ADDENDUM NO. 2
GOODWIN DRIVE
LIFT STATION AND FORCE MAIN
DATE: April 12, 2018

The Drawings, Specifications and Bid Documents shall be amended as follows:

- The following Sections listed below shall be added to the Contract Documents:
  - Section 02532-Supplementary Technical Standards Restoration of Manholes (Manhole Restoration-Cement)
  - Section 02534-Supplementary Technical Standards Restoration of Manholes (Restoration of Manholes - Epoxy)
  - Polyethylene Storage Tank Specification
  - GDOT Section 600-Controlled Low Strength Flowable Fill

- The existing Drawings listed below shall be replaced in entirety with the attached corresponding plan sheets.
  - Sheet 14-Wet Well
Pre-Bid Meeting Questions & Responses

1. What do you do with the storage building on the site?
   The storage building on site is the property of the Apartments and shall not be moved.

2. Do you have a manufacturer or supplier for the chemical feed equipment?

3. Who provides the chemical and what is it?
   MWA will provide chemical (Bioxide)

4. Do you have a spec on the lining for the wet well? One note says bituminous lining and one says cementitious spray on pipe and fittings?
   See attached specification 02534. This specification will apply for all places that refer to bituminous in the contract documents/plans. No coating will be applied to pipe and fittings inside the wetwell.

5. Do you have a spec on the lining for the discharge manhole?
   Specification Section 02532 attached.

6. Is there any lining in the air release manholes?
   No.

7. Do you want the wet well attached to the foundation slab? If so, how?
   See Wetwell Anchor Detail on revised sheet 14 attached.

8. Do you have a Contact info for Chemical Feed System?
   Contact for Chemical Feed system is Gordon Hamilton at 800-737-2235 Poly Processing Company.

9. Flowable Fill will not work past 25lf because cement and sand start separating.
   See GDOT Specification Section 600 attached. Specification gives an option for High Air generators or foaming agents.

10. Is wet well coated? See note #5 on pg 14.
    See attached specification 02534. This specification will apply for all places that refer to bituminous in the contract documents/plans.

11. Urethane lining on interior pipe?
    No coating will be applied to pipe and fittings inside the wetwell.
12. Is all pipe HDPE?
   Yes.

13. Is the complete site that has been cleared to be grubbed of stumps, or just the actual PS site?
   The area that has been cleared shall be removed of stumps.

**Attachments:**

1. Polyethylene Storage Tank Specification
2. Polyethylene Storage Tank – 495 Gallon Upright Tank drawing
3. Specification Section 02532
4. Specification Section 02534
5. GDOT Specification Section 600
6. Revised Plan Sheets
   a. Sheet 14-Wet Well

**CONFIRMATION OF RECEIPT:**

Acknowledge receipt of this addendum by return e-mail and as required on the Bid form “Section 00300-4” of the contract documents.
Section 600—Controlled Low Strength Flowable Fill

600.1 General Description
This work consists of furnishing and placing Flowable Fill as an alternate to compacted soil as approved by the Engineer. Applications for this material include beddings, encasements, and closures for tanks and pipe, and general backfill for trenches and abutments.

600.1.01 Definitions
General Provisions 101 through 150.

600.1.02 Related References
A. Standard Specifications
   Section 500—Concrete Structures
   Section 801—Fine Aggregate
   Section 830—Portland Cement
   Section 831—Admixtures
   Section 880—Water

B. Referenced Documents
   SOP 10
   General Provisions 101 through 150.

600.1.03 Submittals
Mix designs for flowable fill, and other documentation listed in Subsection 500.1.03.

600.2 Materials
All materials shall meet the requirements of the following Specifications:

<table>
<thead>
<tr>
<th>Material</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Fine Aggregate</td>
<td>Subsection 801.2.02</td>
</tr>
<tr>
<td>Portland Cement</td>
<td>Subsection 830.2.01</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>Subsection 831.2.03</td>
</tr>
<tr>
<td>**Air-Entraining Admixtures</td>
<td>Subsection 831.2.01</td>
</tr>
<tr>
<td>Water</td>
<td>Subsection 880.2.01</td>
</tr>
</tbody>
</table>

*Note—Gradation requirement is waived.

