Terminal Construction Spec 001

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# Scope

This specification, together with any attached drawings, data sheets, and Project Scope Definition, covers the minimum requirements for construction/upgrade of pipeline terminals and pumping stations for Owner Energy L.P. (Owner).

The civil and mechanical construction tasks covered by this specification may include excavation and backfilling; concrete foundations; pipe supports and other steel structures; above- and below-grade piping systems; and related activities such as welding, painting, and hydrostatic testing.

In the event of any conflict between this specification and any attached or referenced document, the Project Scope Definition shall govern. Contractor shall contact Owner with any concerns requiring clarification or resolution prior to submitting its proposal.

# Required References

All codes, specifications, standards, etc. referenced herein shall be interpreted as meaning the latest published versions of such references in effect at the time of Vendor’s proposal and shall be considered part of this specification.

## American Petroleum Institute (API)

|  |  |
| --- | --- |
| API STD 610 | Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries |
| API STD 1104 | Welding of Pipelines and Related Facilities |

## ASME International

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| ASME B16.5 | Pipe Flanges and Flanged Fittings |
| ASME B31.4 | Pipeline Transportation Systems for Liquid Hydrocarbons |

## ASTM International

|  |  |
| --- | --- |
| ASTM A 82 | Steel Wire, Plain, for Concrete Reinforcement |
| ASTM A 185 | Steel Welded Wire Reinforcement, Plain, for Concrete |
| ASTM C 109 | Compressive Strength of Hydraulic Cement Mortars |
| ASMT D 1557 | Laboratory Compaction Characteristics of Soil Using Modified Effort |

## U.S. Department of Transportation (DOT)

|  |  |
| --- | --- |
| 49 CFR 195 | Title 49, Part 195, Transportation of Hazardous Liquids By Pipeline |

## Owner Specifications/Manuals

|  |  |
| --- | --- |
| NS-ES-40-005 | Flanged Equipment Bolting |
| NS-ES-68-002 | Coating Systems for Above Ground Tanks and Facilities |
| Owner Operations and Maintenance Manual | |
| Owner Welding Manual | |

# General Requirements

Contractor shall field-verify all drawing dimensions shown on any attached drawings. The dimensions are furnished for information only; Contractor shall be responsible for the final fit of all specified civil and mechanical components.

Contractor shall have surveyed the general soil characteristics, terrain, and other pertinent factors, which should be considered in computing Contractor’s proposal and entering into this contract.

Contractor shall submit its proposal in accordance with the attached Itemized Bid Sheet included with the Project Scope Definition.

## Commencement and Prosecution of Work

Contractor shall begin work when notified by Owner and perform all work in a thorough workmanlike manner. All repairs due to inferior workmanship shall be performed by Contractor at Contractor’s expense.

Contractor shall place on the job site adequate supervision, labor, equipment, tools, and material necessary for adequate initiation and on-time completion of the construction project.

Should work performed under this contract be required near existing Owner facilities, Contractor shall exercise care to prevent damage to these facilities. Damage to Owner’s facilities shall be at Contractor’s sole expense.

Contractor shall endeavor to complete the work on or before the completion date specified by Owner and shall not neglect or discontinue work at any time. Contractor shall use all equipment and labor resources necessary to meet the agreed upon schedule.

Electrical work will be done by others. The contractor under this agreement shall cooperate so that all electrical and mechanical work is expedited.

Owner’s representative may temporarily suspend all work or any portion of the work for such periods as deemed necessary because of: (1) alteration of plans or conditions which are judged not suitable for the continuation of the work or (2) when Contractor fails to perform the work as specified according to the contract, drawings, and specifications.

If the work is suspended by Owner, Contractor shall protect all work performed and materials on site to prevent damage or deterioration to either.

Contractor shall resume all work after notification by Owner.

## Safety

During the period of construction for this site, Contractor’s employees shall be required to wear fire retardant clothing (FRC) at all times. This includes hard hat, Nomex-type clothing or coveralls, safety glasses w/ side shields, and steel-toed boots. Contractor should include this requirement into bid computation.

