 57+18 to 67+10 right using the pipe bursting/splitting and open cut methods for the installation of new 10-inch HDPE, fire hydrant and isolation gate valves.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- F. Add Alternate No. Five would increase the length and extent of the pipe bursting on the existing 8-inch raw water line for the installation of new 10-inch HDPE pipe using butt-fused joints through the property belonging to Mydland, Elmer Milton Trustee, about 300 linear feet between approximate Stations 63+75 to 66+70.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- G. Add Alternate No. Six would increase the length and extent of the pipe bursting of the existing 8-inch raw water line for the installation of new 10-inch HDPE pipe through the property belonging to Wesley and Anna Richards for about 270 linear feet between approximate Stations 66+70 to 69+40. The improvements would also include the abandonment of a section of the existing 8-inch raw water line under Soldier Creek and the replacement of this section with new 10-inch HDPE pipe using the directional bore method of installation, new fire hydrant, isolation gate valves, bends and fittings.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

- H. Add Alternate No. Seven would increase the length and extent of the pipe bursting on the existing 8-inch raw water line for the installation of new 10-inch HDPE pipe through the property belonging to Rice and Sons, about 2,055 linear feet between approximate Stations 69+40 to 89+95 using butt-fused welded bends and joints.

Said price shall include all equipment, labor costs, incidental materials and costs for connecting or reconnecting to existing lines, disinfecting and pressure testing of all new water systems. The restoration work includes any grading work, seeding, fertilizing and mulching.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. AFTER AWARD OF CONTRACT, eight (8) sets of specifications and drawings will be furnished, two of which will be delivered to the VA. These drawings and specifications will be provided by FourFront Design, Inc.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense, from reproducible prints furnished by Issuing Office. Such prints shall be returned to the Issuing Office immediately after printing is completed. Documents are also available in digital format at no additional cost to the Contractor.

1.5 CONSTRUCTION SECURITY REQUIREMENTS

- A. Security Plan:
 - 1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
 - 2. The General Contractor is responsible for assuring that all Sub-contractors working on the project and their employees also comply with these regulations.
- B. Security Procedures:
 - 1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
 - a. Prior to commencement of work, all Contractor employees and Sub-contractors shall be issued appropriate 30 day or PIV Flash Badges. Contractor shall coordinate with COR for badge issuance. All Contractor employees and Sub-contractor personnel must wear appropriate badges at all times.

- b. PIV Flash Badges are the property of the U.S. Government and must be returned at the close of the project, or upon changes in onsite personnel. Final contract payment amounts of \$250.00 minimum per PIV badge shall be held back until Government issued badges are returned.
 - 2. Unless authorized in advance, the Contractor shall limit the regular hours of work from 7:00 a.m. to 4:30 p.m. Monday through Friday with no work on Saturday and Sunday. The VA Medical Center also wishes the Contractor to recognize certain holidays as of celebration and rest. The Contractor will not allow any work on the following holidays:

New Years' Day	Labor Day
Presidents Day	Veterans Day
Martin Luther King Day	Thanksgiving Day
Memorial Day	Christmas Day
Independence Day	
 - 3. For working outside the "regular hours" as defined in the contract, the General Contractor shall give three (3) days notice to the Contracting Officer so that security escort arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
 - 4. No photography of VA premises is allowed without written permission of the Contracting Officer.
 - 5. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.
- C. Key Control:
- 1. The General Contractor shall provide duplicate keys and lock combinations to the Resident Engineer for the purpose of security inspections of every area of the project, including tool boxes and parked machines.
- D. Heating:
- 1. If applicable to the project, salamander heaters are prohibited in buildings or enclosures.
- E. Document Control:
- 1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
 - 2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.

3. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
4. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

1.6 FIRE SAFETY

- A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
 1. American Society for Testing and Materials (ASTM):
 - E84-2008 Surface Burning Characteristics of Building Materials
 2. National Fire Protection Association (NFPA):
 - 10-2006..... Standard for Portable Fire Extinguishers
 - 30-2007..... Flammable and Combustible Liquids Code
 - 51B-2003 Standard for Fire Prevention During Welding, Cutting and Other Hot Work
 - 70-2007..... National Electrical Code
 - 241-2004..... Standard for Safeguarding Construction, Alteration, and Demolition Operations
 3. Occupational Safety and Health Administration (OSHA):
 - 29 CFR 1926 Safety and Health Regulations for Construction
- B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Resident Engineer and Facility Safety Manager for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the General Contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Resident Engineer and facility Safety Manager.
- F. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Resident Engineer and facility Safety Manager.
- G. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- H. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- I. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Resident Engineer and facility Safety Manager. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- J. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Resident Engineer and facility Safety Manager.
- K. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Resident Engineer and facility Safety Manager.
- L. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- M. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- N. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

1.7 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold

and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

- B. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- C. Working space and space available for storing materials shall be as determined by the Resident Engineer.
- D. Workmen are subject to rules of Medical Center applicable to their conduct.
- E. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Resident Engineer where required by limited working space.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Schedule delivery of materials to construction working areas approved by the Resident Engineer. Provide unobstructed access to Medical Center areas required to remain in operation.
- F. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer.
 - 1. Prior to digging, the Contractor shall call "One Call of Wyoming", 811 or 800-849-2476 and the VA Medical Center personnel identified during the Preconstruction Meeting.
 - 2. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Resident Engineer.

3. Contractor shall submit a request to interrupt any such services to Resident Engineer, in writing, 72 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
 4. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 5. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer. For any minor, short term interruptions, the Contractor shall notify the VA Resident Engineer 72 hours in advance of any work that will require a road closure or utility outage.
 6. In case of a contract construction emergency, service will be interrupted on approval of Resident Engineer. Such approval will be confirmed in writing as soon as practical.
- G. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- H. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.
 2. Open trenches shall not exceed 300 feet at a time during construction.

1.8 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Resident Engineer, of which are anticipated routes of access, and furnish a report, signed by the Contracting Officer. This report shall list by areas:
1. Shall note any discrepancies between drawings and existing conditions at site.
 2. Shall designate areas for working space, materials storage and routes of access to areas within buildings where construction occurs and which have been agreed upon by Contractor and Resident Engineer.
- B. Re-Survey: Thirty (30) days before expected partial or final inspection date, the Contractor and Resident Engineer together shall make a thorough re-survey of the areas of construction

involved. They shall furnish a report on conditions then existing, of surfaces or site improvements as compared with conditions of same as noted in first condition survey report:

1. Re-survey report shall also list any damage caused by Contractor to such original site features and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

1.9 INFECTION PREVENTION MEASURES

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Resident Engineer and Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
 1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- C. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
 1. Dampen debris to keep down dust as necessary and where directed by the Resident Engineer.

1.10 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
 1. Reserved items which are to remain property of the Government are noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.
 2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
 3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and

spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

1.11 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall recognize the sensitive nature of avoiding the disturbance of the crop and grass growing period to include irrigation and crop harvesting for the various property owners along the project alignment. The Contractor shall schedule construction sequencing to best preclude any crop lost charges for which they will be financially responsible. The Contractor may adjust the insertion points for the HDPE pipe bursting wherever possible to minimize damages or any necessary permits for which the Contractor is responsible. The Contractor shall re-establish disturbed areas back to original condition and coordinate with COR and individual property owner specific seed mixture requirements.
- B. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site that are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- C. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.
- D. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.12 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work.
Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of Section 00 72 00, GENERAL CONDITIONS.

1.13 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within fifteen (15) calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.14 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the Resident Engineer, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.15 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as reasonably required for this project. The Contractor shall carefully conserve any utilities furnished without charge. Utilities shall be made available only on VA Government owned property without charge as reasonably required for this project. The Contractor is responsible to provide all utilities outside the VA's property at his own expense.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.
- C. Heat: Furnish temporary heat if necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials.

1.16 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Resident Engineer coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations.

Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

1.17 HISTORIC PRESERVATION

- A. Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the Resident Engineer verbally, and then with a written follow up.

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SECTION 01 32 16.15
PROJECT SCHEDULES
(SMALL PROJECTS – DESIGN/BID/BUILD)

PART 1- GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the COR, within 10 days of bid acceptance. The qualification proposal shall include:
 - 1. The name and address of the proposed consultant.
 - 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 - 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES:

- A. The Contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.
- B. The Contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the COR, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 22 x 24 inches and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The Contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the Contractor of this requirement.

Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final schedule development period and shall reflect the Contractors as bid schedule. These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- D. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
 - 1. Notify the Contractor concerning his actions, opinions, and objections.
 - 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

1.6 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The Contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 – 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 – 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
 - 1. Show activities/events as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - b. Contracting Officer's and Architect/Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
 - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
 - 2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
 - 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of

- materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include a listing

of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
 - 1. Actual start and/or finish dates for updated/completed activities/events.
 - 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 - 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 - 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 - 5. Completion percentage for all completed and partially completed activities/events.
 - 6. Logic and duration revisions required by this section of the specifications.
 - 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. Before inserting the contract changes durations, care must be taken to ensure that only

the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.

- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
 - 1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 - 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 - 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
 - 1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
 - 2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 - 3. The schedule does not represent the actual prosecution and progress of the project.
 - 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations

(in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

- B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 – GENERAL

1.1 DESCRIPTION

For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

- 1.2 Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
- A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1.3 Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
- 1.4 Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1.5 The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request by Contracting Officer, adjustment in contract price and time.
- 1.6 Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submit samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in duplicate.
 - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. The Transmittal Letter shall be sent with the complete submittal package and shall contain the list of items, name of Medical Center, name of Contractor, contract number,

manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.

1. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
 2. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- D. Approved samples will be kept on file by the COR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible paper copy or PDF file.
 2. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 3. A space 4-3/4 by 5 inches shall be reserved on each drawing to accommodate approval or disapproval stamp.
 4. When work is directly related and involves more than one trade, shop drawings shall be submitted to the COR under one cover.
- 1.7 Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

Shane A Matt, PE - Project Engineer/Manager
FourFront Design, Inc., 517 Seventh Street, Rapid City, SD 57701

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARTMENT OF VETERANS AFFAIRS

Office of Construction & Facilities Management

Facilities Quality Service (00CFM1A)

811 Vermont Avenue, NW - Room 462

Washington, DC 20420

Telephone Numbers: (202) 461-8217 or (202) 461-8292

Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AGA	American Gas Association http://www.aga.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWS	American Welding Society http://www.aws.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com

EPA Environmental Protection Agency

<http://www.epa.gov>

ETL ETL Testing Laboratories, Inc.

<http://www.et1.com>

GSA General Services Administration

<http://www.gsa.gov>

ICBO International Conference of Building Officials

<http://www.icbo.org>

\ICAC Institute of Clean Air Companies

<http://www.icac.com>

MSS Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

<http://www.mss-hq.com>

NAPHCC Plumbing-Heating-Cooling Contractors Association

<http://www.phccweb.org.org>

NBS National Bureau of Standards

See - NIST

NFPA National Fire Protection Association

<http://www.nfpa.org>

NIH National Institute of Health

<http://www.nih.gov>

OSHA Occupational Safety and Health Administration

Department of Labor

<http://www.osha.gov>

PPI The Plastic Pipe Institute

<http://www.plasticpipe.org>

UBC The Uniform Building Code
 See ICBO

UL Underwriters' Laboratories Incorporated
 <http://www.ul.com>

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor.

1.2 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-06.....Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006)Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-01 (R2004)The Moisture-Density Relations of Soils Using a 5.5 lb. Rammer and a 12 in. Drop
 - T104-99 (R2003)Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T180-01 (R2004)Moisture-Density Relations of Soils using a 10 lb. Rammer and a 18 in. Drop
 - T191-02(R2006)Density of Soil In-Place by the Sand-Cone Method
- C. American Concrete Institute (ACI):
 - 506.4R-94 (R2004)Guide for the Evaluation of Shotcrete
- D. American Society for Testing and Materials (ASTM):
 - A325-06Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - A370-07Definitions for Mechanical Testing of Steel Products
 - A416/A416M-06.....Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
 - A490-06Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
 - C31/C31M-06Making and Curing Concrete Test Specimens in the Field
 - C33-03Concrete Aggregates
 - C39/C39M-05Compressive Strength of Cylindrical Concrete Specimens
 - C109/C109M-05Compressive Strength of Hydraulic Cement Mortars

C138-07	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
C140-07	Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-05	Slump of Hydraulic Cement Concrete
C172-07	Sampling Freshly Mixed Concrete
C173-07	Air Content of freshly Mixed Concrete by the Volumetric Method
C330-05	Lightweight Aggregates for Structural Concrete
C567-05	Density Structural Lightweight Concrete
C780-07	Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-08	Sampling and Testing Grout
C1064/C1064M-05	Freshly Mixed Portland Cement Concrete
C1077-06	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
C1314-07	Compressive Strength of Masonry Prisms
D698-07	Laboratory Compaction Characteristics of Soil Using Standard Effort
D1143-07	Piles Under Static Axial Compressive Load
D1188-07	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D1556-07	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-07	Laboratory Compaction Characteristics of Soil Using Modified Effort
D2166-06	Unconfined Compressive Strength of Cohesive Soil
D2167-94(R2001)	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2216-05	Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D2922-05	Density of soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

- D2974-07Moisture, Ash, and Organic Matter of Peat and Other Organic
Soils
- D3666-(2002).....Minimum Requirements for Agencies Testing and Inspection
Bituminous Paving Materials
- D3740-07Minimum Requirements for Agencies Engaged in the Testing
and Inspecting Road and Paving Material
- E94-04.....Radiographic Testing
- E164-03.....Ultrasonic Contact Examination of Weldments
- E329-07Agencies Engaged in Construction Inspection and/or Testing
- E543-06.....Agencies Performing Non-Destructive Testing
- E605-93(R2006)Thickness and Density of Sprayed Fire-Resistive Material
(SFRM) Applied to Structural Members
- E709-(2001)Guide for Magnetic Particle Examination
- E1155-96(R2008)Determining FF Floor Flatness and FL Floor Levelness Numbers
- E. American Welding Society (AWS):
- D1.1-07Structural Welding Code-Steel

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E 329, C 1077, D 3666, D3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Resident Engineer immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:
1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Resident Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Resident Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 2. Provide part time observation of fill and backfill placement and compaction of trench excavation and field density testing in building and utility areas and provide full time part time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
 3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural and utility fill.
- B. Testing Compaction:
1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698.
 2. Make field density tests in accordance with the primary testing method following ASTM D2922 wherever possible. Field density tests utilizing ASTM D1556 shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Resident Engineer before the tests are conducted.
 - a. Trenches: One test at maximum 100 foot intervals per 4 foot of vertical lift and at changes in required density, but in no case fewer than two tests.

- C. Testing Materials: Test suitability of on-site and off-site borrow as directed by Resident Engineer.

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

1.1 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
 - 1. Adversely effect human health or welfare,
 - 2. Unfavorably alter ecological balances of importance to human life,
 - 3. Effect other species of importance to humankind, or
 - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
 - 1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 - 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.

1.2 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 SUBMITTALS

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 - 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the Resident Engineer to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to

details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the Resident Engineer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.
 - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the Department of Veterans Affairs.
 - j. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.4 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Resident Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
 - 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 - 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 - 3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 - 4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
 - a. Reuse or conserve the collected topsoil sediment as directed by the Resident Engineer. Topsoil use and requirements are specified in Section 31 20 11, EARTH MOVING.

- b. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
- 5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control. Maintain such control measures throughout duration of work.
- 6. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
- 7. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
- 8. Handle discarded materials other than those included in the solid waste category as directed by the Resident Engineer.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
- D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Wyoming and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
 - 1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
 - 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.

3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Resident Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
 1. Perform construction activities involving repetitive, high-level impact noise only between 7:00 a.m. and 4:30 p.m. unless otherwise permitted by local ordinance or the Resident Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

<u>Time Duration of Impact Noise</u>	<u>Sound Level in dB</u>
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Use shields or other physical barriers to restrict noise transmission.
 - b. Use efficient silencers on equipment air intakes.
 - c. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - d. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
- F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Resident Engineer. Cleaning shall include off the station disposal of all items and materials not

required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION:

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Green waste (biodegradable landscaping materials).
 - 4. Metal products (eg, steel, wire, beverage containers, etc).
 - 5. Cardboard, paper and packaging.
 - 6. Plastics (eg, ABS, PVC).

1.2 RELATED WORK:

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE:

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction and demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Breakage.

- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul. Collect, and process recyclable debris from construction projects.
- F. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 SUBMITTALS:

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.
 - 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 - 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- B. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

- C. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.5 APPLICABLE PUBLICATIONS:

- A. Publication listed below forms a part of this specification to the extent referenced. Publication is referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC): LEED Green Building Rating System for New Construction.

1.6 RECORDS:

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration.

Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION:

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL:

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT:

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, and invoices. Include the net total costs for each disposal.

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SECTION 02 11 00
SITE CLEARING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of site clearing is shown on the drawings or specified herein.
- B. Site clearing work includes, but is not limited to:
 - 1. Protection of existing trees and shrubs.
 - 2. Removal of trees and other vegetation.
 - 3. Topsoil stripping
 - 4. Clearing and grubbing.
 - 5. Remove above-grade improvements.
 - 6. Removing below-grade improvements.
 - 7. Removal and replacement of other incidental items.

1.2 JOB CONDITIONS

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from the Resident Engineer.
 - 1. The Contractor shall notify the Contracting Officer's Representative (COR) 72 hours in advance to any road closure, utility outage, rerouting of traffic, etc.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
- C. Protect improvements on Government property.
- D. Restore damaged improvements to their original condition, acceptable to Resident Engineer.
- E. Salvage Improvements: Carefully remove items indicated to be salvaged, and store on Government premises where indicated or directed.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 SITE CLEARING

- A. Pollution Controls: Use water sprinkling and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulation pertaining to environmental protection.
- B. General: Remove only those trees, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction and approved by the Resident

Engineer for removal. Remove such items elsewhere on site or premises as specifically indicated on the drawings. Removal includes digging out stumps and roots.

- C. Topsoil: Topsoil is defined as friable clay loam surface soil. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2-inches in diameter, and without weeds, roots, and other objectionable material.
- D. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
- E. Remove grass and other vegetation from areas before stripping.
- F. Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.
- G. Stripped topsoil shall be used within the top 6-inches of the surface and just below imported topsoil.
- H. Dispose of unsuitable or excess topsoil same as waste material, herein specified.
- I. Clearing and Grubbing: Clear site of trees, shrubs and other vegetation approved by the Resident Engineer and interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated on the drawings. Removal includes digging out stumps and roots.
- J. Completely remove stumps, roots, and other debris protruding through ground surface.
- K. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place and compact fill material as specified in Section 31 20 11 EARTH MOVING.
- L. Removal of Improvements: Remove existing above-grade and below-grade improvements necessary to permit construction, except for those indicated.
- M. Removal or abandoned underground piping or conduit interfering with construction is included under this section.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Burning: Burning is not permitted.
- B. Remove debris and rubble and dispose of it off Medical Center property at an approved landfill according to Federal, State and Local laws or regulations.
- C. Waste soils materials shall be disposed of on Medical Center property at a site to be designated by the Resident Engineer.

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DIVISION 13 CORROSION PROTECTION

SECTION 13900 – CORROSION PROTECTION OF PLASTIC PIPE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide coatings and cathodic protection on all buried, submerged, or immersed ferrous metal (steel, ductile iron, and cast iron) piping and fittings.
- B. Provide galvanic anodes, joint bonds, and tight bonded coatings for all ferrous metallic pipe and fittings used in conjunction with plastic pipe sections.
- C. Maintain electrical isolation of cathodic protected pipes from other unprotected metallic pipes, structures, and grounding systems. Do not connect grounding system to cathodic protected portions of metallic pipelines, provide alternate grounds.
- D. Install test stations at location as shown on the Drawings or listed on a Schedule. Final locations determined by Engineer.
- E. The type of galvanic anode provided shall depend on the soil corrosion zone. See Section 2.07 and Detail 13900.
- F. Provide coatings, insulate and cathodic protection on all buried, submerged, or immersed copper services and fittings, per this section and the details. Provide petrolatum tape coatings for isolated copper fittings if not cathodically protected.
- G. Provide petrolatum tape coatings for restraining glands and tie rods if not already coated with a specified factory applied coating. Asphaltic coating is not a specified coating.
- H. Polyethylene encase valve and curb boxes.
- I. When connecting to existing cast or ductile iron water lines, attach an anode to the existing pipe at the point of connection.
- J. Coat, then concrete encase buried metallic pipe sections under building or tanks or as required to provide protection between plastic pipe and building, pump station, tank, vault, or concrete pipeline connections as shown on Drawings.
- K. Below grade Fittings and Appurtenances Coating:
 - 1. Where coating and lining specified for main pipeline is not feasible, coat and line all buried metallic (steel, ductile iron, and cast iron) valves, fittings, flexible couplings, incidental metallic piping, glands, blow-offs, and hydrants internally and externally with liquid epoxy or fusion bonded epoxy coating in accordance with AWWA C116 or AWWA C550 and this specification. Internal coatings shall be NSF approved for potable water service.
 - 2. Provide Series 300 stainless steel materials or coat all other miscellaneous buried metallic items, (tie rods, thrust restraints, tapping saddles, harnesses, etc.). Coat tie rods and rebar when directly exposed to soil. Provide with factory applied epoxy coating, fusion bonded epoxy coating, heat shrink sleeves, or with coating recommended by coating manufacturer for buried application and approved by Engineer for intended exposure.

3. Coat above-grade piping, vent pipe, bollards, etc. exposed to atmospheric conditions with two coats of polyamide epoxy and one top coat of polyurethane enamel or with a fusion bonded epoxy coating system. Color selected by Owner.

1.02 RELATED WORK

- A. Section 02641 – Valves and Valve Boxes
- B. Section 02644 – Fire Hydrants
- C. Section 02645 – Water Service Lines and Appurtenances
- D. Section 02710 – Water Main
- E. Section 02722 – Manholes

1.03 GENERAL

- A. Like items of materials provided hereunder shall be the end product of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.
- B. The CONTRACTOR shall be responsible for all such material furnished by him and shall replace, at his own expense, all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work or during the one-year correction period. The CONTRACTOR shall be responsible for the safe storage of materials furnished by him or to him and accepted by him and intended for the work. The interior of all pipe and other accessories shall be kept free from dirt and foreign matter at all times.

1.04 REFERENCE STANDARDS

- A. General: The latest revision of the following minimum standards shall apply to the materials and installation included in this specification, except where more stringent standards are applicable. In case of conflict, the most stringent requirements shall apply.
 - 1. American National Standards Institute (ANSI): C80.1-90, Rigid Steel Conduit-Zinc Coated.
 - 2. American Society for Testing and Materials (ASTM):
 - a) B418, Standard Specification for Cast and Wrought Galvanic Zinc Anodes.
 - b) C94, Standard Specification for Ready-Mixed Concrete.
 - 3. American Water Works Association (AWWA):
 - a) AWWA C116, Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
 - b) AWWA C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.

- c) AWWA C216, Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - d) AWWA C217, Cold-Applied Petrolatum Tape and Petroleum Wax Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - e) AWWA C550, Protective Epoxy Interior Coatings for Valves and Hydrants.
4. American Wood Preservers Association (AWPA):
 - a) C2, Commodity Standards for Lumber and Timber
 - b) P5, Waterborne Preservatives
 5. National Association of Corrosion Engineers International (NACE),
 - a) Recommended Practice RP0169, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
 - b) Recommended Practice RP-02-86, The Electrical Isolation of Cathodically Protected Pipelines.
 6. National Electrical Manufacturers Association (NEMA):
 - a) TC 2-83, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - b) WC 3-80, Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (R 1986).
 - c) WC 5-73, Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (R 1985).
 - d) WC 7-88, Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 7. National Fire Protection Association, National Electrical Code, NFPA 70.

1.05 DEFINITIONS

A. Cathodic Protection, (Cathodic Protect, Cathodically Protected, etc.): An electrical method of reducing or eliminating corrosion by making previous anodic areas on a structure surface, turn into a cathode by creating a dc current flow to the structure surface. Two common cathodic protection methods are galvanic anodes and impressed current cathodic protection systems. A galvanic anode system consists of galvanic anode materials (usually magnesium or zinc) that naturally corrodes or sacrifices itself and does not require an outside power source. An impressed current type system utilizes an outside power source usually a rectifier (that converts ac to dc current) and forces (impresses) current from a number of anodes (or groundbed) through the environment to the structure to be protected.

- B. Electrically Continuous Pipeline: A pipeline which has a linear electrical resistance equal to or less than the sum of the resistance of the pipe plus the maximum allowable bond resistance for each joint as specified in this section.
- C. Electrical Isolation: The condition of being electrically isolated from other metallic structures (including, but not limited to, piping, reinforcement, casings, etc.) and the environment as defined in NACE PR0286, The Electrical Isolation of Cathodically Protected Pipelines.
- D. Ferrous or Metallic Pipe: Any pipe or fitting made of steel or iron, or pipe containing steel or iron as a principal structural material (such as steel, ductile iron, and cast iron), except reinforced concrete pipe or stainless steel.
- E. Fittings: Appurtenances to include but not be limited to valves, fittings, tees, angles, couplings, tapping saddles or sleeves, blow-offs, hydrants, including glands, etc.
- F. Fasteners: To include but not be limited to bolts, nuts, washers, tie-rods, screws, restraining devices, etc.
- G. Foreign Owned: Any buried pipe or cable not specifically owned or operated by the City of Sheridan.
- H. Functional and Performance Testing: Tests necessary to demonstrate that installed equipment and systems function as specified and operate in the manner intended. Functional testing is a prerequisite to performance testing for equipment and systems specified to have a performance test.
- I. Joint Bonds: A method of making the pipeline electrically continuous by connecting a wire(s) across each side of the pipe joint or fitting
- J. Lead, Lead Wire, Joint Bonds, Pipe Connecting Wires, Cable: Insulated copper conductor; the same as wire.
- K. Loose Bonded Coatings: A dielectric coating that is not bonded or physically attached to the pipe surface (polyethylene encasement).
- L. Manufacturer's Representative: Employee of manufacturer who is factory trained and knowledgeable in technical aspects of their products and systems.
- M. Petrolatum: A purified mixture of semisolid hydrocarbons obtained from petroleum jelly.
- N. Petroleum Wax: A refined mixture of solid hydrocarbons, paraffin in nature, obtained from petroleum. Provided as a refined paraffin wax or microcrystalline wax forms.
- O. Structure-to-reference electrode potential (also structure-to-reference electrode voltage): The difference in voltage (potential) between the subject metallic structure and the electrolyte in which it is buried or submerged, as measured to the standard specified reference electrode placed in contact with the electrolyte.
- P. Test Station: Insulated lead wire connections to the structure, which are brought to a terminal board or box in order to allow an electrical connection to be made to the structure for cathodic protection testing.

Q. Tight Bonded Coatings: A dielectric coating that is bonded or physically attached to the pipe surface.

1.06 SUBMITTALS

- A. Provide catalog cuts and other information for all products proposed for use that shows compliance of those materials with these Specifications (including Section 01300 and the General Conditions). In addition the following specific information shall be provided.
- B. Installation, material, and safety requirements for thermite weld wire connections.
- C. Quality Assurance Submittals:
 - 1. Manufacturer's Certificates of Compliance.
 - 2. Field Test Reports.
 - 3. Certificate of Compliance with independent laboratory analysis stating that galvanic anode and backfill material supplied meets the requirements of this Specification.
 - 4. Certificate of Compliance from fitting and appurtenance manufacturer and supplier that bolting, nuts, and washers were provided with stainless steel Series 300 materials as specified.

1.07 QUALITY ASSURANCE

- A. Contractor's Competency: Contractor shall have a minimum of two (2) years of practical experience in the type of work called for in this specification, and shall have knowledge about local soil conditions. Contractor may be required to show proof and furnish a list of references substantiating this requirement to the satisfaction of the Owner.
- B. The Contractor shall provide at all times a thoroughly experienced and competent field foreman, who will be present to supervise this portion of construction on-site. This person shall be responsible for the field test reports and have the authority to represent the Contractor, and be the point of contact with the Engineer for this section of the specifications.
- C. The galvanic anode corrosion protection system and monitoring systems shall be fully operational upon completion of pipe installation.

1.08 OBSERVATION OF WORK

- A. Provide access to the project site for Owner, Engineer, and manufacturer at all times during installation and to observe finished work.
- B. The Contractor shall give the Engineer a minimum of 14 days advance notice of the start of any work to allow scheduling for field observation of the construction relating to corrosion protection.

1.09 RECORD DRAWINGS

- A. Contractor shall maintain an accurate record of the construction and a marked-up drawing of all construction modifications. At completion of project, the Contractor shall

provide a copy of the marked-up construction drawings of the corrosion control installations to the Engineer for preparation of Record Drawings.

1.10 SPECIAL GUARANTEE

A. The Contractor and Product Manufacturer shall jointly and severally warrant to the Owner and guarantee the work under this section against defective workmanship and materials for a period of one (1) year(s) or longer if required by the General Conditions commencing on the date of final acceptance of the work.

1. A warranty inspection of the corrosion protection systems shall be made within the warranty period. The Contractor and Product Manufacturer Representative at their option if desired may be present during the warranty inspection by the Engineer and Owner. Any defects in the corrosion protection system discovered at this time shall immediately be repaired in a timely manner (within 60 days of notice) by the Contractor in accordance with the written product manufacturer's instructions as reviewed and approved by the Engineer.

2. For all repairs, the Contractor shall provide an extended warranty (equal to the original warranty period) of one year(s) or longer if required by the General Conditions commencing on the date of final acceptance of the repair work. All repair or any damage to other work caused by such defects or repairing of the defects including additional engineering, full-time inspection during repairs, and re-warranty inspections shall be at sole cost to Contractor or Product Manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

A. Unless otherwise indicated, provide all first-quality, new materials, free from defects, in first class condition suitable for the intended use. Provide materials and equipment, which are the standard products of manufacturers regularly engaged in the production of such materials and equipment. Provide the manufacturer's latest standard design that conforms to these specifications.

B. Provide materials intended for this type of service in accordance with this specification and the referenced standards. Whenever the requirements of the Specifications or Drawings exceed those of the codes or manufacturer's instructions, the requirements of the Specifications or Drawings shall prevail. Where a larger size, higher quality, or better grade of material or a higher standard of workmanship is required, the most stringent requirement shall apply.

C. The use of a manufacturer's name and model or catalog number is solely for the purpose of establishing the standard of quality and general configuration desired. Products of other manufacturers of equal standard and quality will be considered in accordance with the General Conditions.

2.02 MATERIAL SUPPLIERS

A. Suppliers listed below can usually supply the types of materials specified in this section. Alternate suppliers will be considered, subject to approval of the Engineer. Address given is that of offices in the Western United States; contact these offices for information regarding the location of their representative nearest the project site:

1. Farwest Corrosion Control, Denver, CO (303-307-1447).
2. MESA Products, Inc., Tulsa, OK (918-627-3188).
3. Total Corrosion Services, TCS, Billings, MT (406-248-6985).

2.03 WIRES

A. General: Wire shall conform to applicable requirements of NEMA WC 3-80, WC 5-73, and WC 7-88. All cathodic protection wires and cables provided shall be insulated STRANDED copper wire. Wire size, type, and insulation type as specified in this section.

B. Joint Bonds:

1. General: Type of joint bonds shall depend on pipe joint coating and shall be either:

Insulated copper joint bond wires or insulated copper bond straps for all other locations.

2. Bond Lengths: Length of bond strap and joint bond wire may be adjusted for different pipe size and joint type per pipe manufacturer's recommendations so as to provide sufficient slack (1-inch minimum on each end or 2 inches total) for pipe or joint movement between each thermite weld connection with the following minimum lengths listed for each type of bond or strap and fitting or joint type.

3. Insulated Joint Bond Wires: Provide joint bond wires consisting of single-conductor, stranded insulated copper wire with 600-volt high molecular weight polyethylene (HMWPE) insulation. Supply all joint bonds complete with a formed copper sleeve on each end of the wire. Wire conductor for field-applied sleeves shall extend 1/4 inch beyond end of copper sleeve. End of factory formed copper sleeves shall be angled so as to allow end of wire to be exposed to thermite weld material.

a) For Pipe 16-inch or Larger Diameter:

- 1) For Push-on, Mechanical, or Flanged Joints: No. 2 AWG wires, 18-inches long minimum.

A) For Flexible Coupling Joints: No. 2 AWG wires, 24-inches long minimum, with two 12-inch long minimum insulated No. 12 AWG wire pigtails, as manufactured by Erico Products Inc. (Cadweld), Cleveland, OH; or equal. Smaller couplings than 24-inch OD pipe may allow shorter lengths. Larger couplings than for 36-inch OD pipe may require longer lengths. Confirm that bond wire length supplied provides a minimum of 1-inch slack on each end.