**Note—High air generators or foaming agents may be used in lieu of conventional air entraining admixtures and may be added at the jobsite and mixed according to the manufacturer’s recommendation.

600.2.01 Delivery, Storage, and Handling
General Provisions 101 through 150.

600.3 Construction Requirements

600.3.01 Personnel
General Provisions 101 through 150.
Section 600—Controlled Low Strength Flowable Fill

600.3.02 Equipment
General Provisions 101 through 150.

600.3.03 Preparation
A. Mix Design
Flowable fill is a mixture of Portland cement, fly ash, fine aggregate, air entraining admixture, and water. Flowable fill contains a low cementious content for reduced strength development.

1. Submit mix designs for flowable fill to the Engineer for approval by the Office of Materials and Research. The following table lists mix design proportion ranges for excavatable and non-excavatable flowable fill:

<table>
<thead>
<tr>
<th></th>
<th>Excavatable</th>
<th>Non-Excavatable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Type I</td>
<td>75-100 lbs/yd³ (45-60 kg/m³)</td>
<td>75-150 lbs/yd³ (45-90 kg/m³)</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>–</td>
<td>150-600 lbs/yd³ (90-355 kg/m³)</td>
</tr>
<tr>
<td>Water</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>**Air</td>
<td>15 to 35%</td>
<td>5-15%</td>
</tr>
<tr>
<td>**28-Day Compressive Strength</td>
<td>Maximum 100 psi (690kPa)</td>
<td>Minimum 125 psi (860 kPa)</td>
</tr>
<tr>
<td>**Unit Weight (Wet)</td>
<td>90-100 lbs/ft³ (1440-1600 kg/m³)</td>
<td>100-125 lbs/ft³ (1600-2000 kg/m³)</td>
</tr>
</tbody>
</table>

*Mix designs shall produce a consistency that will result in a flowable self-leveling product at time of placement.

**The requirements for percent air, compressive strength, and unit weight are for laboratory designs only and are not intended for jobsite acceptance requirements.

600.3.04 Fabrication
Ensure flowable fill is manufactured at plants that qualify as approved sources according to the Standard Operating Procedure for Quality Assurance for Ready-Mix Concrete Plants in Georgia (SOP 10). Mix and deliver according to Subsection 500.2.01 of the Specifications or other methods approved by the Engineer. Revolution counter requirements are waived.

600.3.05 Construction
When using as backfill for pipe, where flotation or misalignment may occur, assure correct alignment of the pipe by using straps, soil anchors, or other approved means of restraint.

Protect flowable fill from freezing for 36 hours after placement.

600.3.06 Quality Acceptance
A. Jobsite Acceptance
Acceptance of flowable fill is based on documentation as outlined in Subsection 500.1.03 of the Specifications and a minimum temperature of flowable fill at the point of delivery of 50 °F (10 °C).

600.3.07 Contractor Warranty and Maintenance
General Provisions 101 through 150.

600.4 Measurement
Flowable fill will be measured for payment in cubic yards (meters) in-place and accepted when shown as a pay item in the Contract. When flowable fill is not shown as a pay item, include the cost of the work in the bid price for the appropriate item.
Section 600—Controlled Low Strength Flowable Fill

600.4.01 Limits
General Provisions 101 through 150.

600.5 Payment
When shown as a pay item in the Contract, flowable fill complete, inplace and accepted will be paid for Per cubic yard (meter)

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No. 600</th>
<th>Flowable fill</th>
<th>Per cubic yard (meter)</th>
</tr>
</thead>
</table>

600.5.01 Adjustments
General Provisions 101 through 150.
SECTION 02532

SUPPLEMENTARY TECHNICAL STANDARDS
RESTORATION OF MANHOLES

1.0  GENERAL:

1.1  DESCRIPTION: The work consists of spray applying a cementitious mix to the walls and benches of manholes in the Macon Water Authority jurisdiction, resulting in monolithic liner of a minimum one-half inch thickness. The applicator, approved and trained by the manufacturer shall furnish all labor, equipment and materials for installing Strong-Seal High Performance, Sewpercoat, or equivalent to the inside and outside of manholes. The installation shall be in accordance with the manufacturer’s recommendations and Macon Water Authority criteria.

1.2  DEFINITION: The term applicator as used herein shall describe a private contractor hired to perform designated manhole restoration with personnel trained for the specific application.

