SECTION 46 20 00

DECENTRALIZED WASTEWATER TREATMENT SYSTEMS

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\*\* NOTE TO SPECIFIER \*\* Orenco Systems Incorporated; wastewater technologies.  
This section is based on the products ofOrenco Systems Incorporated, which is located at:  
814 Airway Ave.  
Sutherlin, OR 97479  
Toll Free: 800-348-9843  
Phone: 541-459-4449  
Fax: 541-459-2884  
Email: \_\_\_\_\_\_.  
Web Site: www.orenco.com  
[Click Here] for additional information.  
Whether you need decentralized wastewater collection, blackwater treatment systems, greywater treatment systems or all of the above, Orenco has your answer.  
Since 1981, Orenco Systems, Incorporated, has researched, designed, and manufactured innovative onsite and decentralized wastewater collection and treatment technologies. Our solutions include community collection systems, advanced secondary treatment systems, watertight fiberglass tanks, and in-tank pumping and filtration systems. We also manufacture high-quality standard, custom, and OEM controls, along with state-of-the-art fiberglass buildings, tanks, and enclosures.  
Orenco's AdvanTex Treatment Systems were developed for the long-term processing of domestic- and commercial-strength wastewater, as well as greywater to advanced treatment levels using natural processes and at very low energy consumption. The heart of all AdvanTex systems is a multiple-pass, packed-bed, fixed-film media filter that reliably provides high-quality effluent in a wide range of applications. These systems have undergone numerous national and international testing protocols, as well as multiple third-party field verification programs.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project. Three AdvanTex alternative models are typically specified in commercial applications. Your choice of model depends on system sizing requirements and site characteristics outline in the Performance Requirements Article in PART 2.

* + 1. Decentralized Wastewater Treatment: AdvanTex AX100 for commercial properties and communities.
    2. Decentralized Wastewater Treatment: AdvanTex AX-MAX for commercial properties and communities.
    3. Small commercial or residential decentralized wastewater treatment; AdvanTex AX-RT.
  1. RELATED WORK
     1. Section 03 30 00 - Cast-in-Place Concrete.
     2. Section 22 14 26.13 - Roof Drains.
  2. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Association of State Highway and Transportation Officials (AASHTO):
       1. AASHTO M 198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
       2. AASHTO M 304 - Standard Specification for Poly Vinyl Chloride (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter.
    2. American Concrete Institute (ACI):
       1. ACI 315 - Details and Detailing of Concrete Reinforcement.
       2. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
    3. American National Standards Institute (ANSI):
       1. NSF/ANSI 40 - Residential Onsite Systems.
       2. NSF/ANSI 350 - Onsite Water Reuse.
    4. ASTM International (ASTM):
       1. ASTM A 615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
       2. ASTM C 150 - Standard Specification for Portland cement.
       3. ASTM D 1784 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds.
       4. ASTM D 2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
    5. Canadian Standards Association (CSA).
    6. Council of American Building Officials (CABO):
       1. NRB-168; 6181 - Report.
    7. NSF International (NSF):
       1. NSF 40 - Residential Wastewater Treatment Systems.
       2. NSF 350 - Onsite Water Reuse
    8. Underwriters Laboratories (UL):
       1. UL 508 - Standard for Industrial Control Equipment
    9. United States Federal Specifications:
       1. SS-S-00210 - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data: Manufacturer's data sheets on each product to be used, including:
        1. Shop drawings; six sets.
        2. Preparation instructions and recommendations.
        3. Storage and handling requirements and recommendations.
        4. Warranty.
        5. Installation methods.
     3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
     4. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
     5. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment, cleaning and maintenance.
  2. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Minimum ten years experience in manufacturing onsite wastewater collection and treatment equipment.
        1. The manufacturer shall also provide the following support personnel:
           1. Professional Architect/Engineer or personnel under direct supervision of a professional Architect/Engineer dedicated to supporting the project through design, construction, operation, and maintenance.
           2. Asset Management Department assisting operators with operational and maintenance activities.
     2. Installer: Experienced, with a minimum of 10 successful installations of advanced wastewater treatment systems, and acceptable to the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Provide a mock-up for evaluation of fabrication techniques and application workmanship.
       1. Install in areas designated by Architect/Engineer.
       2. Do not proceed with remaining work until installation is approved by Architect/Engineer.
       3. Rebuild mock-up until satisfactory results are achieved.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Store products in the manufacturer's unopened packaging until ready for installation.
     2. Protect finished surfaces from soiling or damage during handling and installation.
  2. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  3. WARRANTY
     1. Manufacturer's Warranty: Provide manufacturer's standard three-year limited warranty for entire treatment system, including, but not limited to the pump, pump vault, hose and valve assembly, control panel, liquid level sensors, treatment system, and splice box.

1. PRODUCTS
   1. MANUFACTURER
      1. Acceptable Manufacturer: Orenco Systems, Inc., which is located at:814 Airway Ave.Sutherlin, OR 97479Toll Free Tel: 800-348-9843Tel: 541-459-4449Email: [request info (info@orenco.com)](https://arcat.com/rfi?action=email&company=Orenco%252BSystems%252C%252BInc.&message=RE%253A%2520Spec%2520Question%2520(11200ore)%253A%2520&coid=46117&spec=11200ore&rep=&fax=);Web: <http://www.orenco.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Each wastewater treatment system is unique and should be based on the mitigating parameters defining the existing conditions and the desired results. The information provided in the following Article will be used to determine applicability of Orenco products and be the basis for preliminary design recommendations or cost estimates. No attempt should be made to specify a waste water system without this data. This data should be compiled by a professional designer with wastewater treatment experience, licensed and registered in the state or province where the project is located.

* 1. PERFORMANCE REQUIREMENTS
     1. General Project Information:
        1. Project Address: \_\_\_\_\_\_.
           1. City: \_\_\_\_\_\_.
           2. State/Province: \_\_\_\_\_\_.
           3. Postal Code: \_\_\_\_\_\_.
           4. County: \_\_\_\_\_\_.
           5. Country: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete facility status option not required.

* + - 1. Facility Status: Existing.
         1. Existing: \_\_\_\_\_\_.
         2. New: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete facility type options not required.

* + - 1. Facility Type: \_\_\_\_\_\_\_\_.
         1. Office.
         2. Existing manufacturing facility.
         3. Residential community.
         4. Resort.
         5. Restaurant.
         6. RV Park.
         7. School.
         8. Single-family residence.

\*\* NOTE TO SPECIFIER \*\* Delete option below not required or keep both.

* + - 1. Occupancy:
         1. Population Equivalents (PEs) Served: \_\_\_\_\_\_.
         2. Equivalent Dwelling Units (EDUs) Served: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete usage percent options not required. Ideally, the sum of the following percentages should equal 100 percent. Add other usage percentages as required.

* + - 1. Usage: Percentages
         1. Year-Round: \_\_\_\_\_\_.
         2. Seasonal: \_\_\_\_\_\_.
         3. Weekdays: \_\_\_\_\_\_.
         4. Weekends: \_\_\_\_\_\_.
         5. Other: \_\_\_\_\_\_.
         6. Details: \_\_\_\_\_\_.
      2. Daily Flow Rates:
         1. Estimated Average Flow (gal per day / L per day): \_\_\_\_\_\_.
         2. Estimated Peak Flow (gal per day / L per day): \_\_\_\_\_\_\_.
      3. Permitted Flows:
         1. Maximum Daily Flow (gal per day / L per day): \_\_\_\_\_\_.
         2. Maximum Monthly Flow (gal per day / L per day): \_\_\_\_\_\_.
         3. Average Dry Weather Flow (gal per day / L per day): \_\_\_\_\_\_.
         4. Average Wet Weather Flow (gal per day / L per day): \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete flow estimation basis options not required.

* + - 1. Flow Estimation Basis:
         1. Regulatory tables.
         2. Measured flows.
         3. Similar facilities.
         4. Other; \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete operating permit options not required.

* + - 1. Operating Permit:
         1. General.
         2. NPDES.
         3. Other \_\_\_\_\_\_.
      2. Site Environment:
         1. Mean Temperature, Summer (F/C): \_\_\_\_\_\_.
         2. Mean Temperature, Winter (F/C): \_\_\_\_\_\_.
         3. Elevation Above Mean Sea Level (ft/m): \_\_\_\_\_\_.
         4. Frost Depth at Project Site (in/mm): \_\_\_\_\_\_.
    1. Collection System:

\*\* NOTE TO SPECIFIER \*\* Delete system options not required.

* + - 1. Collection System Type:
         1. System: New.
         2. System: Existing.

Age of Existing System: \_\_\_\_\_\_.

* + - * 1. System Type: Effluent sewer.
        2. System Type: Gravity sewer.
        3. System Type: Grinder sewer.
        4. System Type: Vacuum sewer.
        5. System Type: Other: \_\_\_\_\_\_.
      1. System Allocation Percentage:

\*\* NOTE TO SPECIFIER \*\* Ideally, the sum of the following percentages should equal 100 percent. Add other allocations as required.

* + - * 1. Commercial: \_\_\_\_\_\_.
        2. Residential: \_\_\_\_\_\_.
        3. Restaurant and Food Service: \_\_\_\_\_\_.
        4. Other: \_\_\_\_\_\_. Details: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete the tankage information paragraph not required.

* + 1. Existing Tankage Information:
       1. Onsite Primary Tankage:
          1. Quantity of Pumped (STEP) Tanks: \_\_\_\_\_\_.
          2. Quantity of Gravity (STEG) Tanks: \_\_\_\_\_\_.
          3. Onsite Primary Tankage: \_\_\_\_\_\_.
          4. No primary tankage on site.
       2. Auxiliary Tankage Quantities and Volumes:

\*\* NOTE TO SPECIFIER \*\* Delete or add tanks, quantities, and volumes as required. Fill in additional details for tanks if required or delete the detail paragraphs.

* + - * 1. Grease Tanks: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Recirculating Tank: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Batch Tanks: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Primary Tanks: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Anoxic Tanks: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Discharge Tanks: Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + - * 1. Other Tank Type: \_\_\_\_\_\_. Quantity: \_\_\_\_\_\_; Volume (gal/L): \_\_\_\_\_\_.