B) Bond wires with pig-tail wires can be utilized at not only flexible couplings, but at fitting or valve locations, where it is easier to bond over the fitting or valve with the larger bond wire. At these locations, the pig tail wires shall be bonded to the fitting or valve body.

- 2) For Insulated Flexible Coupling Joints: No. 2 AWG insulated copper wire, 18-inch long minimum, with one 12-inch long minimum No. 12 AWG wire pigtail.

b) For pipe smaller than 15-inch diameter, Contractor can utilize No. 4 AWG wire size instead of No. 2 AWG wire size, if desired.

c) Insulated Copper Strap Joint Bonds:

1) Utilize insulated (heat shrink coated) copper bond straps, where bond strap is not to be coated with pipe joint heat shrink sleeve in place of insulated wire type joint bonds..

2) Acceptable pre-made insulated copper strap bonds are available from:

J-Four Pipeline Products, (800-331-3404), Broken Arrow, OK; or approved equal.

4. Cathodic Protection Bond Wires or Bonding Straps shall be continuous. Bolted, inline sleeve, or compression type connections are NOT acceptable.

C. Test Wires:

1. No. 12 AWG wire for prepackaged galvanic anode and No. 10 AWG and No. 12 AWG test leads and No. 12 AWG and No. 14 AWG reference electrode lead wires shall be single-conductor, stranded copper wire with 600-volt, TW, THWN, THHN or HMWPE insulation.

2. No. 8 AWG for pipe lead wires shall be single-conductor, stranded copper wire with 600-volt, HMWPE insulation.

D. Wire Identification:

1. Wire insulation color shall indicate the function of each wire and shall be as shown on the Drawings and as follows:

a) Pipeline test wires:

1) Water Pipeline: Blue.

2) Foreign Pipeline: White or as requested by foreign pipeline company.

3) Unprotected Pipe: Black.

b) Anode lead wires: Black.

c) Reference electrode wires: Yellow.

d) Tracer wires: Green.

2.04 THERMITE WELD MATERIALS

A. Electrical connection of copper wire or copper strap to metallic (steel, ductile iron, and cast iron) fittings, pipe, and structures shall be by the thermite weld (cadweld) method.

B. Supply the proper size and type of wire sleeves, cartridges, and welder molds as required for each type of connection and pipe material in accordance with the thermite weld manufacturer's written recommendations. Weld materials from different manufacturers shall not be interchanged.

- C. Provide type of charges required for each pipe or fitting base material.
1. Provide steel charges for steel materials (Cadweld F-33 or Thermoweld P Standard Powder). Charge (cartridge) size shall be minimum of 15 grams and maximum of 25-grams for steel materials.
 2. Provide cast iron charges for all ductile iron and cast iron materials (Cadweld XF-19 or Thermoweld CI Cast Iron Powder). Charge (cartridge) size shall be minimum of 25 grams and maximum of 32-grams for ductile and cast iron materials.
 3. Maximum cartridge size for natural gas and petroleum pipelines and structures shall be 15-grams.
- D. Welder molds shall be graphite molds. Ceramic "One-Shot" molds will not be acceptable. Special welders and materials are required for copper strap, formed joint, and flexible coupling bonds. Vertical type connections require special welders and materials as recommended by the weld manufacturer.
- E. Adapter Sleeves:
1. Install adapter sleeves (Cadweld CAB 133H, Thermoweld A200, or approved equal) for all No. 12 AWG wires. Provide sleeve type as recommended by thermite weld manufacturer and attach in the field.
 2. Install adapter sleeves for all No. 4 AWG and No. 2 AWG wires. Either premade factory sleeved wires or wires with sleeves made in the field with the appropriate sized sleeves and hammer die are acceptable.
 - a) Factory formed sleeves shall be beveled to allow molten thermite weld material to directly contact wire.
 - b) Field formed sleeves shall be attached with the appropriate sized and type of hammer die and method as recommended by the thermite weld manufacturer. Wire conductor for field installed adapter sleeves shall extend 1/4 inch beyond end of the sleeve to allow molten thermite weld material to directly contact wire.
- F. Thermite weld materials are available as specified from Erico Products Inc. (Cadweld - 800-248-9356) Cleveland, OH; Continental Industries, Inc. (Thermoweld - 800-558-1373), Tulsa, OK; or approved equal.

2.05 THERMITE WELD CAPS

- A. Thermite weld caps shall consist of a 4-inch by 4-inch size premade weld cap filled with elastomeric mastic coating and suitable primer, such as the Handy Cap II with Royston Roybond 747 Primer, available from Royston Laboratories, or approved equal.

2.06 GROUND CLAMPS

- A. Ground clamps for wire connections to copper service pipe shall be sized to fit the pipe and wire and UL 467 listed for direct burial in earth or concrete. All parts of the clamp shall be bronze including bolts and nuts, as manufactured by Burndy, O. Z. Gedney, Thomas and Betts, or approved equal.

2.07 GALVANIC ANODES

A. General. Zinc anodes shall be used in Corrosion Zone 1, while Magnesium anodes shall be used in Corrosion Zone 2. Refer to Detail 13900.

B. Zinc Anode:

1. Zinc anodes for buried soil conditions shall meet the requirements of ASTM B418, Type II, composition as follows:

ELEMENT	CONTENT
Aluminum (Al)	0.0050% maximum
Cadmium (Ca)	0.0030% maximum
Iron (Fe)	0.0014% maximum
Lead (Pb)	0.0030% maximum
Copper (Cu)	0.0020% maximum
Zinc (Zn)	Remainder

2. Prepackaged Zinc Anode Dimensions:

BARE ANODE SIZE	5 POUND ANODE	18 POUND ANODE	30 POUND ANODE	ZINC GROUND CELL
Bare Anode Nominal Dimensions	1.4 inches by 9 inches long minimum	1.4 inches by 36 inches long minimum	2 inches by 30 inches long minimum	Two ea. 1.4" by 1.4" by 60" long, minimum
Packaged Weight	24 pounds minimum	70 pounds minimum	70 pounds minimum	Each ground cell 30 pounds minimum
Nominal Package Size	5" diameter by 15 inches long minimum	5" diameter by 42 inches long minimum	5 inches by 36 inches long minimum	8 inches by 78 inches long minimum

C. Magnesium Anode:

1. High-Potential Magnesium Composition for buried soil applications shall have the composition as follows:

ELEMENT	CONTENT
Aluminum (Al)	0.010% maximum
Manganese (Mn)	0.500% to 1.300%
Zinc (Zn)	0.002% maximum
Silicon (Si)	0.002% maximum
Copper (Cu)	0.020% maximum
Nickel (Ni)	0.001% maximum
Iron (Fe)	0.030% maximum
Total Others	0.050% each or 0.300% maximum, total
Magnesium (Mg)	Remainder

2. Prepackaged Magnesium Anode Dimensions:

BARE ANODE SIZE	5 POUND ANODE	17 POUND ANODE	32 POUND ANODE
Bare Anode Nominal Dimensions	3 inches by 7 inches long minimum	3 inches by 25 inches long minimum	5 inches by 21 inches long minimum
Packaged Weight	14 pounds minimum	42 pounds minimum	68 pounds minimum
Nominal Package Size	5 inch diameter by 13 inches long minimum	6 inch diameter by 29 inches long minimum	7 inches by 30 inches long minimum

3. Acceptable High Potential Magnesium Anodes: Dow Galvomag, Magcorp (formerly Amax) Maxmag, or approved equal.

D. Prepackaged Galvanic Anode General Requirements:

1. Anode Wire: Supply each anode with No. 12 AWG stranded copper wire with TW, THWN, THHN or HMWPE TW, THWN, THHN or HMWPE insulation, 10 feet long minimum. Provide longer anode leads as required for test stations to extend splice free from anode to test station location. Lead wire shall be coiled and bound.
2. Wire-to-Anode Connection: The galvanic anode material shall be cast around a galvanized steel wire, strap, or pipe core. The anode connection to the steel core shall silver-soldered (45% silver) by the manufacturer's standard process and be stronger than the wire. Connection of lead wire to anode shall be electrically insulated with manufacturer's standard waterproof epoxy or electrical potting compound type insulation.
3. Prepackaged Anode Backfill: Backfill shall have a grain size so that 100 percent is capable of passing through a 20-mesh screen and 50-percent will be retained by a 100-mesh screen. The backfill mixture shall be thoroughly mixed and firmly packaged around the galvanic anode within the cloth bag or cardboard tube by means of adequate vibration. The complete packaged galvanic anode shall weigh a minimum of 2.0 times the bare anode weight. The quantity of backfill shall be sufficient to cover all surfaces of the anode to a depth of 1-inch.
4. Packaging and Shipping: Bare anodes shall be centered in cotton bag filled with specified backfill. Provide electrode packaged in a plastic or heavy multi-walled paper bag of sufficient thickness to protect the anode, wire, backfill, and cloth bag during normal shipping and handling.
5. Compliance Statement: Furnish an independent laboratory analysis certifying that all anode and backfill material supplied meets the requirements of this Specification.
6. Field Verification: At Engineer's option, a galvanic anode may be selected at random for Contractor to provide an independent laboratory analysis on to demonstrate anode and backfill material supplied meets the requirements of this Specification.

7. Prepackaged Galvanic Anode Backfill Composition:

ELEMENT	CONTENT
Ground Hydrated Gypsum	75 Percent
Powdered Wyoming Bentonite	20 Percent
Anhydrous Sodium Sulfate	5 Percent

2.08 CATHODIC PROTECTION TEST STATIONS/JUNCTION BOXES

A. Post Mounted Test Stations:

1. Test stations shall be a molded polycarbonate or cast aluminum boxes and shall be the standard product of a recognized manufacturer. Minimum test station size shall be 4-inches by 8-inches by 2-inches deep for rectangular shaped test stations and 4-1/2-inches in diameter for circular shaped test stations. Circular or round shaped test stations shall be provided with a screw-on cover with O-ring seal. Rectangular shaped test stations shall be provided with a removable lid and stainless steel lid-locking nut.
2. Test stations shall be provided with a minimum of seven (7) terminals mounted on a plastic- or glass-reinforced laminate terminal block. Terminal nuts and studs shall be 1/4-inch with double nuts for securing the studs to the terminal board. Terminal nuts, studs, flat and lock washers shall be Series 300 stainless steel, nickel- plated brass, or bronze.
3. Test stations shall be suitable for mounting on a threaded 1-inch or larger rigid galvanized steel conduit. Test stations shall be provided with all mounting hardware (galvanized conduit straps, wood screws, conduit bushing, etc.) necessary to provide a rigid support to a 4-inch by 4-inch by 5-foot long pressure-treated wood post. Wood post shall be pressure treated with a waterborne preservative intended for fresh water or soil (burial) contact to a retention of 0.40 pounds per cubic foot (6.4 kilograms per cubic meter) in accordance with AWPA Standard C2 for Lumber and Timber and AWPA Standard P9 for Waterborne Preservatives.
4. Acceptable round style test stations are the Testox 800 Series as manufactured by Gerome Manufacturing Company, Uniontown PA; or approved equal.
5. Acceptable rectangular test stations are the Testox 700 Series as manufactured by Gerome Manufacturing Company, Uniontown PA; or approved equal.

B. Flush Mounted Test Stations in Traffic Areas

1. Test Box: Concrete body cast with a cast iron ring, with a minimum weight of 55 pounds and minimum dimensions of 8-inch inside diameter and 12-inches long. Furnish extensions as required to penetrate concrete surfaces by 4-inches minimum. Furnish with a 12-pound cast iron lid with the letters "TS" or words "Test Station" cast into the lid.
2. Terminal Block: Plastic or glass-reinforced, 1/4-inch thick laminate terminal board with minimum dimensions of 4-inches by 6-inches. Furnish terminal block with a minimum of seven (7) terminals. Terminal nuts and studs shall be 1/4-inch with double nuts for securing the studs to the terminal board. Terminal nuts, studs,

flat and lock washers shall be nickel-plated brass, bronze, or Series 300 stainless steel.

3. Manufacturer and Products: Brooks; Models 1RT or 3RT; or approved equal.

C. Shunts:

1. Shunts for junction box and test stations shall be:

a) 0.01-ohm, minimum 6 amp capacity: Holloway Type RS 0.01 ohm manganin wire shunt with 6 amp capacity or MCM Miller 0.01-ohm shunt, COTT or T and R (Yellow) 0.01-ohm shunt with 8 amp capacity, or approved equal.

b) As shown on Drawings.

2.09 REFERENCE ELECTRODES

A. Prepackaged Copper/Copper Sulfate Reference Electrodes:

1. General: Permanent reference electrode for buried piping locations shall be a copper/copper sulfate reference electrode. Reference electrode dimensions shall be approximately 2 1/2-inches in diameter by 10-inches long. Reference electrode shall be suitable for permanent installation and designed for a 10-year minimum life expectancy with an accuracy of plus or minus 5-millivolts.

2. Electrode manufacturer shall warrant electrode for 10-year design life and provide both labor and material replacement, if electrode becomes unstable by more than 20 millivolts during design life.

3. Prepackaging and backfill: Electrodes shall be supplied prepackaged in a permeable cloth bag containing manufacturer's special low-resistivity backfill mixture formulated to retain moisture and maintain electrode stability. Outside dimensions of electrode package shall be approximately 8-inches in diameter by 15-inches long.

4. Lead wire: Supply electrode with a lead wire attached and electrically insulated with the manufacturer's standard connection. The connection shall be stronger than the wire. Lead wire shall be single conductor No. 14 AWG or larger stranded copper wire insulated as specified under WIRE, this section. Lead wire shall be of sufficient length to reach splice free from reference electrode to test station. Lead wire shall be coiled and bound.

5. Packaging: Package cloth bag with reference electrode in a plastic or heavy paper bag of sufficient mil thickness to protect the electrode, wire, backfill, and cloth bag during normal shipping, handling, and storage.

6. Acceptable CU/CUSO₄ reference electrodes are STAB-L-CELL as available from Cathodic Protection Services (Corrpro), Tulsa, OK; FWCC Series as available from Farwest Corrosion Control, Gardena, CA; Permacell 802 as available from Corrpro, Medina, OH; or approved equal.

2.10 PLASTIC REFERENCE MONITORING PIPE

A. IR Drop Test Station Plastic Reference Pipe: A 3-inch minimum diameter Schedule 40 PVC plastic pipe with a threaded pipe cap shall be provided at IR Drop Free Potential Test Stations as shown on the Drawings. Plastic reference monitoring pipe at flush test stations shall not require threaded cap.

2.11 CONDUIT, LOCKNUTS, AND STRAPS

A. The minimum conduit size shall be 1-inch diameter unless otherwise indicated on Drawings or specified.

B. Use intermediate metal conduit, including couplings, elbows, nipples, and other fittings, hot-dipped galvanized and meeting the requirements of UL and the NEC. Do not use setscrew type couplings, elbows, and nipples unless approved by the Owner.

C. Heavy wall rigid PVC conduit shall be Schedule 40, UL listed for concrete-encasement, underground direct burial, concealed and direct sunlight exposed use. Use conduits, couplings, elbows, nipples, and other fittings meeting the requirements of NEMA TC and TC 3, Federal Specification W-C-1094, UL, NEC, and ASTM specified tests for the intended use.

D. Flexible metal conduit shall be UL listed, liquid-tight flexible metal conduit consisting of galvanized steel flexible conduit covered with an extruded PVC jacket and terminated with nylon bushings or bushings with steel or malleable iron body and insulated throat and sealing O-ring.

E. Locknuts, two-hole straps, and other miscellaneous hardware shall be galvanized steel. Galvanized items shall be hot-dipped galvanized in accordance with ASTM A153.

F. Conduit bushings shall be threaded plastic or plastic-throated galvanized steel fittings.

2.12 WIRE CONNECTIONS AND SPLICE MATERIALS

A. Compression Connectors: Compression connectors for in-line, multi-splices, and tap splices shall be "C" taps made of conductive wrought copper, sized to fit the wires being spliced. Compression connectors shall be applied with the crimp tool and die recommended by the manufacturer for the wire and tap connector size. Acceptable Type "YC" wire compression connectors as manufactured by Burndy Co., or approved equal.

B. Silver Brazing Alloy: Brazing Alloy with 15 percent silver content, 1185 to 1300 degrees F melting range.

C. Splice Kits: In-Line splice insulating kit for insulation repair shall be epoxy resin, 3M Company Scotch Cast; Royston Mini Splice-Right; or approved equal.

D. Electrical Splicing Tape: Tape for wire splice insulation shall be 30 mil linerless rubber high voltage splicing tape, Scotch 130C; and 7 mil vinyl electrical tape, Scotch Super 33+; suitable for moist or wet environments, as manufactured by 3M Products; or approved equal.

E. Wire Connector Terminals: A ring tongue terminal or single hole solderless lug (Lug-it) type connector shall be installed on the end of all stranded wire before connecting it to

test station, terminal box, or junction box terminal studs. Wire connector terminals shall be sized to fit wire and stud size.

1. One-piece copper, tin-plated crimp-on ring tongue terminal. Acceptable ring tongue wire connectors are manufactured by Burndy Co., 3M, Panduit, Thomas and Betts, IDEAL, or approved equal.
2. Seamless copper Lug-it type connector rated shall be UL listed for 600 volt service with off-set tongue. Acceptable single hole solderless lugs are manufactured by ILSCO, or approved equal.

F. Electrical Sealer: Provide electrical sealer Ivy-spray Type Scotch 1603, manufactured by 3M Company, or approved equal.

G. Electrical Connectors: Hardware used in electrical connections including bolts, studs, nuts, washers, and lock-washers shall be tin or nickel plated copper, brass, bronze, or 300 series stainless steel for electrical conductivity and atmospheric corrosion resistance.

2.13 TRACER WIRE

A. Tracer Wire:

1. No. 10 AWG wire for tracer wire shall be single-conductor, stranded copper wire with 600-volt, TW, THWN, THHN or HMWPE insulation.
2. Tracer wire will only be required for non-metallic pipe sections.
3. Tracer wire insulation shall be resistant to corrosive soil and intended for extended direct burial service with color as specified under "Wires" this section.
4. Tracer wire tape shall be 1-inch minimum width polyethylene tape intended for direct burial service.

B. Tracer Wire Access Boxes:

1. Flush Mounted Terminal Box:

a) Plastic flush terminal box body (12" long, 2 1/2" diameter minimum size) with cast iron collar and lockable cast iron lid. Minimum two wire non-conductive terminal board with stainless steel, nickel-plated brass, or bronze hardware for wire terminations.

b) Acceptable flush mounted tracer wire access boxes are:

- 1) Valvco Pipe Tracer Wire Terminal Box available from Sioux Pipe, Sioux Falls, South Dakota.
- 2) C.P. Mini Box available from C.P. Test Services, Inc.
- 3) T2 Cathodic Test Station available from Handley Industries.
- 4) Or approved Equal

2. Post Mounted Terminal Box:

a) Condulet style terminal box with minimum two wire terminal board. Terminal board shall be non-conductive material suitable for outdoor exposure (Lexan, UV protected polycarbonate plastic, etc.). Terminal hardware for wire terminations shall be Series 300 stainless steel, nickel-plated brass, or bronze.

b) Condulet style terminal box shall be suitable for mounting on a threaded 3/4-inch or larger rigid galvanized steel conduit. Terminal box shall be provided with all mounting hardware (conduit straps, wood screws, conduit bushing, etc.) necessary to provide a rigid support to a 4-inch by 4-inch by 5-foot long pressure-treated wood post. Wood post shall be pressure treated with a waterborne preservative intended for fresh water or soil (burial) contact to a retention of 0.40 pounds per cubic foot (6.4 kilograms per cubic meter) in accordance with AWWA Standard C2 for Lumber and Timber and AWWA Standard P9 for Waterborne Preservatives.

c) Acceptable post mounted tracer wire access boxes are:

- 1) T-2 or T-4 Condulet Style Test Heads available from Tinker and Rasor.
- 2) Finklet Test Station or Finkplate Condulet Terminal Board available from COTT Manufacturing Company.
- 3) Two wire condulet test station head available from Agra Equipment Company.
- 4) Or approved Equal

2.14 WARNING TAPE

A. Warning tape shall be heavy-gauge, 4 mil minimum thickness, plastic tape for use in trenches.

1. Warning tape shall be non-traceable type. Warning tape shall be resistant to corrosive soil and intended for extended direct burial service.

2. Tape shall meet A.P.W.A. national color code and shall be imprinted with an appropriate legend to define the type of utility. Tape shall be labeled with bold black letters for full length of tape.

3. Warning tape for plastic and metallic water pipelines below 12-inch size shall be a minimum of 6-inch width. Warning tape for pipe equal to or larger than 12-inch shall be a minimum of 12-inch width. Warning tape shall be blue, and labeled "CAUTION: WATER LINE BURIED BELOW".

4. Acceptable products are available from ITT Blackburn; Allen Systems, Inc.; Griffolyn Co.; or approved equal.

2.15 INSULATING JOINTS

A. General: Insulating joints shall be dielectric unions, flanges, or couplings. The complete assembly shall have an ANSI rating equal to or higher than that of the joint and

pipeline. All materials shall be resistant for the intended exposure, operating temperatures, and products in the pipeline.

B. Copper Service Line Insulators:

1. Insulated service fittings shall consist of brass union body that encapsulates nylon insulator specially designed to provide electrical isolation for this type of intended use:

a) Insulated corporation ball valves, insulated curb ball valves.

b) Service Line Insulators shall be provided to insulate copper or metallic service lines as shown on the Drawings.

c) Service Line Insulator Model Number will depend on designated insulator location and piping connections.

2. Consult manufacture for model number and installation procedures for each application. Acceptable Service Line Insulators are available from:

a) Mueller Co., Decatur, IL (800-423-1323), or approved equal.

2.16 LININGS AND COATING

A. Supply pipe and fittings with linings and coatings of the same type as adjacent pipe, except where shown on the Drawings or called out in the Specifications. Coat pipe and fittings installed as specified herein.

B. Coat metallic pipe and fittings installed above-grade as specified herein. Provide exterior coating for all above-grade piping, fittings, bollards, and vent pipes with two coats of polyamide epoxy coats at 2.5 to 3.5 mils dry film thickness per coat (MDFTPC) and with one top coat of polyurethane enamel at 3 to 4 MDFT or with a 12-mil fusion bonded epoxy coating system. Minimum surface preparation shall be near-white metal blast (SSPC SP-10) for external surfaces. Color as selected by Owner.

C. Coat and line all buried metallic (steel, ductile iron, and cast iron) valves, fittings, miscellaneous piping, and hydrants internally and externally. Supply factory coated valves and fittings with linings and coatings of the same type as adjacent above grade pipe, except where shown on the Drawings or where coating or lining specified for buried main pipeline is not feasible for fabricated items or special pipe pieces (such as incidental metallic piping, valves, fittings, flexible couplings, glands, hydrants, etc.).

D. At Contractor's option, factory coat or line the incidental piping, valves, or fittings with liquid epoxy or with fusion-bonded epoxy coating in accordance with AWWA C116 or AWWA C550. Internal coatings shall be NSF approved for potable water service. Bolts, nuts, and washers, (including in valve bonnet and stuffing box) shall be Series 300 stainless steel.

E. Internal linings and coatings in contact with water shall be NSF approved for potable water service.

F. All ferrous interior mounting faces/surfaces shall be prepared and shop primed with a suitable rust-inhibitive holding primer applied in accordance with this specification and the coating manufacturer's recommendations. Holding rust-inhibitive primer shall be compatible with specified top coats. Apply per coating manufacturer's recommendations to

a thickness that will not impair the clearances required for proper installation of the joint or fitting (valve) operation.

G. Ductile Iron and Cast Iron Surface Preparation: Use SSPC SP grades as surface preparation guide only as it applies to cast iron or ductile iron in percentage cleanliness required and surface contaminants removed, not the color of the metal. The abrasive blast cleaning operation shall remove the same percentage of all surface contaminants (including tightly adhered annealing scale) as the SSPC SP grade referenced. The entire surface area shall be abrasive blasted. No rust stains shall be allowed. Avoid overblasting, high nozzle velocities, and excessive blast times. Cast iron and ductile iron attain a gray color when abrasive blasted due to the higher carbon content compared to steel. For example if a SSPC SP-10 Near White Grade is specified for cast iron or ductile iron, the degree of surface cleanliness is comparable to a near white blast for steel and requires 95 percent removal of all surface contaminants including tightly adhered annealing scale. The one exception is that the ductile or cast iron will not be required to be near-white, but will only be required to be a near-gray color.

H. Liquid Epoxy: Provide factory applied liquid epoxy lining and coating in accordance with AWWA C210 and AWWA C550 and these specifications. Epoxy material shall meet the performance requirements of the referenced AWWA standards. Epoxy material shall be the product of a coating manufacturer normally engaged in production of such material and shall be for intended service conditions. The liquid epoxy coating shall be a two part chemically cured coating or 100-percent material. Coating shall be mixed and applied per coating manufacturer's directions. Liquid-epoxy lining of metallic pipe and fittings shall be potable grade epoxy coating approved for potable water contact and this type of intended service. Abrasive blast with material and in manner as recommended by coating manufacturer to produce surface profile depth and angular shape needed. Surface preparation shall be a minimum of SSPC SP-5 (White) for immersion service and SSPC SP10 (Near White) or better for external service. Coating shall be a minimum of two or more coat system with a minimum thickness of 14 to 16 mils dry film thickness (MDFT). Minimum adhesion to prepared steel shall be 400 psi per ASTM D1002 or per coating manufacturer's printed literature, which ever is higher.

Liquid Epoxy	ICI Devoe	Sherwin-Williams	Tnemec
Liquid Epoxy AWWA C210 and AWWA C550 (Coating in contact with potable water surfaces shall be approved for potable water contact and conforming to NSF Standard 61)	Bar-Rust 233 H	Epoxide II LT	Pota Poxy Series 20

1. Fusion-Bonded Epoxy: Provide factory applied fusion-bonded epoxy lining and coating in accordance with AWWA C213, AWWA C116, and AWWA C550, and these specifications. Fusion-bonded epoxy material shall meet the performance requirements of the referenced AWWA standards. Fusion-bonded epoxy material shall be the product of a coating manufacturer normally engaged in production of such resin and shall be for intended service conditions. The fusion bonded epoxy coating shall be a 100 percent powder epoxy based thermosetting coating. Coating shall be applied by flocking, fluidized bed, or electrostatic method per coating manufacturer's directions. Fusion-bonded epoxy lining of metallic pipe and fittings shall be potable grade epoxy coating approved for potable water contact and this type of intended service. Abrasive blast with material and in manner as recommended by coating manufacturer to produce surface profile depth and

angular shape needed. Surface preparation shall be a minimum of SSPC SP-5 (White) for immersion service and SSPC SP10 (Near White) or better for external service. Fusion bonded epoxy coating shall be one or two-coat system with a minimum thickness of 8 to 10 mils dry film thickness (MDFT). Minimum adhesion to prepared steel shall be 3,000 psi per ASTM D1002 or per coating manufacturer's printed literature, which ever is higher.

Fusion-Bonded Epoxy	3M Scotch Coat	Herberts O'Brien Nap Gard DuPont Powder Coatings	Valspar (formally Lilly Industries)
Fusion Bonded Epoxy AWWA C213, AWWA C116, and AWWA C550 (Coating in contact with potable water surfaces shall be approved for potable water contact and conforming to NSF Standard 61)	Scotchkote 206N (NSF 61 Internal and External) or Scotchkote 6233 for pipe	Nap-Gard Mark X 7 -2500 Pipe Coating (External Only)	Pipeclad 3100 Red (NSF 61 Internal and External) or Pipeclad 2000 Green (External Only)

J. Conduct dry film thickness measurements and 100-percent holiday inspection of all epoxy factory coated items prior to shipment. Repair all defects with approved repair material according to coating manufacturer's directions prior to shipment.

K. Provide repair kits for epoxy-coated materials.

L. Provide stainless steel materials or coat all other miscellaneous buried metallic items, (tie rods, thrust restraints, tapping saddles, harnesses, etc.). Coat tie rods and rebar when directly exposed to soil. Provide with factory applied epoxy coating, fusion bonded epoxy coating, heat shrink sleeves, or with coating recommended by coating manufacture for buried application and approved by Engineer for intended exposure.

2.17 BOLTS, NUTS, WASHERS

A. All bolts, nuts, and washers installed below-grade (either buried, submerged, immersed in water, or in vaults) shall be Stainless Steel Series 300. All nuts shall be fully seated. Nuts shall be compatible with the bolts and have a proof stress equal or greater than the tensile strength of the bolts. Bolt size, lengths, and tensile strength shall be as designed for the application.

B. Stainless steel bolts shall be Type 304SS. Nuts shall be semi-finished heavy hex head ASTM A 194 (Type 303SS). Stainless steel washers shall be Type 304. Stainless steel nuts shall comply with ASTM F594. Stainless steel bolts and nuts shall be provided with an anti-galling lubricating compound. Provide with certification that stainless steel bolts, nuts, and washer materials provided were as specified with name of stainless steel manufacturer and Series 300 grade provided.

C. Fusion bonded coated steel bolts, nuts, and washers shall only be used if specially allowed in the drawings or Special Provisions. They shall be coated with 10 to 12 mils minimum epoxy coating per AWWA C213. Surface preparation shall be SSPC SP-10 (near white). The bolts shall be undersized or the nuts oversized as required to minimize damage to coatings, however, size shall still satisfy design and manufacturer's requirements for bolt strength and size in the particular application. Provide with applicator name, coating manufacturer and product number, and certification that coating was applied as specified.

D. All bolts and nuts shall be installed according to manufacturer's requirements including the use of anti-galling lubricant compound for stainless steel materials. If galling or seizing of the nut and bolt occurs they shall be cut off and replaced with a new nut and bolt. Exercise care to assure tightening of the nut is against the flange or gland and not due to galling or seizing.

E. Galvanized or black steel materials (piping, nipples, unions, fittings etc.) shall not be used in wet, immersed, or buried locations or vaults unless coated as specified.

2.18 PIPE AND FITTING FIELD COATING REPAIR MATERIALS

A. Field Coating Repair Materials:

1. Heat Shrink Sleeve and Sleeve Repair Materials: Heat shrink sleeve repair materials shall consist of either heat shrink sleeve in tube form or heat shrink patch kit depending on size and shape of repair. Acceptable heat shrink products are Tapecoat TC LS/75 sleeve or Tapecoat TC SL/75 precut repair kit available from The TAPECOAT Company, Evanston, IL.; Raychem WaterWrap sleeve or PERP Repair Patch Kit available from Tyco Adhesive (Polyken Kendall) Mansfield, MA.; CANUSA Aqua-Shield Aqua-Sleeve or CANUSA CRPK Repair Patch Kit available from CANUSA, Inc., The Woodlands, TX.; or approved equal.

2. Tape: Cold-applied field repair polyethylene repair type coatings shall consist of suitable primer and minimum 35-mil thick patch/repair/joint tape with aggressive adhesive and release liner, 4 or 6-inches width. Suitable primer shall be provided with the repair coatings as recommended by the repair-coating manufacturer. Acceptable products are Tapecoat H35 Gray available from The TAPECOAT Company, Evanston, IL.; Polyken 1027 primer and Polyken 934-35 tape available from Tyco Adhesive (Polyken Kendall) Mansfield, MA.; Tek-Rap 200-23 Series primer and Tek-Rap 280 tape available from Tek-Rap, Inc., Houston, TX.; or approved equal.

3. Epoxy Coatings: Provide acceptable epoxy coatings that can cure under wet or dry conditions are "A-788 Splash Zone Compound" by Koppers, Pittsburgh, PA; "Aquata Pox" by Raven (King Adhesive Corporation), St. Louis, MO; "Concresive No. 1438 or No. 1170" by Adhesive Engineering Company, San Carlos, CA; or approved equal.

4. Four layer petrolatum wax-tape system (AWWA C-217) intended for burial conditions. Acceptable petrolatum coating systems are STAC Coating System as manufactured by Central Plastics Company, Shawnee, OK.; Denso Pipe and Fittings Petrolatum System as manufactured by Denso Products, Houston, TX.; No. 1 Wax-tape Coating Systems for buried locations and No. 2 Wax-tape Coating Systems for above grade and vault applications as manufactured by The Trenton Corporation, Ann Arbor, MI; or approved equal.

PART 3 – EXECUTION

3.01 GENERAL

A. All materials and equipment associated with pipe connecting wires, joint bonding, test stations, reference electrodes, galvanic anodes, insulating joints, and casing insulators as shown and specified herein shall be furnished and installed by the Contractor.