2.0  MATERIALS:

2.1  STRONG-SEAL HIGH PERFORMANCE: A propriety pre-blended mixture of acid resistant cement, chemically active aggregates, fiberglass rods, and other additives specifically selected for special properties as manufactured by StrongLite Products Corporation and designated Strong-Seal High Performance or an approved equivalent.

2.2  SEWPERCOAT: A proprietary pre-blended mixture of acid resistant ready to use mortar specifically designed to withstand corrosion related to hydrogen sulfide as well as abrasion as manufactured by LaFarge Calcium Aluminates, Inc. The material is designated as Sewpercoat or an approved equivalent.

2.3  FLEX-SEAL: A propriety corrosion resistant aromatic flexible urethane resin to be applied internally to the wall of the adjustment ring. The material is specifically known as Flex-Seal Utility Sealant as manufactured by Sealing Systems, Inc. or an approved equal.

2.4  WATER: Water mixed with these materials shall be clean and potable.

2.4  OTHER MATERIALS: No other material shall be used in conjunction with or added to the selected material.
3.0 **PROPERTIES:**

3.1 **PHYSICAL:** The density at placement shall be a minimum 95 pounds per cubic foot (pcf). The comprehensive strength, ASTM C-495 Standard, after a minimum of 28 days will be 3300 pounds per square inch (psi)

3.2 **Chemical:** The materials are formulated with a calcium cement for use in severe hydrogen sulfate environments, particularly when the product is in direct contact with acidic solutions.

4.0 **APPLICATION:**

4.1 **INTERNAL:** The adjustment ring area under the casting shall receive a thickened flexible urethane to achieve a minimum thickness of 120 mils. The mil thickness is directly related to the expansion associated within the territories climate. The liner shall be applied by spray, brush, or trowel three inches above the bottom of the frame, and shall cover the entire adjustment ring area to three inches below the bottom adjustment ring.

4.2 **EXTERNAL:** The adjustment ring area under the casting shall receive a thickened flexible urethane to achieve a minimum thickness of 120 mils. The mil thickness is directly related to the expansion associated within the territories climate. The liner shall be applied by spray, brush, or trowel two inches wide over the flange of the frame, and shall cover the entire adjustment ring areas to three inches below the bottom adjustment ring.

4.3 **PREPARATION:**

(a) Place covers over invert before prepping.

(b) All foreign materials shall be removed from the manhole walls and bench using high pressure water supply (minimum 1200 psi). Loose and protruding brick, mortar and concrete shall be removed using a mason hammer, chisel, and/or scrapers. Remove all the existing manhole steps. Fill any voids at least one hour prior to spray application of the first coat.

(c) Active leaks shall be stopped using products specifically for that purpose and according to manufacturer’s recommendations. Some leaks may require grouting to stop the inflow. Apply according to Strong Systems or equivalent manufacturer’s grouting instructions.

(d) After all preparation has been completed remove all loose material.
SUPPLEMENTARY MANHOLE RESTORATION TECHNICAL STANDARDS

(e) The ring adjustment area and the lower three inches on the casting frame and the top three inches of the cone/slab must be prepared according to the manufacturer’s instructions.
(f) All preparation methods shall be in accordance with manufacturer’s instructions.

4.4 MIXING: Any product used will be mixed according to manufacturer’s instructions.

CAUTION: DO NOT OVER MIX AND DO NOT RUN PUMP EMPTY

Re-mixing or tempering will not be permitted. Rebound materials shall not be reused.

4.5 SPRAYING: Any product used will be sprayed according to manufacturer’s instructions.

5.0 TESTING:

5.1 At least two three inch diameter by six inch tall cylinders of the cementitious material shall be taken from each day’s work with the date, location, and job recorded on each. The cylinders shall be sent to a testing lab where a twenty-eight day compression test will be made and recorded.

5.2 Manholes: Prior to testing manholes for water-tightness all lift holes shall be plugged with a non-shrink grout, all joints between pre-cast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced. Each manhole shall pass the following test.

(a) Vacuum Test: The manhole, after proper restoration as noted above, shall be vacuum tested. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to affect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the port with the valve open. A vacuum of five inches of Mercury shall be drawn in the manhole and the time measured for the vacuum to decay four inches. The manhole shall pass the test if the time is greater than 60 seconds for 48 inch diameter manholes. If the manhole fails the initial test, necessary repairs shall be made. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc., or approved equivalent.

