SECTION 136010

UNDERGROUND MOTOR FUEL PIPING AND RELATED SYSTEMS

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
   1. SUMMARY
      1. Related Documents: The work of this Section is governed by [Division 1].
      2. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.
      3. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with the contract documents.
      4. In general, the work of this Section includes furnishing labor, equipment and materials necessary to perform the excavation, trenching, de-watering, bedding, backfilling, compaction, shoring and off-site disposal of excess and unsuitable materials during installation of fuel piping, underground storage tanks, transition sump pits, fuel related electrical conduit, and all other related utilities specified or indicated in the Contract Documents.
      5. Related work specified in other Sections includes, but is not necessarily limited to:
         1. Section 136000 Motor Fuel Underground Storage Tanks
         2. Section 136020 Motor Fuel Electrical System
         3. Section [ ]
   2. REFERENCES
      1. American Petroleum Institute:
         1. API 12P - Fiberglass Reinforced Plastic Tanks.
         2. API 1615 - Installation of Underground Petroleum Storage Systems.
         3. API 1632 - Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems.
         4. API 2000 - Venting Atmospheric and Low-Pressure Storage Tanks: Non-refrigerated and Refrigerated.
      2. ASTM International:
         1. ASTM D4021: Glass Fiber Reinforced Polyester Underground Petroleum Storage Tanks.
         2. ASTM C136: Standard Test Method for Sieve Analyses of Fine and Coarse Aggregates.
         3. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics Using Modified Effort
      3. NACE International:
         1. NACE RP-02-85 - Corrosion Control of Underground Storage Tank Systems by Cathodic Protection.
      4. National Electrical Manufacturers Association:
         1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
         2. NEMA WD 1 - General Requirements for Wiring Devices.
         3. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
         4. NEMA FG 1 - Nonmetallic Cable Tray Systems.
         5. NEMA VE 1 - Metal Cable Tray Systems.
         6. NEMA VE 2 - Metal Cable Tray Installation Guidelines.
      5. National Fire Protection Association:
         1. NFPA 30 - Flammable and Combustible Liquids Code.
         2. NFPA 30A – Code for Motor Fuel Dispensing Facilities and Repair Garages.
      6. International Code Council
         1. International Fire Code
      7. Petroleum Equipment Institute:
         1. PEI RP100 - Recommended Practices for Installation of Underground Liquid Storage Systems.
      8. Underwriters Laboratories Inc.:
         1. UL 567 - Pipe Connectors for Flammable Liquids and Combustible Liquids and LP-Gas.
         2. UL 913 - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations.
         3. UL 971 - Nonmetallic Underground Piping for Flammable Liquids.
   3. DEFINITIONS
      1. Degree of Compaction: Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557, for general soil types, abbreviated as percent laboratory maximum density.
   4. SUBMITTALS
      1. Comply with [ ] General Requirements.
      2. Shop Drawings: Submit original copies of product data submittals for materials and equipment in Part 2 of this section including, but not limited to:
         1. Pipe bedding and backfill material.
         2. Leak detection and monitoring equipment.
         3. Piping.
         4. Valves.
         5. Containment Sumps.
         6. Spill Containment Manholes.
         7. Mechanical Overfill Device
         8. Audible/Visual Overfill Alarm
         9. Dispensers.
         10. Submersible Turbine Pumps.
      3. Test Reports: Submit written test results for all tests as outlined in this specification.
      4. Manufacturer’s Field Reports: Submit report of each visit of manufacturer’s representative to provide technical assistance during installation.
      5. State Installer Certification: Certify tank installers employed on the Work, verifying that all workers meet State installer requirements.
      6. Record Drawings: Submit record drawings in accordance with [ ].
      7. Operation and Maintenance Manuals: Submit copies of the Operation and Maintenance Manual in compliance with Closeout Submittals.
      8. Manufacturer certifications: Submit manufacturer certifications for underground piping, dispensers and environmental monitoring system installers.
   5. CLOSEOUT SUBMITTALS

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**NOTE TO SPECIFIER**

Closeout documents are critical for the successful fueling system project, because a complete set of closeout documents is necessary for the facility to meet life-cycle compliance requirements. This specification section is intended to be highly detailed, as experience has shown that contractors are much better able to comply with a detailed list including specific state and other regulatory forms and reports, and manufacturer checklists. As such, this section should be made as specific as possible. The state or other governing UST regulatory program will have most of the information needed for the appropriate level of specificity. Also, consult manufacturers for their installation checklists and test reports. The final closeout list should be coordinated with the “field quality control section” such that all test forms identified there as required, are included in the closeout list.

Coordinate this section with the corresponding section in 136000 and 136020.