## Materials Furnished by Contractor

Contractor shall be responsible for loading, hauling, unloading, and storing of all Contractor-furnished material.

Contractor shall furnish at its expense, unless otherwise indicated by Owner:

* All equipment, tools, machinery, surveying instruments, transportation, labor, and supervision necessary to complete the work.
* Portland Cement concrete with a 28-day compression strength of at least 3000 psi.
* Supplies and expendable materials such as forming materials, reinforcing steel (re-bar), anchor bolts, bearing plates, reinforcement wire, miscellaneous pipe and angle iron, nails, and timbers as required to complete the work.
* Welding rods, grinding discs, and welding supplies.
* Materials and equipment for performing draining of existing facilities for performing tie-ins, where applicable.
* Materials required for hydrostatic testing including all required blind flanges and weld caps; water; pumps; pressure/temperature recorder with charts; certified deadweight set with a copy of calibration certificate (certificate no more than 12 months old); gauges, valves, and interconnecting piping and tubing; and spheres, squeegees and pigs as required for dewatering.
* All other incidental and/or expendable materials necessary to complete the work, without limitation by these specifications, and except as expressly furnished by Owner.

## Materials Furnished by Owner

Owner shall furnish all materials that will become a part of the completed facility, except materials which the Contractor is expressly required to furnish at Contractor’s expense.

Contractor shall be responsible for loading, hauling, unloading, and storing of all Owner-furnished material, which will be made available at a location specified by Owner.

Owner-furnished materials will also include, but not be limited to, the following as necessary for Contractor to complete the specified piping work:

* Pumps, pipe, pipe fittings and valves (Note: coated pipe shall not be placed on the ground but shall be skidded on padded skids. Walking on the pipe will not be permitted).
* Primer and coating materials for underground piping.
* Primer, intermediate, and finish coatings and thinners for above ground piping and structures.
* Miscellaneous steel plate and steel angle.
* Pre-fabricated pipe supports and, as noted in Drawings, pipe support pipe and wide-flanged beam
* U-bolts, gaskets, and flange bolts.

## Material Custody

Contractor shall accept custody of all materials when delivered to Contractor at Owner’s job site or other specified locations. Contractor’s representative shall provide written receipts to Owner for all materials delivered.

While accepting custody of materials from Owner, Contractor shall keep a tally of all materials loaded onto Contractor’s trucks for transportation to construction site. Contractor shall also keep a tally of any accepted, but unused, material as it is stored by Contractor at a designated location. While accepting custody and preparing tally, Contractor shall inspect all materials received and loaded onto its trucks. This inspection by Contractor shall include, at a minimum, a visual inspection. All defects and damages found during this inspection shall be marked with paint and noted on the tally sheets. Owner shall bear the cost of repairing or replacing such materials if it is determined that the damages occurred prior to Contractor’s acceptance of the material, with such defects being clearly noted on the material tally signed by Contractor’s Representative and Company’s Representative. Contractor shall bear the cost to repair or replace any defective or damaged materials not identified during this acceptance inspection.

Contractor shall bear the cost of all materials damaged, lost, or stolen while in Contractor’s custody.

All materials shall be stored by Contractor at such places to relieve Owner of storage and/or demurrage charges. Storage facilities shall be appropriate for the materials stored, e.g., paint and coating materials in climate controlled area to preclude freezing, etc.

Owner may furnish material at locations other than those specified. In the event that material is located at a greater distance from the work site than specified in the attached project scope document, Owner shall compensate Contractor for the mileage difference as extra work according to Contractor’s equipment rental schedule.

Owner will attempt to deliver material to Contractor reasonably in advance of Contractor’s requirements. When material is late in delivery, the Contractor shall make every effort to “work around” the shortage until the material is received.

