



UNIVERSITY OF MASSACHUSETTS-AMHERST

Procurement Department
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(THIS IS NOT AN ORDER)

REQUEST FOR BID # AA11-PR-4170

| To: «Name» «Address_1» «Address_2» «City», «State» «Zip» | | RFB Opening Date& Time: April 11, 2011 @ 2PM Requested by: Phil Lambert Telephone: 1 413 545 0073 Department: Physical Plant Date Prepared: 3/16/2011 | |
|---|---|---|-------------|
| Quantity | Description | Unit Price | Total Price |
| | Steam and Condensate Pre-insulated pipe | | |
| | THIS FORM must be submitted and signed. The bid shall incorporate all the terms and conditions of the attached sheets. Successful Bidder will be required to enter into a Contract for Services which a copy of is attached. | | |
| | | | |
| | | | |
| | Total Bid Price | \$ | |

PLEASE DIRECT ANY QUESTIONS REGARDING THIS RFB TO: PHYSICAL PLANT CONTRACT OFFICE @ 413-577-3405

IMPORTANT INFORMATION

- It is the bidder's responsibility to insure that their bid is received in its entirety by the University of Massachusetts, Procurement Department, 407 Goodell Building, 140 Hicks Way, Amherst, MA 01003-9334 by 2:00 PM on the bid opening date specified above. Bids received after the specified date/time or at a location other than what is listed in the RFB will be rejected and placed unopened in the bid file.

All Bidders must clearly mark on the outside of any shipping envelope or box, SEALED BID ENCLOSED #AA11-PR-4170

- All prices are FOB Destination, delivery free of all charges to: University of Massachusetts Amherst at a location specified on a purchase order.
- Bidders must list their Taxpayer's Identification Number here: _____
- Bid may not be materially altered after the bids have been opened. Only the Director of Procurement can determine what a material alteration is.
- All prices must be submitted on a Net Basis. Unit price shall prevail in case of mathematical error.
- Bids on items that differ from specifications will be rejected at the discretion of the Director of Procurement. Proprietary names are quoted for informational purposes only and are not meant to limit competition. The right is reserved to accept the bid deemed best for the University.
- Exceptions to any terms and conditions contained herein or in the bid specifications, must be noted by bidder in bid. The Director of Procurement reserves the right to reject any bid that does not conform to the specifications.
- The University reserves the right to request a 25% Performance Bond or a 10% certified check from the successful bidder if the award results in a purchase order in excess of \$20,000.

Addenda

Acknowledgement _____

Vendor Name: _____ **Telephone:** _____

Fax: _____

Name of Person Submitting Bid: _____ **Authorized**

Signature: _____

Address: _____

STEAM AND CONDENSATE PRE-INSULATED PIPING SPECIFICATION

For

LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 1 -- 100 FOOT LINE
LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 2 -- 51 FOOT LINE
LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 9 -- 51 FOOT LINE
LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 10 -- 100 FOOT LINE

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following for 302 ft, Low Pressure (LP) steam, and 302 ft, Condensate Return (CR) piping
1. Pipe, fittings and accessories.
 2. Pipe Insulation.
 3. Field Joint Closure Materials.
- B. Include price of technical support separately in the bid. This Specification Section shall apply to all Steam, Condensate, and Relief Piping which is preinsulated at the manufacturer's facility.
- C. Award will be based on the total cost of pipe for the 3 buildings. Provide the cost of each building separately, and a total cost.

1.02 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures:

LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 1.
LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 10.

1. **LP Steam and LP Steam Relief Piping: 100 FT, 4 INCH DIA.** (40 ft sections maximum length)
 - a. Design (Working) Pressure/Temperature 40 psig/360 deg F
 - b. Normal Operating Pressure/Temperature 13 psig/300 deg F
2. **Condensate Return Piping: 100 FT, 2 INCH DIA.** (40 ft sections maximum length)
 - a. Design (Working) Pressure/Temperature: 50 psig/180 deg F
 - b. Normal Operating Pressure/Temperature: 8 psig/180 deg F
3. Conduit Vent and Drain Piping:
 - a. Design (Working) Pressure/Temperature: 10 psig/210 deg F
 - b. Normal Operating Pressure/Temperature: 0 psig/180 deg F
4. Air-Vent and Vacuum-Breaker Piping: Equal to pressure of the piping system to which it is attached.
LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 2.

LINCOLN HOUSING AREA, MANHOLE 21 to BLDG 9.

2. **LP Steam and LP Steam Relief Piping: 51 FT, 4 INCH DIA.** (40 ft sections maximum length)
 - a. Design (Working) Pressure/Temperature 40 psig/360 deg F
 - b. Normal Operating Pressure/Temperature 13 psig/300 deg F

2. **Condensate Return Piping: 51 FT, 2 INCH DIA.** (40 ft sections maximum length)
 - a. Design (Working) Pressure/Temperature: 50 psig/180 deg F
 - b. Normal Operating Pressure/Temperature: 8 psig/180 deg F

3. **Conduit Vent and Drain Piping:**
 - a. Design (Working) Pressure/Temperature: 10 psig/210 deg F
 - b. Normal Operating Pressure/Temperature: 0 psig/180 deg F

5. **Air-Vent and Vacuum-Breaker Piping:** Equal to pressure of the piping system to which it is attached.

LINCOLN STEAM LINE

| | LP Steam | Condensate |
|---|-----------------|-------------------|
| Typical Cross Section Proposed: | | |
| Service Pipe Diameter (in) | 4 | 2 |
| Service Pipe Schedule | Schedule 40 | Schedule 80 |
| Service Pipe Insulation Thickness | 1.5 | 1 |
| Service Pipe Insulation Material | Foam Glass | Foam Glass |
| Outer Conduit Diameter (in) | 10.75 | 6.625 |
| Outer Conduit Insulation Thickness (in) | 1.0 | 1.0 |
| Jacket Outside Diameter (in) | 12.75 | 8.625 |
| Jacket Material | HDPE | HDPE |

| LINE REQUIREMENTS by BUILDING | |
|--|------|
| Building # 1 & # 10 to M/H 21 | |
| Steam Supply 4 inch | |
| Linear Feet | 100 |
| Prefabricated 90 degree pipe elbows | 2 ea |
| Prefabricated Anchors | 2 ea |
| Prefabricated End Seals | 2 ea |
| Condensate Return 2.0 inch | |
| Linear Feet | 100 |
| Prefabricated 90 pipe elbows | 2 ea |
| Prefabricated Anchors | 2 ea |
| Prefabricated End Seals | 2 ea |

| LINE REQUIREMENTS by BUILDING | |
|---|------|
| Building # 2 & # 9 to M/H 21 | |
| Steam Supply 4 inch | |
| Linear Feet | 51 |
| Prefabricated 90 degree pipe elbows | 2 ea |
| Prefabricated Anchors | 2 ea |
| Prefabricated End Seals | 2 ea |
| Condensate Return 2.0 inch | |
| Linear Feet | 51 |
| Prefabricated 90 pipe elbows | 2 ea |
| Prefabricated Anchors | 2 ea |
| Prefabricated End Seals | 2 ea |