ASTMD412  Test Method for Tensile Properties and Elongation
ASTMD903  Test Method for Adhesive Strength
ASTMC1244-93 Vacuum Test 10 inches for two minutes

6.0 MEASUREMENT AND PAYMENT

6.1 Manhole restoration will be measured on a vertical foot basis as in the bid and Section 01025 and paid at the unit price in the bid.

END OF SECTION
SECTION 02534-1

TECHNICAL REQUIREMENTS AND SPECIFICATIONS FOR LINING OF CONCRETE and BRICK STRUCTURES WITH CORROSION RESISTANT POLYMER LINER SYSTEM

PART 1 – GENERAL

Product Description: The lining system shall be a spray-applied polymer monolithic surfacing system for use in rehabilitation of sanitary sewer manholes and pump stations. The lining system shall be one of the following products:

- Tnemec Epoxy Series
- Or Pre-Approved Equal

This specification is for polymer manhole lining systems (i.e. epoxy and polyurethane type systems). The manufacturer of the lining shall furnish an affidavit attesting to the successful use of its material as a lining for concrete structures for a minimum period of 5 years in wastewater conditions recognized as corrosive or otherwise detrimental to concrete. The product must have an equivalent of 10,000 vertical feet (VF) of 48” or larger sanitary sewer manholes installation history.

Prior pre-approval is required to determine if the prospective product may be bid on this project. Without prior pre-approval within the specified time frame a product may be rejected as unacceptable. This time frame allows the Engineer ample time to determine if the proposed product is an acceptable alternative.

Interior Surfacing System

This specification covers work, materials, equipment and tools including specially developed application equipment as required for installation and testing of a field applied unique monolithic interior manhole surfacing system. The use of specialized application equipment combined with rigorous surface preparation requirements shall be used to apply the products without the use of solvents. Product application requirements and procedures described include surface preparation, mixing, application, material handling and storage, qualification of the applicator and application quality control.

SUBMITTALS

All submittals shall be submitted in accordance to the applicable portions of these specifications. Submittals must be stamped by a P.E. licensed in the State of Georgia. Qualification and Performance Responsibility of Applicator: Applicator shall provide documentation that Applicator is an approved installer and licensed by the monolithic surfacing manufacturer and specialized equipment supplier.

QUALITY ASSURANCE

The Applicator shall apply the system and be responsible for the complete performance of the system, including materials, application and quality control. The Applicator shall initiate and
enforce quality control procedures consistent with applicable ASTM standards. The Applicator shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. The Applicator shall use approved equipment adequate in size, capacity and number sufficient to accomplish the work in a timely manner.

DELIVERY, STORAGE, AND HANDLING

Materials are to be kept dry, protected from weather and stored under cover and stored between 50 deg F and 100 deg F. Materials should not be stored near flame, heat or strong oxidants. Protective coating materials are to be handled according to their material safety data sheets.

PART 2 – PRODUCTS AND APPLICATION EQUIPMENT

INTERIOR SURFACING SYSTEM

The interior surfacing system shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the manhole according to ASTM C882 testing and therefore shall be designed for hydrostatic loading.

The finished system shall provide the following minimum coverage:

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Minimum Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Manhole and Wetwells</td>
<td>250 Mils</td>
</tr>
<tr>
<td>Existing Manhole and Wetwell Rehab</td>
<td>350 Mils</td>
</tr>
</tbody>
</table>

The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in conformance with the recommendations of the monolithic surfacing system manufacturer. When cured, the system shall form a continuous, tight-fitting, hard, impermeable surface that is suitable for sewer system service and chemically resistant to any chemicals, bacteria or vapors normally found in domestic sewage. The system shall effectively seal the interior surfaces of the manhole and prevent any penetration or leakage of groundwater infiltration. The system shall be compatible with the thermal conditions of the existing sewer manhole surfaces.

PROTECTIVE COATING APPLICATION EQUIPMENT

The contractor shall use equipment designed for use in the spray or spin-cast application of the specified system approved for use by the monolithic surfacing system manufacturer.