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* + 1. Comply with pertinent provisions of [ ]. In addition, comply with the specifics and additional provisions of this chapter. For the purposes of this section, the terms “Manuals and Instructions” and Closeout Documents” are used interchangeably.
    2. Coordinate closeout submittals with sections 136000 and 136020 to provide a single package for the project.
    3. Format of Closeout Documents, including Operation and Maintenance Manuals and Record Document
       1. Provide Electronic (pdf format for documents and jpeg format for photos) of all closeout documents, record documents, drawings, manuals, operating instructions, warranties, and all other documents referenced in this and related sections. Submission shall be on CD-ROM discs readable by Windows operating system. Files should be organized in logical folders and subfolders.
       2. In addition, provide bound manuals with all closeout documents, including record documents and drawings. Provide two bound manuals/sets of documents. Bind Manuals in hardcover, three-ring binders, and provide identified dividers with tabs. Use multiple volumes as needed. Do not use three ring binders larger than 3 inches. Copies of faxed pages are unacceptable.
       3. Obtain at time of purchase of equipment, two copies of operation, lubrication and maintenance manuals for all items. Assemble these manuals in the three ring binders above, and provide electronic versions.
       4. Furnish hard copy and electronic manuals for the fuel system to Engineer for approval and distribution to Owner within 30 days of completion of the fuel system. Included shall be 8 hours of training and review at which time the contractor shall review the contents of closeout documents with fuel system operating personnel.
    4. Manuals, Instructions, and Closeout Documents shall include the following items. Items shall be for the new fuel system facility:
       1. A minimum of 96 high resolution (no less than 4 mega-pixels) digital (.jpeg format) photographs depicting the installation at each critical construction phase. Particular attention should be paid to underground, buried, and normally inaccessible components.
       2. Underground piping manufacturers’ installation checklists with proof of delivery to manufacturer.
       3. Environmental Monitoring System final setup printout.
       4. Underground sump test records (dispenser, and intermediate/transition sumps)
       5. Dispenser registration documentation and proof of transmittal to manufacturer.
       6. Dispenser calibration documentation.
       7. A copy of the Weights and Measures jurisdiction calibration report.
       8. Copies of any State/Local approvals, authorizations, permits, and registrations to include:
          1. [ ];
          2. [ ];
          3. [ ].
       9. Piping Test Results, Vapor Recovery Test Results, and Test Results for all secondary containment structures or annuluses and all containment sumps.
       10. Records of all other inspections and tests to include:
           1. [ ]; and
           2. [ ].
       11. Automatic line leak detector test results and electronic release detection equipment (sensors and probes) test results on state regulatory agency forms.
       12. Warranties for all equipment and apparatus. In general, any product manufacturer documentation that was provided with the equipment shall be provided as part of the closeout documents. Any warranty requiring forms or checklists shall be completed and fully executed.
       13. Training certification for instruction seminars signed by the individuals trained on these systems.
       14. All instruction bulletins, preventive maintenance schedules, operational instructions, and parts lists provided with the tanks, dispensers, monitoring system, and all other systems.
       15. Waste disposal documentation (if any).
       16. Other environmental information or permits (if any).
       17. Copies of receipts for any keys, locks, or other equipment turned over to the Owner.
       18. Operating and installation manuals and instructions for each piece of equipment that was provided with manuals or instructions, including but not limited to the tank installation instructions.
  1. QUALITY ASSURANCE
     1. Qualifications: Use adequate numbers of skilled, licensed individuals who are thoroughly trained and experienced in the installation and testing of the specified systems and who are completely familiar with the requirements and the methods needed for proper performance of the work of this Section.
     2. Substitutions: Where permitted, comply with Section 016000.
     3. Materials and Equipment shall be manufactured, installed, and tested as specified in latest editions of applicable publications, standards and ruling of:
        1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
        2. National Fire Protection Association (NFPA).
        3. Occupational Safety and Health Act (OSHA).
        4. Factory Mutual Association (FM).
        5. Underwriter’s Laboratories (UL).
        6. American Petroleum Institute (API).
     4. The most recent editions of applicable specifications and publications of the following organizations form part of the Contract Documents:
        1. American National Standards Institute (ANSI).
        2. American Society of Mechanical Engineers (ASME).
        3. National Electric Manufacturers Association (NEMA).