B. Coordinate installation of the specified work as necessary such that installation of the items herein specified can be completed concurrently with pipeline installation. Items not installed before backfilling of the pipe shall be installed at the Contractor's sole expense.

C. The Contractor shall examine all Drawings and coordinate his work so as to avoid conflicts, errors, delays, and unnecessary interference with construction of the facilities and to avoid duplication of the work such as excavation, backfilling, etc.

D. All work shall present a neat and finished appearance. Any changes in the design or method of installation of an item as specified shall be reviewed and approved by Engineer prior to installation.

E. In the event of any conflicts in the Drawings or Specifications, the Engineer shall be consulted. If departures from the Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Engineer in writing for review as soon as practical, but not later than 30 days before installation.

F. Weather Conditions: Installation of the corrosion protection system components, such as splices, bonds, and wire installation shall not be allowed when ambient temperature is below or approaching 0° F. (-18° C.) to minimize wire insulation damage.

3.02 MATERIAL STORAGE AND HANDLING

A. Store materials in secure, protected location. Store thermite weld materials, prepackaged galvanic anodes, and reference electrodes off the ground and keep them dry at all times. Protect against weather, condensation, and mechanical damage. Handle with care to prevent damage. Wire shall not be sharply bent or tightly coiled to minimize possibility of damage to the wire insulation during manufacture, shipment, or installation. Equipment or materials damaged in shipment or in the course of installation shall be replaced. Immediately remove from site all mechanically damaged materials. Prepackaged anodes or reference electrodes shall be handled with care to prevent loss of backfill material. Do not lift or hold anodes and reference electrodes by the lead wire.

3.03 PIPE JOINT AND FITTING BONDING

A. If joint bonding to form an electrically continuous section of pipeline and associated appurtenances is required, all joints including all bolted and restrained joints shall be joint bonded, except those joints specified to be threaded, welded, or insulated. Do NOT joint bond across insulating joints.

B. Wire connections to pipes or fittings shall be as specified under WIRE CONNECTIONS.

C. Install one insulated joint bond wire or bond strap per joint on all pipe or fittings 10 inches in diameter or smaller. Install a minimum of two insulated joint bond wires or bond straps per joint on all pipe or fittings 12 inches in diameter or larger for redundancy. Bond wire size may be No. 4 AWG on pipe sizes equal to or smaller than 15-inch diameter. Insulated joint bond wires or coated or bare copper straps may be utilized depending on joint coating type. Place bond wires on top quadrant of pipe. Minimum number of bond wires or straps per pipe size are as follows:

Pipe Size (Diameter Inches)	Minimum No. of Joint Bond Wires Required	Minimum Joint Bond Wire Size Required	Minimum No. of Joint Bond Straps Required
10-Inches or Smaller	1 Bond Wires	No. 4 AWG	1 Strap Bond
12-Inches to 15-Inches	2 Bond Wires	No. 4 AWG	2 Strap Bonds
16 to 36 Inches	2 Bond Wires	No. 2 AWG	2 Strap Bonds
40 to 54 Inches	3 Bond Wires	No. 2 AWG	2 Strap Bonds

D. Bond metallic gland connection pieces on fittings for plastic pipe into cathodic protected metallic fittings with single No. 12 AWG stranded insulated copper wire.

E. Joint bonding of cast iron soil pipe not required unless specifically shown on Drawings. Joint bonds for cast iron soil pipe and fittings and high silicon cast iron pipe and fittings shall be in accordance with the manufacturer's recommendations.

F. Bronze wedges, bolted or compression sleeved wires or copper straps, or welded "Z" bars are NOT acceptable methods of achieving electrical continuity.

3.04 WIRE CONNECTIONS

A. The electrical connection of copper wire or copper strap to metallic (steel, cast iron, and ductile iron) surfaces shall be by the thermite weld method. Assure that pipe or fitting wall thickness is of sufficient thickness that the thermite weld process will not damage the pipe or fitting wall's integrity or damage the lining in any way.

B. The Contractor is responsible for repair of any damage to pipe, fitting, lining, or coating as a result of the thermite weld process.

C. Make thermite weld connections at locations as directed by pipe manufacturer so as to not damage pipe gasket or internal linings exposed to liquid.

D. The electrical quality and resistance of the connection is dependent on proper adhesion of the welded connection to the pipe or fitting surface. Observe proper thermite weld material selection, safety precautions, surface preparation, and welding procedures as recommended by the material manufacturer.

E. Connections to gas and petroleum piping systems shall be according to ANSI/ASME B31.8 and ANSI/ASME B31.4 codes. Maximum charge size shall be 15 grams.

F. Before the connection is made, clean the surface to bare metal by making a 2-inch by 2-inch window in the coating, and then filing or grinding the surface with a grinding wheel to produce a bright (white) metal finish.

G. All power grinding shall be with a vitrified type-grinding wheel. The use of resin, rubber, or shellac-impregnated type grinding wheels is not recommended by the thermite weld manufacturer and will not be acceptable.

H. Contractor shall take appropriate actions for existing coatings with asbestos to minimize worker exposure and to contain, handle, and dispose of asbestos per regulations.

I. After the surface is cleaned to a smooth, white metal finish, lightly tap the pipe surface so as to produce dimples to improve surface profile and adhesion for the weld

material. In cold weather or on cold or wet surfaces, preheating of the metal surface may be required to improve successful connections. Exothermic welding should be completed immediately following preparation of the metal surface before surface flash rusting or oxidation can occur.

J. Where specified wire sleeves shall be firmly attached to the end of the wire before thermite welding to the metal surface. Wire and sleeve shall be clean and dry. Wire shall extend 1/4-inch out of field formed sleeves. Factory formed sleeves shall be provided with end of sleeve angled so that wire is exposed to thermite weld material.

K. The mold and base metal should always be clean and dry. Replace worn molds at intervals as recommended by manufacturer.

L. Place a metal disk in the bottom of the graphite mold and then pour in the weld material. Be sure to squeeze the plastic cylinder to get all of the starting powder out. Close the mold body lid. Place the graphite mold on the prepared pipe surface and install the wire in the slot at the bottom of the mold. Hold the wire and mold steady and firm on the pipeline.

M. Ignite the weld material with the spark gun. Lightly tap the mold body during the ignition fusion process. Carefully remove the graphite mold after the fusion process is completed.

N. Care should be taken during the thermite welding process, as the exothermic process is extremely hot (4,000 degrees F). Do not breathe the fumes.

O. The graphite mold should not be touched or allowed to come in contact with the pipe coating or other flammable or meltable materials, as it is extremely hot. Carefully clean the slag out of the graphite mold body.

P. Pipe coating shall be protected during thermite welding procedure. Coating damaged by welding or weld splatter shall be repaired per this specification. Welded area shall be allowed to cool to "warm to touch" condition prior to application of primer and field coating.

Q. After the weld connection has cooled, remove slag, visually and physically test quality of connection by tapping with a hammer and lightly pulling on the wire. The completed weld should visually present a good appearance of a well-formed connection with a minimum loss of weld material or splatter. All portions of the wire and sleeve shall be covered with the weld material. Remove and replace all visually defective welds.

R. Attach copper wire to copper service lines with grounding clamp.

3.05 WIRE CONNECTION COATING

A. Clean weld area, prime, and install a prefabricated thermite weld cap per manufacturer's directions over each completed connection after testing unless to be coated by heat shrink joint coating. In cold weather, store primer and cadweld cap materials in a heated location and keep warm until installation.

B. The pipe and factory-coating surface shall be clean and dry before application of primer. Primer shall be thoroughly mixed and applied to pipe surface in an even manner to obtain a minimum dry film thickness of 1 mil. Primed area shall provide uniform coverage around cadweld area and extend a minimum of 3 inches onto coated surface. Skips or

misses and runs and sags shall be reprimed or repaired to provide even uniform coverage.

C. Primed surface shall be kept free of all contamination. Allow primer to dry for one to five minutes depending on application and weather conditions. Primer shall be dry-to-touch condition and have a non-glossy appearance, before application of prefabricated cadweld cap.

D. Prefabricated cadweld cap shall be applied at connection according to manufacturer's directions. The filler material shall be placed over the thermite weld connection and worked around and under the wire and connection. Apply pressure to the prefabricated cadweld cap to assure good adhesion.

E. Completed cadweld cap assembly shall adhere tightly to pipe and wire connection with no voids or gaps. Inadequate adhesion is demonstrated if there are visible gaps or voids under the cap or if the cap can be easily removed from the pipe surface by pulling with fingertip pressure. At all locations where inadequate adhesion is evident, reprime and replace cap or prime and apply either a minimum 6-inch by 6-inch square of field repair tape, a 55-mil thick Tapecoat Gray "Pads", or heat shrink repair material over existing cadweld cap. Apply per tape coating or heat shrink manufacturer's directions.

F. Wire connections at pipe joints or fittings to be coated with heat shrink sleeve do not require cadweld cap assembly. Wire connections shall be completely encapsulated under heat shrink sleeve.

G. All exposed metallic surfaces not covered by the thermite weld cap or heat shrink sleeve shall be repaired per PIPE AND FITTING COATING REPAIR.

3.06 PREPACKAGED GALVANIC ANODE INSTALLATION

A. General:

1. Remove plastic or paper shipping wrap from prepackaged anode prior to placement. Galvanic anodes packaged in cardboard type chip-tube shall be thoroughly perforated just prior to installation.

2. Install galvanic anodes a minimum of 1-foot below the pipe invert and 3 to 5-feet from buried metallic piping or 3-feet from metallic fittings to be protected. Space galvanic anodes equally around the fitting, pipe section, or appurtenance. Locate at bottom edge of pipe trench as shown on the Drawings or as specified. Alternate anode placement on opposite sides of the pipe. If two or more anodes installed at the same location, place on opposite side of the pipe or fitting. Provide a minimum anode spacing of 5-feet from other unprotected pipelines.

3. Handle prepackaged anode with care. Damage to the anode, anode to wire connection, or prepackaged backfill bag will require replacement of the entire assembly.

4. Place anode in native earth backfill do not use pipe zone bedding material.

5. Earth backfill around each anode shall be thoroughly compacted to a point 1-foot above the anode. Backfill material around each anode shall be native soil free of roots, organic matter, trash, and rocks. Stop backfill at specified grade to allow for placing of topsoil, pavement, or concrete, when required.

6. All anode wires shall be buried a minimum of 36-inches below finish grade. Wires shall be handled with care. Splices or damage to the insulation on any wire shall be repaired in accordance with WIRE INSULATION REPAIR and be approved by Engineer.

7. Electrical connection of the anode wire to steel, cast or ductile iron metallic pipe or fittings shall either be directly to the pipe or fitting by the thermite weld method or through a test station with shunt as shown on the Drawings.

8. Electrical connection to copper services shall either be directly to the copper service by a ground clamp or through a test station with shunt as shown on the Drawings.

B. Installation:

1. Each buried or submerged metallic (steel, ductile, or cast iron) pipeline section, appurtenance, valve, or fitting and copper service shall receive a minimum of one galvanic anode.

2. Type of Prepackaged Anodes is project specific. For this project utilize:

Prepackaged zinc or magnesium galvanic anodes (depending on the soil corrosion zone: Zinc for zone 1 and Magnesium for zone 2) for protection of buried metallic pipe, valves and fittings.

3. Where two or more metallic fittings are adjacent to each other, install joint bonds as specified in PIPE CONNECTING WIRES, and install the specified quantity of galvanic anodes for each metallic pipe section, appurtenance, valve, or fitting used in conjunction with nonmetallic pipe.

4. At the Contractor's option, larger anodes may be used in place of multiple smaller anodes for a group of bonded metallic components on non-metallic piping provided the same total bare weight of galvanic anode is used.

5. For ductile iron and cast iron fittings, where specified coating thickness is not provided or specified holiday testing and/or 100% holiday free coatings are not completed by the fitting manufacturer, or bare fitting is coated with petrolatum tape type coating system; then install one size larger anode or double the number of anodes for each fitting than listed on the following table. For example, if a 5 pound anode is listed and a fitting does not meet coating thickness specified or is not 100% holiday free then install a 17 or 18 pound anode instead. If one 17 or 18 pound anode is required per the following table and coating thickness is not as specified, then at Contractor's option, install either a 30-pound anode or two 17 or 18 pound anodes. Existing fittings that are exposed and coated with a four layer petrolatum tape type coating system, shall receive double the number of anodes specified or the next largest anode size shown in these specifications. For example, if a bare fitting (16-inch or less) is exposed and petrolatum tape coated, it shall receive a 17 or 18 pound size anode instead of the 5-pound size anode required for a factory coated fitting.

6. The minimum number of anodes to be installed on buried or submerged factory coated metallic fittings, pipeline sections, or appurtenances with non-metallic pipelines shall be:

PREPACKAGED ANODE SPACING FOR FITTINGS FOR DIFFERENT NON-METALLIC PIPE SIZES				
	16" or less	18" to 30"	32" to 46"	48" or larger
ITEM	NUMBER OF AND BARE ANODE SIZE (Reference Type of Anode Required For Project Per Specification)			
Single Coated Metallic Fitting	1 - 5 pd Magnesium or Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes	3 - 17 pd Magnesium or 3 - 18 pd Zinc anodes
Multiple (2 to 3) Coated Metallic Fittings	1 - 17 pd Magnesium or 18 pd Zinc anode	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes	3 - 17 pd Magnesium or 3 - 18 pd Zinc anodes	4 - 17 pd Magnesium or 4 - 18 pd Zinc anodes
Coated Fire or Flushing Hydrant with 6-inch coated metallic pipe leg or plastic pipe leg and plastic pipe main. (less than 20 foot leg)	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes	2 - 17 pd Magnesium or 2 - 18 pd Zinc anodes
1-inch Coated Copper Service Line (less than 20 foot service to insulator)	1 - 5 pd Magnesium or Zinc anode	1 - 5 pd Magnesium or Zinc anode	1 - 5 pd Magnesium or Zinc anode	1 - 5 pd Magnesium or Zinc anode
1-inch Bare Copper Service Line (less than 20 feet)	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode
Existing Metallic Pipe Tie-In, Leak Location, or Concrete Encased Stub Piece.	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode	1 - 17 pd Magnesium or 18 pd Zinc anode

3.07 TEST STATION INSTALLATION

A. Cathodic protection test stations of the types indicated shall be installed and located as specified herein. They shall be located as shown on the Drawings, or as directed by the ENGINEER. The ENGINEER will finalize test station locations during construction. A reference electrode, coupon, reference pipe, or resistance probe shall be installed only at test station locations indicated on test station schedule.

B. Test station types shall be installed on metallic pipelines per the test station schedule as follows:

1. Install a Type A test stations at specified galvanic anode installation locations on metallic fittings on plastic lines or on galvanic protected metal pipeline.

C. Color-code end of wires per specifications, before installation of wires in conduit or backfilling of the test station wires.

D. Wherever possible test stations shall be located directly over the centerline of the pipeline. Maximum offset distance from pipe centerline shall be 15 feet or at edge of right-of-way as directed by Engineer for protection.

E. Test station shall be installed at protected locations such as next to pipeline structures, fences, road crossings, and edges of cultivated fields. The Engineer shall

determine the final location of the test stations. Changes in the location of any test station shall be reviewed and approved by Engineer prior to installation.

F. Post-mounted test station posts shall be set in firmly compacted soil backfill at height shown on Drawings. Test station body shall be positioned so as to allow easy access for future testing.

1. Test station box and rigid conduit shall be securely fastened to wooden post or rectifier pole with wood screws. Install insulated bushings and insulated throat connectors on ends of all rigid metallic conduits as shown on Drawings.

2. Top of test station head shall be located flush with or a maximum of 1-inch below top of test station post.

G. Flush mounted test stations shall be located directly over pipeline, except in areas of heavy traffic conditions. Where heavy traffic conditions exist, locate test stations to the side of the street. Install concrete collar slab around test station as shown on Drawings. Rotate flush mounted test station slabs so that slab points toward traffic flow. Provide sufficient slack in test wires to allow terminal block to extend 18 inches out of station body.

H. Test wires shall be attached to the pipe as specified under WIRE CONNECTIONS, this section and if possible installed under the heat shrink sleeve joint coating.

I. Test wires shall be provided with sufficient slack and looped or coiled at the test station and pipeline to prevent the wire from being unduly stressed or broken during backfilling operations. Install test wires to top test station terminals. Wires shall be installed in a continuous length.

J. All cathodic protection and test wires shall be buried a minimum of 36-inches below finished grade.

K. Wire connections to test station terminals shall be with crimp-on ring tongue terminals, or lug-it connectors, except where terminal strips with tubular clamps are used.

L. Connect wires to test station terminals as shown on Drawings. Wire type and color code as shown on Drawings and specified under PRODUCTS, this section, shall be maintained throughout project.

M. Seal completed wire connection test lead terminals with electrical sealer for all buried flush mounted test stations and at above grade test station locations where high atmospheric corrosion may occur.

3.08 CONCRETE

A. Concrete for flush mounted test stations or pipe concrete encasement shall conform to the requirements for concrete in Division 3 CONCRETE.

3.09 REFERENCE ELECTRODE INSTALLATION – TIGHT BONDED COATED PIPE

A. Prepackaged Reference Electrodes:

1. Remove reference electrode and cloth bag from the shipping bag and place 6 inches from the pipe below the centerline of the pipe in a horizontal position. Do not hold or lower the reference electrode by the wire lead. Prepackaged reference

electrode shall be backfilled with clean native soil. Terminate wire lead in test station as shown on Drawings.

3.10 WIRE INSULATION REPAIR

- A. Wire splices shall be made with suitably sized Type C compression connectors as specified, or mechanically secured and soldered with rosin cored 50/50 solder. Inline type butt connectors are not allowed.
- B. Minor insulation damage to small cathodic protection wires (equal to or smaller than No. 8 AWG) shall be repaired by spirally wrapping (minimum of 50 percent overlap) with two layers of high voltage rubber splicing tape and two layers of vinyl electrical tape.
- C. Insulation damage or splices to large cathodic protection cables (No. 4 AWG or larger) shall be made with epoxy insulated splice kits (3M Scotchcast 90-B1 or 82-A1 or approved equal). Allow epoxy splice kits to cool and set before moving.
- D. All wire splices and wire insulation repair locations shall be approved by Engineer.

3.11 WARNING TAPE

- A. Bury warning tape above all underground cathodic protection cable, conduit, and/or all pipelines. Warning tape shall be placed approximately 24 inches below the ground surface or at specified depths as required in other sections of this contract document or shown on the details. Align parallel to and within 2 inches of the centerline of pipe run.

3.12 PIPE TRACING WIRE

- A. Insulated tracer wire shall be installed on all non-metallic pipe sections.
- B. Pipe tracing wire shall be taped to top of plastic or non-metallic pipeline at a maximum distance of every 10 feet with polyethylene tape.
- C. Do not attach tracing wire directly to metallic fittings or appurtenances.
- D. Install tracer wire access boxes at all fire hydrant assemblies.
- E. Maximum tracer wire span distance shall be 500 feet. If no existing pipe appurtenances are available for a distance up to 1,000 feet, then install either a post or flush type tracer wire access boxes. Equally divide span distance and install tracer wire access box at mid-point in a protected location. Selection of type and location of tracer wire terminal box will depend on field conditions and shall be in accordance with Engineer's directions.
- F. Field terminate tracer wires in accordance with the Drawings by:
 - 1. Bring end of tracing wire leg to near ground surface elevation by installing a tracer wire flush or above grade access box or test station.
 - 2. Terminate tracing wire above grade at flush or above grade test access boxes or test stations located next to pipe appurtenances (vaults, vent pipes, blow-offs, or at fire hydrant bases).

3. Make tee or inline splices and insulate as specified under section "Wire Insulation Repair".
 4. Tracing wire shall be terminated inside test stations where available on a separate terminal from anode or pipe/fitting leads.
 5. At bases of above grade structures terminate in a flush or abovegrade access boxes.
 6. Above grade terminations next to above grade appurtenances shall consist of a minimum 3/4-inch diameter, 3-foot long rigid galvanized steel conduit terminated approximately 6-inch above grade in an above grade access box.
 7. Terminate in vaults next to ladder to allow easy access for attachment, or drill vault and terminate outside vault next to the vent pipe (if present).
 8. Install in accordance with test station installation procedures with ring tongue terminals.
- G. Test tracer wire for continuity prior to final acceptance of the pipeline installation.

3.13 INSULATED JOINTS

- A. Install copper insulating joints where copper services are connected to metallic water mains and at service meters or curb stops where ownership of copper service changes.
- B. Carefully align and install insulating joints according to the manufacturer's recommendations to avoid damaging insulating materials.

3.14 COATING FOR PIPING, FITTINGS AND ACCESSORIES

- A. Install coated valves, fittings, and miscellaneous metallic pieces so as to not damage coating or lining. Conduct dry film measurements and holiday test to confirm conformance with specifications and referenced standards.
- B. Provide corrosion protection for ferrous metal piping appurtenances such as tie-rods, thrust restraints, tapping saddles and bands, harnesses, and similar items: Stainless steel, fusion bonded epoxy coated, or heat shrink tube wrapped.
- C. Coat restraining harnesses, rebar or tie-rods where utilized as tie-downs or thrust restraints and exposed to soil or liquid with field applied four layer petrolatum tape system.
- D. Flange bolts, Nuts, and Similar Items: Series 300 stainless steel or fusion bonded epoxy coated.
- E. Conduct testing of Series 300 stainless steel materials with magnet to confirm stainless steel provided prior to installation.
- F. If approved by Engineer, coat miscellaneous hard to coat items with four layer petrolatum tape system or heat shrink repair coating.

3.15 PIPE AND FITTING COATING REPAIR

- A. Inspect and repair any coating or lining damage with original manufacturer's approved repair kit. Follow coating manufacturer's written directions for surface preparation and repair coating application. Utilize potable water approved materials for coatings and linings in contact with potable water.
- B. Field coating for field repair of damaged coating on new or existing pipe, piping, appurtenances, and fittings shall be in accordance with this specification.
- C. External pipe and fitting repair coatings shall consist of external coating materials and repair procedures as recommended by the pipe or fitting coating manufacturer.
 - 1. Fusion-bonded epoxy coated items shall be repaired with liquid epoxy repair kits provided by the fusion-bonded coating manufacturer.
 - 2. Epoxy coated items shall be repaired with repair coating from the original coating manufacturer.
 - 3. Spot coating damage at thermite weld connections not covered by standard thermite weld cap coating repair procedure shall be repaired with a field applied 6-inch minimum piece of tape coating, 6-inch minimum size of heat shrink repair material, or a 100 percent solids epoxy coating that can cure in either wet or dry conditions.

3.16 FIELD COATING FOR STEEL AND DUCTILE IRON STUB PIECES AND/OR COPPER SERVICE PIPING OR ISOLATED COPPER FITTINGS

- A. Field tape coat or heat shrink sleeve, short sections of buried metallic piping such as vent pipes, blow-off assemblies, and pipe stubs to be concrete encased under or next to buildings or tanks if not already coated with an approved specified factory applied coating system. Bituminous asphaltic coating does not qualify as a approved factory coating.
- B. Field coat, buried copper service, copper fittings, or galvanized steel service piping where specified or shown on the Drawings.
 - 1. Follow this specification, the coating manufacturer's recommendations, and the referenced AWWA Standards.
 - 2. Acceptable products are specified under "PIPE AND FITTING COATING REPAIR MATERIALS".
 - 3. Hand tool clean surfaces. Copper service lines shall not be sandblasted.
 - Field Tape Coating:
 - a) For hand taping, provide suitable field primer (if required) and 35-mil field applied repair tape with aggressive adhesive and release liner, 4 or 6-inches width.
 - b) Pipe shall be clean and dry prior to and during application of both primer and tape coating. Tape shall be applied in a spiral wrap with a 50 percent overlap in accordance with AWWA Standard C209 Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - 5. Heat Shrink Field Coating:

- a) For heat shrink sleeve installation, provide suitable filler material and heat shrink sleeve material for pipe size required.
 - b) Pipe shall be clean and dry prior to and during installation of heat shrink sleeve. Install sleeve in accordance with AWWA C216, Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
6. Petrolatum Tape Coating System
- a) Field apply petrolatum tape system for all restraining fittings and rods if not already coated with an approved specified factory applied coating system.
 - b) Provide petrolatum system coating for isolated copper fittings if not already protected by a galvanic anode system.
 - c) For petrolatum system tape installation (AWWA C217), provide suitable primer, filler material (mastic), petrolatum tape and outer wrap material for burial application. Pipe or fitting shall be clean and dry prior to and during installation of four layer petrolatum wax tape system. Install petrolatum tape system in accordance with coating manufacturers instructions and these specifications. Apply primer in an even uniform manner to entire tie rod, pipe, or fitting surface area to be coated to achieve minimum primer thickness of 3-mil wet film thickness. Increase amount of primer at and work primer into threads, cavities, pits, angles, edges, and other irregular areas. Apply primer with brush or glove. Apply mastic or tape immediately after application of primer, drying of primer is not required. Work and mold mastic into irregular shapes so as to fill voids and achieve a uniform contour to provide a smooth even support for the tape coating system to avoid bridging. Apply petrolatum tape layer in a spiral wrap fashion around the tie rod or fitting circumference with a 50 percent minimum overlap onto the proceeding layer. Apply the 10-mil PVC outer wrap tape layer in a spiral fashion around the pipe or fitting with a 50 percent minimum overlap. The completed petrolatum coating system shall be a minimum of 40 MDFT and adhere tightly to the coated structure and present a smooth unwrinkled appearance.

3.17 FUNCTIONAL AND PERFORMANCE TESTING

- A. Electrical Insulating Joints:
 - 1. Test each insulated joint after assembly for electrical isolation in accordance with the insulation checker manufacturer's written instructions.
 - 2. Buried electrical insulating joints shall be tested both before and after burial.
 - 3. All defective insulating joints and/or damaged or defective insulation parts shall be corrected or replaced by the Contractor at his sole expense.
- B. Galvanic Anode Energizing and Testing:

1. Some of the galvanic anodes will be connected to the pipe or the fittings in the anode test stations with calibrated shunts after the installation of the galvanic anode cathodic protection system is completed.
2. Do not connect anode and pipe leads together until Engineer is present. Provide the Engineer with 14 days' advance notice before beginning tests or repairs.
3. The Engineer shall make sufficient tests throughout the network of protected pipe to determine proper installation of the galvanic anode cathodic protection system. Any construction defects identified during energizing and testing shall be located and corrected by the Contractor at his sole expense.

3.18 FINAL TESTING

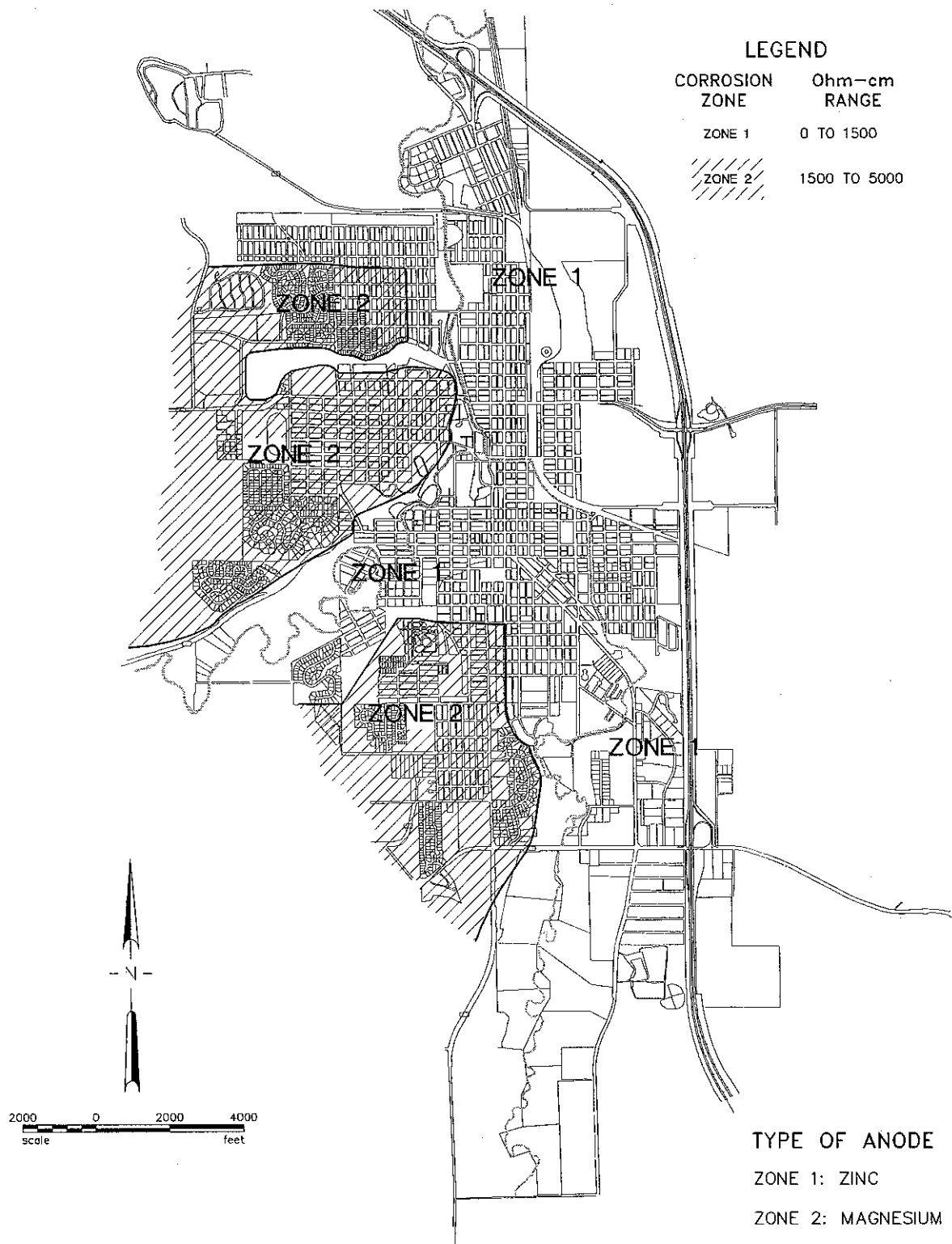
A. After construction is complete, the Engineer shall test the pipeline to ensure proper installation of the joint bonds, galvanic anodes, test stations, and insulated joints. At Contractor's option, he may be present during this testing if desired. Any construction defects identified during the final testing shall be located and corrected by the Contractor at his sole expense. Provide the Engineer with a minimum of 14 days' advance notice before beginning final testing repairs.

END OF SECTION 13900

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DETAILS

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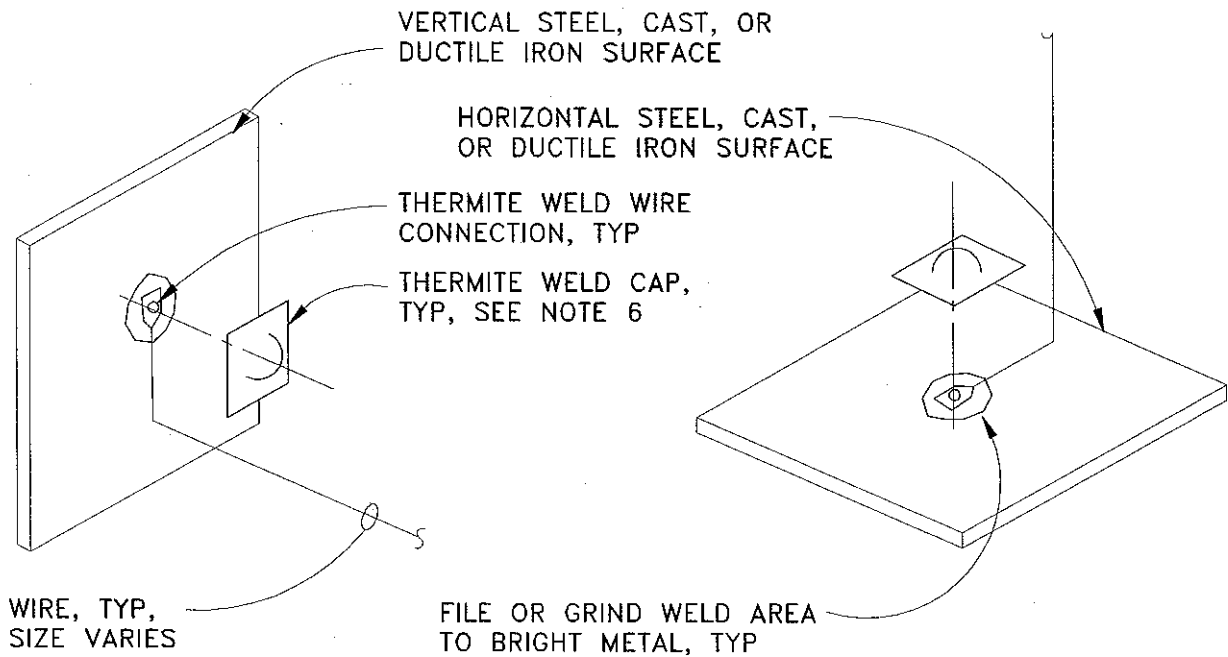


**SOIL CORROSION ZONES
SELECTION OF ANODE**

DWG. NO. 13900

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

1. COPPER SLEEVE REQUIRED FOR THERMITE WELDING OF #10 AWG AND SMALLER WIRE.
2. USE COPPER SLEEVE FOR THERMITE WELDING OF #4 AND #2 AWG JOINT BONDING WIRES.
3. WELDER AND CARTRIDGE SIZE VARIES ACCORDING TO SURFACE SHAPE, MATERIAL, AND HORIZONTAL OR VERTICAL SURFACE. CONSULT WELDER MANUFACTURER FOR RECOMMENDED WELDER AND CARTRIDGE.
4. FOR MULTIPLE WIRE CONNECTIONS TO PIPE SEPARATE THERMITE WELD WIRE CONNECTIONS BY ONE PIPE DIAMETER MINIMUM, 2'-0" MAXIMUM.
5. USE 15 GRAM MAXIMUM SIZE WELD CARTRIDGES FOR CONNECTIONS TO PETROLEUM AND NATURAL GAS PIPELINES OR STRUCTURES. WIRE CONNECTIONS SHALL BE AS SPECIFIED AND APPROVED BY THE OWNER.
6. COAT COMPLETED THERMITE WELD CONNECTIONS WITH ROYSTON PREFABRICATED HANDYCAP II AND 747 PRIMER.