PART 3 – EXECUTION

PRE-COAT INSPECTION

All surfaces including benches, joints, lift holes and walls shall be made smooth and suitable for application of the interior surfacing system. All benches and inverts shall be in place and complete. Active flows shall be dammed, plugged or diverted as required to ensure that the
liquid flow is maintained below the surfaces to be coated. Installation of the protective coating shall not commence until the concrete substrate has properly cured.

SURFACE PREPARATION

Applicator shall inspect all surfaces specified to receive the monolithic surfacing system prior to surface preparation. Applicator shall notify Owner of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the monolithic surfacing system. All concrete that is not sound or has been damaged by chemical exposure shall be restored to a sound concrete surface. All contaminants including: all oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. Surface preparation method(s) shall be based upon the conditions of the substrate and the requirements of the monolithic surfacing system to be applied. Surfaces to receive protective coating shall be cleaned to produce a sound concrete surface with adequate profile and porosity to provide a strong bond between the monolithic surfacing system and the substrate. The first procedure upon entering each structure will be to blast all specified surfaces by low pressure water cleaning.

APPLICATION OF FIELD APPLIED INTERIOR SURFACING SYSTEM

Application procedures shall conform to the recommendations of the interior surfacing system manufacturer, including material handling, mixing, and environmental controls during application, safety, and equipment. The equipment shall be specially designated to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order. The specified materials must be applied by an approved installer of the monolithic surfacing system. The walls and bench of the manhole shall be lined with the monolithic surfacing system to provide a thickness as previously specified based on the condition of the existing structure. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in accordance with the recommendations of the monolithic surfacing system manufacturer.

TESTING AND INSPECTION

During application, a wet film thickness gage meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application. The Engineer and Applicator shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by Applicator.

END OF SECTION
VERTICAL
HIGH DENSITY CROSS-LINKED POLYETHYLENE STORAGE TANKS

PART 1-GENERAL

1.01 Requirements

1. The CONTRACTOR shall provide a vertical, high density cross-linked polyethylene tanks and accessories per section 2.05, complete and in place, in accordance with the Contract Documents.

2. Unit Responsibility: The CONTRACTOR shall be responsible for furnishing the vertical tank(s) and its accessories for the chemical storage as noted.

1.02 REFERENCES, CODES AND STANDARDS

A. American Society of Testing Materials (ASTM).
   1. D638  Tensile Properties of Plastics
   2. D883  Standard Definitions of Terms Relating to Plastics
   4. D1505  Density of Plastics by the Density-Gradient Technique
   5. D1525  Test Method for Vicat Softening Temperature of Plastics
   6. D1693  ESCR Specification Thickness 0.125" F50-10% Igepal

B. ANSI Standards: B-16.5, Pipe Flanges and Flanged Fittings


D. ARM: Low Temperature Impact Resistance (Falling Dart Test Procedure).

E. NSF/ANSI Standard 61, AWWA – Drinking Water System Components


1.03 SUBMITTALS

A. Shop Drawings: Shop drawings shall be approved by the engineer or contractor prior to the manufacturing of the vertical tank(s). Submit the following as a single complete initial submittal. Sufficient data shall be included to show that the product conforms to Specification requirements. Provide the following additional information:

1. Vertical tank and Fitting Material
   a. Resin Manufacturer Data Sheet
   b. Fitting Material
   c. Gasket style and material
   d. Bolt material
2. Dimensioned Tank Drawings
   a. Location and orientation of openings, fittings, accessories, restraints and supports.
   b. Details of manways, flexible connections, and vents.

3. Calculations shall be stamped and signed by a registered, third party engineer in the State of installation.
   a. Wall thickness. Hoop stress shall be calculated using 600 psi @ 100 degrees F.
   b. Tank restraint system. Show seismic and wind criteria.

B. Manufacturer's warranty

C. Manufacturer's unloading procedure (see Poly Processing Company Installation Manual)

D. Manufacturer's installation instructions (see Poly Processing Company Installation Manual)

E. Supporting information of Quality Management System.

F. Electrical heat tracing and foam insulation data sheets as required.

H. Manufacturer’s Qualifications: Submit to engineer a list of 5 installations in the same service as proof of manufacturer's qualifications.

