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DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

STATEWIDE DESIGN & ENGINEERING SERVICES DIVISION

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January 15, 1999

SPECIFICATIONS
for
DOT&PF Standard for Above and Underground
Petroleum Storage Tanks

December 18, 1992

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SECTION 02050

EXCAVATION, DEMOLITION AND DISPOSAL

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. The Work includes excavation, purging of flammable or combustible vapors, removal, and disposal of the underground petroleum storage tanks (USTs). The following is a description of the tanks:

(Completed by Specifier)

- B. The Work also includes excavation and stockpiling of contaminated soils if any from the tank pit. If deemed necessary by the Contracting Officer, the Contractor will return to the site to excavate and stockpile additional contaminated soils.

1.02 REFERENCES

- A. State of Alaska, Department of Environmental Conservation, Underground Storage Tanks, 18 AAC 78.
- B. OSHA Regulations for Construction shall be adhered to and shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- C. Alaska Administrative Code, Title 18, Chapter 75, Oil and Hazardous Substance Pollution Control, and Alaska Statute, Title 46, Water, Air and Environmental Conservation, Chapters 03 and 04.
- D. American Petroleum Institute, Publication 2015, January 1991, Cleaning Petroleum Storage Tanks.
- E. American Petroleum Institute, Recommended Practice 1604, December 1987, Supplement 1989, Removal and Disposal of Used Underground Petroleum Storage Tanks.
- F. National Fire Protection Association (NFPA) 30, "Flammable and Combustible Liquids Code."
- G. Uniform Fire Code, Section 79, "Flammable and Combustible Liquids."
- H. U.S. EPA, 40 CFR 280, "Underground Storage Tank Regulations."

1.03 SUBMITTALS

A. Material Submittals

1. Material Disposal Plan

- a. Develop a plan describing the transportation and disposal of fuel and contaminated fuel products from the tank systems as well as tank and pipe demolition materials.

2. Fuel Spill Cleanup Plan

- a. Develop a plan describing the cleanup of Contractor-caused fuel spills.

PART 2 -- PRODUCTS

2.01 POLYETHYLENE SHEETING

- A. Polyethylene shall be hydrocarbon resistant reinforced sheeting, 10-mil bottom layer, 6-mil top cover, for the placement and protection of contaminated soils.

PART 3 -- EXECUTION

3.01 DESCRIPTION OF WORK

- A. Remove and dispose off-site, existing underground fuel storage tanks, contents, and selected associated fuel piping (as shown on drawings) in accordance with the requirements of these specifications and API, Recommended Practice 1604, whichever is most stringent.
- B. Excavate petroleum contaminated soil and stockpile on-site or off-site as applicable in accordance with the requirements of the State of Alaska and these specifications.
- C. Locate all utilities and disconnect electrical power to the work area.
- D. All remaining fuel, water and sludge shall be removed from the tank in which it is being stored and either reused by the Contractor or properly and legally disposed of. Hand pumping may be required to empty the bottom few inches of sludge. These liquids shall not be discharged into or upon any roadway, ditch, storm drain, sewer line, lake or upon the ground.
- E. Following the removal of the remaining fuel, water and sludge, the Contractor shall then excavate carefully down to the top of the tank and remove the piping, filler, and vent tubes, and temporarily plug all tank openings. The tank can be conditioned by adding solid crushed carbon dioxide (dry ice) in the amount of 15 pounds/1,000 gallons of tank capacity evenly distributed over the greatest possible area. (When using carbon

dioxide, pressures in the tank shall not exceed 5 psig.) An alternative may be to ventilate the tanks with air or other method proposed by the Contractor and accepted by the Contracting Officer. All normal safety and pollution precautions shall be used. The Contractor shall then complete the excavation and remove the tank. The tank can become explosive after initial inerting due to vapor from material still remaining on the interior walls. Therefore, the tank shall be continuously monitored for explosive vapors to determine if the tank contents are inert.

- F. Upon removal, the tank shall then become the property of the Contractor and may be recycled or legally and properly disposed. Contractor may clean and dispose of the tank using alternative methods. Notify the Contracting Officer in writing that the tank has been legally disposed.
- G. Excavate petroleum contaminated soil if any from the tank pit as determined by the Contracting Officer. The Contracting Officer will field screen each backhoe bucket of excavated soil for volatile hydrocarbons. Contractor shall separate contaminated soil and uncontaminated soil into two stockpiles. The contaminated soil shall be placed on a reinforced polyethylene membrane of thickness not less than 10 ml. Contractor shall provide membrane material to stockpile all of the contaminated soil. The Contractor shall have extra membrane at the site if the Contracting Officer determines additional excavation and stockpiling is necessary. Contractor shall provide and cover the contaminated soil stockpile with a nonwoven polyethylene membrane of thickness not less than 6 ml. The stockpile shall be covered in order to adequately protect it from wind and rain.
- H. The tank excavation shall remain open (unfilled) until such time determination is made by the Contracting Officer on the completeness of removal of the petroleum contaminated soil. The Contractor shall erect and maintain security fencing or barricades around the perimeter of the tank excavation until the project site is accepted by the Alaska Department of Environmental Conservation (ADEC) for closure.
- I. The Contractor may be required to return to the project site to excavate additional petroleum contaminated soil dependent on the analytical test results of the undisturbed soil surrounding the tank excavation. The additional contaminated soil shall be stockpiled in the like manner described above as directed by the Contracting Officer.

3.02 EXCAVATION

- A. Locate all utilities and disconnect electrical power to the work area.
- B. Excavate and remove the existing UST systems (including underground piping). Excavate only the quantity of soil necessary to remove the existing UST systems and install the new UST systems unless directed by the Contracting Officer.

3.03 CONTAMINATED SOIL

- A. Place the contaminated soils on protective membrane, as directed by the Contracting Officer.
- B. Contractor shall return to the site to excavate additional contaminated soils, as directed by the Contracting Officer.

3.04 DISPOSAL OF TANKS

- A. The tanks, piping, and other UST demolition material shall become the Contractor's property and shall be transported and disposed of off-site. The tanks shall be removed from the site before they are crushed, cut up or otherwise demolished.
- B. Submit documentation to the Contracting Officer regarding the location of final disposal of the tanks.

END OF SECTION

SECTION 02223 BACKFILLING

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Site filling and backfilling.
- B. Consolidation and compaction.
- C. Fill for over-excavation.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control
- B. Section 01410 - Testing Laboratory Services; Testing Fill Compaction
- C. Section 02050 - Excavation, Demolition and Disposal
- D. Section 03300 - Concrete

1.03 REFERENCES

- A. ASTM C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound rammer and 12-inch drop.
- C. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- D. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10-pound rammer and 18-inch drop.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit 10-pound sample of each type of fill to testing laboratory, in air-tight containers.

PART 2 -- PRODUCTS

2.01 FILL MATERIALS

- A. Type A - Classified fill, well graded, non-frost susceptible; free of shale, clay, friable material, debris; graded in accordance with ASTM C 136 within the following limits: gravelly material shall have a coefficient of uniformity

greater than four (4), and the sandy material shall have a coefficient of uniformity greater than six (6).

<u>Sieve Size</u>	<u>Percent Passing</u>
3 inches	100
3/8-inch	56 to 100
No. 4	35 to 60
No. 10	30 to 64
No. 40	9 to 34
No. 200	0 to 6

- B. Type B - Bedding Material: Material for Type B bedding shall conform to the specifications for Type A fill materials of this Section, and in addition, shall contain material no larger than 3/4-inch.
- C. Type C - Filter Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	100
No. 10	85 to 100
No. 20	60 to 90
No. 40	25 to 50
No. 200	Less than 5%

Sand shall also not have more than 45% of the total weight passing any one sieve and retained on the next consecutive sieve of this list. The Coefficient of Uniformity (Cu) must be less than 4; the Coefficient of Curvature (Cc) must be equal to or less than one.

- D. Type D Pea Gravel: Natural stone, free of clay, shale, organic matter, graded in accordance with ASTM C 136, to the following:
1. Minimum size: 1/4-inch.
 2. Maximum size: 5/8-inch.
- E. Type E - Classified Fill

<u>Sieve Size</u>	<u>Percent Passing</u>
8-inch	100
3-inch	66 to 100
1/2-inch	32 to 100
No. 4	20 to 60
No. 10	2 to 50
No. 40	2 to 30
No. 100	0 to 10

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Verify fill materials to be reused are acceptable.

3.02 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with Type A fill and compact to density equal to or greater than requirements for subsequent backfill material.
- C. Prior to placement of aggregate base course material at paved areas, compact subgrade to 95 percent of its maximum dry density in accordance with ASTM D 1557.

3.03 BACKFILLING

- A. Backfill areas to contours and elevations shown on the drawings with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Classified Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.
- D. Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation dampproofing and utilities in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Remove surplus backfill materials from site.
- I. Leave fill material stockpile areas completely free of excess fill materials.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

- B. Tests and analysis of fill material will be performed in accordance with ASTM C 136, ASTM C 177 and with Section 01400.
- C. Compaction testing will be performed in accordance with ASTM D 1556 and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Department.
- E. Frequency of Tests
 - 1. Mechanical analysis on material: One sample for approval, prior to use of the following, plus regular checks as shown:
 - Classified backfill, all types - one per 2,000 tons
 - Foundation Material - one per 500 linear feet
 - Bedding, all types - one per 1,000 linear feet
 - Leveling course - one per 1,000 tons
 - 2. Density Tests for Compaction Requirements: One test of subgrade prior to placement of concrete ballast pad in tank pit. One test prior to pouring concrete topping slab on aggregate base course.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic.

3.07 SCHEDULE

- A. Type A Classified Fill:
 - 1. Tank concrete ballast subgrade as required.
- B. Type D Fill Material:
 - 1. Compacted noncorrosive pea gravel or crushed rock around underground storage tanks and piping systems.

(Completed by Specifier)

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Aggregate base course.

1.02 RELATED SECTIONS

- A. Section 02050 - Excavation, Demolition and Disposal
- B. Section 02223 - Backfilling
- C. Section 03300 - Concrete

1.03 REFERENCES

- A. AASHTO M147-65 - Materials for Aggregate and Soil Aggregate.
- B. ASTM C1 36 - Sieve Analysis of Fine and Course Aggregates.
- C. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb rammer and 12 inch drop.
- D. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- E. ASTM D 1557 - Test Method for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb rammer and 18 inch drop.
- F. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit 10 lb sample of each type of aggregate to testing laboratory.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Coarse Aggregate: Crushed stone; free of shale, clay, friable materials and debris; graded in accordance with ADOT&PF, Subsection 703-2.03 Table 702-2, D-1, within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2 inches	---
1 inch	100
3/4 inch	70 to 100
3/8 inch	50 to 80
No. 4	35 to 65
No. 8	20 to 50
No. 40	8 to 30
No. 200	0 to 6

- B. In addition, aggregate shall meet the following requirements:

Percent of Wear	AASHTO T 96	50 max
Degradation Value	ATM T-13	45 min.
Percent Fracture	ATM T-4	70 min.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Verify subbase has been inspected, gradients and elevations are correct and are dry.

3.02 AGGREGATE PLACEMENT

- A. Spread course aggregate over prepared subbase to the total designed thickness.
- B. Place course aggregate in 4 inch layers and compact.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Compact placed aggregate materials to achieve compaction to 95 percent of its maximum dry density in accordance with ASTM D1557.
- F. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

- G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from True Elevation: Within 1/2 inch.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Gradation of Aggregate: In accordance with ASTM C136.
- C. Compaction testing will be performed in accordance with ASTM D1556 and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Department.
- E. Frequency of Tests: Refer to Section 01400, Quality Control.

END OF SECTION

SECTION 02680
FUEL DISTRIBUTION

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Work includes fuel distribution systems from the storage tanks to and including fuel dispensers.
- B. Site monitor wells.
- C. Provide all bedding material as specified on drawings and these specifications.

1.02 RELATED WORK

- A. Section 02050 - Excavation, Demolition and Disposal
- B. Section 02223 - Backfilling
- C. Section 02231 - Aggregate Base Course
- D. Section 03300 - Concrete
- E. Section 13201 - Underground Storage Tanks
- F. Section 13202 - Aboveground Storage Tanks

1.03 REFERENCES

Alaska Department of Transportation and Public Facilities

1988 Edition Alaska Standard Specification for Highway Construction.

American Society for Testing and Materials

ASTM D 1557-78 Moisture density relations of soils and soil-aggregate mixtures using 10-lb (4.54 kg) rammer and 18-inch (457 mm) drop.

American Society for Testing Materials

ASTM D 2922-81 Density of soils and soil-aggregate in place by nuclear methods (shallow depth).

American Society for Testing Materials

ASTM D 3017-88 Standard test method for water content of soil and rock in place by nuclear methods (shallow depth).

American National Standards Institute (ANSI) Standards

Standard B31.3 Petroleum refinery piping.

Standard B31.4 Liquid petroleum transportation piping systems.

American Petroleum Institute (API) Recommended Practices

Publication 1625 Installation of underground petroleum storage systems.

National Fire Protection Association (NFPA) Standards

Standard 30 Flammable and combustible liquids code.

Petroleum Equipment Institute (PEI) Recommended Practices

RP-100-86 Recommended practices for installation of underground liquid systems.

Underwriters Laboratories (UL) Standards

UL 567 Pipe connectors for flammable and combustible and LP gas.

UL 971 UL-listed non-metal pipe.

UL 107 Glass fiber reinforced plastic pipe and fittings for flammable liquids.

UL-CAN-4-S633-M81 Flexible underground hose connectors.

Uniform Fire Code (UFC)

Article 79 Flammable and Combustible Liquids

U.S. EPA Regulations

40 CFR 280 Technical standards and corrective action requirements for owner and operators of underground storage tanks (UST).

1.04 QUALITY ASSURANCE

- A. Reference to a particular organization's standards shall be in accordance with those standards unless more restrictive criteria is indicated herein.
- B. Installation of new piping and equipment shall be accordance with the manufacturer's installation instructions and API Recommended Practice 1615, "Installation of Underground Petroleum Storage Systems".
- C. All work and materials shall be in accordance with requirements of all applicable state and local codes, regulations and ordinances, the National

Electrical Code, Uniform Building Code, Uniform Plumbing Code, Uniform Mechanical Code and Uniform Fire Code (locally adopted editions), the latest standards of the NFPA National Fire Codes, and the rules and regulations of all other authorities having jurisdiction. Nothing in drawings and specifications shall be construed to permit work not in conformance with applicable codes, rules, and regulations.

- D. Where drawings or specifications call for material or construction of a better quality or large sizes than required by the above mentioned codes, rules and regulations, the provision of the specifications shall take precedence.
- E. The Contractor shall furnish without any extra charge any additional material and labor when required for compliance with these codes, rules and regulations, even though the work may not be mentioned in the specifications or shown on the drawings. It shall be the responsibility of the successful bidder to bid in accordance with the minimum requirements of the applicable codes, rules, and regulations.
- F. All electrical motors, starters, controls, devices and wiring shall comply with standards of NEC and shall be UL listed and so identified.

1.05 DRAWINGS

- A. Drawings are diagrammatic and show the general design, arrangement and extent of the systems. Do not scale or attempt to use drawings for roughing in measurements, nor use as shop drawings. Make field measurements and prepared shop drawings for submittal. Coordinate work with shop drawings of other specification divisions.
- B. Contractor shall investigate the capacity and space requirements of the proposed equipment before submitting shop drawings.
- C. Where conditions necessitate a rearrangement, prepare and submit to the Contracting Officer, for review, drawings of the proposed rearrangement. Because of the small scale of the drawings, it is not possible to show all offsets, fittings, and accessories which may be required. Carefully investigate the conditions and the work of other trades and arrange work accordingly, furnishing such fittings, traps, valves and accessories as may be required to meet such conditions.

1.06 SUBMITTALS

- A. General: Submittals shall be in accordance with Section 01300, Submittals. Submit all product data and shop drawings in one complete submittal with each submittal copy in a binder with index and tabbed dividers. Partial submittals will not be acceptable except with the prior approval of the Contracting Officer and then only in special cases where an accelerated review is necessary so that the progress of the project is not impeded. Submittals not conforming in physical form and content with the provisions of the drawings and specification will be rejected without review and a complete resubmittal required.