* 1. **Loading and Hauling**

Contractor shall be responsible for loading the pipe, valves, fittings, and other equipment onto trucks (or some other form of transportation) once Contractor takes custody of equipment from Owner. Contractor shall also be responsible for any stockpiling and reloading of fabricated piping that takes place once the piping is in the Contractor’s custody.

Hauling of material shall be done in such a manner as to comply with the rules and regulations of all governing agencies and Contractor shall secure any special permits or licenses required from any such agencies. Contractor shall be liable for any damage by its transportation vehicles to State, County, or private roads including bridges and culverts.

As Contractor loads materials onto its trucks, each piece shall be lowered to position without dropping. After loading, suitable chains with pads and boomers shall be used to tie the load securely.

It will be the responsibility of Contractor to see that the material is placed or installed in accordance with lists and Drawings furnished by Owner for the proper placement of the material by rating, size, weight, and specification. Any moving, relocation, or assembly of pipe, valves, fittings, or equipment resulting from Contractor’s failure to comply with these requirements shall be at Contractor’s expense.

# Concrete Foundations

Contractor shall construct concrete foundations, floors, and supports at the facility in accordance with any attached drawings and referenced standards as applicable. All grade and location stakes for concrete foundations shall be set by Contractor, subject to being verified by Owner’s agent.

Concrete work may include, but not be limited to, layout, excavating, forming, placing of anchor bolts and reinforcing steel, placing of concrete, taking of samples for compressive strength tests, surface finishing, form removal, backfilling, compacting backfill, and cleaning up of all construction areas.

Unless otherwise specified by Owner, Contractor shall provide all other expendable materials required to complete concrete work.

## Excavation and Forming

All foundations shall extend to firm soil. When the soil has been disturbed by Contractor’s activities, the depths of foundations, footings, piers, or supports shall be lowered beyond the depth required on the drawings to undisturbed soil or to soil compacted and tested to 95% modified Proctor without extra compensation to the Contractor.

Contractor shall keep all excavations free of water accumulations.

Other underground facilities may be encountered in the course of the Contractor’s work and the Contractor shall assume responsibility for locating and excavating these facilities. Damage to other underground facilities will be at Contractor’s sole expense.

Contractor shall perform hand excavation as required as a contingency of the work.

## Placing of Reinforcing Steel (Re-bar) and Anchor Bolts

Contractor shall cut, bend, and tie all reinforcing steel. Reinforcing steel shall be free of rust, oil, or foreign matter. Reinforcing steel shall be lapped 40 diameters for continuous reinforcement.

Reinforcing steel shall be on “chairs” and not placed in contact with any soil.

Anchor bolts shall be grade B-7 (or equal) in construction. Anchor bolt and reinforcing bar locations shall be maintained during the concrete pour. All anchor bolts shall be plumb after pouring.

## Placing of Concrete

Concrete shall be normal Portland Concrete cement. Aggregates shall consist of uniformly graded sand and crushed stone and shall be clean and free of foreign matter.

All concrete shall have a minimum 28-day compressive strength of 3000 lbs. per square inch.

All foundations shall be monolithically poured unless specified otherwise and approved by Owner.

All loose dirt and debris shall be removed from within the form before concrete is poured in the form.

Concrete shall be vibrated to prevent air pockets and honeycombing of the concrete in layers no more than 12” thick. Thick pours shall have sufficient personnel and equipment.

Concrete shall be protected from freezing. Concrete damaged by freezing shall be removed and replaced by the Contractor at its sole expense.

If applicable, the top of the concrete foundation(s) shall be chipped to expose new concrete before equipment installation and grouting. The foundations will be raked to facilitate the chipping.

After forms have been removed, the portion of the concrete above grade shall be “rubbed” with a cement mixture to remove surface imperfections.

## Testing and Inspection

At least three (3) test cylinders of concrete will be taken from each delivery truck by the concrete supplier for compressive test purposes. These cylinders will be taken, labeled, and stored in accordance with ASTM C 109. Owner reserves the right to make inspections at any time at the source of supply of materials, at the place of preparation of materials, at the mixing plant if ready-mixed concrete is used, and during execution of all concrete work.

