SECTION 336320 – STEAM AND CONDENSATE UTILITY DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

A. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the Drawings and as specified herein.

B. This section includes the furnishing and installation of steam piping, steam condensate piping, and steam and condensate accessory piping.

1.3 REFERENCES

A. ASME B31.1, Power Piping.

B. ASME B31.9, Building Services Piping.

C. ASHRAE Systems and Equipment Handbook, Current Edition.

D. Michigan Boiler Code, Current Version.

1.4 SUBMITTALS

A. Shop Drawings to include: Pipe, piping specialties, and valves, in accordance with the requirements of other sections of this specification.

B. Test reports data for tests specified. Include torque test reports for flanges in accordance with the requirements of other sections of this specification.

C. Certification of installation from manufacturer's representative for preinsulated buried piping.

1.5 QUALITY ASSURANCE

A. General:

1. The steam piping located in the tunnel is designed for an operating pressure of 150 psig which falls under the jurisdiction of the Michigan Boiler Division and the Boiler Act of 1965.

2. The Act was amended in 1995 which included a clarification of Rule 113 concerning high pressure piping. Steam piping under this rule includes any steam piping where the pressure is over 15 psig and must be installed or repaired in accordance with the ASME B31.1 Power Piping Code and the Rules of the Michigan Boiler Law and Rules.

3. The steam piping located in the tunnels is considered Non-Boiler External Piping under the ASME B31.1 Power Piping Code.

B. General Welding Quality Assurance:

1. Contractors working on these systems are required to be licensed by the State of Michigan Boiler Division.

2. Employers are responsible for qualifying Welding Procedure Specifications (WPS) that are intended to be used by personnel of that organization.

3. Each employer is responsible for qualifying the welders and welding operators employed by that organization and maintain a certificate of Welder/Welding Operator Performance Qualification for each welder under their employment.

4. The employer shall maintain records of the WPS and the welders or welding operators used by that organization and the identification symbol assigned to each welder and their performance qualification.

5. The employer shall use this identification symbol to identify the welds performed by a welder or welding operator by either:

a. Applying the symbol of the welder or welding operator to the joint in a manner specified by the organization.

b. Maintain weld map records identifying the joint with the welder or weld operator.

C. Examinations:

1. Examinations are to be performed by the fabricator, erector, or a party authorized by the Owner which include visual examinations and observations.

2. Visual examinations as defined are to be performed as necessary during the fabrication and erection of the piping components to provide verification that the design and WPS requirements are being met.

3. Visual examinations shall also be performed to verify that completed welds in pipe and piping components comply with the acceptance standards specified in the code.

4. Personnel who perform nondestructive examinations of welds shall be qualified and certified for each examination method in accordance with a program established by the employer of the personnel being certified based on the code requirements.

D. Inspections:

1. Inspections are the responsibility of the Owner and may be performed by employees of the Owner or party authorized by the Owner.

2. Prior to initial operation, the "Non-Boiler External Piping" installation shall be inspected to ensure compliance with the engineering design and with the material, fabrication, assembly, examination and test requirements of the code.

E. Field Testing: Provide testing of each section of piping in accordance with Part 3 of this Specification.

PART 2 - PRODUCTS

2.1 STEAM PIPING

A. Steam piping 4 inches to 24 inches shall be ASTM A53 or A106, seamless, Grade B, Standard Weight with the following schedule/wall thickness:

1. 10 inches and under - Schedule 40.
2. 12 inches and over - 0.375-inch.

2.2 STEAM CONDENSATE PIPING

A. Condensate piping 2 inches to 18 inches shall be ASTM A53 or A106, seamless, Grade B, Extra Strong Weight with the following schedule/wall thickness:

1. 8 inches and under - Schedule 80.
2. 10 inches and above - 0.500-inch.

2.3 ACCESSORY PIPING

A. Accessory piping shall be extra heavy (Schedule 80) ASTM A53, Grade B, seamless, all welded construction except as otherwise specified.

2.4 PIPE FITTINGS

A. Weld fittings shall comply with ANSI for steel butt-welding fittings (B16.11) where applicable, and material shall conform to Division 33 Section "Piping for Utility Distribution." Each fitting shall have manufacturer’s name or symbol, marked on fitting. Pipe fittings shall have same wall thickness as adjoining pipe.

