

# **Specification for New Leachate Tank installation Cell three SWP 577**

**Franklin County Landfill 9340 Virgil H Goode Hwy  
Rocky Mount, VA 24151**

## **PART 1 - GENERAL**

### **1.01 SCOPE OF WORK**

- A. Scope of work is to dismantle and replace the existing interior leachate tank with a glass-fused-to-steel coated, bolted-steel water storage tank to contain landfill leachate while leaving the outer containment tank in place. The proposal will be for materials and labor to accomplish this project. The County will lift out and haul away the dismantled tank for scrap. The tank shall be a glass-fused-to-steel coated, bolted-steel water storage tank, including foundation, tank structure, and tank appurtenances as shown on the contract drawings and described herein.
- B. All required labor, materials and equipment shall be included. All Permits shall be the responsibility of the Owner.

### **1.02 QUALIFICATIONS OF TANK SUPPLIER**

- A. The Engineers selection of factory-applied glass-fused-to-steel bolted tank construction for this facility has been predicated upon specific criteria, construction methods, and an optimum coating for resistance to internal and external tank corrosion. Deviations from the specified design, construction or coating details will not be permitted.
- B. The tank manufacturer shall submit with its proposal a drawing showing major dimensions and plate thickness upon which the bid is based, and a site-specific foundation design based on the soils report showing preliminary dimensions and approximate quantities of concrete and reinforcing steel. A Licensed Professional in Virginia shall electronically stamp the tank and foundation drawings. This information will be required at the time of bid opening as part of the sealed bid process.
- C. The Contractor shall provide a new tank structure as supplied from a manufacturer specializing in the design, fabrication, and erection of factory-applied glass-fused-to-steel, bolted tanks. The manufacturer shall employ a staff of full-time design engineers, own and operate its steel fabrication facilities and glass coat the tank all at one plant location.
- D. The tank requested is a Permastore Tank (Glass Coated Bolted Steel storage tank) or comparable alternative glass-fused-to-steel tank products, as other manufacturers will provide, will be considered for prior approval by the Owner or Engineer. Alternate glass-fused-to- steel Manufacturers shall provide specification to indicate the product would fill the needs of this project. The Owner's decision of judgement on these matters will be final, conclusive and binding.

- E. The tank manufacturers' glass coating product shall be independently audited on an annual basis to confirm compliance to ISO28765:2011
- F. The Engineer reserves the right to evaluate all bids based on long term, 50 year minimum operations, coatings and maintenance costs. Values to be used in this evaluation will be at the discretion of the Engineer, as detailed in this specification and bid tabulation form. The Engineer will add such costs, dependent upon the type of tank offered, to the bidder's price to determine the effective low bid for purposed of making an award.

### 1.03 QUALIFICATIONS OF TANK CONSTRUCTOR

- A. The Tank Constructor shall have a comprehensive written safety and health program. All employees shall understand basic elements of this program prior to assignment to the project. The tank constructor safety plan shall address the following elements, but not limited to: Safety Policy, Disciplinary Program, Training Policy, Project Site Employee Orientation Program, Emergency Action Plan, Written 100% Fall Protection Plan and Personal Protective Equipment.
  - a. The Tank Constructor is required to submit their site-specific safety plan (SSSP) prior to the preconstruction meeting. In addition, their safety and health plan is to be reviewed by the Engineers and/or Owners Safety Committee to assure that they meet the requirements of the site and risk control expectations.
- B. The Tank Constructor shall meet the Safety Performance Eligibility Requirements:
  - a. Experience Modification Rate - Maximum Allowed Average: 1.0
  - b. TRC - Total Recordable Injury (from Company OSHA 300 Log): Maximum allowed Average 5-8
  - c. DART Case Rate - Days Away from Work Restriction or Job Transfer (from Company OSHA 300 Log) - Maximum Allowable Average: 2-3
- C. The Tank Constructor shall be experienced in the construction of the specified tank and shall be certified by the manufacturer as an authorized builder. The Tank Constructor shall have built at least five tanks of similar type that are equal or greater in size than the specified tank.
- D. Tank Erection crews shall comply with the tank manufacturers requirements for building practices and equipment used on the job. The crew personnel shall be authorized by the tank manufacturer as an approved tank installer.

### 1.04 SUBMITTAL DRAWINGS AND SPECIFICATIONS

- A. Construction shall be governed by the Engineers drawings and specifications showing general dimensions and construction details after written approval by the Engineer of

Detailed erection drawings prepared by the Tank Constructor. There shall be no deviation from the drawings and specifications except upon written approval from the Engineer.