## Backfilling Concrete Foundations

Contractor shall backfill around concrete foundations after the forms have been removed. Subsurface work shall not be backfilled until the work has been inspected and accepted by Owner.

Backfill shall be well-compacted around all foundations and supports to prevent settlement. Water flooding of backfill around foundations will not be permitted.

# Piping and Fitting Work

## General

Contractor shall fabricate and install above- and below-grade interconnecting piping, fittings, and appurtenances in accordance with applicable standards, specifications, and any attached drawings.

Owner shall be responsible for shutting down product flow and performing stopple work as necessary for Contractor to perform the specified piping work.

All pipe work shall evidence good workmanship. Horizontal pipe runs shall be level and vertical runs shall be plumb.

Coated pipe shall be handled with slings or other means to prevent damage to the pipe coating. Coated pipe shall not be placed on the ground but shall have skids placed under the coating cut-backs to protect the coating from degradation by soil. Care shall be taken to protect the coating from damage by the skids.

The ends of prefabricated sections and the ends of two or more lengths of pipe welded together shall be closed at the end of each work day to prevent the entrance of foreign matter and shall not be open until future work so requires.

Adequate, uniformly distributed slack shall be constructed into any underground line over 80 feet in length. Underground elbows shall be centered in the trench or shall contact the outside wall of the trench.

All junk, trash, rocks, roots and other debris shall be removed from the trench before the pipe is lowered in.

Any sump tank and drain piping shall be laid precisely on grade and ditch soil utilized to bed and drain for its full length. Batter boards and stringline shall be used to ensure proper grade. The grade shall be field established after the drain source piping has been established and the sump inlet connections determined. Drain piping shall not be included in the hydrostatic test but will be air-tested to 20 psi for one (1) hour to ensure a closed system.

All connections to centrifugal pumps shall be completed without strain on the pump. The pump flange and its mating flange shall be on the same centerline and shall face up without producing misalignment of the pump and motor. All eccentric reducers on pump suction piping shall be flat side up.

Flanged equipment bolting shall be performed in accordance with NS-ES-40-005*.*

Pump and motor alignment, if required, shall be done by others. Contractor shall set pump and motor, bolt up the piping to the pump, then grout the pump and then call for a Owner millwright. Contractor shall furnish a skilled helper for the Owner millwright.

## Excavation

Contractor shall furnish all equipment, materials, and labor, and perform all operations required for excavation, shoring, bedding, and backfilling associated with the installation of any underground piping and fittings per attached drawings.

Contractor shall protect all excavations from cave-in until they are backfilled. The sides of excavations shall be sloped whenever possible to prevent cave-in and to provide safe work areas. Contractor shall assume all responsibility for conforming to governing laws and safety regulations regarding sloping, shoring, and bracing excavations to prevent cave-in.

Contractor shall assume responsibility for locating and excavating any other underground facilities encountered in the course of Contractor’s work. Damage to other underground facilities will be at Contractor’s sole expense. Hand excavation or vacuum potholing shall be utilized by the Contractor to locate underground facilities and to prevent damage to the facilities by machine excavation.

Contractor shall keep pipe trenches and excavations clear of all junk, debris, roots, rocks, trash, other foreign material, and water accumulations.

Wet, spongy, or otherwise unstable soil encountered in the bottom of the trench incapable of properly supporting pipe or ducts shall be removed as required but not exceeding a depth of 2' below the trench bottom, and the trench shall be backfilled to the proper grade with suitable material.

## Tie-Ins

Procedures and supervision for drain down and hot work specific to the project will be provided by Owner. Contractor will provide all required equipment to carry out procedures safely and with no releases.