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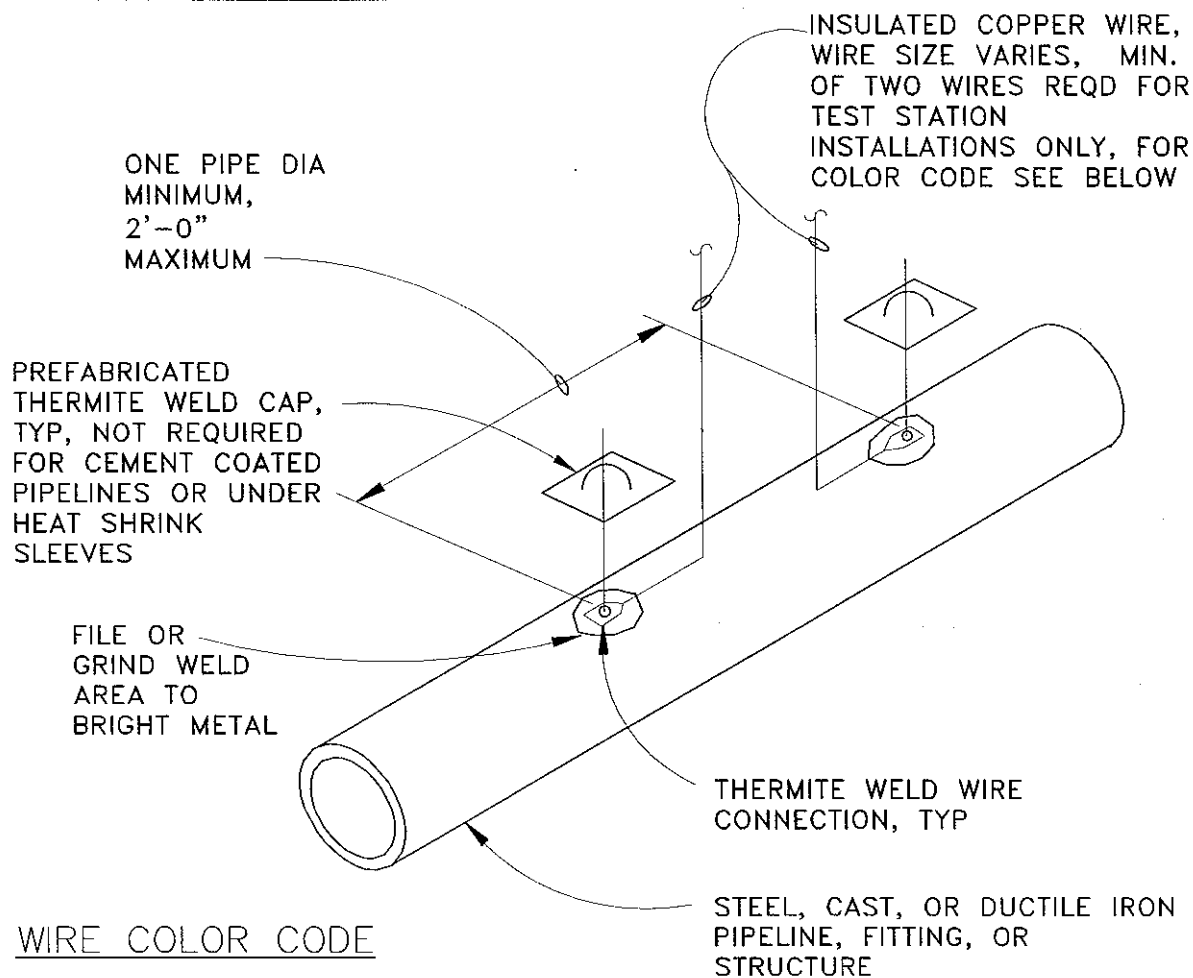
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**WIRE CONNECTION FOR VERTICAL
AND HORIZONTAL SURFACES**

DWG. NO. 13901

CITY of SHERIDAN

NOVEMBER 2003



WIRE COLOR CODE

1. PIPELINE TEST WIRES:

WATER - BLUE

FOREIGN PIPELINES - WHITE OR AS REQUESTED BY
FOREIGN PIPELINE COMPANY

CURRENT TEST SPAN WIRES - UPSTREAM SIDE MARK W/ RED TAPE

2. UNPROTECTED PIPELINE - BLACK

3. CASINGS - ORANGE

4. ANODE LEADS - BLACK

5. REFERENCE ELECTRODE WIRES - YELLOW

6. TRACER WIRES - GREEN

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PIPELINE WIRE CONNECTION

DWG. NO.

13902

CITY of SHERIDAN

NOVEMBER 2003



THERMITE WELD

USE CAST IRON CHARGES FOR DUCTILE IRON AND CAST IRON PIPE OR FITTINGS. USE STEEL CHARGES FOR STEEL PIPE OR FITTINGS



STEP 1

FILE STRUCTURE CONNECTION AREA (2"x2") TO BARE BRIGHT SHINY METAL & CLEAN. ALL WIRE WELDS SHALL BE A MINIMUM OF ONE PIPE DIAMETER APART UP TO A MAXIMUM OF 2 FEET SEPARATION DISTANCE.



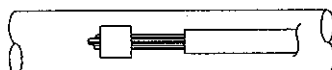
STEP 2

STRIP INSULATION FROM WIRE. ATTACH COPPER SLEEVE (REQUIRED ON No. 10 AWG WIRE & SMALLER & No. 2 & No. 4 AWG JOINT BOND WIRES AS SPECIFIED)



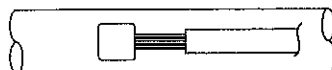
STEP 3

ATTACH COPPER SLEEVE TO WIRE WITH CORRECT HAMMER DIE OR CRIMP TOOL. FACTORY SLEEVES SHALL BE ANGLED AND FIELD MADE BONDS SHALL HAVE WIRE EXTEND 1/4" PAST SLEEVE SO WIRE IS EXPOSED TO THERMITE WELD.



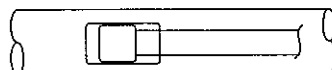
STEP 4

PLACE WASHER IN BOTTOM OF MOLD AND FILL CRUCIBLE W/POWDER, CLOSE LID, HOLD MOLD FIRMLY W/OPENING AWAY FROM OPERATOR & IGNITE W/FLINT GUN.



STEP 5

REMOVE SLAG FROM CONNECTION, VISUALLY INSPECT & TAP WELD FOR SOUNDNESS W/HAMMER. REPLACE ALL POORLY FORMED, UNSIGHTLY, OR DEFECTIVE WELDS.



STEP 6

CLEAN & COAT CONNECTION & EXPOSED STRUCTURE SURFACE W/SPECIFIED PREFABRICATED WELD CAP, HEAT SHRINK SLEEVE, OR PIPE COATING. REPAIR COATING PER COATING MANUFACTURER'S RECOMMENDATION.

GENERAL EXOTHERMIC WELD PROCEDURES

NOT TO SCALE

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DWG. NO.

13903

THERMITE WELD AND
WIRE CONNECTION

CITY of SHERIDAN

NOVEMBER 2003

INSTALLATION TYPE

P POST MOUNT
F FLUSH MOUNT


TEST STATION TYPE

GA-P - GALVANIC ANODE TO PIPELINE
GA-F - GALVANIC ANODE TO FITTING

EXAMPLE TEST STATION

INSTALLATION TYPE

TEST STATION TYPE

POST MOUNT  CASING TEST STATION

NOTES:

1. TEST STATIONS SHALL BE INSTALLED AT THE APPROXIMATE LOCATIONS GIVEN IN THE SCHEDULE OR AS APPROVED BY THE ENGINEER IN THE FIELD. ACTUAL LOCATIONS AND TYPE MAY VARY DEPENDING UPON ACTUAL FIELD CONDITIONS ENCOUNTERED.
2. ADDITIONAL TEST STATIONS SHALL BE INSTALLED IF UNKNOWN FIELD CONDITIONS OR FOREIGN PIPE LOCATIONS ARE ENCOUNTERED DURING CONSTRUCTION. THESE ADDITIONAL TEST STATIONS SHALL BE LOCATED AND CONSTRUCTED AS APPROVED BY ENGINEER IN THE FIELD.
3. REFER TO "CP" SERIES DRAWINGS FOR TEST STATION DETAILS.
4. INSTALL CURRENT TEST SPAN TEST WIRES, REFERENCE ELECTRODES, COUPONS, ANODES, OR GROUND CELLS, ETC.; ONLY AT LOCATIONS NOTED ON TEST STATION SCHEDULE OR PLAN DRAWINGS.

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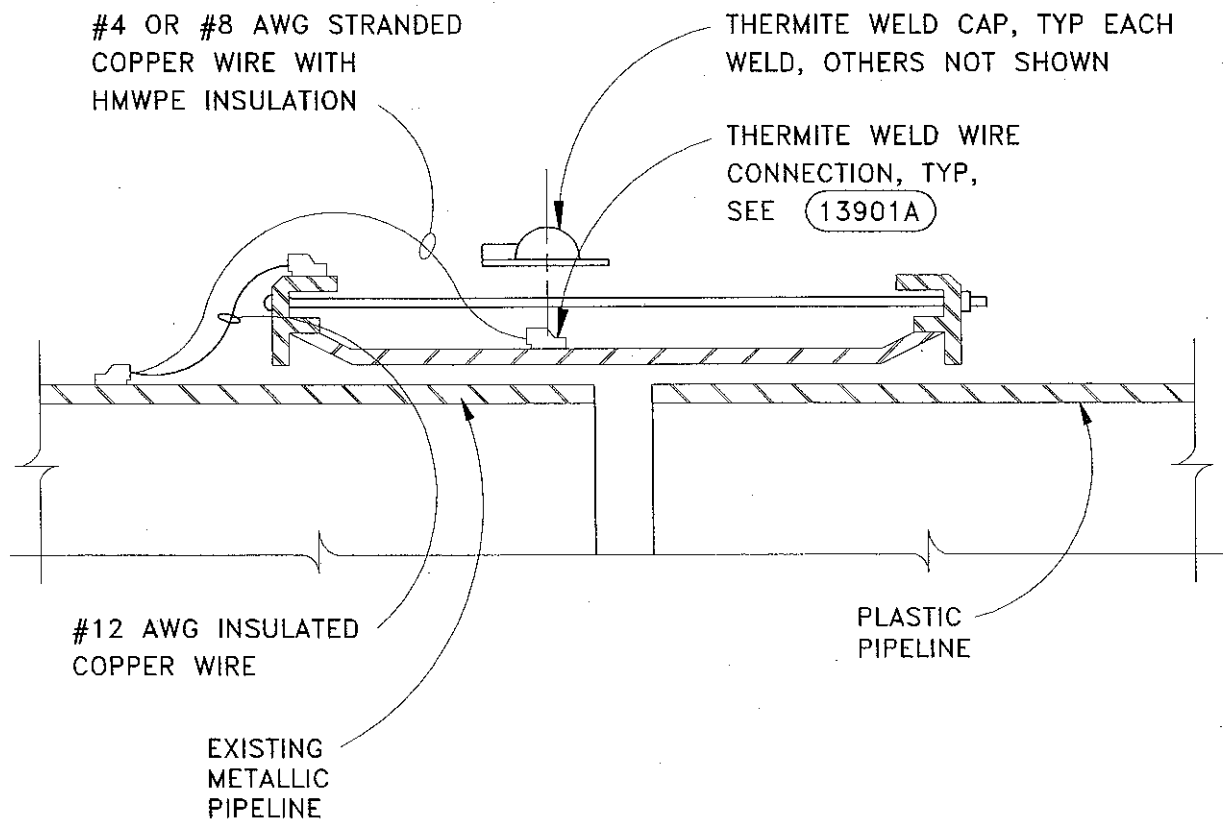
TEST STATION LEGEND

DWG. NO.

13904

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NOVEMBER 2003



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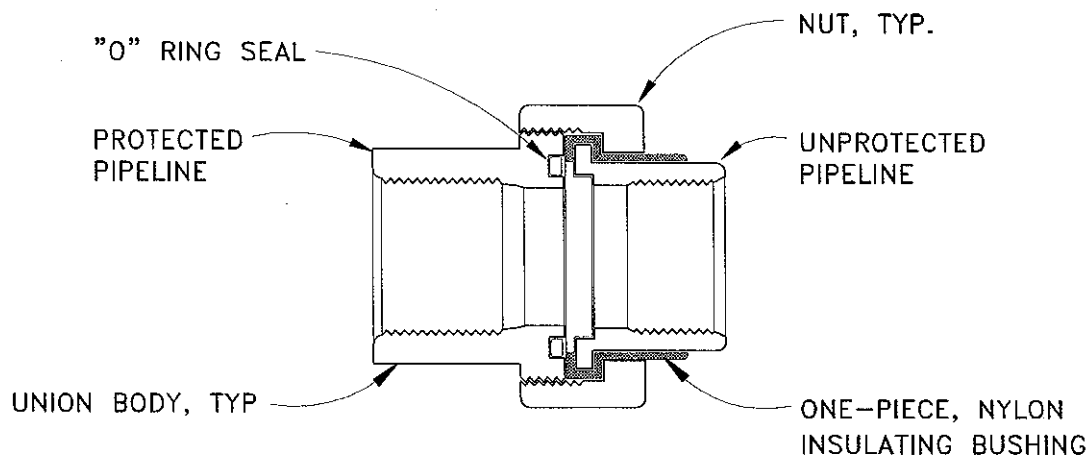
BONDING OF FLEXIBLE COUPLING AT CONNECTION TO PLASTIC PIPE

DWG. NO.

13910

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

1. "O" RING TYPE INSULATING UNION SHOWN. OTHER TYPES (BRASS INSULATED CURB BALL VALVES, STRAIGHT COUPLINGS, CORPORATION BALL VALVES, METER COUPLINGS, ETC.) SIMILAR.
2. INSULATING O-RING AND NYLON INSULATOR BUSHING SHALL BE MOLDED & BONDED TO THE UNION BODY BY MANUFACTURER.
3. ABOVEGRADE IRON PIPE SHALL HAVE GALV. OR COATED STEEL BODIES, UNIONS IN BURIED OR CORROSIVE AREAS SHALL BE COATED.
4. COPPER LINE INSULATORS SHALL HAVE BRASS UNION BODY WITH INSULATORS FORMED AND MOLDED INTO BRASS BODY.

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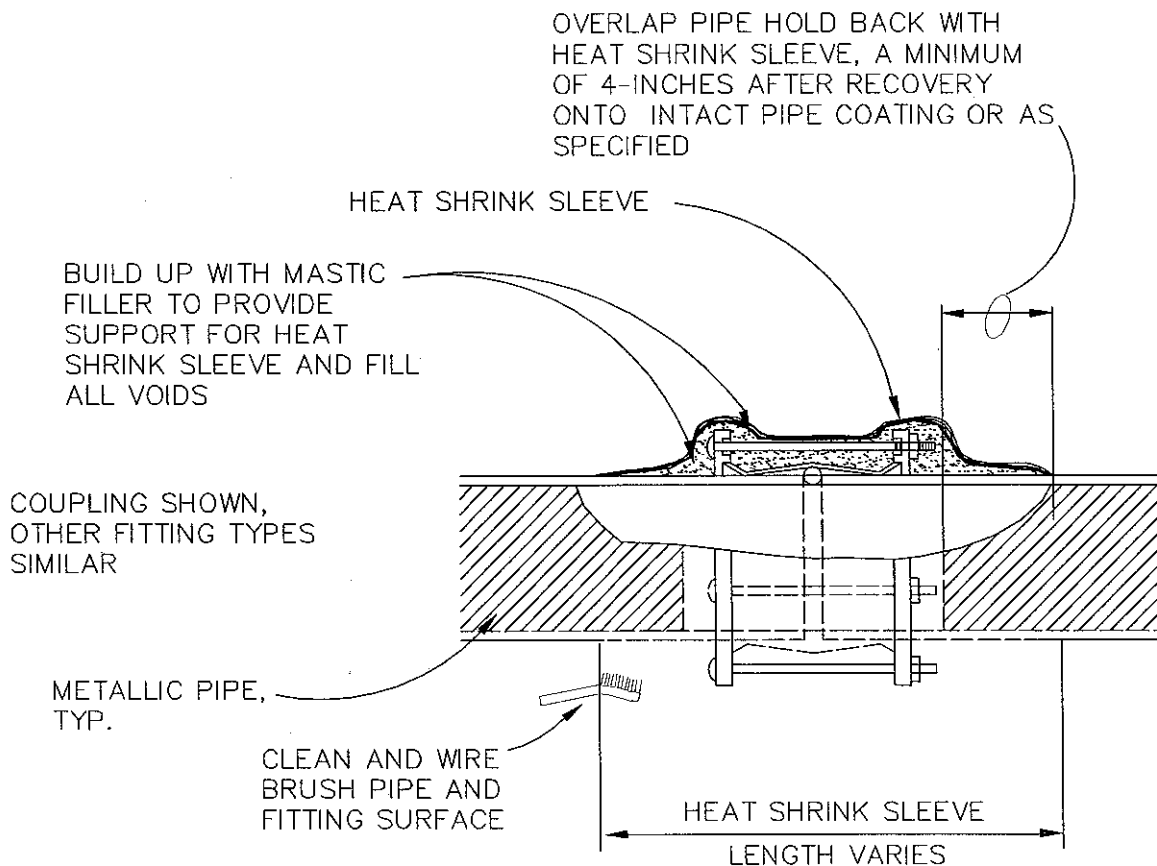
**INSULATING UNIONS AND/OR
COPPER SERVICE INSULATORS**

DWG. NO.

13913

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

1. MASTIC FILLER AND SLEEVE SHALL BE AS RECOMMENDED BY AS HEAT SHRINK MANUFACTURER FOR EACH PIPE AND JOINT TYPE.
2. CLEAN AND ROUGHEN FITTING AND PIPE SURFACE WITH WIRE BRUSH AND APPLY MASTIC FILLER AND HEAT SHRINK SLEEVE PER HEAT SHRINK SLEEVE MANUFACTURER'S DIRECTIONS.
3. JOINT BOND WIRES/STRAPS, ANODE & TEST LEADS (NOT SHOWN) SHALL BE COMPLETELY ENCASED UNDER THE HEAT SHRINK SLEEVE COATING.
4. HEAT SHRINK SLEEVE JOINT COATING SHALL COMPLETELY ENCASE PIPE HOLD BACK, JOINT, AND EXTEND A MIN. 4" ONTO INTACT PIPE COATING. MASTIC FILLER SHALL PROVIDE SMOOTH TRANSITION AT ALL EDGES AND STEP-DOWNS AND FILL ALL VOIDS.
5. CORROSION PROTECTION IS SHOWN FOR FLEXIBLE COUPLING JOINT TYPE, PROTECTION OF OTHER JOINT AND FITTING TYPES SIMILAR.
6. COUPLING SHOWN, OTHER FITTING TYPES SIMILAR.

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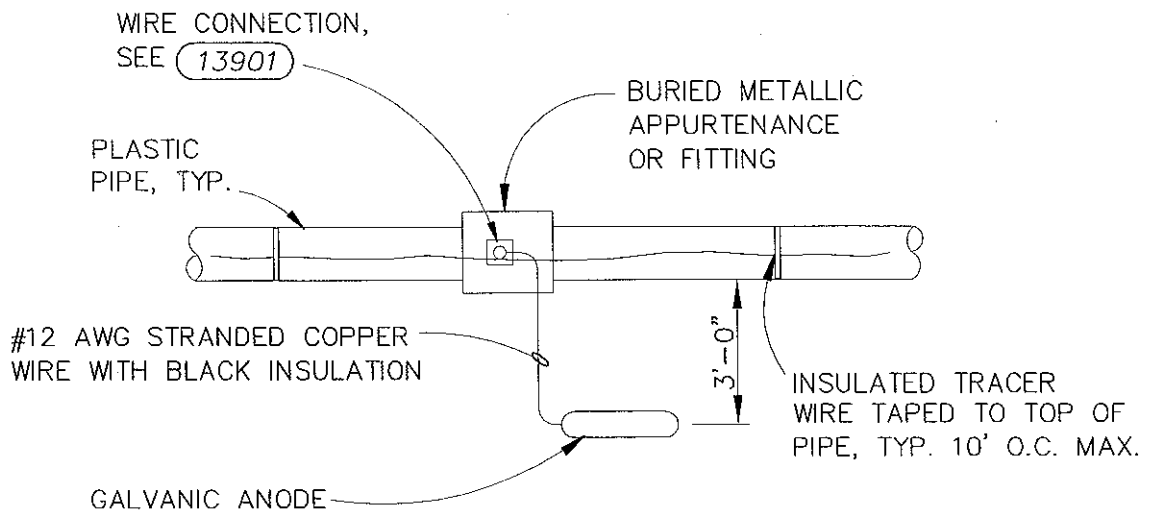
HEAT SHRINK SLEEVE FOR FLEXIBLE COUPLINGS OR FITTINGS

DWG. NO.

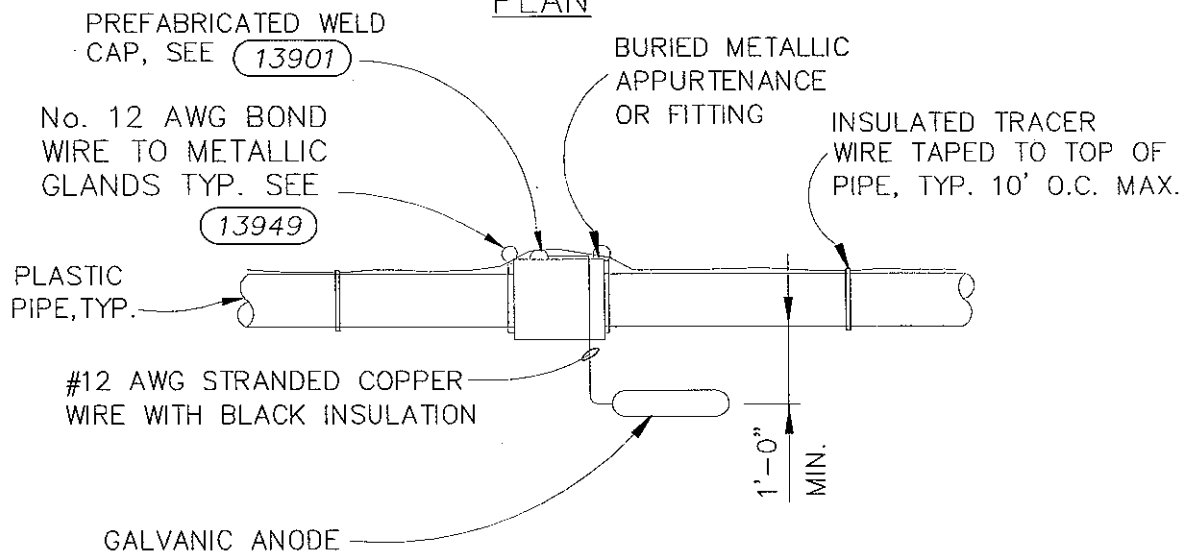
13918

CITY of SHERIDAN

NOVEMBER 2003



PLAN



ELEVATION

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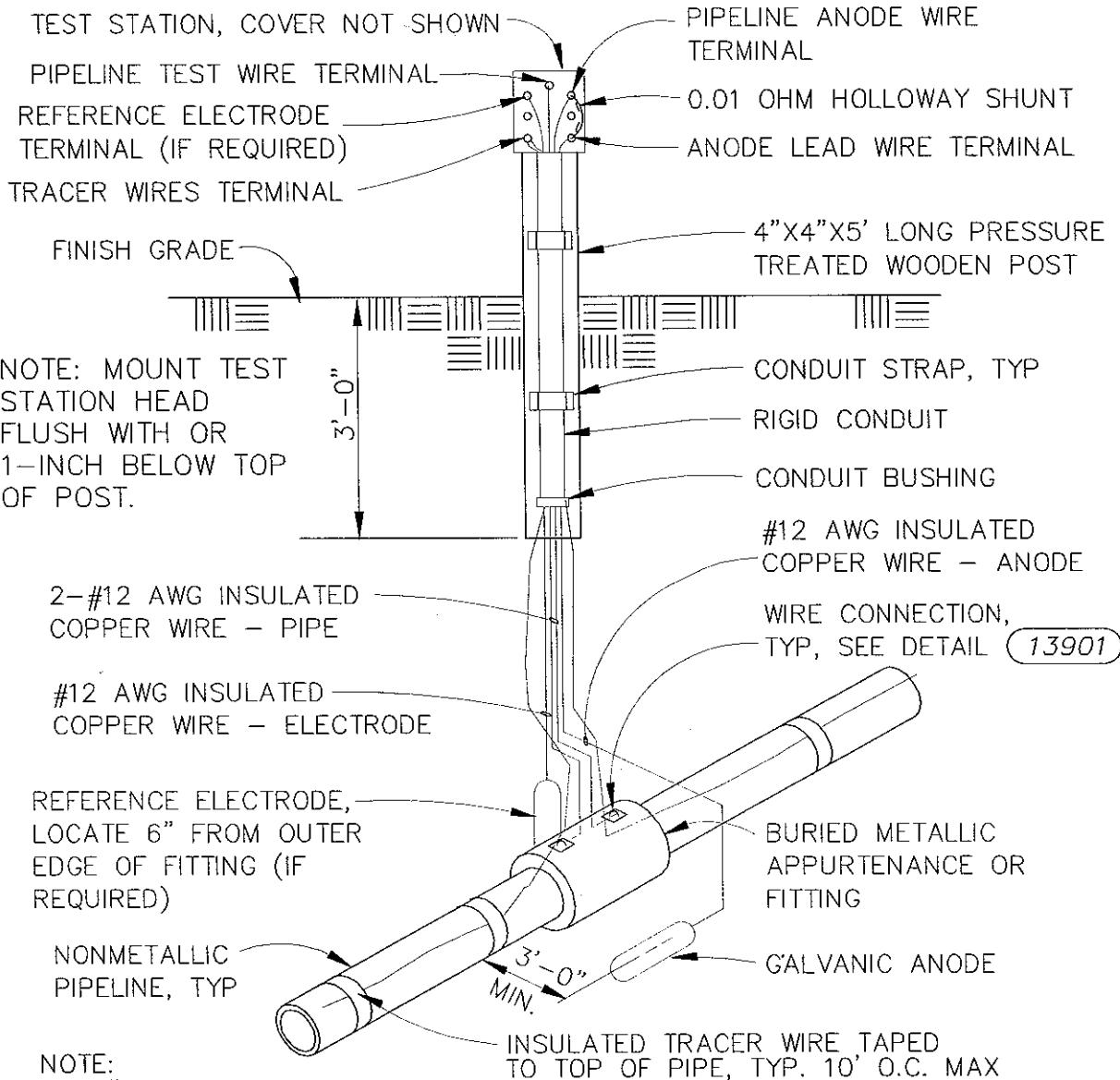
GALVANIC ANODE INSTALLATION AT BURIED METALLIC FITTINGS

DWG. NO.

