SECTION 136050

HEATING OIL AND BACKUP POWER ABOVEGROUND STORAGE TANKS

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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 site preparation, placement, anchoring, piping, and outfitting, of aboveground storage tanks specified or indicated in the Contract Documents.
      5. Related work specified in other Sections includes, but is not necessarily limited to:
         1. Section 136015 Motor Fuel Aboveground Storage Tanks
         2. Section 136020 Motor Fuel Electrical Systems
         3. Section [ ]
   2. REFERENCES
      1. American Petroleum Institute:
         1. API 2000: Venting Atmospheric and Low-Pressure Storage Tanks: Non-refrigerated and refrigerated.
      2. ASTM International:
         1. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
         2. ASTM A105: Standard Specification for Carbon Steel Forgings for Piping Applications
         3. ASTM A197: Standard Specification for Cupola Malleable Iron
         4. ASTM C136: Standard Test Method for Sieve Analyses of Fine and Coarse Aggregates.
         5. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
      3. ASME International:
         1. ASME B16.3: Malleable Iron Threaded Fittings
         2. ASME B16.5: Pipe Flanges and Flanged Fittings
         3. ASME B16.11: Forged Steel Fittings, Socket-Welding and Threaded
         4. ASME B31.3: Process Piping
      4. National Fire Protection Association:
         1. NFPA 30 - Flammable and Combustible Liquids Code.
         2. NFPA 31 – Standard for the Installation of Oil Burning Equipment
         3. NFPA 37 – Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
         4. NFPA 70 – National Electric Code
      5. International Code Council:
         1. International Fire Code
      6. Underwriters Laboratories Inc.:
         1. UL 142: Aboveground Flammable Liquid Tanks
         2. UL 2085: Standard for Protected Aboveground tanks for Flammable and Combustible Liquids
         3. UL 567 - Pipe Connectors for Flammable Liquids and Combustible Liquids and LP-Gas.
         4. UL 913 - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations.
   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 Section 013300 – Submittal Procedures.
      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. Structural fill materials.
         2. Concrete.
         3. Aboveground storage tanks.
         4. Anchors and supports.
         5. Piping
         6. Tank monitoring and inventory equipment.
         7. Overfill protection devices.
      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 Section 017704 and clause B-57.
      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 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 AST 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 136010 and 136020.

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* + 1. Comply with Section 017704 and Clause B-57. 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 [ ] and [ ] 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 2 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, 2 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. AST installation/warranty checklist with proof of delivery to manufacturer.
       3. Environmental Monitoring System final setup printout.
       4. Underground sump test records (transition sumps)
       5. Copies of any State/Local approvals, authorizations, permits, and registrations to include:
          1. [ ]
          2. [ ]
          3. [ ]
       6. Tank Test Results, and Test Results for all secondary containment structures or annuluses and all containment sumps.
       7. Records of all other inspections and tests to include:
          1. [ ]
          2. [ ]
       8. Tank certificate, licenses, and/or registration to include [ ].
       9. 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.
       10. Training certification for instruction seminars signed by the individuals trained on these systems.
       11. All instruction bulletins, preventive maintenance schedules, operational instructions, and parts lists provided with the tanks, and all other systems.
       12. Waste disposal documentation (if any).
       13. Other environmental information or permits (if any).
       14. Copies of receipts for any keys, locks, or other equipment turned over to the Owner.
       15. 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: Comply with Section 016000 – Product Requirements.
     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).
        7. California Air Resources Board (CARB).
     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 borrowed 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 blend.
     9. Complete the [ ] 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. 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. Tank Installer: Company specializing in performing Work of this section with minimum ten years documented experience. The Contractor installing the Motor Fuel System shall be a State certified installer when required.
  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 all active utilities from damage 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 performed 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.
     3. ASTs shall be lifted in strict accordance with manufacturer instructions, and only using manufacturer lifting pad eyes and connections.
  6. ENVIRONMENTAL REQUIREMENTS
     1. Comply with Section 013543 – Environmental Procedures.
     2. Do not install underground piping or AST sub base materials when bedding is wet or frozen.
  7. FIELD MEASUREMENTS
     1. Verify field measurements prior to fabrication.
  8. COORDINATION
     1. Comply with [ ].
  9. WARRANTY
     1. All tanks shall carry a [30] year warranty.

