ERIN J. MENDENHALL
Mayor

DEPARTMENT OF PUBLIC UTILITIES

NOTE:
This waiver submission may include references to proprietary items and brand name products. These references have been retained in order to provide context for the waiver submission. EPA does not evaluate a waiver based on a proprietary item but reviews the performance-based specifications for the project/products. As such, any references to brand or proprietary items are reviewed on an "or equal" basis by EPA.

Items and pages may have been intentionally redacted or excluded by the EPA. Contact CWSRFWaiver@epa.gov for more information if necessary.

February 5, 2021

Taetaye Shimeles
Portfolio Manager, Credit Analysis Branch
WIFIA Management Division
Office of Wastewater Management
U.S. Environmental Protection Agency

Re: Salt Lake City Water Reclamation Facility New AIS Waiver Request for Stainless Steel Back-Up Rings

Mr. Shimeles:

Please find attached our request for an AIS waiver for Stainless-Steel Back-Up Rings. If the request is in order, please forward to EPA for consideration and approval.

These stainless-steel back-up rings are required at the transition connections between the HDPE yard piping and the steel and ductile iron piping that extends out of the buildings and vaults. These transition connections are to be buried, thus stainless-steel backup rings and bolt packs are required due to the corrosivity of the soil at the project site. Our contractor has contacted a number of pipe suppliers about whether they are able to furnish stainless-steel backup rings with their pipe. Each has indicated that there is no domestic source for the back-up rings. We have checked on EPA's AIS Waiver site and find that four projects in the past five years have received waivers for back-up rings. We are also aware that Central Utah Water Conservancy District has submitted a waiver request for Convoluted Stainless-steel Back-Up Rings in the past month.

We are hopeful that this waiver request will receive approval. Please let me know if additional information is needed to submit this request.

Regards,

Jason Brown, P.E.
SLCDPU Chief Engineer

Attachments (2)

cc: Lisa Tarufelli, Michelle Barry, Will Peterson, Jamey West, Mike Brewer, Steve Van Loan (via electronic email)
File Location: PC/ 524905271

AIS Waiver Request
For Stainless Steel Back-up Rings

General Items

Project Name

Salt Lake City Water Reclamation Facility
Nutrient Project (WIFIA - N19109UT)

Description of Work

Salt Lake City Department of Public Utilities (SLCDPU) owns and operates the water reclamation facility (WRF), located at 1365 West 2300 North Salt Lake City, UT, to treat wastewater for the benefit of the service area within Salt Lake City's corporate boundaries.

The Salt Lake City Water Reclamation Facility (SLCWRF) Nutrient Project is the reconstruction of an aging water reclamation facility (WRF) and implementation of a new treatment process to meet new water quality requirements. The existing 55-year old WRF was constructed in 1965 and is the single wastewater treatment facility for the city. The original plant utilized trickling filters (TF) with primary and secondary sedimentation. The WRF was upgraded in 1988 to include activated sludge (AS) and chlorine disinfection, while continuing to use much of the original treatment processes. Multiple structures and components of the existing WRF do not meet current code requirements and require replacement.

The SLCWRF Nutrient Project will maintain the current rated treatment capacity of 56 MGD, which is sufficient to meet anticipated growth and includes options for increasing facility capacity in the future, if needed. The new facility will raise the hydraulic profile to protect the facility in extreme weather or seismic events and will construct new redundant electrical systems to prevent power loss to the plant under natural disaster conditions. The following major improvements are included:

- New Biosolids Dewatering Facility
- New Thermal Drying Facility
- New Administration and Operations Buildings
- New Influent Pump Station
- New Primary Effluent Piping
- New Screenings Facility
- New Grit Removal Facility
- New Primary Clarifiers
- New Bioreactors
- New Secondary Clarifiers
- New Phosphorous Recovery process
- Combined Heat & Power (CHP) improvements
- Electrical primary power substation
- New standby generators
- Electrical power distribution equipment and ductbanks
- Improvements to the Natural Wetland Treatment System

AECOM Technical Services, Inc. is providing engineering design and construction services for the Project. The Project is being designed in a phased approach to accommodate the construction sequencing and schedule. Since the location of the liquid processes for the Project is in the footprint of the existing sludge drying beds and to accommodate the need to pre-load the site to mitigate settlement issues, two early works packages have been broken out for construction.