Details: \_\_\_\_\_\_.

* + 1. Influent Waste Strength Information:

\*\* NOTE TO SPECIFIER \*\* Delete influent type option not required.

* + - 1. Influent Type: Raw wastewater.
      2. Influent Type: Partially treated wastewater.
         1. Details: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Fill in the following influent characteristics. Add any characteristics that are not listed. Do not delete characteristics. If a characteristic is not applicable fill in the blanks with "N/A". Note that 1 mg/L is equal to 1 ppm.

* + - 1. Chemical Oxygen Demand (COD): (mg/L or ppm).
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      2. Biochemical Oxygen Demand (BOD5):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      3. Total Suspended Solids (TSS):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      4. Total Dissolved Solids (TDS):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      5. Fats, Oils, and Grease (FOG):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      6. Total Phosphorus (TP):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      7. Total Kjeldahl Nitrogen (TKN):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      8. Ammonia (NH3-N):
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      9. Alkalinity:
         1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      10. pH:
          1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      11. Chloride:
          1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      12. Sulfide(SO4):
          1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.
      13. Other: \_\_\_\_\_\_.
          1. Typical: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete determination methods not required.

* + - 1. Determination Method:
         1. Regulatory definition.
         2. Textbook table.
         3. Similar systems.
         4. Direct sample (Grab). Number of Samples: \_\_\_\_\_\_.
         5. Direct sample (Composite). Number of Samples: \_\_\_\_\_\_.
         6. Other (Details): \_\_\_\_\_\_.
    1. Discharge Treatment Levels:

\*\* NOTE TO SPECIFIER \*\* Fill in the following discharge treatment levels. Add any characteristics that are not listed. Do not delete any characteristics. If a characteristic is not applicable fill in the blanks with "N/A". Note that 1 mg/L is equal to 1 ppm.

* + - 1. Biochemical Oxygen Demand (BOD5): (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      2. Carbonaceous BOD5 (cBOD5): (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      3. Total Suspended Solids (TSS): (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      4. Total Dissolved Solids (TDS (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      5. Settleable Solids: (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      6. Total Phosphorus (TP): (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      7. Total Nitrogen (TN): (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      8. Ammonia (NH3-N), Summer: (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      9. Ammonia (NH3-N), Winter: (mg/L).
         1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      10. Nitrite (NO2-N): (mg/L).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      11. Nitrate (NO3-N): (mg/L).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      12. Fecal Coliform (FC): (CFU/100 mL).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      13. Escherichia Coliform (E. coli): (MPN/100 mL).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      14. pH: (mg/L).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      15. Dissolved Oxygen (DO) minimum: (mg/L).
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
      16. Other: \_\_\_\_\_\_.
          1. Average: \_\_\_\_\_\_; Maximum: \_\_\_\_\_\_; Sample Frequency: \_\_\_\_\_\_.
    1. Discharge and Dispersal Information:

\*\* NOTE TO SPECIFIER \*\* Delete disinfection options not required.

* + - 1. Disinfection:
         1. None.
         2. Chlorine.
         3. Ultraviolet (UV).
         4. Other: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete discharge options not required.

* + - 1. Discharge:
         1. Subsurface.
         2. Surface.
         3. Existing System: \_\_\_\_\_\_.
         4. Other. \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete dispersal method options not required.

* + - 1. Dispersal Method:
         1. Gravity.
         2. Pressure.
         3. Shallow gravelless
         4. Irrigation.
         5. Injection well.
         6. Other: \_\_\_\_\_\_.
    1. Application Type:

\*\* NOTE TO SPECIFIER \*\* Delete type options not required.  
Examples for Type 1: Apartments/Condominiums, Mobile Home Parks, Municipal Systems, Planned Communities or Residential Subdivisions, and Work Camps.

* + - 1. Type 1: Domestic primary-treated effluent quality (blend of black and greywater).

\*\* NOTE TO SPECIFIER \*\* Examples for Type 2: Parks or Campgrounds, Golf Courses or Ski Resorts, Manufacturing Facilities or Offices, Public Toilets/Rest Areas, RV Parks, and Visitor Centers.

* + - 1. Type 2: Primarily black water waste.

\*\* NOTE TO SPECIFIER \*\* Examples for Type 3 Churches and schools.

* + - 1. Type 3: Primarily black water waste with surge flows.

\*\* NOTE TO SPECIFIER \*\* Examples for Type 4: Hospitals, Retirement Facilities, and Veterinary Clinics

* + - 1. Type 4: Primarily black water waste with pharmaceuticals or toxic inhibitors.

\*\* NOTE TO SPECIFIER \*\* Examples for Type 5: Bars/Taverns, Casinos, Delis, Gas Stations, Hotels/Motels, Restaurants, Resorts, and Shopping Centers or Strip Malls

* + - 1. Type 5: Black water with restaurant waste.

\*\* NOTE TO SPECIFIER \*\* Examples for Type 6: Organic removal, Ammonia removal.

* + - 1. Type 6: Polishing bioreactors.

\*\* NOTE TO SPECIFIER \*\* Examples for Type 7: Wineries, breweries, dairies, and food processing facilities or slaughterhouses.

* + - 1. Type 7: High strength process waste.
      2. Type 8: Greywater

\*\* NOTE TO SPECIFIER \*\* The following model information is given here primarily for reference purposes. Which units and configurations that best suit your specific application cannot be determined until data from the Performance Requirements article has been reviewed by the manufacturer with the wastewater consultant.

* + 1. Energy Consumption: Treatment plant secondary treatment energy consumption should be less than 3 kWh per 1000 treated gallons (3785.4 treated liters).
  1. DECENTRALIZED WASTEWATER TREATMENT FOR COMMERCIAL PROPERTIES AND RESIDENTIAL COMMUNITIES

\*\* NOTE TO SPECIFIER \*\* Intended for large residential, commercial, and municipal applications requiring advanced secondary treatment. Used primarily for decentralized settings, including new installations, retrofits, or repairs. Ideal for subdivisions, "fringe" development, hotels, resorts, schools, churches, businesses, manufactured home parks, RV parks, campgrounds, rest areas, and truck stops. Delete paragraph if not required. Orenco can provide project-specific specifications for the AdvanTex treatment system to the consultant for inclusion into a plan set or specification book.

* + 1. Basis of Design: AdvanTex AX100 Treatment Systems as manufactured and supplied by Orenco Systems Incorporated.
       1. Modular wastewater treatment systems treating primary-treated effluent to better-than-secondary standards, including nitrogen-reduction. Systems consist of watertight fiberglass basins and utilize highly absorbent, engineered textile filter media. Pump location facilitates removal without removing effluent screen, floats or peripheral items.

\*\* NOTE TO SPECIFIER \*\* Systems can be installed in multi-pod arrays to handle higher flow capacities.

* + - * 1. Flow Capacity: 5000 gal per day per unit - Type 1 Applications (18,927 L per day).
        2. Flow Capacity: 25 to 50 gal per day per sq ft (18,927 L per day per sq m).
      1. General Features:
         1. Length: 191 inches (4851 mm).
         2. Width: 94 inches (2388 mm).
         3. Height: 42 inches (1067 mm).
         4. Dry Weight: 1760 lbs (798 kg).
         5. Treatment Surface Area: 100 sq ft (9.3 sq m), nominal.
         6. Installation Footprint: 128 sq ft (11.9 sq m), actual.
         7. Installation Methods: Partial burial or bermed installation; 6 inches (150 mm) above berm, minimum; bury depth 9 inches (230 mm) below natural grade, maximum.
         8. Recirculation-Blend Tankage: External.
         9. Recirculation Method: Recirculating splitter valve.
         10. Energy Requirements: 2 kWh (7200 kJ) per 1000-gal (3785.4 L) maximum for secondary treatment.
         11. Consistent treatment, including peak flows.
         12. Timer operation for flow monitoring, flow modulation, and surge control.
         13. Fixed-film, engineered textile media, operated in an unsaturated condition.
         14. Consistent media quality.
         15. Low energy consumption.
         16. Low maintenance requirements.
         17. Complete pre-manufactured package, ready to install.
         18. Watertight construction, corrosion-proof materials, and components.
         19. Foam-core lid provides insulation value of R-6 (RSI-1.1).
         20. Quiet operation.
         21. Round-the-clock system supervision via Orenco's remote telemetry controls.

\*\* NOTE TO SPECIFIER \*\* AdvanTex AX100 Treatment Systems require external recirculation-blend tankage. For standard AdvanTex Treatment Systems, recirculation-blend tankage should be sized to at least 75 percent of the design maximum day flow, or 100 percent average day design flow, whichever is greater.

* + - 1. Tanks: Designed by registered Architect/Engineer and approved by state or local regulatory agencies or authorities having jurisdiction.
         1. Loading Criteria:

Saturated Backfill: 140 lbs for cu ft (2242.6 kg per cu m) minimum.

Unsaturated Backfill: 127 lbs per cu ft (2034.3 kg per cu m); 500 lbs per sq ft (2441.2 kg per sq m) minimum.

Lateral Load: 62.4 lbs per cu ft (999.5 kg per cu m) minimum.

Lateral loading shall be determined from ground surface.

Concentrated Wheel Load: 2500 lbs (1134 kg).

* + - * 1. Load Condition Analysis:

Bury of 4 ft (1219 mm), plus full exterior hydrostatic load.

Bury of 4 ft (1219 mm), plus full exterior hydrostatic load, plus 2500 lbs (1134 kg) wheel load.

Bury of 1 ft (305 mm), plus 2500 lbs (1134 kg) wheel load.

Tank Full, Interior Hydrostatic Load and Unsupported by Soil.

Represents tank full of liquid at 62.4 lbs per cu ft (999.5 kg per cu m). This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

Tanks requiring deep burial, greater than 48 inches (1219 mm) or subject to truck or heavy traffic loading require special consideration.

A minimum soil cover of 12 inches (305 mm) shall be used, unless specified otherwise by manufacturer.