1. PRODUCTS
   1. EARTHWORK MATERIALS
      1. Aboveground Storage Tank Support Slab Fill Materials
         1. Provide AST bedding and backfill material in strict accordance with [\_\_\_\_\_\_\_\_\_\_].
         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. \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* + 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. Crushed stone shall be [\_\_\_\_\_\_\_\_\_\_\_\_].
       2. Crushed gravel or crushed rock shall be 1-1/2" 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. Crushed gravel shall be [\_\_\_\_\_\_\_\_\_\_\_\_].
  1. CONCRETE
     1. Concrete for the AST support slab shall have a minimum 28-day compressive strength of 3000 psi, with a maximum slump of 4 inches. Concrete shall be broom finished.
     2. Reinforcing bar shall comply with ASTM A615.
  2. ABOVEGROUND HEATING OIL AND BACKUP POWER
     1. Manufacturer: Subject to compliance with project requirements, manufacturers offering products which may be incorporated into the Work include the following:
        1. Containment Solutions
        2. Modern Welding
        3. Highland Tank
     2. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.
     3. All aboveground motor fuel storage tanks shall be “Protected” Secondary Containment Tanks as defined in NFPA 30 and carry a UL 142 [2085] listing.

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**NOTE TO SPECIFIER**

Generally, heating and standby power ASTs can be ul-142 secondary containment tanks. Understanding that protected (UL-2085) tanks offer a fire rating, bullet resistance, vehicle impact resistance, and opportunities for reduced setbacks to buildings and property lines, there may be certain site or site conditions that warrant the use of protected tanks.

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* + 1. The contractor shall provide UL labeled aboveground storage tank in sizes and with fittings shown on the contract drawings.
    2. Tanks shall be tested and in accordance with the current installation instructions provided with the tank.
    3. All tanks shall be rectangular.
    4. Tanks shall be provided with grounding lugs and means for seismic anchoring.
    5. Tanks shall have a slight crown on the tank top to avoid the accumulation of water.
    6. Tanks shall be provided with national pipe thread (NPT) fittings/bungs as shown on the construction drawings.
    7. Tanks shall be provided with tank manufacturer sized emergency vents on both the primary and secondary tank which comply with the requirements of NFPA 30.
    8. Tanks shall be supplied with a factory applied primer and epoxy top coat, and shall be light in color (Dessert Sand or White).
    9. All tanks shall be new, and procured after the Notice to Proceed for this project is issued. That is to say, “left-over” tanks from previous projects currently in the Contractor’s possession are not acceptable.
  1. ABOVEGROUND OIL PIPING:
     1. Aboveground fuel oil piping shall be Schedule 40 seamless steel conforming to ASTM A53.
     2. Piping 2 inches in diameter and below shall be threaded, welded or flanged. Piping larger than 2 inches in diameter shall be welded or flanged.
     3. All flanges shall be steel, 150 lb. conforming to ASME B16.5.
     4. All threaded fittings shall be malleable iron conforming to ASTM A197, class 150, conforming to ASME B16.3.
     5. All welded fitting shall be forged, class 3000, conforming to ASME B16.11.
  2. OVERFILL PROTECTION DEVICES
     1. Mechanical Overfill Protection Device:
        1. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated into the Work include the following:
           1. Morrison Brothers.
           2. OPW.
           3. Emco Wheaton.
        2. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.
        3. The device shall be rated for pressure deliveries.
        4. The device shall close when the tank is 95% full, and have the ability to relieve 2% of the pressure to allow for hose drain.
        5. The device shall be sized to match the incoming fill pipe size, understanding that the nominal NPT tank top fitting (bung) will be need to be substantially larger to accommodate the same size fill pipe.
        6. The device shall be equipped with an aluminum drop tube that terminates between 4” and 6” from the tank bottom.
     2. Audible/Visual Overfill Alarm:
        1. Provide an audible/visual overfill alarm manufactured by the environmental monitoring system manufacturer. Coordinate with Section 136020 Motor Fuel Electrical Systems.
        2. Provide High Level Alarm Signage
  3. ANTI-SIPHON DEVICE
     1. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated into the Work include the following:
        1. Morrison Brothers.
        2. Magnatrol.
        3. OPW.
     2. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.
     3. The anti-siphon device shall be an electrically actuated solenoid valve that opens only when the submersible pump is running.
  4. MECHANICAL LEVEL GAUGE
     1. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated into the Work include the following:
        1. Morrison Brothers.
        2. OPW.
        3. Approved Equal.
     2. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.
     3. The mechanical level gauge shall read in gallons or feet and inches in digital format. Two-hand clock-type gauges that read in feet and inches are not acceptable.