- B. The Tank Constructor is required to furnish, for the approval of the Engineer and at no added cost, five sets of structural calculations and plans for the tank structure and site-specific foundation. All such submissions shall be stamped by a Professional Engineer licensed in the state of **Virginia**.
- C. When approved, two sets of such prints and submittal information will be returned to the tank builder marked "APPROVED FOR CONSTRUCTION," and these drawings will then govern the work detailed thereon. The approval by the Engineer of the tank supplier's drawings shall be an approval relating only to their general conformity with the bid drawings and specifications and shall not guarantee detail dimensions and quantities, which remains the contractor's responsibility.
- D. The tank manufacturer's warranty as required by Section 9.0 herein shall be included with submittal information.
- E. The Contractor shall provide a standard Operation and Maintenance Manual after receipt of approved drawings.

## **PART 2 - PRODUCT CRITERIA**

### **2.01 TANK SIZE**

The factory-coated, glass-fused-to-steel, bolted tank shall have a nominal diameter of \_\_\_ feet, with a nominal side water height of \_\_\_33 feet or height designated in relevant RFP. The exterior tank color shall be either.

Cobalt Blue or Forest Green, or any other standard color as chosen by the Owner. Tank's interior sheet color shall be White.

### **2.02 TANK CAPACITY**

- A. Tank capacity shall be a minimum of 180,000(nominal)\_usable U.S. gallons.
- B. Finished floor elevation shall be set at the site elevation of the existing tank.
- C. Tank Design Standards
  - 1. The materials, design, fabrication, and erection of the bolt-together tank shall conform to the AWWA Standard for "Factory-Coated Bolted Steel Tanks for Water Storage" - ANSI/AWWA D 103, latest revision.
  - 2. The tank coating system shall conform solely to Section 12.4 of ANSI/AWWA D103, latest revision, and Section 10 ISO 28765:2011, latest revision.
  - 3. All materials furnished by the tank manufacturer which are in contact with the stored water ,shall be certified and listed by the National Sanitation Foundations (NSF) to meet

NSF/ANSI Additives Standard 61.

D. Design Criteria

1. The tank shall be designed in accordance with AWWA D103, latest revision requirements, and all other pertinent Local, State, and Federal standards. The project engineer shall be responsible for all site-specific seismic criteria and design loads. The tank shall also be designed in accordance with the recommendations of the Geotechnical Report contained in the Contract documents.
2. The Vertical bolt seam on the tank shell shall utilize a straight seam joint, incorporating a four-comer mitered joint designed for liquid storage. The joint design must meet or exceed the design requirements set out in this specification and conform to the relevant design standards.

2.03 MATERIALS SPECIFICATIONS

A. Plates and Sheets

1. Plates and sheets used in the construction of the tank shell and tank roof (if required) shall comply with the minimum standards of AWWA D103, latest edition.
2. Design requirements for mild-strength steel shall conform to ASTM A101 SS Grade 33.
3. Design requirements for high-strength steel shall conform to ASTM A1011 Grade 55 Class 1 or ASTM A1011 Grade 60 class 1.

4. The annealing effect created from the glass-coated firing process shall be considered in determining ultimate steel strength. In no event shall yield strength greater than 50,000 psi be utilized for calculations as detailed in AWWA D103, Sections 5.4 and 5.5.
5. The annealing effect created from the glass-coated firing process shall be considered in determining steel's ultimate and yield strengths.

B. Rolled Structural Shapes

1. Material shall conform to the minimum requirements of ASTM A36.

C. Horizontal Wind Stiffeners (If required for structural purposes)

1. Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" design with extended tail to create multiple layers of stiffener, permitting wind loads to distribute around the tank.
2. Web truss stiffeners shall be of steel with hot dipped galvanized coating.
3. Rolled steel angle stiffeners are not permitted for intermediate stiffeners.

D. Bolt Fasteners

1. Bolts used in tank lap joints shall be ½" - 13 UNC-2A rolled thread, conforming to ASTM A325 and A490.
2. ASTM A325 Compliant Bolts:
  - a. Minimum Tensile Strength- 120,000 psi
  - b. Minimum Proof Load- 85,000 psi
  - c. Minimum Allowable Shear Stress with threads excluded from the shear plane - 30,000 psi
3. ASTM A490 Compliant Bolts:
  - a. Minimum Tensile Strength - 150,000 psi
  - b. Minimum Proof Load- 120,000 psi
  - c. Minimum Allowable Shear Stress with threads excluded from the shear plane -37,500 psi
4. Bolt Finish - Hot dipped galvanized per AWWA D103-09, Sections 4.2, 12.3 and A4.2.
5. Bolt Head Encapsulation shall consist of high impact polypropylene copolymer encapsulation of entire bolt head up to the splines on the shank. Resin shall be stabilized with an ultraviolet light resistant material. The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.
6. All bolts on the vertical tank wall shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.