## Backfilling and Compacting

All backfilling shall be done in a manner to prevent any damage to facilities and pipe coatings. Excavation below the bottom of any pipe shall be backfilled and compacted to prevent displacement of below-grade facilities due to overburden of backfill. In no instance shall pipes or conduits be bedded in fill having porosity or permeability characteristics greater than the surrounding native soil.

# Welding

## General

Contractor’s welding equipment shall be in first-class condition and shall be subject to inspection and rejection by Owner.

Welding for the tie-in work and any related welding near an existing facility shall require that a Owner Representative complete a hot work permit on a daily basis, or as changing conditions warrant, and Contractor shall sign permit prior to any work commencing.

Contractor shall use welding rods as specified in the Owner Welding Manual for the various grades of pipe or steel. Contractor shall only use welding rods that have been properly stored and protected.

Contractor shall not perform welding during periods of rain or excessive wind unless the work is protected by shelters and/or windbreaks approved by Owner. Contractor shall not perform welding work when Owner judges conditions as unsatisfactory for such work.

## Welder Qualification

Each welder must be qualified in accordance with the Owner Welding Manual and API 1104.

Before being employed by Contractor on this work, each welder must pass a welding test using a welding procedure previously qualified by Owner. The welder’s performance of the welding procedure shall be observed, supervised, and documented by a Owner representative. Arrangements and expenses required to qualify welders shall be covered by Contractor.

## Welding Procedures

Prior to welding, each piece of pipe shall be swabbed to remove foreign matter. The ends shall be thoroughly cleaned of paint, rust, scale, dirt, oil, grease, or other foreign matter. Any pipe ends that are deformed or damaged shall be removed, repaired, or re-beveled per the Owner Welding Manual and to the satisfaction of Owner. Each section of welded pipe shall be inspected for cleanliness before being tied-in and shall be further cleaned if necessary.

All girth welds are to be at right angles to the axis of the pipe. No miter welds will be permitted.

Should lamination or split ends be discovered in the pipe during welding, the full joints containing such defects shall be removed. No portion of such discarded joints shall be used. Removal of such defective pipe shall be performed by Contractor under extra work order issued by Owner if the defect or defects in the pipe could not have been discovered by Contractor through the use of ordinary care in inspection.

Contractor shall remove a cylinder from the constructed pipe where any dents, gouges, grooves and arc burns occur resulting from Contractor’s operations. Removal of the defect shall be at the Contractor’s expense and the cost of the pipe removed shall be chargeable to the Contractor. Removed sections shall be replaced and new welds made. Contractor shall bear the cost of such repairs.

All cut pipe sections to be welded shall be cut using a torch cutting machine or portable lathe, providing a beveled end. The resulting surface shall be hammered, chiseled and brushed to clear away all adhering burned metal, and the inside of the pipe shall be thoroughly cleaned to remove any particles of burned metal, all subject to the approval of Owner.

## Inspection and Examination of Welds

All welding work shall undergo visual inspection by Owner and shall be supplemented by radiographic inspection or other accepted nondestructive testing methods performed by Owner in accordance with API 1104 and the Owner Welding Manual*.*

Owner shall specify the nondestructive examination of 10 to 100 percent of girth welds made by each welder during each welding day. Contractor may also be required to remove completed welds, as selected and designated by Owner, for destructive testing purposes. The cost of replacing welds shown to be defective after such inspection and examination shall be borne by Contractor.

# Coating of Below Grade Piping

Pipe to be placed below ground shall be furnished by Owner with a mill-applied fusion bond epoxy (FBE) coating. Contractor shall clean, prime, and coat the pipe at all girth welds using a 2-part epoxy method as specified by Owner. Contractor shall then test the pipe throughout its length with an approved Holiday detector before lowering into the ditch or backfilling.

Pipe, fittings, and appurtenances furnished bare shall be cleaned, primed, coated, and tested with an approved Holiday detector before lowering into the ditch.

All coating of girth welds, bare pipe, fittings, and holidays performed in the field by Contractor shall be in accordance with manufacturer's written instructions provided with the particular coating product as supplied by Owner.