1.03 ADDITIONAL GENERAL REQUIREMENTS

- A. Provide direct burial, preinsulated piping and accessories for the above location.
 - 1. Contractor shall provide direct buried, preinsulated steam and condensate piping assemblies, fittings, accessories and appurtenances to make a complete system.
 - 2. All fabricated systems shall be designed to withstand Highway AASHTOH-20 loading.
- B. Insulation will be Foam Glass.
- C. Exterior steel service pipe will be blast cleaned and zinc coated or an equivalent process to preserve the steel.
- D. The outside of the insulation will have an aluminum diffusion barrier applied prior to application of the outer jacket or an equivalent process to extend the foam life.
- E. There are no drawings provided with this specification.
- F. Contractor must visit site prior submittal.
- G. Contractor is responsible for all measurement.

1.04 CONTACTS

- A. Tom Fydenkevez
 Mechanical Utilities Manager
 Physical Plant
 University of Massachusetts Amherst
 360 Campus Center Way
 Amherst, MA 01003-9248

 Telephone: (413) 545-6451

1.05 SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe, fittings and accessories.
2. Pipe Insulation.
3. Field Joint Closure Materials.
4. Expansion Joints and Loops.
5. Warranties specified herein.

B. Shop Drawings: Detail, 1/4 inch equals 1 foot scale, pipe, multiple pipes, alignment guides, expansion joints and loops. Provide Part Drawing Layout (PDL) which details locations and fabrication of each assembly, anchors, alignment guides, and expansion joints and loops. All straight sections, fittings, anchors, end seals and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. Locations of necessary oversized casing and guides shall be indicated. Each system layout shall be computer analyzed by a State of Massachusetts Professional Engineer employed by the piping system manufacturer to determine stress on the steam pipes and condensate pipes and anticipated thermal movement of the steam and condensate pipes. The system design shall be in strict conformance with ANSI/ASME B31.1, latest edition and ASME standards listed. Corrosion allowance for all steel pipe schedules on this project (new and existing piping) shall be 0.05" for sizes 1" and smaller, and 0.063" for pipes 1¼" and larger. Connections to existing piping shall be in accordance with ANSI/ASME B31.1 "Power Piping". The computer generated analysis shall be included in this submittal and clearly identify piping, fittings and appurtenances as designated on the Part Drawing Layout (PDL). The analysis submittal shall include detailed input and output stress analysis, a stress analysis node drawing, and a report interpreting the data showing stress analysis to be in compliance with ASME B31.1 "Power Piping".

C. Storage Requirements: Supplier shall provide storage requirements in writing to ensure the storage of the preinsulated piping systems, fittings and appurtenances meet the warranty requirements specified. The written requirements shall also indicate the minimum area required for storage of said materials.

D. Substitutions: It shall be the sole responsibility of the Supplier to provide all written documentation to support a substitution which deviates from the specified items contained within this specification. Documentation shall include specific product and installation data which clearly shows an equal to or better than situation exists for the Owner. Documentation shall include previous project installations and brief descriptions of project scope that have been completed for a minimum of five years with reference information including specific contact names of Owners, their facility name, address and telephone number. Provide a minimum of three references.

E. Field Quality Control: N/A

F. Piping Assembly Manufacturer:

1. Quality Assurance Procedures Manual
2. The factory shall provide the QA manual detailing pipe handling, fabrication, insulating, testing and storage.
3. Service Pipe:
 - a. Mill Cert's (MTR's) are required.
 - b. 100% Radiographic Testing (X - Ray) of all Factory Service Pipe Welds shall be required, by a third party testing laboratory regularly engaged in X - Ray inspection.
 - c. Pipe Bending - Fittings that utilize a pipe bender shall be identified as such on the Submittal or Part Drawing Lay - Out (PDL).
4. Conduit:
 - a. 100% Air Test of all Spool Pieces, reports shall be traceable to each individual spool piece.
 - b. Conduit Insulation - Test Reports shall be submitted as detailed under the Outer Conduit Insulation section of these specifications.
 - c. FRP or HDPE Jacket - Test Reports shall be submitted as detailed under the Outer Conduit Insulation jacket section of this specification.
5. Installation Instructions:
 - a. Shall be required, detailing manufacturer's installation, warranty, maintenance and operation of the pipe system.
6. All factory documentation shall be provided during the submittal stage. All documentation shall be furnished directly to the Owner's Representative. The factory shall also provide a copy of all documentation to the Installing Contractor.

G. Operation and maintenance data.

H. Installer Certificates: Welders' certificates for welding processes and operators.

I. Design Calculations: Piping system stress analysis, to include design of expansion joints, loops, and bends.

J. Heat loss calculations.

K. Required concrete anchor sizes.

1.06 QUALITY ASSURANCE

A. ASME Compliance: Comply with ANSI/ASME B31.1, "Power Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.

- B. Reference "Common Work Results for HVAC" in Division 15 for additional Quality Assurance requirements.

1.07 WARRANTY

- A. General: Piping manufacturer shall submit a written warranty to The University, with copy to the Installing Contractor, for the piping to be executed upon installation by the Installing Contractor from the date of Substantial Completion for a period of five years to repair piping systems and replace components damaged by failure. Likewise, the Installing Contractor shall submit a written warranty to The University for the field joints to be executed upon installation from the date of Substantial Completion for a period of five years to repair field joints and replace field joints damaged by failure. These warranty requirements shall apply to the pre-purchased piping as well as to the piping provided under this contract.
- B. The warranty as specified above shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrently with other warranties made by the Manufacturer under requirements of the Contract Documents.

1.08 SUBMITTAL REVIEW PERIOD

- A. Allow up to two weeks for review of submittals by the University and the Engineer. This process may require revised submittals to be submitted within several days after initial review by the Engineer.