The City has contracted with Sundt/PCL as the CM/GC for the project to provide pre-construction and construction for the project. Initial construction of the project (Construction package EW-1), began on March 10, 2020 and is nearly complete. Preloading/settling of the site (Construction package EW-2) was awarded and begin on June 15, 2020. Construction of the new mechanical dewatering facility (Construction Package ST-1) began on November 16, 2020.

Funding for the project includes revenue bonds, a federal loan through the Water Infrastructure Finance and Innovation Act (WIFIA), and revenues associated with gradual rate increases.

Description of the Foreign and Domestic Construction Materials

The plans and specifications require the installation of stainless-steel back-up or backer rings at transition connections between HDPE and steel or ductile iron piping. Stainless-steel rings for buried applications are required to due to the corrosive nature of the soils on-site. HDPE piping is specified for the majority of the yard piping to reduce costs and to provide flexibility for mitigation of differential settlement at transition connections to steel or ductile piping at vaults and buildings. HDPE is typically subject to twisting or torsional forces during installation due to thermal expansion and contraction while in open trenches. To mitigate these forces, HDPE connections to steel or ductile pipe use a solid HDPE adapter flange (no bolt holes) mated to a typical bolted steel or ductile flange with a gasket. A back-up or backer ring is installed on the HDPE pipe prior to fusing of the adapter flange on the end of the HDPE pipe. Bolts installed between the back-up ring and the flange on the steel or ductile pipe provide the compression necessary for a leak-proof seal. The project specifications require that the rings be type 316 stainless steel rated equal to or greater than the pressure rating of the mating pipe; also that the back-up ring bore be chamfered or radiused to provide clearance to the fusion weld radius of the flange adapter. The back-up rings are to be designed for use in HDPE pipe systems and be warrantied for a minimum one-year period. The project will require an estimated 450 stainless-steel back-up rings ranging in size from 4-inch to 48-inch. The estimated size and number of stainless-steel back-up rings needed for the project are tabulated below. Stainless-steel back-up rings are fabricated internationally, but there are no domestic manufacturers that can meet the specification requirements within the United States.

Unit of Measure
The Back-up Ring sizes listed below are measured by 'each'.

Quantity
A total estimated quantity of 450 Stainless Steel Back-up Rings are listed in the table below.

[redacted] Back-up Rings	
Size (inch)	Quantity
4	80
6	110
8	60
12	40
16	20
18	20
20	20
24	30
30	20
36	16
42	16
48	18
Total	**450**

Time of delivery and availability
Delivery time of the stainless-steel back-up rings is not applicable to this waiver. Stainless steel back-up rings that meet the required specifications are not fabricated domestically in the United States and therefore not available.
For similar projects, the EPA conducted market research on the supply and availability of stainless-steel back-up rings and concluded that there are no domestic manufacturers of these rings that met the technical specifications of projects (similar to the SLCWRF Nutrient Project specifications). Domestic manufacturers can provide rings that are "either a lap-joint, plate or modified slip-on flange that are designed for metallic systems, but they lack engineering, warranty or specifications supporting a 2:1 safety factor or pressure on a HDPE system."

Location of the construction project
The project is located in Salt Lake County, Utah as described above.