- B. Product Data: Submit all catalog data and other descriptive literature to fully substantiate the conformance with specification of equipment and materials submitted. Mark product data to indicate exactly those items that are to be provided and cross out unrelated or non applicable items. In addition, submit manufacturer's detailed installation instruction on all equipment and materials submitted.
- C. Shop Drawings: Submit drawings for fabrication and installation of all system components. Include fully dimensioned layout of all piping, equipment and all associated connection details. Coordinate shop drawings with work of other trades.

1.07 JOB CONDITIONS

- A. Fees, certificates, warranties:
 - 1. The Contractor shall arrange and pay for all required permits, fees, connection charges, taxes, and other miscellaneous charges necessary to execute the work. Submit drawings and specifications to the State Fire Marshall and/or local Fire Marshall for review and approval prior to beginning construction.
 - 2. The Contractor shall deliver to the Contracting Officer all certificates of approval issued by the state, county, local or other authorities having jurisdiction over the work performed. Certificates shall be forwarded promptly when received by the Contractor.
 - 3. Equipment specified shall be covered by the manufacturer's standard warranty on the new equipment for 1 year from the date of issuance of the Certificate of Substantial Completion and as further protected by the manufacturer's standard warranty. If within 12 months from the Date of Substantial Completion any of the equipment herein described is shown to be defective in workmanship or materials, it shall be replaced or repaired free of charge by the Contractor.
- B. Product Handling:
 - 1. Contractor is responsible for protection of all material, equipment, and apparatus provided from damage, water, and dust, both in storage and when installed, until final acceptance.
 - 2. Provide temporary storage facilities for material and equipment.
 - 3. Material, equipment, or apparatus damaged because of improper storage or protection will be rejected and replaced at Contractor's expense.

C. Special Requirements:

1. Maintain emergency and service entrances usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic when required by Contracting Officer.

D. Schedule of Work: Arrange work to comply with schedule of construction.
(Completed by Specifier)

E. Coordination of Work: The Contractor shall coordinate all trades whose work is adjacent, in order to avoid field interference and delay in execution of the work of all trades. Furnish detailed advance information regarding all requirements related to work by others.

1.08 OPERATION AND MAINTENANCE DATA

- A. Submit in accordance with Section 01700, Contract Closeout.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. Materials and apparatus shall be new unless otherwise specified, and each shall have all necessary trimmings, accessories and controls required to make it functionally complete. All items of the same type shall be of the same manufacturer. All phases of the work will be performed by competent workmen, skilled in their respective trades.
- B. All materials, equipment and processes requiring approval of the Underwriters Laboratories or other nationally recognized testing agency shall be labeled so approved in accordance with the provisions of the State of Alaska.

2.02 FLEXIBLE PIPING SYSTEM

- A. Double wall flexible piping system shall be Enviroflex as manufactured by Total Containment, Inc., or equal. Piping shall be UL listed for underground piping of flammable liquids. The double-wall piping system shall consist of a flexible inner primary pipe contained within a flexible outer containment pipe, each making connection within a series of surface access containment chambers. All piping runs shall be continuous, whereby there shall be no fittings or piping connections, for either the primary or secondary containment pipe which are not visible or accessible from the above ground surface. The secondary containment system shall provide water tight containment of the primary piping.
- B. Product compatability: All components of the double-wall piping system shall be compatible with the products to be stored.

- C. Corrosion resistance: All components of the double-wall piping system shall be made of noncorrosive materials, or if metallic, such as the fittings and couplings, isolated from corrosion causing elements.
- D. Structural integrity: The outer secondary containment system shall be of such a design and made of materials to have sufficient strength to withstand the maximum underground burial loads and tested in accordance with AASHTO M294. The flexible inner primary piping system shall be capable of withstanding liquid pressure five times greater than the designed operating pressures.
- E. Integrity testing: The outer secondary containment systems shall undergo an air pressure hold test (3 to 5 psi) after installation and before the final backfill. The flexible inner primary piping system shall be subject to 60 psi air pressure hold test prior to final backfill.
- F. Monitoring capability: The design of the secondary containment system shall permit any leak in the primary piping system to flow from its source to a surface access containment chamber which shall be fitted with an electronic leak detection system.

2.03 FIBERGLASS PIPING AND FITTINGS

- A. Fiberglass piping and fittings shall be Ameron Dualoy 3000/L or equal. Piping and fittings shall be UL listed for underground piping of flammable liquids and shall conform to ASTM D 2310, D 2517 and D2996. Pipe shall be filament wound fiberglass reinforced epoxy with integral epoxy liner and exterior coating. Fittings shall be compression molded and filament wound fiberglass reinforced epoxy. Joining shall be bell and spigot tapered adhesive bonded joint with two-part epoxy adhesive for primary product piping system and 2 part clamshell wing nut bolted fittings for secondary containment fittings. Secondary containment piping and fittings shall be one pipe size larger than primary product piping and fittings. Both primary and secondary containment piping shall be sloped to drain back to tank at slopes indicated on drawings. Primary piping systems shall be 150 psig working pressure (-60 to 150 degrees F). Secondary containment piping systems shall be 5 psig working pressure.

2.04 TRACER TAPE

- A. Underground tracer tape shall be minimum 6-inch wide plastic labeled "Caution - Buried Pipe Below" for all buried pipe except under building slabs. Tape shall be 24 inches maximum above top of pipe and continuous along length of pipe.

2.05 FUEL DISPENSER

- A. Fuel dispenser shall be Bennett BN3913-562 or equal. Unit shall be UL listed for commercial and industrial applications and ready to operate with card and key lock systems.

1. Gallon pulsers and electric resets.
 2. Lighted cabinet with red enamel finish.
 3. Weights and measures four piston meters.
 4. Single hose, 12 feet long x 1 inch diameter.
 5. Standard 1/3 hp, 120v, 1 phase motor (optional 3/4 hp).
 6. Positive displacement pump (optional submersible pump and remote dispenser).
 7. Capable of handling 15% methanol blended fuel (optional 100% methanol).
 8. Strainer rust-proof 100 mesh (optional 35 micron filter).
 9. Product designation on both sides of cabinet.
- B. Filter on hose connection shall be a Central Illinois C1-1000 or equal external Hydra-sorb water/sediment filter.
- C. Nozzle shall be Emco Wheaton A2000, OPN 811, or equal.
1. UL approved.
 2. Aluminum body.
 3. Aluminum spout.
 4. Buna N disc.
 5. Graphite impregnated asbestos with Teflon packing (optional Buna N O-ring).
 6. 1 inch threaded female NPT inlet with 3/4 inch bushing.
 7. Stainless steel shut-off.
- D. Hose breakaway coupling shall be Emco Wheaton EWA19-103, OPW 66, or equal. Coupling shall prevent damage to dispenser and fuel spills by drive-aways using a dry disconnect.
1. UL listed.
 2. Automatic pull apart and flow shut-off.
 3. Electroless nickel-plated aluminum body and plug.
 4. Viton and Buna N O-rings.

5. Stainless steel ball and spring internal components.
 6. Plastic external sleeve.
 7. Plastic and celcon poppets.
 8. Coupling with 6 inch spacer hose.
- E. Hose swivel shall be Emco Wheaton EWA103, OPW 45, or equal. Ball and socket design shall allow the hose and nozzle to move smoothly and freely on any plane or axis.
1. UL listed.
 2. Aluminum body.
 3. Buna N seal.
 4. Chrome plated brass connector.
- F. Dispenser containment sump shall be Ace Tank and Equipment Co. CN 447, Total Containment, Inc. DU 2215, or equal. Sump shall be designed for use with Bennett Series 3900 dispenser. Sump shall secure fire/impact valve in position with U-clamp and provide complete containment of fuel leaks within dispenser. Provide cathodic protection anodes on steel sumps.
- G. Fire/impact safety valve shall be Emco Wheaton EWA60, OPW 10R, or equal. Valve shall automatically shut-off in event of a fire or impact.
1. Cast iron body and top.
 2. Brass and stainless steel trim.
 3. Stainless steel spring.
 4. Buna N seal.
- H. Fuel dispenser island concrete forms shall be Ace Tank and Equipment Co. CX936R6-12 or equal.
1. Steel construction.
 2. Dimensions: 36 inches wide, 9 inches high, 6 inch radius ends.

2.06 FLEXIBLE CONNECTORS

- A. Flexible connectors shall be Teleflex TL 6010 or equal.
1. UL approved for underground use.
 2. Teflon inner core.

3. Stainless steel outer braid and ends.
 4. Compatible with all fuels including alcohol blends.
- B. Secondary Containment Boots shall be Teleflex TL6010498L24 or equal with stainless steel clamps and caps as required.

2.07 SITE MONITOR WELLS

- A. Piping shall be schedule 40 PVC with .020 inch slots spaced at 1/4 inches in pipe section below ground water level only. Length and size as shown on drawings.
- B. Monitor well handhole shall be Emco Wheaton EWA722-001, OPW 104AOW, or equal.
1. Cast iron lid and rim with API recommended warning label and permanently attached stainless steel hold down bolts.
 2. Polyethylene handhole skirt of approximate 12 inch diameter with additional API recommended warning label inside handhole.
 3. ABS plastic lockable cap and collar for 4 inch pipe.
 4. Buna N O-ring seal.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Install new piping and equipment in accordance with the drawings, applicable referenced publications, and the manufacturer's written instructions, checklists and warranty requirements for each system component.
- B. Underground piping shall be laid in trenches excavated to proper line and grade and the piping shall be firmly supported to prevent settlement.
- C. Trench excavations shall be as specified below:
1. Trench for piping shall be of adequate width for the proper laying of pipes. Care shall be taken not to over excavate. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of the pipe sections where it is necessary to excavate for fittings, bedding and for the proper sealing of pipe joints. Such depressions shall be dug after the trench bottom has been graded, and, in order that the pipe rest on the prepared bottom for as nearly its full length as practicable, depressions shall be only of such length, depth, and width as required for properly making the particular type of joint. Stones shall be

removed as necessary to avoid point bearing. Over excavation shall be backfilled as specified in Section 02223, Backfilling. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe is encountered in the bottom of the trench, such material shall be over excavated to a depth to allow for a stable pipe bed and backfilling per Section 02223, Backfilling.

2. The trenches shall not be backfilled until all required pressure tests and/or inspections are performed and until the systems as installed conform to the requirements specified herein.
- D. Cap or plug piping and equipment connections during installation to prevent entry of dirt, sand, and grit.
 - E. All fuel and vent piping underground shall be buried a minimum of 24 inches below bottom of concrete slab with a slope of 1/4 inch per foot back to tank.

3.02 TESTING

- A. Operate equipment successfully through ten successive complete cycles of operation.
- B. Pressurize primary product pipe to 150 psig with water as test medium for 24 hours with no loss in pressure. Blow out piping completely with dry compressed air after successful completion of test. Leaks shall be repaired by cutting out leaking section, installing new pipe and fittings and retesting system.
- C. Secondary containment piping system and tank vents shall be tested with compressed air at 5 psig. Soap fittings for leaks. Leaks shall be repaired by cutting out leaking section, installing new pipe and fittings and retesting system.

END OF SECTION

SECTION 03300 CONCRETE

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Provide the concrete shown on the Plans.
- B. Include reinforcing steel and anchor bolts as shown on the drawings.

1.02 RELATED SECTIONS

- A. Section 02223 - Backfilling
- B. Section 02231 - Aggregate Base Course
- C. Section 13201 - Underground Storage Tanks
- D. Section 13202 - Aboveground Storage Tanks

1.03 REFERENCES

- A. American Concrete Institute Publication:
 - 1. ACI 302 -- Guide for Concrete Floor and Slab Construction.
 - 2. ACI 306 -- Cold Weather Concreting.
- B. American Society for Testing and Materials Publications:
 - 1. ASTM C 33 -- Concrete Aggregates
 - 2. ASTM C 150 -- Portland Cement.
 - 3. ASTM C 260 -- Air-Entraining Admixtures for Concrete.
 - 4. ASTM C 94 -- Ready-Mixed Concrete.
 - 5. ASTM C 685 -- Concrete Made by Volumetric Batching and Continuous Mixing.

1.04 QUALITY ASSURANCE

- A. Obtain all concrete from the same source.

1.05 WEATHER LIMITATIONS

- A. No concrete shall be placed when the air temperature is less than 40 degrees F or approaching 40 degrees F without following the provisions of ACI 306..

1.06 SUBMITTALS

A. Material Submittals:

1. Concrete mix design.
2. Test results showing that the proposed concrete mix design has produced concrete which conforms to this specification.
3. Manufacturer's instructions for the concrete curing compound.

B. Project Control Submittals:

1. Batch ticket for each truckload of concrete delivered to the job site. The following information shall be on the ticket:
 - a. Name of concrete plant.
 - b. Ticket serial number.
 - c. Date of delivery.
 - d. Truck number.
 - e. Name of Contractor.
 - f. Name and location of project.
 - g. Concrete classification.
 - h. Amount of concrete delivered.
 - i. Time when the concrete is loaded onto the truck.

PART 2 -- PRODUCTS

See drawings for specifications for concrete materials and concrete mixture.

2.01 CONCRETE CURING MATERIALS

- A. Conform to ACI 302.

2.02 CONCRETE FORMING MATERIAL

- A. Conform to ACI 302.

2.03 REINFORCING STEEL

- A. Conform to ACI 302.

PART 3 -- EXECUTION

3.01 INSPECTION

- A. Ensure that the base material is not frozen and is free of debris, standing water, snow and ice.
- B. Ensure that the base material is compacted and at the proper grade.

3.02 PREPARATION

- A. Moisten the base material, if dry, to minimize water absorption from the fresh concrete.

3.03 FORMWORK

- A. Provide formwork in accordance with ACI 302, where the excavation edge cannot be used for form for the concrete.
- B. See Section 02680, Fuel Distribution for specifications for the metal island formwork.

3.04 REINFORCING STEEL PLACEMENT

- A. Place the reinforcing steel as shown on the drawings, and in accordance with ACI 302.

3.05 CONCRETE PLACEMENT

- A. Place the concrete in accordance with ACI 302. Ensure that all joint filler material remains in place during placement.
- B. Install contraction joints as described in ACI 302.

3.06 CONCRETE FINISHING

- A. Provide a floated finish.

3.07 CONCRETE CURING

- A. Cure the concrete in accordance with ACI 302.

3.08 PROTECTION

- A. Protect the concrete from damage and defacement during the curing period.

END OF SECTION

SECTION 13201
UNDERGROUND STORAGE TANKS

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Provide new Underground Storage Tank (UST) systems in accordance with the drawings, the referenced publications, and the manufacturer's written instructions, checklists, and warranty requirements for each system component. UST systems include the products, equipment, and systems identified in this section.
- B. Provide all bedding material as specified on the drawings and these specifications.

1.02 RELATED SECTIONS

- A. Section 02050 - Excavation, Demolition and Disposal
- B. Section 02223 - Backfilling
- C. Section 02231 - Aggregate Base Course
- D. Section 02680 - Fuel Distribution
- D. Section 03300 - Concrete

1.03 REFERENCES

Alaska Department of Transportation and Public Facilities

1988 Edition Alaska Standard Specification for Highway Construction.

American Society for Testing and Materials

ASTM D 1557-78 Moisture density relations of soils and soil-aggregate mixtures using 10-lb (4.54 kg) rammer and 18-inch (457 mm) drop.

American Society for Testing Materials

ASTM D 2922-81 Density of soils and soil-aggregate in place by nuclear methods (shallow depth).

American Society for Testing Materials

ASTM D 3017-88 Standard test method for water content of soil and rock in place by nuclear methods (shallow depth).

American National Standards Institute (ANSI) Standards

- Standard B31.3 Petroleum refinery piping
- Standard B31.4 Liquid petroleum transportation piping systems.