* + - * 1. Tanks to be structurally sound, watertight, and guaranteed in writing by tank manufacturer for two years from date of final acceptance.

Signed guarantee shall accompany bids.

Guarantee and warranty shall be furnished at the time of submittal.

Warranty shall not be limited liability to replacement cost of the tanks.

The tank shall be capable of withstanding long-term hydrostatic loading, in addition to soil loading, due to a water table maintained at ground surface.

* + - * 1. Access Openings: 20 inches (508 mm) diameter and of the configuration shown on the manufacturer's drawings.
        2. Modification of completed tanks will not be permitted.
        3. Inlet Plumbing: Includes an inlet tee that penetrates 18 inches (457 mm) into the liquid from the inlet flow line.

Depth may vary depending on the tank's height. In all cases, the inlet should extend to a level below the bottom of the maximum scum depth.

Allow for natural ventilation back through the building sewer and vent stack.

* + - * 1. Capable of withstanding an aboveground static hydraulic test and shall be individually tested.

\*\* NOTE TO SPECIFIER \*\* Delete either the concrete tank or fiberglass tank paragraph, whichever is not required.

* + - * 1. Concrete Tanks:

Walls, bottom and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.

The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.

Reinforcing steel: ASTM A 615 Grade 60, fy is 60,000 lbs per sq inches (413685 kPa).

Details and placement in accordance with ACI 315 and ACI 318.

Concrete: Ready-mix with cement conforming to ASTM C I50, Type II.

Cement Content: Six sacks per cubic yard minimum.

Aggregate Size: 3/4 inch (19 mm) maximum.

Water to Cement Ratio: Kept low; plus or minus 0.35.

Compressive Strength: 4000 lbs per sq inches (27579 kPa) minimum in 28 days.

Concrete Mix Design: Submitted to Architect/Engineer by the Contractor for review and approval.

Calcium chloride will not be allowed in the mix design.

Samples: Three concrete sample cylinders taken and tested for each tank manufactured until manufacturer and Architect/Engineer are satisfied the minimum compression strength is being obtained.

Compliance Ensurance: Manufacturer to make and set three sample cylinders for a minimum of 20 percent of the remaining tanks at the discretion of the Architect/Engineer.

If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured.

Testing Costs: The tank manufacturer's responsibility.

Tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.

Tank Protection: Tank to be watertight prior to addition of seal coatings.

Comply with Council of American Building Officials (CABO) report No. NRB-168; 6181.

Heavy cement-base waterproof coating, on inside and outside surfaces.

Form Release Used on Tank Molds: Nox-Crete or approved equivalent.

Diesel or other petroleum products are not acceptable.

Transportation to Job Site: Tanks are not to be moved from manufacturing site until tanks have cured for seven days or reach two-thirds of the design strength.

Access Openings: Furnish openings of size and configuration to accommodate individual packaged pump systems.

Access Risers: 24 inches (610 mm) diameter access risers. Tank manufacturer shall cast in place a flanged tank adapter facilitating the bonding of the access riser.

Flanged Tank Adapter: Orenco Systems, Incorporated Model PRTA24 or approved equivalent.

Material: 1/4 inch (6 mm) thick ABS and have an outside diameter of 27 inches (686 mm) and inside diameter of 22-3/4in (578 mm).

Overall Height: 3 inches (76 mm) minimum to allow 1-1/2 inches (38 mm) exposed for sufficient bonding area once the adapter is installed in the tank.

Access Risers: 21 and 30 inches (533 and 762 mm) diameter access risers. Tank manufacturer shall cast in place a fiberglass or ABS tank adapter facilitating the bonding of the access riser.

\*\* NOTE TO SPECIFIER \*\* Delete adapter options not required.

Model RRFTA: Grooved tank adapter plate.

Model RRFTA30: Grooved tank adapter plate.

Model PRTA30: Flanged tank adapter

Septic Tank and Top Slab Seal: Preformed flexible plastic gasket. conforming to federal specification SS-S-00210(2iOA) and AASHTO M 198.

Material: Flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, or approved equivalent.

A mechanical fastening method shall be used if the seasonal groundwater level may reach the top slab seam of the tank.

Watertightness: Factory tested and again on-site prior to acceptance.

Inlets to Septic Tank: Watertight pipe seal, Cast-A-Seal, manufactured by Press-Seal Gasket Corporation or approved equivalent.

Factory Testing: Prior to shipping, fill tank with water to soffit and let stand. After 24 hours, refill tank to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two hours.

Any leakage shall be cause for rejection.

On Site Testing: After installation before backfilling, fill each tank with water to a point 2 inches (51 mm) above the top of the tank and the water loss measured after a twenty-four-hour period.

After it has been determined that there is no leakage, test the access riser seam.

Access riser Seam test: Backfill to a minimum depth of 2 inches (51 mm) above the riser seam to prevent damage from hydrostatic uplift. Fill the tank to a point 2 inches (51 mm) above the riser seam.

Field test period may be reduced to not less than two hours.

Any leakage over the two hour period is not acceptable.

* + - * 1. Fiberglass Tanks: Manufacturer: Orenco Systems, Incorporated or approved equivalent.

Manufacturer will supply the following information to the Architect/Engineer of Record.

Detailed installation, O and M instructions, and warranty terms.

Calculation methodology.

Analyze using finite element analysis for buried structures.

Address the following:

Strength.

Buckling.

Deflection of 5 percent of tank diameter, based on service load (including long-term deflection lag).

Buoyancy.

Material: Fiberglass reinforced polyester resin, using grades of resin and fiberglass considered acceptable for use with septic tank construction.

The thicknesses for different regions of the tanks shall be described and shown in shop drawings for each individual tank.

The minimum wall thickness shall be 3/16 inch (5 mm).

No exposed glass fibers.

Permanent Metal Parts: 300 series stainless steel.

Material Properties:

Typical primary strength properties are listed below:

Tensile Modulus: 1,000,000 lbs per inch (6894757.3 kPa).

Ultimate Tensile strength: 10,000 lbs per inch (68947.6 kPa).

Ultimate Compressive strength: 21,000 lbs per inch (144790 kPa).

Ultimate Flexural strength: 18,000 lbs per inch (124105.6 kPa).

Ultimate Shear In-Plane: 7,000 lbs per inch (48263.3 kPa).

Performance Testing: Evaluated by a Registered Professional Architect/Engineer having sole responsibility to determine the maximum external loading on any of the tank models.

In lieu of calculations, supplier may elect in-situ performance testing.

In-situ testing of each tank model shall include use of strain gauge and deflection gauge. The tank will be subjected to external forces equal to twice the actual load.

Initial Deflection: 3 percent of tank diameter maximum.

Inspections: By Architect/Engineer in the supplier's yard, within the plant, upon delivery and again after installation.

If wall thickness is suspected to be less than 3/16 inch (5 mm) or delamination is suspected on any portion of the tank, the Architect/Engineer may drill a 1/4 inch (6 mm) diameter hole through the tank wall for inspection purposes.

If wall thickness is less than the required minimum 3/16 inch (5 mm), or delamination is present, repair of the 1/4 inch (6 mm) hole, if feasible shall be the responsibility of the Contractor.

If repair is not feasible, the tank shall be rejected.

If 20 percent or more of the tanks are rejected for any of the aforementioned reasons, each tank under this Bid will become suspect of substandard quality and subject to rejection by the Architect/Engineer.

If the required minimum 3/16 inch (5 mm) thickness is found, and no delamination is present, the repair of the inspection holes shall be the responsibility of the Architect/Engineer.

Minimum Tank Weight: Specified by manufacturer's Architect/Engineer for each tank model.

The manufacturer will permanently mark the weight of each tank on the top near the access hole.

Holes Specified for Tank: Provided by the manufacturer.

Resin or other appropriate sealant shall be properly applied to all cut or ground edges so that no glass fibers are exposed and voids are filled.

Inlet Piping to Tank Wall: EPDM gaskets from Orenco Systems, Incorporated, or approved equivalent.

ABS or Schedule 40 PVC pipe and fittings shall be used at the inlets.

Inlet Plumbing: Inlet tee penetrating 18 inch (457 mm) into liquid from inlet flow line.

Depth may vary depending on tank's height. Inlet to extend to a level below the bottom of maximum scum depth.

Allow for natural ventilation back through building sewer and vent stack.

Watertightness: Factory and on-site testing prior to acceptance.

Each tank shall be tested at the factory, prior to shipping.

Fill with water to the soffit and let stand for a minimum of 2 hours.

Any leakage shall be cause for rejection.

After installation is completed and before backfilling:

Completely fill the tank with water, to a level 2 inches (51 mm) into the riser.

Wait a minimum of 2 hours (or as required by local authorities having jurisdiction) and inspect the tank for leaks.

There should be no drop in liquid level and no visual leakage from seams, pinholes, or other imperfections.

Any leakage shall be cause for rejection.

Once the tank is proven to be watertight, drop the water level in tank below the invert, but not below the mid-seam.

Each tank shall be marked in the uppermost surface above or near the outlet and include a permit or identification number, weight of tank, type of tank, and date of manufacture.

* + - 1. Risers: Manufactured and supplied by Orenco Systems, Incorporated,supplying access to internal vaults and into the septic tanks for septage pumping.
         1. Riser to Tank Attachment: Watertight seal. For adhering PVC or fiberglass risers to either fiberglass or ABS tank adapters.

Adhesive: Two-component methacrylate structural adhesive or approved equivalent.

* + - * 1. Risers to extend 3 inches (76 mm) above original grade allowing for settlement and ensuring positive drainage away from the access.
        2. Nominal Diameter: 30 inches (762 mm) minimum when the depth of bury is 36 inches (914 mm) or greater or duplex pumping assemblies are used.
        3. Nominal Diameter: 24 inches (610 mm) minimum and shall vary in height depending on the depth of bury on the various tanks.
        4. To ensure product compatibility, a single manufacturer shall supply risers, lids, and attachment components.
      1. Inlet and Recirculating Splitter / Ball Valve Risers: Manufactured and supplied by Orenco Systems, Incorporated.
         1. Model Perma-Loc, Ultra-Rib, KOR FLO or approved equivalent.