Name and address of the proposed supplier
Local Supplier of [redacted] Rings:
Core and Main
275 West 2855 South,
Salt Lake City, UT 84115

A detailed justification for the use of foreign construction materials
The [redacted] convoluted stainless-steel back-up ring design was patented by [redacted], a Texas-based firm, specifically for use in HDPE piping systems. The profile was designed to fit the standard fusion weld radius of the HDPE adaptor flange. [redacted] was unsuccessful in finding a domestic fabricator to produce the convoluted [redacted] back-up ring. A suitable fabrication facility with capability was found in China.
The purpose of the stainless-steel back-up rings is to provide reliable leak-free transition connections between the HDPE yard piping and the steel or ductile piping in the vaults or buildings. The back-up

rings must resist corrosion and be rated to match the pressure rating of the mating pipe. These back-up rings must provide reliable, worry-free service because they will all be buried connections. SLCDPU, its designer, AECOM, and its contractor, Sundt/PCL, have been unable to locate a source of domestically manufactured stainless-steel back-up rings that meet the project specifications (See Attachment 1).

Availability Waiver Request
Stainless Steel Convoluted Back-Up Rings

Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials

The convoluted stainless-steel back-up rings are not manufactured domestically in the United States. There are no domestically manufactured stainless-steel back-up rings that would meet the specifications for the SLCWRF Nutrient Project (See Attachment 1).

For similar projects, the EPA conducted market research on the supply and availability of stainless-steel back-up rings and concluded that there are no domestic manufacturers of these rings that meet the technical specifications of those projects (similar to the SLCWRF Nutrient Project specifications). There are domestic manufacturers capable of providing solid or lap-joint rings in the sizes required for the project, but these manufactures cannot provide back-up rings specifically designed for HDPE piping systems and that meet the specifications and warranty requirements of the project

Documentation of the assistance recipient's efforts to find available domestic sources, such as description of the process for identifying suppliers and a list of contacted suppliers

SLCDPU's contractor, Sundt/PCL contacted pipe suppliers, seeking to find stainless-steel back-up rings that would meet AIS, and project specifications. Each supplier either indicated that they did not know of any domestic sources of AIS compliant Stainless-steel back-up rings or referred them to suppliers, who represent [redacted] convoluted Stainless-steel back-up rings, which are non-domestic. Core and Main forwarded a letter they received from [redacted] regarding their [redacted] convoluted stainless-steel back-up rings (See Attachment 1). The letter states that they are not aware of a domestic competitor that can supply stainless-steel, AIS compliant back-up rings specifically designed for HDPE piping systems. This letter is attached (See Attachment 2).

In addition, SLCDPU is aware of one nearby wastewater improvement district, Central Valley Water Reclamation Facility and one nearby water conservancy district, Central Utah Water Conservancy District that have recently applied for an AIS waiver for convoluted stainless-steel back-up rings [redacted]. The Central Valley Water Reclamation Facility AIS waiver request was approved by EPA on December 15, 202 for their Biological Nutrient Removal Project. The prime contractor for that project, Gerber Construction, contacted a number of domestic suppliers listed in the EPA correspondence, seeking AIS compliant stainless-steel back-up rings. The Central Utah Water Conservancy District AIS waiver request for the Duchesne Valley Water Treatment Plant Process Improvement Project has been received by EPA, the 15-day public comment period has closed, and EPA is currently reviewing the waiver request. The prime contractor for that project, Bodell Construction, also contacted a number of domestic suppliers listed in the EPA correspondence, seeking AIS compliant stainless-steel back-up rings. In each case, they found that domestic project compliant back-up rings were unavailable. Similar AIS waiver requests have been granted recently for the City of Baltimore's BRWTP project (2020), the Winston-Salem and Forsyth County City/County Utilities Commission's Muddy Creek WTP project (2015) and the Duchesne County Water Conservancy District's Victory Pipeline project (2015).

SECTION 40 05 33

HIGH-DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide materials testing and installation of high-density polyethylene (HDPE) pressure pipe and fittings as indicated and in compliance with Contract Documents.