American Petroleum Institute (API) Recommended Practices

- Publication 1615 Installation of underground petroleum storage systems.
- Publication 1621 Recommended practice for bulk liquid stock control at retail outlets.
- Publication 1632 Cathodic protection of underground storage tanks and piping systems.

National Association of Corrosion Engineers (NACE) Recommended Practices

- RP-01-69 Control of external corrosion on submerged metallic piping systems.
- PR-02-85 Control of external corrosion on metallic buried, partially buried, or submerged liquid storage systems.

National Fire Protection Association (NFPA) Standards

- Standard 30 Flammable and combustible liquids code.

National Institute of Occupational Safety and Health (NIOSH) Criteria

Criteria for a recommended standard -- working in confined space.

Petroleum Equipment Institute (PEI) Recommended Practices

- RP-100-86 Recommended practices for installation of underground liquid systems.

Steel Tank Institute (STI) Standards

- ST1 (1983) Specification for STI-P3 system of external corrosion protection of underground steel storage tanks.
- STI (----) Standard for dual wall underground storage tanks.
- STI F894-89* Specification for external corrosion protection or FRP composite steel underground storage tanks.

Underwriters Laboratories (UL) Standards

UL 58	Standard for steel underground tanks for flammable and combustible liquids.
UL 567	Pipe connectors for flammable and combustible and LP gas.
UL 971	UL-listed non-metal pipe.
UL 1746	Corrosion protection systems for underground storage tanks.
UL 107	Glass fiber reinforced plastic pipe and fittings for flammable liquids.
UL CAN-4-G03.1-M85	Standards for galvanic corrosion protection systems for underground tanks for flammable and combustible liquids.
UL CAN-4-S603-M85	Standard for steel underground tanks for flammable and combustible liquids.
UL CAN-4-S631-M84	Isolating bushings for steel underground tanks protected with coatings and galvanic systems.
UL-CAN-4-S633-M81	Flexible underground hose connectors.

Uniform Fire Code

UFC 79	Flammable and Combustible Liquids
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U.S. EPA Regulations

40 CFR 280	Technical standards and corrective action requirements for owner and operators of underground storage tanks (UST).
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1.04 QUALITY ASSURANCE

- A. Reference to a particular organization's standards shall be in accordance with those standards unless more restrictive criteria is indicated herein.
- B. Installation of new tanks shall be accordance with the tank manufacturer's installation instructions and API Recommended Practice 1615, "Installation of Underground Petroleum Storage Systems".
- C. All work and materials shall be in accordance with requirements of all applicable state and local codes, regulations and ordinances, the National Electrical Code, Uniform Building Code, Uniform Plumbing Code, Uniform

Mechanical Code and Uniform Fire Code (locally adopted editions), the latest standards of the NFPA National Fire Codes, and the rules and regulations of all other authorities having jurisdiction. Nothing in drawings and specifications shall be construed to permit work not in conformance with applicable codes, rules, and regulations.

- D. Where drawings or specifications call for material or construction of a better quality or large sizes than required by the above mentioned codes, rules and regulations, the provision of the specifications shall take precedence.
- E. The Contractor shall furnish without any extra charge any additional material and labor when required for compliance with these codes, rules and regulations, even though the work may not be mentioned in the specifications or shown on the drawings. It shall be the responsibility of the successful bidder to bid in accordance with the minimum requirements of the applicable codes, rules, and regulations.
- F. All electrical motors, starters, controls, devices and wiring shall comply with standards of NEC and shall be UL listed and so identified.

1.05 DRAWINGS

- A. Drawings are diagrammatic and show the general design, arrangement and extent of the systems. Do not scale or attempt to use drawings for roughing-in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings for submittal. Coordinate work with shop drawings of other specification divisions.
- B. Contractor shall investigate the capacity and space requirements of the proposed equipment before submitting shop drawings.
- C. Where conditions necessitate a rearrangement, prepare and submit to the Contracting Officer, for review, drawings of the proposed rearrangement. Because of the small scale of the drawings, it is not possible to show all offsets, fittings, and accessories which may be required. Carefully investigate the conditions and the work of other trades and arrange work accordingly, furnishing such fittings, traps, valves and accessories as may be required to meet such conditions.

1.06 SUBMITTALS

- A. General: Submittals shall be in accordance with Section 01300, Submittals. Submit all product data and shop drawings in one complete submittal with each submittal copy in a binder with index and tabbed dividers. Partial submittals will not be acceptable except with the prior approval of the Contracting Officer and then only in special cases where an accelerated review is necessary so that the progress of the project is not impeded. Submittals not conforming in physical form and content with the provisions of the drawings and specification will be rejected without review and a complete resubmittal required.

- B. Product Data: Submit all catalog data and other descriptive literature to fully substantiate the conformance with specifications of equipment and materials submitted. Mark product data to indicate exactly those items that are to be provided and cross out unrelated or non applicable items. In addition, submit manufacturer's detailed installations instruction on all equipment and materials submitted.
- C. Shop Drawings: Submit drawings for fabrication and installation of all system components. Include fully dimensioned layout of all piping, equipment and all associated connection details. Coordinate shop drawings with work of other trades.

1.07 JOB CONDITIONS

- A. Fees, certificates, warranties:
 - 1. The Contractor shall arrange and pay for all required permits, fees, connection charges, taxes, and other miscellaneous charges necessary to execute the work. Submit drawings and specifications to the State Fire Marshall and/or local Fire Marshall for review and approval prior to beginning construction.
 - 2. The Contractor shall deliver to the Contracting Officer all certificates of approval issued by the state, county, local or other authorities having jurisdiction over the work performed. Certificates shall be forwarded promptly when received by the Contractor.
 - 3. Equipment specified shall be covered by the manufacturer's standard warranty on the new equipment for 1 year from the date of issuance of the Certificate of Substantial Completion and as further protected by the manufacturer's standard warranty. If within 12 months from the Date of Substantial Completion any of the equipment herein described is shown to be defective in workmanship or materials, it shall be replaced or repaired free of charge by the Contractor.
- B. Product Handling:
 - 1. Contractor is responsible for protection of all material, equipment, and apparatus provided from damage, water, and dust, both in storage and when installed, until final acceptance.
 - 2. Provide temporary storage facilities for material and equipment.
 - 3. Material, equipment, or apparatus damaged because of improper storage or protection will be rejected and replaced at Contractor's expense.

C. Special Requirements:

1. Maintain emergency and service entrances usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic when required by Contracting Officer.

D. Schedule of Work: Arrange work to comply with schedule of construction.

(Completed by Specifier)

E. Coordination of Work: The Contractor shall coordinate all trades whose work is adjacent, in order to avoid field interference and delay in execution of the work of all trades. Furnish detailed advance information regarding all requirements related to work by others.

1.08 OPERATION AND MAINTENANCE DATA

- A. Submit in accordance with Section 01700, Contract Closeout.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. Materials and apparatus shall be new unless otherwise specified, and each shall have all necessary trimmings, accessories and controls required to make it functionally complete. All items of the same type shall be of the same manufacturer. All phases of the work will be performed by competent workmen, skilled in their respective trades.
- B. All materials, equipment and processes requiring approval of the Underwriters Laboratories or other nationally recognized testing agency shall be labeled so approved in accordance with the provisions of the State of Alaska.

2.02 UNDERGROUND TANKS FOR STORAGE OF PETROLEUM PRODUCTS

- A. General: Tanks shall be constructed of steel with STI-P3 corrosion protection system. As an alternate if acceptable to the owner, steel/fiberglass composite or fiberglass tanks may be substituted. All tanks shall be of the same material of construction and guaranteed compatible with the contents indicated on the drawings. Tanks and appurtenances shall be Underwriters Laboratories (UL) listed for underground storage of petroleum products. They shall also meet the provision of NFPA 30 and 31, the Uniform Fire Code Article 79 and Environmental Protection Agency requirements. In addition, tanks shall have 30 year limited warranty against external corrosion.

- B. Steel tanks with STI-P3 corrosion protection system shall be as manufactured by Anchorage Tank, Greer Tank, Ace Tank Company, or equal:
1. Size, capacity and appurtenances per drawings with UL label. Nominal diameter of 47 inches for 550 to 1100 gallon tanks; 60 inches for 1500 gallon tanks; 64 inches for 2000 gallon tanks; 76 inches for 3000 to 4000 gallon tanks; and 95 inches for 5000 to 10,000 gallon tanks. Tanks to be anchored to concrete ballast pads below tanks as shown on drawings with hold down straps supplied by tank manufacturer. As an alternate, anchor to "deadman" anchors below tanks per tank manufacturer's specifications. Tanks shall be installed in strict conformance with manufacturer's instructions. Contractor shall be trained by the tank manufacturer for installation of the tanks. Wet hole installation techniques shall be rigidly followed if water is encountered in the excavation.
 2. Tanks shall be double wall construction conforming to UL-58/Type I and STI-P3 standards and be so labeled. The secondary containment outer wrap shall encompass 360° of the inner tank, fitting as tightly as possible while providing monitor well access on each end. Exterior shall be coated with a polyurethane resin and provided with zinc anodes for cathodic protection all per STI-P3 specification. Manufacturer will provide electrically isolated pipe connections with striker plates below each of these openings. Tank to be provided with Steel Tank Institute's 30-year limited warranty. Storage tanks without cathodic protection will not be considered.
 3. Tank penetrations shall be as shown on drawings. Manways shall include a gasket suitable for the material contained within the tank and stainless steel bolts, nuts and washers.
- C. Steel/fiberglass reinforced plastic composite tanks as manufactured by Anchorage Tank, Greer Tank, Ace Tank Company, or equal.
1. Size, capacity and appurtenances per drawings with UL label. Nominal diameter of 47 inches for 550 to 1,100 gallon tanks; 60 inches for 1,500 gallon tanks; 64 inches for 2,000 gallon tanks; 76 inches for 3,000 to 4,000 gallon tanks; and 95 inches for 5,000 to 10,000 gallon tanks. Tanks to be anchored to concrete ballast pads below tanks as shown on drawings with hold down straps supplied by tank manufacturer. As an alternate, anchor to "deadman" anchors below tanks per tank manufacturer's specifications. Tanks shall be installed in strict conformance with manufacturer's instructions. Contractor shall be trained by the tank manufacturer for installation of the tanks. Wet hole installation techniques shall be rigidly followed if water is encountered in the excavation.

2. Tanks shall be double wall construction composite tanks, conforming to UL-58/Type I and ACT-100 standards and be so labeled. The secondary containment outer steel wrap shall encompass 360° of the inner tank, fitting as tightly as possible while providing monitor well access on each end. Exterior shall be laminated with fiberglass reinforced polyester per ACT-100 specification to 125 mils nominal (100 mils minimum). Manufacturer will provide electrically isolated pipe connections with striker plates below each of these openings. Tanks without two steel walls with outer fiberglass coating and Steel Tank Institute's 30-year limited warranty will not be considered.
 3. Tank penetrations shall be as shown on drawings. Manways shall include a gasket suitable for the material contained within the tank and stainless steel bolts, nuts and washers.
- D. Fiberglass reinforced plastic (FRP) tanks shall be as manufactured by Xerxes, Owen-Corning or equal:
1. Size, capacity and appurtenances per drawings with UL label. Nominal diameter of 52 inches for 550 to 1,000 gallon tanks; 76 inches for 2,000 to 4,000 gallon tank; and 96 inches for 6,000 to 10,000 gallon tanks. Tanks to be anchored to concrete ballast pads below tanks as shown on drawings with tank manufacturer furnished hold down straps. As an alternate, anchor to "deadman" anchors below tanks per tank manufacturer's specifications. Install tanks in strict conformance with manufacturer's instructions. Contractor shall be trained by the tank manufacturer for installation of the tanks. Wet hole installation techniques shall be rigidly followed if water is encountered in the excavation.
 2. Tanks shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank. The interstitial space shall also allow for filling with a brine solution as a hydrostatic leak detection monitoring device with a monitoring fitting and reservoir in the secondary tank wall. Fabricate tanks in conformance with ASTM D 4021-81 and UL File MH 9061 for storage of flammable liquids. Primary and secondary tanks shall be constructed and tested at factory and in the field at 5 psi pressure with 5 to 1 safety factor with no loss in pressure for 24 hours. Primary and secondary tanks shall also be vacuum tested by tank manufacturer to assure structural integrity. Primary tank shall be tested at 11.5 inches and secondary tank tested at 9.5 inches mercury vacuum. Tanks shall withstand surface H-20 axle loads when properly installed according to manufacturer's installation instructions. Tanks shall be designed to withstand external static pressure when buried in ground with 7-foot of overburden over the top of the tank, the hole fully flooded and a minimum safety factor of 7 to 1 against general buckling.

3. Tank penetrations shall be as shown on drawings. Manways shall include a gasket suitable for the material contained within the tank and stainless steel bolts, nuts and washers.

2.03 TANK APPURTENANCES

- A. General: Tank appurtenances shall be as shown on drawings and specified below. Appurtenances shall be Underwriters Laboratories (UL) listed for underground storage of petroleum products. All appurtenances exposed to the earth in final installation shall, where practical, be shop installed, tested and painted/coated with the same coating going on the tanks before shipment to the site.
- B. Monitor well handhole shall be Emco Wheaton EWA722-001, OPW 104AOW, or equal.
 1. Cast iron lid and rim with API recommended warning label and permanently attached stainless steel hold down bolts.
 2. Polyethylene or steel handhole skirt of approximate 12 inch diameter with additional API recommended warning label inside handhole.
 3. ABS plastic lockable cap and collar for 4 inch pipe.
 4. Buna N O-ring seal.
- C. Service manway manhole shall be Universal 78-3610 or equal.
 1. Steel diamond plate cover with gasket, recessed handle and four flush mount bolts rated for H-20 load.
 2. Steel 12 gauge skirt.
 3. Dimensions: 34-3/4 inch inside diameter, 36 inch cover diameter and 9-1/2 inch skirt depth.
- D. Service manway sump shall be Containment Technologies HD Series or equal:
 1. Polyethylene sump and lid with bolted water tight lid [optional: easy access water shed lid].
 2. Dimensions: 46 inch diameter base, 33 inch diameter riser and 20 to 40 inch height as required.
 3. Riser extension part no. 9033 with 33 inch diameter and 9 inch height each extension as required.
- E. Suction check valve shall be Emco Wheaton A464-002, OPW 32H-5055, or equal.

1. Cast iron body galvanized inside and out.
 2. Brass or bronze seats and discs.
 3. Double poppet internal assembly easily removed for inspection and replacement without disconnecting pipe.
 4. Buna N gaskets.
 5. 2 inch size with threaded female NPT connections.
- F. Suction strainer shall be Emco Wheaton 157, OPW, or equal.
1. Brass body.
 2. Stainless steel 20 mesh screen.
 3. 2 inch size with threaded female NPT connection.
- G. Vent cap shall be Emco Wheaton MR 354, OPW 23, or equal.
1. Aluminum body and cap for upward venting.
 2. Brass 40 mesh screen easily removed for cleaning.
 3. 2 inch size with threaded NPT connection.
- H. Pressure/vacuum vent cap shall be Emco Wheaton, EWA 84, OPW 523, or equal.
1. Aluminum body and cap for upward venting.
 2. Stage I vapor recovery design.
 3. Brass 40 mesh screen easily removed for cleaning.
 4. 2-inch size with threaded NPT connection.
 5. UL listed.
- I. Spill/fill containment box shall be Emco Wheaton EWA 1003-008, OPW 1-4580, or equal.
1. Aluminum non-sparking lid.
 2. Flexible expansion joint for frost heave or tank settlement.
 3. Pull-up internal drain.
 4. 5 gallon sump containment capacity.
 5. 4 inch threaded female NPT connection for fill pipe.

