ADDENDUM NO. 4

Date: **26 October 2011**

San Antonio Water System

Project Name: **Olmos Basin Central Watershed Sewer Relief Line (C-3), Reaches 1 to 4**

Project No.: **08-2512**

Solicitation No.: **B-11-051-CM**

This addendum, applicable to work referenced above, is an amendment to the bidding documents and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the addendum number and issue date in the space provided in submitted copies of the proposal.

A. Bidding and Contract Requirement Revisions:

Item 1: Invitation to Bidders, Page IV-1:

a) The bid opening **date** has been changed to Monday, October 31, 2011. Note that there is no change to the location that bids will be received.

DELETE first sentence of fifth paragraph that reads:

> "Sealed bids will be received by the Contract Administration Division, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212, until **2:00 p.m., October 27, 2011.**"

and REPLACE with the following:

> "Sealed bids will be received by the Contract Administration Division, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212, until **2:00 p.m., October 31, 2011.**"

Item 2: Specification Section 02504, Fiberglass Reinforced Polymer Mortar Pipe

a) DELETE Specification Section 02504, Fiberglass Reinforced Polymer Mortar Pipe (7 pages) in its entirety and REPLACE with the attached Revised Specification Section 02504, Fiberglass Reinforced Polymer Mortar Pipe (7 pages).

Item 3: SAWS Approved Product for Concrete Manhole Coatings

a) ADD the the following SAWS Approved Product for Concrete Manhole Coatings to the Contract Documents: Carboline Protective Coatings Product/System "Plasite 4500", min. 125 mils thick
Reference the following Contract Document items related to manhole coatings and update accordingly to include the above listed Carboline product as an approved Epoxy coating along with the Raven and Spray Wall products:
   - Supplemental Specification Item 910 Manhole Rehabilitation
   - SAWS Standard Specification Item 850 Sanitary Sewer Structures
   - Special Provisions to SAWS Standard Specification Item 850 Sanitary Sewer Structures
   - SAWS Standard Specification Item 852 Sanitary Sewer Manholes
   - Special Provisions to SAWS Standard Specification Item 852 Sanitary Sewer Manholes

B. Drawing Revisions:

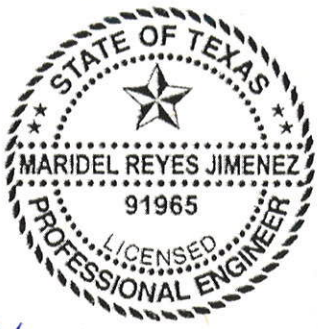
None with Addendum No. 4

This Addendum, including these **2** pages, is **9** pages with attachments in its entirety.

Attachment(s):

Specification Section 02504, Fiberglass Reinforced Polymer Mortar Pipe (7 pages)

Each bidder is requested to acknowledge receipt of this Addendum No. 4 by his/her signature affixed hereto and to file same with and attached to his/her bid.



Maridel Reyes 10-26-11

Approved by ENGINEER
WESTON SOLUTIONS, INC., TEXAS REGISTERED ENGINEERING FIRM F-3123

The undersigned acknowledges receipt of this Addendum No. 4 and the bid submitted herewith is in accordance with the information and stipulations set forth.

Date

Signature of Bidder

END OFADDENDUM

SECTION 02504

FIBERGLASS REINFORCED POLYMER MORTAR PIPE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This item governs the furnishing and installing of fiberglass-reinforced polymer-mortar (FRPM) pipe in a trench, encasement pipe, tunnel or other installation where the pipe is lifted or carried into place and where the pipe will be used to convey gravity flow. This item does not apply to pipe where installation requires jacking or other means that subject the pipe to axial loads larger than are required to couple the pipe or where the pipe would be subjected to pressurized flow.