1.02 REFERENCES:

A. American Society of Mechanical Engineers (ASME):

1. B18.2.2: Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

B. ASTM International (ASTM):

1. A193: Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

2. A194: Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both

3. A240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

4. D638: Standard Test Method for Tensile Properties of Plastics

5. D3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

6. D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

7. F714: Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

8. F1055: Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing

9. F2620: Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

C. American Water Works Association (AWWA):

1. C906: Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, for Water Distribution and Transmission.

2. M55: PE Pipe-Design and Installation

D. Plastics Pipe Institute (PPI):

1. TN-38: Bolt Torque For Polyethylene Flanged Joints

2. TR-33: Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00.

1. Action Submittals:

a. Shop Drawings:

(1) Catalog information confirming pipe, fittings, and other materials conform to requirements of this Section.

(2) Drawings of specific connection details.

(3) Drawing of fabricated or manufactured fittings.

(4) A plan for pipe joining and installation. The plan must be reviewed and approved by Engineer prior to pipe installation.

b. Submit HDPE temperature control plan describing Contractor's approach to controlling movement of the pipe related to the thermal expansion and contraction of the pipeline during installation. Plan shall outline Contractor's approach to mitigate and control movement during installation, backfill, and connection to flanges or structures.

2. Informational Submittals:

a. Manufacturer's Certificate of Compliance.

b. Infrared temperature gun product data.

c. Certificates of qualification for persons to be fusing HDPE pipe. Experience and training record of persons to be fusing HDPE pipe.

d. Hydrostatic Testing Plan as required per Section 01 43 00.

e. Certifications of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.

f. Hydrostatic test report documentation.

g. Fusion parameters including recommended limits of criteria recorded by data logger.

h. Fusion report for each joint, including information listed under Article Field Quality Control.

1.04 SUSTAINABLE DESIGN:

A. Comply with the requirements specified in Section 01 81 13.01.

1.05 SPARE PARTS:

A. Comply with the requirements specified in Section 01 61 00.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 43 00.

B. Qualifications:

1. Pipe Manufacturer: Listed with Plastic Pipe Institute.

2. Persons fusing HDPE pipe shall have minimum of 1 year of experience with fusing HDPE pipe and shall have received a minimum of 20 hours of training for fusing HDPE pipe from pipe supplier or fusing equipment supplier.

1.07 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

1. Shipping: Do not cut, kink, or otherwise damage pipe during transportation.

2. Storage:

a. Limit stacking of pipe to a height that will not cause excessive deformation of bottom layers of pipes under anticipated temperature conditions.

b. Where necessary, because of ground conditions, store pipe on wooden sleepers, spaced suitably and of such widths as not to allow deformation of pipe at point of contact with sleeper or between supports.

c. Keep pipe shaded from direct sunlight prior to installation in trench.

1.08 CONNECTIONS TO EXISTING PIPE, NEW PIPE, AND STRUCTURES:

A. Fusing to Existing HDPE Pipe: Comply with manufacturer's or distributor's recommendations based on Site conditions and PPI TR-33.

B. Any connections from new HDPE pipe to existing or new pipelines shall be done using a flanged restrained joint. If plans do not specify the type of joint between HDPE and another pipe or structure, use a flanged welded steel pipe spool to connect the new HDPE pipe to another pipe or concrete structure.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. JM Eagle

B. WL Plastics

C. Performance Pipe

2.02 MATERIALS:

A. Pipe and Fittings:

1. Conform to requirements of ASTM F714.

2. Resin: Polyethylene resin shall meet or exceed requirements of ASTM D3350 for PE 4710 material. Pressure rating shall be based on hydrostatic design stress of 200 psi at 73.4 degrees F.

3. Outside Diameter Basis: Iron Pipe Size (IPS) unless noted otherwise on Drawings.

4. For piping exposed as in buildings, galleries and pumping stations connect to equipment using flanged connections. Use butt fused pipe for straight runs of piping in these locations, unless otherwise indicated.

5. Pipe lengths, fittings, and flanged connections to be joined by thermal butt-fusion shall be of a compatible resin mix for the fusion process.

6. Fittings:

a. Sizes 6 Inches and Smaller: Molded and fabricated from polyethylene pipe.

b. Sizes 8 Inches and Larger: Use thermal butt-fusion.

c. Polyethylene fittings shall have same or higher pressure rating as pipe.