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**NOTE TO SPECIFIER**

If the AST is proximate to the building in which the heating system is present or the generator system, aboveground piping should generally be used. Note that aboveground piping runs, without secondary containment, shall be kept to a minimum. If underground piping is necessary, it should be installed in accordance with the requirements of section 136010, using the transition sump below.

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* 1. TRANSITION SUMP
     1. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated into the Work include the following:
        1. S. Bravo Systems
        2. Western Fiberglass.
        3. OPW.
     2. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.
     3. The transition sump shall be designated for the purpose of transitioning from underground to aboveground piping.
     4. The transition sump shall be manufactured of fiberglass reinforced plastic (FRP).
     5. The transition sump shall have a watertight cover and shall be fully sealable both aboveground and underground such that ground or storm water cannot enter the containment area.
     6. The transition sump shall be fully and easily accessible for inspection and maintenance.

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**NOTE TO SPECIFIER**

Depending on the system configuration, the installation of submersible pumps may be required.

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* 1. SUBMERSIBLE PUMPS
     1. Refer to Section 136000 for specifications on submersible pumps.

1. EXECUTION
   1. GENERAL
      1. The installation of aboveground storage tanks 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 aboveground tanks 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 30, NFPA [31] [37].
   2. DRAINAGE AND DEWATERING
      1. The Contractor is responsible for the collection and disposal of all surface and subsurface water encountered during construction.
      2. Drainage
         1. So that construction operations progress successfully, completely drain the construction site during periods of construction to keep soil materials sufficiently dry. 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.
      3. 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 be responsible for all equipment and labor necessary for the removal of all surface 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.
         2. Groundwater flowing toward or into the excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in excavation and to eliminate interference with orderly progress of construction.
         3. The Contractor shall be responsible for all dewatering excavations ad 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.
         4. All dewatering shall be accomplished in strict accordance with all Federal, state, and local requirements, and in strict accordance with all applicable general or site specific dewatering permits.
         5. Unless authorized by the Owner, bulk transportation and disposal of excavation water at an off-site facility will not be allowed.

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**NOTE TO SPECIFIER**

Pay particular attention to this section on dewatering. Permitting groundwater discharges, especially if to surface water, especially from a site that has an existing ust use, can be involved, and may require a groundwater discharge permit or notification of intent under the remediation general permit. Understanding that the direction here is for this to be the contractor’s responsibility, if a difficult dewatering situation is predicted as part of the design process, more detail to the contractor, or the development of a dewatering plan prior to bidding, may be desired.

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* + - 1. The Contractor shall be responsible for filing all permits to allow groundwater discharges to surface or groundwater.
  1. BACKFILL AND FILL MATERIAL PLACEMENT
     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.
     2. 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 D1557), 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 be responsible to maintain safe slopes in accordance with OSHA regulations throughout the construction period.

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**NOTE TO SPECIFIER**

It is unlikely that shoring would be required for an AST installation. If a unique project scope or unique site conditions exist, refer the specification chapter 136000 for language and guidance on the specification of shoring or excavation support.

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* + 1. 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.
    2. 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 D1557) as tested by the Contractor.
    3. 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.

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**NOTE TO SPECIFIER**

The gravel or stone bed under the AST support slab must be designed for site specific conditions. In general, the bedding should be no less than 12 inches of compacted gravel or stone.

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* + - 1. The Contractor shall provide a minimum of [12-inches] of compacted [crushed stone][gravel] bed below all new AST support slabs and a minimum of [8-inch] compacted gravel cushion below all other 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.
      2. 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.
      3. All new fill shall be compacted to at least 95% Maximum Dry Density at Optimum Moisture Content according to ASTM D1557, as tested by the Contractor. 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.
  1. EXAMINATION
     1. Verify excavations are to required grade, dry, and not over-excavated.
  2. INSTALLATION - ABOVEGROUND TANKS
     1. The installation of aboveground storage tanks shall be conducted in strict accordance with the tank manufacturer’s installation instructions. Nothing in this specification is intended to supersede or contradict those instructions.
     2. Install aboveground tanks and tank systems in accordance with NFPA 30, NFPA [31] [37], and the International Fire Code. Additionally, install the aboveground tanks and tank systems in accordance with the requirements of all State and Local codes and regulations including, but not limited to, the State of [ ].
     3. Check factory installed equipment and accessories for loosening during transit.
     4. Install tanks level on the slab, without gaps or debris between the steel tank foundations and supporting slab.
     5. Seal unused tank openings using threaded steel pipe plugs. Install with petroleum compatible thread sealant.