1.09 FIELD JOINT SEQUENCE/QUALITY ASSURANCE DOCUMENTATION

- A. All field joints shall be assembled and tested in the following sequence. Standard (traceable) Report Form documentation shall be provided as described below. Documentation format shall be submitted to Owners Representative for approval.

| Sequence | Documentation |
|--|----------------------------------|
| Service Pipe Fit and Weld | Contractor Weld Map |
| Service Pipe Weld Stamp | Contractor Weld Map |
| X - Ray of Service Pipe Welds (5%) | Contractor Weld Map/Welder Stamp |
| Remove Shipping Bars | Contractor Weld Map/X - Ray Film |
| Insulate Service Pipe | Contractor / MFG's Weld Map |
| Weld Closure Sleeve | Contractor Weld Map |
| Weld Stamp Closure Sleeve | Owners Test /MFG's Test Report |
| Hydrostatic Test of Service Pipe | Owners Test /MFG's Test Report |
| Conduit Air Test | Owners Test /MFG's Test Report |
| Conduit Air Test Sensitive Leak Test (Soap Test) | Owners Test /MFG's Test Report |
| Sensitive Leak Test (Soap Test) prior to Insulating Casing | Owners Test /MFG's Test Report |
| Insulate Casing with Polyurethane Foam | MFG's Test Report |
| Shrink Wrap Polyurethane Foam/Seal Insulation | MFG's Test Report |

- B. Record Drawings shall be the responsibility of the installing contractor. Record Drawings shall be submitted to the Owners Representative. Record Drawings shall include the weld map, shall be traceable to the weld map and shall have a numbering system for each field joint weld. The weld map and trace number shall correspond with the Preinsulated Pipe Manufacturer's pipe trace identification numbers.

C. Factory Field Technician:

1. A factory employed and certified field technician shall be required on site to provide inspection during the critical periods of installation defined as:
 - a. Unloading of the first load of material.
 - b. Inspection of the initial trench and bedding.
 - c. Field joint instruction.

- d. Cold springing of steam pipe.
- e. Pouring of anchor blocks.
- f. Initial backfill.

2. Factory Field Technician requirements:

- a. Technically qualified, factory trained piping system installation instructor with a minimum of five years of experience.
 - b. A resume shall be submitted to the Owner for approval. If the Owner does not approve, the proposed Technician, the Manufacturer shall submit an alternate for approval.
 - c. The Technician shall remain on the project until completion unless the Owner approves their departure or requests removal of the Technician.
 - d. All costs associated with the Technician shall be included in the bid.
- D. A daily field report shall be required from the factory technician detailing work observed while on site. Field reports shall be submitted to the Installing Contractor and Owners representative. Field reports shall include the condition and quality of materials used in accordance with the contract documents and manufacturer's written instructions. Field reports shall also include any discrepancies, installation concerns, unsatisfactory work performed and the Technician's recommendations for appropriate and corrective action to be taken.
- E. Upon completion of the pipe installation the contractor shall deliver to the Owners Representative, a notarized certificate from the manufacturer stating that the installation has been made in accordance with the manufacturer's recommendations and warranty requirements. Sales representatives will not be acceptable to perform pipe installation inspections.
- F. Outer Conduit:
- 1. Shall be pneumatically tested at 15 psig with a corresponding sensitive leak test (soap test) for a period of not less than 1 hour. The contractor shall repair all areas suggestive of failing the sensitive leak test. No pressure drop shall be allowed. The manufacturer's field service technician shall witness all testing. PLEASE NOTE: DO NOT exceed 15 psig test pressure and DO NOT stand in front of, in line with or near end test cap(s) when the pressure is applied. This may result in serious injury or death if the caps dislodge from the piping or the 15 psig is exceeded. A competent observer shall be present at all times during pneumatic test to assure that 15 psig is not exceeded.
- G. Field Joints:
- 1. The Installing Contractor shall develop a field joint procedure sign off sheet. The sheet shall be developed in conjunction with inputs from the factory technical representative and shall include welder's identification for the service pipe and conduit. A checklist will be developed on the sign off sheet that all procedural items conform to manufacturer's installation pamphlet. The field joint checklist shall

correspond to the Part Drawing Layout and shall be identified and traceable to a number or code on the Part drawing Layout. A final contractor "As - Built" will be submitted back to the factory for recording purposes. Any field cuts, additions or changes to the system will be noted and redrawn by the factory for submission to the owner's representative.

PART 2 PRODUCTS

2.01 AVAILABLE MANUFACTURERS

A. Products:

1. Perma Pipe/Ricwil Inc., Multi - Therm 500 System
John C. Diggert, Inc.
264 Main Street
Rockfall, CT 06481
Telephone: (860) 349-0468
Email: digertt@gmail.com

2. Rovanco Piping Systems, Inc. - Insul 800 System
Jensen Mechanical Equipment Inc.
c/o Scott R. Jensen
P.O. Box 346
New Hartford, CT 06057
Telephone: 860-738-2800

3. Tricon Piping Systems, Inc.,
Steel-Con Plus System Insulated Piping Systems, Inc.
c/o Shaun Quilty
510 Chapman St.
Canton MA 02021
Telephone: (781) 828-6340

4. Thermacor Process, L.P., Duotherm 505 (HDPE) System
RL Stone Company, Inc.
c/o Andrew Everson
30 Brocketts Pt. Road
Branford CT 06405
Telephone: (203) 687-6777
Email: andye@rl-stone.com

- B. The prefabricated preinsulated direct buried Steam and Condensate lines as shown on the contract drawings shall be insulated, with either a fiberglass reinforced polyester (FRP) or high density polyethylene (HDPE) jacketed, steel conduit. Wherever HDPE jackets are indicated on the drawings or specifications, FRP jackets shall be permitted.
- C. The pipe system shall be designed to operate at the pressures indicated for the steam and for the condensate, in separate conduits. The design is based upon model type Multitherm - 500 as manufactured by Perma Pipe/Ricwil (1-860-349-0468). The system supplier shall have fabricated systems of the composition defined herein for at least ten years.