- J. Fill adapter shall be Emco Wheaton EWA 30-014, OPW 633T, or equal.
 - 1. Die cast aluminum with hard anodized coating.
 - 2. For conventional or dual point fill systems.
 - 3. 4 inch size with threaded female NPT connection.
- K. Fill cap shall be Emco Wheaton EWA 97-003, OPW 634TT, or equal.
 - 1. Aluminum body.
 - 2. Buna N replaceable gasket seal.
 - 3. Easy coupling and removal with padlocking capability.
 - 4. 4 inch size.
- L. Overfill prevention device shall be Emco Wheaton EWA 1100-001, OPW 61S0, or equal.
 - 1. Anodized aluminum body that fits into 4 inch gravity fill drop tube.
 - 2. Teflon vertical slide float design protected by shroud.
 - 3. Viton main poppet seal.
 - 4. Install for shut-off at 90% tank capacity.
- M. Drop tube shall be Emco Wheaton EWA 20-004, OPW 61T-7268, or equal.
 - 1. Aluminum tube.
 - 2. 4 inch size with length cut to suit.
- N. Vapor recovery fill adapter for coaxial vapor recovery shall be Emco, Wheaton EWA 96-001, OPW 633TC, or equal.
 - 1. Korloy or hard coated cast aluminum construction.
 - 2. Coaxial vapor recovery design.
 - 3. 4-inch size with threaded female NPT connection.
- O. Coaxial drop tube shall be Emco Wheaton EWA 90-001, OPW 61TC, or equal.
 - 1. Aluminum tube.
 - 2. 4-inch size with length cut to suit.

- P. Dual point vapor recovery handhole shall be Ace Tank AT717-12, OPW 104A-1066 or equal.
 - 1. Cast iron ring and cover.
 - 2. Non-skid cover surface.
 - 3. 12-inch diameter.
- Q. Dual point vapor recovery adapter shall be Emco Wheaton EWA 76, OPW 1611AV, or equal.
 - 1. Aluminum construction.
 - 2. Seals off vapor path when not coupled.
- R. Dual point vapor recovery adapter cap shall be Emco Wheaton EWA 99, OPW 1711T or equal.

2.04 FLEXIBLE PIPING SYSTEM

- A. Double wall flexible piping system shall be Enviroflex as manufactured by Total Containment, Inc. Piping shall be UL listed for underground piping of flammable liquids. The double-wall piping system shall consist of a flexible inner primary pipe contained within a flexible outer containment pipe, each making connection within a series of surface access containment chambers. All piping runs shall be continuous, whereby there shall be no fittings or piping connections, for either the primary or secondary containment pipe which are not visible or accessible from the above ground surface. The secondary containment system shall provide water tight containment of the primary piping.
- B. Product compatibility: All components of the double-wall piping system shall be compatible with the products to be stored.
- C. Corrosion resistance: All components of the double-wall piping system shall be made of noncorrosive materials, or if metallic, such as the fittings and couplings, isolated from corrosion causing elements.
- D. Structural integrity: The outer secondary containment system shall be of such a design and made of materials to have sufficient strength to withstand the maximum underground burial loads and tested in accordance with AASHTO M294. The flexible inner primary piping system shall be capable of withstanding liquid pressure five times greater than the designed operating pressures.
- E. Integrity testing: The outer secondary containment systems shall undergo an air pressure hold test (3 to 5 psi) after installation and before the final backfill. The flexible inner primary piping system shall be subject to 60 psi air pressure hold test prior to final backfill.
- F. Monitoring capability: The design of the secondary containment system shall permit any leak in the primary piping system to flow from its source to

a surface access containment chamber which shall be fitted with an electronic leak detection system.

2.05 FIBERGLASS PIPING AND FITTINGS

- A. Fiberglass piping and fittings shall be Ameron Dualoy 3000/L or equal. Piping and fittings shall be UL listed for underground piping of flammable liquids and shall conform to ASTM D 2310, D 2517 and D 2996. Pipe shall be filament wound fiberglass reinforced epoxy with integral epoxy liner and exterior coating. Fittings shall be compression molded and filament wound fiberglass reinforced epoxy. Joining shall be bell and spigot tapered adhesive bonded joint with two-part epoxy adhesive for primary product piping system and 2 part clamshell wing nut bolted fittings for secondary containment fittings. Secondary containment piping and fittings shall be one pipe size larger than primary product piping and fittings. Both primary and secondary containment piping shall be sloped to drain back to tank at slopes indicated on drawings. Primary piping systems shall be rated at 150 psig working pressure (-60 to 150 degrees F). Secondary containment piping system shall be 5 psig working pressure.

2.06 INVENTORY CONTROL AND LEAK DETECTION SYSTEM

- A. Inventory control system shall be Veeder-Root Model TLS-350 or equal. The system shall be a modular designed electronic field programmable measurement system that shall continuously monitor the liquid in all underground tanks and provide detailed printout reports on tank liquid volume in gallons (± 15 gallons) liquid height in inches (± 0.1 inches), temperature in degrees F (± 1.5 degrees F), water level in inches (± 0.1 inches) and the time (± 1 minutes/week) and date. System shall include a wall mounted console, tank probes and all interconnecting wiring and conduit. Supplier shall provide, size and coordinate all system components to suit the application providing a complete, reliable, working installation. Supplier shall also provide on-site initial programming of unit, tests for accuracy, and instruction of the Department's representatives in programming and operation of system. Additional features shall include the following:
1. Automatic delivery report that confirms bulk delivery amounts automatically.
 2. Programmable high level alarm to warn of overfill during bulk deliveries, low-level fuel inventory alarm, high water limit alarm, and sudden-loss alarm to detect rapid inventory changes caused by theft or major tank failure during closed hours.
 3. Leak detection capability to monitor a single tank or all tanks in the system for product losses caused by small leaks. This leak detection method shall be supplementary to the system described in subarticle B below when the fluid is at equilibrium and no dispensing or deliveries are taking place. Capable of detecting product loss from a tank of 0.1

gallons per hour. The leak detect printout shall show the cumulative change sensed in tank volume by hour.

4. Programmable automatic report times.
 5. Each console shall be able to monitor up to 8 tanks.
 6. Factory calibrated probes operated on a capacitance principle for the diesel or gasoline fuel tanks and magnetostrictive principle for waste oil tanks to sense liquid height and requiring only a two-wire connection to the console. Each probe length to suit tank with riser and ring kits and ballast rings as required for tank liquids.
 7. RS-232 port to interface with terminals.
 8. Power requirements shall be 120 volts, single phase, 60 Hz.
- B. Leak detection system shall be made up of accessories to the Inventory Control Veeder-Root 350 specified in subarticle A above or shall be a Owens-Corning Hydrostatic Tank Monitor Model AB0014A with switch panel SP-4 and piping sump sensor Model PSS. The system shall be a UL listed electronic field programmable fluid detection system that shall continuously monitor locations shown on drawings for tank or piping leakage. System shall include a wall-mounted control console, fluid sensors, and all interconnecting wiring and conduit. Supplier shall size and coordinate system components to suit the application providing a complete, reliable, working installation. Supplier shall also provide on-site initial programming of units, tests for operation, and instruction of Owner's Representatives in field programming and operation of system. Additional features shall include the following:
1. Sensors shall be rated for Class I, Division 1, Group D locations. The sensors shall be stainless steel and be capable of detecting a 2-inch or more accumulation of liquid in the service manways. Sensors for a brine filled interstitial space shall be that specified by the tank supplier.
 2. Each control console shall monitor up to 8 fluid sensors.
 3. Audio and visual alarms at 75 dB at 100 cm.
 4. Auxiliary relay output for remote alarm, phone dialer or pump shutdown.
 5. Analog output for recording or control instrumentation.
 6. Power requirements of 120 volt, single phase, 60 Hz and maximum power consumption of 2 watts per sensor.
 7. Intrinsically safe interface between sensors and electronic control panel.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Install new UST systems in accordance with the drawings, the referenced publications, and the manufacturer's written instructions, checklists, and warranty requirements for each system component.
- B. Excavation for tanks shall be large enough to provide a minimum clearance of 12 inches between the ends and sides of tanks and the sides of the excavation. Tanks shall be at least 12 inches apart.
- C. The excavation shall be deep enough to provide for a backfill depth of at least 12 inches below the bottom of the tank.
- D. The cover shall consist of a minimum of 36 inches of compacted backfill, or a minimum of 18 inches of compacted backfill plus at least 6 inches of reinforced concrete.

3.02 TANK TESTING

- A. Perform aboveground air tests in accordance with the tank manufacturer's written instructions. Do not apply a high air pressure line directly to the interstitial space of the double wall tank at any time.

3.03 PIPE TESTING

- A. Perform a pipe tightness test in accordance with API 1615, using compressed air and a soap solution.

END OF SECTION

SECTION 13202 ABOVEGROUND STORAGE TANKS

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Provide new Aboveground Storage Tank (AST) systems in accordance with the drawings, the referenced publications, and the manufacturer's written instructions, checklists, and warranty requirements for each system component. AST systems include the products, equipment, and systems identified in this section.

1.02 RELATED SECTIONS

- A. Section 02050 - Excavation, Demolition and Disposal.
- B. Section 02223 - Backfill.
- C. Section 02231 - Aggregate Base Course.
- D. Section 03300 - Concrete

1.03 REFERENCES

Alaska Department of Transportation and Public Facilities

1988 Edition Alaska Standard Specification for Highway Construction.

American Society for Testing and Materials

ASTM D1557-78 Moisture density relations of soils and soil-aggregate mixtures using 10-lb (4.54 kg) rammer and 18-inch (457 mm) drop.

American Society for Testing Materials

ASTM D2922-81 Density of soils and soil-aggregate in place by nuclear methods (shallow depth).

American Society for Testing Materials

ASTM D3017-88 Standard test method for water content of soil and rock in place by nuclear methods (shallow depth).

American National Standards Institute (ANSI) Standards

Standard B31.3 Petroleum refinery piping

Standard B31.4 Liquid petroleum transportation piping systems.

American Petroleum Institute (API) Recommended Practices

Publication 1621 Recommended practice for bulk liquid stock control at retail outlets.

National Fire Protection Association (NFPA) Standards

Standard 30 Flammable and combustible liquids code.

National Institute of Occupational Safety and Health (NIOSH) Criteria

Criteria for a recommended standard -- working in confined space.

Uniform Fire Code

UFC 79 Flammable and Combustible Liquids.

1.04 QUALITY ASSURANCE

- A. Reference to a particular organization's standards shall be in accordance with those standards unless more restrictive criteria is indicated herein.
- B. Installation of new tanks shall be accordance with the tank manufacturer's installation instructions.
- C. All work and materials shall be in accordance with requirements of all applicable state and local codes, regulations and ordinances, the National Electrical Code, Uniform Building Code, Uniform Plumbing Code, Uniform Mechanical Code and Uniform Fire Code (locally adopted editions), the latest standards of the NFPA National Fire Codes, and the rules and regulations of all other authorities having jurisdiction. Nothing in drawings and specifications shall be construed to permit work not in conformance with applicable codes, rules, and regulations.
- D. Where drawings or specifications call for material or construction of a better quality or large sizes than required by the above mentioned codes, rules and regulations, the provision of the specifications shall take precedence.
- E. The Contractor shall furnish without any extra charge any additional material and labor when required for compliance with these codes, rules and regulations, even though the work may not be mentioned in the specifications or shown on the drawings. It shall be the responsibility of the successful bidder to bid in accordance with the minimum requirements of the applicable codes, rules, and regulations.
- F. All electrical motors, starters, controls, devices and wiring shall comply with standards of NEC and shall be UL listed and so identified.

1.05 DRAWINGS

- A. Drawings are diagrammatic and show the general design, arrangement and extent of the systems. Do not scale or attempt to use drawings for roughing-in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings for submittal. Coordinate work with shop drawings of other specification divisions.
- B. Contractor shall investigate the capacity and space requirements of the proposed equipment before submitting shop drawings.
- C. Where conditions necessitate a rearrangement, prepare and submit to the Contracting Officer, for review, drawings of the proposed rearrangement. Because of the small scale of the drawings, it is not possible to show all offsets, fittings, and accessories which may be required. Carefully investigate the conditions and the work of other trades and arrange work accordingly, furnishing such fittings, traps, valves and accessories as may be required to meet such conditions.

1.06 SUBMITTALS

- A. General: Submittals shall be in accordance with Section 01300, Submittals. Submit all product data and shop drawings in one complete submittal with each submittal copy in a binder with index and tabbed dividers. Partial submittals will not be acceptable except with the prior approval of the Contracting Officer and then only in special cases where an accelerated review is necessary so that the progress of the project is not impeded. Submittals not conforming in physical form and content with the provisions of the drawings and specification will be rejected without review and a complete resubmittal required.
- B. Product Data: Submit all catalog data and other descriptive literature to fully substantiate the conformance with specifications of equipment and materials submitted. Mark product data to indicate exactly those items that are to be provided and cross out unrelated or non applicable items. In addition, submit manufacturer's detailed installations instruction on all equipment and materials submitted.
- C. Shop Drawings: Submit drawings for fabrication and installation of all system components. Include fully dimensioned layout of all piping, equipment and all associated connection details. Coordinate shop drawings with work of other trades.

1.07 JOB CONDITIONS

- A. Fees, certificates, warranties:
 - 1. The Contractor shall arrange and pay for all required permits, fees, connection charges, taxes, and other miscellaneous charges necessary to execute the work. Submit drawings and specifications to the State

Fire Marshall and/or local Fire Marshall for review and approval prior to beginning construction.

2. The Contractor shall deliver to the Contracting Officer all certificates of approval issued by the state, county, local or other authorities having jurisdiction over the work performed. Certificates shall be forwarded promptly when received by the Contractor.
3. Equipment specified shall be covered by the manufacturer's standard warranty on the new equipment for 1 year from the date of issuance of the Certificate of Substantial Completion and as further protected by the manufacturer's standard warranty. If within 12 months from the Date of Substantial Completion any of the equipment herein described is shown to be defective in workmanship or materials, it shall be replaced or repaired free of charge by the Contractor.

B. Product Handling:

1. Contractor is responsible for protection of all material, equipment, and apparatus provided from damage, water, and dust, both in storage and when installed, until final acceptance.
2. Provide temporary storage facilities for material and equipment.
3. Material, equipment, or apparatus damaged because of improper storage or protection will be rejected and replaced at Contractor's expense.

C. Special Requirements:

1. Maintain emergency and service entrances usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic when required by Contracting Officer.

D. Schedule of Work: Arrange work to comply with schedule of construction.

(Completed by Specifier)

E. Coordination of Work: The Contractor shall coordinate all trades whose work is adjacent, in order to avoid field interference and delay in execution of the work of all trades. Furnish detailed advance information regarding all requirements related to work by others.

1.08 OPERATION AND MAINTENANCE DATA

A. Submit in accordance with Section 01700, Contract Closeout.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. Materials and apparatus shall be new unless otherwise specified, and each shall have all necessary trimmings, accessories and controls required to make it functionally complete. All items of the same type shall be of the same manufacturer. All phases of the work will be performed by competent workmen, skilled in their respective trades.
- B. All materials, equipment and processes requiring approval of the Underwriters Laboratories or other nationally recognized testing agency shall be labeled so approved in accordance with the provisions of the State of Alaska.

2.02 ABOVEGROUND TANKS FOR STORAGE OF PETROLEUM PRODUCTS

- A. General: Tanks shall be constructed of steel. All tanks shall be of the same material of construction and guaranteed compatible with the contents indicated on the drawings. Tanks and appurtenances shall be Underwriters Laboratories (UL) listed for storage of petroleum products. They shall also meet the provision of NFPA 30 and 31, the Uniform Fire Code Article 79 and Environmental Protection Agency requirements.
- B. Fire rated tanks shall be as manufactured by Anchorage Tank (U-Fuel), Ace Tank Company (Fuel Safe), or equal:
 - 1. Size, capacity and appurtenances per drawings with UL label. Nominal diameter of 63 inches for 550 to 1,100 gallon tanks; 80 inches to 2,000 gallon tank; 92 inches for 4,000 gallon tank; and 112 inches for 6,000 to 10,000 gallon tanks. Tanks to be set on concrete pads below tanks as shown on drawings as required. Install tanks in strict conformance with manufacturer's instructions. Contractor shall be trained by the tank manufacturer for installation of the tanks.
 - 2. Tanks shall be insulated triple-wall aboveground steel storage tank for storing flammable liquids. Primary and secondary tank to be insulated with 8 inches of high-temperature insulation for fire resistance to 2,000 degrees F, and minimization of tank venting due to an external fire or day/night temperature fluctuations. Secondary containment provided by a steel tank inside the insulation fully enclosing the primary tank. Tank system to have a 2-hour fire rating and be rated for seismic zone 4 applications.