        4. American Society for Testing of Materials (ASTM).
        5. American Welding Society (AWS).
        6. Manufacturers Standardization Society of the Valve and Fitting Industry (MSS).
     5. Tests of all Contractor secured materials and products being submitted for approval to determine conformance with all requirements of the Contract Documents, including borrow materials proposed for use, shall be performed by an independent testing laboratory retained and compensated by this Contractor.
     6. As materials are incorporated into the project, on-site and off-site quality control tests shall be performed during construction to determine conformance with the Contract Documents by an independent testing laboratory retained and compensated by this Contractor.
     7. Quality assurance testing to validate results of quality control tests performed by the Contractor’s testing laboratory shall be performed by an independent testing laboratory retained and compensated by the Owner.
     8. All fuel system equipment shall be compatible with oxygenated fuel blends including up to 15% Ethanol and 20% biodiesel blends.
     9. Complete the gasoline system installation in accordance with the requirements of the State of [ ].
     10. Comply with the testing and field quality control requirements elsewhere in this section.
  2. PERMITS AND SUBMISSIONS
     1. The Contractor shall be responsible for all permits and notifications required by State and Local codes and regulations.
     2. Specifically at a minimum, the Contractor shall make the following submissions to the State of [ ] Department of [ ]:
        1. [ ].
        2. [ ].
        3. [ ].
        4. [ ].
     3. The Contractor shall also be responsible for the making the following submission to the [ ] Weights and Measures:
        1. [ ].
     4. Copies of all submissions and permits/registrations received shall be provided as part of the closeout documentation.
  3. QUALIFICATIONS
     1. Manufacturer: Utilize companies specializing in manufacturing products specified in this section with minimum five years documented experience.
     2. Leak Detection Systems: The installing contractor of the Environmental Monitoring System shall the highest level manufacturer installer certification.
     3. Tank Installer: Company specializing in performing Work of this section with minimum ten years documented experience. The Contractor installing the Gasoline System shall be a State certified installed when required.
     4. Provide a manufacturer certified installer to supervise the installation of the underground UL-971 piping systems (both semi-rigid and fiberglass reinforced plastic). Provide installers of the aboveground pre-manufactured piping system that have a resume of significant experience installing the system, including at least 10 years of demonstrated experience.
  4. GENERAL CONDITIONS
     1. Lines and grades shall be as indicated. Establish and maintain temporary benchmarks on the site for reference. All vertical dimensions shall be verified from these benchmarks.
     2. All permanent benchmarks shall be protected from disturbance or destruction. Any point disturbed or destructed shall be immediately replaced by a qualified surveyor at this Contractor’s expense. Documentation of any such relocation or replacement shall be given to the Engineer.
     3. Disposition of Utilities
        1. Adequately protect from damage all active utilities and remove or relocate only as indicated, specified or directed.
        2. Report inactive and abandoned utilities encountered in excavating and grading operations to the Engineer. Remove, plug or cap as directed by the Engineer.
        3. Provide a minimum of a 48 hour notice to the Engineer and receive written notice to proceed before interrupting any utility.
     4. Stockpiling of topsoil and other excavated materials will be permitted on-site within the project limits on a case by case basis provided the stockpiles are constructed and maintained in a manner that does not create a foreign object damage risk or adversely affect any other ongoing construction or operation at the site.
     5. During windy or wet conditions and at the conclusion of each day’s work period, cover all excavated material to prevent it from becoming saturated or being displaced by wind or rain. Anchor all sides of covering as required to hold the covering firmly in place. In all cases, provide additional measures as necessary to prevent erosion, sedimentation and wind-borne displacement of excavated materials from their stockpiled location.
     6. Before beginning any work specified in this Section, the Contractor shall make certain that all applicable soil erosion and sediment control requirements are compiled with and the proper authorities have been informed of the construction schedule.
     7. Provide the services of a registered land surveyor to lay out all fuel related work perform under this Contract.
  5. DELIVERY, STORAGE, AND HANDLING
     1. Comply with [ ].
     2. Protect equipment, materials and specialties from elements and other damages caused during shipment, storage and erection until final acceptance from the Owner.
  6. ENVIRONMENTAL REQUIREMENTS
     1. Comply with [ ].
     2. Do not install underground piping when bedding is wet or frozen.
  7. FIELD MEASUREMENTS
     1. Verify field measurements prior to fabrication.
  8. COORDINATION
     1. Comply with [ ].