- D. All straight sections, fittings, anchors, end seals and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. Locations of necessary oversized casing and guides shall be indicated. Each system layout shall be computer analyzed by a State of Massachusetts Professional Engineer employed by the piping system manufacturer to determine stress on the steam pipes and condensate pipes and anticipated thermal movement of the steam and condensate pipes. The system design shall be in strict conformance with ANSI/ASME B31.1, latest edition and ASME standards listed above. Corrosion allowance for all steel pipe schedules on this project (new and existing piping) shall be 0.05" for sizes 1" and smaller, and 0.063" for pipes 1¼" and larger. Connections to existing piping shall be in accordance with ANSI/ASME B31.1 "Power Piping". The computer generated analysis shall be included in this submittal and clearly identify piping, fittings and appurtenances as designated on the Part Drawing Layout (PDL). The analysis submittal shall include detailed input and output stress analysis, a stress analysis node drawing, and a report interpreting the data showing stress analysis to be in compliance with ASME B31.1 "Power Piping".
- E. The Supplier shall furnish the length of straight pipe calculated plus an additional 5 percent for each category and size of pipe. Where warranted provide 40 foot lengths to limit the number of field joints required during installation by the Installing Contractor. Smaller lengths shall be provided to facilitate installation and to suit site conditions.
- F. The Supplier shall furnish the required quantity of field joint closure materials for each system cross section type plus a minimum of 10% additional field joint closure materials. Provide no less than 2 additional field joint closure materials for each system cross section type.

2.02 SERVICE PIPE

- A. HP and LP steam piping shall be Schedule 40, ASTM A-53 or ASTM A106, Gr. B, Seamless Carbon Steel. Standard Weight schedule piping for sizes NPS 12 and larger shall not be permitted.
- B. Condensate Piping shall be Schedule 80, ASTM A-53 or ASTM A106, Gr. B, Seamless Carbon Steel.
- C. All joints shall be buttwelded for sizes 2½. inches and larger, and socket welded for 2 inches and below. Where possible, straight sections shall be supplied in 40 foot random lengths with 6 inches of piping exposed at each end or field joint fabrication. Piping assemblies containing service pipes 2½ inches and larger shall have beveled ends on the service pipe.

2.03 SERVICE PIPE FITTINGS

- A. Forged Steel, Socket Weld Fittings (NPS 2" and smaller): ANSI B16.11, ASTM A105; Class 3000, 2000 psig, WOG (minimum) class.
- B. Seamless Forged (Wrought) Steel, Butt Weld Fittings (NPS 2-1/2" to 26"): ANSI B16.9 and either ASTM A105 or ASTM A234, Grade B (WPB). Elbows shall be long radius. Use standard weight butt weld fittings, except use extra

strong weight butt weld fittings for NPS 12" and larger (LPS and HPS) and for NPS 2½" and larger CR.

- C. Service pipe elbows may be manufactured with the use of a pipe bending machine.

2.04 SUBASSEMBLIES

- A. End seals and gland seals shall be designed and factory fabricated to prevent the ingress of moisture into the system. All subassemblies shall be designed to allow for complete draining and drying of the conduit system.
- B. End Seals and Gland Seals shall be manufactured in accordance with details shown on the contract plans. End Seals or Gland Seals shall not be manufactured with modular rubber belts such as Mechanical Sleeve Seal as component parts. End Seals shall be a steel plate welded to carrier pipes and to casing, complete with drain and vent openings on vertical centerline. Gland Seals shall be a packed stuffing box and gland follower mounted on steel plate, welded to end of casing, permitting axial movement of carrier piping, with drain and vent connections on vertical centerline. Gland seals shall be compressible silicone rubber adjustable sealing type, suitable up to 4500F and shall fill the space between the carrier pipe and outer casing.
- C. End Seals and Gland Seals that penetrate walls, floors, vaults or manholes shall include a compression plate under the jacket designed to withstand link belt compression. The assembly shall be shown on the submittal documents and shall be subject to the Engineer's and Owner's approval. The Mechanical Contractor shall be responsible for sizing and providing the appropriate sleeve and mechanical sleeve seal at each penetration point. Refer to articles 2.03 and 3.01 of specification section 15053.

2.05 ANCHORS

- A. Prefabricated plate anchors shall be furnished and installed where shown on the drawings and Part Drawing Layouts (PDL) and shall consist of a ASTM A36 steel plate welded to the service pipe and conduit. The anchor shall be insulated in a manner that prevents excessive heat transfer to the polyurethane foam and jacket. Heat transfer calculations shall be provided demonstrating that the anchor to jacket interface points, do not exceed the temperature rating of the polyurethane foam and jacket. The anchor shall be factory fabricated to allow the conduit system to be drainable, dryable and air pressure testable through the anchor plate. The contractor shall follow other Specification Sections and Manufacturer's written instructions for concrete encapsulation and installation in the field. Anchor axial forces due to piping thermal expansion from within the steam tunnels and manholes will be provided to the pre-insulated piping manufacturer. As part of the stress analysis required herein, the pre-insulated piping manufacturer shall calculate the forces acting on the same anchor from the direct buried piping thermal expansion. Utilizing both these anchor forces the pre-insulated piping manufacturer shall determine the required anchor plate size and provide the required concrete anchor size as part of the submittals. Assume excavation around anchor is filled with bedding material and compacted to 95% modified proctor.

2.06 SERVICE PIPE INSULATION

- A. The insulation for the direct-buried piping should be foam glass, in accordance with ASTM C- 552 Standard Specification for Cellular Glass Thermal Insulation. The mineral; wool insulation shall be fabricated in half, curved sidewall, or insulation sections.
- B. Thermal Conductivity (k Values): 0.29 BTU-in/hr-sq.ft.-deg F at 75 deg F per ASTM C177, C518
 - 1. Service Temperature: +900 deg F.
 - 2. Moisture Absorption: Maximum 0.2 percent by volume per ASTM C240.
 - 3. Dry Density: 7.5 lbs/cu.ft. maximum per ASTM C303.
 - 4. Compressive Strength: 90 psig minimum at +/- 10% deformation per ASTM C165.
 - 5. Water Vapor Transmission: 0.00 perm-inches per ASTM E96.
- C. The bore coating shall be Hydrocal B-11 Gypsum cement, manufactured by U.S. Gypsum Corporation.
- D. The insulation shall be secured to the pipe by stainless steel bands. Banding shall be required every 12".
- E. Insulation Thickness shall be as shown in Attachment 1 of this specification:
- F. Substitutions of insulation type or thickness shall not be allowed.