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**NOTE TO SPECIFIER**

Check local codes for seismic anchoring requirements and revise the specification accordingly. These standards include details and specifications for non-seismic anchoring.

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* + 1. Anchor tank in accordance with the construction drawings. Use all anchor points provided by the tank manufacturer, i.e. there should be no unused anchor holes in the tank supports.
    2. Ground tanks in accordance with the construction drawings.

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**NOTE TO SPECIFIER**

The most effective means is to a concrete encased electrode in the tank slab. Alternatively, a double ground rod can be used. Because the piping and vents are steel, additional bonding is generally not required. Unique situations which may affect the bonding of the system (such as the use of non-metallic gaskets on flanges), or at installations where there is a high risk of lightning, additional bonding or lightning protection should be considered.

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* + 1. Vents:
       1. Install working tank vents in accordance with the construction drawings and NFPA 30, NFPA [31] [37]. Install product appropriate caps on all vents.
       2. Install emergency vents in accordance with NFPA 30, NFPA [31] [37], and the tank manufacturer instruction. Remove all shipping restraints and packaging. Ensure that all emergency vents are free to operate, and are not bolted, taped, or otherwise restricted from actuation prior to operation of the tank.
  1. INSTALLATION – ABOVEGROUND PIPING SYSTEM
     1. Install and test the aboveground piping in accordance with NFPA 30, NFPA [31] [37], and ASME B31.3.
     2. Secure and support all piping in accordance with the [ ] Mechanical Code.
     3. Flush and clean piping system prior to the introduction of product.
  2. INSTALLATION - OVERFILL PROTECTION DEVICES
     1. Install overfill protection devices in accordance with manufacturer requirements.
     2. Install the mechanical overfill protection device such that it is readable and visible from the fill port
     3. Install the audible/visual overfill protection device such that the horn is audible and the light is visible from the fill port.
     4. Mount the High Level Alarm sign adjacent to the audible/visual overfill alarm.
  3. INSTALLATION - ANTI-SIPHON DEVICE
     1. Install overfill protection devices in accordance with manufacturer requirements.
  4. INSTALLATION - MECHANICAL LEVEL GAUGE
     1. Install overfill protection devices in accordance with manufacturer requirements.
     2. If a mechanical overfill protection device is used which reads in feet and inches, paint the following label, in contrasting colors on the AST: “SAFE FILL HEIGHT, XX FEET, XX INCHES,” where XX corresponds to the dimensions on the mechanical level gauge when the tank is 90% full.
  5. INSTALLATION - TRANSITION SUMP
     1. Install transition sump in accordance with manufacturer requirements.
     2. Install transition sump such that it is watertight, and not subject to water intrusion from ground or surface water.
     3. Conduct a hydrostatic test on the sump for 24 hours, filling the water to at least 1 inch above the highest penetration. Conduct the test only after all penetrations are complete.
     4. Monitor the sump for leaks with the environmental monitoring system. Coordinate with Section 136020 Motor Fuel Electrical Systems.
  6. INSTALLATION - SUBMERSIBLE PUMPS
     1. Refer to Section 136000, Motor Fuel Underground Storage Tanks for installation requirements for submersible pumps.
  7. FIELD QUALITY CONTROL
     1. Coordinate with Sections [ ], [ ], and [ ].
     2. Test all tanks, sumps, and interstitial spaces in accordance with State of [ ] requirements, manufacturer requirements and guidelines, and NFPA 30. All test results shall be submitted to the engineer within 24 hours of completion. The primary and secondary chambers of all product carrying vessels (pipes and tanks) 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. Notify the Engineer at least 10 working days prior to final backfill of the 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.
     4. In addition to the requirements outlined above, hydrostatically test all containment sumps 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.
     5. 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 [ ].
     6. Complete the Overfill Verification Form, as provided on the construction documents.
  8. INITIAL FUEL DELIVERY
     1. The Contractor shall be responsible for supplying sufficient fuel for startup and calibration activities.
  9. 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 [ ], [ ], [ ].
  10. COMMISSIONING
      1. The Contractor shall commission the 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 to conduct unrestricted operations and use all systems to their full intended and designed capacity.
      2. 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.

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**NOTE TO SPECIFIER**

The timing of the commissioning period may be adjusted based on project complexity. The intent of item d. Below is to prevent a situation where startup of the system is not begun until just before opening.

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* + 1. 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.
    2. Fuel or flammable liquids shall not be introduced into the aboveground 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.
    3. 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.
  1. 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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