1. PRODUCTS
   1. EARTHWORK MATERIALS
      1. Underground Pipe Bedding and Backfill Material
         1. Provide underground pipe bedding and backfill material in strict accordance with the UL-971 piping manufacturer’s installation instructions.
         2. Provide a laboratory Certificate of Sieve Analysis (ASTM Method C136) to the Owner for approval prior to backfilling.

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**NOTE TO SPECIFIER**

Adjust general site fill materials (crushed stone and crushed gravel) to meet site specific conditions or to meet the recommendations of a geotechnical report. Do not vary tank backfill materials from that required by that tank manufacturer.

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* + 1. Granular Fill
       1. Crushed stone and similar base materials shall be material that will compact and adequately bond under watering and rolling. Base course materials are to be placed in one or more layers, rolled thoroughly, and compacted until the material does not creep or wave ahead of the roller. All coarse aggregates shall be removed, and the finish surface of the base must be firm and free of loose material.
       2. Crushed gravel or crushed rock shall be 1-1/2 inch minus, free from dirt, clay balls, and organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and less than 8% by weight passing the No. 200 sieve.]
    2. Geotextile Fabric
       1. Provide geotextile fabric for all underground storage tank installations.
       2. Geotextile fabric shall be "ProPex 4545" manufactured by the Amoco Corporation. approved equal, or as specified by the tank manufacturer.
  1. TANK TOP EQUIPMENT: All tank top equipment shall meet the Phase I EVR standard as defined by the California Air Resources Board.
  2. GASOLINE PIPING
     1. UNDERGROUND FIBERGLASS REINFORCED PLASTIC
        1. Manufacturer:
           1. Ameron
           2. Smith Fibercast
           3. Approved Equal
        2. FRP: ASTM D2310 and ASTM D2996, UL-971 listed double walled, coaxial, filament wound glass fiber reinforced epoxy pipe with integral epoxy liner and exterior coating. Piping materials shall be as follows:
           1. Pipe: All primary filament wound pipe shall contain a resin-rich liner with a minimum thickness of 0.015 inches. The liner resin system shall be chemically resistant epoxy resin that has been demonstrated to be satisfactory for the intended service. Pipe shall be coaxial and a pre-manufactured double-walled system.
           2. Structural Wall: The resins, reinforcements, colorants and other materials when combined as a composite laminate structure shall meet the performance requirements of this specification. Glass fiber reinforcement shall be type E glass with an epoxy-compatible finish. Glass fiber content shall not be less than 60% by weight of the reinforced structural wall.
           3. Interstitial Layer: The layer between the primary and interstitial pipe layers shall be of uniform thickness with the ability to allow fluid flow throughout, meeting UL criteria. This layer shall also prevent relative movement of the primary and secondary pipes.
           4. Containment Pipe: Construction of the containment pipe and materials used shall be identical to the reinforced portion of the primary pipe, exhibiting similar physical properties.
           5. Pipe Dimensions: Primary pipe shall be manufactured to steel pipe outside diameters for all sized. Pipe outside diameter tolerances shall not exceed +/-1%. Secondary piping shall properly fit into fittings supplied by manufacturer.
           6. Wall Thickness: The total wall thickness of pipe furnished under this Specification shall not at any point be greater than 120% nor less than 87-½% of the nominal thickness.
           7. Fitting Dimensions: All fittings supplied under this Specification shall have face-to-face dimensions and laying lengths as specified in the manufacturer’s literature.
           8. Joining Methods:

Primary Pipe: Primary pipe and fittings shall be joined by means of a matching taper adhesive joint. Adhesives used for joining components shall be compatible with all intended fluids. The adhesive systems shall be used in accordance with the manufacturer’s recommendations.

Containment Pipe: Containment pipe joints shall be made with bolted clamshell halved bonded together with adhesive.

Flanges: Flanges shall be two-piece (van Stone) type with raised grooves on the sealing face. Fiberglass-reinforced stub ends are to be adhesive bonded to pipe or fitting.

* + 1. GASOLINE PIPING – UNDERGROUND FLEXIBLE
       1. Manufacturer:
          1. UPP
          2. APT
          3. NUPI
          4. Approved Equal
       2. Flexible below grade piping shall meet the UL-971 standard and shall not have underground joints outside of sumps or containment areas.
  1. GASOLINE SYSTEM VALVES
     1. Ball Valves
        1. Manufacturer
           1. Morrison Brothers Model 691
           2. Crane Valve, North America.
           3. Hammond Valve.
           4. Milwaukee Valve Company.
           5. NIBCO, Inc.
           6. Approved equal
        2. MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids, full port.
     2. Vertical Dispenser Check Valves
        1. Manufacturer
           1. OPW 10BUP-5926
           2. OPW 10SBUP-5926
           3. Approved equal
        2. Vertical, double poppet, check valve with protective shear groove, coated cast iron, Viton disc, thermal relief valve, compatible with E85 and M85.
  2. GASOLINE FILL SPILL CONTAINMENT MANHOLE
     1. Manufacturer
        1. OPW
        2. Emco Wheaton
        3. Fairfield
        4. Approved Equal
     2. Requirements: The remote fill spill containment manhole shall:
        1. Be UL Listed
        2. Be double walled
        3. Be completely testable and without any manhole excavation
        4. Be capable of a primary bucket replacement without any excavation
        5. Provided with manufacturer installed mechanical leak detection indicator.
  3. MECHANICAL OVERFILL PROTECTION DEVICE
     1. Manufacturers:
        1. OPW (71-SO).
        2. Morrison Brothers.
        3. Approved Equal.
     2. Requirements: The remote fill spill containment manhole shall be Phase I EVR listed by the California Air Resources Board.
  4. AUDIBLE/VISUAL OVERFILL ALARM
     1. Manufacturers: The Audible/Visual Overfill Alarm System shall be manufactured by the selected Environmental Monitoring and Fuel Control System manufacturer. Coordinate with other sections.
     2. One strobe/horn combination shall be provided for every UST individually. Strobe/horn combinations shall not share tanks.
  5. GASOLINE SYSTEM SUBMERSIBLE TURBINE PUMP
     1. Manufacturer
        1. FE Petro
        2. Red Jacket
        3. Approved Equal

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**NOTE TO SPECIFIER**

Adjust submersible pump size and type. While a 2 hp fixed speed pump is appropriate for most USPS facilities, larger or unique systems may warrant a larger or fixed speed pump.