2.07 OUTER CONDUIT

- A. The steel conduit casing shall be insulated. Each service pipe shall be in a separate conduit. The conduit shall be ASTM A - 139 smooth wall, spiral or ERW welded steel, of sizes 10 gauge for up to 26" diameter, 6 gauge for 28-36" diameter, and 4 gauge for 38-42" diameter.
- B. Outer Conduit diameter shall be as shown in Attachment 1 of this specification. Any exceptions taken shall be noted at time of bid.
- C. Changes in casing size, as required at oversized casing to allow for carrier pipe expansion, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage.
- D. Manufacturer shall be responsible for adapting conduit size at tie-in to existing direct buried, preinsulated steam and condensate piping, where noted on drawings. Where existing conduit is found to be leaking steam or condensate, do not connect conduits. Notify owner and engineer.
- E. Manufacturer shall be responsible for calculating lengths and locations of necessary oversized casing and guides.

2.08 EXPANSION LOOPS

- A. Supply expansion loops with the designations and sizes as shown in on civil plan and profiles Refer also to Profile Notes. Manufacturer shall verify as part of engineering function the proper pipe sizes, lengths of pipe, dimensions of expansion loops, etc. Any exceptions taken shall be noted at time of bid. Do not value -engineer any part of design without first obtaining written approval from both Engineer and the University's Project Manager.

2.09 OUTER CONDUIT INSULATION

- A. Conduit insulation shall be spray applied polyurethane foam, having a nominal 2 pound per cubic foot density for all straight lengths and fittings. The insulation thickness shall be as shown in Attachment 1 of this specification. Quality assurance procedures for the insulation shall include either a visual check prior to jacketing, infrared, or x-ray testing of the entire length, to insure there are no insulation voids. The Manufacturer shall provide documented test results of these tests. The urethane foam shall meet ASTM C591 and have the minimum characteristics of .18 K-factors, density of 2 pcf and a closed cell content of 90 to 95% with a compressive strength of 40 PSI.
- B. The polyurethane foam shall be tested by the preinsulated pipe manufacturer for mechanical and thermal properties to assure compliance with the above values. All test samples will be taken from production material, identified, tagged and tested in accordance with the table below. Test reports showing results will be furnished to the Engineer and Owner's Representative for approval. Data supplied by the polyurethane foam chemical supplier is not acceptable.

| | | |
|---------------------------------|----------------|---------------------------------|
| Attribute | D 2856 | Once Per Shift |
| Insulation Density | | Once per Shift |
| Insulation Compression Strength | C177 /C518 | Requirement |
| Insulation Closed Cell Content | n/a | > 2 lb/ft ³ |
| Insulation Thermal Conductivity | D2842 | > 40 PSIG min at 5% deformation |
| Service Temperature | E96 | Sample Frequency |
| Moisture Absorption | Once Per Shift | > 90% |
| Water Vapor Transmission | Once Per Shift | < 0.18 |
| ASTM STD | Once Per Shift | Btuin/hr/ft ² /°F |
| D 1622 | | -320 °F to +250 °F |
| D 1621 | Once Per Shift | Max 0.054% by vol. |
| | Once Per Shift | 1.26 perm-inches |
| | Once Per Shift | |

2.10 OUTER CONDUIT INSULATION JACKET

- A. All straights and fittings shall be either fiberglass reinforced polyester FRP) or high density polyethylene (HDPE) factory jacketed (exterior casing).
- B. FRP jackets shall be filament wound/chop spray up directly over the insulation. The resin content shall include a gray pigment, all straights and fittings shall be the same color. FRP jackets shall be a minimum 90 - 100 mils thick for OD less than or equal to 15", and minimum 120 mils thick for OD less than or equal to 24"
- C. HDPE jackets shall be ASTM D-1248 and minimum 150 mils thick for all pipe sizes, and the following physical properties:
 - ASTM D-3350 Resin Type III, Grade P34
 - ASTM D-638 Ultimate Elongation 850%
 - ASTM D-638 Tensile Yield Strength 3,300 psi,
 - ASTM D-790 Tangent Flexural Modulus 175,000 psi.
- D. All spool pieces shall have stenciling or labeling on the jacket that correspond to part numbers on the part drawing lay-out, identifying each piece of pipe.
- E. Quality assurance procedures at the plant shall include a mil thickness check of the jacket during each production shift, a test report showing results will be furnished to the Engineer and Owner's Representative for approval.
- F. A sample coupon shall be required to determine Flexural, Compressive and Tensile Strength of the jacket. The test sample will be taken from production material, identified, tagged and tested, a test report showing results will be furnished to the Engineer and Owner's Representative for approval.
- G. Jacket outside Diameter shall be as shown in Attachment 1 of this specification. Elbows shall be oversized as recommended by the pre-insulated piping manufacturer. Any exceptions taken shall be noted at time of bid.
- H. No alternate jacket types, including, PVC, Aluminum or Tape shall be allowed on the factory supplied preinsulated piping.

2.11 INSULATION JACKET CUT BACKS

- A. Shall be sealed at the factory using mastic or resin/chopped matt. The insulation shall be protected during shipping and while on site with plastic bags or shrink wrap.

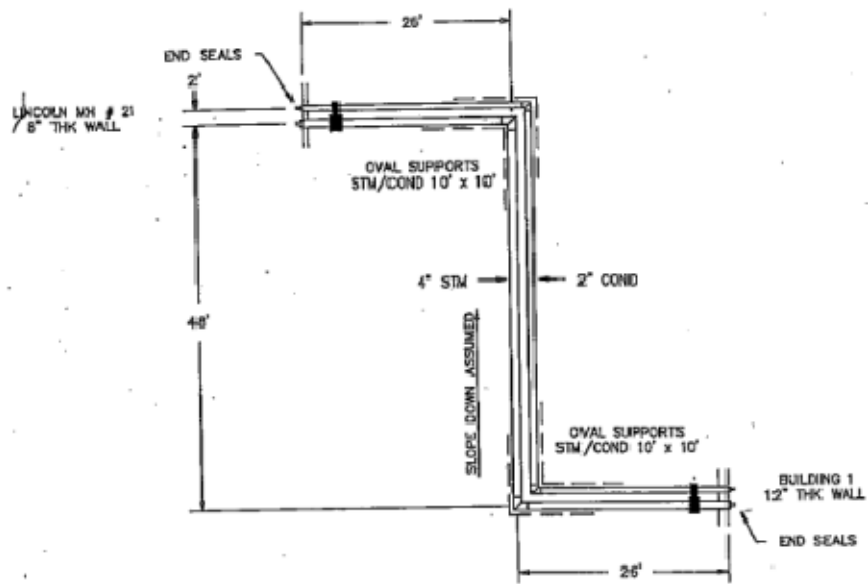
2.12 PIPE SUPPORTS

- A. All pipes within the outer casing shall be supported at not more than 10-foot intervals. These supports shall be designed to allow for continuous airflow and drainage of the conduit in place. The straight supports shall be designed to occupy not more than 10% of the annular air space. Supports shall be 18 gauge galvanized corrugated ring support, tack welded construction, and of the type where insulation thermally isolates the carrier pipe from the outer conduit. The surface of the insulation shall be protected at the support by a 18 gauge galvanized lagging sleeve not less than 12 inches long, fitted with traverse and, where required rotational arresters.