I. Factory Test Report
   1. Material, specific gravity rating at 600 psi @ 100 degrees F. design hoop stress.
   2. Wall thickness verification.
   3. Fitting placement verification.
   4. Visual inspection
   5. Impact test
   4. Gel test
   5. Hydrostatic test

1.04 QUALITY ASSURANCE

A. The CONTRACTOR shall provide a vertical tank of high density cross-linked polyethylene. Tanks furnished under this Section shall be supplied by Poly Processing Company or approved equal who has been regularly engaged in the design and manufacture of chemical storage tanks for over 10 years.

B. Tanks shall be manufactured from virgin materials.

1.05 WARRANTY
A. The warranty shall be provided upon request for the specific service application. For most chemical applications, Poly Processing Company offers a limited 5 year full replacement warranty. For Sulfuric Acid, Hydrochloric Acid, and Sodium Hypochlorite the warranty varies. See Poly Processing Company’s chemical specific positions and warranty statement.

PART 2 – PRODUCTS

2.01 GENERAL

A. Tanks shall be rotationally-molded, vertical, high density cross-linked polyethylene, one-piece seamless construction, cylindrical in cross-section and vertical with flat bottoms. Tanks shall be adequately vented as prescribed in Poly Processing Company’s Technical Bulletin, Venting-Design for ACFM (air cubic feet per minute). Where indicated, tanks shall be provided with ancillary mechanical fittings and accessories. Tanks shall be marked to identify the manufacturer, date of manufacture and serial numbers must be permanently embossed into the tank.

2.02 MANUFACTURER

A. Tanks shall be manufactured by Poly Processing Company.

2.03 POLYETHYLENE STORAGE TANKS

A. Service: Chemical storage tanks shall be suited for the following operating conditions:

B. High Density Cross-linked Polyethylene resin used in the tank manufacture shall be Poly CL™ or equal and shall contain ultraviolet stabilizer as recommended by resin manufacturer. Where black tanks are indicated, the resin shall have a carbon black compounded into it. The tank material shall be rotationally molded and be a resin that is commercially available at the time of tank manufacture.

C. For sodium hypochlorite and sulfuric acid storage, resin shall include additional medium density polyethylene (OR-1000) with four times the antioxidant properties of a standard polyethylene bonded to the interior surface during the manufacturing process. Resin to be certified NSF/ANSI 61 for chemical storage.

D. Wall thickness for a given hoop stress is to be calculated in accordance with ASTM D 1998. Tanks shall be designed using a hoop stress no greater than 600 psi. In NO case shall the tank thickness be less than design requirements per ASTM D 1998.

1. The wall thickness of any cylindrical portion at any fluid level shall be determined by the following equation:

T = P x OD/2SD or 0.433 x SG x H x OD/2SD

Where: T = wall thickness, in
P = pressure, psi
SG = specific gravity, gm/cc
H = fluid head, ft
OD = outside diameter, ft
SD = hydrostatic design stress, 600 psi
a. The minimum wall thickness shall be sufficient to support its own weight in an upright position without external support but shall not be less than 0.187” thick.

2. On closed top tanks the top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall be equal to the thickness of the top of the straight sidewall. In most cases, flat areas shall be provided for attachment of large fittings on the dome of the tank.

3. The bottom head shall be integrally molded with the cylindrical wall. Knuckle radius shall be:

<table>
<thead>
<tr>
<th>Tank Diameter, ft</th>
<th>Min Knuckle Radius, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than or equal to 6</td>
<td>1</td>
</tr>
<tr>
<td>greater than 6</td>
<td>1-1/2</td>
</tr>
</tbody>
</table>

4. Tanks with 3000 gal capacity or larger shall have at least 3 lifting lugs. Lugs shall be designed for lifting the tank when empty.

a. Unless otherwise indicated by Contract drawings, for indoor pneumatic fill, manways shall be 24-in diameter or greater and equipped with an emergency pressure relief device or SAFE-Surge™ Manway with pressure relief at 6” water column to prevent over-pressurization. The SAFE-Surge manway shall be chemically compatible with the chemical being stored. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.

b. Unless otherwise indicated by Contract drawings, for outdoor pneumatic fill, manways shall be 24-in diameter or greater and equipped with Poly Processing Company’s F.S.2650® combined manway and vent to prevent over pressurization of tank. Manway must be capable of relieving a volume flow rate of up to 2650 ACFM. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.

c. Unless otherwise indicated, tanks less than 2000 gallons in non-pneumatic applications shall have a manway cover 17-in or smaller of Polyethylene material with a coarse thread. Gaskets shall be closed cell, cross-linked polyethylene foam, viton or EPDM materials.