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* + 1. General Requirements
       1. 2 hp, fixed speed
       2. Provide with manufacturer supplied pump controller.
       3. Provide with the appropriate shaft length

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**NOTE TO SPECIFIER**

Adjust language for diesel dispensers based on site specific fleet conditions as shown, for single product diesel dispensers

For single product diesel dispensers only, based on the fleet mix, ultra-high capacity dispensers may be appropriate. Also, if there is a mix of vehicles, single product diesel dispensers should be provided with a one 3/4 inch hose and nozzle, and one 1 inch hose and nozzle. This will allow for the accommodation of larger and smaller diesel vehicles.

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* 1. GASOLINE SYSTEM DISPENSERS
     1. Manufacturer:
        1. Wayne
        2. Gasboy
        3. Bennett
     2. Self-contained, two hose single product electronic dispensers with island oriented nozzle boots, solenoid valves and 100:1 electronic pulse output per nozzle.
     3. Label all dispensers by fueling position. Do not affix labels to removable dispenser doors.
     4. Provide one dispenser key per dispenser to the owner at project conclusion.
     5. [For single product diesel dispensers, provide high capacity/ultra high capacity models.] [Provide one ¾” hose and nozzle and one 1” hose and nozzle on single product diesel dispensers.]
     6. Provide primary and spare dispenser filters for dispenser startup described later in this section. All dispenser filters provided shall be designed for compatibility with ethanol blends.
     7. Provide all required stickers and labels, including 87 Octane, ULSD, product labels, anti-static, and all required safety labels.
  2. DISPENSER CONTAINMENT
     1. Below ground – provide FRP piping sumps as shown on the construction drawings and compatible with dispenser footprint.
     2. Manufacturers:
        1. Franklin Fueling.
        2. S. Bravo.
        3. Approved equal.
  3. DISPENSER EQUIPMENT

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**NOTE TO SPECIFIER**

Adjust language for diesel dispensers based on site specific fleet conditions as shown, for single product diesel dispensers

For single product diesel dispensers only, based on the fleet mix, ultra-high capacity dispensers may be appropriate. Also, if there is a mix of vehicles, single product diesel dispensers should be provided with a one 3/4-inch hose and nozzle, and one 1-inch hose and nozzle. This will allow for the accommodation of larger and smaller diesel vehicles.

Coordinate with diesel dispenser section

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* + 1. Hose Retractors
       1. Manufacturers/Models:
          1. POMECO: Model 6100-7000.
          2. Morrison Bros: Model 610 0100AR.
          3. Approved Equal.
    2. Nozzles
       1. Manufacturers/Models:
          1. OPW: Model 11B.
          2. Approved Equal.
    3. Hoses
       1. Manufacturers/Models:
          1. Goodyear: ¾” flexsteel hardwall.
          2. Approved Equal.
    4. Breakaways
       1. Manufacturers/Models:
          1. Catlow: Model CTM 75.
          2. Approved Equal.
    5. Hose Swivels
       1. Manufacturers/Models:
          1. OPW: Model 45-5060.
          2. Approved Equal.
    6. Emergency Shutoff/Crash Valves
       1. Manufacturers/Models:
          1. OPW.
          2. Morrison Brothers.
          3. Approved Equal.
       2. Specifications:
          1. Normally closed valve.
          2. Shear point.
          3. 2 inch NPT threaded end connections.
          4. Fire protection fusible link trips the valve closed at 165 degrees F.
          5. Test port.
       3. Materials
          1. Ductile iron valve top and body.
          2. Disc and seal material compatible with gasoline.
          3. Stainless steel poppet spring.
          4. Provide with stabilizer bar to hold valve rigidly in place and allow for proper shearing action.
  1. FIRE EXTINGUISHERS
     1. Provide 4-A:80-B:C fire extinguishers, metal cabinets, and signage at locations shown on the construction drawings.
  2. GASOLINE SYSTEM IDENTIFICATION
     1. Nameplates
        1. Manufacturers:
           1. Craftmark Identification Systems
           2. Safety Sign Co.
           3. Seton Identification Products
     2. Valve Tags
        1. Manufacturers:
           1. Craftmark Identification Systems
           2. Safety Sign Co.
           3. Seton Identification Products
     3. Underground Pipe Markers
        1. Manufacturer:
           1. Tek ID
           2. Approved equal