Construction: Non-corrosive and designed to be buried in soil.

Material: PVC per ASTM D 1784 and tested in accordance with AASHTO M304M-89.

Stiffness per ASTM D 2412: 10 lbs per sq inches (69 kPa) minimum.

Truck Wheel Load Capacity: 54 sq inches (34839 sq mm): 2500 lbs (1134 kg) for 60 minutes.

Vertical deflection: 1/2 inch (13 mm) maximum.

Risers to extend to 3 inches (76 mm) above the ground surface allowing for settlement and shall have a nominal diameter of 24 inches (610 mm).

\*\* NOTE TO SPECIFIER \*\* Delete whichever of the two following paragraphs is not required.

* + - * 1. Inlet and Outlet Flange: Holes for FRP style splitter valve flanges, shall be drilled and installed by the manufacturer of the valve.
        2. Inlet and Outlet Grommets: Holes for grommets for old style splitter valves shall be drilled and installed by the manufacturer of the valve.
      1. Outlet Riser: Manufactured and supplied by Orenco Systems, Incorporated.
         1. Model Perma-Loc, Ultra-Rib, KOR FLO or approved equivalent.

Construction: Non-corrosive and designed to be buried in soil.

Material: PVC per ASTM D-1784 and tested in accordance with AASHTO M304M.

Stiffness per ASTM D2412: 10 lbs per sq inches (69 kPa) minimum.

Truck Wheel Load Capacity: 54 sq inches (34839 sq mm): 2500 lbs (1134 kg) for 60 minutes.

Vertical deflection: 1/2 inch (13 mm) maximum.

* + - * 1. Nominal Diameter: 24 inches (610 mm) for simplex pumping applications.
        2. Nominal Diameter: 30 inches (762 mm) when used in a duplex pumping application.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - * 1. Electrical and Discharge Grommets: EPDM grommets from Orenco Systems Incorporated, factory installed by the riser manufacturer for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal.
      1. Riser to Tank Attachment:
         1. Component Construction: Waterproof, non-corrosive materials; PVC, ABS, fiberglass, or stainless steel.
         2. Adhesives and Sealants: Waterproof, corrosion resistant, and approved for intended application.
         3. Riser to Tank Connection: Watertight and structurally sound capable of withstanding a vertical uplift of 5000 lbs (2268 kg) to prevent riser separation due to tank settlement, frost heave, or accidental vehicle traffic over the tank.
         4. Attachment Systems: Manufactured and supplied by Orenco Systems, Incorporated or approved equal.

\*\* NOTE TO SPECIFIER \*\* Delete tank adapters not required.

Tank Adapter Model PRTA24: Cast into tank lid or bolted to lid using Model PRTA24BDKIT bolt down kit, and a two-component methacrylate structural adhesive.

Tank Adapter Model PRTA24-2: Cast into tank lid and a two-component methacrylate structural adhesive when tank burial depth is greater than 36 inches (914 mm).

Tank Adapter Model RRFTA30: Bolted to tank lid using RRFTA30BDKIT bolt down kit, and a two-component methacrylate structural adhesive.

Tank Adapter Model PRTA30: Cast into tank lid or bolted to tank using PRTA30RBDKIT bolt down kit, and a two-component methacrylate structural adhesive.

* + - 1. Lids: Manufactured and supplied by Orenco Systems, Incorporated or approved equivalent.
         1. One lid furnished with each access riser.

DuraFiber Model FLD24G.

DuraFiber Model FLD30G.

* + - * 1. Performance Requirements: Provide evidence lids have been used successfully in continuous field service for a minimum of five years demonstrating long-term integrity and suitability for application.

Waterproof, corrosion, and UV resistant.

* + - * 1. Construction: Fiberglass with green non-skid finish.

Flatness: A crown or dome of no more than 1/8 inch (3 mm) is allowable. No ponding of water allowed on lid surface.

Finish: Green non-skid finish. Self-lubricating plastics, such as polyethylene, shall not be considered non-skid without addition of a non-skid coating.

Watertight seal with top of riser.

* + - * 1. Load Capacity: Truck wheel load, 81 sq inch (52258 sq mm) of 2500 lbs (1134 kg) for 60 minutes with a maximum vertical deflection of 3/4 inch (19 mm).

\*\* NOTE TO SPECIFIER \*\* Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant.

* + - * 1. Fasteners: Tamper-resistant stainless-steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square.

Fasteners shall not extend above the surface of the lid.

\*\* NOTE TO SPECIFIER \*\* Optional components delete if not required.

* + - * 1. Traffic bearing lid: Cast iron frame and cover manufactured by Sather Manufacturing Company, Incorporated or approved equivalent, which will fit over a standard lid. The cover shall have the word SEWER cast into it.

\*\* NOTE TO SPECIFIER \*\* Delete model number options not required.

Model number 6024.

Model number 3060.

Model number 4036.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - * 1. Rigid closed-cell foam insulation: 2 or 4 inches (51 or 102 mm) thick attached to underside of lid.

R-value: 10, per 2 inches (51 mm) increment minimum.

Fasteners: Corrosion resistant stainless steel.

\*\* NOTE TO SPECIFIER \*\* Delete pump vault not required.

* + - 1. Pump Vault; Flow Inducer Series: Orenco Systems, Inc. Model FITR Series, Flow Inducer Tower or approved equivalent.
         1. Tower: Up to five, 5 inches (127 mm) diameter PVC flow inducers each with eight, 2 inches (51 mm) diameter holes evenly spaced around the bottom.
         2. Will accept one to five high-head effluent pumps.

\*\* NOTE TO SPECIFIER \*\* Platform is required when pump is used in a fiberglass tank.

* + - * 1. Platform: A VB1806-FRP platform or approved equivalent.
      1. Pump Vault; PVU Series: Orenco Systems, Inc. Model PVU Series, Universal Biotube Pump Vault or-approved equivalent.
         1. Filter: Minimum effective screen area of 19.7 sq ft (1.83 sq m).
         2. Polyethylene Vault: 12 inches (305 mm) diameter, eight, 2 inches (51 mm) diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping.

Approximately 70 percent of minimum liquid level).

* + - * 1. Biotube Assembly: 1/8 inch (3 mm) mesh polypropylene tubes.
        2. Flow Inducer: Attached to vault to accept one or two high-head effluent pumps.
      1. Discharge Hose and Valve Assembly: Model HV200BSQ manufactured and supplied by Orenco Systems, Incorporated or approved equal.
         1. Discharge Assembly: 2 inch (51 mm) diameter.

PVC ball valve, 150 lbs per sq inches (1034 kg per sq m).

PVC true union check valve, 200 lbs per sq inches (1379 kg per sq m).

PVC flex hose. Working pressure rating: 60 lbs per sq inches (413.7 kg per sq m).

PVC schedule 40 pipe with cam coupler adapter for quick disconnect.

Optional components. Delete any of the remaining three components not required.

* + - * 1. Cold Weather Drainback: In colder climates a drain-back style discharge assembly which includes an 1/8 inch (3 mm) drain back orifice above the check valve. This valve style may be used with a cold weather kit.
        2. Cold Weather Kit: For cold weather climates and deep bury tanks, Orenco Systems, Incorporated Model Cold Weather Kit or approved equivalent.
        3. High Pressure Flex Hose: Orenco Systems, Incorporated, Model HVX200PR series or approved equivalent. Constructed of elastomer compound with a working pressure of 250 lbs per sq inch (1724 kg per sq m) for systems requiring a higher horsepower pump.
      1. Float Switch Assembly:
         1. Flow Equalization Tank: As manufactured and supplied by Orenco Systems, Incorporated.

Model MF4P: Mercury free with four normally open mechanical switch floats mounted on a PVC stem attached to the filter cartridge.

Floats: Adjustable and removable without removing the pump vault.

Listed: UL and CSA.

Alarms preset per Architect/Engineer's plans; high level/lag pump enable, timer override on/off, timer on/off, and low-level.

Each float lead secured with a nylon strain relief bushing at the splice box.

* + - * 1. Recirculation-Blend Tank: As manufactured and supplied by Orenco Systems, Incorporated.

Model MF3P: Three normally open mechanical switch floats mounted on a PVC stem attached to the filter cartridge.

Floats: Adjustable and removable without removing the pump vault.

Listed: UL and CSA.

Alarms preset per Architect/Engineer's plans; high level, timer override on/off, and low-level.

Each float lead secured with a nylon strain relief bushing at the splice box.

* + - 1. Submersible High-Head Effluent Pumps: Manufactured and supplied by Orenco Systems, Incorporated or approved equivalent.
         1. Listed: UL and CSA as an effluent pump.
         2. Motor: 3/4 to 1.0 hp (0.56 to 0.75 kW), 230 VAC, single phase, 60 Hz, two-wire.
         3. Power Cord: 10 ft (3048 mm) long extra heavy duty (SOOW) with ground.
         4. Run Dry Capability: minimum 24-hour without water lubrication.
         5. Bypass Orifice: 1/8 inch (3 mm) bypass to ensure flow circulation for motor cooling and to prevent air bind.
         6. Floating impeller design.
         7. Liquid ends repairable (by replacing impellers and diffusers) for better long-term cost of ownership.
         8. Rated for continuous use and frequent cycling; 100 cycles per day minimum.
         9. Motor cable: Suitable for Class 1, Division 1 and 2 applications.
         10. Lightweight for easy removal and maintenance.
         11. Intake Screen: 1/8 inch (3 mm) mesh polypropylene.
         12. Internal thermal overload protection and internal lightning protection.
         13. Factory West Testing: 3-point (Dead head, Design Flow, and Design Flow plus 30 percent) confirming performance.

\*\* NOTE TO SPECIFIER \*\* Delete Pumps not required.

* + - * 1. Single Pod Dosing: Model PF5007 Series: 3/4 hp (0.56 kW).
        2. Simultaneous Two- and Three-Pod Dosing: Model PF7510 Series: 1hp (0.75 kW).
        3. Pre-Anoxic Return Effluent Pump (Rnox): Model PF3005 or PF5005 Series: 1/2 hp (0.37 kW).
        4. Alkalinity Mixing Tank Water Feed Pump: Model PF3005 Series: 1/2 hp (0.37 kW).
        5. Alkalinity Injection and Mixing Tank Pumps: Model PF2005 Series: 1/2 hp (0.37 kW).