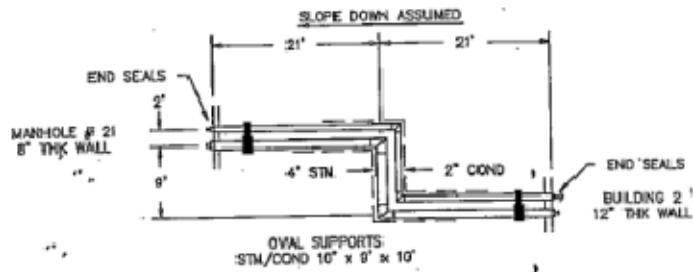
2.13 FITTINGS

- A. All fittings shall be factory prefabricated and preinsulated. All fittings shall have factory welded or bent straight legs, that are factory insulated and jacketed on each end to insure a "straight" field joint connection.
- B. Factory pipe bending of the service pipe is permissible. Fittings that utilize a pipe bender shall be documented and identified by the pipe manufacturer on the submittal and Part Drawing Layout.
- C. Fitting insulation and jackets shall be continuous and uniform and shall adhere to the Outer Conduit Insulation and Jacket requirements as detailed in these specifications. Field fabricated or insulated fittings shall not be allowed.

END OF SECTION



ALTERNATE # 2
LINCOLN MH # 21 TO BLDG 1 & MD



ALTERNATE # 3
MANHOLE # 21 TO BLDG 2 & 9

This form is jointly issued and published by the [Executive Office for Administration and Finance \(ANF\)](#), the [Office of the Comptroller \(CTR\)](#) and the [Operational Services Division \(OSD\)](#) for use by all Commonwealth Departments. **Any changes to the official printed language of this form shall be void. This shall not prohibit the addition of non-conflicting Contract terms.** By executing this Contract, the Contractor under the pains and penalties of perjury, makes all certifications required by law and certifies that it shall comply with the following requirements: that the Contractor is qualified and shall at all times remain qualified to perform this Contract; that performance shall be timely and meet or exceed industry standards, including obtaining requisite licenses, permits and resources for performance; that the Contractor and its subcontractors are not currently debarred; that the Contractor is responsible for reviewing the Standard Contract Form Instructions available at <https://www.comm-pass.com/>; that the terms of this Contract shall survive its termination for the purpose of resolving any claim, dispute or other Contract action, or for effectuating any negotiated representations and warranties; and that the Contractor agrees that all terms governing performance of this Contract and doing business in Massachusetts are attached to this Contract or incorporated by reference herein, including the following requirements: all relevant Massachusetts state and federal laws, regulations, Executive Orders, treaties, [requirements for access to Contractor records](#), the terms of the applicable [Commonwealth Terms and Conditions](#), the terms of this Standard Contract Form and Instructions including the [Contractor Certifications and Legal References](#), the Request for Response (RFR) or solicitation (if applicable), the Contractor's response to the RFR or solicitation (if applicable), and any additional negotiated provisions.



[THE CONTRACTOR MUST COMPLETE ONLY THOSE SECTIONS PRECEDED BY AN "→".]

| | |
|--|--|
| →VENDOR CODE: | MMARS DOCUMENT ID: _____ CONTRACT ID: _____ |
| →CONTRACTOR NAME: | DEPARTMENT NAME: |
| →CONTRACT MANAGER: | CONTRACT MANAGER: |
| →PHONE: →FAX: →E-MAIL ADDRESS: | PHONE: FAX: E-MAIL ADDRESS: |
| →BUSINESS MAILING ADDRESS: | BUSINESS MAILING ADDRESS: |
| THE FOLLOWING COMMONWEALTH TERMS AND CONDITIONS FOR THIS CONTRACT HAS BEEN EXECUTED AND FILED WITH CTR: <i>(Check only one)</i> <input type="checkbox"/> COMMONWEALTH TERMS AND CONDITIONS <input type="checkbox"/> COMMONWEALTH TERMS AND CONDITIONS FOR HUMAN AND SOCIAL SERVICES | |
| COMPENSATION: <i>(Check one option only)</i> <input type="checkbox"/> Maximum Obligation of this Contract: \$ _____ <input type="checkbox"/> No Maximum Obligation has been set for this Contract: (Check one) <input type="checkbox"/> Rate Contract with a Rate of: \$ _____ Per: _____ <input type="checkbox"/> Rate Contract with Multiple/Negotiated Rates: (Attach listing of multiple rates or description of negotiation process) | PAYMENT TYPE: <i>(Check one option only)</i> <input type="checkbox"/> Payment Voucher (PV) <input type="checkbox"/> Ready Payment (RP) (Schedule: _____ Initial Base Amt:\$ _____) <input type="checkbox"/> Contractor Payroll (CP) (Required for Contract Employees) <input type="checkbox"/> Recurring Payment (Required for Leases and TELPs) |
| →PAYMENT METHOD: The Contractor agrees to be paid by Electronic Funds Transfer (EFT is the Commonwealth's Preferred Payment Method): <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| BRIEF DESCRIPTION OF CONTRACT PERFORMANCE: <i>(Reference to attachments without a narrative description of performance is insufficient.)</i> | |
| PROCUREMENT OR EXCEPTION TYPE: <i>(Check one option only)</i> <input type="checkbox"/> Single Department Procurement/Single Department User Contract; <input type="checkbox"/> Single Department Procurement/Multiple Department User Contract; <input type="checkbox"/> Multiple Department Procurement/Limited Department User Contract; <input type="checkbox"/> Statewide Contract (Only for use by OSD or an OSD-designated Department); <input type="checkbox"/> Grant (as defined by 815 CMR 2.00); <input type="checkbox"/> Emergency Contract (attach justification); <input type="checkbox"/> Interim Contract (attach justification); <input type="checkbox"/> Contract Employee; <input type="checkbox"/> Collective Purchase (attach OSD approval) <input type="checkbox"/> Legislative/Legal Exemption (attach proof); <input type="checkbox"/> Other (Specify): | |
| RFR REFERENCE NUMBER: (or "N/A" if not applicable) | |
| ANTICIPATED CONTRACT EFFECTIVE START DATE: Performance shall begin on _____, which shall be no earlier than the latest date this Contract is signed by authorized signatories of the Department and Contractor and approved under Section 1 of the applicable Commonwealth Terms and Conditions. | |
| TERMINATION DATE OF THIS CONTRACT: This Contract shall terminate on _____ unless terminated or amended by mutual written agreement by the parties prior to this date under Section 4 of the applicable Commonwealth Terms and Conditions. | |
| →AUTHORIZING SIGNATURE FOR THE CONTRACTOR: →X: _____ (Signature of Contractor's Authorized Signatory) →DATE: _____ (Date must be handwritten at time of signature) →NAME: _____ →TITLE: _____ | AUTHORIZING SIGNATURE FOR THE DEPARTMENT: X: _____ (Signature of Department's Authorized Signatory) DATE: _____ (Date must be handwritten at time of signature) NAME: _____ TITLE: _____ |