1. EXECUTION
   1. GENERAL
      1. The installation of underground piping and all fuel system equipment shall be conducted in strict accordance with the manufacturer’s installation instructions. Nothing in this specification is intended to supersede or contradict those instructions.
      2. Install underground piping and all fuel system equipment in accordance with the requirements of all State and Local codes and regulations including, but not limited to, the State [ ], the State of [ ] Fire Code as adopted and amended by the State of [ ], and The International Fire Code and NFPA 30A.
   2. EARTHWORK
      1. Excavation
         1. The area under new concrete slabs and/or footings, concrete and/or asphalted paving, and concrete walkways shall be excavated to the depth indicated on the Contract documents. Unless otherwise directed, all excavated native soil must be replaced with approved backfill material. Allowance must be made for the required base and sand or gravel cushion-leveling course. The area of the foundations and footings shall be proof rolled to detect any soft zones. All soft zones must be removed and replaced with select material compacted to 95% maximum dry density (ASTM D 1557), as tested by the Contractor.
         2. Structures and utilities located within the excavated area shall not be disturbed without prior approval by the Owner. The Contractor shall protect all structures and utilities to remain so as to prevent disruption of facility operations.
         3. The Contractor shall provide the necessary shoring, sheeting or bracing as required by OSHA and other applicable regulatory agencies for any trenching or similar excavation. All shoring materials used shall be in good, serviceable condition, and carried down as the excavation progresses.
      2. Dewatering
         1. The Contractor shall not allow water to accumulate in excavations. Surface water must be prevented from flowing into excavations and from flooding the Project site. The Contractor shall establish/construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide surface water runoff away from the construction activity and/or provide temporary ditches, dikes, swales and other drainage features and equipment as required to maintain dry soils and prevent erosion. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. [It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.] Excavated slopes and backfill surfaces shall be protected to prevent erosion. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.
         2. The Contractor shall be responsible for all equipment and labor necessary for the removal of all surface and ground water that enters the excavation. Remove water from excavations to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain portable holding tanks, pumps, well points, sumps, suction and discharge water lines, and other dewatering system components to convey water away from excavations. Maintain erosion control measures to prevent sediment from leaving the work area.
         3. [A geotechnical report is available.] The Contractor shall be responsible for all dewatering of the excavations necessary to complete the installation in accordance with manufacturer requirements. The Contractor is responsible for securing all State and Federal permits for the discharge of groundwater.
      3. Material Disposal
         1. The Contractor shall dispose of all excess and/or unsuitable excavated material. In the event that contaminated soil, water or hazardous waste material is encountered in any excavation, the Contractor shall secure the excavation and notify owner immediately. Under no circumstances shall any contaminated soil, water or hazardous materials be removed without authorization by Owner. Refer to and comply with Section 013543 – Environmental Procedures, and Section 017419 – Construction Waste Management and Disposal.

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**NOTE TO SPECIFIER**

Adjust general subgrade preparation requirements to meet site specific conditions or to meet the recommendations of a geotechnical report. Do not vary piping bed or backfill materials from that required by the underground piping manufacturer.