\*\* NOTE TO SPECIFIER \*\* Delete electrical splitter box type not required.

* + - 1. Electrical Splice Box; External: Orenco Systems, Inc. Model SBEX series external splice box or approved equivalent.
         1. Wet Locations: UL approved.
         2. Electrical Cord Grips: Up to 4.
         3. Outlet Fittings: Two 3/4 inch (19 mm) outlet fittings.
         4. Waterproof Butt Splice Connectors: UL listed.
         5. Conduit Seal Kit: UL-approved and accessible above ground.

Required to prevent the passage of gases, vapors, or flames through the conduit to the control panel.

Additional UL classified sealant added to splice box coupling preventing condensation accumulation in the splice box.

Moisture-cure polyurethane quick drying foam with an R-5 rating for each inch of foam.

Silicone sealant, neutral cure, non-acetic, non-corrosive, and able to withstand 450 degrees F (232 degrees C) temperature.

* + - 1. Electrical Splice Box; Internal: Orenco Systems, Inc. Model SB series external splice box or approved equivalent.
         1. Wet Locations: UL approved.
         2. Electrical Cord Grips: Up to 6.
         3. Outlet Fittings: 1 or 1.25 inch (25 or 32 mm) outlet fittings.
         4. Waterproof Wire Nuts: UL Listed.
         5. Conduit Seal Kit: UL-approved and accessible above ground.

Required to prevent the passage of gases, vapors, or flames through the conduit to the control panel.

Additional UL classified sealant added to splice box coupling preventing condensation accumulation in the splice box.

Moisture-cure polyurethane quick drying foam with an R-5 rating for each inch of foam.

Silicone sealant, neutral cure, non-acetic, non-corrosive, and able to withstand 450 degrees F (232 degrees C) temperature.

* + - 1. Recirculating Splitter / Ball Valve: Manufactured and supplied by Orenco Systems, Incorporated.

\*\* NOTE TO SPECIFIER \*\* Delete the valve options not required. The following option is standard. The item is patented, and the Architect/Engineer knows of no equivalent.

* + - * 1. Model MM4-FRP or MM6-FRP: 4 or 6 inches (102 or 152 mm) diameter ball valve assembly.

Provides guaranteed return of treated effluent returning from filter.

Designed to redirect 100 percent of flow to recirculation/dilution tank during periods of low flow or 100 percent to final discharge during periods of high flow.

Construction: Corrosion resistant PVC, Fiberglass, polyethylene and ABS components.

Removal and Replacement: Sliding quick-disconnect.

\*\* NOTE TO SPECIFIER \*\* The item is patented, and the Architect/Engineer knows of no equivalent.

* + - * 1. Model RSV3U or RSV4U: 3 or 4 inches (76 or 102 mm) diameter splitter valve assembly.

Provides guaranteed return of treated effluent returning from filter.

Designed to redirect 100 percent of flow to recirculation/dilution tank during periods of low flow or 20 percent of return flow to final discharge and 80 percent to the recirculation/dilution tank during periods of high flow.

Construction: Corrosion resistant PVC and rubber components.

Removal and Replacement: Unions.

\*\* NOTE TO SPECIFIER \*\* The item is patented, and the Architect/Engineer knows of no equivalent.

* + - * 1. Model MM2U, MM3U or MM4U: 2, 3 or 4-in (51, 76, or 102 mm) diameter ball valve assembly.

Provides guaranteed return of treated effluent returning from filter.

Designed to redirect 100 percent of flow to recirculation/dilution tank during periods of low flow or 100 percent to final discharge during periods of high flow.

Construction: Corrosion resistant PVC and rubber components.

Removal and Replacement: Unions.

* + - 1. Chemical Feeder: Manufactured and supplied by Orenco Systems, Incorporated or approved equivalent.

\*\* NOTE TO SPECIFIER \*\* Delete chemical feeder type not required.

* + - * 1. Dry Chemical Feeder: Model FEEDER-D-P; 8 cu ft (226.5 L).

Construction: Corrosion-resistant stainless steel and durable fiberglass parts.

Power Supply: Variable-speed AC, 0.5 hp (0.37 kW), 6.8A, 90 VDC motor.

Feed Capacity: 0.35 to 17.64 oz per min (10 to 500 gr per min).

* + - * 1. Liquid Chemical Feeder: Model LCF3036-SS. Injects alkalinity mix into pre-anoxic return line to the Flow Equalization/Pre-Anoxic Tank.

Construction: Corrosion-resistant stainless steel and durable fiberglass parts.

Direct Drive Mixer: 1/3 hp (0.25 kW) 1750 rpm, to keep slurries in suspension.

Alkalinity Feed Rates: Controlled by peristaltic pump; 0.9 gal per hr (3.4 L per hr) to the injection point.

Pump Speed Control: 4 to 20 m/A, 0 to 10 VCD, or pulse inputs.

* + - 1. Controls and Alarms: Listed per UL 508.
         1. Panel Repairability: Repairable in field without using soldering irons or substantial disassembly.
         2. Panel requires real-time connectivity with the telemetry control panel and alarm communication.

Dedicated phone line, Ethernet cable, or InGateway 601 series cellular modem, model IG601.

* + - * 1. Panel: Orenco Systems, Inc. TCOM control panel or Architect/Engineer-approved equal.

Data Collection and Utilization: Logs data to include but not be limited to system conditions, pump run time, pump cycles, and alarm conditions.

Downloadable Logs: ASCII or DIF format.

Multi-Level Password Security.

Program Logic Rules: "If - Then" declarations. Rules written based on operands, including the following:

Input and output status.

Point status.

Date: mm/dd/yy format.

Time of day: 24 hour clock.

Timers.

Historical data; allowing for control optimization or detection of trends.

Scheduling Functions: Control digital "Points" based on date or day of week and time.

Automatic daylight savings time adjustment.

Automatic Pager Call-Outs: Signals Pagers during alarm conditions; trend detection possibly leading to system failure.

* + - * 1. Real-Time Direct Connection: Via laptop serial port allowing operator real-time access to detailed logged data and the ability to change point values.

Standard Components:

Motor-Start Contactor: 120VAC 16 FLA, 1 hp (0.75 kW), 60 Hz; 2.5 million cycles at FLA (10 million at 50 percent of FLA).

Motor-Start Contactor: 240 VAC, 16 FLA, 3 hp (2.27 kW), 60 Hz; 2.5 million cycles at FLA (10 million at 50 percent of FLA).

HOA 3-Way Toggle Switch: Single-pole manual OFF, auto ON. 20 amps, 1 hp (0.75 kW).

Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 120 VAC. DIN rail mounting with thermal magnetic tripping characteristics.

Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole for 120 VAC or double-pole for 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.

Audio Alarm: 95 dB at 24 inches (610 mm), warble-tone sound.

120 VAC Ground Fault Interrupter (GFI).

Current Sensor: 120 VAC with adjustable high and low alarm set points.

Visual Alarm: 7/8 inch (22 mm) diameter red lens, "push-to-silence." NEMA 4, 1-watt bulb, 120 VAC.

Touch Screen Display: interface module with 5.7 color touch screen.

Panel Enclosure: NEMA 4X, constructed of UV-resistant fiberglass. Conduit couplings provided.

Panel Enclosure: NEMA 4, steel construction. Stainless steel hinges and latch. Conduit couplings provided.

Remote Telemetry Unit: ATRTU-Net; self-powered 24 VDC at 10 mA max, 8 digital inputs, 8 analog inputs.

Expandable to 16 with expansion board.

On-board modem; 9600 baud Ethernet port; 10 base T, RJ45 jack.

Modbus port; R5422/485 terminals.

Deadfront user interface.

Flow Meter: Siemans, electromagnetic flow meter model MAG 3100, with 5000/6000 series transmitter.

Log daily flows on an hourly basis.

Optional Components:

\*\* NOTE TO SPECIFIER \*\* Delete optional components not required.

Pump Run Light: 7/8 inch (22 mm) green lens. NEMA 4, 1-watt bulb, 120 VAC.

Effluent Alarm: 95 db at 24 inches (610 mm), warble-tone sound.

Flashing Light: Lexan lens, flanged base, red, UL-recognized.

Heater: Anti-condensation heater. Self-adjusting, radiates additional wattage as temperature drops.

Intrinsically Safe Control Relays: 120 VAC. Listed per UL 698A, for Class 1 Div. 1, Groups A, B, C, D hazardous locations.

Larger enclosure required.

Manual Transfer / Disconnect Switch: 3-way (main, auto, off).

Event Counter: 120 VAC, 6-digit, non-resettable.

Elapsed Time Meter: 120 VAC, 7-digit, non-resettable.

Limit of 99,999 hours; accurate to 0.01 hours.

* + - 1. Ventilation System: Model AXVFACF or AXVFACF-HT as manufactured and supplied by Orenco Systems Incorporated or approved equivalent.
         1. Vent fans meeting the following requirements:

UL recognized.

Power Rating: 0.8Hp (00.6 kW), 115/230V, 1.4A/0.7A, single phase, 3400 RPM.

Provide up to 245 cu ft (6.94 cu m) per min at 0 inch (0 mm) H2O.

* + - * 1. Exhaust basin containing carbon filtering media shall be 12 inches (305 mm) in diameter.
        2. Basin: Ribbed PVC per ASTM D-1784 as manufactured by Orenco Systems, Incorporated or approved equivalent. Tested in accordance with AASHTO M304M-89.
        3. Risers: Factory-equipped with 6 inches (152 mm) layer of activated carbon for odor suppression.

\*\* NOTE TO SPECIFIER \*\* Heater is optional. Delete if not required.

* + - * 1. Heater: Thermolec, Model, FER-61.5-120 or approved equivalent.

Rating: 120V, 1000 watts, 8.3 amps.

Automatic reset thermal cut-out to prevent overheating.