13940

CITY of SHERIDAN

NOVEMBER 2003



NOTE:

1. INSTALL GALVANIC ANODE 1'-0" BELOW PIPE INVERT ELEVATION.
2. INSTALL REFERENCE ELECTRODES ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
3. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE 13902

TYPE P-AF

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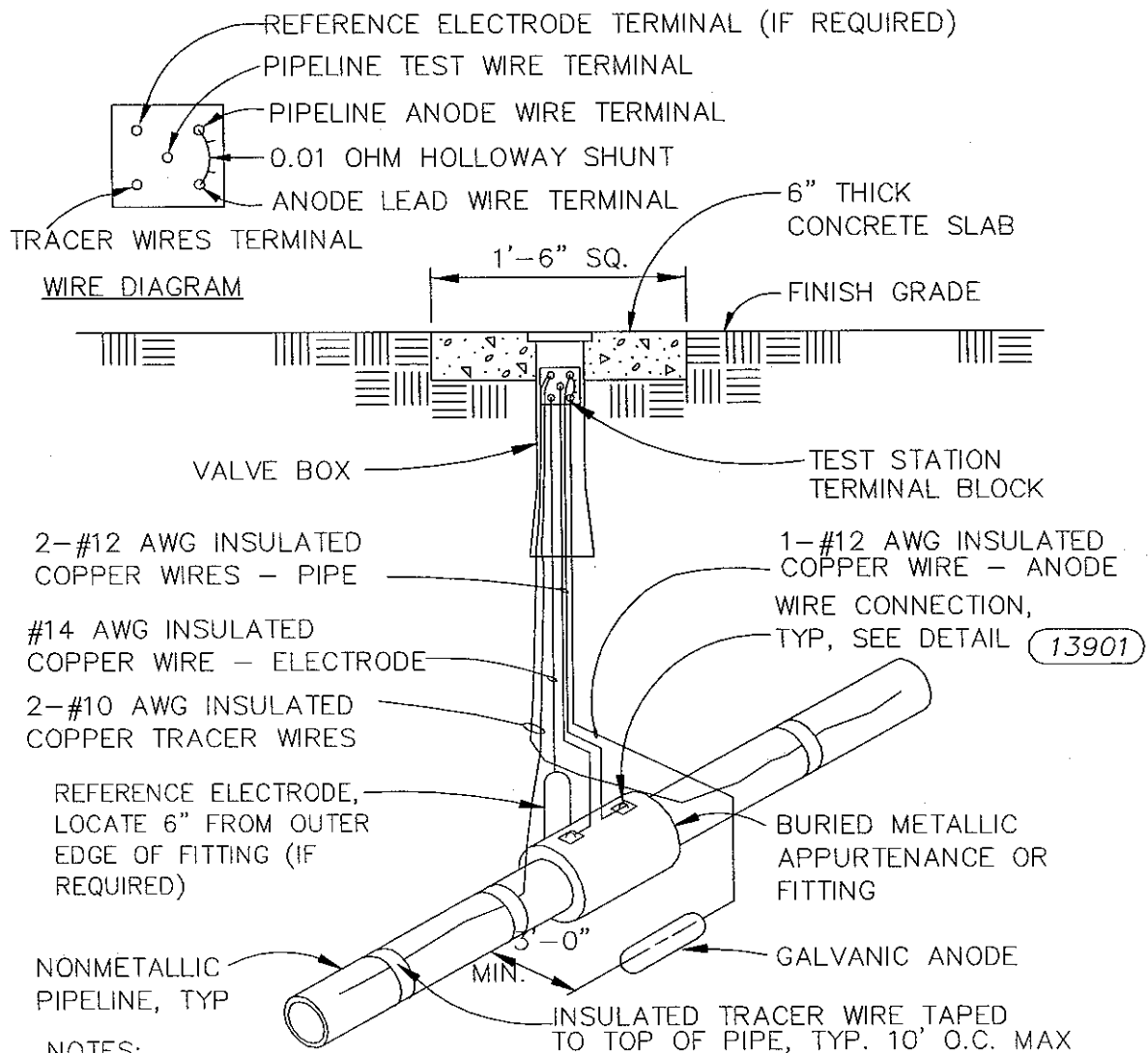
NOT TO SCALE

**POST MOUNTED TEST STATION
WITH GALVANIC ANODE**

DWG. NO. 13941

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

1. PROVIDE SUFFICIENT SLACK IN TEST WIRES TO ALLOW TERMINAL BLOCK TO EXTEND 18" OUT OF TEST STATION. COIL WIRES IN TEST STATION.
2. INSTALL GALVANIC ANODE 1'-0" BELOW PIPE INVERT ELEVATION.
3. INSTALL REFERENCE ELECTRODES ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
4. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE 13902

TYPE F-FA

NOT TO SCALE

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FLUSH MOUNTED TEST STATION WITH GALVANIC ANODE

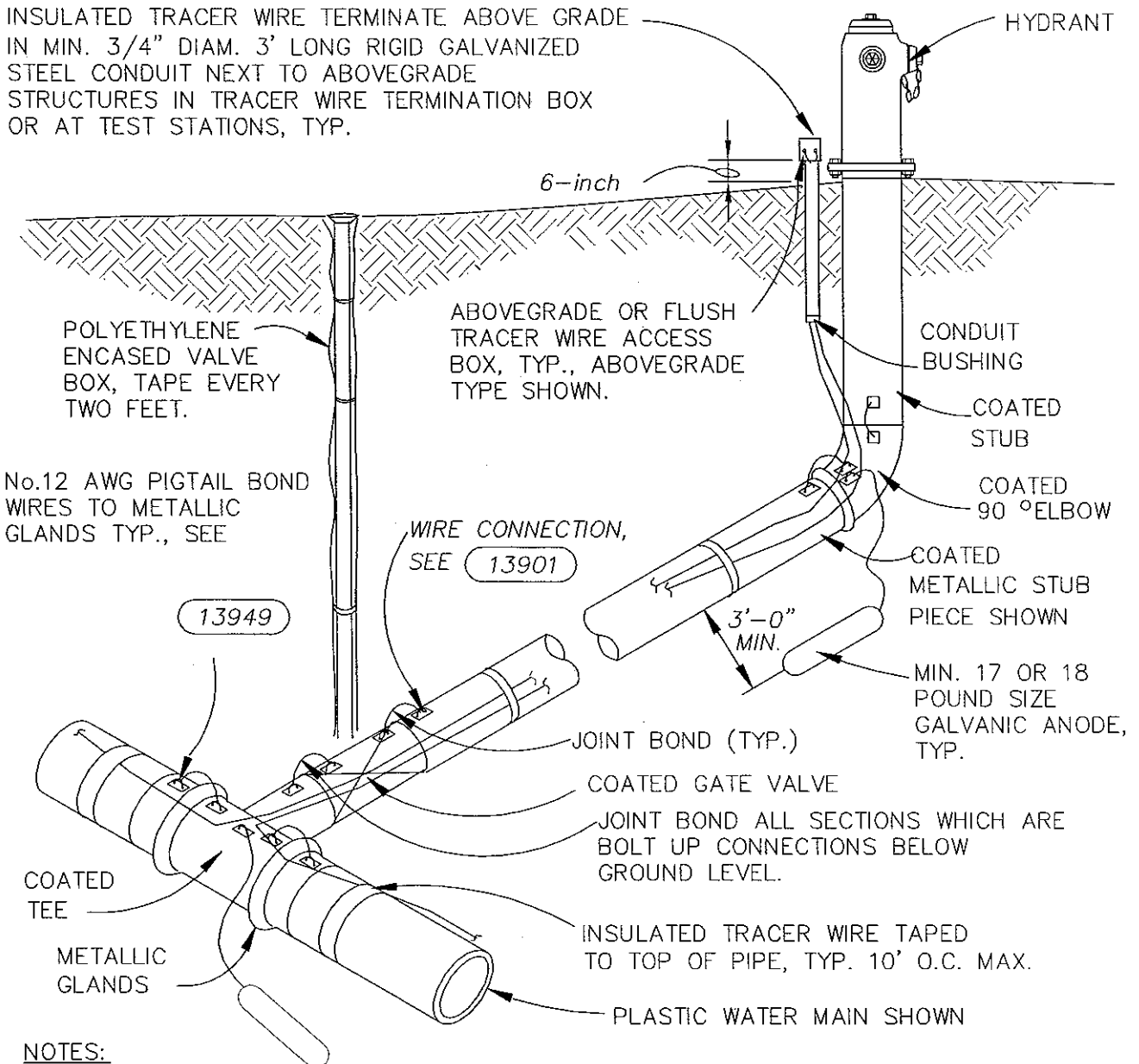
DWG. NO.

13942

CITY of SHERIDAN

NOVEMBER 2003

INSULATED TRACER WIRE TERMINATE ABOVE GRADE
IN MIN. 3/4" DIAM. 3' LONG RIGID GALVANIZED
STEEL CONDUIT NEXT TO ABOVEGRADE
STRUCTURES IN TRACER WIRE TERMINATION BOX
OR AT TEST STATIONS, TYP.



NOTES:

1. INSTALL GALVANIC ANODE 1'-0" BELOW PIPELINE, FITTING, OR VALVE
INVERT ELEVATION.
2. INSTALL MINIMUM NUMBER AND SIZE OF GALVANIC ANODES SPECIFIED,
MINIMUM OF ONE PER EACH METALLIC FITTING OR TWO TOTAL ASSEMBLY.

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NOT TO SCALE

**GALVANIC ANODE INSTALLATION AT
HYDRANT ASSEMBLIES W/ DUCTILE STUB**

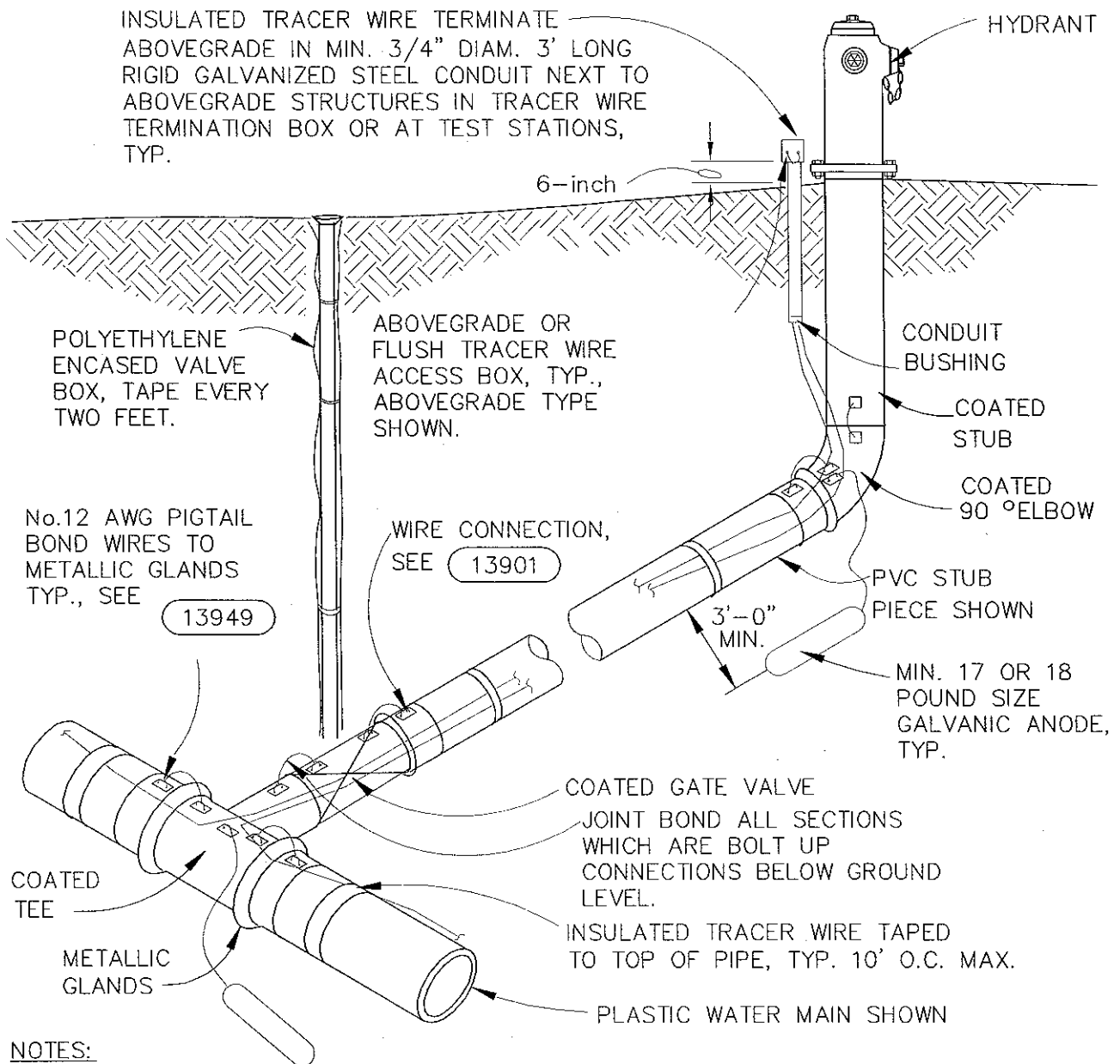
DWG. NO.

13944D

CITY of SHERIDAN

NOVEMBER 2003

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NOTES:

1. INSTALL GALVANIC ANODE 1'-0" BELOW PIPELINE, FITTING, OR VALVE INVERT ELEVATION.
2. INSTALL MINIMUM NUMBER AND SIZE OF GALVANIC ANODES SPECIFIED, MINIMUM OF ONE PER EACH METALLIC FITTING OR TWO TOTAL ASSEMBLY.

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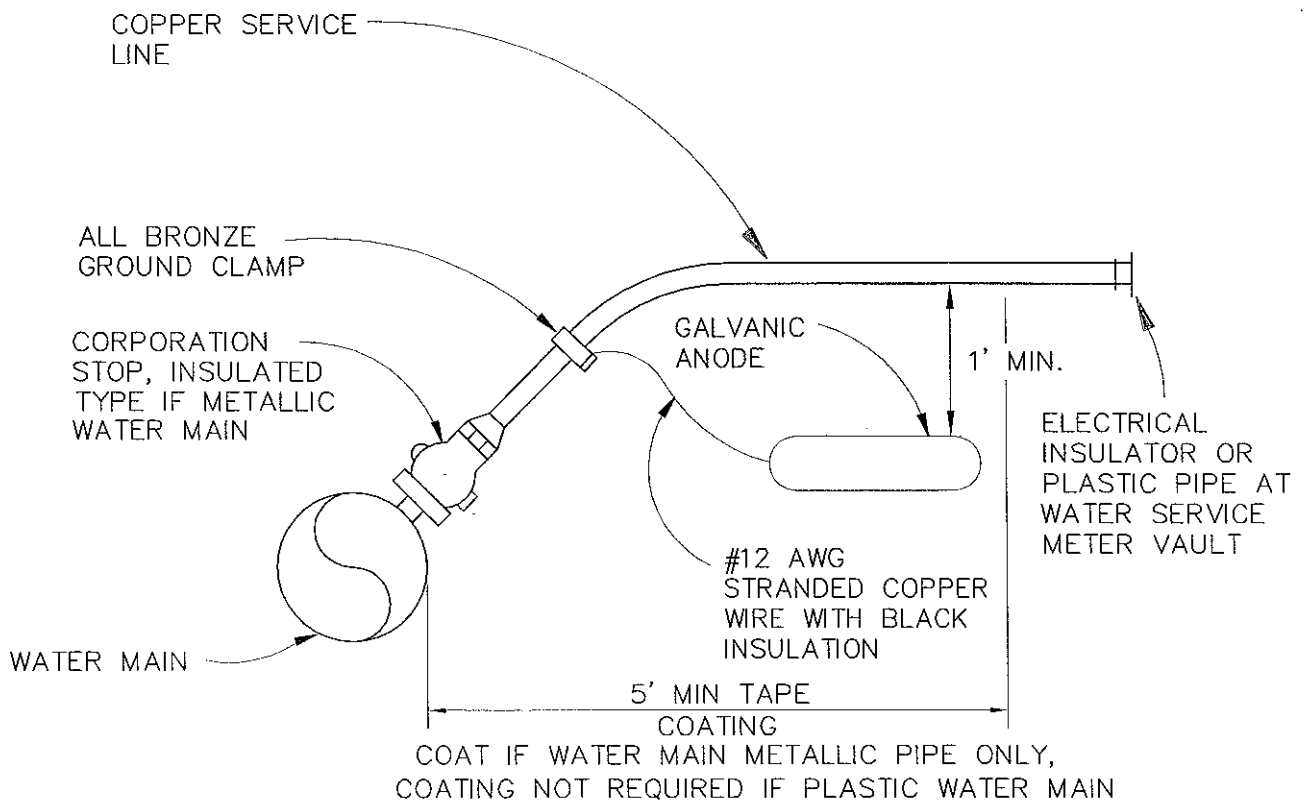
NOT TO SCALE

**GALVANIC ANODE INSTALLATION AT
HYDRANT ASSEMBLIES W/ PVC STUB**

DWG. NO. 13944P

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

- 1) INSTALL ANODE 3'-5' FROM PIPE AND 1'-0" BELOW PIPE INVERT ELEVATION. TAPE COAT LINE FROM METALLIC WATER MAIN, MIN. 5' OR AS SPECIFIED, APPLY TAPE COATING PER SPECIFICATION.
- 2) ACTUAL ORIENTATION OF SERVICE LINE IS IN THE HORIZONTAL PLANE.
- 3) WITH HDPE SERVICE LINE, WRAP CORP STOP WITH PETROLATUM TAPE.

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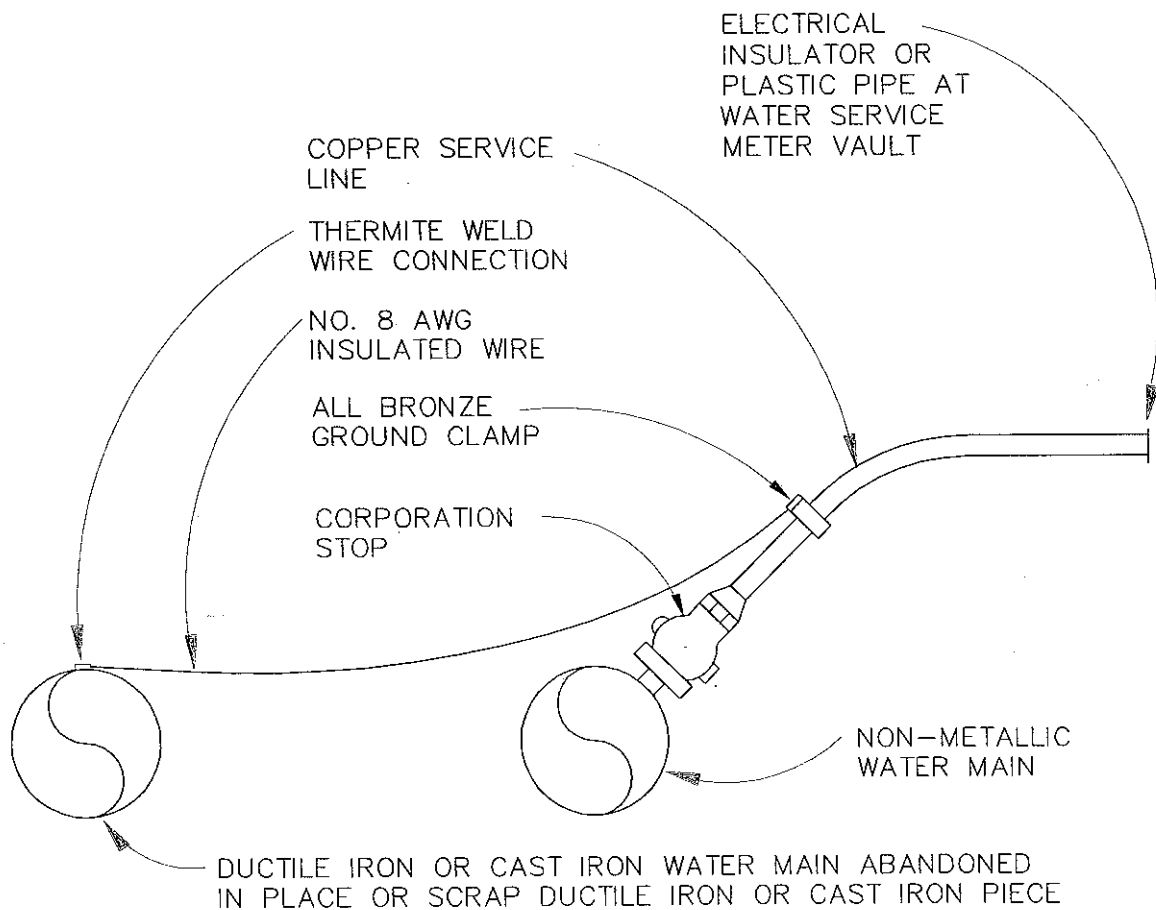
ANODE WIRE CONNECTION TO COPPER SERVICE PIPELINE

DWG. NO.

13945

CITY of SHERIDAN

NOVEMBER 2003



NOTE:

PIPE ANODE SHALL BE 6-INCH DIAMETER MINIMUM
CAST OR DUCTILE IRON PIPE, 10-FOOT MINIMUM LENGTH.

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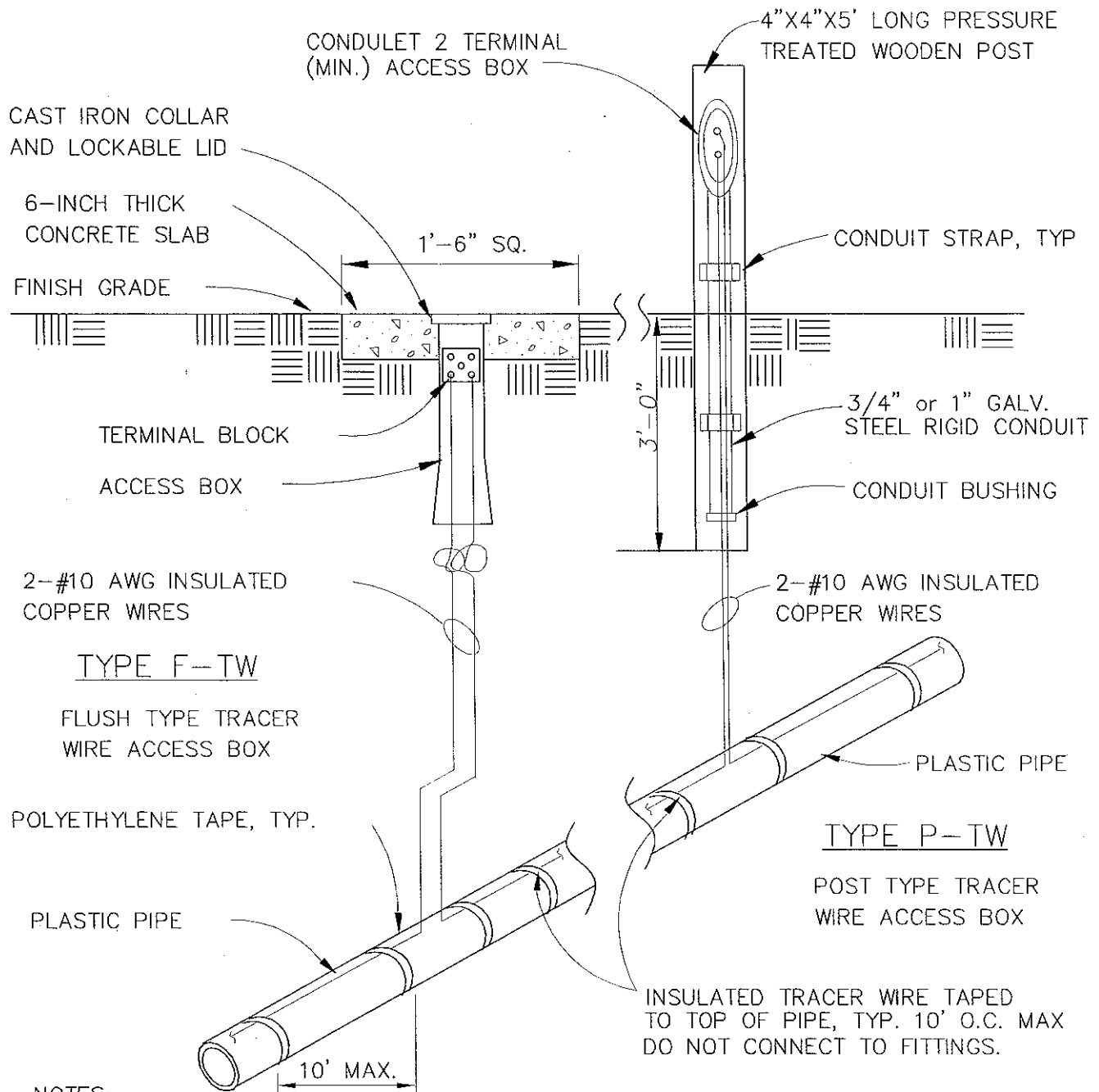
**DUCTILE OR CAST IRON
PIPE ANODE**

DWG. NO.

13946

CITY of SHERIDAN

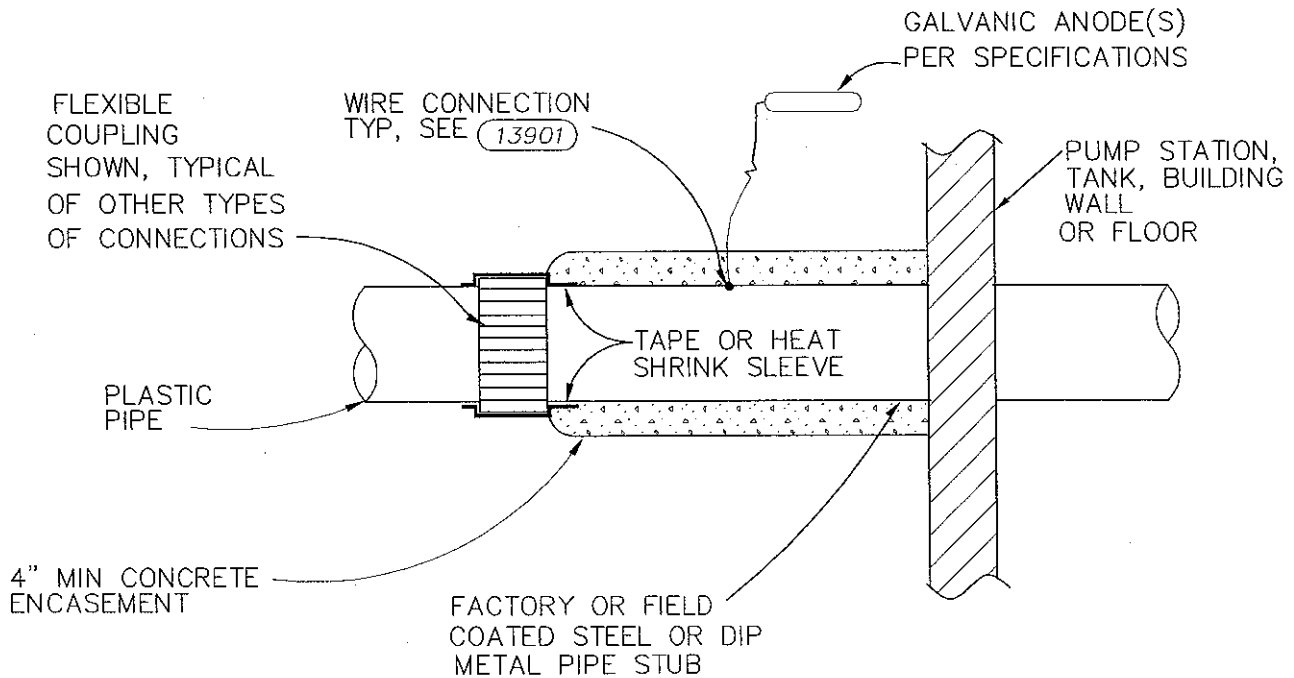
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TRACER WIRE ACCESS BOXES



NOTES

1. CADWELD WIRES, ASSEMBLE AND TEST COUPLING FITTING CONNECTION AND COAT PRIOR TO CONCRETE ENCASEMENT AND BACKFILLING.
2. COAT METAL PIPE STUB PER SPECIFICATIONS PRIOR TO ENCASEMENT.
3. CENTER 12" WIDE JOINT WRAP TAPE OR HEAT SHRINK SLEEVE ON FLEXIBLE COUPLING AND PIPE INTERFACE AFTER TESTING BEFORE ENCASEMENT.
4. COMPLETELY ENCASE COATED STEEL OR DUCTILE IRON PIPE STUB BETWEEN FLEXIBLE COUPLING AND CONCRETE STRUCTURE, BUILDING WALL, FLOOR OR UNDER TANK WITH A MIN. 4-INCH THICK CONCRETE LAYER.
5. INSTALL GALVANIC ANODE(S) TO CONCRETE ENCASED PIPE, ONE MINIMUM.
6. PROVIDE COMPLETE CONCRETE ENCASEMENT FOR FULL LENGTH OF METAL PIPE STUB UNDER CONCRETE FLOOR SLABS OR TANK BOTTOMS.

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NOT TO SCALE

**CONCRETE ENCASED METAL PIPE STUB
BETWEEN PLASTIC PIPE FLEXIBLE COUPLING
AND CONCRETE STRUCTURE CONNECTION**

DWG. NO.

13948

CITY of SHERIDAN

NOVEMBER 2003

#12 AWG STRANDED INSULATED
COPPER PIG TAIL WIRE WITH
SLEEVES, No. OF BONDS PER
SPECIFICATIONS, LENGTH AS
REQ'D. TO PROVIDE MIN. 1"
SLACK

WIRE CONNECTION, TYP,
SEE 13901

PREFABRICATED WELD CAP,
TYP EACH WELD, OTHERS
NOT SHOWN, UNLESS
HEAT SHRINK SLEEVED

METALLIC FITTING OR
VALVE BODY, TYP.

PLASTIC
PIPE

METALLIC
GLAND

NOTES:

1. BOND PLASTIC PIPE METALLIC GLANDS TO METALLIC FITTING BODY

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METALLIC FITTING GLANDS

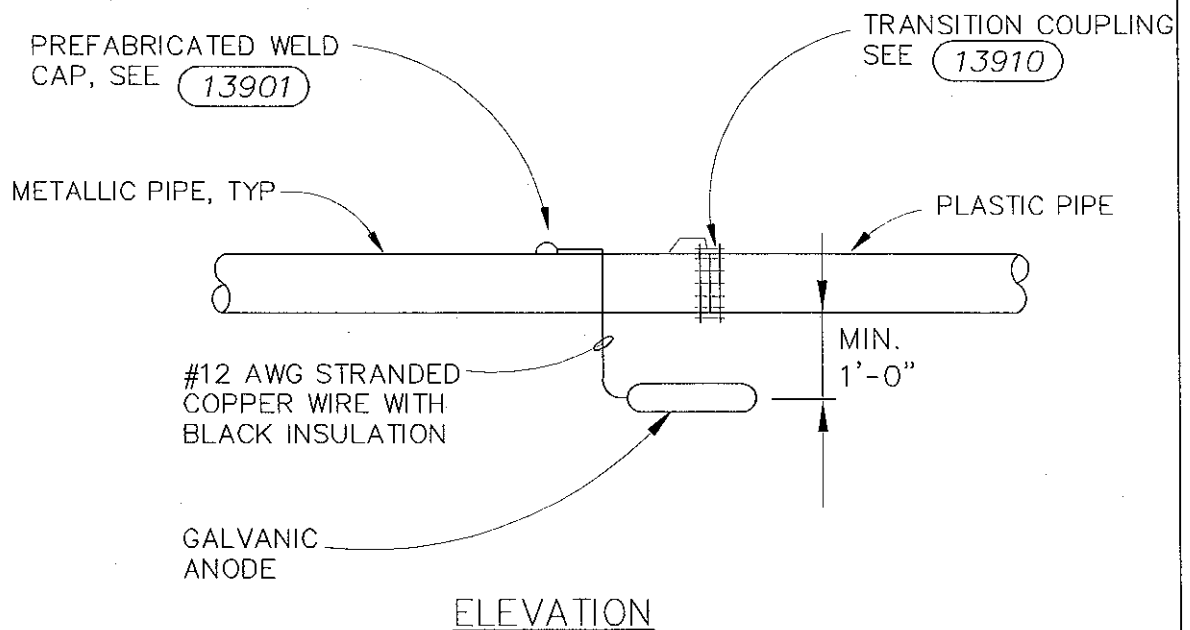
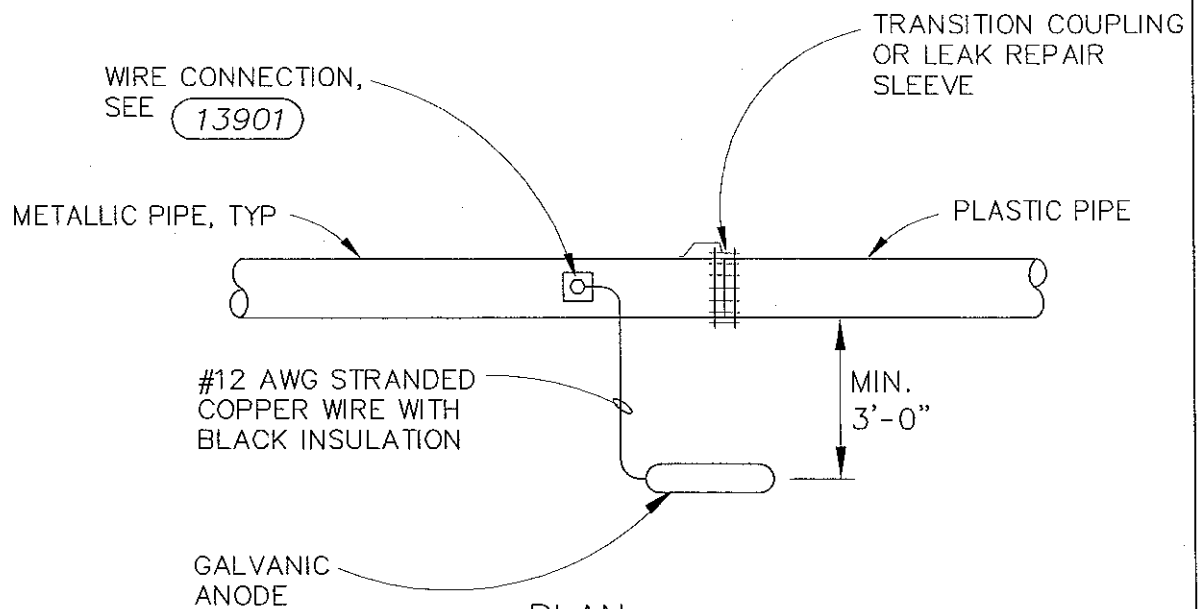
DWG. NO.

13949

CITY of SHERIDAN

NOVEMBER 2003

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NOTE:

1. INSTALL TYPE, SIZE, AND NUMBER OF ANODES SPECIFIED.
2. INSTALL 2 ANODES (17 OR 18 POUND) AT ALL LEAK REPAIR LOCATIONS.