COMMONWEALTH TERMS AND CONDITIONS

This Commonwealth Terms and Conditions form is jointly issued by the Executive Office for Administration and Finance (ANF), the Office of the Comptroller (CTR) and the Operational Services Division (OSD) for use by all Commonwealth of Massachusetts ("State") Departments and Contractors. **Any changes or electronic alterations by either the Department or the Contractor to the official version of this form, as jointly published by ANF, CTR and OSD, shall be void.** Upon execution of these Commonwealth Terms and Conditions by the Contractor and filing as prescribed by the Office of the Comptroller, these Commonwealth Terms and Conditions will be incorporated by reference into any Contract for Commodities and Services executed by the Contractor and any State Department, in the absence of a superseding law or regulation requiring a different Contract form. Performance shall include services rendered, obligations due, costs incurred, commodities and deliverables provided and accepted by the Department, programs provided or other commitments authorized under a Contract. A deliverable shall include any tangible product to be delivered as an element of performance under a Contract. The Commonwealth is entitled to ownership and possession of all deliverables purchased or developed with State funds. Contract shall mean the Standard Contract Form issued jointly by ANF, CTR and OSD.

1. Contract Effective Start Date. Notwithstanding verbal or other representations by the parties, or an earlier start date indicated in a Contract, the effective start date of performance under a Contract shall be the date a Contract has been executed by an authorized signatory of the Contractor, the Department, a later date specified in the Contract or the date of any approvals required by law or regulation, whichever is later.

2. Payments And Compensation. The Contractor shall only be compensated for performance delivered and accepted by the Department in accordance with the specific terms and conditions of a Contract. All Contract payments are subject to appropriation pursuant to M.G.L. C. 29, §26, or the availability of sufficient non-appropriated funds for the purposes of a Contract, and shall be subject to intercept pursuant to M.G.L. C. 7A, §3 and 815 CMR 9.00. Overpayments shall be reimbursed by the Contractor or may be offset by the Department from future payments in accordance with state finance law. Acceptance by the Contractor of any payment or partial payment, without any written objection by the Contractor, shall in each instance operate as a release and discharge of the State from all claims, liabilities or other obligations relating to the performance of a Contract.

3. Contractor Payment Mechanism. All Contractors will be paid using the Payment Voucher System unless a different payment mechanism is required. The Contractor shall timely submit invoices (Payment Vouchers - Form PV) and supporting documentation as prescribed in a Contract. The Department shall review and return rejected invoices within fifteen (15) days of receipt with a written explanation for rejection. Payments shall be made in accordance with the bill paying policy issued by the Office of the Comptroller and 815 CMR 4.00, provided that payment periods listed in a Contract of less than forty-five (45) days from the date of receipt of an invoice shall be effective only to enable a Department to take advantage of early payment incentives and shall not subject any payment made within the forty-five (45) day period to a penalty. The Contractor Payroll System, shall be used only for "Individual Contractors" who have been determined to be "Contract Employees" as a result of the Department's completion of an Internal Revenue Service SS-8 form in accordance with the Omnibus Budget Reconciliation Act (OBRA) 1990, and shall automatically process all state and federal mandated payroll, tax and retirement deductions.

4. Contract Termination Or Suspension. A Contract shall terminate on the date specified in a Contract, unless this date is properly amended in accordance with all applicable laws and regulations prior to this date, or unless terminated or suspended under this Section upon prior written notice to the Contractor. The Department may terminate a Contract without cause and without penalty, or may terminate or suspend a Contract if the Contractor breaches any material term or condition or fails to perform or fulfill any material obligation required by a Contract, or in the event of an elimination of an appropriation or availability of sufficient funds for the purposes of a Contract, or in the event of an unforeseen public emergency mandating immediate Department action. Upon immediate notification to the other party, neither the Department nor the Contractor shall be deemed to be in breach for failure or delay in performance due to Acts of God or other causes factually beyond their control and without their fault or negligence. Subcontractor failure to perform or price increases due to market fluctuations or product availability will not be deemed factually beyond the Contractor's control.

5. Written Notice. Any notice shall be deemed delivered and received when submitted in writing in person or when delivered by any other appropriate method evidencing actual receipt by the Department or the Contractor. Any written notice of termination or suspension delivered to the Contractor shall state the effective date and period of the notice, the reasons for the termination or suspension, if applicable, any alleged breach or failure to perform, a reasonable period to cure

any alleged breach or failure to perform, if applicable, and any instructions or restrictions concerning allowable activities, costs or expenditures by the Contractor during the notice period.

6. Confidentiality. The Contractor shall comply with M.G.L. C. 66A if the Contractor becomes a "holder" of "personal data". The Contractor shall also protect the physical security and restrict any access to personal or other Department data in the Contractor's possession, or used by the Contractor in the performance of a Contract, which shall include, but is not limited to the Department's public records, documents, files, software, equipment or systems.