1.02 RELATED DOCUMENTS

A. Specification Item No. 848 Sanitary Sewer

B. Specification Item SP848 Special Provisions to Sanitary Sewers

C. Specification Item No. 804 Excavation, Trenching and Backfill

D. Specification Item No. 849 Air and Deflection Testing

E. Specification Item SP849 Air and Deflection Testing

1.03 REFERENCES

A. ASTM D 3262 - Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.

B. ASTM D 2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

C. ASTM D 3681 - Standard Test Method for Chemical Resistance of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe in a Deflected Condition

D. ASTM D 4161 – Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

E. ASTM D 638 – Test Method for Tensile Properties of Plastics

1.04 SUBMITTALS

A. Submittals shall conform to requirements of Section 01300.

B. The following information shall be provided, as a minimum, for approval of the pipe:

1. Drawings of the proposed pipe, including joint and gasket, and showing dimensions.

2. Pipe manufacturer’s certification that the chemical composition of the gasket is compatible with the environment to which it will be subjected.

3. Certified copies of the most recent production test results for pipe stiffness (ASTM D 2412) of

pipe of the same type, liner, grade, class, and diameter as specified for the Project.

4. Certified copies of most recent qualifications test results for long-term chemical resistance (ASTM D 3681), joint tightness (ASTM D 4161), and beam strength (ASTM D 3262) of pipe of the same type, liner, and grade as specified for the Project. Qualification test results shall be from pipe manufactured in the same facility as will be used to produce pipe for the Project and shall be from pipe manufactured of material from the same sources as will be used to produce pipe for the Project.

C. The following information shall be provided, as a minimum, prior to delivery of pipe to the Project:

1. Manufacturer shall provide layout drawings illustrating placement of each pipe identified with a numbering system, including manhole risers if constructed of FRPM pipe and joint type.

2. Drawings of each fitting or manhole riser, identified by location on the Project

D. The following information shall be provided, as a minimum, prior to installation of the pipe:

1. Certified copies of test reports on the elastomer from which the shipment of gaskets was made.

2. Certified copies of production test results on pipe manufactured for the Project. Production tests shall be as defined by ASTM D 3262 and shall involve workmanship (inspections for visible defects), dimensions (pipe diameter, length, wall thickness, and end squareness), and pipe stiffness (as determined by ASTM D 2412).

3. Blocking diagrams specific to each pipe size, stiffness and joint lengths including blocking material, location, width and spacing. Provide associated calculations for beam stresses, maximum allowable grout pressure, expecting initial deflection, and uplift force.

PART 2 - PRODUCTS

1.05 MANUFACTURERS

A. Pre-approved manufacturers for fiberglass reinforced polymer mortar pipe, based on method of installation, are listed below:

1. HOBAS, USA, Inc. — Approved for Open Cut, Slip Line, Jacking, Boring and Tunneling
   1413 Richey Road
   Houston, TX 77073

2. FLOWTITE Pipe — Approved for Open Cut only
   18585 Samuels Road
   Zachary, LA 70791

1.06 MATERIALS

A. Resin Systems: The manufacturer shall use polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired form a composite material of similar construction and composition as the proposed product.

B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be the highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.

C. Silica Sand: Sand shall be minimum 95% silica with a maximum moisture content of 0.2%.

D. Additives: Resin additives such as curing agents, pigment dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product.

E. Pipe

1. Pipe shall conform to the requirements of ASTM D 3262 and shall be manufactured of glass-fiber-reinforced thermosetting polyester resin mortar with a non-reinforced or glass-reinforced thermoset liner and non-reinforced polyester resin/sand or a glass-reinforced polyester resin surface layer. Pipe shall have a minimum stiffness of 72 psi (496 kPa) at 5 percent deflection for direct bury and 72 psi at 5 percent deflection for installation in tunnel and/or jack and bore where there is a primary liner when tested according to ASTM D 2412. Pipe shall meet Designation Code ASTM D 3262-1-2-3- or 1-1-1.

F. Joints

1. Joints shall conform to the requirements of ASTM D 4161. Joints shall be sleeve coupling, bell and spigot coupling, or flush bell and spigot coupling and shall be compatible with the installation procedure. All joint components not manufactured with the pipe shall be produced by one manufacturer. Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D 4161. Joints at tie-ins, when needed, may utilize fiberglass, gasket-sealed closure couplings.

G. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Field taps shall be made using "inserta-Tee" as manufactured by Fowler manufacturing Company, or equal. All fittings and accessories shall be furnished by the pipe supplier and shall have bell and/or spigot configuration compatible with the pipe.

H. Gaskets

1. Gaskets shall conform to the requirements of ASTM F 477. All gaskets shall be produced by one manufacturer and be suitable for service intended.

I. Marking

1. Pipe: Each length of pipe shall be marked in at least one location using large, easily legible, permanent letters indicating the nominal pipe size, manufacturer's name, and ASTM designation code. If the Owner requires identification of each pipe length by a numbering system for tracking or installation purposes, manufacturer shall mark such numbers on the inside and outside of the pipe.

2. Gaskets: Markings shall include gasket manufacturer's name or symbol, gasket size and manufacturer's code to differentiate between high- and low-head gaskets.

J. Grout Ports: Provide grout ports in the wall of pipe when required. Provide plugs of 316 stainless steel or other corrosion-resistant material compatible with the pipe. Grout port plugs shall be designed and installed to meet the test pressure of the pipe and remain watertight over the design life of the pipe.

K. Manhole Connections: Provide a water stop flange (wall pipe) for connection to a cast-in-place manhole base or other structure.

1.07 DIMENSIONS

A. Diameters: The actual outside diameter (18" to 48") of the pipes shall be in accordance with Table 3 of ASTM D 3262. For other diameters, OD's shall be per manufacturer's literature.

B. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

C. Wall Thickness:

1. Wall Thickness for Direct Bury installation and Tunnel Carrier Installation: The minimum wall thickness shall be per manufacturer's literature.

2. Wall Thickness for Jacking Installation: The minimum wall thickness, measured at the bottom of the spigot gasket groove where the wall cross-section has been reduced, is determined from the maximum jacking load. Minimum factor of safety against jacking force is 2.5 based on straight alignment.

D. End Squareness:

1. End Squareness for Direct Bury installation and Tunnel Carrier Installation Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8".

2. End Squareness for Jacking Installation Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/16".

E. Tolerance of Fittings: The tolerance of the angle of an elbow and the angle between the main and leg of a wye or tee shall be plus or minus 2 degrees. The tolerance on the laying length of a fitting shall be plus or minus 2 inches.

1.08 STIFFNESS CLASSES

A. Stiffness class of FRPM pipe shall satisfy design requirements, but shall not be less than 72 psi, when tested in accordance with ASTM D 2412, for used in direct bury operation or 72 psi when installed within a primary tunnel liner.

B. Stiffness class of FRPM in a pipe jacking operation shall be governed either by the ring deflection limitations or by a pipe design providing longitudinal strength required by the jacking method and shall satisfy design requirements stated below. Submit design calculations as required in Paragraph 1.05, Submittals.

1. Ring deflection calculations shall conform with design requirements of 30 TAC Chapter 217 pertaining to flexible pipe used in gravity sewers. The pipe deflection calculations shall ensure that predicted deflection will be less than 5 percent under long-term loading conditions (soil prism load) for the highest density of soil overburden and surcharge loads. Deflection on calculations shall be prepared using long-term (drained) values for soil parameters contained in the geotechnical investigation report for the Project, or other site-specific data obtained by the CONTRACTOR as approved by the ENGINEER.

2. Minimum pipe stiffness when tested in accordance with ASTM D 2412 shall normally be 140 psi.

1.09 SOURCE QUALITY CONTROL

A. Production tests and qualification tests shall be performed and documented as required by ASTM D 3262.

B. For pipe larger than 36" diameter, manufacturer must provide evidence of current ISO registration.

1.010 REJECTION

1. Pipe: Pipe shall be subject to rejection whenever the following defects are, in the opinion of the Engineer, of an extent, severity or nature to detrimentally affect the strength or serviceability of the pipe: surface cracking, interlaminar separation, separation of the liner or surface layer from the structural wall, blisters, bubbles, pinholes, pits, foreign inclusions, resin-starved areas, or damage from improper handling or installation. In addition, bulges, dents, ridges and other surface irregularities on the inside of the pipe that result in variation of the inside diameter by more than 1/8 inch (3 mm) from the adjacent unaffected area may be cause for rejection.