B. Backup Rings:

1. Convoluted for Flanged Connections:

a. ASTM A240, Type 316 stainless steel, unless noted otherwise on the drawings.

b. Complete with one-piece, molded polyethylene flange adapters.

c. Flanged Connections: Same or greater pressure rating as pipe and sized to be compatible with mating flange.

C. Gaskets: Material, size, and thickness shall be as recommended by pipe or flange manufacturer, and in accordance with PPI Technical Note 38.

D. Joints: Thermal butt-fusion, except in specific locations as shown on Drawings.

E. Bolts, Nuts, Washers:

1. Type 316 stainless steel, ASTM A193, Grade B8 hex head bolts; and ASTM A194, Grade 8 hex head nuts.

2. Bolts: Fabricated in accordance with ASME B18.2.2 and provided with washers of same material as bolts.

F. Wall Anchor (Anchor Ring):

1. Material: Same as HDPE pipe.

2. Internal Diameter: Equal to adjacent pipe.

3. Shear Strength: Equal to or greater than tensile strength of adjacent pipe.

4. Fabrication: Butt fusion. Extrusion bead welding is not allowed.

G. Electrofusion Flex Restraint: Electrofusion flex restraint is not allowed.

H. Products that restrain HDPE pipe with wedges, machined serrations, or clamps are not acceptable.

2.03 TRACER WIRE:

A. All direct bury piping (including service lines) shall be installed with 12 gauge solid copper THHN tracer wire for pipeline location purposes by means of an electronic line tracer.

1. The wires must be installed along the entire length of the pipe on the top of the pipe and be held in place with ties or hitches spaced not more than 12-feet apart.

2. Sections of wire shall be spliced together using approved splice caps and waterproof seals or solder. Twisting the wires together is not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General:

1. Install buried polyethylene pipe in conformance with Section 31 23 33, AWWA M55, PPI TR-33, ASTM F2620, and pipe manufacturer's recommendations.

2. Joining: Butt-fuse pipes and fittings in accordance with pipe manufacturer's recommendations. Depending on Site conditions, perform butt-fusion joining in or outside of excavation.

3. If HDPE pipe surface temperature is above 80 degrees F as measured with infrared temperature gun, allow pipe to cool prior to making any connections to flanges, existing pipeline systems, or structures.

4. Connect HDPE pipe to auxiliary equipment such as valves, pumps, tanks, and other piping systems with flanged connections as follows:

a. Polyethylene flange adapter, thermally butt-fused to end of pipe. Flange "stub ends" are not allowed.

b. Convoluted backing flange, as specified herein.

c. Bolt and nut of sufficient length to show a minimum of three complete threads when joint is made and tightened to manufacturer's standard.

d. Follow requirements of PPI Technical Note 38 including mandatory 4-hour bolt retorquing.

5. Special Precautions at Flanges: Support polyethylene pipe connected to heavy fittings, maintenance holes, and rigid structures in such a manner that no subsequent relative movement between polyethylene pipe at flanged joint and rigid structures is possible.

6. Minimum Long-Term Field Bending Radius: Restricted to limits recommended by AWWA M55, Table 8-2.

B. Placement in Trench:

1. Control water in trench per Section 31 23 33.

2. Handle joined pipeline in such a manner that pipe is not damaged by dragging it over sharp and cutting objects.

3. Position slings for handling pipeline away from butt-fused joints.

4. Remove sections of damaged pipe and replace it with undamaged pipe. Damaged pipe is defined as pipe with kinks or gouges exceeding 10 percent of pipe wall thickness.

5. Exercise care when lowering pipe into trench to prevent damage or twisting of pipe.

6. At flanges, valves, and connections, excavate out trench bottom sufficiently to provide clearance between undisturbed trench bottom and flange, valve, or connection.