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* + 1. Subgrade Preparation
       1. The Contractor shall finely grade all improvement areas indicated on the contract documents to the finish elevation indicated less the depth of the slab, footing, paving, and/or walkways and their base. Any required fill must conform to specifications set forth in Paragraph F.4.a. All subgrades shall be compacted to 95% Maximum Dry Density (ASTM D 1557) as tested by the Contractor.
    2. Fill, Backfill, and Base
       1. The Contractor shall not commence placement of fill, backfill, or base materials until the subgrade has been inspected and approved by the Owner. Excavations resulting from underground storage tank (UST) or above ground storage tank (AST) removals shall not be backfilled until the Owner has reviewed the results of post-excavation soil sample analysis and advised Contractor to proceed.
       2. The Contractor shall provide a minimum of [8-inch compacted gravel] cushion below all new concrete slabs, (including replacement), footings, paving, and walkways. Backfill around concrete shall be of materials not subject to expansion or contraction (non‑cohesive), and shall be sloped away from the concrete work. Sand shall not be placed above any gravel used as backfill in an area undergoing installation of concrete slabs, footings, paving, and walkways.
       3. Trench or excavation backfill shall be compacted to 95% maximum dry density, as tested by the Contractor, with a mechanical tamper in lifts not to exceed [6 inches]. Surface material and finish must be replaced to match that of adjacent grade surface, including any base material required.
  1. PIPE TRENCHES
     1. Excavate to the dimensions indicated in the Contract Drawings. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.
  2. BACKFILL AND FILL MATERIAL PLACEMENT OVER PIPES
     1. Backfilling shall not begin until construction below finish grade has been approved, underground utilities or fuel and related piping installations have been inspected, tested and approved.
  3. EXAMINATION
     1. Verify excavations are to required grade, dry, and not over-excavated.
  4. INSTALLATION - BURIED PIPING SYSTEMS
     1. All piping to be installed by manufacturer certified personnel in strict accordance with manufacturer installation instructions.
     2. Verify connection size, location, and inverts are as indicated on Drawings.
     3. Establish elevations of buried piping with not less than 18 inches of cover unless otherwise specified.
     4. Remove scale and dirt on inside of piping before assembly.
     5. Install pipe to elevation as indicated on Drawings.
     6. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.
     7. Install pipe on prepared bedding.
     8. All underground product piping and vent piping shall have a continuous 1% slope down to the tank piping sump. The piping shall be installed such that there are no traps or liquid collection points. At the conclusion of final testing, back off all test boots and remove all Schrader valves and test fittings such that any product entering the secondary containment space in the piping system will drain to the monitored tank sump.
     9. Install pipe to allow for expansion and contraction without stressing pipe or joints.
     10. Install shutoff and drain valves at locations indicated on Drawings.
     11. Install magnetic utility warning tape continuous over top of pipe buried 6 inches below finish grade.
     12. Pipe Testing Requirements:
         1. Test piping per manufacturer’s and State of [ ] requirements and specifications.
         2. Maintain the required pressure for a minimum of 2 hours after the backfill process has been completed.
     13. Pipe Cover and Backfilling:
         1. Backfill trench in accordance with the.
         2. Maintain optimum moisture content of fill material to attain required compaction density.
         3. After pneumatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 4 inches compacted layers to 12 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
         4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
         5. Do not use wheeled or tracked vehicles for tamping.
  5. SPILL AND OVERFILL EQUIPMENT
     1. Install spill and overfill equipment in accordance with manufacturer requirements and the construction drawings.
     2. Submit mechanical overfill prevention valve calculations to the Engineer for approval.
     3. Demonstrate operability/measure all overfill prevention devices in the presence of the Engineer.
     4. Submit written test results.
  6. INSTALLATION – DISPENSERS
     1. Dispensers shall be installed in strict accordance with manufacturer instructions.
     2. The Contractor shall furnish and install filters for each gasoline dispenser/pump. Activate each dispenser and inspect filter for leaks. Allow approximately 100 gallons of product to flow through the filter, then remove and replace filter.
     3. The Contractor shall perform the following electrical circuit test for the dispensers:
        1. Turn off all circuit breakers controlling the pumps and check to assure that all pumps are not running.
        2. Confirm that all nozzles are in the dispenser boot with the boot electrical switch off.
        3. Turn on circuit breaker controlling one pump and on each dispensing pump:
        4. Remove nozzle, turn operating handle on, and dispense product to confirm hose is pressurized.
        5. If circuit disconnection or other problems are detected using the above procedure, make correction and repeat entire system checkout.
     4. The Contractor shall add 87 Octane, and ethanol (10%) stickers to the appropriate dispensers, as and if applicable.
     5. Dispensers must be properly anchored.
  7. INSTALLATION – FIRE EXTINGUISHERS
     1. Install fire extinguishers, cabinets and signage in accordance with NFPA and State Fire Code Requirements, in locations shown on the construction drawings.
     2. Coordinate location of extinguisher mounts so as not to conflict with other fuel island equipment.
  8. FIELD QUALITY CONTROL

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**NOTE TO SPECIFIER**

It is important to be as specific as possible when identifying the forms that the Contractor is required to fill out. Each piping and tank manufacturer has a checklist and testing forms. Many states do as well. Most states also have test forms for leak detection equipment, overfill devices, and tank gauging devices, that are required to be submitted annually once the facility is in operation. The completion of these forms should all be included in this specification so that the Owner has proper, state approved, documentation of these tests for the first year of operation. Most state regulatory programs have all of their reporting and testing forms online and easily accessible for inclusion as appropriate here.

Coordinate this section with the corresponding section in 136000 and 136020.