All holidays on mill-coated or field-coated pipe, girth welds, and fittings shall be repaired by Contractor. The Contractor shall then retest the defective coating area after repair.

Before coating, all girth welds, bare pipe, and fittings shall be thoroughly cleaned of dirt, rust, scale, oil, grease, or other foreign matter and shall be dry.

Holidays larger than a pinhole shall be repaired with a minimum of three (3) inches of coating on either side of the defect.

Contractor shall test all coated pipe and fittings a second time after raising pipe from skids and before lowering into the trench in the presence of Owner’s representative or before backfilling if the pipe is already in the ditch.

# Grouting

Contractor shall grout equipment to foundations as required with care to prevent voids or pockets in the grout and to ensure that the grout is in contact with the complete equipment base and concrete foundation surface. Contractor shall assume responsibility for providing grout work acceptable to Owner.

Grout types used shall have minimum compressive strength of 5000 psi at 28 days and be non-shrink cement-based, non-shrink epoxy, sand-cement drypack, or as specified by Owner.

Concrete foundations shall be at least seven (7) days old prior to surface preparation.

Metal surfaces in contact with the grout shall be clean and free of oil, grease, or other foreign substances.

Mixing, finishing and curing of grout shall be per the manufacturer's printed instructions.

# Pressure Testing

The applicable standard for pressure testing performed on non-DOT regulated piping shall be of ASME B31.4 *Pipeline Transportation Systems for Liquid Hydrocarbons* (latest published version).

Water source for hydrostatic testing, as well as pressures and durations for testing of facility piping shall be as per Owner specifications.

Contractor shall furnish and install all equipment and temporary piping to properly fill the line and apply the prescribed test pressure for the specified period. Contractor will be responsible for metering, pumping, hoses, and connectors capable of safely withstanding test pressures as specified by Owner. Contractor shall provide personnel to supervise the test continuously for the duration of the test and manually record temperature and pressure every 15 minutes with notations as to any changes made to the piping. Documentation of completed pressure tests shall include a drawing that clearly indicates extent of tested piping, test date, and pressure.

For fabricated assemblies and short sections of pipe for which a post-installation hydrostatic test is impractical, a pre-installation hydrostatic test is acceptable with x-ray of the tie-in welds.

Any leaks developed by the tests and any defective welds found shall be repaired and the entire assembly retested at Contractor’s expense. Owner shall reimburse Contractor for all costs involved in repairing leaks which are a result of defective material furnished by Owner that could not have been discovered by Contractor through the use of ordinary care in inspection.

Contractor shall protect all piping and equipment from the possibility of freezing damage.

NOTE: Any facility piping rated at pipeline pressures shall be hydrostatically tested in accordance with Section 609, Pipeline Hydrostatic Testing found in the Owner Operations and Maintenance Manual.

# Painting of Above Grade Piping and Structures

All above grade pipe, fittings, equipment, and appurtenances shall be painted in accordance with Owner Specification NS-ES-68-002.

Painting shall not be performed during periods of rain, sand storms, damp or frosty weather, or under any conditions which cause “sweating” of the piping to be coated. The finished, painted surface shall be free of runs, sags or other flaws. Work not conforming to these specifications shall be corrected at the Contractor’s expense.

All manufacturers’ valve information tags and equipment information tags shall be protected from paint by covering the tag with masking tape and/or grease.

Before painting begins, a meeting shall be held between Owner Representative and Contractor to verify the following:

* Items to be masked for protection from damage and paint
* Timing and coordination of painting in areas where other work (i.e. electrical installations) may take place concurrently
* Application procedures

# Cleanup

Contractor shall keep all work areas clean of junk, trash, welding rods, pipe rings and other debris to the satisfaction of Owner during the construction period and at job completion. Contractor shall be responsible for the disposal of all such trash and debris. Any excess materials left at the construction site shall be neatly stacked or stockpiled to the satisfaction of Owner.