NOTE: Tanks must be vented to allow for performance at atmospheric pressure, in accordance with the following matrix:

<table>
<thead>
<tr>
<th>Venting Requirements For Polyethylene Tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Pump Fill</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>IF ≤ 1000 gallons</td>
</tr>
<tr>
<td>Vent size should equal size of largest fill or discharge fitting</td>
</tr>
<tr>
<td>IF &gt; 1000 gallons</td>
</tr>
<tr>
<td>Vent size should exceed the largest fill or discharge fitting by 1 inch</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

(2) 2 inch vents DO NOT EQUAL 4 inch venting capacity
For detailed venting guidelines, please visit our Technical Resources at www.polyprocessing.com

E. Tank colors shall be natural (unpigmented), black (compounded), or as specified by the ENGINEER with written agreement by the tank manufacturer.
2.04  TANK ACCESSORIES

2.05  TANKS:

A. Tank Schedule per the following specifications

<table>
<thead>
<tr>
<th>Tank Type</th>
<th>Quantity</th>
<th>Diameter</th>
<th>Height</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Tank</td>
<td>1</td>
<td>5'-4&quot;</td>
<td>4'-0&quot;</td>
<td>17&quot;</td>
</tr>
</tbody>
</table>

DIA: 5'-4"  HT: 4'-0"  TOP: 17"

Note 1: Approximate overall height is measured along the straight cylindrical portion of the tank and includes the dome top.

B. Fittings

Tank 1 Fittings:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill</td>
<td>1&quot; PVC bulkhead fitting w/epdm gasket</td>
</tr>
<tr>
<td>Level</td>
<td>2&quot; PVC Dome fitting w/titanium bolts &amp; epdm gasket</td>
</tr>
<tr>
<td>Spare</td>
<td>1&quot; PVC bulkhead w/epdm gasket</td>
</tr>
<tr>
<td>Pump Suction</td>
<td>2&quot; B.O.S.S. Fitting w/titanium studs &amp; epdm gasket</td>
</tr>
<tr>
<td>Overflow</td>
<td>2&quot; PVC bulkhead fitting w/epdm gasket</td>
</tr>
<tr>
<td>Vent</td>
<td>3&quot; PVC bulkhead fitting w/epdm gasket</td>
</tr>
<tr>
<td>Lid/Manway</td>
<td>Cap 17&quot; Buttress Thread Blk Pe</td>
</tr>
</tbody>
</table>

1. Tank fittings shall be according to the fitting schedule in 2.05B above. Threaded fittings shall use American Standard Pipe Threads. If tanks are insulated, fittings shall be installed at the factory prior to application of the insulation.

2. Bolted flange fittings shall be constructed of one 150 lb. flange with ANSI bolt pattern, one flange gasket and stud bolts with gaskets. Stud bolts to have chemical resistant polyethylene injection molded heads and gaskets to provide a sealing surface between the bolt head and the interior tank wall. Stud bolt heads are to be color coded for visual ease of identifying the bolt material by onsite operators. Green- 316 Stainless Steel, Black-Titanium, Red- Alloy C-276, Blue- Monel. All materials shall be compatible with chemical service and as indicated in the fitting schedule above. For NSF/ANSI 61 certification, EPDM or Viton GF gaskets shall be supplied.

3. For sodium hypochlorite and sulfuric acid storage, Bolted One-Piece Sure Seal (B.O.S.S.), double flange fittings constructed of virgin polyethylene shall be supplied. Bolts will be welded to a common backing ring and encapsulated with polyethylene preventing fluid contact with the metal material. Flange will have one full face gasket to provide a sealing surface against inside tank wall. All materials shall be compatible with chemical service and as indicated in the fitting schedule above. For NSF/ANSI 61 certification, EPDM or Viton GF gaskets shall be supplied.

4. Down Pipes and Fill Pipes: Down pipes and fill pipes shall be supported at 6-ft max intervals. Down pipes and fill pipes shall be PVC or material compatible with the chemical stored.