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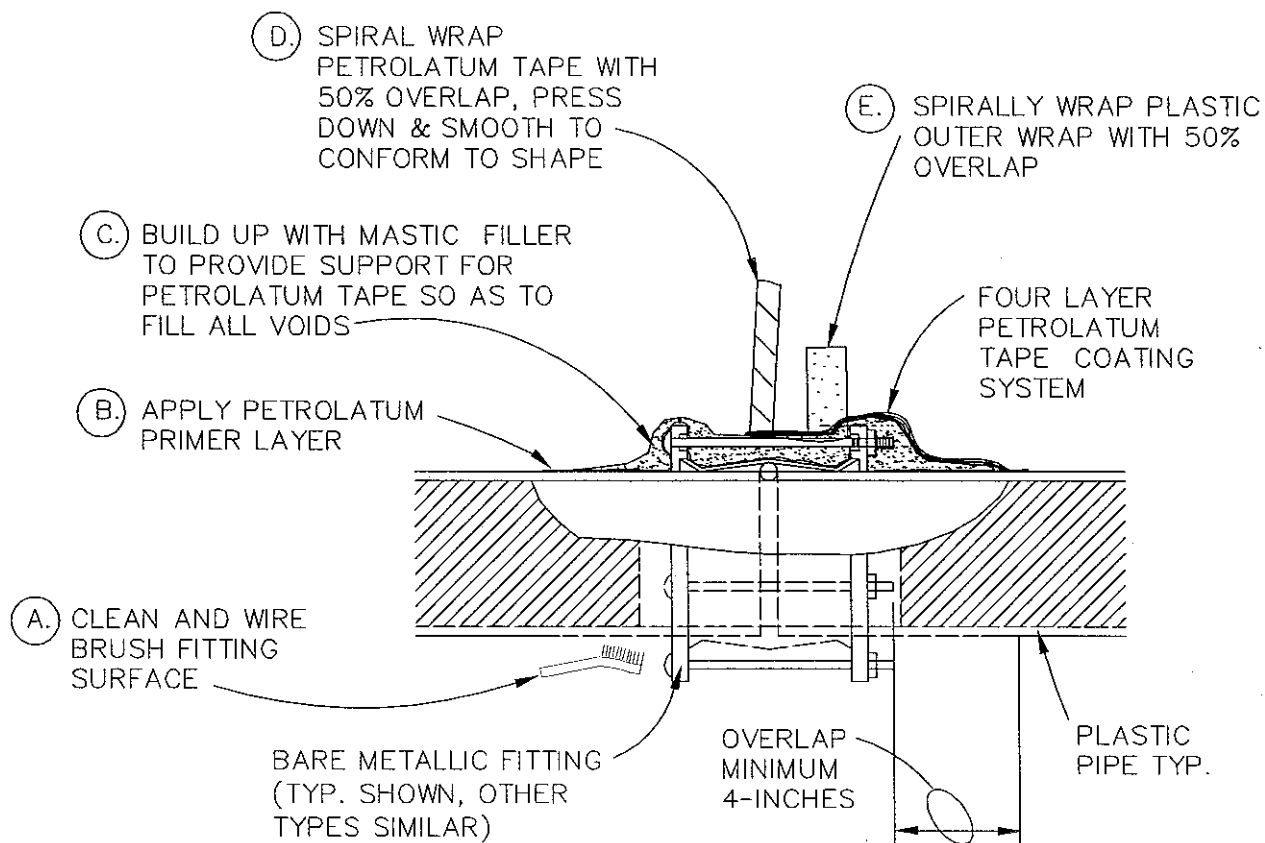
**GALVANIC ANODE INSTALLATION FOR
EXISTING METALLIC PIPE CONNECTIONS
OR LEAK REPAIR LOCATIONS**

DWG. NO.

13950R

CITY of SHERIDAN

NOVEMBER 2003



NOTES:

1. PRIMER, MASTIC FILLER, TAPE, AND OUTER WRAP AS RECOMMENDED BY TAPE MANUFACTURER FOR EACH FITTING TYPE AND ENVIRONMENT.
2. CLEAN AND ROUGHEN FITTING SURFACE WITH WIRE BRUSH AND APPLY PETROLATUM PRIMER LAYER, MASTIC FILLER, PETROLATUM TAPE, AND PLASTIC OUTER WRAP PER MANUFACTURER'S DIRECTIONS.
3. JOINT BOND WIRES, ANODE & TEST LEADS (NOT SHOWN) SHALL BE BE COATED WITH HANDYCAP & THEN ENCASED UNDER PETROLATUM TAPE COATING.
4. PRIMER AND MASTIC FILLER SHALL PROVIDE SMOOTH TRANSITION AT ALL EDGES AND STEP-DOWNS AND FILL ALL VOIDS.
5. PETROLATUM TAPE COATING SHALL COMPLETELY ENCASE BARE METALLIC FITTING & EXTEND A MIN. 4" ONTO PLASTIC PIPE SURFACE.
6. FOUR LAYER SYSTEM WITH PROTECTIVE WRAP FOR BURIED CONDITIONS AND THREE LAYER SYSTEM FOR ABOVEGRADE APPLICATIONS.
7. CORROSION PROTECTION IS SHOWN FOR FLEXIBLE COUPLING JOINT TYPE, PROTECTION OF OTHER BARE OR COPPER METALLIC FITTING TYPES SIMILAR.

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NOT TO SCALE

**PETROLATUM TAPE COATING FOR
BARE METALLIC COUPLINGS & FITTINGS**

DWG. NO.

13967

CITY of SHERIDAN

NOVEMBER 2003

SECTION 31 20 11
EARTH MOVING (SHORT FORM)

PART 1 - GENERAL

1.1 :DESCRIPTION:

This section specifies the requirements for furnishing all equipment, materials, labor and techniques for earthwork including excavation, fill, backfill and site restoration utilizing fertilizer, seed and/or sod.

1.2 DEFINITIONS:

A. Unsuitable Materials:

1. Fills: Topsoil; frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 3 inches; organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
2. Existing Subgrade (except footings): Same materials as above paragraph that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proofrolling, or similar methods of improvement.
3. Existing Subgrade (footings only): Same as Paragraph 1, but no fill or backfill. If materials differ from design requirements, excavate to acceptable strata subject to Resident Engineer's approval.

B. Earthwork: Earthwork operations required within the new construction area. It also includes earthwork required for other trench work throughout the job site.

C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in ASTM D698.

D. Fill: The term fill means fill or backfill as appropriate.

1.3 RELATED WORK:

A. Materials Testing and Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Safety: Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.

C. Protection of Existing Utilities, Fire Protection Services, Existing Equipment, Roads, and Pavements: Section 01 00 00, GENERAL REQUIREMENTS.

1.4 CLASSIFICATION OF EXCAVATION:

A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items including underground structures indicated to be

demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

B. Rock Excavation:

1. Solid ledge rock (igneous, metamorphic, and sedimentary rock).
2. Bedded or conglomerate deposits so cemented as to present characteristics of solid rock which cannot be excavated without blasting; or the use of a modern power excavator (shovel, backhoe, or similar power excavators) of no less than 1 cubic yard capacity, properly used, having adequate power and in good running condition.
3. Boulders or other detached stones each having a volume of 1/2 cubic yard or more.

1.5 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION:

A. Measurement: Cross section and measure the uncovered and separated materials, and compute quantities by the Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond the following limits:

1. 12 inches outside of the perimeter of formed footings.
2. 24 inches outside the face of concrete work for which forms are required, except for footings.
3. 6 inches below the bottom of pipe and not more than the pipe diameter plus 24 inches in width for pipe trenches.
4. The outside dimensions of concrete work for which no forms are required (trenches, conduits, and similar items not requiring forms).

B. Payment: No separate payment shall be made for rock excavation quantities shown. The contract price and time will be adjusted for overruns or underruns in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Rock Excavation Report:

1. Certification of rock quantities excavated.
2. Excavation method.
3. Labor.
4. Equipment.
5. Land Surveyor's or Civil Engineer's name and official registration stamp.
6. Plot plan showing elevations.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Nursery and Landscape Association (ANLA):
2004American Standard for Nursery Stock
- C. American Association of State Highway and Transportation Officials (AASHTO):
T99-01 (R2004)Moisture-Density Relations of Soils Using a 5.5 lb Rammer
and a 12-inch Drop
T180-01 (2004)Moisture-Density Relations of Soils Using a 10 lb Rammer and
an 18-inch Drop
- D. American Society for Testing and Materials (ASTM):
D698-07Laboratory Compaction Characteristics of Soil Using Standard
Effort
- E. Standard Specifications for Road and Bridge Construction, Wyoming State Department of
Transportation, latest revision.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Fills: Materials approved from on site and off site sources having a minimum dry density of 110 pcf, a maximum Plasticity Index of 6, and a maximum Liquid Limit of 30.
- B. Granular Fill: Bedding for PVC water pipe, crushed stone or gravel graded from 1/2-inch to No. 4.
- C. Fertilizer: (5-10-5) delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents. The fertilizer shall be applied at a rate of 300 pounds per acre.
- D. Seed: Grass mixture delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents. The seed shall be applied at a rate of 100 pounds per acre for the areas disturbed during construction not to be sodded or paved. The Contractor shall furnish and install seed mixtures approved by the various property owners along the project alignment on areas disturbed by the construction activities. Seed mixture for non-specific these areas shall be as follows unless otherwise noted:

Crested Wheatgrass	40%
Perennial Ryegrass	30%
Hard Fescue	20%
Annual Ryegrass	10%

- E. Vegetable mulch material, if required and approved, shall be clean wheat straw.

PART 3 - EXECUTION

3.1 SITE PREPARATION:

- A. Clearing: Clearing within the limits of earthwork operations as described or designated by the Resident Engineer. Work includes removal of trees, shrubs, fences, paving, debris, trash and any other obstructions. Remove materials from the Medical Center property and easements.
- B. Grubbing: Remove stumps and roots 3 inches and larger diameter. Undisturbed sound stumps, roots up to 3 inches diameter, and nonperishable solid objects which will be a minimum of 3 feet below subgrade or finished embankment may be left.
- C. Trees and Shrubs: Trees and shrubs, not shown for removal, may be removed from the areas within the construction easement if such removal is approved in advance by the Resident Engineer. Remove materials from the Medical Center. Box, and otherwise protect from damage, existing trees and shrubs which are not shown to be removed in the construction area. Repair immediately damage to existing trees and shrubs by trimming, cleaning and painting damaged areas, including the roots, in accordance with standard industry horticultural practice for the geographic area and plant species. Building materials shall not be stored closer to trees and shrubs that are to remain, than the farthest extension of their limbs.
- D. Stripping Topsoil: Unless otherwise indicated on the drawings, the limits of earthwork operations shall extend anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, from within the limits of earthwork operations as specified above unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Topsoil shall be fertile, friable, natural topsoil of loamy character and characteristic of the locality. Topsoil shall be capable of growing healthy horticultural crops of grasses. Stockpile topsoil and protect as directed by the Resident Engineer. Eliminate foreign material, such as weeds, roots, stones, subsoil, frozen clods, and similar foreign materials, larger than 1/2 cubic foot in volume, from soil as it is stockpiled. Retain topsoil on the station. Remove foreign materials larger than 2 inches in any dimension from topsoil used in final grading. Topsoil work, such as stripping, stockpiling, and similar topsoil work, shall not, under any circumstances, be carried out when the soil is wet so that the tilth of the soil will be destroyed.

- E. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

3.2 EXCAVATION:

- A. Shoring, Sheet piling and Bracing: Shore, brace, or slope to its angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with OSHA requirements.
 - 1. Extend shoring and bracing to the bottom of the excavation. Shore excavations that are carried below the elevations of adjacent existing foundations. The Contractor is encouraged to use a trench box to minimize the trench width.
 - 2. If the bearing of any foundation is disturbed by excavating, improper shoring or removal of shoring, placing of backfill, and similar operations, provide a concrete fill support in compliance with Specification Section 31 23 23.33, FLOWABLE FILL, under disturbed foundations, as directed by Resident Engineer, at no additional cost to the Government. Do not remove shoring until permanent work in excavation has been inspected and approved by Resident Engineer.
- B. Excavation Drainage: Operate pumping equipment, and/or provide other materials, means and equipment as required, to keep excavations free of water and subgrades dry, firm, and undisturbed until approval of permanent work has been received from Resident Engineer. Approval by the Resident Engineer is also required before placement of the permanent work on all subgrades. When subgrade for foundations has been disturbed by water, remove the disturbed material to firm undisturbed material after the water is brought under control. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, the Resident Engineer should be contacted to consider the use of flowable fill.
- C. Blasting: Blasting shall not be permitted.
- D. Trench Earthwork:
 - 1. Water Main Trenches at Tie-in Locations and Insertion/Extraction Pits:
 - a. Trench width below a point 6 inches above top of the pipe shall be 24 inches for up to and including 12 inches diameter and four-thirds diameter of pipe plus 8 inches for pipe larger than 12 inches. Width of trench above that level shall be as necessary for sheet piling and bracing and proper performance of the work.

- b. The pipe shall be bedded with granular imported bedding material from 6 inches below the pipe invert to 6 inches above the pipe crown.
 - c. Place and compact as specified the remainder of backfill using acceptable excavated materials. Do not use unsuitable materials.
 - d. Use granular fill for bedding where rock or rocky materials are excavated.
- E. Site Earthwork: Excavation shall be accomplished as required by drawings and specifications. Remove subgrade materials that are determined by the Resident Engineer as unsuitable, and replace with acceptable material. Any shortage of backfill material shall be replaced by Contractor with an approved backfill material meeting specifications. Payment for backfill material shall be made under bid item Imported Backfill Material.

3.3 FILLING AND BACKFILLING:

- A. General: Do not fill or backfill until all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from the excavation. Use excavated materials or borrow for fill and backfill, as applicable. Do not use unsuitable excavated materials. Do not backfill until pipes coming in contact with backfill have been installed, and inspected and approved by Resident Engineer.
- B. Placing: Place material in horizontal layers not exceeding 8 inches in loose depth and then compacted. Do not place material on surfaces that are muddy, frozen, or contain frost.
- C. Compaction: Use approved equipment (hand or mechanical) well suited to the type of material being compacted. Do not operate mechanized vibratory compaction equipment within 10 feet of new or existing building walls without the prior approval of the Resident Engineer. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each layer until there is no evidence of further compaction to not less than 95 percent of the maximum density determined in accordance with the following test method ASTM D698 for structural areas beneath pavements. Non-structural areas shall be compacted to a minimum of 90 percent at plus or minus 3 percent of optimum moisture content.

3.4 GRADING:

- A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.

- B. Cut rough or sloping rock to level beds for foundations. In unfinished areas fill low spots and level off with coarse sand or fine gravel.
- C. Slope backfill outside the building away from the building walls to provide adequate drainage and prevent ponding.

3.5 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:

- A. Disposal: Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Medical Center property.
- B. Remove from the construction site and dispose of any excess excavated materials after all fill and backfill operations have been completed.
- C. Segregate all excavated contaminated soil designated by the Resident Engineer from all other excavated soils, and stockpile on site on two 6 mil polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements.

3.6 CLEAN-UP:

- A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the Medical Center property.

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SECTION 31 23 19
DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies performance of dewatering required to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry. Control of surface water shall be considered as part of the work under this specification.

1.2 SUMMARY:

- A. The work to be completed by the Contractor includes, but is not necessarily limited to the following:
 - 1. Implementation of the Erosion and Sedimentation Control Plan.
 - 2. Dewater excavations, including seepage and precipitation.
- B. The Contractor shall be responsible for providing all materials, equipment, labor, and services necessary for care of water and erosion control. Excavation work shall not begin before the Erosion and Sedimentation Control Plan is in place.

1.3 REQUIREMENT:

- A. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least 1 foot below lowest foundation subgrade or bottom of pipe trench and to allow material to be excavated in a reasonably dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where sheeting is not required. Operate dewatering system continuously until backfill work has been completed.
- B. Reduce hydrostatic head below any excavation to the extent that water level in the construction area is a minimum of 1 foot below prevailing excavation surface.
- C. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
- D. Maintain stability of sides and bottom of excavation.
- E. Construction operations are performed in the dry.
- F. Control of surface and subsurface water is part of dewatering requirements. Maintain adequate control so that:
 - 1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.

2. Erosion is controlled.
3. Flooding of excavations or damage to structures does not occur.
4. Surface water drains away from excavations.
5. Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken.

G. Permitting Requirements: The contractor shall comply with and obtain the required State and County permits where the work is performed.

1.4 RELATED WORK:

- A. Materials Testing and Inspection During Construction: See Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Safety Requirements: See Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.
- C. Submittal requirements as specified in Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- D. Protection of Existing Utilities, Fire Protection Services, Existing Equipment, Roads, and Pavements: See Section 01 00 00, GENERAL REQUIREMENTS.
- E. Excavation, Backfilling, Site Grade and Utilities: See Section 31 20 00, EARTH MOVING.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Drawings and Design Data:
 1. Submit drawings and data showing the method to be employed in dewatering excavated areas 30 days before commencement of excavation.
 2. Material Shall Include: Location, depth and size of wellpoints, headers, sumps, ditches, size and location of discharge lines, capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
 3. Include a written report outlining control procedures to be adopted if dewatering problem arises.
 4. Materials submitted shall be in a format acceptable for inclusion in required permit applications to any and all regulatory agencies for which permits for discharge water from the dewatering system are required due to the discharge reaching regulated bodies of water.
- C. Inspection Reports.

D. All required permits.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install a dewatering system to lower and control ground surface water in order to permit excavation, construction of structure, and placement of backfill materials to be performed under dry conditions. Make the dewatering system adequate to pre-drain the water-bearing strata above and below the bottom of structure foundations, utilities and other excavations.
- B. In addition, reduce hydrostatic pressure head in water-bearing strata below structure foundations, utility lines, and other excavations, to extent that water levels in construction area are a minimum of 1 foot below prevailing excavation surface at all times.

3.2 OPERATION:

- A. Prior to any excavation below the groundwater table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.
- B. Place an adequate weight of backfill material to prevent buoyancy prior to discontinuing operation of the system.

3.3 WATER DISPOSAL:

- A. Dispose of water removed from the excavations in such a manner as:
 - 1. Will not endanger portions of work under construction or completed.
 - 2. Will cause no inconvenience to Government or to others working near site.
 - 3. Will comply with the stipulations of required permits for disposal of water.
 - 4. Will Control Runoff: The Contractor shall be responsible for control of runoff in all work areas including but not limited to: excavations, access roads, parking areas, laydown, and staging areas. The Contractor shall provide, operate, and maintain all ditches, basins, sumps, culverts, site grading, and pumping facilities to divert, collect, and remove all water from the work areas. All water shall be removed from the immediate work areas and shall be disposed of in accordance with applicable permits.
- B. Excavation Dewatering:
 - 1. The Contractor shall be responsible for providing all facilities required to divert, collect, control, and remove water from all construction work areas and excavations.
 - 2. Drainage features shall have sufficient capacity to avoid flooding of work areas.

3. Drainage features shall be so arranged and altered as required to avoid degradation of the final excavated surface(s).
 4. The Contractor shall utilize all necessary erosion and sediment control measures as described herein to avoid construction related degradation of the natural water quality.
 5. The Contractor shall plan for and make arrangements to divert either surface runoff or groundwater for the purpose of irrigating adjacent grassed or turf areas rather than allow water disposal to water courses or navigable waters via storm sewers or drainage ditches.
- C. Dewatering equipment shall be provided to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work during construction. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

3.4 STANDBY EQUIPMENT:

- A. Provide complete standby equipment, installed and available for immediate operation, as may be required to adequately maintain de-watering on a continuous basis and in the event that all or any part of the system may become inadequate or fail.

3.5 CORRECTIVE ACTION:

- A. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system loosening of the foundation strata, or instability of slopes, or damage to foundations or structures, perform work necessary for reinstatement of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Government.

3.6 DAMAGES:

- A. Immediately repair damages to adjacent facilities caused by dewatering operations.

3.7 REMOVAL:

- A. Insure compliance with all conditions of regulating permits and provide such information to the Resident Engineer. Obtain written approval from Resident Engineer before discontinuing operation of dewatering system.

----- E N D -----

SECTION 31 23 23.33
FLOWABLE FILL

PART 1 - GENERAL

1.1 INTRODUCTION:

- A. Flowable fill refers to a cementitious slurry consisting of a mixture of fine aggregate or filler, water, and cementitious material(s), which is used as a fill or backfill in lieu of compacted earth. This mixture is capable of filling all voids in irregular excavations and hard to reach places (such as under undercuts of existing slabs), is self-leveling, and hardens in a matter of a few hours without the need for compaction in layers. Flowable fill is sometimes referred to as controlled density fill (CDF), controlled low strength material (CLSM), lean concrete slurry, and unshrinkable fill.
- B. Flowable fill materials will be used as only as a structural fill replacement on VA projects. The materials and mix design for the flowable fill should be designed to produce a comparable compressive strength to the surrounding soil after hardening, making excavation at a later time possible to produce the compressive strength indicated for the placed location, as determined by the Resident Engineer.

1.2 DESCRIPTION:

Furnish and place flowable fill in a fluid condition that sets within the required time and, after curing, obtains the desired strength properties as evidenced by the laboratory testing of the specific mix design, at locations shown on the plans or as directed by the Resident Engineer, verbally or in writing. This section specifies flowable fill for use as structural fill to remain easily excavatable using a backhoe as would be utilized for adjoining earth.

1.3 RELATED WORK:

- A. Materials Testing and Inspection During Construction: See Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Earthwork, Excavation and Backfill and Compaction Requirements: See Section 31 20 11, EARTH MOVING.

1.4 DEFINITIONS:

- A. Flowable Fill: Ready-mix Controlled Low Strength Material used as an alternative to compacted soil, and is also known as controlled density fill, and several other names, some of which are trademark names of material suppliers. Flowable fill (Controlled Low Strength Material) differs from portland cement concrete as it contains a low cementitious content to reduce strength

development for possible future removal. Chemical admixtures may also be used in flowable fill to modify performance properties of strength, flow, set and permeability.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Flowable Fill Mix Design: Provide flowable fill mix design containing cement and water. At the Contractor's option, it may also contain fly ash, aggregate, or chemical admixtures in any proportions such that the final product meets the strength and flow consistency, and shrinkage requirements included in this specifications.
 - 1. Test and Performance - Submit the following data:
 - a. Flowable fill shall have a strength of **30-60** psi according to ASTM C 39 at 28 days after placement.
 - b. Flowable fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 1/8-inch per ft. of flowable fill depth (for mixes containing high fly ash content). Measurement of a Final Bleeding shall be as measured in Section 10 of ASTM C 940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - c. Flowable fill shall have a unit weight of 115 – 145 lb/feet 3 measured at the point of placement after a 60 minute ready-mix truck ride.
- C. Provide documentation that the admixture supplier has experience of at least one year, with the products being provided and any equipment required to obtain desired performance of the product.
- D. Manufacturer's Certificates: Provide Resident Engineer with a certification that the materials incorporated in the flowable fill, following achievement of the required strength, do not represent a threat to groundwater quality.

1.6 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - D4832-02Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

- C618-03Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as Mineral Admixture in Concrete.
(Use Fly Ash conforming to the chemical and physical requirements for mineral admixture, Class F listed, including Table 2 (except for Footnote A). Waive the loss on ignition requirement.)
- C403/C403M-05Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
- C150-99 Rev.A-04Standard Specification for Portland Cement
- C33-03Standard Specification for Concrete Aggregates
- C494/C494M-04Standard Specification for Chemical Admixtures for Concrete
- C940 RevA-98Standard Specification for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced – Aggregate Concrete in the Laboratory

C. American Concrete Institute (ACI):

- SP-150-94Controlled Low-Strength Materials

1.7 QUALITY ASSURANCE:

- A. Manufacturer: Flowable fill shall be manufactured by a ready-mix concrete producer with a minimum of 1 year experience in the production of similar products.
- B. Materials: For each type of material required for the work of this Section, provide primary materials that are the products of one manufacturer. If not otherwise specified here, materials shall comply with recommendations of ACI 229, “Controlled Low Strength Materials.”
- C. Pre-Approval Procedures: The use of flowable fill during any part of the project shall be restricted to those incidences where, due to field conditions, the Contractor has made the Resident Engineer aware of the conditions for which he recommends the use of the flowable fill, and the Resident Engineer has confirmed those conditions and approved the use of the flowable fill, in advance. During the submittal process, the contractor shall prepare and submit various flowable fill mix designs corresponding to required conditions or if the contractor desires to use flowable fill due to economics. Approval for the strength of the flowable fill shall be obtained from the Resident Engineer when the contractor desires, or is required, to use flowable fill at specific location(s) within the project. Prior to commencement of field operations the contractor shall establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.8 DELIVERY, STORAGE, AND HANDLING:

Deliver and handle all products and equipment required, in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

1.9 PROJECT CONDITIONS:

Perform installation of flowable fill only when approved by the Resident Engineer, and when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

PART 2 - PRODUCTS**2.1 MATERIALS:**

Provide flowable fill containing, at a minimum, cementitious materials, sand and water.

Cementitious materials shall be portland cement, pozzolanic materials, or other self-cementing materials, or combinations thereof, at the contractor's option and following approval by the Resident Engineer. The flowable fill mix design shall also contain, fine aggregate or filler, and/or chemical admixtures in any proportions such that the final product meets the strength, flow consistency and shrinkage requirements included in this specification, as approved by the Resident Engineer.

- A. Portland Cement: ASTM C150, Type 1 or Type 2, meeting Wyoming State DOT standards.
- B. Mixing Water: Fresh, clean, and potable, meeting Wyoming State DOT standards for use as mix-water for cast-in-place concrete.
- C. Air-Entraining Admixture: ASTM C260.
- D. Chemical Admixtures: ASTM C494.
- E. Aggregate: ASTM C33.

2.2 FLOWABLE FILL MIXTURE:

- A. Mix design shall produce a consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.
- B. Flowable fill shall have a minimum strength of 200 psi according to ASTM C39 at 28 days after placement.
- C. Flowable fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 1/8-inch per foot of flowable fill depth (for mixes containing high fly ash content). Measurement of a Final Bleeding shall be as measured in Section 10 of ASTM C 940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.

- D. Flowable fill shall have a unit weight of 115 – 145 lbs/feet³ measured at the point of placement after a 60 minute ready-mix truck ride. In the absence of strength data the cementitious content shall be a maximum of 100 lbs/cy.
- E. Flowable fill shall have an in-place yield of a maximum of 110% of design yield for removable types at 1 year.
- F. Provide equipment as recommended by the Manufacturer and comply with manufacturer's recommendations for the addition of additives, whether at the production plant or prior to placement at the site.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine conditions of substrates and other conditions under which work is to be performed and notify Resident Engineer, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 APPLICATION OF FLOWABLE FILL:

Secure tanks, pipes and other members to be encased in flowable fill. Insure that there are no exposed metallic pipes, conduits, or other items that will be in contact with the flowable fill after placement. If so, replace with non-metallic materials or apply manufacturers recommended coating to protect metallic objects before placing the flowable fill. Replacement or protection of metallic objects is subject to the approval of the Resident Engineer.

3.3 PROTECTION AND CURING:

Protect exposed surfaces of flowable fill from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Resident Engineer.

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SECTION 33 10 00
WATER UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION:

Underground water distribution system complete, ready for operation, including all appurtenant structures, and connections to both service lines and to existing water supply.

1.2 RELATED WORK:

- A. Maintenance of Existing Utilities: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Excavation, trench widths, pipe bedding, backfill, shoring, sheeting, bracing: Section 31 20 11, EARTH MOVING.
- C. Concrete: Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.3 DEFINITIONS:

- A. Water Distribution: Pipelines and appurtenances which are part of the supply or distribution systems. The water supply systems comprise the network of piping located between the treatment plant and VA Medical Center, including hydrants, valves, and other appurtenances used to supply water for domestic, fire-fighting/fire protection and irrigation purposes.
- B. Water Service Line: Pipe line connecting domestic service piping to a potable water supply line.

1.4 QUALITY ASSURANCE:

- A. Products Criteria:
 - 1. Multiple Units: When two or more units of the same type or class of materials or equipment are required, these units shall be product of one manufacturer.
 - 2. Nameplate: Nameplate bearing manufacturer's name or identifiable trademark securely affixed in a conspicuous place on equipment or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
- B. Comply with the rules and regulations of the Public Utility having jurisdiction over the connection to Public Water lines and the extension, and/or modifications to Public Utility systems.
- C. Comply with all rules and regulations of Federal, State, and Local Government, including the Department of Environmental Quality (WDEQ) having jurisdiction over the design, construction, and operation of potable water systems.
- D. All material surfaces in contact with potable water shall comply with NSF 61.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers' Literature and Data (Submit all items as one package):
(Ductile Iron, Polyvinyl Chloride (PVC) and High Density Polyethylene (HDPE) pipe shall be in accordance with AWWA C600, C605 and C906 respectively; and shall be provided to Resident Engineer for approval.
 - 1. Piping.
 - 2. Gaskets.
 - 3. Valves.
 - 4. Fire hydrants.
 - 5. Vaults, frames and covers.
 - 6. Steps.
 - 7. Post indicator.
 - 8. Valve boxes.
 - 9. Corporation and curb stops.
 - 10. Curb stop boxes.
 - 11. Joint restraint.
 - 12. Disinfection products.
 - 13. Link/sleeve seals.
 - 14. Fittings.
- C. Testing Certifications:
 - 1. Hydrostatic Testing.
 - 2. Certification of Disinfection, including free chlorine residuals, and bacteriological examinations.

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI/ASME):
 - B16.1-98Cast Iron Pipe Flanges and Flanged Fittings
 - B16.26-88Cast Copper Alloy Fittings for Flared Copper Tubes
 - B40.100-98Pressure Gauges and Gauge Attachments

C. American Society for Testing and Materials (ASTM):

A123-97	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A148M-03	Standard Specifications for Steel Castings
A307-02	Standard Specifications for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A536-04	Standard Specifications for Ductile Iron Castings
B61-02	Steam or Valve Bronze Castings
B62-02	Composition Bronze or Ounce Metal Castings
B88-02	Seamless Copper Water Tube
B828	Standard Practice: Soldering and Brazing Copper Tube and fittings
C139-03	Concrete Masonry Units for Construction of Catch Basins and Manholes
D1784-03	Standard Specifications for Rigid PVC Compounds and CPVC Compounds
D3139-98	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
F477-02e1	Elastomeric Seals (Gaskets) for Joining Plastic Pipe

D. American Water Works Association (AWWA):

B300-04	Hypochlorites
B301-04	Liquid Chlorine
C104-04	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
C105-99	Polyethylene Encasement for Gray and Ductile C.I. Piping for Water and Other Liquids
C110-03	Ductile-Iron and Gray-Iron Fittings, 80 mm (3 Inches) Through 1200 mm (48 Inches) for Water and Other Liquids
C111-01	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
C115-99	Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
C150-02	American National Standard for Thickness Design of Ductile Iron Pipe

- C151-96Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or
Sand-Lined Molds, for Water or Other Liquids
- C153-00Ductile-Iron Compact Fittings, 80 mm (3 inches) Through 300
mm (12 Inches) for Water and Other Liquids
- C500-02Gate Valves for Water and Sewerage Systems
- C502a-95.....Dry-Barrel Fire Hydrants
- C509-01Resilient Seated Gate Valve for Water and Sewage System
- C550-01Protective Epoxy Interior Coatings for Valves and Hydrants
- C600-01Installation for Ductile-Iron Water Mains and Their
Appurtenances
- C605-94Underground Installation of Polyvinyl Chloride (PVC) Pressure
Pipe and Fittings for Water
- C651-92Disinfecting Water Mains
- C800-01Underground Service Line Valves and Fittings
- C900-97Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inches Thru 12
Inches, for Water
- C906.....PE-High Density Polyethylene Pipe, 4 Inches Thru 63 Inches,
for Water
- E. National Fire Protection Association (NFPA):
 - 24-95Installation of Private Fire Service Mains and Their
Appurtenances
 - 291-01Fire Flow Testing and Marking of Hydrants
 - 1141-98Fire Protection in Planned Building Groups
- F. NSF International:
 - 14-03Plastics Piping Components and Related Materials
 - 61-02Drinking Water System Components-Health Effects (Sections 1-
9)
- G. Foundation for Cross-Connection Control and Hydraulic Research-2005
- H. Copper Development Association's Copper Tube Handbook-2005

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS:

- A. Ductile iron pipe, direct buried:

1. Provide ductile iron pipe conforming to the requirements of AWWA C151, Pressure Class 350 for Pipe 4 inches through 12 inches in diameter, with standard thickness cement mortar lining interior, and interior asphaltic seal coat and exterior asphaltic coating, in accordance with AWWA and ANSI Standards.
2. Below Grade: Supply pipe in lengths not in excess of a nominal 20 feet with rubber ring type push-on joints, mechanical joint or approved restrained joint. Provide flange joint pipe where shown on the drawings. Provide mechanical and restrained joint pipe with sufficient quantities of accessories as required for each joint.
3. When a polyethylene encasement over pipe, fittings, and valves is a requirement as indicated on the drawings, the material, installation and workmanship shall conform to applicable sections of AWWA C105. Make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfill following installation without delay to avoid exposure to sunlight.

B. Ductile Iron Pipe Above Grade or in Below Ground Concrete Pits:

1. Flanged ductile iron pipe, AWWA C115, with factory applied screwed long hub flanges except as otherwise specified hereinafter. Face and drill flanges after being screwed on the pipe, with flanges true to 90 degrees with the pipe axis and flush with end of pipe, ANSI B16.1, 250 psi standard, for the purpose intended.
2. Wall Sleeve Castings: Size and types shown on the drawings and be hot dipped galvanized. Seal strips, where required shall be Link Seal as manufactured by Thunderline Corp., Wayne, Michigan or equal.
3. Pipe Thickness Class: Minimum of Class 53 as defined in AWWA C150 for all sizes of flanged pipe.
4. Rubber Ring Gaskets: Full face type, AWWA C111, 1/16 inch rubber ring gaskets and of approved composition suitable for the required service.
5. Pipe and fittings exposed to view in the finished work are to be painted. Pipe shall not receive the standard tar or asphalt coat on the outside surfaces but shall be shop primed on the outside with one coat of Kop-Coat No. 621 Rust Inhibitive Primer or equal. Paint color shall be per the direction and approval of the Resident Engineer.
6. Bolts and Nuts on Flanged Fittings: Grade B, ASTM A307, Low alloy, high strength steel in accordance with AWWA C111. Assemble stainless steel bolts and nuts using anti-seize compound to prevent galling.