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* + 1. Coordinate with Sections 136000 and 136020.
    2. Test all piping systems, sumps, interstitial spaces in accordance with State of [ ] requirements, manufacturer requirements and guidelines, and PEI-RP100. All test results shall be submitted to the engineer within 24 hours of completion. The primary and secondary chambers of all product carrying vessels shall be tested prior to and after final backfill. The test pressure on the interstitial piping space shall be maintained through the final backfill process and verified after backfill is complete.
    3. After completion of the gasoline system installation, and after backfilling and setting concrete, Test all underground piping with a precision method capable of detecting leaks of 0.005 gph. The precision test shall be performed by a third party independent testing company, and shall provide a certified report of tightness to the owner with 5 days of completion.
    4. After completion of the gasoline system installation, test the Stage I Vapor Recovery System. The following tests shall be conducted. Provide test results to the owner within 5 days of completion, and in the closeout documents:
       1. Pressure Decay Test (Bay Area Air Pollution Control District Source Test Procedure ST-30 (2/6/91)); and
       2. P/V Vent Cap Test (Leak Rate and Cracking Pressure of Pressure/Vacuum Valves CARB TP-201.1E).
    5. Where installed, test the Stage II Vapor Recovery System in accordance with [ ].
    6. Notify the Engineer at least ten (10) working days prior to setting the tanks into the excavation and ten (10) working days prior to final backfill of the tank top and underground piping. The Engineer may be present during tank setting and for a final-pre-backfill inspection of all underground components, and neither of these evolutions shall be conducted until the Engineer has had the opportunity to observe.
    7. In addition to the requirements outlined above, hydrostatically test all tanks sumps and turbine enclosures by filling each sump with water to within 6 inches of the top and monitoring the water level of 2 hours. This test shall be conducted by a testing agency and the results reported to the Engineer within 24 hours of completion.
    8. Provide documentation of all tests signed by certified personnel to the owner prior to the operation of the facility and in the closeout documents including a copy of the State of [ ].
    9. Complete an operational test of all leak detection and level monitoring systems. Test in accordance with State and Manufacturer requirements. Submit completed state leak detection and sensor test forms to the owner prior to the operation of the facility, and in the closeout documents.
    10. Test all safety devices, including but not limited to crash valves, emergency stop devices, and leak detection devices, in the presence of the engineer. Provide a written report of all tests including completion of the State of [ ] Report.
    11. Commission and calibrate the fuel dispensers using the services of a manufacturer certified service organization. Provide a report of startup and calibration from that agency.
    12. Complete the Suction Stub Verification Form, Overfill Verification Form, Tank Tilt Verification Form, and Brine Level Verification Form, as provided on the construction documents.
    13. Complete the [ ] Department of [ ] of Weights and Measures [ ], and affix the weights and measures seal on each dispenser face, one per nozzle and meter. Provide a copy of Weights and Measures Report in the closeout documents.
    14. Adjust/calibrate/commission the submersible pump controllers, adjusting output pressures as required to achieve the desired flowrate performance.
    15. Test the flowrate of fuel at each dispenser in the presence of the engineer, owner, and tenant. Flowrate shall be 9-10 gallons per minute for gasoline dispensers, with all nozzles pumping. [Flowrate shall be greater than 20 gallons per minute for ultra-high capacity diesel dispensers.]
  1. INITIAL FUEL DELIVERY
     1. The Contractor shall be responsible for supplying sufficient gasoline for startup and calibration activities.
  2. TANK AND SYSTEM REGISTRATION
     1. The Contractor shall submit to the owner, prior to the operation of the facility, a completed and executed State of [ ]. Include the completed form, with owner signature, in the closeout documents with evidence of submission to the State agency.
     2. Submit all other forms, notifications, and reports as required by the State, and provide copies to the owner prior to operation of the system, and in the closeout documents including the State of [ ], [ ], [ ].
  3. COMMISSIONING
     1. Coordinate commissioning activities with the commissioning activities required in sections 136010 and 136020. A single commission program, combining the requirements of the three sections shall be coordinated.
     2. The Contractor shall commission the motor fuel systems. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for the owner and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
     3. The Contractor shall submit a system commissioning plan to the owner and engineer for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems. The plan may be combined with commission plans for other vehicle service equipment systems.
     4. Commissioning of the fuel system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.
     5. Fuel or flammable liquids shall not be introduced into the underground tanks until the environmental monitoring and leak detection system is fully programmed, operational, and tested. Fuel shall not be introduced into the dispensing system until all safety (including emergency stop, crash valves, etc.) and leak detection devices have been tested and fire extinguishers are installed.
     6. Back off all test boots and remove all test fittings from piping systems at the conclusion of testing, to allow for the free flow of product from the piping secondary into the monitored containment sump in the case of primary pipe failure.
     7. Notify the engineer no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the contractor shall facilitate a final inspection by the engineer. The contractor shall have all necessary trade personnel on-site to operate equipment, open containment areas, and open electrical enclosures and equipment during the engineer’s final Commissioning inspection. That final inspection shall include, but not be limited to:
        1. Operational test of all systems.
        2. Operational test of all safety devices (e-stop switches, crash valves, overfill alarms);
        3. General review of the installation against plans, specs, and manufacturer requirements;
        4. Review of all test reports and manufacturer start-up reports;
        5. Test of all leak detection sensors;
        6. Closeout document requirements review;
        7. Tank registration form review, to include all outstanding regulatory reports;
        8. Inspection of all tank level probes to verify 90% setting;
        9. Inspect of mechanical overfill protection devices to verify/measure 95% setting;
        10. Inspect of all sumps and containment areas;
        11. Review and validation of monitoring system programming;
        12. Operational test of the fuel management system and verification that the system is recording transactions and that the operator is able to generate fuel invoices.
        13. Confirmation that system training has been completed; and
        14. Verification that remote monitoring for the Environmental Monitoring System is programmed and functioning properly.
  4. MANUFACTURER'S FIELD SERVICES
     1. The Contractor’s field superintendent supervising the installation of all underground petroleum carrying components shall be factory or manufacturer certified to perform such installation. Additionally, the field supervisor shall carry any State or Local certifications to install underground tanks and petroleum components.
     2. Furnish factory training representatives to provide up to 8 hours of training on each major piece of equipment or system.

END OF SECTION

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