Both primary and secondary containment tank to be pressure tested for tightness per UL-142 requirements. Openings to primary tank provided for normal and emergency vents per UL specifications, tank fill, product removal, level gauge and automatic fill shut-off at 90% level. Openings to secondary containment chamber provided for normal and emergency venting and interstitial monitor, sized per UL-142. Both primary and secondary tank thickness, steel specifications,

welding procedures and testing methods per UL-142. External surfaces of tank system to be given a commercial blast and coated with white self-priming epoxy paint to a minimum of three mils dry film thickness. Tank system to include emergency vent for the primary tank. Storage system without pressure or vacuum testable primary and secondary containment and high temperature insulation will not be considered. All welding shall have weld spatter removed, welds sealed and corners chamfered. Sandblast and epoxy paint with a light color.

3. Tank penetrations shall be as shown on drawings.

2.03 TANK APPURTENANCES

- A. General: Tank appurtenances shall be as shown on drawings and specified below. Appurtenances shall be Underwriters Laboratories (UL) listed for storage of petroleum products. All appurtenances shall, where practical, be shop installed, tested and painted/coated with the same coating going on the tank before shipment to the site.
- B. Suction fire safety valve shall be Morrison 346, or equal.
 1. Ductile iron body, cap, plunger and swing arm.
 2. Stainless steel spring.
 3. Asbestos gasket.
 4. Teflon packing.
 5. 160 degrees F fusible link.
 6. 200 psi working pressure.
- C. Suction strainer shall be Emco Wheaton 157, OPW or equal.
 1. Brass body.
 2. Stainless steel 20 mesh screen.
 3. 2 inch size with threaded female NPT connection.
- D. Fill drybreak adapter shall be Emco Wheaton F 500, OPW 1611A, or equal.
 1. Die cast aluminum with hard anodized coating.
 2. Dual point fill systems.
 3. 4 inch size with threaded female NPT connection.
- E. Fill cap shall be Emco Wheaton F 499, OPW 1711T, or equal.

1. Aluminum body.
 2. Buna N replaceable gasket seal.
 3. Easy coupling and removal with padlocking capability.
 4. 4 inch size.
- F. Overfill prevention device shall be Clay Bailey Lafon Fill Limiter, or equal.
1. Install for shut-off at 90% tank capacity.
- G. Drop tube shall be Emco Wheaton EWA20-004, OPW 61T-7268, or equal.
1. Aluminum tube.
 2. 4 inch size with length cut to suit.
- H. Emergency vent shall be Clay Bailey 368, or equal.
1. Cast iron body.
 2. Design of top minimizes effects of weather.
- I. Vent cap shall be Emco Wheaton MR 354, OPW 23, or equal.
1. Aluminum body and cap for upward venting.
 2. Brass 40 mesh screen easily removed for cleaning.
 3. 2-inch size with threaded NPT connection.
- J. Isolation valves shall be Morrison 235B or equal.
1. Brass body, bonnet, discs and stem.
- K. Pressure/vacuum vent cap shall be Emco Wheaton, EWA 84, OPW 523, or equal.
1. Aluminum body and cap for upward venting.
 2. Stage I vapor recovery design.
 3. Brass 40 mesh screen easily removed for cleaning.
 4. 2-inch size with threaded NPT connection.
 5. UL listed.

2.04 INVENTORY CONTROL AND LEAK DETECTION SYSTEM

- A. Inventory control system shall be Veeder-Root Model TLS-350 or equal. The system shall be a modular designed electronic field programmable measurement system that shall continuously monitor the liquid in all underground tanks and provide detailed printout reports on tank liquid volume in gallons (± 15 gallons) liquid height in inches (± 0.1 inches), temperature in degrees F (± 1.5 degrees F), water level in inches (± 0.1 inches) and the time (± 1 minutes/week) and date. System shall include a wall mounted console, tank probes and all interconnecting wiring and conduit. Supplier shall provide, size and coordinate all system components to suit the application providing a complete, reliable, working installation. Supplier shall also provide on-site initial programming of unit, tests for accuracy, and instruction of the Department's representatives in programming and operation of system. Additional features shall include the following:
1. Automatic delivery report that confirms bulk delivery amounts automatically.
 2. Programmable high level alarm to warn of overfill during bulk deliveries, low-level fuel inventory alarm, high water limit alarm, and sudden-loss alarm to detect rapid inventory changes caused by theft or major tank failure during closed hours.
 3. Leak detection capability to monitor a single tank or all tanks in the system for product losses caused by small leaks. This leak detection method shall be supplementary to the system described in subarticle B below when the fluid is at equilibrium and no dispensing or deliveries are taking place. Capable of detecting product loss from a tank of 0.1 gallons per hour. The leak detect printout shall show the cumulative change sensed in tank volume by hour.
 4. Programmable automatic report times.
 5. Each console shall be able to monitor up to 8 tanks.
 6. Factory calibrated probes operated on a capacitance principle for the diesel or gasoline fuel tanks and magnetostrictive principle for waste oil tanks to sense liquid height and requiring only a two-wire connection to the console. Each probe length to suit tank with riser and ring kits and ballast rings as required for tank liquids.
 7. RS-232 port to interface with terminals.
 8. Power requirements shall be 120 volts, single phase, 60 Hz.
- B. Leak detection system shall be made up of accessories to the Inventory Control Veeder-Root 350 specified in subarticle A above or shall be a Owens-Corning Hydrostatic Tank Monitor Model AB0014A with switch

panel SP-4 and piping sump sensor Model PSS. The system shall be a UL listed electronic field programmable fluid detection system that shall continuously monitor locations shown on drawings for tank or piping leakage. System shall include a wall-mounted control console, fluid sensors, and all interconnecting wiring and conduit. Supplier shall size and coordinate system components to suit the application providing a complete, reliable, working installation. Supplier shall also provide on-site initial programming of units, tests for operation, and instruction of Owner's Representatives in field programming and operation of system. Additional features shall include the following:

1. Sensors shall be rated for Class I, Division 1, Group D locations. The sensors shall be stainless steel and be capable of detecting a 2-inch or more accumulation of liquid in the service manways. Sensors for a brine filled interstitial space shall be that specified by the tank supplier.
2. Each control console shall monitor up to 8 fluid sensors.
3. Audio and visual alarms at 75 dB at 100 cm.
4. Auxiliary relay output for remote alarm, phone dialer or pump shutdown.
5. Analog output for recording or control instrumentation.
6. Power requirements of 120 volt, single phase, 60 Hz and maximum power consumption of 2 watts per sensor.
7. Intrinsically safe interface between sensors and electronic control panel.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Install new AST system in accordance with the drawings, the referenced publications, and the manufacturer's written instructions, checklists, and warranty requirements for each system component.
- B. Tanks shall be at least 36 inches apart.

3.02 TANK TESTING

- A. Perform aboveground air tests in accordance with the tank manufacturer's written instructions. Do not apply a high air pressure line directly to the interstitial space of the double wall tank at any time.

END OF SECTION

UNDERGROUND STORAGE TANK (UST) APPURTENANCE SCHEDULE

PRODUCT	INTERSTITIAL WELL NO. 1 (SEE DETAIL 1/ST-3)	SERVICE MANWAY (SEE DETAIL 2/ST-3)	AUXILLIARY TANK FITTING	FILL/SPILL CONTAIN. BOX (SEE DETAIL 3/ST-3)	INTERSTITIAL WELL NO. 2 (SEE DETAIL 4/ST-3)
DIESEL FUEL NO. 2 (SEE NOTE 2)	<ul style="list-style-type: none"> SECONDARY TANK BOSS: 2" NPT REDUCER BUSHING: 4"x2" NPT RISER PIPE: 4"DIA SCHEDULE 40 BLACK STEEL WITH ASPHALT MASTIC COATING AND 4" NPT ENDS. LENGTH TO SUIT. HANDHOLE: EMCO WHEATON EWA 722-001, OPW 104AOW OR EQUAL INCLUDING MONITOR WELL HANDHOLE WITH LOCKABLE CAP AND COLLAR. PROTECTION PROVER: PP2 LUG ON TOP SIDE OF TANK WITH WIRE CONNECTION WRAPPED AROUND RISER PIPE UP TO EXPOSED CONNECTION IN MONITOR WELL HANDHOLE. <p>NOTE: THIS MONITOR WELL TO BE USED FOR PROTECTION PROVER AS WELL AS MANUAL LEAK DETECTION OF INTERSTITIAL SPACE IN DOUBLE WALL TANK. IT CAN ALSO SERVE FOR ADDITIONAL AUTOMATIC LEAK DETECTION LIQUID SENSOR IN THE FUTURE AS REQUIRED.</p>	<ul style="list-style-type: none"> SERVICE MANHOLE: UNIVERSAL 78-3610 FRAME AND COVER TANK MANHOLE: CLAY AND BAILEY ASRFM36 REVERSE FLANGE MANHOLE FRAME AND ASRFM KIT-A COVER AND GASKET KIT. COVER WITH THREE (3) PRIMARY TANK BOSSES AT 4" NPT EACH ARRANGED ON A CIRCLE AROUND CENTER AT 120° SEPARATION. SUMP: CONTAINMENT TECHNOLOGIES HD 2033, 3033 OR 4033 WITH BOLTED WATERTIGHT LID AND RISER EXTENSIONS 9033 AS APPLICABLE. TANK MANHOLE FITTING NO. 1: PRODUCT <ul style="list-style-type: none"> PRIMARY TANK BOSS: 4"NPT REDUCER BUSHING: 4"x2" NPT DOUBLE TAPPED PIPING: 2"DIA AMERON DUALLOY 3000/L WITH SUMP WALL PENETRATION ASSEMBLY PART NO. 3303670 OR ENVIROFLEX PIPING SYSTEM. SUCTION TUBE: 2"DIA SCHEDULE 40 BLACK STEEL WITH 2"NPT ENDS SUCTION CHECK VALVE: EMCO WHEATON A464-002, OPW 32H-5055 OR EQUAL POPPET ANGLE CHECK VALVE SUCTION STRAINER: EMCO WHEATON I57, OPW EQUIVALENT MODEL OR EQUAL LOCATED WITH 6" CLEARANCE ABOVE STRIKER PLATE AT BOTTOM OF TANK. TANK MANHOLE FITTING NO. 2: VENT (SEE NOTE 5) <ul style="list-style-type: none"> PRIMARY TANK BOSS: 4" NPT REDUCER BUSHING 4"x2" NPT SINGLE TAPPED PIPING: 2"DIA AMERON DUALLOY 3000/L WITH SUMP WALL PENETRATION ASSEMBLY PART NO. 3303670 VENT CAP: EMCO WHEATON MR 354, OPW 23 OR EQUAL UPWARD DISCHARGE VENT. FOR VAPOR RECOVERY SYSTEMS USE EMCO WHEATON EWA 84, OPW 523 OR EQUAL PRESSURE/VACUUM VENT WITH SETTINGS TO MEET LOCAL REQUIREMENTS (SEE NOTE 6) TANK MANHOLE FITTING NO. 3: INVENTORY PROBE <ul style="list-style-type: none"> PRIMARY TANK BOSS: 4"NPT RISER PIPE: 4"DIA SCHEDULE 40 BLACK STEEL WITH 4"NPT ENDS. LENGTH TO SUIT INVENTORY PROBE: VEEDER ROOT TLS-350 SYSTEM WITH PROBE LENGTH TO SUIT AND CAP AND RING KIT AT TOP OF RISER PIPE. LEAK DETECTION SENSOR: VEEDER ROOT TLS-350 SYSTEM WITH LIQUID SENSOR IN BOTTOM OF SUMP 	<ul style="list-style-type: none"> PRIMARY TANK BOSS: 4" NPT RISER PIPE: 4" DIA SCHEDULE 40 BLACK STEEL WITH ASPHALT MASTIC COATING AND 4" NPT ENDS. LENGTH TO SUIT. VAPOR RECOVER HANDHOLE: ACE TANK AT717-12, OPW 104A-1066 OR EQUAL VAPOR RECOVERY ADAPTER: EMCO WHEATON EWA76, OPW 1611AV OR EQUAL. VAPOR RECOVERY ADAPTER CAP: EMCO WHEATON EWA 99, OPW 1711T OR EQUAL <p>NOTE: NO AUXILLIARY TANK FITTING ON TANKS LESS THAN 1000 GALLONS</p>	<ul style="list-style-type: none"> PRIMARY TANK BOSS: 4"NPT RISER PIPE: 4" DIA SCHEDULE 40 BLACK STEEL WITH ASPHALT MASTIC COATING AND 4" NPT ENDS. LENGTH TO SUIT. CONTAINMENT HANDHOLE: EMCO WHEATON EWA 1003-008, OPW 1-4580 OR EQUAL. FILL ADAPTER: EMCO WHEATON EWA 30-014, OPW 633T OR EQUAL. FOR COAXIAL VAPOR RECOVERY SYSTEMS USE EMCO WHEATON EWA 9-001, OPW 633TC OR EQUAL. FILL CAP: EMCO WHEATON EWA 97-003, OPW 634TT OR EQUAL. OVERFILL PREVENTION: EMCO WHEATON A100-001, OPW 6150 OR EQUAL. DROPTUBE: EMCO WHEATON EWA20-004, OPW 61T-7268 OR EQUAL. FOR COAXIAL VAPOR RECOVERY SYSTEMS USE, EMCO WHEATON EWA 90-001, OPW 61TC OR EQUAL. LENGTH CUT TO SUIT WITH 45/d ANGLE END TERMINATING 8 - 12" ABOVE STRIKER PLATE AT BOTTOM OF TANK TO MEET LOCAL REQUIREMENTS. <p>NOTES: ENGRAVE WORDS "DIESEL FUEL NO. 2" ON COVER OF FILL/SPILL CONTAINMENT BOX IN LARGEST LETTERS PRACTICAL TO FIT SPACE WITH 1/8 INCH WIDE BY 1/16 INCH DEEP MINIMUM CUT FOR THE INSCRIPTION.</p>	<ul style="list-style-type: none"> SECONDARY TANK BOSS: 2"NPT REDUCER BUSHING: 4"x2"NPT RISER PIPE: 4" DIA SCHEDULE 40 BLACK STEEL WITH ASPHALT MASTIC COATING AND 4" NPT ENDS. LENGTH TO SUIT. HANDHOLE: EMCO WHEATON EWA 721-001, OPW 104 AOW OR EQUAL. LEAK DETECTION SENSOR: VEEDER ROOT TLS-350 SYSTEM WITH LEAK SENSOR IN INTERSTITIAL SPACE OF DOUBLE WALL TANK AND WATERPROOF CAP AND RING KIT AT TOP OF RISER PIPE.
UNLEADED GASOLINE (SEE NOTE 2)	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE EXCEPT WORDS "UNLEADED GASOLINE" ON COVER OF FILL/SPILL CONTAINMENT BOX. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE
WASTE OIL (SEE NOTE 2)	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE EXCEPT NO ANGLE CHECK VALVE OR STRAINER IN PRODUCT PIPE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FULE NO. 2 ABOVE EXCEPT FILL IS TO BE USED AS A PUMPOUT; NO OVERFILL PROTECTION DEVICE; NO COAXIAL ADAPTER OR DROPTUBE; AND ENGRAVE "WASTE OIL" ON COVER OF FILL/SPILL CONTAINMENT BOX. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE

ABOVEGROUND STORAGE TANK (AST) APPURTENANCE SCHEDULE

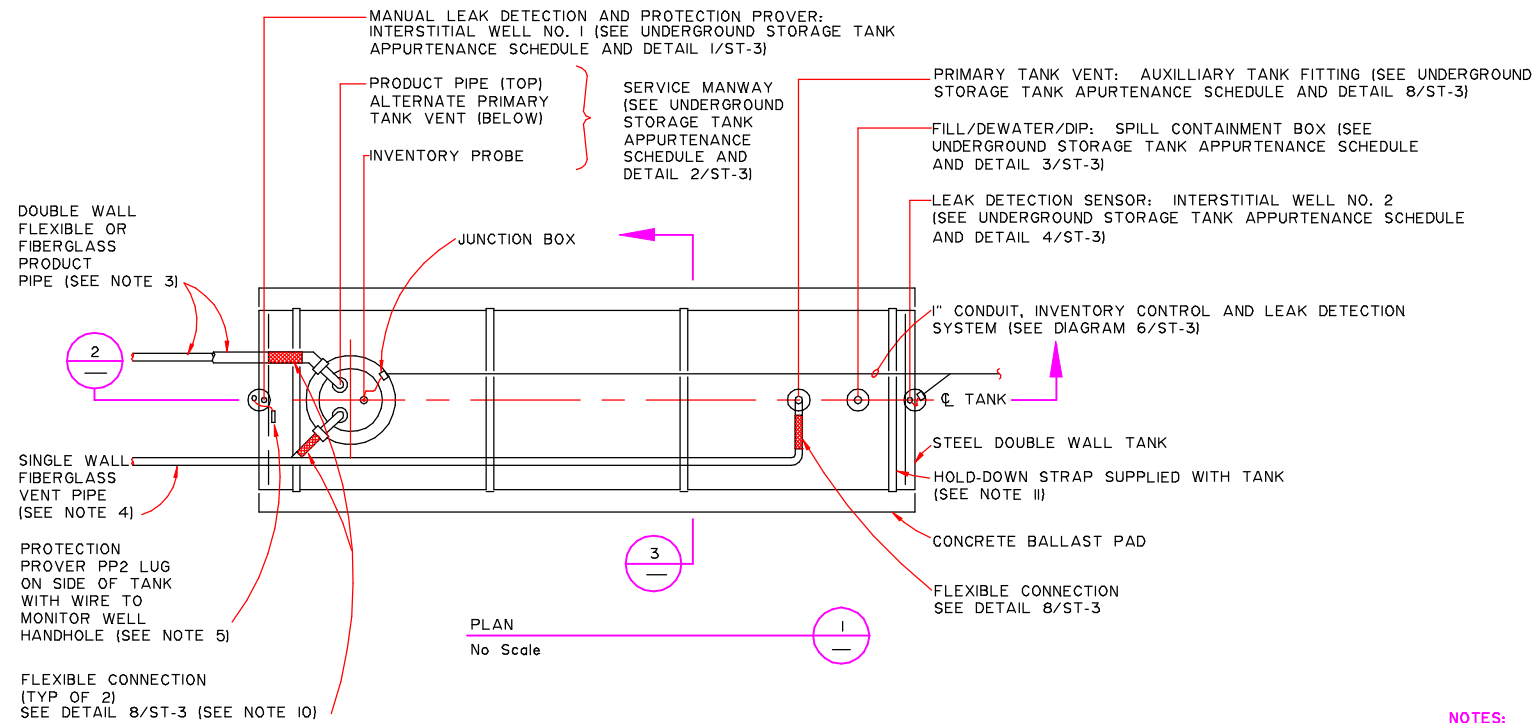
PRODUCT	TANK FITTING NO. 1	TANK FITTING NO. 2	TANK FITTINGS NO. 3 AND 6	TANK FITTINGS NO. 4 AND 5	TANK FITTING NO. 7	TANK FITTING NO. 8
DIESEL FUEL NO. 2 (SEE NOTE 2)	<ul style="list-style-type: none"> TANK BOSS: 4" NPT RISER PIPE NIPPLE: 4"DIA SCHEDULE 40 BLACK STEEL WITH 4"NPT ENDS. FILL DRYBREAK ADAPTER: EMCO WHEATON F500, OPW 1611A OR EQUAL. ISOLATION VALVE: MORRISON 235B OR EQUAL. FILL CAP: EMCO WHEATON F499, OPW 1711T OR EQUAL. OVERFILL PREVENTION: CLAY BAILEY LAFON FILL LIMITER OR EQUAL. DROP TUBE: EMCO WHEATON EWA 20-004, OPW 61T-7268 OR EQUAL. LENGTH CUT TO SUIT WITH 45° ANGLE END TERMINATING 6" ABOVE BOTTOM OF TANK TO MEET LOCAL REQUIREMENTS. <p>NOTE: STENCIL WORDS "DIESEL FUEL NO. 2" ON TOP OF FILL DRYBREAK SPILL CONTAINMENT BOX IN 2" HIGH LETTERS.</p>	<ul style="list-style-type: none"> TANK MANHOLE: 24" DIA. WITH STAINLESS STEEL NUTS, BOLTS AND WASHERS. 	<ul style="list-style-type: none"> TANK BOSS: 4"NPT REDUCER BUSHING: 4"x2"NPT RISER PIPE NIPPLE: 2"DIA SCHEDULE 40 GALVANIZED STEEL WITH 2" NPT ENDS. VENT: EMCO WHEATON MR 354, OPW 23 OR EQUAL UPWARD DISCHARGE VENT. FOR VAPOR RECOVERY SYSTEMS, USE EMCO WHEATON EWA84, OPW 523 OR EQUAL PRESSURE/VACUUM VENT WITH SETTINGS TO MEET LOCAL REQUIREMENTS. (SEE NOTE 6). 	<ul style="list-style-type: none"> EMERGENCY VENTS: CLAY BAILEY NO. 368 SIZED IN ACCORDANCE WITH UFC 79.509(B). 	<ul style="list-style-type: none"> PRIMARY TANK BOSS: 4" NPT RISER PIPE: 4"DIA SCHEDULE 40 GALVANIZED STEEL WITH 4" NPT ENDS. LENGTH TO SUIT. INVENTORY PROBE: VEEDER ROOT TLS-350 SYSTEM WITH PROBE LENGTH TO SUIT AND CAP AND RING KIT AT TOP OF RISER PIPE. 	<ul style="list-style-type: none"> SECONDARY TANK MANHOLE: 24" DIA WITH S/S NUTS, BOLTS AND WASHERS. PRIMARY TANK BOSS: 4"NPT REDUCER BUSHING: 4"x2" NPT DOUBLE TAPPED RISER PIPE NIPPLE: 2"DIA SCHEDULE 40 BLACK STEEL WITH 2"NPT ENDS SUCTION TUBE: 2"DIA SCHEDULE 40 BLACK STEEL PIPE WITH 2"NPT ENDS SUCTION STRAINER: EMCO WHEATON I57, OPW EQUIVALENT MODEL OR EQUAL LOCATED 6" ABOVE BOTTOM OF TANK. EXTERNAL FIRE SAFETY VALVE: MORRISON 346 OR EQUAL SOLENOID VALVE: ASCO 8210 OR EQUAL. NORMALLY CLOSED. DISPENSER ACTIVATED. LEAK DETECTION SENSOR: VEEDER ROOT TLS 350 SYSTEM WITH LIQUID SENSOR IN INTERSTITIAL SPACE AND ANOTHER IN TANK PIPE SUMP.
UNLEADED GASOLINE (SEE NOTE 2)	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE EXCEPT STENCIL WORD "UNLEADED GASOLINE". 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAVE AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE
WASTE OIL (SEE NOTE 2)	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE EXCEPT FILL IS TO BE USED AS A PUMPOUT; NO OVERFILL PREVENTION DEVICE AND STENCIL WORDS "WASTE OIL". 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE. 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE 	<ul style="list-style-type: none"> SAME AS DIESEL FUEL NO. 2 ABOVE EXCEPT NO STRAINER IN PRODUCT PIPE.

NOTES:

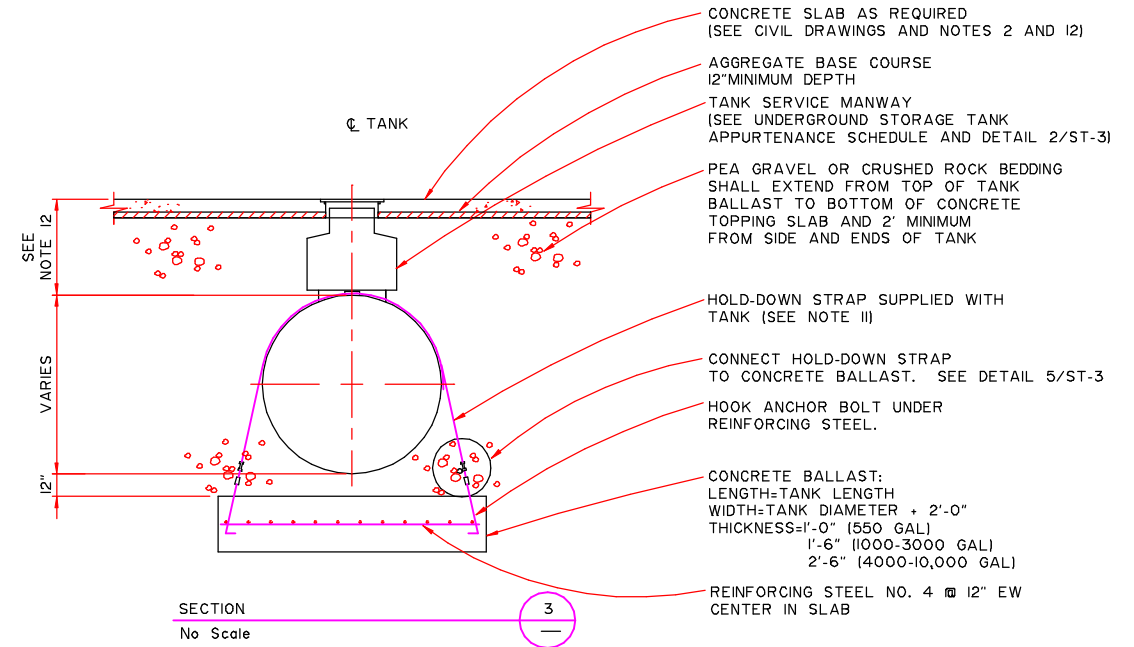
- MANUFACTURER'S PRODUCTS ARE LISTED TO ESTABLISH STANDARD OF QUALITY. PRODUCTS OF EQUAL QUALITY BY OTHER MANUFACTURERS INCLUDING, BUT NOT LIMITED TO, OPE, EBW, POMECO AND CLAY BAILEY ARE ACCEPTABLE. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. ALL APPURTENANCES SHALL BE BY SAME MANUFACTURER TO THE EXTENT PRACTICAL.
- ALL TANKS AND APPURTENANCES SHALL BE SUITABLE FOR PETROLEUM PRODUCT LISTED. OTHER PETROLEUM PRODUCTS, ADDITIVES OR FUELS MAY NOT BE COMPATIBLE WITH TANK AND APPURTENANCES.
- ALL APPURTENANCES SHALL, WHERE PRACTICAL, BE SHOP INSTALLED, TESTED AND PAINTED/COATED WITH THE SAME COATING GOING ON THE TANK BEFORE SHIPMENT TO THE SITE.
- TANKS SHALL HAVE WARNING SIGNS FABRICATED AND POSTED AS DIRECTED BY UFC 79.109 AND 79.110.
- TANK VENT SHALL BE LOCATED AT AUXILLIARY TANK FITTING FOR DUAL POINT VAPOR RECOVER. IF NO AUXILLIARY TANK FITTING IS AVAILABLE, THEN LOCATE VENT IN SERVICE MANWAY AS ALTERNATE AND USE COAXIAL VAPOR RECOVER.
- ALL TANKS SHALL HAVE VAPOR RECOVERY CAPABILITY FOR FUTURE USE OR CHANGE IN TANK STORAGE CONTENTS.
- TANKS THAT ARE NOT REQUIRED TO USE VAPOR RECOVERY IN INITIAL INSTALLATION SHALL HAVE ALL VAPOR RECOVERY APPURTENANCES INSTALLED EXCEPT VENT CAP SHALL BE STANDARD UPWARD DISCHARGE AND NOT PRESSURE/VACUUM VENT CAP.



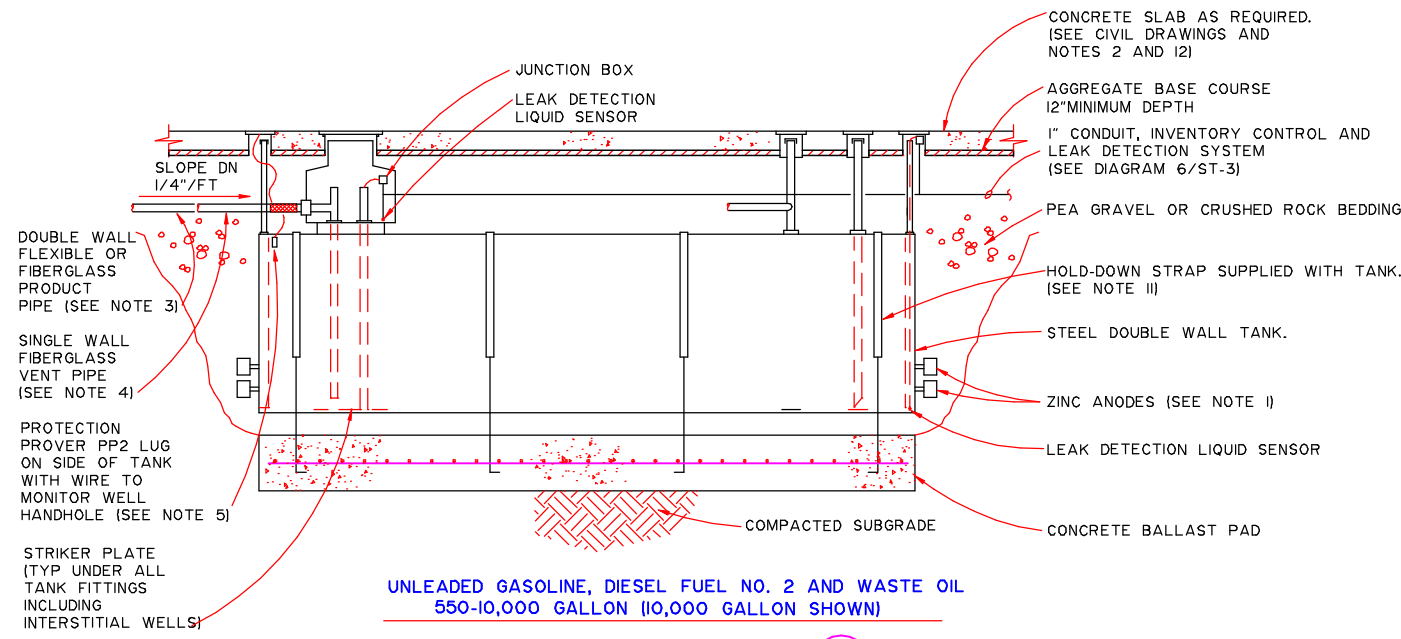
Drawing No.	ST-1	By	
	Sheet No.		
Alaska Department of Transportation & Public Facilities		Effective Date: January 15, 1993	
STORAGE TANK STANDARDS		SCHEDULES	
REVISIONS		Date	Description



PLAN
No Scale



SECTION
No Scale



SECTION
No Scale

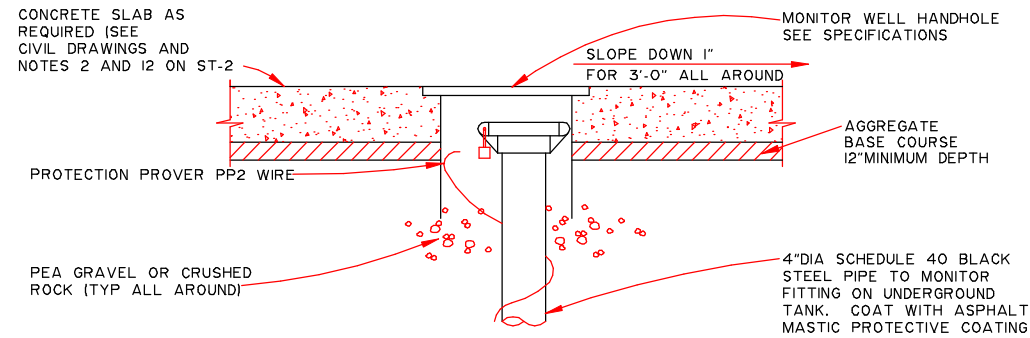
UNLEADED GASOLINE, DIESEL FUEL NO. 2 AND WASTE OIL
550-10,000 GALLON (10,000 GALLON SHOWN)