5. U-Vents: Each tank must be vented for the material and flow and withdrawal rates expected. Vents should comply with OSHA 1910.106(F)(iii)(2)(IV)(9). U-vents shall sized by the tank manufacturer and be furnished complete with insect screen if required (Insect screen lessens the vent capacity by 1/3) in accordance with the venting schedule listed above.
6. All fittings on the 1/3 lower sidewall of tanks with capacities ≥ 1000 gallons shall have 100% virgin PTFE Flexijoint® expansion joint. Expansion joint to have a minimum of 3 convolutions, stainless steel limit cables and FRP composite flanges. Galvanized parts will not be accepted.

Expansion joint to meet the following minimum performance requirements:

Axial Compression ≥ 0.67"
Axial Extension ≥ 0.67"
Lateral Deflection ≥ 0.51"
Angular Deflection ≥ 14°
Torsional Rotation ≥ 4°

2.07 FACTORY TESTING

A. Material Testing

1. Perform gel and low temperature impact tests in accordance with ASTM D 1998 on condition samples cut from each polyethylene chemical storage tank.

2. Degree of Crosslinking. Use Method C of ASTM D 1998- Section 11.4 to determine the o- xylene insoluble fraction of cross-linked polyethylene gel test. Samples shall test at no less than 60 percent.

B. Tank Testing

1. Dimensions: Take exterior dimensions with the tank empty, in the vertical position. Outside diameter tolerance, including out-of-roundness, shall be per ASTM D 1998. Fitting placement tolerance shall be +/− 1/2-in vertical and +/− 1 degree radial.


3. Hydrostatic test: Following fabrication, the bottom tanks, including inlet and outlet fittings, shall be hydraulically tested with water by filling to the top sidewall for a minimum of 1 hour and inspected for leaks. Following successful testing, the tank shall be emptied and cleaned prior to shipment.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

A. The tank shall be shipped upright or lying down on their sides with blocks and slings to keep them from moving. AVOID sharp objects on trailers.
B. All fittings shall be installed and, if necessary, removed for shipping and shipped separately unless otherwise noted by the contractor.

C. Upon arrival at the destination, inspect the tank(s) and accessories for damage in transit. If damage has occurred, Poly Processing Company shall be notified immediately.

3.02 INSTALLATION
   A. Install the tanks in strict accordance with Poly Processing Company’s Tank Installation Manual and shop drawings.

   B. Installation will be inspected by manufacturer to verify system flexible connections, venting and fittings are properly installed. In addition to on-site inspection tank system(s) to be reviewed using tank manual check list as supplied by manufacture as listed below.

   C. Manufacturer to provide 1 hour training session to prepare operators to service and maintain the tank system. Included in training session will be (#) training manuals.

   D. Manufacturer’s trained technician to do an onsite inspection of installation. Inspection will verify chemical application, plumbing connections, venting, and applicable ancillary equipment such as ladders, restraints, etc. A verification of proper installation certificate will be supplied when equipment passes installation checklist.

   E. Tank manuals will consist of installation check lists, tank drawing(s) as built, fitting drawings referencing nozzle schedule on tank drawing, materials of construction, and recommended maintenance program.

3.03 FIELD TESTING
   A. Poly Processing Company recommends that all tanks be hydro-tested for 24 hours prior to commissioning.

End of Section
LOWER SIDEWALL CONNECTIONS ALL MUST USE FLEXIBLE FITTINGS

NOTE:

1. THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.
2. DIMENSIONS WILL VARY ±3% DUE TO VARIATIONS IN MULTIPLE MOLDS & CONDITIONS PREVALENT DURING MANUFACTURE & USAGE.
3. 4 1/2" WIDE MOLDED IN GALLONAGE MARKERS & APPROX. 10" IN 100 GAL. INCREMENTS UP TO 300 GAL. AVOID WHEN PLACING FITTINGS.

STANDARD COVER:
17" CAP/BUTTRESS THRD
BLACK PE
STOCK NO 4550

DTL "A"—STIFFENER BAND
SCALE: 1 1/2"=1'-0"

495 GALLON UPRIGHT TANK

REV "C" ADDED FITTING NOTE BY MBW 2/11/03 CKJB
REV "B" REVIS D BY MBW 2/11/03 CKJB
REV "A" ADDED DIMENSION BY JB 10/7/02 CKMBW