7. All lap joint bolts shall be properly selected such that threaded portions will not be exposed to the "shear plane" between tank sheets.
8. Bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted. The bolt heads will be color coded to aid the correct bolt length identification during construction and minimize risk of utilizing the incorrect bolt length and not compromising the structural integrity of the build.
9. All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.

#### E. Sealants

1. The lap joint sealant shall be a one component, moisture cured, polyurethane compound (**Sika TS Plus**). The sealant shall be suitable for contact with potable water and shall be certified to meet the NSF/ANSI Standard 61 for indirect additives.
2. The sealant shall be used to seal lap joints, sheet edges and bolt connections for sheet notches and starter sheets. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, low shrinkage, and be suitable for interior and exterior use.
3. Sealant curing rate shall depend on temperature and humidity conditions in line with the manufacturer's guidelines. The sealant shall cure to a rubber-like consistency and have excellent adhesion to the glass coating, have low shrinkage, and be suitable for interior and exterior use.
4. Neoprene gaskets and tape-type sealer shall not be used.

### 2.04 GLASS COATING SPECIFICATION

#### A. Surface Preparation

1. Sheets shall be steel grit-blasted to a silver-grey finish on both sides to remove mill scale and surface oxidation.
2. Grit blasting shall be performed to the equivalent of SSPC SP10/NACE No 2, as required by AWWA D103-09.
3. The surface anchor pattern shall be in the range of 1.0 mil to 4.0 mils, with a target value of 2.4 mils.

#### B. Cleaning

- I. After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.
2. Inspection of the sheets shall be made for traces of foreign matter or rust; any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality.

#### C. Fabrication

- I. The sheets shall be fabricated prior to coating, trimming to the proper length and width, and putting all bolt seam holes and manways in place.
2. The sheets shall be rolled to the finished tank diameter prior to coating. Field bending of the sheets to the tank diameter will not be permitted.

#### D. Coating

- I. All sheets shall receive a pre-coat to both sides. The pre-coat application weight is controlled and measured and sheets that do not meet the required specification in accordance with the Manufacturer's specified parameters shall be rejected at this point.
2. All pre-coated sheets shall be heat dried to ensure a moisture-free surface before the glass coating layer is applied.
3. A coat of cobalt-rich glass slip shall be continuously applied to both sides of the sheet, followed by heat drying.
4. The coated sheets shall be visually inspected, and sheets with spray or glass defects shall be rejected at this point.
5. The thickness of the coating system shall be measured using an electronic instrument; the instrument shall have a valid calibration record. Interior and exterior dry film coating thicknesses are controlled and measured and sheets that do not meet the required specification, in accordance with the Manufacturer's specified parameters, shall be rejected at this point.
6. After inspection the sheets shall be fired through the furnace at approximately 1500°F in accordance with the Manufacturer's procedures.
7. A second coat of cobalt rich glass slip shall be continuously applied to both sides of the sheets. The internal glass is a dedicated high performance material and delivers exceptional resistance to chemical corrosion.
8. Stages D.4 to D.6 are repeated.

9. The firing processes shall form a composite glass surface having general acid/alkali resistance to solutions in the range pH 2 to pH 11 subject to temperature and chemical composition.
10. Tank internal sheet color shall be white or similar equivalent. An additional range of optional or special external colors are available by agreement with the Manufacturer.
11. Sample tests shall be carried out in accordance with ISO 28765 section 10 by the Manufacturer to ensure that enamel materials meet the physical properties and chemical resistance characteristics specified as published in the Manufacturer's product Quality Standard. The Manufacturer shall provide published product Quality Standards detailing the International Standards used for testing.
12. The tank manufacturers glass coating product shall be independently audited on an annual basis to confirm compliance to ISO28765:2011
13. The sheet edges shall receive an electrostatically applied pre-coat to achieve a durable glass coating. A further factory applied coating of a quick drying, single component stabilizing finish, reinforced with flat self-leaving glass flake, is applied to the sheet edges after firing and before packing. This material provides additional protection to the edges during transit, site storage and installation.

Correct joint design methodology shall be used to uniformly distribute the load over a sufficient surface area to maximize bond strength. Full sealant over pointing from the sheet edge and extending onto the next ring of sheets shall be used to ensure the tank fluid pressure maintains a low stress sealant joint and protects the sheet edges from liquid and mechanical hazards.

Full protection and sealing of the sheet edges and tank overlap shall be achieved by the application of polyurethane sealant specifically designed for use with glass-fused-to-steel tanks. (Refer to Section 3.0 paragraph E)

#### E. Factory Inspection

1. Inspection procedures shall be carried out within the Manufacturer's plant under ISO 9001:2000 Quality Management System.
2. A color comparator shall be used to measure the color of the external sheet surfaces. Electronic color control shall be used to ensure that allowable color uniformity is achieved within the Manufacturer's specified parameters. Sheets of a color outside of these limits shall be rejected.
3. The instrument used shall have a valid calibration record and shall be regularly checked against the Manufacturer's approved calibration standard.