- C. All Pipe Fittings: Ductile iron with a minimum pressure rating of 350 psi. Fittings shall meet the requirements of ANSI and AWWA specifications as applicable. Rubber gasket joints shall conform to AWWA C111 for mechanical and push-on type joints. Ball joints shall conform to AWWA C151 with a separately cast ductile iron bell conforming to ASTM A148. Flanged fittings shall conform to AWWA C115 and be furnished flat faced and drilled to 125 psi or 250 psi template in accordance with ANSI B16.1 with full faced gaskets.
- D. Provide cement mortar lining and bituminous seal coat on the inside of the pipe and fittings in accordance with AWWA C104. Provide standard asphaltic coating on the exterior.
- E. Provide a factory hydrostatic test of not less than 500 psi for all pipe in accordance with AWWA C151.
- F. Provide non-detectable adhesive backed identification tape on top and sides of all buried ductile iron pipe, extended from joint to joint along the length of the pipe and have black lettering identifying the pipe service at no more than 12 inch intervals. According to service, the tape background color shall be as follows: potable water-blue, raw, irrigation water – as directed by Resident Engineer.

2.2 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS:

- A. Class-Rated High Density Polyethylene Pipe (HDPE):
 - 1. HDPE pipe and accessories 4 inches-63 inches in diameter, AWWA C906 PE-High Density Polyethylene (HDPE) Pressure Pipe, Class 200, SDR 11 and SDR 9 ductile iron pipe size (D.I.P.S.) PE 4710. SDR 9 shall only be used from approximately 63+71.76 to 69+50 (+/- 580 LF).
- B. Joints:
 - 1. Pipe 4 inches and greater in diameter: Heat fusion of the pipe butt ends.
- C. Fittings:
 - 1. Class-Rated Pipe, 4 inches in diameter and greater:
 - a. Butt-Fusion: Fitting shall be PE 4710 and shall meet the requirements of ASTM D 3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe. Markings for molded fittings shall comply with the requirements of ASTM D 321. Fabricated Fittings shall be marked in accordance with ASTM F2206.
 - b. Mechanical Joints:
 - 1. Ductile iron body with mechanical joints conforming to the requirements of AWWA C153. All fittings shall have a pressure rating equal to or greater than the the pipe.

2. Mechanical Joint Adapters (MJ Adapters) - Mechanical Joint Adapters shall have a material designation code of PE 4710 or higher and a minimum Cell Classification as noted in 2B.01A. Mechanical Joint Adapters shall be made to ASTM D 3261 or if machined, must meet the requirements of ASTM F 2206. Markings for molded or machined MJ Adapters shall be per ASTM D 3261.

3. Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices in conformance with the PPI Handbook of Polyethylene Pipe, Chapter 9 and AWWA Manual of Practice M55, Chapter 6.

2.3 POLYVINYL CHLORIDE PIPE AND FITTINGS:

A. Class-Rated Polyvinyl Chloride (PVC) Pipe:

1. PVC pipe and accessories 4 inches–14 inches in diameter, AWWA C900 “Polyvinyl Chloride (PVC) Pressure Pipe”, Class 200, DR 14, ductile iron outside diameters, unless otherwise shown or specified.
2. PVC Pipe and Accessories Smaller than 4 inches: Schedule 80, meeting the requirements of ASTM D-1785, Type 1, Grade 1. All exposed piping shall be CPVC meeting requirements of ASTM F441.

B. Joints:

1. Pipe 3 inches and Greater in Diameter: Push-on type with factory installed solid cross section elastomeric ring meeting the requirements of ASTM F-477.
2. Pipe Less Than 3 inches in Diameter: Threaded (ASTM D-2464) or solvent welded (ASTM 2467). Use Teflon tape or liquid Teflon thread lubricant approved for use on plastic on all threaded joints.

C. Fittings:

1. Class-Rated Pipe 3 inches in Diameter and Greater: Ductile iron with mechanical joints conforming to the requirements of AWWA C153.
2. For Schedule 80 Pipe less than 3 inches in Diameter: Threaded or solvent weld. Threaded PVC fittings shall conform to ASTM D2464. CPVC fittings shall conform to ASTM F437 for threaded fittings and ASTM F439 for solvent weld fittings.

2.4 COPPER PIPE AND TUBING:

Copper Piping: ASTM B88, Type K, or Type L with flared fittings in accordance with AWWA C800, with sweat cast brass fittings per ANSI B16.18. Use brazing alloy, AWS A5.8, Classification BCuP.

2.5 VALVES:

- A. Asbestos packing is not allowed.
- B. Gate Valve:
 - 1. 3 inches and Larger: Resilient seated, ductile iron body, bronze mounted, inclined seats, non-rising stem type turning counter-clockwise to open, 200 pound WOG. AWWA C509. The resilient seat shall be fastened to the gate with stainless steel fasteners or vulcanizing methods. The interior and exterior shall be coated with thermo-setting or fusion epoxy coating in accordance with AWWA C550.
 - 2. Operator:
 - a. Underground: Except for use with post indicators, furnish valves with 2 inch nut for socket wrench operation.
 - b. Above Ground and in Pits: Hand wheels.
 - 3. Joints: Ends of valves shall accommodate, or be adapted to, pipe installed.
- C. Butterfly Valve:
 - 1. Iron body butterfly valves conforming to AWWA C504. Seats shall be Buna N molded in and bonded to the valve body. The water design body and valve disc shall be cast iron ASTM A 126. The butterfly valves shall have hand wheel operators and e in accordance with City of Sheridan Specifications, Section 02641 – Valves and Valve Boxes, page 2.
- D. Air/Vacuum Valve Assemblies:
 - 1. Cast or ductile iron body and cover, stainless steel float fasteners and guide shaft, Buna-N needle and seat. Valve assembly shall be in accordance with the City of Sheridan Specifications, Section 02641 – Valves and Valve Boxes, page 3 and included details.
- E. Dual Check Valve:
 - 1. Smaller than 4 inches: Bronze or brass body meeting ASTM B61 or B62, straight accessible angle dual check valve by Mueller, Ford or approved equal.
- F. Ball Valve:
 - 1. Smaller than 4 inches: Bronze or brass body meeting ASTM B61 or B62, straight ball valve and operator by Mueller, Ford or approved equal.
- G. Corporation stops and saddles shall conform to AWWA C800.

- H. Curb Stop: Smaller than 3 inches. Waterworks standard for Type "K" copper, single piece cast bronze body with tee top operated plug sealed with O-ring gaskets, 200 pound WOG per AWWA C800.

2.6 CURB STOP BOX:

Cast iron extension box with screw or slide type adjustment and flared base. Box shall be adapted, without full extension, to depth of cover required over pipe at stop location. Cast the word "WATER" in cover and set cover flush with finished grade. Curb stop shut-off rod shall extend 2 feet above top of deepest stop box.

2.7 VALVE BOX:

Cast iron extension box with screw or slide-type adjustment and flared base. Minimum thickness of metal shall be 3/16 inch. Box shall be adapted, without full extension, to depth of cover required over pipe at valve location. Cast the word "WATER" in cover.

2.8 FIRE HYDRANTS:

- A. Size of main valve opening of each hydrant shall be 5 inches, minimum. Hose thread, size of fire apparatus connection, and shape, size and direction of rotation of operating head of hydrant shall be identical with present local fire department and/or water department standards.
- B. Hydrant shall be type AWWA C502, heavy construction, of proper length to connect pipe without extra fittings, and shall be the traffic type with safety flange on barrel and safety couplings on the valve stem with the following features:
 1. Interior removable without digging up hydrant; can be packed under pressure; 6 inch bell connection; one steamer nozzle and two hose nozzles with nozzle caps securely chained to barrel; suitable drainage device; single rubber or leather-faced valve in base; nozzles, stuffing boxes, wedge nuts, seat rings, clamp plates, etc. Threaded joints or spindles shall be bronze. Upper and lower barrels shall be of equal diameters. Upper barrel shall be of sufficient length to permit setting hydrant with barrel flange not more than 2 inches above finished grade. All fire hydrants shall have 6 inch bottom connection.
 2. Fire hydrants for installation south of Soldier Creek (Station 67+00 +/-) shall be furnished without factory installed weep holes because of potential groundwater.
 3. Provide fire hydrants with a finish paint identical to the existing fire hydrants.

2.9 PIPE SLEEVES:

Ductile iron or zinc coated steel.

2.10 BACKFLOW PREVENTER:

- A. Potable Water and Irrigation Water Service: A physical, actual air gap, isolation valves and check valves for service lines. Gate valves installed on the assembly shall be resilient seated valve conforming to AWWA C509.
- B. In cold climate areas, backflow assemblies and devices shall be protected from freezing by a method acceptable to local jurisdiction.
- C. Backflow preventers shall be approved by the Foundation for Cross-Connection Control and Hydraulic Research per current edition of the Manual of Cross-Connection Control.
- D. Backflow preventer shall not be located in any area containing fumes that are toxic, poisonous or corrosive.
- E. Direct connections between potable water piping and sewer connected wastes shall not exist under any condition with or without backflow protection.
- F. Backflow preventer shall be accessed and have clearance for the required testing, maintenance and repair. Access and clearance shall require a minimum of one (1) foot between the lowest portion of the assembly and grade, floor or platform. Installations elevated more than five (5) feet above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.

2.11 VAULTS AND MANHOLES (BACKFLOW PREVENTER, METER AND GATE VALVE):

- A. Top and base shall be reinforced concrete.
- B. Walls shall be reinforced concrete, precast concrete.

2.12 POTABLE WATER:

Water used for filling, flushing, and disinfection of water mains and appurtenances shall conform to Safe Drinking Water Act.

2.13 DISINFECTION CHLORINE:

- A. Liquid chlorine shall conform to AWWA B301 and AWWA C651.
- B. Sodium hypochlorite shall conform to AWWA B300 with 5 percent to 15 percent available chlorine.
- C. Calcium hypochlorite shall conform to AWWA B300 supplied in granular form or 5.g tablets, and shall contain 65 percent chlorine by weight.

2.14 WARNING TAPE

Standard, 4-Mil polyethylene 3 inch wide tape, detectable non-detectable type, blue with black letters, and imprinted with "CAUTION BURIED WATER LINE BELOW".

PART 3 - EXECUTION

3.1 REGRADING:

Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.

3.2 PIPE LAYING, GENERAL:

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Resident Engineer.
- B. All pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective piping is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Government. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.
- C. All buried piping shall be installed to the lines and grades as shown on the drawings. All underground piping shall slope uniformly between joints where elevations are shown.
- D. Contractor shall exercise extreme care when installing piping to shore up and protect from damage all existing underground water line and power lines, and all existing structures.
- E. Do not lay pipe on unstable material, in wet trench, or when trench or weather conditions are unsuitable.
- F. Do not lay pipe in same trench with other pipes or utilities unless shown otherwise on drawings.
- G. Hold pipe securely in place while joint is being made.
- H. Do not walk on pipes in trenches until covered by layers of earth well tamped in place to a depth of 12 inches over pipe.
- I. Full length of each section of pipe shall rest solidly upon pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipes on wood blocking.
- J. Tees, plugs, caps, bends and hydrants on pipe installed underground shall be anchored. See sections 3.7 "PIPE SUPPORTS" and 3.8 "RESTRAINED JOINTS".
- K. Close pipe openings with caps or plugs during installation. Tightly cover and protect equipment against dirt, water and chemical, or mechanical injury. At completion of all work, thoroughly clean exposed materials and equipment.
- L. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by the manufacturer.
- M. Warning tape shall be continuously placed 12 inches above buried water pipes. 18 to 24 inches.

3.3 HIGH DENSITY POLYETHYLENE PIPE

- A. HDPE piping shall be installed in strict accordance with the manufacturer's instructions and AWWA M55. Place select material and thoroughly compact to 1 foot above the top of an exposed pipe and thereafter backfilled as specified in Section 31 20 11 "EARTH MOVING".

3.4 DUCTILE IRON PIPE:

- A. Installing Pipe: Lay pipe in accordance with AWWA C600 with polyethylene encasement if required in accordance with AWWA C105. Provide a firm even bearing throughout the length of the pipe by tamping selected material at the sides of the pipe up to the spring line.
- B. All pipe shall be sound and clean before laying. When laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other approved means.
- C. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Bevel cut ends of pipe to be used with push-on bell to conform to the manufactured spigot end. Cement lining shall be undamaged.
- D. Jointing Ductile-Iron Pipe:
 1. Push-on joints shall be made in strict accordance with the manufacturer's instruction. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is joined, and pushed home with approved means.
 2. Mechanical Joints at Valves, Fittings: Install in strict accordance with AWWA C111. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gaskets with soapy water before tightening the bolts. Bolts shall be tightened to the specified torque.
 3. Flanged joints shall be in accordance with AWWA C115. Flanged joints shall be fitted so that the contact faces bear uniformly on the gasket and then are made up with relatively uniform bolt stress.

3.5 PVC PIPE:

- A. PVC piping shall be installed in strict accordance with the manufacturer's instructions and AWWA 605. Place selected material and thoroughly compacted to one foot above the top of the pipe and thereafter backfilled as specified in Section 31 20 11, EARTH MOVING.

3.6 COPPER PIPE:

Copper piping shall be installed in accordance with the Copper Development Association's Copper Tube Handbook and manufacturer's recommendations. Copper piping shall be bedded in 6 inches of sand and then backfilled as specified in Section 31 20 11, EARTH MOVING.

3.7 PIPE SUPPORTS:

A. Supports:

1. All piping shall be properly and adequately supported. Hangers, adjustable pipe supports, base elbows and tees, and concrete piers and pads shall be provided as indicated on the drawings. If the method of support is not indicated on the drawings, exposed piping shall be supported by pipe saddles wherever the structure is suitable and adequate to carry the superimposed load. Supports shall be placed approximately 8 feet on centers and at each fitting.

3.8 RESTRAINED JOINTS:

- A. Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained “locked-type” joints and the joints shall be capable of holding against withdrawal for line pressures 50 percent above the normal working pressure but not less than 200 psi. The pipe and fittings shall be restrained push-on joints or restrained mechanical joints.
- B. The minimum number of restrained joints required for resisting force at fittings and changes in direction of pipe shall be determined from the length of retained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.
- C. Restrained joint assemblies with ductile iron mechanical joint pipe shall be “Flex-Ring”, “Lok-Ring”, or mechanical joint coupled as manufactured by American Cast Iron Pipe Company, EBBA iron “Mega-Lug” or approved equal.
- D. Ductile iron, steel, PVC or HDPE joints shall be restrained with EBBA couplings, Series 3800, 4800 or approved equal.
- E. Ductile iron mechanical joint fittings shall be restrained with EBBA Iron Sales, Inc. Series 1100 Restrainer. The restraining device shall be designed to fit standard mechanical joint bells with standard T head bolts conforming to AWWA C111 and AWWA C153. Glands shall be manufactured of ductile iron conforming to ASTM A536. Set screws shall be hardened ductile iron and require the same torque in all sizes. Steel set screws not permitted. These devices shall have the stated pressure rating with a minimum safety factor of 2:1. Glands shall be listed with Underwriters Laboratories and/or approved by Factory Mutual.
- F. Thrust blocks shall not be permitted.
- G. Where ductile iron pipe manufactured with restrained joints is utilized, all restrained joints shall be fully extended and engaged prior to back filling the trench and pressurizing the pipe.
- H. PVC pipe bell and spigot joints shall be restrained with the Uni-Flange Corp. Series 1350 Restrainer or approved equal. The restraining device and Tee head bolts shall be manufactured of

high strength ductile iron meeting ASTM A536. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy steel meeting the requirements of ASTM A242.

- I. Ductile iron mechanical joint fittings used with PVC pipe shall be restrained with UNI-Flange Corp. Series 1300 Restrainer, EBBA Iron, Inc, Series 2000PV Mechanical Joint Restrainer Gland, or approved equal. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A-536. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy steel meeting the requirements of ASTM A242.

3.9 PIPE SEPARATION:

A. Horizontal Separation-Water Mains and Sewers:

1. Water mains shall be located at least 10 feet horizontally from any proposed drain, storm sewer, sanitary or sewer service connection.
2. Water mains may be located closer than 10 feet to a sewer line when:
 - a. Local conditions prevent a lateral separation of 10 feet.
 - b. The water main invert is at least 18 inches above the crown of the sewer.
 - c. The water main is either in a separate trench or in the same trench on an undisturbed earth shelf located one side of the sewer.
3. When it is impossible to meet (1) or (2) above, both the water main and drain or sewer shall be constructed of mechanical joint ductile iron pipe. Ductile iron pipe shall comply with the requirements listed in this specification section. The drain or sewer shall be pressure tested to the maximum expected surcharge head before back filling.

B. Vertical Separation-Water Mains and Sewers:

1. A water main shall be separated from a sewer so that its invert is a minimum of 18 inches above the crown of the drain or sewer whenever water mains cross storm sewers, sanitary sewers or sewer service connections. The vertical separation shall be maintained for that portion of the water main located within 10 feet horizontally of any sewer or drain crossed. A length of water main pipe shall be centered over the sewer to be crossed with joints equidistant from the sewer or drain.
2. Both the water main and sewer shall be constructed of slip-on or mechanical joint ductile iron pipe or PVC pipe equivalent to water main standards of construction when:
 - a. It is impossible to obtain the proper vertical separations described in (1) above; or
 - b. The water main passes under a sewer or drain.
3. A vertical separation of 18 inches between the invert of the sewer or drain and the crown of the water main shall be maintained where a water main crosses under a sewer. Support the sewer or drain lines to prevent settling and breaking the water main.
4. Construction shall extend on each side of the crossing until the perpendicular distance from the water main to the sewer or drain line is at least 10 feet.

3.10 SETTING OF VALVES AND BOXES:

- A. Provide a surface concrete pad 18 by 18 by 6 inches to protect valve box when valve is not located below pavement.
- B. Clean valve and curb stops interior before installation.
- C. Set valve and curb stop box cover flush with finished grade.
- D. Valves shall be installed plumb and level and in accordance with manufacturer's recommendations.

3.11 SETTING OF FIRE HYDRANTS:

- A. Set center of each hydrant not less than 2 feet nor more than 6 feet back of edge of road or face of curb. Fire apparatus connection shall face road with center of nozzle 18 inches above finished grade. Set barrel flange not more than 2 inches above finished grade.
- B. Set each hydrant on a slab of stone or concrete not less than 4 inches thick and 15 inches square. The service line to the hydrant, between the tee and the shoe of the hydrant, shall be fully restrained.
- C. Set bases in not less than 1/2 cubic yard of crushed rock or gravel placed entirely below hydrant drainage device.
- D. Clean interiors of hydrants of all foreign matter before installation.

3.12 PIPE SLEEVES:

Install where water lines pass through retaining walls, building foundations and floors. Seal with modular mechanical type link seal. Install piping so that no joint occurs within a sleeve. Split sleeves may be installed where existing lines pass through new construction.

3.13 FLUSHING AND DISINFECTING:

- A. Flush and disinfect new water lines in accordance with AWWA C651 and Wyoming Department of Environmental Quality (WDEQ).
- B. Initial flushing shall obtain a minimum velocity in the main of 2.5 feet per second at 40 PSI residual pressure in water main. The duration of the flushing shall be adequate to remove all particles from the line.

Number of Hydrant Outlets			
Size of Tap, in.			
1	1 1/2	2	2 1/2
Number of taps on pipe			
1	--	--	1
--	1	--	1
--	2	1	1
--	3	2	1
--	--	3	2
--	--	4	2

The backflow preventers shall not be in place during the flushing.

- C. The Contractor shall be responsible to provide the water source for filling, flushing, and disinfecting the lines. Only potable water shall be used, and the Contractor shall provide all required temporary pumps, storage facilities required to complete the specified flushing, and disinfection operations.
- D. The Contractor shall be responsible for the disposal of all water used to flush and disinfect the system in accordance with all governing rules and regulations. The discharge water shall not be allowed to create a nuisance for activities occurring on or adjacent to the site.
- E. The bacteriological test specified in AWWA C651 shall be performed by a laboratory approved by the Health Department of Environmental Quality of the State. The cost of sampling, transportation, and testing shall be the responsibility of the Contractor.
- F. Re-disinfection and bacteriological testing of failed sections of the system shall be the sole responsibility of the Contractor.

G. Before backflow preventers are installed, all upstream piping shall be thoroughly flushed.

3.14 HYDROSTATIC TESTING:

- A. Hydrostatic testing of the system shall occur prior to disinfecting the system.
- B. After new system is installed, except for connections to existing system and building, backfill at least 12 inches above pipe barrel, leaving joints exposed if required or requested by the Resident Engineer. The depth of the backfill shall be adequate to prevent the horizontal and vertical movement of the pipe during testing.
- C. Prior to pressurizing the line, all joint restraints shall be completely installed and inspected.
- D. If the system is tested in sections, and at the temporary caps at connections to the existing system and buildings, the Contractor shall provide and install all required temporary thrust restraints required to safely conduct the test.
- E. The Contractor shall install corporation stops in the line as required to purge the air out of the system. At the completion of the test, all corporation stops shall be capped.
- F. The Contractor shall perform pressure and leakage tests for the new system for 2 hours to 200 psi or two times the working pressure, whichever is less. Leakage shall not exceed the following requirements.
 - 1. Copper Tubing: No leaks.
 - 2. Ductile Iron Pipe: AWWA C600. Provide to Resident Engineer office.
 - 3. Polyvinyl Chloride (PVC) AWWA C605. Provide to Resident Engineer office.

--- E N D ---

SECTION 33 32 00

PIPE BURSTING METHOD FOR RAW AND POTABLE WATER LINE REPLACEMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This specification shall cover the rehabilitation of the existing raw or potable water line by the static pull type of pipe bursting, a system by which a bursting tool splits the existing pipe while simultaneously installing a new polyethylene pipe of a larger or same size pipe where the old pipe existed. The original 8-inch raw water line was cast iron when installed but since has had sections replaced or repaired using ductile iron with some cement encasement, HDPE or PVC. Therefore, the pipe bursting procedures shall require the appropriate pipe splitting head or equipment dependent on the material being split. Only the static pull method of pipe bursting will be allowed. The bursting or splitting head must be used in conjunction with either a pulling rod assembly or a winch cable inserted through the existing pipe. The size of the winch will depend upon the diameter of the pipe to be replaced. In no case is the constant tension on the winch to exceed 20 tons.

1.2 QUALITY ASSURANCE

- A. The Contractor shall be certified by the particular Pipe Bursting System Manufacturer that the company is a fully trained user of the pipe bursting system.
- B. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by qualified representatives.
- C. The Contractor must have successfully completed at least one (1) job, similar in scope and nature to the requirements of pipe bursting set forth in these bid documents.

1.3 SUBMITTALS

- A. The Contractor shall submit the following information:
1. Shop drawings, catalog data and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.
 2. Certification of workmen trained for installing the pipe.
 3. Television inspection reports and DVDs made after the new pipe installation.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Transport, handle and store the pipe and fittings as recommended by the manufacturer.
- B. If the new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Contracting Officer at the Contractor's expense, before proceeding further.
- C. Deliver, store and handle other materials as required to prevent damage.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

- A. The Polyethylene Plastic Pipe shall be high density polyethylene plastic pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) IPS, AWWA C906, PE 4710.
 - B. The sizes of the insertions to be used shall be such to increase the water line to 10 inch diameter.
 - C. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
 - D. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 - E. Dimension Ratio: The minimum wall thickness of the polyethylene pipe shall be DR 11,200 psi.
 - F. Tests for compliance with this specification shall be made as specific herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification.
- Polyethylene plastic pipe and fittings may be rejected to meet any requirements of this specification.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be static pull and shall generate sufficient force to burst and compact the existing pipe.
- B. The pipe bursting tool shall be pulled through the water line by a winch. The bursting unit shall pull the polyethylene pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the PE pipe insertion. The pipe bursting unit shall be remotely controlled.
- C. The pipe bursting tool shall be static pull. The force from the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. This action shall not only break the pipe but also create the void into which

the burster can be winched and enables forward progress to be made. At the same time the polyethylene pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.

3.2 WINCH UNIT

- A. A winch shall be attached to the front of the bursting unit. The winch must automatically maintain a constant tension at a set tonnage reading to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit in line.
- B. The winch shall be hydraulically operated providing a constant tension throughout the operation. The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load.
- C. The constant tension winch shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.
- D. The winch cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.
- E. The Contractor shall provide a system of guide pulleys and bracing at each insertion/extraction pit to minimize cable contact with the existing water line between pits.
- F. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

3.3 SERVICE CONNECTIONS

- A. All service connections shall be identified and located prior to the pipe insertion to expedite reconnection. Upon completion of insertion of the new pipe, the Contractor shall expedite the reconnection of services so as to minimize any inconvenience to the customers.
- B. Connection of the new service lateral to the main line shall be accomplished by means of a service saddle connection. Install using procedures and equipment as referenced in manufacturer's written installation instructions.

3.4 TEMPORARY SERVICE

- A. The Contractor will not be required to provide temporary water service during replacement of the raw water line.

3.5 CONSTRUCTION METHOD

- A. During pipe bursting operations, horizontal or vertical deflections in the pipe shall not exceed 11.25 degrees. A pipe deflection of 11.25 degrees or greater shall require an insertion/extraction pit with an appropriate HDPE or ductile iron bend. If HDPE bends are used, they shall be butt-

fused to the new HDPE pipe sections. Cathodic protection shall be provided for all ductile iron bends.

- B. Insertion/Extraction pits shall be kept to a maximum spacing of 500 feet. If field conditions make 500 foot spacing unfeasible, the Resident Engineer shall be contacted prior to pipe bursting operations in this area for approval.
- C. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom.
- D. The installed pipe shall be allowed to cool and relax due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. This shall be conducted per the manufacturer's recommended amount of time, but not less than four hours.

3.6 FIELD TESTING

- A. Defects which may affect the integrity or strength of the pipe in the opinion of the Resident Engineer, Contracting Officer or his representative shall be repaired or the pipe replaced at the Contractor's expense.

3.7 PIPE JOINING

- A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak-proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
- B. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Resident Engineer, Contracting Officer and/or his representative prior to insertion. All defective joints shall be cut out and replaced at no cost to Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or

handling as determined by the Resident Engineer, Contracting Officer and/or his representative shall be discarded and not used.

-----END-----

(Name) CONSTRUCTION COMPANY

**SITE SPECIFIC
SAFETY PREVENTION
PLAN**

+

CONSTRUCTION HEALTH AND SAFETY PROGRAM

FOR

Name of Project

Location

Veterans Affairs Medical Center – Sheridan, Wyoming

PROJECT # 541-AB-XYZ

CONTRACT # VA541-A-XYZ

SCOPE OF WORK SUMMARY

Summary

This job consists of **(Basic Description)**

Pre-demolition:

Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 12. Use the Hazardous Work Activity Checklist with the Scope of Work to determine which elements need to be addressed for the pre-demolition phase.

Demolition:

Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 12. Use the Hazardous Work Activity Checklist with the Scope of Work to determine which elements need to be addressed for each of the demolition phase.

Construction:

Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure Section - 12. Use the Hazardous Work Activity Checklist with the Scope of Work to determine which elements need to be addressed for the construction phase.

1. SIGNATURE SHEET

The following persons are responsible for preparing and approving this plan:

Preparer:

Contact Name (Phone #)

Contact Title

Name Construction Company

Date

2. BACKGROUND INFORMATION

- | | | |
|----|---------------------------------|--|
| A. | Contractor: | Name
Address
City, State Zip |
| B. | Project Name: | Name |
| C. | Project Description: | Brief Description |
| D. | Contractor Accident Record: | Contractor provide OSHA Log information |
| E. | Work Requiring Activity Hazard: | Personal Protective Equipment Policy
Located in Section 13. |

3. STATEMENT OF SAFETY AND HEALTH POLICY

(May use this statement or replace with you own company's statement)

Name Construction Company has developed a comprehensive safety and health program that addresses our specific safety and health concerns and provides guidance for the performance of our individual job tasks within the framework of appropriate Occupational Safety and Health Administration (OSHA) standards.

Safety takes a commitment from all personnel within our organization. Training will be interactive with an opportunity for all to actively participate, ask questions, make suggestions, and refer to our written policies and procedures.

It is the policy of **Name** Construction Company to provide a work environment that is inherently safe. The safety and health of our employees is of primary importance as they are our most important resource.

Safety training needs will be identified by continual reassessment of our work methods, equipment and job sites as well as employee and management input. Observation of unsafe acts will be addressed immediately.

Each employee is encouraged to contact their Supervisor immediately should a safety or health risk exist so that corrective action may be taken immediately.

Safety requires not only that each person understand and perform individual tasks in a safe manner, but also that each individual is aware of his/her surroundings and is actively involved in the safety and health of others.

This Policy Statement will be conspicuously posted in the job site office along with the OSHA Form 300, Log and Summary of Occupational Injuries and Illnesses.

4. RESPONSIBILITIES AND LINES OF AUTHORITY

The following people have responsibilities and authority for corporate safety:

A. RESPONSIBILITIES

1. Chief Corporate Safety Officer: **Contact Name & Telephone #)
Business Name
Title**
2. Site Safety Responsibilities: **Contact Name & Telephone #
Business Name
Title**
3. Project Safety Consulting: **Contact Name & Telephone #
Business Name
Title**

B. LINES OF AUTHORITY

The overall lines of authority concerning safety and health will be as follows:

**Name – Title
Name – Title**

A Site Safety and Health Officer will be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor and subcontractors. The SSHO will be employed by the prime. SSHO qualifications with education certificates will be located in Appendix B.

The competent person for Health Hazard Control and Respiratory Protection Program will conduct and document a hazard assessment in accordance with Section 06 to identify and evaluate.

Site Safety and Health Officer (SSHO)

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors daily quality control report.

5. SUBCONTRACTORS and SUPPLIERS

A. IDENTIFICATION OF SUBCONTRACTORS:

Name of Subcontractor

B. CONTROLLING AND COORDINATION OF SUBCONTRACTORS AND SUPPLIERS:

Suppliers will be under close supervision during material delivery and pick-up. Communication with suppliers will be important to ensure loads are put in designated areas, and supplier is made aware of any immediate hazards in the area he/she will be in. A project schedule has been coordinated and submitted for approval for the coordination of the scope of work being performed.

C. SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS:

All subcontractors will be responsible to implement their corporate level Safety and Health Plan as appropriate for the project, submitting these documents to **Name** Construction Company prior to the start of their activities on the work site. In addition, they will be responsible for adhering to all applicable OSHA and the Veterans Affairs Safety and Health Program requirements. This will be verified through our own site safety inspections and meetings.

In the event that a subcontractor does not have the required safety and health programs, their employees will receive training utilizing **Name** Construction Company safety and health programs. This training will be documented and compliance with the provisions of **Name** Construction Company Safety and Health programs will be mandatory.

6. TRAINING

A. SITE ORIENTATION TRAINING

All site employees will be required to attend a Safety Training Orientation at the start of the project, or before they begin work at the job site. The site supervisor, competent person, will conduct the training. The topics listed below are mandatory, but not limit to the following:

(Adjust the below list to meet the specific construction requirements based on the scope of work and hazard assessment)

- **Site Emergency reporting number/Emergency procedures**
- **Safety Program**
- **Accident Reporting**
- **Contingency Plan for severe weather**
- **Site Sanitation**
- **Fall Protection**
- **Personal Protective Equipment**
- **Lock out/tag out**
- **Fire Protection/Fire Prevention Plans**
- **Fire Extinguishers**
- **MSDS**
- **Housekeeping**
- **Slips, trips, and falls**

- **Hazard Communication Plan**

B. MANDATORY TRAINING AND CERTIFICATIONS

(List any mandatory training or certificates required by the employees)

C. EMERGENCY RESPONSE TRAINING

Located within this documentation, under Section 12, are detailed responses in various applicable emergencies that could occur on this job site. These areas also contain the training and requirements.

D. SUPERVISOR AND EMPLOYEE SAFETY MEETINGS

The primary site supervisor, who is the competent person (certifications in Appendix B), will conduct the initial employee site safety orientation. Mandatory safety meetings will be held on a weekly basis. Safety and health topics will vary from week to week on subject matter, utilizing the 29 CFR 1910 and 29 CFR 1926 standards, along with the Veterans Affairs Safety and Health Program and issues raised during construction.