7. Record-keeping And Retention, Inspection Of Records. The Contractor shall maintain records, books, files and other data as specified in a Contract and in such detail as shall properly substantiate claims for payment under a Contract, for a minimum retention period of seven (7) years beginning on the first day after the final payment under a Contract, or such longer period as is necessary for the resolution of any litigation, claim, negotiation, audit or other inquiry involving a Contract. The Department shall have access, as well as any parties identified under Executive Order 195, during the Contractor's regular business hours and upon reasonable prior notice, to such records, including on-site reviews and reproduction of such records at a reasonable expense.

8. Assignment. The Contractor may not assign or delegate, in whole or in part, or otherwise transfer any liability, responsibility, obligation, duty or interest under a Contract, with the exception that the Contractor shall be authorized to assign present and prospective claims for money due to the Contractor pursuant to a Contract in accordance with M.G.L. C. 106, §9-318. The Contractor must provide sufficient notice of assignment and supporting documentation to enable the Department to verify and implement the assignment. Payments to third party assignees will be processed as if such payments were being made directly to the Contractor and these payments will be subject to intercept, offset, counter claims or any other Department rights which are available to the Department or the State against the Contractor.

9. Subcontracting By Contractor. Any subcontract entered into by the Contractor for the purposes of fulfilling the obligations under a Contract must be in writing, authorized in advance by the Department and shall be consistent with and subject to the provisions of these Commonwealth Terms and Conditions and a Contract. Subcontracts will not relieve or discharge the Contractor from any duty, obligation, responsibility or liability arising under a Contract. The Department is entitled to copies of all subcontracts and shall not be bound by any provisions contained in a subcontract to which it is not a party.

10. Affirmative Action, Non-Discrimination In Hiring And Employment. The Contractor shall comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law. The Contractor commits to purchasing supplies and services from certified minority or women-owned businesses, small businesses or businesses owned by socially or economically disadvantaged persons or persons with disabilities.

11. Indemnification. Unless otherwise exempted by law, the Contractor shall indemnify and hold harmless the State, including the Department, its agents, officers and employees against any and all claims, liabilities and costs for any personal injury or property damages, patent or copyright infringement or other damages that the State may sustain which arise out of or in connection with the Contractor's performance of a Contract, including but not limited to the negligence, reckless or intentional conduct of the Contractor, its agents, officers, employees or subcontractors. The Contractor shall at no time be considered an agent or representative of the Department or the State. After prompt notification of a claim by the State, the Contractor shall have an opportunity to participate in the defense of such claim and any negotiated settlement agreement or judgment. The State shall not be liable for any costs incurred by the Contractor arising under this paragraph. Any indemnification of the Contractor shall be subject to appropriation and applicable law.

12. Waivers. Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach.

13. Risk Of Loss. The Contractor shall bear the risk of loss for any Contractor materials used for a Contract and for all deliverables, Department personal or other data which is in the possession of the Contractor or used by the Contractor in the performance of a Contract until possession, ownership and full legal title to the deliverables are transferred to and accepted by the Department.



COMMONWEALTH TERMS AND CONDITIONS

14. Forum, Choice of Law And Mediation. Any actions arising out of a Contract shall be governed by the laws of Massachusetts, and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof. The

Department, with the approval of the Attorney General's Office, and the Contractor may agree to voluntary mediation through the Massachusetts Office of Dispute Resolution (MODR) of any Contract dispute and will share the costs of such mediation. No legal or equitable rights of the parties shall be limited by this Section.

15. Contract Boilerplate Interpretation, Severability, Conflicts With Law, Integration. Any amendment or attachment to any Contract which contains conflicting language or has the affect of a deleting, replacing or modifying any printed language of these Commonwealth Terms and Conditions, as officially published by ANF, CTR and OSD, shall be interpreted as superseded by the official printed language. If any provision of a Contract is found to be superseded by state or federal law or regulation, in whole or in part, then both parties shall be relieved of all obligations under that provision only to the extent necessary to comply with the superseding law, provided however, that the remaining provisions of the Contract, or portions thereof, shall be enforced to the fullest extent

permitted by law. All amendments must be executed by the parties in accordance with Section 1. of these Commonwealth Terms and Conditions and filed with the original record copy of a Contract as prescribed by CTR. The printed language of the Standard Contract Form, as officially published by ANF, CTR and OSD, which incorporates by reference these Commonwealth Terms and Conditions, shall supersede any conflicting verbal or written agreements relating to the performance of a Contract, or attached thereto, including contract forms, purchase orders or invoices of the Contractor. The order of priority of documents to interpret a Contract shall be as follows: the printed language of the Commonwealth Terms and Conditions, the Standard Contract Form, the Department's Request for Response (RFR) solicitation document and the Contractor's Response to the RFR solicitation, excluding any language stricken by a Department as unacceptable and including any negotiated terms and conditions allowable pursuant to law or regulation.

IN WITNESS WHEREOF, The Contractor certify under the pains and penalties of perjury that it shall comply with these Commonwealth Terms and Conditions for any applicable Contract executed with the Commonwealth as certified by their authorized signatory below:

CONTRACTOR AUTHORIZED SIGNATORY: _____
(signature)

Print Name: _____

Title: _____

Date: _____

(Check One): _____ Organization _____ Individual

Full Legal Organization or Individual Name: _____

Doing Business As: Name (If Different): _____

Tax Identification Number: _____

Address: _____

Telephone: _____ FAX: _____

INSTRUCTIONS FOR FILING THE COMMONWEALTH TERMS AND CONDITIONS

A "Request for Verification of Taxation Reporting Information" form (Massachusetts Substitute W-9 Format), that contains the Contractor's correct TIN, name and legal address information, must be on file with the Office of the Comptroller. If the Contractor has not previously filed this form with the Comptroller, or if the information contained on a previously filed form has changed, please fill out a W-9 form and return it attached to the executed COMMONWEALTH TERMS AND CONDITIONS.

If the Contractor is responding to a Request for Response (RFR), the COMMONWEALTH TERMS AND CONDITIONS must be submitted with the Response to RFR or as specified in the RFR. Otherwise, Departments or Contractors must timely submit the completed and properly executed COMMONWEALTH TERMS AND CONDITIONS (and the W-9 form if applicable) to the: **Payee and Payments Unit, Office of the Comptroller, 9th Floor, One Ashburton Place, Boston, MA 02108** in order to record the filing of this form on the MMARS Vendor File. Contractors are required to execute and file this form only once.