3.02 FIELD TESTING:

A. Joint Fusion:

1. Measure and log each joint fusion by an electronic monitoring device (data logger) affixed to fusion machine, and shall be capable of being retrieved electronically. Data to be logged shall include the following:

a. Pipe size and dimensions.

b. Machine model and size.

c. Operator identification.

d. Job identification number.

e. Weld number.

f. Fusion, heating, and drag pressure settings.

g. Heater plate temperature.

h. Time stamp showing when weld was performed.

i. Heating and curing time of weld.

j. Curing temperature readings and time stamps of readings.

k. Error messages and warnings for out of range temperature or pressure settings.

2. In addition to logged items above, the following shall be logged or annotated on report:

a. Location of joint being fused by pipeline station or by reference to pipe Shop Drawing.

b. Ambient temperature and humidity.

c. If internal bead was removed.

B. Joint Weld Testing:

1. Contractor shall perform joint testing in accordance with testing procedures specified in ASTM D638.

2. Specimens: Cut pipe 12 inches on each side of field made joint. Rejoin ends and proceed with Work.

3. Test Frequency:

a. First 500 Linear Feet: Two joints selected at random by Engineer.

b. Each Additional 2,000 Linear Feet: One joint selected at random by Engineer.

c. Each Test Failure: Two additional joints selected at random by Engineer.

3.03 PRESSURE AND LEAK TEST:

A. The system design pressure shall be 150 psi, unless noted otherwise on the drawings.

B. Testing in the trench: Fill the pipeline with water after it has been laid; bleed off any trapped air. Subject the lowest element in the system to a test pressure that is 1.5 times the design pressure, and check for any leakage. When, in the opinion of the Engineer, local conditions require that the trenches be backfilled immediately after the pipe has been laid, apply the pressure test after backfilling has been completed but not sooner than a time which will allow sufficient curing of any concrete that may have been used.

1. The test procedures consist of two steps: the initial expansion and the test phase. When test pressure is applied to a water-filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system at hourly intervals for three hours to maintain the test pressure. After about four hours, initial expansion should be complete and the actual test can start.

2. When the test is to begin, the pipe is full of water and is subjected to a constant test pressure of 1.5 times the system design pressure. The test phase should not exceed three hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return the test pressure and compare this to the maximum allowance in Table 40 05 33-1 below.

Table 40 05 33-1 Allowance for Expansion Under Test Pressure							
Nominal Pipe Size	U.S. Gal/100 ft of Pipe			Nominal Pipe Size	U.S. Gal/100 ft of Pipe		
	1-Hour	2-Hour	3-Hour		1-Hour	2-Hour	3-Hour
2	0.08	0.12	0.15	20	2.80	5.50	8.00
3	0.10	0.15	0.25	22	3.50	7.00	10.50
4	0.13	0.25	0.40	24	4.50	8.90	13.30
5	0.21	0.41	0.63	28	5.50	11.10	16.80
6	0.30	0.60	0.90	30	6.20	12.60	19.10
8	0.50	1.00	1.50	32	7.00	14.30	21.50
10	0.75	1.30	2.10	36	9.00	18.00	27.00
12	1.10	2.30	3.40	42	12.00	24.00	36.00
14	1.40	2.80	4.20	48	15.00	27.00	43.00
16	1.70	3.30	5.00	54	18.00	30.00	50.00
18	2.20	4.30	6.50				

From PPI Technical Report TR-31 by the Plastic Pipe Institute.

C. An alternate leakage test consists of maintaining the test pressure over a period of four hours, and then dropping the pressure by 10 psi. If the pressure then remains within 5 percent of the target value for one hour, this indicates there is no leakage in the system.

D. Under no circumstances shall the total time under test exceed eight hours at 1.5 times the system pressure rating. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section shall be permitted to "relax" for eight-hours prior to the next test sequence.

3.04 MANUFACTURER'S SERVICES:

A. Provide pipe manufacturer's representative at Site for assistance during pipe joining operations and pipe installation.

3.05 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01 77 00.

END OF SECTION