\*\* NOTE TO SPECIFIER \*\* AX-Max Treatment Systems are intended for large-flow sites such as commercial and community applications that require advanced secondary treatment. They eliminate the need for separate recirculation and discharge tanks by performing both functions within a single module. AX-Max units are ideal for subdivisions, "fringe" development, hotels, resorts, schools, churches, businesses, manufactured home parks, RV parks, campgrounds, rest areas, and truck stops. Delete paragraph if not required.

* + 1. Basis of Design: AdvanTex AX-MAX Treatment Systems as manufactured and supplied by Orenco Systems Incorporated.
       1. Modular wastewater treatment systems for treating primary-treated effluent to better-than-secondary standards, including nitrogen-reduction. Systems consist of watertight fiberglass tanks incorporating recirculation-blend and discharge tankage in a single module. Each unit includes pumping systems and ventilation. Systems utilize lightweight, highly absorbent, engineered textile filter media.

\*\* NOTE TO SPECIFIER \*\* Delete models not required.

* + - * 1. Model AX-MAX075-14: Overall Length: 14 ft (4267 mm).

Footprint: 112.0 sq ft (10.4 sq m).

* + - * 1. Model AX-MAX100-14: Overall Length: 14 ft (4267 mm).

Footprint: 112.0 sq ft (10.4 sq m).

* + - * 1. Model AX-MAX125-21: Overall Length: 21 ft (6401 mm).

Footprint: 168.0 sq ft (15.6 sq m).

* + - * 1. Model AX-MAX150-21: Overall Length: 21 ft (6401 mm).

Footprint: 168.0 sq ft (15.6 sq m).

* + - * 1. Model AX-MAX175-28: Overall Length: 28 ft (8534 mm).

Footprint: 224.0 sq ft (20.8 sq m).

* + - * 1. Model AX-MAX200-28: Overall Length: 28 ft (8534 mm).

Footprint: 224.0 sq ft (20.8 sq m).

* + - * 1. Model AX-MAX225-35: Overall Length: 35 ft (10668 mm).

Footprint: 280.0 sq ft (26.0 sq m).

* + - * 1. Model AX-MAX250-35: Overall Length: 35 ft (10668 mm).

Footprint: 280.0 sq ft (26.0 sq m).

* + - * 1. Model AX-MAX275-42: Overall Length: 42 ft (12802 mm).

Footprint: 336.0 sq ft (31.2 sq m).

* + - * 1. Model AX-MAX300-42: Overall Length: 42 ft (12802 mm).

Footprint: 336.0 sq ft (31.2 sq m).

* + - 1. General Features:
         1. Length: 14-42 ft (4.2-12.8 m).
         2. Width: 90 inches (2286 mm).
         3. Height: 93 inches (2362 mm).
         4. Dry weight: Variable, up to 12,000 lbs (5440 kg).
         5. Treatment surface area: 25 to 300 sq ft (2.3 to 27.9 sq m), nominal.
         6. Installation footprint: 112 to -336 sq ft (10.4 to 31.2 sq m), actual.
         7. Installation methods: Partial burial or bermed installation, or free-standing installation; 24 to 36 inches (610 to 910 mm) above grade or berm for ease of maintenance; antifloatation available for areas with high groundwater.
         8. Recirculation-blend tankage: Included.
         9. Recirculation method: Tank baffle wall, recirc-return valve.
         10. Construction: Fiberglass-reinforced plastic with a thickness of 4 inches (102 mm).
         11. Stage 1: A pump and piping network recirculating water from the recirculation tank atop the hanging textile media. Filter Media: Hanging textile media.
         12. Stage 2: Pumps recirculating water from the recirculation tank atop the hanging textile media. Filter Media: Hanging textile media.

\*\* NOTE TO SPECIFIER \*\* Can be installed in multi-unit arrays to handle higher flows

* + - 1. Flow Capacity: 5,000 to 15,000 gal per day - Type 1 Applications (18.9 to 56.8 cu m per day).
      2. Pumps: Submersible High-Head Effluent pumps suitable for Class 1, Division 1 and 2 applications. Lightweight for easy removal and maintenance.

\*\* NOTE TO SPECIFIER \*\* Delete horsepower, model options not required.

* + - * 1. Horsepower: 1/2 (0.37 kW). Model PF300512; Pre-anoxic return (Rnox) pump.
        2. Horsepower: 3/4 (0.56 kW). Model PF500712.
        3. Horsepower: 1 (0.75 kW). Model PF501012.
        4. Horsepower: 1 (0.75 kW). Model PF751012.
        5. Horsepower: 2 (1.49 kW). Model PF1452012.
        6. Listed: UL and CSA for effluent use.
        7. Run Dry Capability: 24 hour minimum without water lubrication.
        8. Bypass Orifice: 1/8 inch (3 mm) ensuring flow circulation for motor cooling and to prevent air bind.
        9. Impeller: Floating design.
        10. Liquid Ends Repairable: By replacing impellers and diffusers, for better long-term cost of ownership.
        11. Rating: Continuous use. 100 cycles per day, minimum.
        12. Intake Screen: 1/8 inch (3 mm) mesh polypropylene.
        13. Protection: Internal thermal overload and internal lightning protection.
        14. Factory Tested: 3-point (Dead head, Design Flow, and Design Flow plus 30 percent) wet testing at the factory to confirm performance.
        15. Electric Supply Requirements: 230 VAC, single phase, 60 Hz, two-wire motor.

\*\* NOTE TO SPECIFIER \*\* Power cord below refers to pump model PF751012 only. Delete pump cord option not required.

* + - * 1. Power Cord: 1 to 30 ft (305 to 9144 mm) long extra heavy duty (SO) electrical cord with ground.
        2. Power cord: 10 to 30 ft (3048 to 9144 mm) long extra heavy duty (SO) electrical cord with ground.
        3. Lightweight for easy removal and maintenance.
      1. Mechanical Biological Batch Reactor: Submersible heavy duty, direct drive mixer to recirculate water for blending filtrate from 1st Stage with a carbon supplement and suspended media.
      2. Ventilation System:
         1. Individual Unit Fans: 3400 RPM. 245 cu ft (6.94 cu m) per min at 0 inch (0 mm) H2O minimum.

Listed: UL.

Horsepower: 0.8 (0.6 kW).

Electric Power Requirements: 115/230 VAC, 1.4/0.7 A.

Exhaust: Forced through enclosure containing activated carbon capable of odor removal for one year, minimum.

* + - * 1. Combined Ventilation Fans: 3450 RPM. 100 cu ft (28.32 cu m) per min minimum per AX-Max unit.

Cincinnati Fan Model LMF-6 or approved equivalent.

Mounted in control building.

Rating: Continuous duty.

Housing: Commercial grade 319-cast aluminum.

Spark Resistance: AMCA Type C.

* + - * 1. Air Line Pipe Insulation: Heated air from control building to AX-Max units.

Rating: Underground burial.

Pittsburgh Corning FOAMGLAS ONE INSULATION or approved equivalent.

Jacketing: PITTWRAP SS JACKETING or approved equivalent.

* + - 1. Splice Box Conduit Seals and Sealants:
         1. Re-installed splice boxes.
         2. Waterproof Butt Splice Connectors: UL listed.
         3. Conduit Seal Kit: UL-approved, and accessible above ground.

Prevent the passage of gases, vapors, or flames through the conduit to the control panel.

Additional UL classified sealant at the splice box coupling preventing condensation accumulation in the splice box.

Moisture-cure polyurethane quick drying foam or approved equivalent with an R-5 rating for each inch of foam.

Silicone sealant or approved equivalent. Neutral cure silicone, non-acetic, non-corrosive silicone withstanding temperatures to 450 degrees F (232 degrees C).

\*\* NOTE TO SPECIFIER \*\* Delete chemical feeder type not required.

* + - 1. Dry Chemical Feeder: Model DCF; 8 cu ft (226.5 L).
         1. Construction: Corrosion-resistant stainless steel and durable fiberglass parts.
         2. Power Supply: Variable-speed AC, 0.5 hp (0.37 kW), 6.8A, 90 VDC motor.
         3. Feed Capacity: 0.35 to 17.64 oz per min (10 to 500 gr per min).
      2. Liquid Chemical Feeder: Model LCF3036-SS. Injects alkalinity mix into pre-anoxic return line to the flow equalization/pre-anoxic tank.
         1. Construction: Corrosion-resistant stainless steel and durable fiberglass parts.
         2. Direct Drive Mixer: 1/3 hp (0.25 kW) 1750 rpm, to keep slurries in suspension.
         3. Alkalinity Feed Rates: Controlled by peristaltic pump; 0.9 gal per hr (3.4 L per hr) to the injection point.
         4. Pump Speed Control: 4 to 20 m/A, 0 to 10 VCD, or pulse inputs.

\*\* NOTE TO SPECIFIER \*\* Intended for small-flow applications requiring advanced secondary treatment, including new installations, retrofits, or repairs. Separate recirculation and discharge tanks are not required. Both functions are performed in a single module. Ideal for sites with shallow-bury requirements, poor soils, or for small lot sizes. With proper flow-splitting, they can be installed in multi-unit arrays to handle higher flows. Delete paragraph if not required.

* + 1. Basis of Design: AdvanTex AX-RT Treatment Systems as manufactured and supplied by Orenco Systems Incorporated.
       1. Modular wastewater treatment systems for treating primary treated effluent to better-than-secondary standards, including nitrogen reduction. Systems consist of watertight fiberglass basins incorporating recirculation-blend tankage and discharge tankage into a single module. Systems utilize lightweight, highly absorbent, engineered textile filter media.
       2. Model AX20-RT: 500 gal per day - Type 1 Applications (1890 L per day).
          1. Performance Requirements:

\*\* NOTE TO SPECIFIER \*\* Delete NSF certified system if not required.

NSF Certified System: NSF/ANSI Standard 40 for class I systems.

\*\* NOTE TO SPECIFIER \*\* Delete UV disinfection not required.

UV disinfection.

\*\* NOTE TO SPECIFIER \*\* Delete discharge options not required.