B. Threaded fittings shall be Class 300 maleable (ductile) and conform to Division 33 Section "Piping for Utility Distribution."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Piping shall be installed in such a way that it will be free to expand and contract, without noise or damage to itself or to other structures.

2. Piping shall be installed in such a manner that it will NOT interfere with the necessary passage, head room or opening.

3. Risers and vertical pipe shall be plumb, straight and have no unnecessary fittings or offsets.

4. Filings, dust, and dirt shall be wiped from interior of the pipe or tubing before connections are made.

5. Changes in direction of piping shall be made using the appropriate fittings.

6. Pitch: Horizontal supply mains shall pitch up or down in the direction of flow as indicated.

7. Reducing fittings shall be used for changes in pipe sizes.

8. Open ends of pipelines and equipment shall be capped or plugged during installation to keep dirt or other foreign materials out of the systems.

3.2 TESTING

A. Accessible Steam and Condensate Piping in Tunnels:

1. Leak Tests for Steam and Steam Condensate Piping:

a. Provide complete pneumatic testing for leaks of all piping systems in accordance with ASME B31.1 "Code for Pressure Piping," latest revision.

b. Apply not more than 25 psig for at least 10 minutes to identify major leaks.

c. Final test pressure shall be at least 1.5 the design pressure, but in no cases less than 150 psig.

d. Hold at full test pressure for a minimum of 10 minutes and gradually reduce to design pressure.

e. Following the application of pneumatic test pressure for at least 4 hours, examination shall be made for leakage of the piping and at all joints and connections using soap bubbles or other acceptable method to visually identify leaks.

f. If leaks are found, they shall be eliminated as appropriate, and the test repeated until no leakage is found.

2. In-Service Leak Test for Steam and Condensate:

a. An in-service test and examination using system steam is acceptable when other types of tests are not practical or when leak tightness is demonstrable due to the nature of the service; i.e., where shut-off valves are not available for isolating a line or where temporary closures are impractical.

b. The in-service test shall be conducted only after receiving written authorization from the Engineer.

c. This method shall also be used subsequent to pneumatic testing when used in lieu of hydrostatic testing.

d. When performing an initial service test, the piping system shall be gradually brought up to normal operating pressure and temperature and continuously held for a minimum time of 10 minutes.

e. Examination of leakage shall be made of joints and connections at that time.

B. Test Procedures:

1. Blank off or replace with spool pieces items of devices and equipment such as vessels, valves, instruments, etc. rated for pressure less than the test pressure. Reconnect equipment after testing.

2. Perform tests before piping is covered or concealed.

3. A pressure recorder shall monitor the testing of piping systems to verify test results.

C. Cycle Testing:

1. Following the completion of the leak testing procedures, the Contractor shall schedule with the Project Representative to have MSU staff conduct a cycle test on both the steam and condensate piping installed under this Contract.

a. All testing shall be scheduled through the Project Representative with a minimum of 72 hours notice.

b. The cycle test may also be performed in conjunction with the in service test as authorized by the Owner.

c. The Contractor shall be present while the cycle test is being conducted.

2. The cycle test shall consist of a single warm-up cycle and cool-down cycle where the systems are gradually brought up to normal operating pressure and temperature for a period of 8 hours.

3. Prior to beginning the test, the Contractor shall mark the position of the steam and condensate expansion joints and guides at ambient conditions.

4. The position of the expansion joints and guides shall also be marked after the system has been brought up to operating temperature and pressures.

5. Following the cool down period, and when the system has been cooled to ambient conditions, the Contractor shall visually inspect these components including pipe slide supports to ensure their return to the initially marked position. The Contractor shall note misalignment and failure of the system to return to the original position.

3.3 CLEANING AND FLUSHING

A. Piping shall be cleaned before the installation, and flushed after the installation and before system start-up.

B. Equipment, detergents, solvents and other cleaning agents shall be furnished by a qualified water treatment service.

C. Disconnect piping to be flushed. Remove instruments which may be damaged by the cleaning procedures. Such items shall be replaced with spool pieces, plugs, or blind flanges.

D. Before the piping is put in service, clean it using a pressure tank with a hose equipped with a nozzle to direct a high velocity stream of water against the inside wall of the pipe. Make a minimum of 2 passes through the pipe with the hose. A minimum pressure of 250 psi shall be developed at the nozzle.

END OF SECTION 336320