NOTES:

- ① ZINC ANODES FOR CATHODIC PROTECTION ARE ON TANKS OF STEEL CONSTRUCTION ONLY. TANK MANUFACTURER SHALL DETERMINE SIZE AND NUMBER OF ANODES IN ACCORDANCE WITH UFC 79.603 DEPENDING ON TANK SIZE AND SOIL CONDITIONS.
- ② CONCRETE SURFACE SLAB AS A MINIMUM SHALL BE AS SHOWN IN DETAILS FOR MANHOLES AND HANDHOLES. REST OF SURFACE SHALL BE AS SHOWN ON CIVIL DRAWINGS.
- ③ DOUBLE WALL FLEXIBLE OR FIBERGLASS PRODUCT PIPE IS 2 INCH PRIMARY PIPE INSIDE AND 3 INCH SECONDARY PIPE OUTSIDE.
- ④ SINGLE WALL FIBERGLASS VENT PIPE IS 2 INCH FOR TANK FILL RATE NOT TO EXCEED 700 GPM AND VENT LENGTH NOT TO EXCEED 200 FEET (INCLUDING 7 ELBOWS). IF FILL RATE OR LENGTH EXCEEDS EITHER VALUE, THEN REFER TO UFC 79.604 TO CONFIRM VENT SIZE.
- ⑤ PROTECTION PROVER LUG PP2 SUPPLIED WITH STEEL TANK HAVING STI-P3 PROTECTION. WIRE CONNECTION ALSO SUPPLIED WITH TANK SHALL WRAP AROUND MONITOR WELL RISER PIPE UP TO EXPOSED CONNECTION IN MONITOR WELL HANDHOLE.
- ⑥ FILL IS TO BE USED AS PUMPOUT PORT WHEN TANK IS TO BE USED FOR WASTE OIL STORAGE.
- ⑦ WHERE POSSIBLE, MAINTAIN 20 FEET MINIMUM FROM ANY BUILDING OR ANY PROPERTY LINE THAT CAN BE BUILT UPON. EXCAVATION FOR UNDERGROUND STORAGE TANKS SHALL BE MADE WITH DUE CARE TO AVOID UNDERMINING OF FOUNDATIONS OF EXISTING STRUCTURES. UNDERGROUND TANKS SHALL BE LOCATED WITH RESPECT TO EXISTING BUILDING FOUNDATIONS AND SUPPORTS SO THAT THE LOADS CARRIED BY THE LATTER CANNOT BE TRANSMITTED TO THE TANK. THE DISTANCE FROM ANY PART OF A TANK TO THE NEAREST WALL OF ANY BASEMENT OR PIT AND TO ANY PROPERTY LINE SHALL BE NOT LESS THAN 3 FEET IN ACCORDANCE WITH UFC 79.601.
- ⑧ MULTIPLE TANK INSTALLATIONS SHALL HAVE TANKS PLACED WITH A ONE FOOT MINIMUM SEPARATION IN ACCORDANCE WITH UFC 79.601.
- ⑨ CONCRETE - BACKFILL AND COMPACT UNDERLAYMENTS IN CONFORMANCE WITH THE ALASKA DOT/PF REQUIREMENTS FOR CONCRETE PADS. CONCRETE SHALL BE 3000 PSI AT 28 DAYS, WITH NOT LESS THAN 5 1/2 SACKS TYPE I PORTLAND CEMENT PER CUBIC YARD. SLUMP SHALL BE 2-4". USE 3/4" MINUS AGGREGATE, WASHED CLEAN. WATER SHALL BE POTABLE. PROVIDE ADMIXTURES FOR 5% ± 1% AIR ENTRAINMENT.
- ⑩ FLEXIBLE CONNECTION REQUIRED FOR FIBERGLASS PIPE ONLY - NOT FOR DOUBLE WALL FLEXIBLE PIPE.
- ⑪ NUMBER OF HOLD-DOWN STRAPS AND METHOD OF ELECTRICAL ISOLATION FROM TANK FOR CORROSION PROTECTION SHALL BE AS REQUIRED BY THE TANK MANUFACTURER.
- ⑫ TANKS SHALL BE COVERED WITH A MINIMUM OF 2 FEET OF EARTH OR SHALL BE COVERED BY NOT LESS THAN 1 FOOT OF EARTH, ON TOP OF WHICH SHALL BE PLACED A SLAB OF REINFORCED CONCRETE NOT LESS THAN 4 INCHES THICK. WHEN UNDERGROUND TANKS ARE OR ARE LIKELY TO BE SUBJECTED TO TRAFFIC, THEY SHALL BE PROTECTED AGAINST DAMAGE FROM VEHICLES PASSING OVER THEM BY AT LEAST 3 FEET OF EARTH COVER, OR 18 INCHES OF WELL-TAMPED EARTH AND AGGREGATE BASE COURSE PLUS 6 INCHES OF REINFORCED CONCRETE, OR 8 INCHES OF ASPHALTIC CONCRETE, EXTENDING AT LEAST 1 FOOT HORIZONTALLY BEHIND THE OUTLINE OF THE TANK IN ALL DIRECTIONS. FOR ADDITIONAL REQUIREMENTS PERTAINING TO TANK BURIAL, SEE UFC 79.601(b).

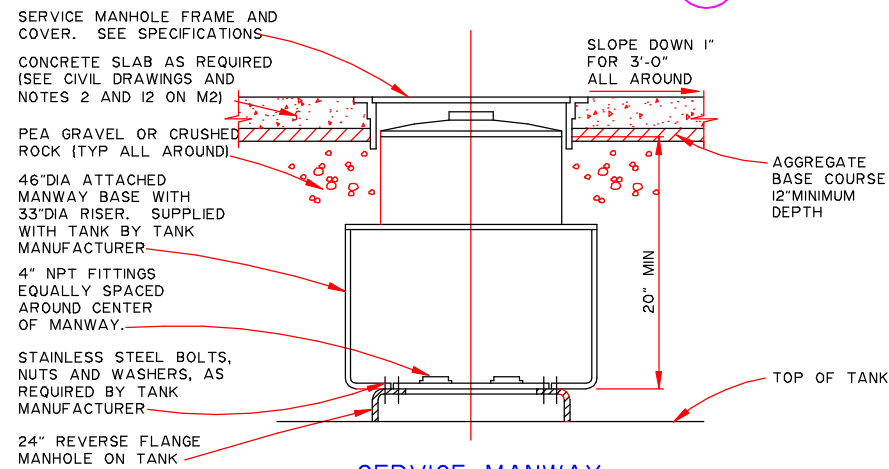


Drawing No. ST-2	Sheet No. 2 of 5	Effective Date: <u>January 15, 1993</u>	
		Alaska Department of Transportation & Public Facilities	UNDERGROUND STORAGE TANKS (UST) PLANS AND SECTIONS
STORAGE TANK STANDARDS		REVISIONS	By
		Description	
		Date	



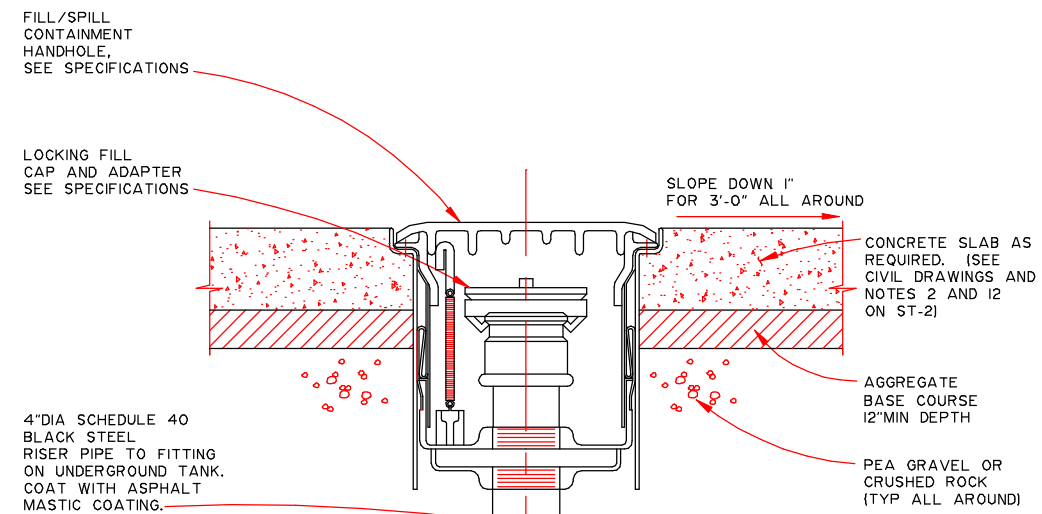
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DETAIL No Scale 1 ST-2



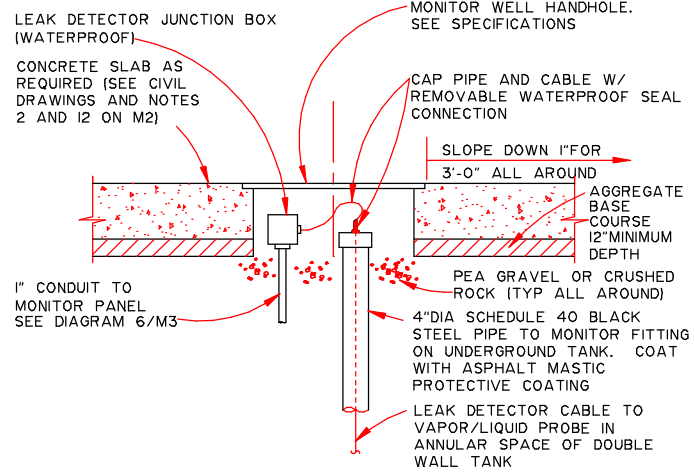
SERVICE MANWAY

DETAIL No Scale 2 ST-2



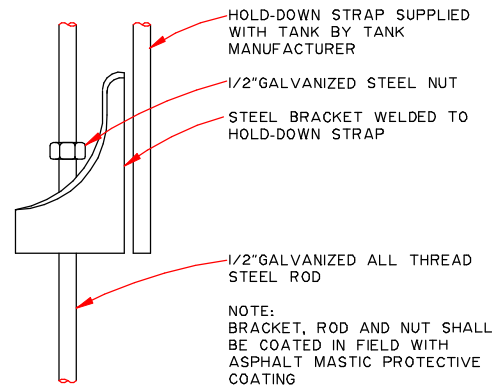
FILL/SPILL CONTAINMENT BOX

DETAIL No Scale 3



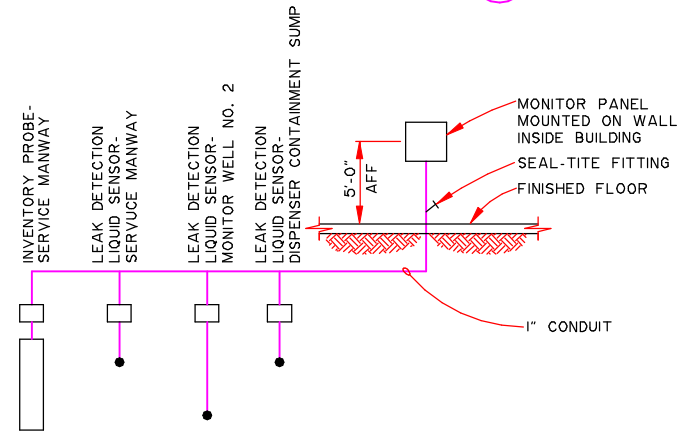
INTERSTITIAL WELL NO. 2

DETAIL No Scale 4 ST-2



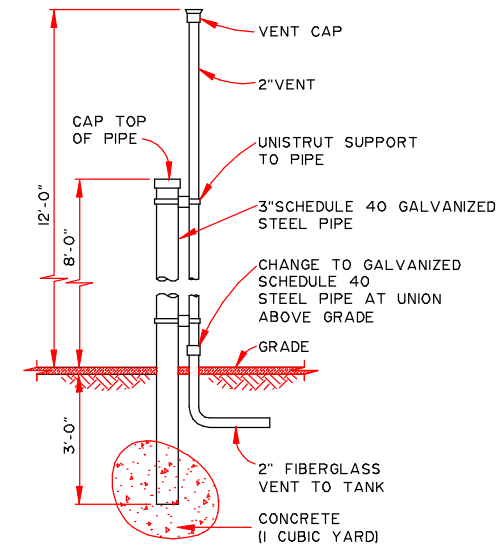
HOLD-DOWN STRAP CONNECTION

DETAIL No Scale 5



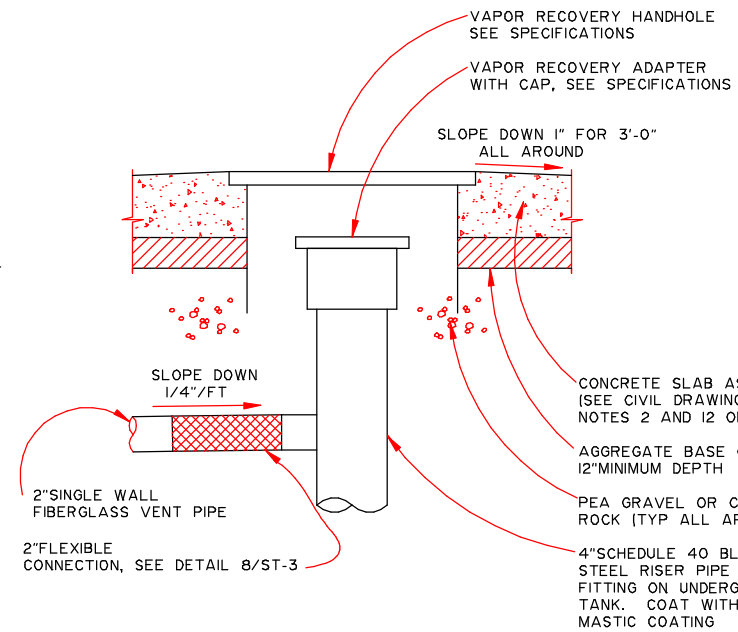
LIST INVENTORY CONTROL AND LEAK DETECTION SYSTEM