- I. All sheets that pass Factory Inspection and Quality Control checks shall be protected from damage prior to packing for shipment.
2. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
3. Individual stacks of panels shall be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels to eliminate contact or movement of finished panels during shipment.
4. Shipment from the factory shall be by ship, truck, hauling the tank components exclusively.

#### F. Pipe Connections

- I. Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. Tank shell reinforcing shall comply with **AWWA D103** latest edition. The tank Manufacturer's recommended sealant shall be applied on any cut panel edges or bolt connections.
2. All pipe connection sizing and orientation shall be as shown on the plans.

#### G. Outside Tank Ladder

- I. An outside tank ladder shall be furnished and installed as shown on the contract drawings.
2. Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs.
3. A lockable ladder gate shall be provided to prevent access to the bottom 8 feet of ladder.

#### H. External Platform

- I. Provide a 3' x 3' galvanized steel platform at tank eave elevation for geodesic domes.
2. Provide a 3' x 3' galvanized steel platform 43" below eave elevation for tapered beam roofs.

#### I. Access Doors

- I. One bottom access door shall be provided as shown on the contract drawings in accordance with AWWA DI 03.
2. The manhole opening shall be a minimum of 30" in diameter; the access door (shell manhole) and the tank shell reinforcing shall comply with AWWA DI 03 latest edition, Sec.7.1. The access doors shall be of galvanized steel.

#### J. Identification Plate

A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5) feet from grade elevation in a position of unobstructed view.

### **PART 3- EXECUTION**

### 3.01 ERECTION

#### A. Foundation

1. The replacement tank will be installed within the existing containment and on the foundation.

#### B. Tank Floor

1. The floor design is of reinforced concrete with an embedded glass coated steel starter sheet as specified by the Engineer and in accordance with AWWA D103 latest edition.
2. Leveling and circularity of the first ring of sheets shall be required. The maximum level differential within the ring shall not exceed .125" in any 30' circumference.
3. A leveling plate assembly, consisting of two anchor rods and a slotted plate or foundation angle on shim packs for the rebate type base, shall be used to secure the starter ring prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted.
4. The tank shall incorporate a polyurethane elastic sealant for the tank wall to the floor area. A polyurethane adhesive/sealant will be used on the inside surface of the starter sheet, below the concrete floor level.

#### C. Sidewall Structure

1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the Manufacturer's erection manual using factory trained and certified erectors.
2. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.
3. Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to a liquid test, all surface areas shall be visually inspected.
4. An electrical leak test shall be performed during erection using a wet sponge, nine (9) volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturers published touch up procedure.

5. No backfill shall be placed against the tank sidewall without prior written approval of the Engineer and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank Manufacturer.

### 3.02 FIELD TESTING

#### A. Hydrostatic

1. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling the tank to its overflow elevation and observing the water level drop for a period of 24 hours. The tank surface shall be observed as well for any signs of leakage.
2. Any visible leaks disclosed by this test shall be corrected by the Authorized Distributor in accordance with the Manufacturer's recommendations.
3. Water required for testing shall be furnished by the OWNER at the time of tank erection completion and at no charge. Disposal of test water shall be the responsibility of the OWNER. Water required for re-testing will be furnished by the OWNER but will be paid for by the Prime Contractor.

#### B. Disinfection( not necessary for this project)

1. Prime Contractor shall disinfect the tank prior to startup according to AWWA Standard C652 "Disinfection of Water Storage Facilities".
2. Disinfection shall not take place until tank sealant is fully cured.
3. Acceptable forms of chlorine for disinfection shall be:
  - a. Liquid chlorine as specified in AWWA C652.
  - b. Sodium hypochlorite as specified in AWWA C652.
4. Acceptable methods of chlorination shall be:
  - a. Chlorination method 1 as outlined in AWWA C652.
  - b. Chlorination method 2 as outlined in AWWA C652.
  - c. Chlorination method 3 as outlined in AWWA C652.

## TANK MANUFACTURER'S WARRANTY

The tank structure is warranted to be free from defects due to faulty workmanship or materials, under normal and proper use, maintenance and operation, during the period expiring on the earlier of (i) one year after liquid is first introduced to the tank or (ii) 14 calendar months after shipment from the factory.

### Optional 5 Year Warranty:

Glass coated metal sheets manufactured by the Company and incorporated into the goods (but no other products or materials) that are not normally in contact with the liquid contents of the tank or that are above the normal high point of the liquid contents of the tank are warranted to be free from defects due to faulty workmanship or materials for a period of 5 years from the date of delivery of the goods into which they have been incorporated.

**\*\* END OF SECTION \*\***