7. SAFETY AND HEALTH INSPECTIONS

A. INSPECTIONS AND QUALIFIED PERSON

The site supervisor, who is the competent person, will conduct the Safety and Health inspections. Certifications are located in Appendix B.

Two types of safety inspections will be performed on this job site.

1. A weekly Safety and Health inspection, which will be conducted by the site supervisor. The inspection forms will document and track the following information:
 - Violation
 - Date of violation
 - Nature of violation
 - Needed corrective action
 - Date of correction
 - Name of responsible person(s)

In addition to the above form, we also notify any employee and/or subcontractor in writing of any violations. This information is followed up on, as needed and/or requires immediate attention to the violations. All safety inspection forms are reviewed to ensure that all noted corrective actions are within the applicable OSHA and Veterans Affairs Safety and Health Manual guidelines. This documentation will be kept at the project field office, and will aid in the audits of the Accident Prevention Plan.

2. The second type of Safety and Health Inspection will be a daily checklist. This too, will be performed each workday onsite, by the site supervisor. This documentation will be kept at the project field office, and will aid in the audits of the Accident Prevention Plan.

B. EXTERNAL INSPECTIONS / CERTIFICATIONS

Prior to the activity of cutting and/or welding, the COTR for the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a burn permit.

8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

A. SAFETY PROGRAM GOALS

The goals for this project are as follows:

1. Zero accident rate
2. Zero injury/illness rate
3. Compliance with all applicable OSHA standards and Veterans Affairs Safety Director

Safety and Health Manual requirements:

- As part of employment with **Name** Construction Company are required to comply with all aspects of corporate level Safety and Health Plan.
- Supervisors are expected and required to comply with all aspects of the corporate level Safety and Health Plan as well as to enforce all applicable requirements at the jobsite. Supervisors are expected and required to complete all necessary site safety documentation in a complete and timely manner. Supervisors are required to report all safety incidents to the main office as soon as possible. The above items represent the method used to ensure our goals are met.

B. SAFETY INCENTIVE PROGRAM

We do not have a specific safety incentive program; however, we do pass information along, good and bad, to employees and give credit to those who perform in a safe manner. Our expectations are that all employees work in a safe manner as part of their employment with us. Continued safe activities ensure continued employment. (Or describe an incentive program that you may have)

C. POLICIES AND PROCEDURES REGARDING NONCOMPLIANCE

The corporate level Safety and Health Plan outlines the procedures for non-compliance in the form of our Enforcement and Discipline procedures.

Name Construction Company believes its employees have a genuine desire to perform top quality, time effective and safe work and that the Health and Safety program as a whole will provide them with the skills to accomplish that work. Our goal is not to use these discipline guidelines to bring about safe work activities. The goal is to provide the company and its workers protection against those individuals who refuse to act in a consistently safe manner.

Without proper enforcement, the policy will not be able to deliver the intended results. Therefore, it is essential that all employees be held accountable to these guidelines for disciplinary actions up to and including discharge.

Disciplinary action will be taken by the company to correct violations of its policies and procedures and/or unsatisfactory performance. The disciplinary procedure for minor infractions will be as follows:

- | | | |
|----|-------------------------|---------------------------------|
| 1. | 1 st offense | Verbal Warning |
| 2. | 2 nd offense | Written Warning |
| 3. | 3 rd offense | Written Warning with Suspension |
| 4. | 4 th offense | Dismissal |

Termination, Layoff, and Suspension

An employee may be terminated for any of the following:

1. Insubordination
2. Poor job performance
3. Failure to follow safety practices
4. Excessive tardiness/absenteeism
5. Falsification of any records
6. Destruction of company property
7. Theft
8. Use of alcohol or drugs on property
9. Unlawful leave of absence

Termination requires the prior approval of an officer of the company. To ensure a fair and impartial system, all employees will be given additional safety instructions as needed after receiving a safety violation notice.

Additional instruction may include reviewing the appropriate manuals, procedures, etc. All additional must be documented and become a part of the employee's personal folder. All reports of discipline must be reviewed and signed off by the personnel director or the operations manager.

D. WRITTEN COMPANY PROCEDURES FOR MANAGER AND SUPERVISOR ACCOUNTABILITY

All supervisors and managers are subject to the same corporate level Safety and Health Program requirements as outlined in the Enforcement and Discipline procedures above.

9. ACCIDENT REPORTING

The following persons shall be responsible for items as listed:

A. EXPOSURE DATA / MAN HOURS WORKED

This information will be maintained by the site supervisor and verified by **Contact Name**. A daily log will be maintained of all man hours worked. This information will also be used to determine the final TIR for the project.

B. ACCIDENT INVESTIGATIONS, REPORTS, AND LOGS

The project manager and site supervisor will conduct all accident and near miss investigations. The site supervisor will maintain the OSHA 300 log. All documentation will be kept on the job site. Certifications for competent person(s) are located in Appendix B.

C. IMMEDIATE NOTIFICATION OF MAJOR ACCIDENTS

Should a major accident occur, the following notifications will take place as soon as any injured person(s) are cared for:

Contact Name, Title
Contact Name, Title
Contact Name, Title

VA Safety Representative: Tom Homan Office (307) 675-3625
Cell (307) 752-1377

VA Environmental Representative: Chris Shaw Office (307) 675-3446
Cell (307) 763-1399

The Sheridan VA Medical Center does not have an Emergency Room or surgical services. It is a psychiatric hospital.

Hospital Sheridan County Memorial Hospital
1401 West 5th St.
Sheridan, WY 82801
911 (307) 672-1000

Fire Department **911** Office (307) 674-7244

Security Dial 3333 from any VA Phone

10. MEDICAL SUPPORT

The following items concern the handling of all medical support requirements:

A. ON SITE

For non-emergency support first aid supplies will be kept at the **Name** Construction Company field office. All subcontractors will be required to supply properly trained personnel as well as their own first aid supplies. All supplies will be subject to our safety inspections. No one will perform first aid or CPR unless properly trained, and verification of certification is on file at the jobsite. Exposure Control Plan is located in Section 13.

B. OFF SITE

Sheridan County Memorial Hospital
1401 West 5th St.
Sheridan, WY 82801
911 (307) 672-1000

Maps are available for all contractors on site (See Appendix A).

11. PERSONAL PROTECTIVE EQUIPMENT

Procedures for implementing an effective PPE policy in accordance with 29 CFR 1910.132, will be as follows:

During a pre-construction walk through, **Contact Name**, the Project Manager, will perform a job site hazard assessment.

HAZARD ASSESSMENT

The purpose of the survey is to identify sources of hazards to workers and co-workers. The documentation of this hazard assessment is located in **(Contractors records or include as appendix D.)**

POTENTIAL HAZARD SOURCES **(Adjust based on scope of work)**

- **Excavation/Trenching**
- **Electrical Hazards**
- **Fall Protection**
- **Surfaces that could become slick, uneven walking and working surfaces**
- **Welding / Brazing Hazards**
- **Quality Air Control**
- **Potential Overhead Obstructions (above ceiling)**
- **Rolling or pinching objects**
- **Sharp objects that might pierce feet or cut hands**
- **Motion that includes tool movement, moving machinery, or machine parts, or movement of personnel that could result in collision with stationary objects.**

Each of the basic hazards has been reviewed and a determination made as to the type, level of risk, and seriousness of potential injury. Consideration has been given to the possibility of exposure to several hazards at once. The general procedure for determining appropriate protective equipment is to:

Identify the potential hazards and the type of protective equipment that is available, and what protection it provides.

Compare the capabilities of various types of PPE with the hazards associated with the environment.

Select the PPE, which provides a level of protection greater than the minimum required to protect employees from the hazards.

Select PPE that will fit each employee properly and provides protection from the hazard.

The Hazard Assessment Worksheet is located in Appendix D.

EMPLOYEE TRAINING

Name Construction Company employees will be trained, at the site safety orientation on the following topics:

- When PPE is necessary.
- What PPE is necessary and which PPE has been selected for each process the employee operates.
- How to properly put on, take off, adjust and wear PPE.

12. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (Examples provided, replace with your own or use these as required by the Scope of Work and the Hazardous Work Activity Checklist.)

A. LAYOUT PLANS

Plans for the layout of the locations of the project office, compressed gas cylinder storage, employee safe zone, and construction dumpster (TBD), are in Appendix A.

B. RESPONSE PLAN

Name Construction Company intends to make certain all emergency incidents are handled in a proper and safe manner giving priority to the following:

- Life Safety
- Property Conservation
- Emergency Situation Investigation
- Return to Normal Operations

This plan covers the actions of all **Name** Construction employees. All subcontractors on site will be required to submit for approval, to **Name** Construction Company, their own site specific Emergency Response Plan. If not adequate, the subcontractor and their employees must be orientated to the **Name** Construction Company site specific emergency response plan, before they can begin work at this site.

1. PROCEDURES AND TESTS

This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards.

Clean-up operations required by a governmental body, whether Federal, state, local or other involving hazardous substance that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA, NPL, and initial investigations

of government identified sites which area conducted before the presence or absence of hazardous substances has been ascertained;

Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 W.S.C. 6901 et seq);

Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;

Operations involving hazardous waste that area conducted at treatment, storage, disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations; and Emergency response operations for releases of, or substantial threats of releases of, hazardous substances with regard to the location of the hazard.

As part of this program, **Name** Construction Company will inform subcontractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety, or other hazards. The substances listed in Section 12, paragraph c, under MSDS, have the potential to be released or spilled. Section 12.c, Hazard Communication, lists some potential hazards that contractors and/or subcontractors my encounter. Also listed are the response actions to be taken and the proper notification.

The following procedures address emergency response as follows:

- Pre-emergency planning and coordination with outside parties:

VAMC (COTR) will receive notification of date to start work, along with MSDS's of all substances brought onto the facility.

- Personal roles, lines of authority, training, and communication:

The personnel utilizing these chemicals will contain the substances brought onto the facility. Plumbers will contain and handle all compressed gas cylinders, as they are trained in. In the case where a situation occurs that they cannot handle, they will be trained on evacuating the area, notifying the on-site supervisor, and workers in the immediate worksite.

- Emergency recognition and prevention:

All workers will, at the safety orientation, be informed of this site-specific emergency response plan and procedures. All workers will be responsible to recognize hazards and their prevention, practice this at all times on the worksite.

- Safe distances and places of refuge:

All workers at this site will be informed of the designated location of the safe zone. This will also be posted in the field office for all to be reminded of. In the event of an emergency occurrence, and the Local

Fire Department, or any other entity is summoned, all workers will report to this zone to be accounted for.

- Site security and control:

In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities. Staying away from the immediate situation and not allowing any unauthorized personnel to enter until proper authorities arrive.

- Evacuation routes and procedures:

All work will be performed on the interior of the building. Evacuation plans are posted in various locations throughout work area by the VA.

- Decontamination:

This does not apply to this job.

- Emergency medical treatment and first aid:

This section is located in Section 10, Medical Support.

- Emergency alerting and response procedures:

It will be the duty of all workers onsite, including subcontractors, to immediately report to the site supervisor and/or project manager, any and all emergencies.

2. FIREFIGHTING PLAN

We at **Name** Construction Company limit our employees to portable fire extinguishers. The site supervisor at safety orientation will cover this Plan. The following topics will include:

- The general principles of fire extinguisher use and the hazards involved with incipient stage firefighting.
- Actions to be taken by authorized person(s):
 - Evacuate area.
 - Notify site supervisor and/or project manager.
 - Determine if incipient fire.
 - Utilize fire extinguisher.
 - If fire or smoke is too great, report to safe zone.
 - Make call to Fire Department if instructed by supervisor and/or project manager.
- Actions to be taken by unauthorized person(s):

- Evacuate area.
- Notify supervisor and/or project manager.
- Report to safe zone.
- Make call to Fire Department if instructed by site supervisor and/or project manager.

Only approved fire extinguishers will be onsite and checked on a daily basis by the site supervisor. These will be located in the following areas, but not limited to:

- Inside field office.
- In any area where cutting or welding is taking place.

3. POSTING OF EMERGENCY TELEPHONE NUMBERS

As listed in Section 9, the posting of Emergency Telephone Numbers will be in your job field office, where all workers will have access to them. All employees and subcontractors will be made aware of these and the location at the safety orientation. The numbers are as follows:

Hospital	Sheridan County Memorial Hospital 1401 West 5 th St. Sheridan, WY 82801 911
Fire Department	911 / (307) 674-7244
Security	Dial 3333 from any VA Phone

C. HAZARD COMMUNICATION PROGRAM

This site specific Hazard Communication Plan has been implemented in accordance with 29 CFR 1910.1200.

All areas in which hazardous chemicals will be stored shall have the proper label and/or signs. The MSDS for all chemicals on site will be located in a book labeled MSDS, in the project field office.

The training of employees and subcontractors will be as follows:

- Where to find this program
- What is in this program
- All chemicals on this jobsite
- What is an MSDS
- How to find specific information on an MSDS
- Labeling system
- What area these chemicals are stored in, map indicating
- The proper handling procedures for these chemicals
- Spill/release clean up protocol

Should there be an immediate threat to life or property, the emergency response plan for the installation, which is to be on file at the field office.

It is mandatory that all subcontractors submit, before a new chemical is introduced to the worksite, that the proper MSDS is submitted to the site supervisor/project manager. It will be the responsibility of the site supervisor to inform all employees and subcontractors of the new chemical(s), introduce the MSDS, and the potential hazards of that chemical. The site supervisor and/or project manager will have the responsibility to notify the Contracting Officer / COTR of any and all new chemicals brought onto the facility.

Chemical storage areas, if needed, to be located per VA designated location.

D. RESPIRATORY PROTECTION PLAN

Not applicable to this project. (Describe if applicable)

E. HEALTH HAZARD CONTROL PROGRAM

The goal for **Name** Construction Company is to make the workplace foolproof to the fullest extent feasible. It is an ongoing program, never finished.

- Administrative Controls

Administrative controls include lengthened rest breaks, additional relief workers. Training, training, and more training.

- Engineering Controls

If feasible, design the facility, equipment, or process to remove the hazard and/or substitute something that is not hazardous or is less hazardous. If removal is not feasible, enclose the hazard to prevent exposure in normal operations.

The most frequent sources for updating hazard information area routine inspections, employee reports of hazards, and accident/incident investigations. A good source for hazard information updates is the ongoing job hazard analyses, which will be performed by the site supervisor, on a monthly basis, or as needed. This documentation will be located at the job field office.

When exposure to hazards cannot be engineered completely out of normal operations or maintenance work, and when safe work practices cannot provide sufficient additional protection, a further method of control is using protective clothing or equipment. These include eye protection, steel-toed shoes, hard hats, hearing protection, gloves, and fall protection.

F. LEAD ABATEMENT PLAN

It is assumed that there are no painted surfaces that contain lead, therefore, when performing welding, cutting, or heating of such material, it is not required that mechanical ventilation be supplied nor the use of personal respiratory protection. (Ventilation may be required per the welding standard for other reasons)

G. ASBESTOS ABATEMENT PLAN

Not applicable to this project. **(Describe if applicable)**

H. ABRASIVE BLASTING

Not applicable to this project. **(Describe if applicable)**

I. CONFINED SPACE

(Describe program)

J. CRITICAL LIFT PROCEDURES

(Example)There will be X critical lifts required on this project. A crane will be utilized to load new materials onto Xth floor roof and remove demolished material from the roof. A plan will be submitted prior to this work being performed.

K. CONTINGENCY PLAN FOR SEVERE WEATHER

For the site-specific severe weather conditions that employees may encounter over the next few months, **Name** Construction Company has developed the following procedures. First, Megen employees will adhere to all NWS warnings and advisories. For snowfall, the policy for workers is that a Level Three emergency, which is predicted heavy snow fall, or other dangerous weather conditions.

L. DEMOLITION

All employees engaged in demolition activities shall be instructed in the demolition plan so that they may conduct their work activities in a safe manner.

M. EMERGENCY RESCUE (Tunneling)

(Example)There will be no tunneling activities being performed on this project. However, any situation that arises that requires rescue of any individual, employees and subcontractors will take the actions called for in Section 9, Accident Reporting, which is to notify site/supervisor and the local fire department.

N. UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

The work specifications do not call for underground construction. **(Describe if applicable)**

O. COMPRESSED AIR PLAN

Compressed gas cylinders may be used at this worksite. These cylinders and gases present an injury hazard in the event that a regulator or cylinder is damaged and/or broken. The particular gases used will be acetylene. These hazards will be reduced by routine inspections and maintenance of compressed gas cylinders and by assuring all the units are secured from tipping.

Compressed gas cylinder will be kept away from excessive heat, will not be stored where they might be damaged or knocked over by passing or falling objects. The storage of oxygen and fuel gas compressed cylinders will be separated by at least 20 ft.

P. FRAMEWORK AND SHORING ERECTION AND REMOVAL PLANS

The demolition on this project will not require any shoring or framework. **(Describe if applicable)**

Q. JACKING PLAN (lift) SLAB PLANS

This plan is not applicable to this job site. **(Describe if applicable)**

R. SAFETY AND HEALTH PLAN

All applicable plans, and requested certifications applicable by the Veterans Affairs Safety and Health Program are within this complete Accident Prevention Plan. **Name** Construction Company has fulfilled all required Safety and Health Plans and Programs according to regulation, and will enforce all tasks relating to CFR 1910 and 1926 standards to ensure 100% safety.

S. BLASTING

Not applicable to this job site. **(Describe if applicable)**

T. DIVING PLAN

Not applicable to this job site. **(Describe if applicable)**

U. PLAN FOR PREVENTION OF ALCOHOL AND DRUG ABUSE

(Review – replace with your own company policy if this doesn't work for you)

Due to the nature of our work, it is critical that all employees are free from the adverse effects of drugs and/or alcohol. The company is committed to providing a safe workplace for all its employees. The goal of this policy is to maintain a safe and secure work environment that is free from the effects of alcohol and drug abuse.

The intent of this policy is to be responsive to the employees health needs by the early recognition and treatment of chemical dependency problems and behavioral / medical disorder, and to support the rights of the company and its employees to work within an alcohol / drug free environment.

Therefore, the following actions are strictly prohibited and will prompt disciplinary action up to and including consideration for immediate discharge:

- The illegal use, sale, arranging for sale, possession or manufacturing of narcotics, drugs or controlled substances while on the job or on VA property.

- The use of alcohol or illegal drugs while on the job or VA property.
- Arriving at work or working under the influence of alcohol or illegal drugs, narcotics or controlled substances.
- Any illegal substance confiscated pursuant to this policy will be turned over to the proper authorities.

This policy is not applicable to physician prescribed drugs. Employees on such medication(s), which may adversely affect their job performance, should promptly discuss the matter with their supervisor. Failure of the employee to so notify their supervisor can result in disciplinary action including discharge. It should be noted that while legal, prescribed drugs could adversely affect the safety of the employee and other employees on the site. All **Name** Construction employees are drug tested before hiring, periodically, and annually.

V. FALL PROTECTION PLAN

Employee falls represent a very high number of worker injuries / fatalities. For this reason, we must have a comprehensive and effective fall protection program. For this job site, personal fall arrest systems will be mandatory for every person on this job site at a height of 6 ft or more. This should not be applicable to this scope of work since there is an existing railing around the perimeter of the roof.

Personal fall arrest systems consist of the following type equipment:

- Full body harness
- Lanyard
- Horizontal and/or vertical lifelines
- Self-retracting lifelines
- Anchorages able to support 5,000 lbs.

All components of a personal fall arrest system must be inspected on a daily basis prior to use. Any defective component shall be immediately removed from service. Personal fall arrest systems are not to be connected to guardrails and/or hoists.

The site supervisor, at the site safety orientation, will provide for the following topics to be covered for employees and subcontractors:

- Nature of fall hazards
- Personal fall arrest system
- Inspection of personal fall arrest system
- This fall protection plan
- When and where personal fall arrest system are required

X. STEEL ERECTION PLAN

This plan is not applicable to this project. **(Describe if applicable)**

Y. NIGHT OPERATIONS LIGHTING PLAN

This plan is not applicable to this project. (Describe if applicable)

Z. SITE SANITATION PLAN

Due to the nature of construction and the hospital environment, it is vital that proper sanitation requirements be met. In order to assure proper employee protection and sanitation needs, the following guidelines must be adhered to:

- The use of the VA's facility is permitted unless this privilege is abused.
- Toilet facilities of the VA that are in close proximity of the work location will be utilized unless directed otherwise.
- Housekeeping will be a continuous process and will be everyone on the job site's responsibility.
- **Name** Construction Company will remove the demolished material from the site the same day. No dumpster will be necessary on this project.
(Describe dumpster location if applicable)

AA. FIRE PREVENTION PLAN

The following sections listed below are all contents of this Accident Prevention Plan. The information in these listed sections below all contains information that helps

constitute this Fire Prevention Plan:

7	Safety and Health Inspections
12.b.3.	Firefighting Plan
12.b.4	Posting of Emergency Numbers
12.c.	Hazard Communication Program
Z.	Site Sanitation Plan

Through safety and health inspections, housekeeping, proper maintenance, proper storage and handling, ensuring all employees and subcontractors are performing their designated work duties properly, the handling of supplies and equipment as directed, following all guidelines set forth through operating manuals, instructions, and training, the risk of a job site fire can be avoided.

All employees and subcontractors require the proper storage of combustibles. Combustible liquids must be stored and covered in approved containers.

All chemical spills including, of course, combustible liquids, must be cleaned up immediately.

Note: Care must be taken when cleaning up chemical spills. Information on appropriate personal protective equipment, proper disposal, proper cleanup procedures, required ventilation, etc is found on the products MSDS.

Cleanup materials and damaged containers must be properly disposed.

Combustible liquids and trash must be segregated and stored away from ignition sources.

Approved portable fire extinguishers will be checked on daily basis, ensuring they are charged and ready for use.

Smoking is not permitted inside the facility. Only designated areas by the VA will be permitted (outside), with smoking debris discarded in designated areas.

All chemical and chemical products will be handled and stored in accordance with the procedures noted on their individual MSDS.

Debris will not be allowed to accumulate on the job site and will be maintained daily.

NAME Construction will request a Hot Work Permit from the COTR or Safety Office to perform acetylene oxygen welding, brazing and cutting, the following precautionary measures will be required as part of this permit along with any additional requirements by the VA Medical Center Policy 138-25 (Hot Work):

- Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible.
- Ensure that no open containers or spills of combustible substances are present.
- Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal.
- Proper protection equipment and practices will be used, i.e., fireproof blankets, removal of combustible materials where practicable, and portable fire extinguishers of proper type on hand.
- When the above operations are in use a continuous Fire Watch will be performed while equipment is being used.
- Training in fire protection will occur at the site safety orientation. This training shall include the following topics, but not limited to:
 - Site Mapping
 - Portable Fire Extinguishers
 - Individual Roles and Responsibilities
 - Fire Watch
 - Response Plans
 - Safe Zone
 - Notification

13. CONTRACTOR INFORMATION

Name Construction Company will make every effort possible to perform and enforce all Safety and Health issues. The following topics give insight as to how we plan to implement and handle job tasks, PPE, etc.

WALKING / WORKING SURFACES

Slips, trips and falls caused by poorly maintained or cluttered walking surfaces and work areas are a leading cause of workplace injuries. Employees may encounter the following hazards:

- Working near debris removal.
- Working near material receiving areas.
- Uneven work areas.

Care will be given to the removal of all construction debris as soon as possible. The work site will be maintained in a clean, sanitary, and orderly condition.

FALL HAZARDS

This site may have the potential for fall hazards. Those hazards may include:

- Potential ladder work.
 - Potential scaffolding
- a. The hazards of ladder use can be reduced by careful selection of ladders of appropriate height, Strength, routine inspection and maintenance, and training of workers in safe and proper ladder use.
- b. Scaffolding, if needed, will be inspected on a daily basis, and fall protection will be mandatory.

PORTABLE LADDERS

Portable ladders may be utilized during the course of construction. The hazards of ladder use can be reduced by careful selection of ladders of appropriate height, strength, routine inspection and maintenance, and training of workers in safe and proper ladder use.

EXIT SAFETY DURING EMERGENCIES

During fire or other emergency it is critically important that workers are able to get out of the work area to safety in a quick and orderly fashion. A site emergency response plan has been implemented; all workers on site will be familiar with these procedures. These include:

- Knowing the alarm sound.
- Knowing where to gather to be accounted for.
- Knowing ones role during an emergency
- A complete site emergency plan is located in this submittal.

AERIAL AND MAN LIFTS

It is not anticipated that aerial man lifts will be utilized on this project. **(Describe if applicable)**

COMPRESSED GASES

Compressed gas cylinders may be used at this worksite. These cylinders and gases present an injury hazard in the event that a regulator or cylinder is damaged and/or broken. The particular gases used will be acetylene. These hazards will be reduced by routine inspections and maintenance of compressed gas cylinders and by assuring all the units are secured from tipping.

Compressed gas cylinder will be kept away from excessive heat, will not be stored where they might be damaged or knocked over by passing or falling objects. The storage of oxygen and fuel gas compressed cylinders will be separated by at least 20 ft.

FLAMMABLE/COMBUSTIBLE MATERIALS

There will be no need for any storage or fuel tanks on this project. **(Describe if applicable)**

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) includes hard hats, gloves, safety glasses, steel-toed shoes/boots, hearing protection, and personal fall protection.

a. Eye protection will be as follows:

Safety glasses used for any worker performing or observing tasks that may result in flying objects, dust, etc. exposing them to eye injury.

During welding/cutting operations, the required filter lenses will be utilized according to the operation, electrode size and arc current.

b. Head Protection

All workers on this site will be required to wear approved hard hats when working in the close proximity of heavy equipment and where structural steel is being hoisted.

c. Foot Protection

All workers will be required to wear the appropriate foot protection. Steel-toed shoes/boots are mandatory.

d. Hand Protection

Workers may be exposed to hand injuries from sharp objects, abrasive materials, and weather. Gloves designed to protect against the specific

hazard encountered are an effective means of reducing such risks and will be used on this project.

e. Hearing Protection

Any area with noise levels at or above 85dba will be required to wear hearing protection. When workers are utilizing loud equipment, or being exposed to such levels, hearing protection shall be provided. These levels are not anticipated on this project.

f. Personal Fall Protection

Name Construction Company requires all employees working at or above 6' to wear personal fall protection, unless the personal fall protection creates a safety hazard by utilizing it. In that case, other means of fall protection shall be provided. Workers that may be performing work on ladders are instructed to adhere to the following:

- Inspect before using
- Place ladder using 4 to 1 rule
- Never place base of ladder on objects
- Never place ladder in front of door unless
 - Door is blocked in open position
 - Door is demarcated off
 - Door is locked

For work that requires scaffolding use for employees and subcontractors, personal fall protection shall be mandatory, unless working less than 6 ft. The following topics listed will be conveyed to workers prior to scaffolding use:

- Review scaffolding supplier pamphlet for proper construction
- Inspect scaffolding structure before initial use/and daily
- Report any defects immediately / do not use / tag out of service
- Placement of structure
- When fall protection is required
- What you can tie off to

SAFETY SIGNS

Signs will be posted at this site to aid in warning workers and pedestrians of dangers and/or reminding them of safety work practices.

Signs that will apply to this job site include the following: **(Adjust list as necessary)**

- Compressed gas storage
- No Smoking
- Fire extinguisher locations
- Lock out/tag out
- Construction area / authorized personnel only
- First Aid

Employees and subcontractors will be instructed to recognize and understand the above listed signs and tags.

MEDICAL AND FIRST AID

Worker's health and safety is jeopardized if medical care facilities and first aid are not readily available in the event of injury or illness. Rapid and appropriate response to emergency situations will save lives and reduce the severity of injury.

Appropriate emergency response to medical situations has been outlined in Section 03, Medical Support.

Every employee will be made aware at the site safety orientation of the set guidelines for notification, response, where the first aid kit is located, and emergency phone list location. The first aid kit will be checked weekly for needed additional supplies.

FIRE PROTECTION

As stated in the flammable/combustible section of this document, compressed gas cylinders will be located on site. Designated smoking areas, portable fire extinguishers, cautions during cutting/welding operations, etc., are located throughout this document in under various, but applicable topic areas.

FIRE EXTINGUISHERS

Portable fire extinguishers will be located no more than 20' from any flammable/combustible storage and/or use area. Also one will be located in the field office. All portable fire extinguishers shall be inspected on a daily basis to ensure a ready condition.

POWERED INDUSTRIAL TRUCKS

The use of this equipment will not be required on this project. **(Describe if applicable)**

CRANES

(Example) The use of this equipment will be required on this project for loading materials onto the Xth floor roof. Crane safety will be the responsibility of the company performing the work

HAND AND PORTABLE POWERED TOOLS AND OTHER HAND-HELD EQUIPMENT

A wide variety of hand tools may be utilized at this worksite. **Name** Construction Company will ensure the safe condition of all tools and equipment, including those furnished by the workers, through frequent and

regular job site inspections. Also ensure that the proper use, inspections, and maintenance procedures take place.

ELECTRICAL EQUIPMENT

The electrical equipment on this project will be minimal, however what is used, will be in good working order with no noted defects. All extension cords etc will be protected by a GFCI. Again, **Name** Construction Company will ensure, through equipment handling, operating, and storage training, along with inspections, that all equipment brought to this job site is in good condition.

TOXIC AND HAZARDOUS SUBSTANCES

Employees and subcontractors will be made aware of all substances brought onto the facility, as well as potential substances they could possibly encounter while working here on this site. The information will be included in the site safety orientation. This part is covered in the Hazard Communication Program located within this document.

HAZARD COMMUNICATION

Employees and subcontractors will be provided information identifying the hazardous substances in the workplace and describing safe handling procedures.

Name Construction Company will inform employees and subcontractors about the hazardous chemical to which they have the potential to be exposed to, by means of a Hazard Communication Program. Included in this HazCom Program are MSDS, labels, sign recognition and meaning, and other applicable training. The site supervisor at the site safety orientation will provide this.

LOCK OUT/ TAG OUT

Only VA Employees will not manipulate breakers or valves to perform a Lock Out Tag unless specific permission (in writing) is obtained by the Assistant Chief Engineering, M&O. The VA will hang tags on valves or breakers as requested by the project manager. After the VA places their lock on the device, then **Name** Construction Company will be allowed to place their lock on the device. When clearing the Lock Out Tag Out, **Name** Construction Company will remove our locks and notify the COTR. The VA will then remove their locks and reposition the valve or breaker at the request of **Name** Construction Company.

WELDING/CUTTING OR OTHER HOT WORK

All Hot Work will be done in accordance with the Sheridan VA Medical Center Policy 138-25.

TRENCHES AND EXCAVATIONS

There are no trenches or excavations required for this project. (Describe if applicable)

14. SITE-SPECIFIC HAZARDS AND CONTROLS

While working at the Sheridan VA Medical Center, the Name Construction Company will comply with OSHA regulations.

The hazards that have the potential to occur at this job site, along with the controls to prevent incidents or accidents are listed below. Throughout this document, are the listed hazards in the tasks that are required to perform this project. Also throughout this document, are the many controls in which we, Name Construction Company, will do the best job possible to enforce.

- | | | |
|----|--|--|
| a. | Slips, trips, and falls | Housekeeping
Sanitation |
| b. | Electrical Hazards | Training on lock out / tag out
Informing where buried electrical lines are located in work area |
| c. | Light Radiation | Ensuring that subcontractor to weld/cut are wearing the appropriate shade of lens according to the type of welding procedure and equipment used. |
| d. | Rolling or pinching | Steel toed shoes/boots are required at all times at this job site |
| e. | Potential fall from ladders, scaffolding | Personal fall protection shall be enforced. |
| f. | Crane Safety | Crane safety will be the responsibility of the company performing the work. |

APPENDIX A

Evacuation Route Map to Emergency Services

NOTE: Presently, there is one evacuation route on the Sheridan VA Medical Center. That is Fort Rd., the road on which you entered the facility.

Note: Map to local hospital will be provided by the COTR.

APPENDIX B

CERTIFICATIONS & JOBSITE DOCUMENTATION PROGRAM

List all individuals including their titles, who have completed

1. OSHA 30 Hour Construction Safety Course
2. OSHA 10 Hour construction Safety Course
3. Competent Person Certifications for Respiratory Protection, Fall Protection, Trenching and Shoring, etc. as required by the Scope of Work and applicable regulations.
4. Lock Out/Tag Out Certification

APPENDIX C

CONTRACTOR ACCIDENT RECORD

OSHA 300 FORM

To be updated and maintained in your on site construction office.

APPENDIX D

HAZARD ASSESSMENTS