Gravity discharge. Dry Weight: 883 lbs (400 kg).

Pump Discharge: 10 gal per min (0.6 L per sec); 120 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 10 gal per min (0.6 L per sec); 230 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 20 gal per min (1.3 L per sec); 120 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 20 gal per min (1.3 L per sec); 230 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 30 gal per min (1.9 L per sec); 120 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 30 gal per min (1.9 L per sec); 230 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 50 gal per min (3.2 L per sec); 120 Vac. Dry Weight: 923 lbs (419 kg).

Pump Discharge: 50 gal per min (3.2 L per sec); 230 Vac. Dry Weight: 923 lbs (419 kg).

\*\* NOTE TO SPECIFIER \*\* Delete float switch option not required.

Float Switch: Mercury.

Float Switch: Non-mercury.

\*\* NOTE TO SPECIFIER \*\* Delete either or both of the following to paragraphs if not required.

Ultra-cold weather package.

Antifloatation kits.

* + - * 1. General Features:

Length: 102 inches (2590 mm).

Width: 62 inches (1575 mm).

Height: 72 inches (1829 mm).

Dry Weight: 900 lbs (408 kg).

Treatment Surface Area: 20 sq ft (1.9 sq m), nominal.

Installation Footprint: 45 sq ft (4.2 sq m), actual.

Installation Methods: Partial burial or bermed installation; minimum 2 inches (51 mm) above grade.

Recirculation-Blend Tankage: Internal.

Recirculation Method: Tank baffle wall, recirc-return valve.

Footprint; Overall Unit: 44 sq ft (4.11 sq m).

Footprint; Visible after installation: 20 sq ft (1.86 sq m).

Lid Insulation Value: R-6 (RSI-1.1).

Components:

Biotube effluent filter; in septic tank.

Inlet.

Treatment Tank:

Recirculating blend chamber.

Tank baffle.

Recirculating return valve.

Recirculating transfer line.

Recirculating filtrate chamber.

Recirculating pumping system.

Discharge pumping system (pump discharge only).

Manifold and spin nozzles.

Textile Treatment media.

Outlet.

Splice box.

Passive air vent.

\*\* NOTE TO SPECIFIER \*\* Delete control panel option not required.

Control Panel: Remote telemetry control panel and monitoring.

Control Panel: Non-telemetry controls.

* + - 1. Model AX25-RT: 625 gal per day - Type 1 Applications (2365 L per day).
         1. Performance Requirements:

\*\* NOTE TO SPECIFIER \*\* Delete NSF certified if not required.

NSF Certified System: NSF/ANSI Standard 40 for class I systems.

\*\* NOTE TO SPECIFIER \*\* Delete discharge options not required.

Gravity discharge. Dry Weight: 908 lbs (412 kg).

Pump discharge: 10 gal per min (0.6 L per sec); 120 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 10 gal per min (0.6 L per sec); 230 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 20 gal per min (1.3 L per sec); 120 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 20 gal per min (1.3 L per sec); 230 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 30 gal per min (1.9 L per sec); 120 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 30 gal per min (1.9 L per sec); 230 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 50 gal per min (3.2 L per sec); 120 Vac. Dry Weight: 948 lbs (430 kg).

Pump discharge: 50 gal per min (3.2 L per sec); 230 Vac. Dry Weight: 948 lbs (430 kg).

\*\* NOTE TO SPECIFIER \*\* Delete float switch option not required.

Float Switch: Mercury.

Float Switch: Non-mercury.

\*\* NOTE TO SPECIFIER \*\* Delete either or both of the following to paragraphs if not required.

Ultra-cold weather package.

Antifloatation kits.

* + - * 1. General Features:

Length: 102 inches (2590 mm).

Width: 62 inches (1575 mm).

Height: 72 inches (1829 mm).

Footprint; Overall Unit: 44 sq ft (4.11 sq m).

Footprint; Visible After Installation: 20 sq ft (1.86 sq m).

Lid Insulation Value: R-6 (RSI-1.1).

Components:

Biotube effluent filter; in septic tank.

Inlet.

Treatment Tank:

Recirculating blend chamber.

Tank baffle:

Recirculating return valve.

Recirculating transfer line.

Recirculating filtrate chamber.

Recirculating pumping system.

Discharge pumping system (pump discharge only).

Manifold and spin nozzles.

Textile treatment media.

Outlet.

Splice box.

Passive air vent.

\*\* NOTE TO SPECIFIER \*\* Delete control panel option not required.

Control Panel: Remote telemetry control panel and monitoring.

Control Panel: Non-telemetry controls.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required. AdvanTex treatment systems are controlled by Orenco controls TCOM™ telemetry-based control panel. The panel can be connected to landlines, cellular service, Internet, or satellite service and used to control, monitor, and collect data on sensors, pumping equipment, and operational parameters and events in real time. Alarms may be set according to system parameters. Operators can remote access the control unit, determine alarm cause, and address the situation without being physically present at the facility. The panel can use trend data for automatically adjusting timer settings, based on established recirculation ratios. Additional equipment controls for pretreatment, tertiary treatment, or disinfection can be incorporated. SCADA systems can also be incorporated. Consult with Orenco to discuss integration needs.

* 1. CONTROLS
     1. Listed: UL 508. Controls and alarms.
     2. Panels: Orenco Systems, Inc. TCOM control panel or approved equivalent.
        1. Repairable in the field without soldering irons or substantial disassembly.
        2. Real-time connectivity with the telemetry control panel and alarm communication.

\*\* NOTE TO SPECIFIER \*\* Delete the connectivity options not required.

* + - * 1. Dedicated phone line.
        2. Ethernet cable.
        3. InGateway 601 series cellular modem, model IG601.
      1. Data Collection and Utilization: Logs data for system conditions and events such as daily flows, pump run time, pump cycles, and alarm conditions. Store log data for minimum of one year.
      2. Downloadable Logs: DIF or ASCII format.
      3. Multi-Level Password Security: Only qualified personnel can remotely access site.
      4. Program Logic Rules: "If - then" declarations.
         1. Rules based on several operands, including the following:

Input and output status.

Point status.

Date: mm/dd/yy format.

Time of day: 24 hour clock.

Timers.

* + - 1. Historical Data: For control optimization or detection of trends.
      2. Schedule Functions: Control digital "points" based on date or day of week and time.
      3. Automatic daylight savings time adjustment.
      4. Automatic call-out to pagers during alarm conditions when panel detects trends that could lead to system failure.
    1. Real-time direct connection to panel via laptop serial port, allowing real-time access to detailed logged data and ability to change point values.
       1. Standard Components:
          1. Motor-Start Contactor: 17 FLA, 1 to 2 hp (0.75 to 1.49 kW), 60 Hz; 2.5 million cycles at FLA (10 million at 50 percent of FLA for 230 VAC.
          2. HOA 3-Way Toggle Switch: Single-pole switch, Hands (manual) Off, Auto ON. 20 amps, 1 hp (0.75 kW).
          3. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 120 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
          4. Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole for 120 VAC or double-pole for 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
          5. Audio Alarm: 80 dB at 24 inches (610 mm), warble-tone sound.
          6. Ground fault interrupter (GFI), 120 VAC.
          7. Current Sensor: 120 VAC with adjustable high and low alarm set points.
          8. Visual Alarm: 7/8 inch (22 mm) diameter red lens, "push-to-silence." NEMA 4, 1-watt bulb, 115 VAC.
          9. Panel Enclosure: NEMA 4X rated. Conduit couplings provided.

Construction: UV-resistant fiberglass or NEMA 4, constructed of steel.

Hinges and Latches: Stainless steel.

* + - * 1. Remote Telemetry Unit: ATRTU-Net; self-powered 24 VDC at 10 mA max, 8 digital inputs, 8 analog inputs.

Expandable to 16 with expansion board.

On-Board Modem: 9600 baud.

Ethernet Port: 10 base T, RJ45 jack.

Modbus Port: R5422/485 terminals.

* + - * 1. Touch Screen Display: Interface module with 5.7 color touch screen.
        2. Flow Meter: Siemans, electromagnetic flow meter model MAG 3100, with 5000/6000 series transmitter. Logs daily flows and flows on an hourly basis.
      1. Optional Components:
         1. Pump Run Light: 7/8 inch (22 mm) green lens. NEMA 4, 1-watt bulb, 120 VAC.
         2. Effluent Alarm: 95 db at 24 inches (610 mm), warble-tone sound.
         3. Flashing Light: Lexan lens, flanged base, red, UL-recognized.
         4. Heater: Anti-condensation heater. Self-adjusting, radiates additional wattage as temperature drops.
         5. Surge Arrestor: AG2401 120/230 V, three 18 inch (457 mm) leads, rated for a maximum of 32,000 Amps. Listed: UL and CSA.
         6. Manual Transfer and Disconnect Switch: 3- Way (main, auto, off).
         7. Event Counter: 120 VAC, 6-digit, non-resettable.
         8. Elapsed Time Meter: 120 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required. Orenco's TCOM control panels are typically housed in a fiberglass shelter/building, but they are also available with multiple enclosure types if a shelter is not used. However, for ease of operation, they should be protected from direct sunlight to protect the electronics and allow the operator access without direct exposure to the elements (rain, snow, etc.).