DIAGRAM No Scale 6



STAND ALONE VENT SUPPORT

DETAIL No Scale 7



DETAIL No Scale 8

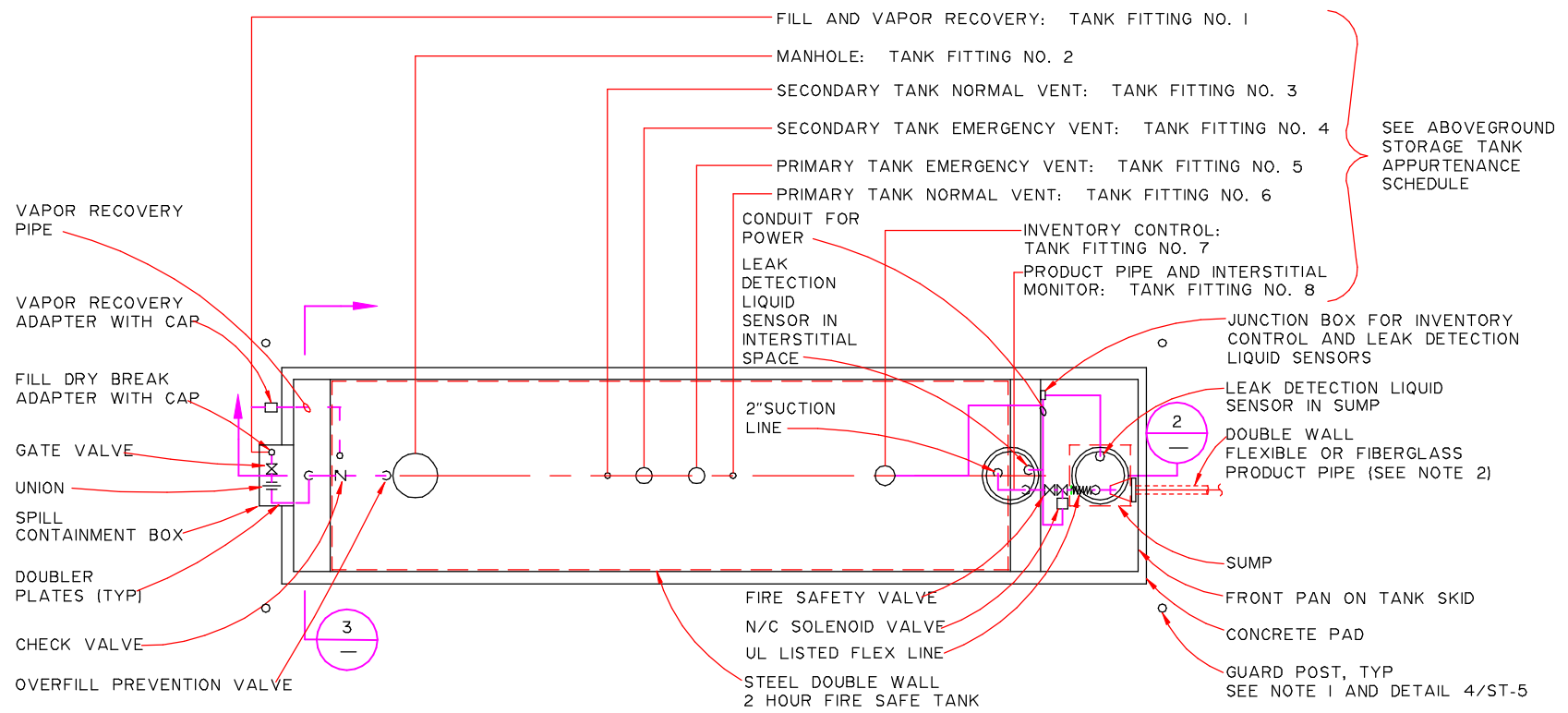


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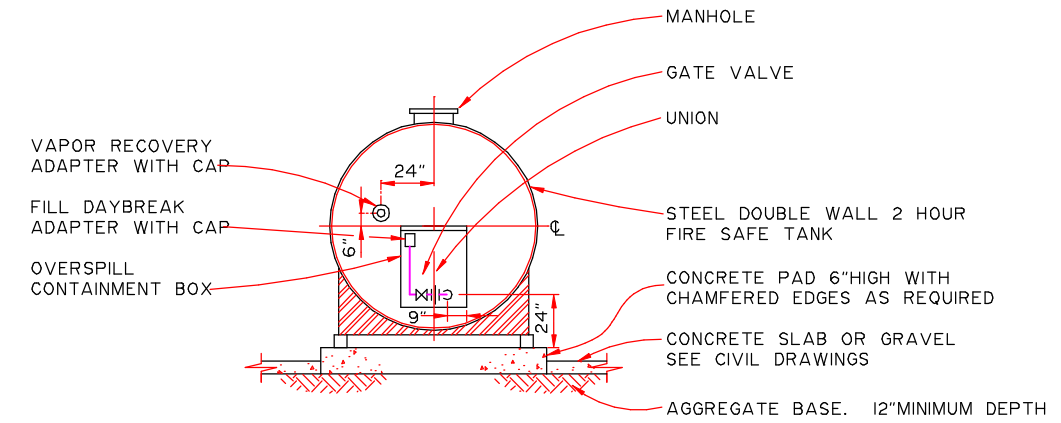
STORAGE TANK STANDARDS
UNDERGROUND STORAGE TANKS (UST)
DETAILS

Alaska Department of Transportation & Public Facilities
Effective Date: January 15, 1993

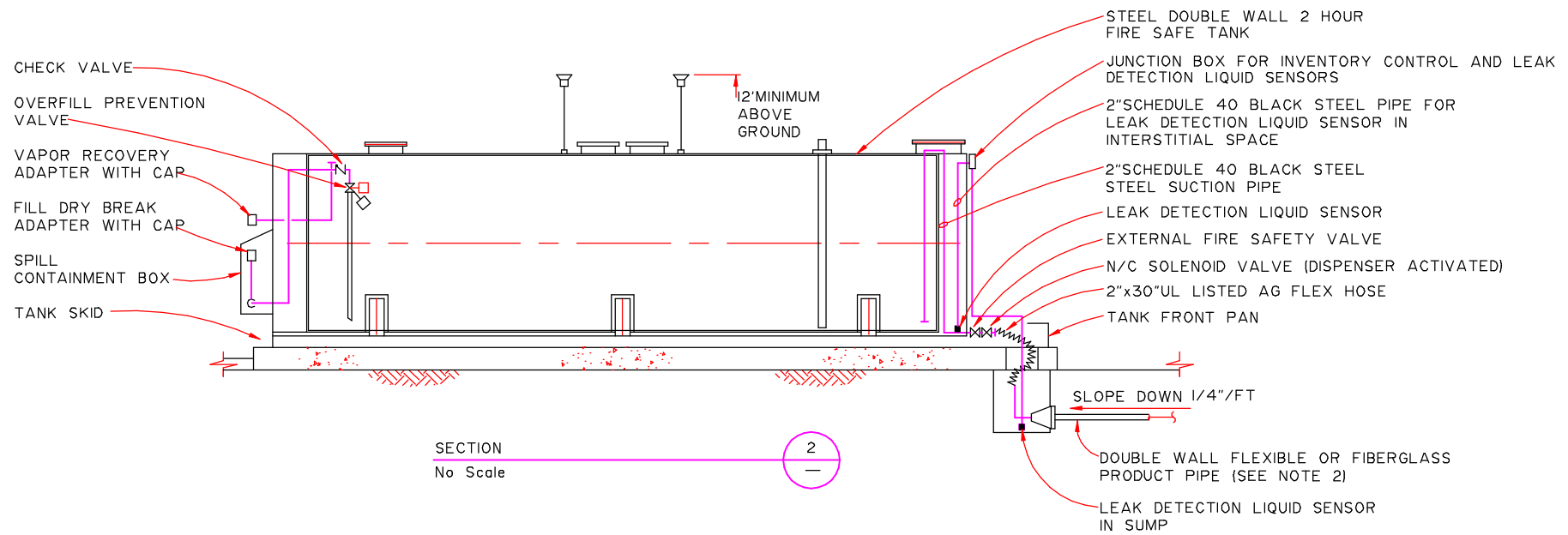
Drawing No. ST-3	3 of 5
Sheet No.	5



PLAN
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SECTION
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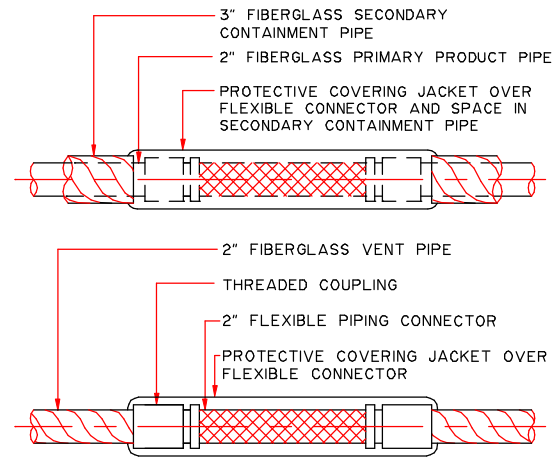


SECTION
No Scale

- 1) GUARD POSTS SHALL BE LOCATED 5'-0" FROM CONCRETE PAD ON ALL FOUR CORNERS OF TANK. ADDITIONAL POSTS SHALL BE LOCATED AT NOT GREATER THAN 4'-0" INTERVALS ALONG SIDES AND ENDS OF TANK. TOTAL NUMBER WILL VARY DEPENDING ON SIZE OF TANK. GUARD POSTS IN ACCORDANCE WITH UFC 80.30(W).
- 2) DOUBLE WALL FLEXIBLE OR FIBERGLASS PRODUCT PIPE IS 2 INCH PRIMARY PIPE INSIDE AND 3 INCH SECONDARY PIPE OUTSIDE.
- 3) FILL IS TO BE USED AS A PUMP OUT PORT WHEN TANK IS TO BE USED FOR WASTE OIL STORAGE. ELIMINATE CHECK VALVE AND OVERFILL PREVENTION DEVICE.
- 4) MAINTAIN 5' (TANKS LESS THAN 75I GALLONS) OR 7.5' (TANKS 75I - 10,000 GALLONS) MINIMUM DISTANCE FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY AND 5' MINIMUM DISTANCE FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY IN ACCORDANCE WITH UFC 79.503.
- 5) MULTIPLE TANK INSTALLATIONS SHALL HAVE TANKS PLACED WITH A MINIMUM 3 FOOT SEPARATION IN ACCORDANCE WITH UFC 79.504.
- 6) PRODUCT PIPE SHALL BE SINGLE PIPE 2" SCHEDULE 40 GALVANIZED STEEL PIPE FROM TANK FITTING TO FLEXIBLE HOSE.
- 7) ABOVEGROUND STORAGE TANKS SHALL BEAR A LABEL OR PLACARD IDENTIFYING THE MATERIAL THEREIN IN ACCORDANCE WITH UFC STANDARD NO. 79-3.

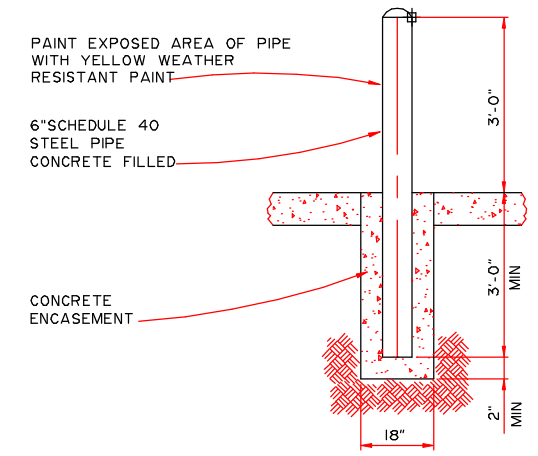


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Description			
STORAGE TANK STANDARDS			
ABOVEGROUND STORAGE TANKS (AST)			
PLANS AND SECTIONS			
Alaska Department of Transportation & Public Facilities		Effective Date: January 15, 1993	
Drawing No. ST-4	Sheet No. 4	of	5



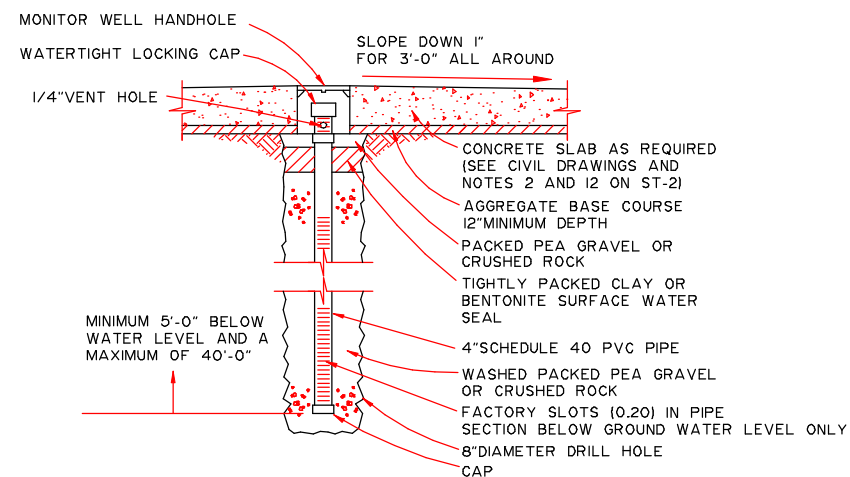
FIBERGLASS PIPING SYSTEM
TYPICAL FLEXIBLE PIPING CONNECTIONS

DETAIL NO SCALE 1



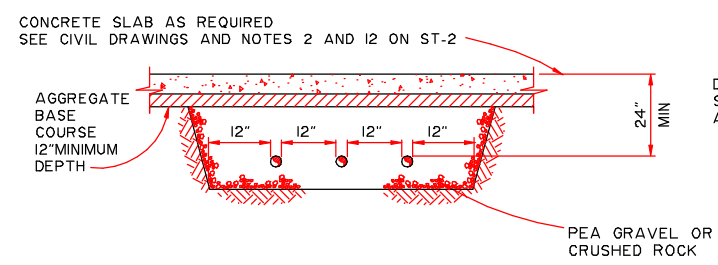
GUARD POST

DETAIL NO SCALE 4



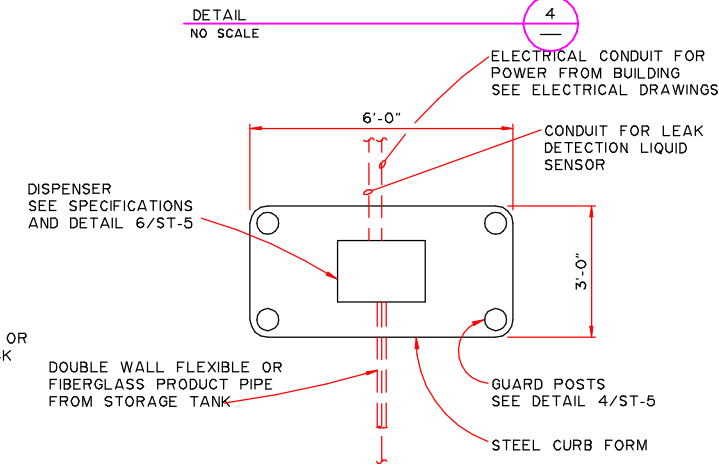
SITE MONITOR WELL

DETAIL NO SCALE 7

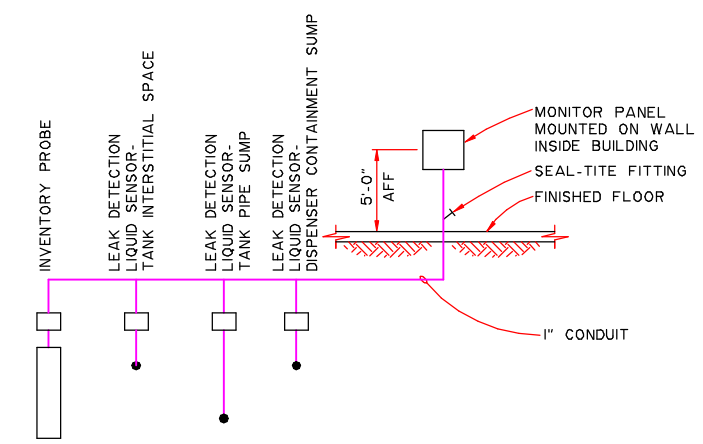


TYPICAL PIPE TRENCH

SECTION NO SCALE 2

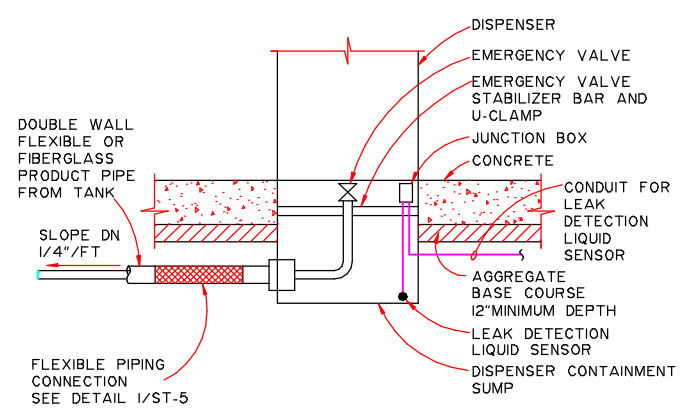


DETAIL NO SCALE 5



AST INVENTORY CONTROL AND LEAK DETECTION SYSTEM

DIAGRAM NO SCALE 3



DETAIL NO SCALE 6



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	Date	By
Sheet No.	Description	
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DETAILS		
Alaska Department of Transportation & Public Facilities		
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