2. Gaskets: Gaskets shall be subject to rejection whenever they show surface checking, weathering, or other deterioration, or damage from improper installation.

3. Any joints that do not pass the air test shall be removed and relayed.

4. The method of mitigation shall be the sole option of the Owner and Engineer. Repair with a structural glass lay-up will not be performed without specific written permission by Owner. A repair will be considered correction of defective work and may not be performed without compensation to the Owner.

1.011 INSPECTION

A. The ENGINEER shall be entitled to inspect pipes or witness the pipe manufacturing. Such inspection shall not relieve the manufacturer of the responsibilities to provide products that comply with the applicable standards and these Specifications.

B. Manufacturer's Notification to Customer: Should the ENGINEER wish to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the ENGINEER with adequate advance notice of when and where the production of those pipes will take place.

C. Failure to Inspect: Should the ENGINEER elect not to inspect the manufacturing, testing, or finished pipes, it in no way implies approval of products or tests.

1.012 PACKAGING, HANDLING, AND SHIPPING

A. Packing, handling, and shipping should be done in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

1.013 INSTALLATION

A. Install pipe and fittings in accordance with requirements of Item 848 – Sanitary Sewers.

B. The manufacturer must supply a suitable qualified field service representative to be present periodically during the installation of pipe.

C. Pipe Bedding: Conform to requirements of Item 804 – Excavation, Trenching and Backfill.

D. Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cable is not recommended.

E. Jointing

1. Clean ends of pipe and coupling/joint components.

2. Check pipe ends and couplings for damage. Correct any damage found.

3. Coupling grooves must be completely free of dirt.

4. Apply joint lubricant to pipe ends and the elastomeric seals. Use only lubricants approved by the pipe manufacturer.

5. Use suitable equipment and end protection to push or pull the pipes together.

6. Pipe shall be coupled using suitable equipment such as wire rope puller or come along to pull pipes together in a manner that will not damage pipe or exceed forces recommended by the manufacturer for coupling or joining or pushing pipe.

7. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer for the joint used.

F. Pipe Grouting: Annular space grouting shall not damage the liner and shall conform to the manufacturer's requirements.

G. If pressure grouting of the pipe is conducted as part of a pipe-jacked tunnel installation, seal the grout holes with liner resin to a thickness equal to the pipe liner thickness, or with a threaded plug for that purpose.

1.014 FIELD TESTS

A. Infiltration / Exfiltration Test: Maximum allowable leakage shall be per local specification requirements.

B. Low Pressure Air Test: Pipe may be tested with air pressure (max 5 psi). The system passes the test if the pressure drop due to leakage through the pipe or pipe joints is less than or equal to the specified amount over the prescribed time period.

C. Individual Joint Testing: For pipes large enough to enter, individual joints may be pressure tested with a portable tester to 5 psi (max.) with air or water in lieu of line infiltration, exfiltration or air testing. Owner's Inspector and Contractor's representative who witness the testing will be required to sign off on joint test reports each day.

D. Deflection: Maximum allowable long-term deflection is 5% of the initial diameter.

PART 4 - MEASUREMENT AND PAYMENT

1.015 MEASUREMENT AND PAYMENT

A. No payment will be made for fiberglass pipe under this Section. Include in unit price for Item 848 Sanitary Sewers and SP 848 Special Provisions to Sanitary Sewers.

B. The minimum stiffness of FRPM pipe required is shown on the Drawings. A minimum stiffness of 72 psi is required for direct bury pipe regardless of depth or concrete encasement.

C. Air and Deflection testing pipe shall not be paid separately but shall be considered subsidiary in the related unit price under Item 848 Sanitary Sewers and SP 848 Special Provisions to Sanitary Sewers..

END OF SECTION 02504