* 1. CONTROL BUILDING
     1. Basis of Design: Control Building by Orenco Systems. Incorporated fiberglass shelter or approved equivalent to house controls and chemical feeders.
        1. DuraFiber fiberglass building or engineered-approved equal to house controls, chemical feed units, and other equipment.
        2. Construction: Complete seamless, molded, one-piece enclosure with an insulated foam-core wall monolithically poured.
           1. Capable of withstanding 160 mph winds (257.5 kph).
           2. Delivered fully assembled and ready to be connected to incoming power.
           3. Contractor shall provide a concrete slab per plans and specifications.
        3. Roof: Capable of handling a 100 lbs per sq ft (488.2 kg per sq m) live load.
        4. Dimensions: Width: 8 ft (4978 mm). Length and height are dependent on project requirements.
        5. Material:
           1. Fiberglass: Fiberglass building shall be manufactured from fiberglass reinforced polyester resin, using grades of resin and fiberglass considered acceptable for use in water and wastewater environments.
           2. Insulation: Insulation foam shall be a minimum 2 lbs per cu ft (32 kg per cu m) polyurethane or polyisocyanurate. The inside surface shall be protected with a polyester gelcoat; the outside surface shall be protected with a high performance polyaspartic urethane for continuous outdoor exposure. Interior color shall be white; exterior color shall be torque tan. Building shall be free of any wood product.
        6. Walls and Ceiling: Seamless, molded, one-piece unit manufactured using a closed-molded RTM or vacuum-infusion process to ensure integral bonding of the foam core with the fiberglass laminates. 3 inches (76 mm) thick with minimum insulation value of R18. Fiberglass laminate on either side of the foam core is a minimum of .17 inches (4 mm).
           1. Integral pocket flange built into bottom of building wall for securing building to concrete slab.
           2. Spay-up type manufacturing process is not acceptable.
        7. Entry Door: 48 x 80 inches (1219 x 2032 mm) insulated fiberglass entry door with stainless steel hardware and threshold shall be included.
           1. Made with a 2 inches (51 mm) minimum polyurethane or polyisocyanurate foam core. Density: 2 lbs per cu ft (32 kg per cu m) minimum.
           2. Manufactured using a closed-molded RTM or vacuum-bagging process. Spay-up type manufacturing process is not acceptable.
           3. Hardware:

Door hung on 4 x 4 inches (102 x 102 mm) stainless steel ball bearing hinges with non-removable pins. The hinges are bolted through the door jamb with 304 stainless steel fasteners.

Equipped with grade 1 Corbin Russwin lockset with Rhodes style handle.

Framing for the door constructed of fiberglass, manufactured using a closed-molded RTM or pultrusion process.

Equipped with door closer, Norton 8301H or equivalent. A full-power-range closer with a "hold open" option.

* + - 1. Lift Points: Lifting brackets or eyebolts installed on roof exterior to allow lifting of the building by crane, excavator, or similar equipment.
         1. Manufacture Workmanship Warranty: 10 year limited.
      2. Building Options:
         1. Load Center: Eaton with BR series circuit breakers or approved equal.

Provide panel schedule of control building at time of submittal.

* + - * 1. Lighting:

Interior: Vapor-tight fluorescent wrap around, model Lithonia DMW232M or approved equal.

Exterior: Compact fluorescent wall pak, model Lithonia TWS 42TRT 120PE L/LP, photocell or approved equal.

* + - * 1. Heat, Ventilation and Air Conditioning:

Heater: Surface mounted, adjustable-wattage up to 1.5 kW with integrated thermostat. King model SL1215 or approved equal.

Ventilation Fan: Inline centrifugal duct fan, 100 cfm at .2 inches (51 mm) SP. Model Fantech FR100 or approved equal.

Intake Vent: Aluminum, in door with insect screen and rain cover. Dayton 5NKLO or approved equal.

* + - * 1. Electrical Outlets: Duplex 125V, 15A with ground fault circuit interruption.
        2. Electrical equipment shall be surface mounted. All electrical equipment shall be installed and wired in conformity to the latest edition of the National Electric Code.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. OPERATION AND MAINTENANCE MATERIALS:
     1. Maintenance Manuals: Manufacturer shall provide 5 operation and maintenance manuals, 4 to be sent to the Owner and 1 sent to the Architect/Engineer.
     2. Spare Parts: The Manufacturer shall provide a spare pump, spare floats, control components, and nozzles, and various other components deemed necessary.
     3. Lateral Brush Cleaning Kit: Model OM AX-LAT as manufactured and supplied by Orenco Systems, Incorporated or approved equivalent. 90 inches (2286 mm) lateral cleaning brush used to clean 1-1/4 inches (32 mm) diameter laterals.
     4. Sheet Cleaning Wand: Model OM-AX Cleaning Wand as manufactured and supplied by Orenco Systems Incorporated or approved equivalent. Wand shall have the ability to connect to a standard garden hose and fit in between AX sheets to spray off debris.
     5. Field Test Kit:
        1. pH test strips (0-14 pH).
        2. Alkalinity test strips (0-240 ppm).
        3. Ammonia (NH3-N) test strips (0-6 ppm).
        4. Nitrate/Nitrite (NO3-N / NO2-N) test strips (0-50 ppm).
        5. Dissolved Oxygen (DO) kit (1-12 ppm).
        6. Chloride titrators (30-600 ppm & 300-6000 ppm).
        7. Turbidity kit (0-200 NTUs).
        8. Thermometer: 0 to 240 degrees F (minus 17.8 to 115.5 degrees C).
        9. Monitoring Parameters:
           1. pH.
           2. Alkalinity.
           3. Ammonia (NH3-N).
           4. Nitrate/Nitrite (NO3-N / NO2-N).
           5. Dissolved Oxygen (DO).
           6. Chlorides.
           7. Turbidity.
           8. Temperature.
     6. Biotube Cartridge Cleaning Cradle: Model OM-BIOTUBE CRADLE as manufactured and supplied by Orenco Systems Incorporated or approved equivalent. For housing the Biotube Effluent Filter cartridges for cleaning and maintenance.
     7. Biotube Cartridge Cleaning Brush: Model OM-BIOTUBE BRUSH as manufactured and supplied by Orenco Systems Incorporated or approved equivalent. For cleaning the Biotube Effluent Filter cartridges.
     8. Scum Measuring Utility Gauge: Model SMUG as manufactured and supplied by Orenco Systems Incorporated or approved equivalent. Consists of a minimum 3/8 inch (9.5 mm) diameter stainless steel rod with an incremental scale for measuring scum levels. The rod shall be bent at a 90 degree angle at the base to aid in identifying the scum "by feeling."
     9. Sludge Measuring Device: Model SLUDGE JUDGE ULTRA as manufactured and supplied by Orenco Systems Incorporated or approved equivalent.
        1. Construction: Polycarbonate treated with an ultraviolet stabilizer. Cold weather durable. Heat tolerable up to 280 degrees F (137.8 degrees C). 3/4 inch (19 mm) diameter and marked with tape to designate 1 ft (305 mm) increments.

1. EXECUTION
   1. EXAMINATION AND PREPARATION
      1. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance.
      2. Do not begin installation until substrates have been properly prepared.
      3. If substrate preparation is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation before proceeding.
   2. PRECONSTRUCTION CONFERENCE
      1. Prior to site work, a conference attended by the Owner, Contractor, Architect, Engineer, Manufacturer, Operator, and others as appropriate to establish a working understanding among the parties as to work involved installing components of the treatment system.
         1. Designate an Inspector for the installation of the treatment system. Cost or fees associated with services of the Inspector and Architect/Engineer during construction will be the responsibility of the Owner.
   3. INSTALLATION
      1. Install in strict accordance with manufacturer's instructions, recommendations, and approved submittals.
         1. Follow manufacturer's recommendations.
      2. Manufacturer shall provide the services of a trained representative.
         1. Instruct the installing Contractor's crew and Inspector regarding the installation and field testing of each component.
         2. Trained representatives provide installation and field testing training services for a minimum of 1 visit of a minimum of 1 eight-hour day at the beginning of construction.

\*\* NOTE TO SPECIFIER \*\* Paragraph below applies to model ADVANTAX100. Delete if not required.

* + 1. Control Panel: Mounted on an exterior backboard or inside a control building, nearest the tank and pumps.
       1. Exterior Wall Mounting: Select a garage or outbuilding where the sound of the motor contactor engaging will not be noticed.
          1. Garage or Outbuilding not Available: Installation should include sound deadening insulation. Post and panel mounting assemblies are acceptable. Mount in shade and protected from weather.
       2. Located within 50 ft (15.24 m) and in sight of pump motor or provide a lockable disconnect switch.
       3. Mounted Height: Commonly 5 ft (1524 mm) from ground level and easily accessible for maintenance.

\*\* NOTE TO SPECIFIER \*\* Paragraph below applies to model AXMAX. Delete if not required.

* + 1. Control Panel: Mounted on beneath an awning or within a building nearest the tank and pump. Mount in shade and protected from weather.
       1. Mounted Height: Commonly 5 ft (1524 mm) from ground level and easily accessible for maintenance.
    2. Riser: For cold weather areas, backfill with 3/8 inch (9.5 mm) pea gravel or other similar granular material to prevent frost heave.
  1. QUALITY CONTROL
     1. To Ensure Quality Control: Inspector shall inspect and certify that an initial installation of the AdvanTex system is in compliance with manufacturer's recommendations and requirements.
     2. Upon Completion of Inspection: Inspector in coordination with Architect/Engineer, shall perform or direct the Contractor to perform any required adjustments to the equipment and place equipment into operation under the supervision of the Architect/Engineer.
        1. Equipment and materials required to perform the testing shall be the responsibility of the Contractor.
        2. Letter of Completion: Signed by the Inspector and copies faxed, emailed, or mailed to the Architect/Engineer and manufacturer within 1 week of the AdvanTex system being installed and prior to System Commissioning.
     3. The Manufacturer shall provide the services of a trained representative for a minimum of 1 visit of a minimum of 1 eight hour day for the purpose of quality control during construction.
     4. Manufacturer shall provide the services of a trained representative for training the Owner's service provider and inspecting the AdvanTex installation. The inspection will include items covered from the installation training.
  2. SYSTEM COMMISSIONING
     1. The manufacturer shall provide the services of a trained representative for a minimum of 1 visit of a minimum of 1 eight hour day for the purpose of commissioning.
     2. Manufacturer shall provide the services of a trained representative for system commissioning and shall provide the Architect/Engineer a written report of findings.
        1. The Architect/Engineer should then perform or direct the Contractor to perform any required adjustments to the equipment and place equipment into operation.
        2. Equipment and materials required to perform additional testing shall be the responsibility of the Contractor.
        3. Manufacturer shall submit to the Architect/Engineer and Owner, a detailed start-up checklist, according to the manufacturer's inspection and startup procedures.
  3. PROTECTION
     1. Protect installed products until completion of project.
     2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION