



**AT&T 760-220-164**  
Issue 2  
November 1996

# **AT&T Practices**

## **Storage Systems, Combustible Liquid Fuels, Design, Installation and Maintenance**



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# AT&T Practices

## Storage Systems Combustible Liquid Fuels

### Design, Installation and Maintenance

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## **1. About this Document**

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### **1.1 Purpose**

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- 1.1.1 The purpose of this practice is to provide commentary for and list general engineering information covering design, installation and maintenance of fuel storage systems for standby electrical power generation and heating equipment. Also given are basic guidelines for evaluating tank locations based on storage size requirements. This practice is devoted to storage of kerosene, diesel fuels and heating oils and not for storage or dispensing of Class I fuel (gasoline). This practice is intended for use by Network Operations/Building Operations, Network Engineering Services, NSD Real Estate, Corporate Environmental Engineering and consultants of AT&T. Material and product information presented in this practice and criteria drawings should be reviewed and upgraded to meet the standard of the industry at the time the fuel storage system is installed.
- 1.1.2 This practice supersedes all previous practices related to fuel storage systems for standby electrical power generation and heating equipment:
- AT&T 760-220-161
  - AT&T 760-220-162
  - AT&T 760-220-163.

### **1.2 Reason for Reissue**

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- 1.2.1 This practice is reissued for the following reasons:
- a. Section 2 is rewritten to clarify the guidelines used in the selection of locations for fuel storage tanks.
  - b. Section 4, Paragraph 4.04 is deleted and the remainder of Section 4, Fuel Storage Requirements, is re-numbered.
  - c. Section 10, Paragraphs 10.09 and 10.10 are added to clarify design standards for day tanks providing fuel to one or multiple engines. Item 10.12 (i) is added to specify need for fusible link shutoff valves. Remainder of section is renumbered.
  - d. Section 14, Paragraphs 14.13 (d) and (e) are reworded to emphasize the use of Schedule 40 carbon steel as the preferred material for underground carrier piping and interior fuel piping.
  - e. Appendix C, Engine Fuel Consumption Data, is added to provide fuel consumption information for tank sizing purposes.

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## **2. General Information**

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- 2.0.1 Environmental regulations (40 CFR, Part 280) require that existing underground storage tank (UST) systems be upgraded or replaced by 1998 as mandated by Federal EPA. Upgrading is not generally considered to be cost effective based on the fact that older decaying tanks remain in use. As a result, many older, existing USTs should be removed from service and replaced by a new fuel storage system. In many cases, where fuel storage capacity needs are low, the most environmentally sound and cost beneficial alternative for a new fuel storage system is aboveground storage. Aboveground storage will greatly reduce the potential for future environmental liability.
- 2.0.2 Seventy two hour (3-day) plus 25 percent reserve stored fuel supplies are recommended at most locations. In many cases, the required amount of fuel can be accommodated in aboveground tank(s). Refer to Section 4., Fuel Storage Requirements, for specific tank sizing guidelines.
- 2.0.3 Aboveground fuel storage systems provide a viable alternative for replacing UST systems or installing new fuel storage systems. Aboveground systems offer low cost maintenance and low cost retrofitting of equipment. Where security is a concern, (i.e. remote sites, urban areas) interior tanks are well protected and exterior tanks can be protected by concrete encasement of the tanks, fencing or concrete block wall enclosures. Moreover, inspections of aboveground fuel systems are easier. Interior installations can protect the system and maintenance personnel from extreme weather conditions. Because piping and accessories are exposed, field adjustments can be quickly and easily made. The ease of these adjustments will result in the system running at maximum efficiency. A major benefit to aboveground system installation is the lower potential for environmental liability. Problems that may arise will likely be confined and thus be handled without affecting neighboring areas.
- 2.0.4 Generally, the following guidelines shall be used to select the tank locations for providing fuel storage. Refer to AT&T Standard Criteria Drawings, Appendix D.
1. Fuel storage up to 1,320 gallons should be placed within the engine room in unenclosed tanks. Maximum 660 gallons per tank, and 660 gallons maximum available to any single engine.
  2. Fuel storage in excess of that provided in (1) above should be provided in space available in the building.
  3. Fuel storage in excess of that provided in (1) and (2) above, but less than 10,000 gallons, should be provided in aboveground, double wall, concrete encased storage tanks.

4. Fuel storage in excess of that provided in (1) and (2) above, and in excess of 10,000 gallons should be provided in underground storage tanks. Do not normally provide both aboveground and underground exterior fuel storage at the same site.
- 2.0.5 The fuel delivery system and all alarms shall be tested as part of the installation.
- a. Prior to acceptance of the system installation, all tanks, piping and fittings shall be hydrostatically or pneumatically tested. Test pressure shall not exceed manufacturers recommendations. *IN NO EVENT SHALL THE PIPING BE CONNECTED TO THE TANK DURING PIPE/FITTING TESTS.*
  - b. Prior to acceptance of the electrical installation, all alarms, both local and remote, shall be tested and verified for proper operation.

### **3. Safety**

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- 3.0.1 It is essential that all personnel recognize and be alert to the hazards involved when working around flammable and combustible liquids. Personnel should be aware of and know the operation of fire suppression equipment. A strict no smoking and no open flames policy shall be enforced.
- 3.0.2 The first consideration in fuel storage tank installation design is adherence to the National Board of Fire Underwriters safety requirements. These standards classify fuels as Class I, II and III, depending on their flash point. No Class I fuels are to be stored or dispensed from within buildings or shelters.
- 3.0.3 The maximum permissible size of fuel storage tanks depends upon the location on the property, location within structures and on applicable codes and standards. Construction of and piping to storage tanks are subject to local codes, environmental and safety requirements and/or insurance regulations. National Fire Protection Association (NFPA) 30 and 37 give general guidelines for the storage of Class II combustible liquids. These codes and standards prescribe regulations consistent with recognized good practices for the safeguarding of life and property from the hazards of fire and explosions arising from the storage, handling and use of flammable and combustible liquids.
- a. NFPA 37 limits the unenclosed day tanks or supply tanks supplying engines which drive standby generators or other equipment for emergency purposes. Not more than one unenclosed 660 gallon maximum capacity tank or two or more unenclosed tanks with an aggregate capacity of not more than 660 gallons shall be connected to one engine. The aggregate capacity of all unenclosed day and

supply tanks in a building shall not exceed 1,320 gallons. Day and supply tanks with individual capacities larger than 660 gallons or those tanks that cause the unenclosed aggregate capacity to exceed 1,320 gallons in a building shall be enclosed in a 3 hour fire rated enclosure.

- b. A Spill Prevention Control and Countermeasure (SPCC) Plan prepared in accordance with 40 CFR, Part 112 is required for a facility when an individual aboveground tank capacity exceeds 660 gallons, when the aggregate aboveground tank capacities exceed 1,320 gallons, or when the aggregate underground capacities exceed 42,000 gallons.
- c. Ventilation requirements may also apply. NFPA and the National Institute for Occupational Safety and Health (NIOSH) ventilation requirements shall be followed. A continuously operating system providing a minimum of 4 air changes per hour is recommended for enclosed spaces.
- d. Adequate communications facilities (telephone and/or intercom) shall be provided.

## **4. Fuel Storage Requirement**

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- 4.0.1 Stored fuel allotments should be based on the actual connected load to the building and the corresponding engine fuel consumption rate, allowing for worst case seasonal variations. Tables containing fuel consumption rates for various common standby generators may be found in Appendix C. Consideration should be given to anticipated future building expansion that would add to the power demand. Growth projections should not exceed a three year period.
- 4.0.2 In accordance with the formula shown below, storage tanks should be sized so that 3/4 of 90 percent of the tank volume will supply fuel needs to the engine(s) for 72 hours, with additional volume for heating or other fuel consuming equipment. The value for Fuel Flow to be inserted into the formula should be determined utilizing the maximum connected electrical load and the fuel consumption charts for various engines, Appendix C. It may be necessary to interpolate between chart values for specific consumption rates not shown. Refer to Section 10., Day Tanks, for day tank sizing requirements.

$$\text{Tank Capacity (gal.)} = \frac{\text{Fuel Flow (gph)} \times 72 \text{ (hr)} \times 4}{3 \times 0.9}$$

**Example:**

Calculate the fuel storage tank capacity required for a location with a total connected electrical load of 1,350 kW. The location is equipped with three 750 kW Solar turbines, two of which are required for operation with one standby. No other fuel burning equipment is installed at this location.

$$\text{Tank Capacity (gal.)} = \frac{\text{Fuel Flow (gph)} \times 72 \text{ (hr)} \times 4}{3 \times 0.9}$$

**Fuel Flow Calculation:**

Fuel Flow = fuel consumption per engine x number of engines

Fuel consumption is obtained from the fuel consumption chart for 750 kW Solar turbines located in Appendix C, as follows:

$$\begin{aligned} \% \text{ load} &= \text{total load/number of engines/750 kW per engine} \\ &= 1,350 \text{ kW}/2 \text{ engines}/750 \text{ kW per engine} \\ \% \text{ load} &= 90\% \end{aligned}$$

Interpolating between 80% and 100% values shown in fuel consumption chart, Appendix C, fuel consumption is 86.8 gallons per hour per engine.

$$\begin{aligned} \text{Fuel Flow} &= \text{fuel consumption per engine} \times \text{number of engines} \\ &= 86.8 \text{ gallons per hour} \times 2 \text{ engines} \\ \text{Fuel Flow} &= 173.6 \text{ gallons per hour} \end{aligned}$$

$$\begin{aligned} \text{Tank Capacity (gal.)} &= \frac{\text{Fuel Flow (gph)} \times 72 \text{ (hr)} \times 4}{3 \times 0.9} \\ &= \frac{173.6 \text{ (gph)} \times 72 \text{ (hr)} \times 4}{3 \times 0.9} \end{aligned}$$

$$\text{Tank Capacity (gal.)} = 18,517.3 \text{ gallons.}$$

Since this is not a standard tank volume, round up to the next standard volume, or 20,000 gallons

**4.0.3 Exceptions:**

- a. Locations having contractual obligations that exceed a three day supply.
- b. Remote locations having access limitations due to unusual conditions or circumstances (e.g., severe weather, seasonal accessibility, distance to fuel supplier, etc.).

**4.0.4 Storage tanks should be located so that the length of supply and return piping to the end use equipment is minimized and consistent with regulations**

and requirements as to the minimum distances from the building, other structures and property lines.

- 4.0.5 The maximum fuel level in the tank and piping system should not exceed the engine fuel injector elevation unless appropriate design measures are implemented.

## **5. Regulations/Codes/Industry Standards**

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### 5.0.1 Regulations:

- a. USEPA, Title 40, Code of Federal Regulations, Part 112, "Oil Pollution Prevention."
- b. USEPA, Title 40, Code of Federal Regulations, Part 280, "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks."
- c. OSHA, Title 29, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards.
- d. State Technical Regulations.
- e. Local, City and/or County Regulations.

### 5.0.2 Codes:

- a. Uniform Fire Code.
- b. ASME, "Boiler and Pressure Vessel Code."
- c. NFPA 30, "Flammable and Combustible Liquids Code."
- d. NFPA 70, "National Electric Code."
- e. Local Building and Mechanical Codes.

### 5.0.3 Industry Standards:

- a. ANSI B31.1, "Power Piping."
- b. ANSI B31.9, "Building Service Piping."
- c. API RP 575, "Inspection of Atmospheric and Low-Pressure Storage Tanks."
- d. API Std 650, "Welded Steel Tanks for Oil Storage."
- e. API RP 1615, "Installation of Underground Petroleum Storage Systems."

- f. API 1632, "Cathodic Protection of Underground and Petroleum Storage Tanks and Piping Systems."
- g. API 2000, "Venting Atmospheric and Low Pressure Storage Tanks."
- h. ACT-100, "Fabrication of FRP Clad/Composite Underground Storage Tanks."
- i. ASME Sec. 9, "Welding and Brazing Qualifications."
- j. ASME B16.3, "Malleable Iron Threaded Fittings."
- k. ASME B16.18, "Cast Bronze Solder-Joint Pressure Fittings."
- l. ASME B16.22, "Wrought Copper and Bronze Solder-Joint Pressure Fittings."
- m. ASME B16.26, "Cast Bronze Fittings for Flared Copper Tubes."
- n. ASME B36.10, "Welded and Seamless Wrought Steel Pipe."
- o. ASTM A53, "Pipe, Steel, Black and Hot-Dipped Zinc Coated Welded and Seamless."
- p. ASTM 106, "Seamless Carbon Steel Pipe for High - Temperature Service."
- q. ASTM A234, "Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures."
- r. ASTM B88, "Seamless Copper Water Tube."
- s. ASTM D4021, "Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks."
- t. AWS A5.8, "Brazing and Filler Material."
- u. NACE RP-01-69, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems."
- v. NACE RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried or Submerged Liquid Storage Systems."
- w. NFPA 31, "Installation of Oil Burning Equipment."
- x. NFPA 37, "Stationary Combustion Engines and Gas Turbines."
- y. NFPA 110, "Emergency and Standby Power Systems."
- z. NFPA 704, "Identification of the Fire Hazards of Materials."
- aa. NSC CAN4-S603-M85, "Steel Underground Tanks for Flammable and Combustible Liquids."
- ab. NSC CAN4-SW603.1-M85, "Galvanized Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids."

- ac. NSC CAN4-S615-M83, "Reinforced Plastic Underground Tanks for Petroleum Products."
- ad. NSC CAN4-S631-M84, "Isolating Bushings for Steel Underground Tanks Protected with Coatings and Galvanic Systems."
- ae. NSC CAN-S633-M84, "Flexible Underground Hose Connectors for Flammable and Combustible Liquids."
- af. PEI RP 100-90, "Installation of Underground Liquid Storage Systems."
- ag. STI, "External Corrosion Protection of Underground Steel Storage Tanks."
- ah. STI, "Installation Instructions for Factory-Fabricated Aboveground Tanks."
- ai. UL 58, "Steel Underground Tanks for Flammable and Combustible Liquids."
- aj. UL 80, "Steel Inside Tanks for Oil-Burner Fuel."
- ak. UL 142, "Steel Aboveground Tanks for Flammable and Combustible Liquids."
- al. UL 567, "Pipe Connections for Flammable and Combustible Liquids and LP-Gas."
- am. UL 971, "Nonmetallic Underground Piping for Flammable Liquids."
- an. UL 1316, "Glass-Reinforced Plastic Underground Storage Tanks for Petroleum Products."
- ao. UL 1746, "Corrosion Protection Systems for Steel Underground Storage Tanks."
- ap. UL 2085, "Insulated Aboveground Tanks for Flammable and Combustible Liquids."
- aq. UFC, "Uniform Fire Code Appendix Standard A-II-F-1."

## **6. User Involvement**

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- 6.0.1 The user(s) shall be consulted during the design/installation process because the user(s) is familiar with equipment operation and available space at the facility that would provide a suitable location or conversely render some locations unsuitable. As a minimum, the user shall be involved with the following:
  - a. Verify and approve calculated storage volume.
  - b. Review of plans and specifications (conceptual and final).

- c. Consultation, development and acknowledgment of Method of Procedure (MOP) and Service Method of Procedure (SMOP) needed for the project to come to completion.
  - d. Observation of the installer's work, including testing and acceptance of installed components.
- 6.0.2 Detailed involvement with the user(s) should translate into overall cost savings due to the anticipated reduction in engineering costs and delays that may occur during construction.

## **7. Record Keeping**

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- 7.0.1 Federal and State Regulations require that certain records be maintained by the tank owner. As a minimum, copies of all records shall be maintained at the facility where a tank is located or be available within 48 hours. Maintaining all records and permits is the responsibility of the user. Records which should be maintained include, but are not limited to the following:
- a. Approved state registration form with assigned tank or facility ID number.
  - b. Inventory/test records:
    - 1. Appropriate tank gauging records with date and signature, included with log of all engine runs.
    - 2. Tank tightness records giving date and leak rate results (or threshold).
    - 3. Hard copy printout from automatic inventory monitoring system and monthly report forms. Refer to Appendix B.
  - c. Cathodic protection test records, if applicable.
  - d. Operating permits:
    - 1. Underground storage tank permit (subject to state regulations).
    - 2. Aboveground storage tank permit (subject to state regulations).
    - 3. Air operating permits (subject to state regulations).
  - e. Certification of new installation.
  - f. Corrosion analysis report discussing corrosion potential at site if cathodic protection is not provided (not required for FRP and composite tanks).

- g. Documents verifying operation and maintenance of corrosion protection equipment.
- h. Records documenting tank system repairs or upgrades.
  - i. Release detection records and data.
  - j. Records relating to permanent closures of tanks.
- k. SPPC Plan if required by 40 CFR, Part 112.
  - l. Material Safety Data Sheets.
- m. Operation and Maintenance (O&M) manuals.

## **8. Right-To-Know**

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- 8.0.1 EPA requires non-manufacturing industries covered under the Occupational Safety and Health Administration's hazard communication standard to submit Material Safety Data Sheets (MSDS) to the state emergency response commission, local emergency planning committee and local fire department. These industries are ones that have hazardous chemicals at any one time in amounts greater than the threshold level. The threshold level for petroleum products is 10,000 pounds (about 1,400 gallons) of a typical distillate fuel, such as diesel fuel.
  - a. The MSDSs shall be readily available at the facility.
  - b. MSDSs for unmanned facilities should also be available at manned facilities responsible for the unmanned facilities.
- 8.0.2 Facilities required to submit MSDSs must submit inventory forms to the appropriate emergency response agencies. These forms will be prepared and submitted by the Environmental Health and Safety (EH&S) organization environmental coordinators. Specific contact information is available via the EH&S hotline at 1-800-KNOW EHS (1-800-566-9347).
  - a. The inventory form requires "Tier I" information for hazardous chemicals present at the facility and exceeding the threshold levels.
  - b. With respect to any specific hazardous chemical at the facility, a Tier II form may be submitted in lieu of the Tier I information. Tier I and Tier II reporting is established by Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986.
  - c. The facility shall allow on-site inspection by the fire department upon request and provide specific location information on hazardous chemicals at the facility.

- 8.0.3 The NFPA Hazardous Classifications (NFPA 704) system should be used to readily indicate the location of hazardous material storage areas for emergency responders.
- a. This system uses the diamond-shaped multi-colored warning symbol to classify the material. The top, left and right boxes refer to flammability, health and reactivity hazards respectively and contain a rating number from 0 to 4. The bottom box is used for special hazards.
    - 1. Refer to the standard classification system for proper identification of hazardous materials stored at the site.
    - 2. Typically, diesel fuel and kerosene require an "0-2-0" placard. The placard shall also reflect other hazardous materials that may be stored at the facility.
  - b. The symbol should be placed on the outside wall of the building in plain view.

## **9. Registration Requirements**

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- 9.0.1 Federal Regulations require owners of certain underground storage tanks to be registered with the designated state and/or local agency.
- 9.0.2 Individual states and/or local agencies require certain aboveground storage tanks to be registered with the respective agency.
- 9.0.3 Tank registration usually requires the payment of annual registration renewal fees, the display of the registration and renewal certification at the facility and a plot plan showing the location of the fuel system.
- 9.0.4 Tank registration and payment of renewal fees are the responsibility of the Environmental Health and Safety (EH&S) organization.
- 9.0.5 Refer to Appendix A for state agencies designated to receive notifications.

## **10. Day Tanks**

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- 10.0.1 When designing the fuel oil delivery system it may be necessary to utilize day tanks under the following circumstances:
  - a. Where excessively long pipe runs from the primary tank to the emergency generator create excessive pressure drops which can not be tolerated by the fuel pump on the engine.

- b. Where the hydrostatic head created by the primary tank or piping must be limited to reduce hydrostatic head on engine fuel injectors.
- c. Other engineering and maintenance considerations.

#### 10.0.2 Sizing Day Tank for Emergency Generators

- a. Day tanks should be sized to provide 2 1/2 hours of fuel to all connected generators, running at full load. This day tank "running" capacity shall be calculated from the normal pump shut off point to 4 inches above the bottom of the tank. Normally, total tank capacity should not exceed 660 gallons in accordance with NFPA 37.
- b. Maximum of two generators shall be connected to any single day tank.

10.0.3 Except as described in section 10.04 (c), day tanks shall be double wall with an interstitial space and fabricated from mild carbon steel. Tanks shall be fabricated to UL Standards and should bear the UL label. All openings should be located on the top of the tank.

#### 10.0.4 Selecting Day Tank

- a. Standard engineered double-wall tank with built up pumping system and controls shall be used when:
  - 1. The required fuel storage capacity is between 100 gallons and 660 gallons.
  - 2. The hydrostatic head created by a full overflow pipe is less than 5 PSI.
- b. Packaged double-wall day tank may be used when:
  - 1. The required fuel storage capacity is less than 100 gallons.
  - 2. The hydrostatic head created by a full overflow pipe is less than 5 PSI.
  - 3. Packaged components meet the standard of the built up system.
- c. Pneumatic tank (ASME rated at 100 PSI) installed inside a prefabricated secondary containment dike. The dike capacity shall be 110 percent of the tank capacity to comply with NFPA 30. The tank shall bear the UL label. This tank shall be used when:
  - 1. The required fuel storage capacity is less than 660 gallons, and
  - 2. The hydrostatic head created by a full overflow pipe is greater than 5 PSI.

10.0.5 Atmospheric venting of day tanks shall be designed in accordance with NFPA 30 for the aboveground storage of petroleum products. All vents, pri-

mary and emergency, shall terminate outside the building at an elevation of 12 ft. minimum above grade, at least 4 ft. above the highest point in the fuel system and at least 5 ft. away from any openings in building walls.

- 10.0.6 An overflow pipe (with no valves or obstructions), designed in accordance with NFPA 30 shall be provided to direct fuel oil back to the primary tank in the event of an overfill condition due to failure of the transfer pump(s) to shut off when the tank is full.
- 10.0.7 Tank gauging shall be accomplished through the use of an electronic gauging system. The gauge transmitter shall be capable of withstanding minimum 50 PSI hydrostatic pressure in the event of a tank overfill. An overfill condition will force oil into the overflow pipe above the tank top creating hydrostatic pressures above atmospheric. The gauge shall be capable of performing the following functions:
- a. Continuous tank gauging with local displays.
  - b. Non Discriminating interstitial monitoring.
  - c. Programmable relay outputs for remote alarming.
  - d. RS-232 port for interface with computers for programming the unit, remote interrogation and interface with building automation systems.
  - e. Water detection.
  - f. Local alarms.
  - g. The system shall be Pneumercator LDE-740P, or approved alternate.
- 10.0.8 Day tanks shall be filled by positive displacement fuel oil pumps with internal pressure relief by-pass. An automatic system shall be utilized to control the fuel oil pumps. All electric and electronic devices incorporated in the system shall be UL listed for the particular function that they serve. In case of power failure to the fuel oil pumps and control panel, a spare electrical feed should be provided with a transfer switch. If the existing switchgear has a split bus, then the spare feeder should come from a power panel which is fed from a different bus than the primary feeder.
- 10.0.9 Day tanks which provide fuel to more than one engine and day tanks at locations where there are not redundant engines installed, shall be fed by two dedicated fuel oil pumps which discharge into a common manifold. The pumps shall operate on a lead-lag circuit. If the lead pump fails, then the lag pump shall start automatically and an alarm shall be activated to indicate lead pump failure.
- 10.10 Day tanks which provide fuel to one engine only shall be fed by one dedicated fuel oil pump. Failure of this pump to operate shall cause an alarm to be activated to indicate pump failure. If this condition is not corrected, a low

level alarm shall be activated at the 50% day tank fuel level. Continued operation will cause the engine to fail due to fuel exhaustion. This failure will cause the redundant engine (if available) to be activated.

10.11 Piping shall conform to the following requirements:

- a. All piping materials and systems shall carry applicable UL or ASTM listings.
- b. Rigid primary piping should be composed of black steel with welded joints. Rigid copper may be used if it is protected or is needed for short runs in existing installations. Fittings shall be suitable for use with the piping used. Carrier pipe materials should conform to the provisions of NFPA 30.
- c. Steel secondary containment shall enclose carrier piping in all areas except tank room, pump room and engine room.

10.12 The following accessories shall be provided:

- a. Firesafe ball valves to isolate critical parts of the system.
- b. Manual pump to transfer fuel to the day tank in the event AC power is not available to operate fuel oil pump(s). Note: In multi story buildings with day tanks located on an upper floor, the hand pump may be replaced with a small (1-2 gpm) electric pump powered by the DC battery plant or inverter.
- c. Duplex strainer on fuel oil supply line between main storage tank(s) and fuel oil pump(s).
- d. Pressure gauges on each pump discharge line.
- e. Vacuum gauges on each pump suction line.
- f. Flow indicator on each pump suction line.
- g. External pressure bypass for positive displacement pumps.
- h. Stainless steel braided flexible connectors at all transition points, UL rated for interior use.
- i. Fusible link shutoff valves as required by:
  1. OSHA, 29 CFR, Chapter XVII, 1919.106.
  2. NFPA 30, paragraph 3-3.4.
  3. NFPA 37, paragraph 4-3.

10.13 The following day tank alarms shall be provided. Alarms shall be local at the day tank control panel with dry normally closed contacts for connection to remote alarms. All alarms shall be installed with normally open and normally closed positions.

- a. Lead pump failure, or pump failure as appropriate.

- b. Day tank high level.
- c. Day tank low level.
- d. Day tank annular space leak or containment dike leak.

## **11. Interior (small) Tanks Under 660 Gallons**

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- 11.0.1 Tanks shall carry a UL listing and conform to the provisions of UL and NFPA 30. Adherence to these standards/codes should provide the basis for meeting applicable regulations governing aboveground fuel storage systems. However, local codes or regulations may be more stringent and shall be reviewed during design.
- 11.0.2 The dimensions of interior tanks will depend on many factors. Whenever possible, standard manufacturer's fabrication dimensions shall be used. In sizing tanks, consideration shall be given to the following:
  - a. Shape: Rectangular, oval - horizontal, oval - vertical, or cylindrical - horizontal.
  - b. Secondary containment: Containment basin or prefabricated double - wall tank.
  - c. Clear dimensions of doorways to provide access for tank and other equipment.
  - d. Clear dimensions in room where tank is to be located. Consideration may be given to the construction of a small additional room to house fuel storage equipment.
  - e. Height of engine fuel injectors.
  - f. Required minimum capacity as outlined in Paragraph 4.02.
- 11.0.3 Fabrication of the tank and all openings should be conducted at the manufacturer's production facility (field fabrication of small tanks is not recommended). Size and number of openings will depend on the type of equipment (e.g., fill port, vent, supply, return, etc.) supplied for the tank. At least one additional (spare) plugged opening should be provided to allow for manual gauging, inspections, cleaning, or the addition of future equipment. All openings should be located on the top of the tank.
- 11.0.4 Tanks shall be pressure tested at the place of manufacture prior to delivery.
- 11.0.5 Tanks shall be shipped and handled with all openings plugged to prevent damage to the openings and to minimize the possibility of foreign materials being introduced into the tank.

- 11.0.6 Upon delivery, tanks shall be pneumatically tested within the allowable pressure ranges specified by the manufacturer. Soap test all accessible factory joints.
- 11.0.7 Secondary containment shall be provided for permanently installed interior tanks:
  - a. Double - walled rectangular tanks are preferred. These tanks provide maximum fuel capacity while requiring the least amount of floor space.
  - b. Single - walled tanks are acceptable if secondary containment is provided. Secondary containment shall consist of an oil - tight basin located directly under and around the tank and having the capacity to capture at least 110 percent of the nominal capacity of the tank.
  - c. Leak sensors shall be installed in secondary containment devices to detect tank leaks.
- 11.0.8 All installed tanks must be vented to conform to NFPA 30. Primary tank vents shall terminate outside of buildings at least 12 ft. above grade, at least 4 ft. above the highest point in the fuel system and at least 5 ft. away from any wall openings. Sizing of atmospheric (normal) vents must be in accordance with NFPA to insure operating pressures below 2.5 PSIG (UL 142 requirement). Vent size and location will be dependent on tank construction and characteristics of the material being stored. Emergency venting, in case of fire, must also be accounted for in the design and conform to NFPA 30 and to UL requirements. Emergency venting of the interstitial space on double - walled tanks must also be provided.
- 11.0.9 Tanks shall be constructed of carbon steel or other approved non - combustible material.
- 11.10 Engines with integrally mounted double - walled tanks are permitted. The installation of these types of tanks will in most cases be cost prohibitive unless the tank and engines are installed during new construction or major renovations.
- 11.11 All fuel storage systems shall be accompanied by adequate signage. The signage shall indicate the hazards associated with fuel storage, warn against open flames and smoking, describe the nature of the stored product, and show the tank fill location. Hazard warning signs shall be affixed to the exterior wall of the building in a readily visible location and in accordance with NFPA 704.
- 11.12 Available space will limit the location of interior tanks. If adequate space is available within existing buildings, the cost of replacing a fuel storage system can be lowered substantially. However, the use of existing building space may be limited due to fire partitioning required for fire - rated zones or because space is not available. The room storing fuel must be separated

from the rest of the facility and fully partitioned by walls and doors having a fire rating of at least 2 hours, or greater if required by local codes. Usually an interior tank of less than 660 gallons will be located in the Engine Room.

- 11.13 Building additions for fuel storage may be constructed where adequate existing building space is not available. Building additions shall allow enough space to perform routine maintenance and allow for retrofit of equipment. Heating equipment may be necessary to help prevent the fuel from reaching its cloud point in extreme cold environments. Lighting shall also be provided.
- 11.14 User input during tank location selection is critical due to their familiarity with day to day operations. The user shall be consulted to locate the tank in an area that will minimize potential impacts to existing and planned site use.
- 11.15 The fuel delivery system shall be designed to minimize interference with building equipment but allow for ease of access. New fuel systems shall not block or hinder traffic routes. Piping shall be kept low on floors or walls where practical and shall not run across doorways or areas where equipment or materials will be stored or used.
- 11.16 Piping shall be located and installed to afford maximum protection against damage from site activities. Protective devices such as shields or traffic plates may be installed to help guard against piping or tanks being struck or damaged by equipment or by personnel working in the immediate area.
- 11.17 Piping shall conform to the following requirements:
  - a. All piping materials and systems shall carry applicable UL or ASTM listings.
  - b. Rigid primary piping should be composed of black steel. Rigid copper may be used if its protected or is needed for short runs. Fittings shall be suitable for use with the piping used. Carrier pipe materials shall conform to the provisions of NFPA 30.
  - c. Flexible connectors shall be used to connect fuel piping at the engine frame and at other transition points. Braided stainless steel is acceptable material and shall serve as the minimum construction material. The connector shall have a metallic inner liner and be UL rated for interior use.
  - d. Secondary containment shall enclose carrier piping in all areas except tank, pump and engine rooms
  - e. As outlined in paragraph 10.12 (i) or where required by other codes, supply and return line connections to the tank shall be provided with a fire isolation valve (e.g., fusible link valve) when the tank is located outside of the engine room. These valves shall be located where the lines penetrate the engine room wall to isolate fuel from the

engine room and prevent contribution of combustion materials in the event of a fire. A fusible link valve shall be provided on the supply line at all furnaces.

- f. Supply connection to the engine shall be provided with fire rated isolation valves (e.g., ball valve). The supply line shall also be equipped with a foot valve near the tank bottom.
  - g. Anti-siphon or automatic flow shutoff devices shall be incorporated in the piping to provide proper operation of the fuel delivery system while protecting the building environment from fuel leaks. Appropriate flow prevention devices shall be used to ensure that no continuous flow of fuel occurs to the engine (or other connected devices) when not operating. Electrically activated solenoid valves may be required in certain instances. If used for this application, solenoid valves shall fail in a closed position.
  - h. Provide overflow prevention shutoff valve on fill pipe.
- 11.18 Fill ports shall normally be located outside of the building. Exterior fill ports require a containment box to catch spilled product during delivery. The containment box shall have a cover to protect against weather and traffic. For security, a lockable fill cap shall be provided, and the cover may be pad-locked.
- 11.19 The fuel delivery system shall be tested as part of the installation.
- a. Prior to acceptance of the tank installation, all piping and fittings shall be hydrostatically tested or pneumatically tested. The pressure shall not exceed the manufacturer's recommendations. *IN NO EVENT SHALL THE PIPING BE CONNECTED TO THE TANK DURING PIPE/FITTING TESTS.*
  - b. A properly designed installation shall allow for ease in testing and rapid tightening or replacement of fittings or equipment failing the test.
- 11.20 Cylinder fuel loading in the engine may present a problem in installations where the static level of fuel in the tank and piping system exceeds the height of the fuel injectors. As a result of this condition, fuel may flow into the cylinders during engine shut-down through defective fuel injectors and "flood" the engine. A possible remedy to this condition is the installation of a day tank with a self-contained pump, or incorporating solenoid valves into the design. However, the added cost of a day tank may be prohibitive. Solenoid valves are prone to failure, and if installed shall be redundant, in parallel, and inspected regularly. If used for this application, solenoid valves shall fail in a closed position.
- 11.21 The storage tank should be finish painted gray and touched up as needed in the field. Piping shall be color coded to distinguish the components of the

fuel supply system from other equipment. Piping shall be labeled to describe its function and direction of fuel flow.

- 11.22 A tank gauging and leak monitoring system with the following features shall be installed:
- a. A continuous electronic tank gauging system with local displays and RS-232 port interface with computers for programming the unit.
  - b. Low fuel level alarm:
    - 1. Connected to remote building alarm.
    - 2. Alarm shall be triggered when 24-hour fuel supply remains.
    - 3. At manned locations, an audible low level alarm may be added.
  - c. High fuel alarm set at 90 percent capacity of the tank.
  - d. Tank leak alarm in:
    - 1. Interstitial space of double -walled tank.
    - 2. Secondary containment basin.
  - e. Water detection alarm to detect water accumulations in the tank.
  - f. The system shall be Pneumercator LDE-740P, Veeder-Root TLS 350, or approved alternate.

## **12. Interior (large) Tanks Exceeding 660 Gallons**

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- 12.0.1 It may be desirable to locate large tanks inside of buildings. However it should be noted that the maximum size unenclosed tank permitted by NFPA is 660 gallons. Single tanks larger than 660 gallons, if used to store fuel oil for emergency power generation must be enclosed within a minimum three hour fire rated enclosure. Local codes shall be checked, as some codes may require a four hour enclosure.
- 12.0.2 Sizing Tanks:
- a. Provide required minimum capacity as outlined in Paragraph 4.02
  - b. User shall verify and approve calculated volumes.
  - c. Additional supplies shall be considered in accordance with Paragraph 4.03.
  - d. Additional amounts shall be considered for combination tanks supplying engines and heating equipment.

12.0.3 Location:

- a. Tanks requiring fire rated enclosures must be located on the lowest level of the building.
- b. It is desirable to place the tank as close as possible to an outside wall of the building. This will afford access to the outside of the building for termination of vents and fill pipe.
- c. Floor loading shall be checked and verified to be certain that the floor can safely withstand the load created by the tank filled with product and the fire rated structure that encloses it.
- d. Avoid placing the tanks adjacent to fire escape exits and fresh air intakes.
- e. Clearance around tanks and piping, as well as setbacks to property lines shall be maintained in accordance with NFPA 30, local codes, in addition to making certain that adequate clearance exists for servicing the fuel storage system.
- f. A path of entry into the building for the new tank shall be established and carefully verified. As a last resort, field fabricated tanks may be specified; however, local codes shall be checked for acceptance. Field fabricated tanks shall be UL inspected and labeled prior to being placed into service.

12.0.4 The aboveground tank should be single wall, fabricated from mild carbon steel in accordance with UL Standards. The tank should bear the UL label.

12.0.5 The following appurtenances shall be provided:

- a. The minimum size fitting opening shall be 4 in. diameter NPT.
- b. One, minimum 24 in. diameter manhole for entry into the tank. An internal ladder shall be provided for safe access into the tank.
- c. In addition to factory installed lift lugs for lifting the tank, additional factory installed lift lugs may be specified on the heads of the tank to provide a lifting point when moving the tank into place.
- d. A water pumpout tube terminating as close as possible to, but not more than one inch from the bottom of the tank.
- e. Factory supplied, U.L. listed saddles.

12.0.6 Atmospheric primary and emergency venting of aboveground tanks shall be designed in accordance with NFPA 30 for aboveground storage of petroleum products. All vents, primary and emergency, shall terminate outside the building at an elevation of at least 12 ft. above grade and 4 ft. above the highest point in the fuel system. Minimum distances from windows, doors and fresh air intakes shall be maintained in accordance with NFPA 30 and local codes that may apply.

12.0.7 Piping shall conform to the following requirements:

- a. All piping materials and systems shall carry applicable UL or ASTM listings.
- b. Rigid primary piping shall be composed of black steel. Rigid copper may be used if it is protected or is needed for short runs in upgrading existing systems. Fittings shall be suitable for use with the piping used. Carrier pipe materials shall conform to the provisions of NFPA 30.
- c. Flexible connectors shall be used to connect fuel piping at the engine frame and other transition points. Braided stainless steel is acceptable material and shall serve as the minimum construction material. The connector shall have a metallic inner liner and be UL rated for interior use.
- d. Secondary containment shall enclose carrier piping in all areas except engine tank and pump rooms.
- e. Where required by codes, supply and return line connections to the tank shall be provided with a fire isolation valve (e.g., fusible link valve) when the tank is located outside of the engine room. These valves shall be located where the lines penetrate the engine room wall to isolate fuel from the engine room and prevent contribution of combustion materials in the event of a fire. A fusible link valve shall be provided on the supply line at all furnaces.
- f. Supply connections to the engine should be supplied with fire rated isolation valves (e.g., ball valve). The supply line shall also be equipped with a foot valve near the tank bottom.
- g. Anti siphon or automatic flow shutoff devices shall be incorporated in the piping to provide proper operation of the fuel delivery system while protection the building environment from fuel leaks. Appropriate flow prevention devices shall be used to ensure that no continuous flow of fuel occurs to the engine (or other connected devices) when not operating. Electrically activated solenoid valves may be required in certain instances. If used for this application, solenoid valves shall fail in a closed position.
- h. Provide overflow prevention valve in fill line.

12.0.8 Fill ports shall normally be located outside of the building. Exterior fill ports require a containment box to catch spilled product during delivery. The containment box shall have a cover to protect against weather and traffic. For security, a lockable fill cap shall be provided, and the cover may be padlocked.

- 12.0.9 The fuel delivery system shall be tested as part of the installation.
- a. Prior to acceptance of the tank installation, all piping and fittings shall be hydrostatically or pneumatically tested. The pressure shall not exceed the manufacturer's recommendations. *IN NO EVENT SHALL THE PIPING BE CONNECTED TO THE TANK DURING PIPE/FITTING TESTS.*
  - b. A properly designed installation shall allow for ease in testing and rapid lightening or replacement of fittings or equipment failing the test.
- 12.10 Cylinder fuel loading in the engine may present a problem in installations where the static level of fuel in the tank and piping system exceeds the height of the fuel injectors. As a result of this condition, fuel may flow into the cylinders during engine shut - down through defective fuel injectors and "flood" the engine. A possible remedy to this condition may be the installation of a day tank with a self contained pump or incorporating solenoid valves into the design. However, the added cost of a day tank may be prohibitive. Solenoid valves are prone to failure, and if installed shall be redundant, in parallel and inspected regularly. If used for this application, solenoid valves shall fail in a closed position.
- 12.11 The storage tank shall be finish painted gray and touched up as needed in the field. Piping shall be color coded to distinguish the components of the fuel supply system from other equipment. Piping shall be labeled to describe its function and direction of fuel flow.
- 12.12 A system of secondary containment shall be designed to contain a spill from any tank within the tank enclosure. The system shall be capable of containing minimum 110 percent of the capacity of the largest tank within the containment area. Local codes shall be checked for compliance. The entire surface of the containment area shall be coated with an impervious coating compatible with the product stored in the tanks.
- 12.13 A fire rated enclosure with a minimum 3 hour rating consisting of floors, walls, ceiling and doors shall house the entire tank system. Local codes shall be checked for compliance. The following items shall be included as a minimum:
- a. Doors shall be keyed to match other doors in the building, and shall swing out.
  - b. Ventilation to comply with applicable codes.
  - c. Where space permits full steps with landings at the doorways rather than ladder rungs at the doorways to step over the containment wall.
  - d. Explosion proof lighting inside the enclosure.
  - e. Explosion proof emergency lighting inside the enclosure.

- f. A fire suppression system, if codes require, inside the enclosure (verify compatibility with existing systems).
- 12.14 A tank gauging and leak monitoring system with the following features shall be installed:
- a. A continuous electronic tank gauging system with local displays and RS-232 port interface with computers for programming the unit.
  - b. Low fuel level alarm:
    - 1. Connected to remote building alarm.
    - 2. Alarm shall be triggered when 24 - hour fuel supply remains.
    - 3. At manned locations, an audible low level alarm may be added.
  - c. High fuel alarm set at 90 percent capacity of the tank.
  - d. Tank leak alarm in:
    - 1. Interstitial space of double - walled tank.
    - 2. Secondary containment dike.
  - e. Water detection alarm to detect water accumulations in the tank.
  - f. The system shall be Pneumercator LDE-740P, Veeder-Root TLS 350 or approved alternate.
  - g. The system shall be installed outside of the fire rated enclosure.
- 12.15 The primary method of overfill prevention shall be through the use of an audible/visible overfill alarm.
- 12.16 Signs shall be placed at the entrance to the tank room warning of the storage of a combustible substance in the area. Signage on the storage tank shall also indicate the capacity of the tank and the product stored therein.

### **13. Exterior Aboveground Tanks**

- 13.0.1 Tanks shall carry a UL listing and conform to the provisions of UL 142, UL 2085, NFPA 30 and NFPA 37. Adherence to these standards/codes should provide the basis for meeting applicable regulations governing aboveground fuel storage systems. However, local codes or regulations may be more stringent and shall be reviewed during design.

- 13.0.2 The dimensions of exterior tanks will depend on many factors. Whenever possible, standard manufacturer's fabrication dimensions shall be used. In sizing tanks, consideration shall be given to the following:
- a. Shape: Rectangular, oval - horizontal, oval - vertical or cylindrical - horizontal.
  - b. Secondary containment: Prefabricated double - walled tank with interstitial space and concrete encasement. Due to increased maintenance considerations, aboveground tanks equipped with containment basins are to be avoided.
  - c. Clear dimensions of property lines, buildings, roadways, microwave towers and doorways to provide access for tank and other equipment.
  - d. Consideration may be given to the construction of a small additional room to house fuel storage equipment.
  - e. Height of engine fuel injectors.
  - f. Required minimum capacity as described in Paragraph 4.02
- 13.0.3 Fabrication of the tank and all openings shall be conducted at the manufacturer's production facility (no field fabrication). Size and number of openings will depend on the type of equipment (e.g., fill port, vent, supply, return, etc.) supplied for the tank. At least one additional (spare) plugged opening should be provided to allow for manual gauging, inspections, cleaning or the addition of future equipment. All openings shall be located on the top of the tank.
- 13.0.4 Tanks shall be pressure tested at the place of manufacture prior to delivery.
- 13.0.5 Tanks shall be shipped and handled with all openings plugged to prevent damage to the openings and to minimize the possibility of foreign materials being introduced into the tank.
- 13.0.6 Upon delivery, tanks shall be pneumatically tested within the allowable pressure ranges specified by the manufacturer. Soap test all factory joints.
- 13.0.7 Exterior aboveground storage tanks shall be provided with the following features:
- a. The tank shall be of double - walled construction including an interstitial space secondary containment as well as leak detection and monitoring.
  - b. The tank must be encased in a minimum of six inches of reinforced concrete or as required to provide a 2 hour fire enclosure and ballistic protection.

- c. Structural calculations must be provided by the manufacturer to indicate that the aboveground storage vessel meets all applicable code requirements and standards, including seismic requirements for the area of installation.
  - d. A minimum 30 year warranty against structural failure or external corrosion shall be provided by the tank manufacturer.
  - e. Built in spill protection shall be provided with minimum capacity of five gallons or as required by local or federal codes.
  - f. One spare fitting shall be provided.
  - g. A grounding lug must be welded to the tank in a location easily accessible. The building ground network shall be extended and connected to the tank grounding lug. All field connections shall be one shot exothermic with no clamps or compression fittings.
  - h. Fastening devices shall be installed by the tank manufacturer. Required field fastening devices shall be approved by the manufacturer.
  - i. The aboveground storage tank must meet with the approval of federal, state, and local municipality requirements prior to the final design phase.
  - j. Leak sensors shall be installed in secondary containment interstitial space.
  - k. Overfill prevention valve installed on fill pipe.
- 13.0.8 Aboveground storage tanks shall be supported on a concrete pad designed to support the storage tank and its contents. Design consideration shall be given to the type of tank, temperature variations and seismic activities.
- 13.0.9 All installed tanks must be vented to conform to NFPA 30. Atmospheric vents shall terminate outside of buildings at least 12 ft. above grade and 4 ft. above the highest point in the fuel system. Sizing of atmospheric (normal) vents must be in accordance with NFPA to insure operating pressures below 2.5 PSIG (UL 142 requirement). Vent size and location will be dependent on tank construction and characteristics of the material being stored. Emergency venting, in case of fire, must also be accounted for in the design and conform to NFPA 30 and UL. Venting of the interstitial space on double - walled tanks must also be provided.
- 13.10 Tanks shall be made of carbon steel or other approved non - combustible material.

- 13.11 All fuel storage systems shall be accompanied by appropriate signage as follows:
- a. The signage plan shall indicate the hazards associated with fuel storage, warn against open flames and smoking, describe the nature of the stored product and show the tank fill location.
  - b. Hazard warning signs shall be affixed to the exterior wall of the building in a readily visible location and in accordance with NFPA 704.
- 13.12 The user's input during tank location selection is critical due to their familiarity with day to day operations. The user shall be consulted to locate the tank in an area that will minimize potential impacts to existing and planned site use.
- 13.13 The fuel delivery system shall be designed to minimize interference with building equipment but allow for ease of access. New fuel systems shall not block or hinder traffic routes. Piping shall be kept low on floors or walls where practical and shall not run across doorways or areas where equipment or materials will be stored or used.
- 13.14 Piping shall be located and installed to afford maximum protection against damage from site activities. Protective devices such as shields or traffic plates may be installed to help guard against piping or tanks being punctured or otherwise damaged by equipment or by personnel working in the area.
- 13.15 Building Engineering will evaluate and determine the lowest expected temperature at the facility, then review the fuel characteristics to determine if heating of the piping and fuel storage tank is required. This evaluation will be reviewed and approved by the user prior to final system design.
- 13.16 Piping shall conform to the following requirements:
- a. All piping materials and systems shall carry applicable UL or ASTM listings.
  - b. Rigid primary piping should be composed of black steel. Rigid copper may be used if it is protected or is needed for short runs. Fittings shall be suitable for use with the piping used. Carrier pipe materials shall conform to the provisions of NFPA 30.
  - c. Flexible connectors shall be used to connect fuel piping at the engine frame and other transition points. Braided stainless steel is acceptable material and shall serve as the minimum acceptable material. The connector shall have a metallic inner liner, and be UL rated for interior or exterior use.

- d. Secondary containment shall enclose carrier piping from the tank to the building and in areas where telephone or electrical equipment is placed.
  - e. Supply connection to the engine shall be supplied with fire rated isolation valves (e.g., ball valve). The supply line shall also be equipped with a foot valve near the bottom of the tank.
  - f. Anti - siphon or automatic flow shutoff devices shall be incorporated in the piping to provide proper operation of the fuel delivery system while protecting the building environment from fuel leaks. Appropriate flow prevention devices shall be used to ensure that no continuous flow of fuel occurs to the engine (or other connected devices) when not operating. Electrically activated solenoid valves may be required in certain instance. If used, solenoid valves shall fail in a closed position.
- 13.17 Fill ports require a containment box to catch spilled product during delivery. The containment box shall have a cover to protect against weather. For security, a lockable fill cap shall be provided, and the cover may be pad-locked.
- 13.18 The fuel delivery system shall be tested as part of the installation.
- a. Prior to acceptance of the tank installation, all piping and fittings should be hydrostatically or pneumatically tested. The pressure shall not exceed the manufacturer's recommendations. *IN NO EVENT SHALL THE PIPING BE CONNECTED TO THE TANK DURING PIPE/FITTING TESTS.*
  - b. A properly designed installation shall allow for ease in testing and rapid tightening or replacement of fittings or equipment failing the test.
- 13.19 Cylinder fuel loading in the engine may present a problem in installations where the static level of fuel in the tank and piping system exceeds the height of the fuel injectors. As a result of this condition fuel may flow into the cylinders during periods of engine shut - down through defective fuel injectors and "flood" the engine. A possible remedy to this condition may be the installation of solenoid valves. Solenoid valves are prone to failure, and if installed shall be redundant, in parallel and inspected regularly. If used, solenoid valves shall fail in a closed position.
- 13.20 The storage tank shall be finish painted a neutral color and touched up as needed in the field. Piping shall be color coded to distinguish the components of the fuel supply system from other equipment. Piping shall be labeled to describe its function and direction of fuel flow.

- 13.21 A tank gauging and leak monitoring system with the following features shall be installed:
- a. A continuous electronic tank gauging system with local displays and RS-232 port for interface with computers for programming the unit.
  - b. Low fuel level alarm:
    - 1. Connected to remote building alarm.
    - 2. Alarm shall be triggered when a 24 - hour fuel supply remains.
    - 3. At manned locations, an audible low level alarm may be added.
  - c. High fuel alarm set at 90 percent of the capacity of the tank.
  - d. Tank/piping alarm in:
    - 1. Interstitial space of double - walled tank.
    - 2. Secondary containment piping.
  - e. Water detection alarm to detect water accumulations in the tank.
  - f. The system shall be Pneumercator LDE-740P, Veeder-Root TLS-350 or approved alternate.

## **14. Exterior Underground Tanks**

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- 14.0.1 Underground exterior tanks shall carry a UL listing and conform to the provisions of the UL label and NFPA
- 14.0.2 Steel tanks shall carry a UL 58 listing and meet the requirements of UL 58 and STI - P3.
- 14.0.3 Fiberglass tanks shall carry a UL 1316 listing and meet the requirements of UL 1316 and ASTM D4021.
- 14.0.4 These standards should provide the basis for meeting applicable regulations governing underground fuel storage systems. However, local codes or regulations may be more stringent and should be reviewed during design.
- 14.0.5 Underground fuel storage tanks shall be manufacturer's standard sizes whenever possible. The following shall be considered when sizing tanks:
  - a. Required minimum capacity as calculated in Paragraph 4.02.
  - b. Manufacturer's standard sizes.
  - c. Clear dimensions in areas where tanks can be located.

- 14.0.6 The tank and all openings shall be factory fabricated. Size, number and arrangement of openings will depend on the piping and equipment requirements of the installation. At least one additional (spare) plugged opening shall be provided to allow for the addition of future equipment. This opening shall be 4 in. diameter NPT.
- 14.0.7 Tanks shall be tested at the factory prior to delivery.
- 14.0.8 Tanks shall be shipped and handled with all openings plugged to prevent damage to the openings and to minimize the possibility of foreign materials being introduced into the tank.
- 14.0.9 Upon delivery, tanks shall be pneumatically tested within the allowable pressure ranges specified by the manufacturer. Soap test all factory joints.
- 14.10 Steel tanks shall be 360 degree (100% volume) double wall Type II with inner and outer tanks constructed of carbon steel, all welded construction. Minimum steel thickness shall be in accordance with UL 58. The exterior of the tank shall be clad with STI - P3 epoxy, FRP or urethane coating. The finish coating shall be site tested for defects. The tank shall be equipped with sacrificial anode cathodic protection as required by STI - P3 classification or as required by local codes. Dielectric unions shall be provided at all connections to isolate all piping from the tank and all piping inside the tank from outside piping. Tank shall carry a 30 - year warranty against structural failure or external corrosion.
- 14.11 Fiberglass tanks shall be 360 degree double - walled Glass Fiber Reinforced Polyester (FRP) underground diesel storage tanks. Fittings shall be threaded (NPT) 4 in. diameter fittings. Reducing couplings shall be provided as required by the line sizes. All metallic surfaces shall be FRP coated. Tank shall carry a 30 year warranty against structural failure or corrosion.
- 14.12 All underground fuel storage tanks shall be equipped as follows:
  - a. A fill pipe for placing product into the tank located directly over the tank whenever possible. The fill shall include an overfill protection system consisting of an automatic overfill valve, drop tube, minimum 15 - gallon capacity containment catch basin, separate surface man-hole and lockable fill cap and tight fill adapter. The assembly shall be installed to divert surface water from the catch basin.
  - b. An audible alarm shall sound when the tank is filled to 90 percent of its full capacity.
  - c. Automatic flow shut - off devices shall be used to prevent filling the tank beyond 95 percent of its full capacity.
  - d. A vent line shall be provided. Vent lines shall be in accordance with NFPA.

- e. A port to provide for manual gauging of the tank to measure actual product water levels. This port may also be used to remove accumulated water.

14.13 Piping shall conform to the following requirements:

- a. All piping materials and systems shall carry applicable UL or ASTM listings.
- b. A suction type fuel delivery line to supply fuel to the engine or heating plant. The size of the fuel delivery piping is determined by the type, viscosity and quantity of fuel to be delivered. The suction line shall be equipped with a foot valve near the tank bottom.
- c. The need for return and overflow fuel lines are site specific. Fuel shall return to the tank by gravity whenever possible.
- d. Underground fuel oil supply and return piping shall be double-walled pipe and fittings suitable for use as underground diesel oil piping. The outer secondary pipe shall be designed to permit flow of fluid down the pipe for leak containment and detection. The carrier pipe should be constructed of Schedule 40 carbon steel. Other approved materials such as Fiberglass or type "K" copper may be utilized on a site specific basis.
- e. Preferred material for aboveground interior fuel oil supply and return piping shall be Schedule 40 carbon steel. Type "K" copper or other approved material may be used on a site specific basis.
- f. Aboveground vent piping shall be galvanized Schedule 40 steel with forged steel, screwed fittings. Fittings for galvanized steel pipe shall be galvanized.
- g. Underground vent piping shall be fiberglass reinforced pipe with socket fittings.
- h. All ferrous piping and valves shall be finish painted and labeled. Shop or field painting is acceptable. Direction of fuel flow shall be shown on accessible piping.
- i. Provide UL rated (underground or interior use) flexible connectors at all transition points, engine, tank, pumps, etc.

14.14 Prior to acceptance of the tank installation, all piping and fittings should be hydrostatically or pneumatically tested. The pressure shall not exceed the manufacturer's recommendations. *IN NO EVENT SHALL THE PIPING BE CONNECTED TO THE TANK DURING PIPE/FITTING TESTS.*

14.15 A tank gauging and leak monitoring system shall be installed with local display and RS - 232 port for interface with computers for programming the unit. The system provided shall include the following items:

- a. Control unit.

- b. Printer with take - up reel.
  - c. 0.1 GPH probe with fuel level sensor, water sensor and temperature sensor.
  - d. Riser cap.
- 14.16 Modules and sensors shall be provided for the interstitial space, probe and sump sensor. For fiberglass tanks, provide an interface with the hydrostatic pressure switch in the reservoir. The normal mode for the system shall be "Leak Detect". The system shall automatically sense the emergency engine or transfer pump running and prevent a false leak alarm from being sent. The interstitial monitor and sump sensors shall remain active at all times. After the engine or pump has stopped, the system shall automatically provide an inventory printout and then revert to the normal leak detect mode. The system shall also be programmed to automatically provide an inventory printout every 30 days. The system shall provide the following alarms:
- a. Low fuel alarm:
    - 1. Connected to remote building alarm.
    - 2. Alarm shall be triggered when 24 - hour fuel supply remains.
    - 3. At manned locations, an audible low level alarm may be added.
  - b. High fuel alarm set at 90 percent capacity of the tank.
  - c. Tank/piping leak alarm in:
    - 1. Interstitial space of double - walled tank, or
    - 2. Secondary containment basin.
  - d. Water detection alarm to detect water accumulations in the tank.
  - e. The system shall be VEEDER - ROOT TLS - 350 or approved alternate.

## **15. Training/Testing/Inspections**

- 15.0.1 Fuel system and power tests shall be performed during installation of the fuel storage system.
- a. A preliminary engine test shall be performed prior to installation work to ensure the engine and other existing controls and equipment function properly. The test shall last for a sufficient length of time to verify engine reliability.

- b. A subsequent test shall be performed after installation of the new fuel system. The test must run for a sufficient length of time to verify new fuel system and engine reliability. This test shall consist of multiple engine starts and stops to properly determine complete system operation.
- 15.0.2 At the completion of installation activities, the Engineer and the user shall make a joint examination of the system. The system installer shall not deem the project complete until after the examination and proper operation of the fuel storage and standby power systems are verified. The installer shall correct, repair, or replace any items called out as incorrect during the examination in accordance with the contract documents.
- 15.0.3 At the time of project completion, certain documents shall be submitted to user by the system installer. Copies of these documents will be filed at the site, in the permanent user file and with the Engineer. The following documents, as a minimum, are required for all fuel system installations:
- a. All required permits for construction activities.
  - b. All test/operation reports.
  - c. Product warranties.
  - d. Record drawings.
  - e. Tank registration form (if required).
  - f. Operations and Maintenance (O&M) Manuals; including:
    - 1. System control schematics.
    - 2. Product data sheets.
    - 3. Maintenance schedule and requirements.
    - 4. Trouble - shooting guide.
    - 5. Written system operating procedure.
    - 6. Shop drawings.
    - 7. Valve/tagging schedule.
    - 8. System warranties.
  - g. Environmental compliance requirements.
  - h. Identification and addresses of:
    - 1. Contractors
    - 2. Architectural/Engineering firm.
    - 3. AT&T Building Engineer.
    - 4. Construction Inspectors.
    - 5. Environmental Health and Safety (EH&S) organization.

## **16. Ongoing Testing and Maintenance**

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16.0.1 Federal, state or local laws require that certain periodic tests be conducted to insure the fuel release prevention system is operating properly including:

- a. Inventory control system.
- b. Leak sensors:
  - 1. Interstitial space of double - walled tanks.
  - 2. Secondary containment basins.
  - 3. Piping sumps.
- c. Corrosion protection systems.
- d. Monitoring wells.
- e. Anti - siphon devices.
- f. Tank tightness.
- g. Piping tightness.
- h. Line leak detectors.

16.0.2 Periodic system maintenance tests of the engine and the new fuel supply system shall be scheduled and conducted by the user on a routine basis. These tests shall provide assurance that the system is in proper working order at all times. All piping, fittings, controls and accessories shall be checked during these system maintenance tests.

16.0.3 Components of the fuel system shall be maintained to prevent service interruptions. All components of the system shall be examined during the monthly engine test runs to ensure they are performing to specification. All deficiencies shall be noted in the Storage Tank Monthly Report (Appendix B).

16.0.4 All maintenance activities shall be conducted in accordance with the latest issue of AT&T Practice 770 - 210 - 310, Underground Storage Tanks, Maintenance.

## **17. Alarms**

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17.0.1 The fuel storage system monitoring control panel is capable of recognizing an array of fuel system alarms. Due to this array of fuel storage system alarms, only selected fuel storage system alarms, based on urgency will be dedicated to the Building Alarm Panel. The remainder of the non-urgent alarms will be connected to a common fuel system alarm in the building

alarm panel. The non-urgent common fuel alarms can be interrogated at the fuel storage system monitoring control panel. Building alarm contacts should normally be closed, failing in the open position. The fuel storage system monitoring control panel shall be provided with normally open and normally closed relay contacts.

17.0.2 Dedicated fuel alarms - unmanned or partially unmanned facility:

- a. Low fuel
- b. Tank rupture
- c. piping rupture
- d. engine failure
- e. Day tank pump failure
- f. Common fuel alarm:
  - 1. high fuel
  - 2. high water

17.0.3 Dedicated fuel alarms - fully attended facilities:

- a. Low fuel
- b. Engine failure
- c. Day tank pump failure
- d. Common fuel alarm
  - 1. tank rupture
  - 2. piping rupture
  - 3. high fuel
  - 4. high water.

## **18. Grounding**

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- 18.0.1 The primary objectives for installing a low impedance grounding systems are personnel safety by minimizing the possibility of electric shock, equipment protection from fire hazards, proper equipment operation, noise reduction in communications circuits and service reliability with low maintenance. In order to ensure these objectives are met, grounding systems shall be designed and installed to meet the minimum standards as set forth in the latest edition of the National Electric Code, Article 250, and according to AT&T Practices.
- 18.0.2 If the new fuel supply system is located within existing building confines, the existing ground ring shall be used for equipment grounding. All metallic objects above grade on the outside of the building shall be attached to the exterior ground ring.
- 18.0.3 Underground components of underground storage tank systems shall not be grounded, including but not limited to the following:
- a. Storage tank
  - b. Anchor straps
  - c. Concrete reinforcing steel
  - d. Risers, manholes and manhole covers.
- 18.0.4 At locations where building additions (fuel rooms) are constructed to permit aboveground storage of fuel, the existing facility ground ring shall be expanded to include the additional space. An interior ground bus shall be provided in the building addition or the existing interior ground shall be expanded into the addition.
- 18.0.5 Grounding devices shall be tested by an independent testing firm to verify operation. All connections to the exterior ground ring shall be made using non -mechanical, exothermic welds. All connections to the interior building ground ring shall match existing connectors. The locations of existing exterior ground rings encountered during construction and any newly installed ground rings or expansions shall be shown on installer prepared project record drawings.

## 19. Reference Documents

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19.0.1 The following documents are associated with this document:

Number	Title
AT&T 760 - 220 - 165	AT&T Underground Storage Tanks Combustible and Flammable Liquid Fuels Removal and Abandonment
AT&T 770 - 210 - 310	Underground Storage Tanks Maintenance
AT&T 154 - 103 - 101	Alarm Standards Manual
AT&T 010 - 160 - 020	Underground Storage Tanks Resource Conservation and Recovery Act (RCRA) Environmental

19.0.2 Paper copies of the 9 - digit numbered documents listed in Paragraph 19.01 are stocked at the Lucent Technologies Customer Information Center located in Indianapolis, Indiana. To order copies:

TOLL FREE:	<b>1-800-432-6600</b> (USA) <b>1-800-255-1242</b> (Canada)
Toll:	<b>1-317-352-8557</b> (Worldwide)
FAX:	<b>(317) 352-8484</b>
MAIL:	Lucent Technologies, Inc. Customer Information Center Attn.: Customer Service Representative P.O. Box 19901 Indianapolis, IN 46219



## **Appendix A — State Agencies Designated to Receive Notifications**

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This listing provides the State Agencies designated to receive notification for new tank installations or the removals of existing tanks. The listing was published by the EPA in December 1995.

Refer to local phone listings for 24-hour hot lines and for 800 numbers.

### **List of State Agencies**

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Alaska	UST/LUST CONTACT Dept. of Environmental Conservation UST Program 410 Willoughby Ave., Suite 105 Juneau, AK 99801-1795 907-465-5200
Alabama	UST CONTACT Dept. of Environmental Management P.O. Box 301463 1751 Congressman W.L. Dickerson Drive Montgomery, AL 36130-1463 205-271-7986
Arakansas	UST/LUST CONTACT Dept. of Pollution Control & Ecology Underground Storage Tank Division P.O. Box 8913 Little Rock, AR 72219-8913 501-682-0880
Arizona	UST/LUST CONTACT Dept. of Environmental Quality 3033 N. Central Ave.#4T Phoenix, AZ 85012 602-207-4242
California	UST/LUST CONTACT State Water Resources Control Board Underground Storage Tank Program P.O. Box 944212 Sacramento, CA 94244-2120 916-227-4320

Colorado	LUST CONTACT Dept. of Health Department of Labor and Employment Oil Inspection Section, Tower #3 1515 Arapahoe St., Room 600 Denver, CO 80202-2117 303-692-2000
Colorado	UST CONTACT State Inspector of Oils Department of Labor and Employment Oil Inspection Section, Tower #2 1515 Arapahoe St., Room 400 Denver, CO 80202-2117 303-620-4300
Conneticut	UST/LUST CONTACT Dept. of Environmental Protection Underground Storage Tank Program 79 Elm St. Hartford, CT 06106 203-424-3374
Washington, D.C.	UST/LUST CONTACT Environmental Regulatory Administration Underground Storage Tank (UST) Branch 2100 Martin Luther King Jr. Ave., S.E., Suite 203 Washington, D.C. 20020-5732 202-645-6080
Delaware	UST/LUST CONTACT Dept. of Natural Resources & Environmental Control Underground Storage Tank Branch 715 Grantham Lane New Castle, DE 19720 302-323-4588
Florida	UST CONTACT Dept. of Environmental Protection Storage Tank Regulation Section Twin Towers Office Building 2600 Blair Stone Road Tallahassee, FL 32399-240o 904-488-3935

Florida (continued)	LUST CONTACT Dept. of Environmental Protection Petroleum Reimbursement Section Twin Towers Office Building 2600 Blair Stone Road Tallahassee, FL 32399-2400 904-487-3299
Georgia	UST CONTACT Underground Storage Tank Management Program Environmental Protection Division Department of Natural Resources 4244 International Parkway, Suite 100 Atlanta, GA 30354 404-362-2687
	LUST CONTACT Assistant State Fire Marshall 2 MLK Dr. West Tower, Suite 620 Atlanta, Ga. 30334 404-656-9798
Hawaii	UST/LUST CONTACT Dept. of Health Solid and Hazardous Waste Branch 919 Ala Moana Blvd., Room 212 Honolulu, HI 96814 808-586-4226
Iowa	UST/LUST CONTACT Dept. of Natural Resources Henry A. Wallace Building 900 E. Grand Ave. Des Moines, IA 50319 515-281-8693
Idaho	UST/LUST CONTACT Dept. of Health & Welfare Division of Environmental Quality 1410 N. Hilton Boise, ID 83706 208-334-5860
Illinois	UST CONTACT Office of State Fire Marshall Division of Petroleum and Chemical Safety 1035 Stevenson Drive Springfield, IL 62703-4259 217-785-1020

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Illinois (continued)	LUST CONTACT Environmental Protection Agency Leaking UST Section P.O. Box 19276 Springfield, IL 62794-9276 217-782-6762
Indiana	UST CONTACT UST Division Office of the State Fire Marshal 402 W. Washington St., Room E241 Indianapolis, IN 46204 317-232-2222
	LUST CONTACT Dept. of Environmental Management Office of Environmental Response P.O. Box 7015 Indianapolis, IN 46206-7015 317-233-6418
Kansas	UST/LUST CONTACT Dept. of Health & Environment Bureau of Environmental Remediation Forbes Field, Building 740 Topeka, KS 66620 913-296-1678
Kentucky	UST/LUST CONTACT Division of Waste Management Underground Storage Tank Branch 14 Reilly Road Frankfort, KY 40601-1190 502-564-6716
Louisiana	UST/LUST CONTACT Dept. of Environmental Quality Underground Storage Tank Division P.O. Box 82178 Baton Rouge, LA 70884-2178 504-765-0243
Massachusetts	UST CONTACT Underground Storage Tank Manager State Fire Marshall's Office (FMO) 1010 Commonwealth Ave. Boston, MA 02215 617-351-6000

Massachusetts <i>(continued)</i>	LUST CONTACT Bureau of Waste Site Cleanup Dept. of Environmental Protection 1 Winter St. Boston, MA 02108 617-292-5887
Maryland	UST/LUST CONTACT Dept. of Environment Waste Management Admin. Oil Control Program 2500 Broening Highway Baltimore, MD 21224 410-631-3442
Maine	UST/LUST CONTACT Dept. of Environmental Protection State House - Station 17 Augusta, ME 04333 207-287-2651
Michigan	UST CONTACT Michigan Dept. of Natural Resources Underground Storage Tank Division Town Center 333 South Capitol Avenue 2nd Floor P.O. Box 30157 Lansing, MI 48909-7657 517-373-8168
Minnesota	UST/LUST CONTACT Pollution Control Agency Tank and Spill Section 520 Lafayette Road N. St. Paul, MN 55155-3898 612-297-8679
Missouri	UST/LUST CONTACT Dept. of Natural Resources Water Pollution Control Program P.O. Box 176 Jefferson City, MO 65102 314-751-3822

Mississippi	UST/LUST CONTACT Dept. of Environmental Quality Underground Storage Tank Section P.O. Box 10385 Jackson, MS 39289-0385 601-961-5171
Montana	UST/LUST CONTACT UST Program Dept. of Health & Environmental Quality Waste Management Division P.O. Box 200901 Helena, MT 59620-0901 406-444-5970
North Carolina	UST/LUST CONTACT Groundwater Section Division of Environmental Management P.O. Box 29535 Raleigh, NC 27626-0535 919-733-8486
North Dakota	UST CONTACT Dept. of Health Division of Waste Management Box 5520, 1200 Missouri Ave., Room 302 Bismark, ND 58502-5520 701-328-5166
Nebraska	UST CONTACT State Fire Marshal's Office Flammable Liquid Storage Tank Division 246 S. 14th St. Lincoln, NE 68508-1804 402-471-9465
	LUST CONTACT Dept. of Environmental Quality Emergency Response Section P.O. Box 98922 Lincoln, NE 68509-8922 402-471-4230
New Hampshire	UST/LUST CONTACT Dept. of Environmental Services Water Supply and Pollution Control Division 6 Hazen Drive, P.O. Box 95 Concord, NH 03301 603-271-3644

New Jersey	UST/LUST CONTACT Bureau of Underground Storage Tanks Department of Environmental Protection and Energy Trenton, NJ 08625 609-984-3156
New Mexico	UST/LUST CONTACT Environmental Department Underground Storage Tank Bureau P.O. Box 26110 1190 St. Francis Drive Harold Runnels Building Santa Fe, NM 87502505-827-0188
Nevada	UST/LUST CONTACT Bureau of Waste Management Division of Environmental Protection Capitol Complex 333 W. Nye Lane Carson City, NV 89710 702-687-5872 Ext. 3037
New York	UST/LUST CONTACT Dept. of Environmental Conservation Bulk Storage Section 50 Wolf Road, Room 340 Albany, NY 12233-3520 518-457-4351
Ohio	UST/LUST CONTACT Bureau of UST Regulations Division of State Fire Marshall Dept. of Commerce P.O. Box 687 Reynoldsburg, OH 43068-0687 614-752-7938
Oklahoma	UST/LUST CONTACT Corporate Commission Fuels Division - UST Jim Thorpe Building, Room 238 Oklahoma City, OK 73105 405-521-3107
Oregon	UST CONTACT Dept. of Environmental Quality Underground Storage Tank Compliance Section 811 SW Sixth Ave., 7th Floor Portland, OR 97204 503-229-5733

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Oregon	LUST CONTACT Dept. of Environmental Quality UST Cleanup Program 811 SW Sixth Ave., 9th Floor Portland, OR 97204 503-229-5733
Pennsylvania	UST/LUST CONTACT Dept. of Environmental Resources Storage Tank Program, BWQM 400 Market St. P.O. Box 8762 Harrisburg, PA 17105-8762 717-772-5599
Rhode Island	UST CONTACT Dept. of Environmental Management Division of Waste Management Underground Storage Tank Section 291 Promenade St. Providence, RI 02908 401-277-2797
	LUST CONTACT RIDEM Division of Site Remediation LUST Section 291 Promenade St. Providence, RI 02908 401-277-3872
South Carolina	UST/LUST CONTACT Dept. of Health and Environmental Control Groundwater Protection Division 2600 Bull St. Columbia, SC 29201 803-734-5335
South Dakota	UST/LUST CONTACT Dept. of Environment & Natural Resources Groundwater Quality Program 523 E. Capitol Joe Foss Building Pierre, SD 57501-3181 605-773-3296

Tennessee	UST/LUST CONTACT Dept. of Environment and Conservation 4th Floor, L&C Annex 401 Church St. Nashville, TN 37243-1541 615-532-0945
Texas	UST/LUST CONTACT Texas Natural Resource Conservation Petroleum Storage Tank Division P.O. Box 13087, Capitol Station Austin, TX 78711-3087 512-239-2000
Utah	UST/LUST CONTACT Dept. of Environmental Quality Bureau of Solid & Hazardous Waste Division of Environmental Response and Remediation 168 North, 1950 West 1st Floor P.O. Box 144840 Salt Lake City, UT 84114-4840 801-538-4100
Virginia	UST/LUST CONTACT UST Program Water Division Department of Environmental Quality 629 East Main St. Richmond, VA 23240-0009 804-762-4269
Vermont	UST/LUST CONTACT Dept. of Environmental Conservation Underground Storage Tank Program 103 S. Main St., West Building Waterbury, VT 05761-0404 802-241-3888
Washington	UST/LUST CONTACT Toxics Cleanup Program Department of Ecology P.O. Box 47655 Olympia, WA 98504-7655 206-407-7179

Wisconsin	UST CONTACT Dept. of Industry, Labor & Human Relations Bureau of Petroleum Insp. and Fire Protection P.O. Box 7969 Madison, WI 53707 608-266-7605
	LUST CONTACT Dept. of Natural Resources P.O. Box 7921 Madison, WI 53707-7921 608-267-7560
Wyoming	UST/LUST CONTACT Dept. of Environmental Quality Water Quality Division Herschler Building, 4th Floor W. 122 W. 25th St. Cheyenne, WY 82002 307-777-7781
West Virginia	UST/LUST CONTACT Office of Waste Management Department of Environmental Protection UST/LUST Section 1356 Hansford St. Charleston, WV 25302-1401 304-558-6371

## **Appendix B — Storage Tank Monthly Report Form**

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The storage tank monthly report form is to be used by the on\_site work force to record the storage tank status. This form is to be maintained at the facility for a minimum of three years.



## Storage Tank Monthly Report Form

Location: \_\_\_\_\_

Tank Size (gallons): \_\_\_\_\_

\_\_\_\_\_

Width: \_\_\_\_\_

\_\_\_\_\_

Height: \_\_\_\_\_

GEO. Location No. \_\_\_\_\_

Diameter: \_\_\_\_\_

State I.D. No. \_\_\_\_\_

Length: \_\_\_\_\_

Year: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Tank Manufacturer: \_\_\_\_\_

Tank Status: \_\_\_\_\_

Note: Monthly reports must be kept for three years.  
All alarms should be explained in remarks

Month	Gallons of Fuel	Inches of Fuel	Inches of Water	Temperature of Fuel (F)	Monthly Fuel Usage	Alarms This Month (Y/N)	Leak Test Pass/Fail	Remarks
JAN								
FEB								
MAR								
APRIL								
MAY								
JUNE								
JULY								
AUG								
SEPT								
OCT								
NOV								
DEC								



## **Appendix C — Engine Fuel Consumption Data**

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This Appendix provides fuel consumption data for various types of standby engine - generators. This data is provided for planning purposes only and should be utilized for sizing of fuel storage tanks.

**Table 1. Engine Fuel Consumption Data**

<b>Engine - Alternator (KW) Percent Load</b>	<b>Gal. Per Hour</b>
Detroit Diesel - 225 KW	
100%	19.5
75%	15.3
50%	11.7
25%	8.6
Detroit Diesel - 115 KW	
100%	10.8
75%	8.2
50%	6.12
25%	4.34
Detroit Diesel - 75 KW	
100%	7.2
75%	5.6
50%	4.18
25%	2.95
Detroit Diesel - 45 KW	
100%	4.58
75%	3.63
50%	2.79
25%	2.10
Detroit Diesel - 30 KW	
100%	3.25
75%	2.55
50%	2.02
25%	1.55

**Table 1. Engine Fuel Consumption Data (Continued)**

<b>Engine - Alternator (KW) Percent Load</b>	<b>Gal. Per Hour</b>
Allis Chalmers - 115 KW	
100%	10.0
75%	7.8
50%	5.5
25%	3.7
Caterpillar - 350 KW	
100%	28.8
75%	21.2
50%	14.6
25%	—
White Superior - 500 KW	
100%	38.0
75%	28.0
50%	20.0
25%	—
Electro - Motive Diesel - 2500 KW (non KS)	
100%	192.5
Solar 200 KW Turbine (Manufacturer Discontinued)	
100%	38.19
75%	32.22
50%	27.50
25%	22.22
No Load	19.44

**Table 1. Engine Fuel Consumption Data (Continued)**

<b>Engine - Alternator (KW) Percent Load</b>	<b>Gal. Per Hour</b>
Solar - 750 KW Turbine	
100%	93.05
80%	80.55
60%	68.75
40%	57.50
20%	47.22
No Load	36.11
Solar - 2500 KW Turbine (non KS)	
100%	281.00
Allison - 2100 KW & 2500 KW Turbines	
2500 KW	283.00
2100 KW	254.00
1250 KW	192.00
625 KW	147.00
No Load	100.00

## **Appendix D — AT&T Standard Criteria Drawings**

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The fuel storage tank drawings and design criteria were developed to aid the fuel storage tank system designer to design and prepare drawings and specifications for site specific fuel storage tanks systems. The fuel storage tanks drawings and design criteria are for design only and are not for construction. The “engineer of record” should review these drawings as a basis for their design.

### **List of Drawings**

---

- Day Tank and Day Tank Controls Design Criteria
- Interior Fuel Storage Tank - Less Than 660 Gallons - Design Criteria
- Aboveground Tanks Inside Buildings with Fire Rated Enclosure Design Criteria
- Aboveground Fuel Storage Tank - Outside of Buildings - Design Criteria
- Underground Fuel Storage Installation - Outside of Buildings - Design Criteria.





# FUEL STORAGE TANK DESIGN CRITERIA

## I N D E X

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COVER SHEET
DAY TANK AND DAY TANK CONTROLS DESIGN CRITERIA
INTERIOR FUEL STORAGE TANK – LESS THAN 660 GALLONS – DESIGN CRITERIA
ABOVEGROUND TANKS INSIDE BUILDINGS WITH FIRE RATED ENCLOSURE DESIGN CRITERIA
ABOVEGROUND FUEL STORAGE TANK OUTSIDE OF BUILDINGS DESIGN CRITERIA
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA

ISSUE

NOVEMBER 16, 1992 1

DECEMBER 1, 1995 2

FOR DESIGN ONLY  
NOT FOR  
CONSTRUCTION

AT&T PROPRIETARY  
USE PURSUANT TO COMPANY INSTRUCTIONS

FUEL STORAGE TANK  
DESIGN CRITERIA

COVER SHEET

AT&T

SCALE: AS NOTED  
SHEET OF





# DAY TANK AND DAY TANK CONTROLS DESIGN CRITERIA

## SHEET INDEX

SHEET NUMBER	SHEET TITLE
CS-1	COVER SHEET
C-1	DESIGN CRITERIA
C-2	DESIGN CRITERIA
T-1	DAY TANK PLAN AND ELEVATION
T-2	PIPING SCHEMATIC TWO ENGINES PER DAY TANK
T-2A	PIPING SCHEMATIC ONE ENGINE PER DAY TANK
T-3	CONTROL PANEL WIRING SCHEMATIC TWO ENGINES PER DAY TANK
T-3A	CONTROL PANEL WIRING SCHEMATIC ONE ENGINE PER DAY TANK

ISSUE	
NOVEMBER 16, 1992	1.
DECEMBER 1, 1995	2.

FOR DESIGN ONLY,  
NOT FOR CONSTRUCTION.

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: <b>CS-1</b>
JOB TITLE AND LOCATION: <b>DESIGN CRITERIA FOR DAY TANKS AND DAY TANK CONTROLS</b>	
DRAWING TITLE: <b>COVER SHEET</b>	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 1 OF 6

C:\DRAWINGS\TANKS\STD\DAY\_TANK\DCS-1.DWG 08/26/95 11:40 DAB



ISSUE	
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1.0 GENERAL  
1.01 SCOPE

- A. THIS DESIGN CRITERIA, TOGETHER WITH THE SUPPLEMENTARY INFORMATION LISTED HEREIN, COVERS THE EQUIPMENT AND DESIGN REQUIREMENTS TO BE USED IN THE ENGINEERING, MANUFACTURE, AND INSTALLATION OF INDOOR FUEL OIL TANKS AND THEIR CONNECTION TO EMERGENCY STANDBY POWER PLANTS AND HEATING SYSTEMS. THE MAIN OBJECTIVE IS TO PROVIDE AN AUTOMATIC UNATTENDED RELIABLE FUEL STORAGE SYSTEM.
- B. THE FUEL OIL STORAGE SYSTEM SHOULD BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS AND DIRECTIVES FROM AT&T PRACTICES AND WITH CONSIDERATIONS INDICATED IN PARAGRAPH 2.02. UNENCLOSED ABOVEGROUND FUEL OIL STORAGE TANKS SHOULD HAVE A MAXIMUM CAPACITY OF 660 GALLONS PER TANK AND NOT EXCEED 1,320 GALLONS AGGREGATE SUBJECT TO LOCAL AGENCY APPROVALS.
- C. THE RECOMMENDATIONS IN THIS SECTION ARE BASED, IN GENERAL, ON THE NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, NFPA SECTION 30, 31, 37, 110 AND 221. MANY DETAILS FEATURED IN THESE SOURCE DOCUMENTS HAVE NOT BEEN COVERED HEREIN. REVIEW THESE AND OTHER APPLICABLE DOCUMENTS FOR COMPLETE DETAILS.
- D. FEDERAL, STATE, LOCAL, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS SHOULD BE FULLY COMPLIED WITH AT ALL TIMES, INCLUDING INTERFACING WITH AND UPGRADING EXISTING FUEL SYSTEMS.
- E. THE USE OF TANKS MUST PROVIDE A SAFE AND ENVIRONMENTALLY SOUND STORAGE SYSTEM. IT IS ESSENTIAL THAT FEATURES FOR RELIABILITY, SAFETY, FIRE PROTECTION, ENVIRONMENTAL PROTECTION, STRUCTURAL INTEGRITY, SEISMIC PROTECTION, AND ISOLATION SHOULD BE INCORPORATED AND ADDRESSED.
- F. PLANS AND SPECIFICATIONS SHOULD BE SUBMITTED FOR PROPOSED INSTALLATIONS OF FUEL OIL TANK LOCATIONS ILLUSTRATING SUCH FEATURES AS TANK SIZE, UTILITIES, DISTANCES FROM THE FACILITIES, PROPERTY LINES, BUILDING PENETRATIONS, ROOM LAYOUTS, DOORS, WINDOWS AND WATER WAYS IF APPLICABLE. PRELIMINARY PLANS SHOULD BE SUBMITTED TO THE OWNER FOR THEIR APPROVAL AND THEN SUBMITTED TO LOCAL AUTHORITIES FOR REVIEW AND APPROVAL.
- G. TANK AREAS, ENCLOSURES, AND ADJACENT SPACES SHOULD BE KEPT FREE FROM DEBRIS AND OTHER MATERIALS WHICH MAY BE COMBUSTIBLE OR FLAMMABLE.
- H. PROPER SIGNS AND DECALS SHALL BE SPECIFIED. THE PURPOSE OF THE SIGNAGE IS TO ADVISE OCCUPANTS THAT OPEN FLAMES AND SMOKING ARE PROHIBITED WITHIN AND AROUND THE TANK AREA.
- I. SEISMIC BRACING AND NECESSARY FLEXIBLE CONNECTORS SHOULD BE SPECIFIED TO PREVENT DAMAGE TO TRANSFER PIPING OR TANKS, DURING PERIODS OF SEISMIC ACTIVITY.
- J. IF THE SPECIFIC PROJECT INVOLVES REMOVAL OR CLOSURE OF AN EXISTING TANK, REFER TO UST REMOVAL AND ABANDONMENT CRITERIA.
- K. SOIL SAMPLING SHOULD BE AT THE DISCRETION OF THE OWNER AND ENGINEER.
- L. WHERE REFERENCES TO SPECIFIC MANUFACTURERS ARE SHOWN, AN ALTERNATE MAY BE SUBSTITUTED FOR APPROVAL.

1.02 OWNER INVOLVEMENT

- A. DETAILED INVOLVEMENT WITH THE OWNER SHOULD TRANSLATE INTO OVERALL COST SAVINGS DUE TO THE ANTICIPATED REDUCTION IN ENGINEERING COSTS AND CONSTRUCTION DELAYS, DUE TO POTENTIAL DESIGN CHANGES REQUESTED BY THE OWNER.
- B. THE OWNER SHOULD BE CONSULTED DURING THE DESIGN/INSTALLATION PROCESS BECAUSE THEY ARE FAMILIAR WITH EQUIPMENT OPERATION AND AVAILABLE SPACE AT THE BUILDING TO PROVIDE FOR A SUITABLE FUEL OIL TANK LOCATION, OR CONVERSELY RENDER SOME LOCATIONS UNSUITABLE. AS A MINIMUM, THE OWNER SHOULD BE INVOLVED WITH THE FOLLOWING:
  1. FIELD VERIFY LOCATION OF FUEL OIL TANK.
  2. REVIEW OF PRELIMINARY AND FINAL DESIGN PLANS AND SPECIFICATIONS.
  3. CONSULTATION, DEVELOPMENT, AND ACKNOWLEDGEMENT OF A WORK METHOD OF PROCEDURES (MOP) NEEDED FOR THE PROJECT.
  4. PROJECT OVERSIGHT DURING CONSTRUCTION, INCLUDING SITE ACCESS.
  5. ACCEPTANCE OF THE COMPLETED WORK.
  6. MAINTAIN DOCUMENTATION IN ACCORDANCE WITH PART 12.

2.0 TANK REQUIREMENTS

2.01 TANK LOCATION

- A. TANKS SHOULD NOT BE LOCATED ADJACENT TO OUTDOOR AIR INLETS OR FIRE ESCAPE EXITS.
- B. TANK LOCATIONS SHALL BE IN ACCORDANCE WITH LOCAL CODES AND STANDARDS. SUFFICIENT CLEARANCES SHALL BE MAINTAINED AROUND THE TANKS AS REQUIRED FOR MAINTENANCE AND AS REQUIRED BY APPLICABLE CODES.
- C. CONSIDERATION SHOULD BE GIVEN TO TANK CLEARANCES AND ACCESS INTO THE BUILDING.

2.02 SIZING DAY TANKS

- A. OWNER SHALL VERIFY AND APPROVE CALCULATED VOLUMES.
- B. TANK SIZING CRITERIA SHALL BE AS FOLLOWS:
  1. DAY TANK CAPACITY SHALL NOT EXCEED 660 GALLONS.
  2. NORMAL DRAW OFF SHALL BE SIZED FOR 2-1/2 HOURS AT FULL LOAD RATED FUEL CONSUMPTION OF ALL GENERATORS CONNECTED TO THE DAY TANK. SEE GRAPHIC REPRESENTATION ON DRAWING T-1.

- 3. FUEL OIL PUMPS SHOULD CYCLE FROM TWO TO THREE TIMES PER HOUR.
- 4. THERE SHOULD BE NO MORE THAN TWO GENERATORS BEING FED FROM EACH DAY TANK.

3.0 STORAGE TANK

3.01 GENERAL

- A. VERIFY LOCAL CODE REQUIREMENTS
- B. VERIFY A PATH FOR NEW TANK INTO BUILDING.

3.02 TANK SELECTION

- A. SELECT EITHER A STANDARD DOUBLE WALL UL-142 TANK OR AN ASME TANK:
  1. ESTABLISH MAXIMUM HEIGHT OF OVERFLOW PIPE FROM BOTTOM OF DAY TANK TO HIGHEST ELEVATION OF OVERFLOW LINE. IF THE HYDROSTATIC PRESSURE CREATED BY THE OVERFLOW LINE IS 5 PSI OR GREATER, USE AN ASME TANK. IF PRESSURE IS LESS THAN 5 PSI, USE A STANDARD DOUBLE WALL UL 142 TANK.

3.03 VENTING

- A. PRIMARY AND EMERGENCY VENTING SHOULD COMPLY WITH NFPA 30 SIZING REQUIREMENTS. BOTH VENTS SHOULD TERMINATE OUTSIDE THE BUILDING. THE ELEVATION OF THE VENT CAP SHOULD BE HIGHER THAN THE FUEL OIL OVERFLOW LINE TO PREVENT FUEL FROM SPILLING OUT THE VENT, IF THE OVERFLOW LINE ACTIVATES.

3.04 CONTROLS

- A. SEE DRAWING NO. T-3 THROUGH T-5 FOR DESCRIPTION OF CONTROLS.

4.0 PIPING

4.01 PRODUCT PIPING

- A. FUEL OIL SUPPLY AND RETURN PIPING SHALL BE SUITABLE FOR USE AS ABOVEGROUND FUEL OIL PIPING.
  1. ACCEPTABLE CARRIER PIPE:
    - A. SCHEDULE 40 CARBON STEEL.
    - B. TYPE "K" HARD COPPER.
    - C. ACCEPTABLE ALTERNATE.
  2. ACCEPTABLE SECONDARY CONTAINMENT PIPE:
    - A. SCHEDULE 40 STEEL.
    - B. HOPE.
    - C. ACCEPTABLE ALTERNATE.

4.02 VENT PIPING

- A. TANK VENTING SYSTEMS SHALL BE DESIGNED ACCORDING TO NFPA 30 AND LOCAL CODES.
- B. VENT PIPING SHALL BE GALVANIZED SCHEDULE 40 STEEL.

4.03 PIPING MATERIALS:

- A. COPPER PIPING:
  1. COPPER PIPE SOLDER JOINTS SHALL BE OF TYPE CONFORMING TO ANSI B16.22. COPPER PIPE UNIONS SHALL BE WROUGHT COPPER, CAST BRONZE, OR BRASS.
  2. INSULATING UNIONS FOR COPPER PIPE SHALL BE PROVIDED AT ALL EQUIPMENT HAVING FERROUS CONNECTIONS.
  3. FLARE FITTINGS FOR COPPER PIPE ARE NOT ACCEPTABLE. SOLDER SHALL BE A SILVER ALLOY SOLDER WITH A MELTING POINT OF NOT LESS THAN 1100° F.
  4. SILVER BRAZING FLUX SHALL BE USED FOR SOLDER OF 1100° F. OR HIGHER MELTING POINT.
  5. DIELECTRIC COUPLINGS AND/OR FLANGED KITS SHALL BE PROVIDED AT ALL COPPER TO STEEL CONNECTIONS AND AS REQUIRED TO ISOLATE THE PIPING FROM THE TANK.
  6. ABOVEGROUND COPPER PIPING SHALL BE HARD DRAWN COPPER.
- B. STEEL PIPING:
  1. STEEL PIPE SHALL BE CARBON STEEL SEAMLESS ASTM A53 GRADE A OR GRADE B CARBON STEEL BUTT WELDED ASTM A120.
  2. PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40 OR EXTRA HEAVY WEIGHT SCHEDULE 80.
  3. PIPE FINISH SHALL BE GALVANIZED OR BLACK.
  4. FITTINGS FOR JOINTS 2-1/2 INCHES IN DIAMETER OR SMALLER SHALL BE THREADED OR WELDED.
  5. FITTINGS FOR JOINTS 3 INCHES IN DIAMETER OR LARGER SHALL BE FLANGED OR WELDED.
  6. THREADED JOINTS:
    - A. FITTINGS SHALL BE 300 LB. MALLEABLE IRON, SCREWED - ANSI B16.3.
    - B. PIPE THREADING SHALL BE IN ACCORDANCE WITH USAS B 2.1 - 196B. SCREWED JOINTS SHALL HAVE STANDARD THREADS, CLEAN CUT AND TAPERED WITH ALL BURRS REMOVED. JOINT COMPOUND SHALL BE APPLIED TO THE MALE THREADS.
    - C. JOINT COMPOUND FOR THREADED JOINTS SHALL BE "CASOLA SOFT-SET WITH TEFLON" OR AS APPROVED.

7. WELDED JOINTS:

- A. 2-1/2 INCHES AND SMALLER: SOCKET WELDED FITTINGS ANSI B16.11.
  - B. 3 INCHES AND LARGER: BUTT WELDED FITTINGS ANSI B16.9.
- B. FLANGED JOINTS:
- A. FITTINGS SHALL BE SLIP ON TYPE STEEL WELDED FLANGES. WELDED NECK FITTINGS MAY BE USED FOR WELDED FITTINGS WHERE REQUIRED. FITTINGS SHALL BE CLASS 1500 STEEL PIPE FLANGES AND FLANGED FITTINGS, ANSI B16.5.
  - B. STEEL BOLTS AND NUTS SHALL BE CADMIUM PLATED - ASTM A307 GRADE B.
  - C. GASKETS SHALL BE RING TYPE, 1/8 INCH THICK, GASOLINE RESISTANT.
- C. HOPE PIPING: TOTAL CONTAINMENT OR APPROVED EQUAL.

4.04 INSTALLATION:

A. ABOVEGROUND PIPING:

1. DESIGN EXPOSED PIPING TO RUN PARALLEL TO WALL OF STRUCTURES.
2. SUPPORTS AND ANCHORS SHALL BE ADEQUATE TO SUPPORT THE PIPE FILLED WITH WATER WITH A MINIMUM SAFETY FACTOR OF 12 AND FOR THE TEST PRESSURE SPECIFIED. SPECIFY FACTORY ENGINEERED SUPPORTS, BRACES AND ANCHORS, WHERE REQUIRED.
3. FUEL OIL TRANSFER PIPING SHOULD BE ARRANGED TO PREVENT GRAVITY FEED FROM THE FUEL OIL STORAGE TANK TO THE ENGINE.
4. ALL PIPING CONNECTIONS TO THE ABOVEGROUND STORAGE TANK SHOULD BE AT THE HIGHEST POINT. NO PIPING CONNECTIONS SHOULD BE MADE BELOW THE HIGHEST POSSIBLE FUEL STORAGE LEVEL.
5. ANTI-SYPHON VALVES SHOULD BE PROVIDED TO PREVENT LOSS OF FUEL OIL INTO UNDESIRABLE AREAS (THE ENVIRONMENT OR THE FACILITY).
6. SUPPLY PIPING SHALL BE INSTALLED FOR TOP-LOADING OF THE DAY TANKS. METALLIC FILL PIPES SHALL BE DESIGNED AND INSTALLED TO MINIMIZE THE GENERATION OF STATIC ELECTRICITY BY TERMINATING THE PIPE WITHIN 4 TO 6 INCHES FROM THE BOTTOM OF THE TANK.

4.05 TESTING

- A. PIPING SHALL BE LEAKAGE TESTED PRIOR TO BEING COVERED, ENCLOSED OR PLACED INTO SERVICE.
- B. FUEL OIL PIPING SHALL BE HYDROSTATICALLY TESTED TO THE GREATER OF: 100 PSIG OR 150% OF WORKING PRESSURE FOR 1 HOUR WITH NO READABLE PRESSURE DROP ON A 1/2 OF 1% ACCURACY GAUGE.
- C. TANK SHALL BE ISOLATED FROM PIPING DURING THIS TEST.
- D. SECONDARY CONTAINMENT PIPING SHALL BE PRESSURE TESTED TO FIVE POUNDS OF AIR FOR TWO HOURS.
- E. ALL JOINTS SHALL BE SOaped AND VISUALLY INSPECTED DURING TESTING. NO LOSS IN PRESSURE WILL BE ALLOWED.
- F. ALL TESTING SHALL BE WITNESSED BY THE OWNER.
- G. EACH PIPING SYSTEM SHALL, AFTER ALL TESTING IS SATISFACTORILY COMPLETED, BE FLUSHED, BLOWN OUT OR OTHERWISE CLEANED IN ACCORDANCE WITH THE REQUIREMENT OF THE PIPE FABRICATION STANDARD ES 5.
- H. ALL LOCAL CODES SHALL BE ADHERED TO.

5.00 ACCESSORIES / SPECIALTIES

- 5.01 ACCESSORIES AND SPECIALTIES SHALL BE PROVIDED AS REQUIRED FOR THE SPECIFIED SITE.

5.02 VALVES

- A. DOUBLE POPPET FOOT VALVE SHALL BE INSTALLED AT THE BASE OF THE SUCTION DROP PIPE TO PREVENT FUEL, IN THE SUCTION PIPING TO THE ENGINE, FROM DRAINING OR SIPHONING BACK TO THE STORAGE TANK.
- B. A PRESSURE BYPASS VALVE IS TO BE INSTALLED AT THE ENGINE IF AUTOMATIC SHUTOFF VALVES ARE INSTALLED IN THE RETURN PIPING BACK TO THE TANK.
- C. ALL CONTROL VALVES SHOULD BE PROVIDED WITH A MANUAL OVERRIDE DEVICE TO ENABLE THE SYSTEM OPERATOR TO OVERRIDE A MALFUNCTIONING VALVE DURING AN EMERGENCY OR CONTROL SYSTEM FAILURE.
- D. AN EMERGENCY SHUT-OFF VALVE WITH A FUSIBLE LINK MAY BE REQUIRED AT THE ENTRANCE OF THE FUEL OIL PIPING INTO THE FACILITY. THIS VALVE SHALL CLOSE IN THE EVENT OF A FIRE WITHIN THE ENGINE ROOM, THEREBY TERMINATING THE FUEL SUPPLY.

5.03 ABOVEGROUND TANKS ACCESSORIES

- A. FOR PIPING OR TANK INSTALLATIONS WHICH ARE LOCATED ABOVE THE ENGINE INJECTORS, ANTI-HEAD PRESSURE VALVES SHALL BE INSTALLED IN BOTH SUPPLY AND RETURN LINES.
- B. EMERGENCY VENT FOR INTERSTITIAL SPACE ON DOUBLE WALL TANKS. MORRISON BROS. NO. 244, 8 OZ./SQ.IN.
- C. FLEXIBLE CONNECTORS - TIEFLEX, UL LISTED FOR ABOVEGROUND PETROLEUM SERVICE.
- D. VENT CAPS SHALL BE OPW FUELING COMPONENTS MODEL 23 OR EMCO-WHEATON MODEL A634.

6.0 EXCAVATION AND BACKFILL - NOT USED

7.0 RIGGING AND HOISTING - NOT USED

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS		DRAWING No.: <b>C-1</b>
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DRAWING TITLE: <b>DESIGN CRITERIA</b>		
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**B.00 CONCRETE**  
**B.01 GENERAL**

THESE STANDARDS SHALL APPLY TO CONCRETE ANCHOR SLABS, TOP SLABS AND OTHER MISCELLANEOUS CAST-IN-PLACE CONCRETE.

**A. DESIGN REFERENCES SHALL INCLUDE:**

1. ACI 304.2R - PLACING CONCRETE BY PUMPING METHODS
2. ACI 305R - HOT WEATHER CONCRETING
3. ACI 308R - COLD WEATHER CONCRETING
4. ACI 315 - MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES
5. ACI 318 - SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
6. ASTM A 615 - SPECIFICATION FOR DEFORMED AND PLAIN BILLET STEEL BARS FOR CONCRETE REINFORCEMENT
7. ASTM C 31 - TEST METHODS FOR MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD
8. ASTM C 39 - TEST METHOD FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

**B. ENGINEER SHALL EVALUATE PROJECT LOCATION FOR SEISMIC RISK. REFERENCE SEISMIC RISK MAPS PRODUCED BY APPLIED TECHNOLOGY COUNCIL, 480 CALIFORNIA AVENUE, PALO ALTO, CALIFORNIA 94306 OR OTHER NATIONALLY ACCEPTED RISK MAPS.**

**C. MISCELLANEOUS DESIGN CRITERIA AS FOLLOWS:**

1. ALL CONCRETE SHOULD BE DESIGNED UTILIZING A MINIMUM OF 3500 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C-31 OR C-39.
2. REINFORCEMENT BARS SHALL BE ASTM A 615, GRADE 60.
3. EVALUATE NEED, IF ANY, FOR WATERPROOFING OR DAMPPROOFING SYSTEMS AS WELL AS WATERSTOPS.

**9.0 MONITORING SYSTEMS**

**9.1 GENERAL**

**A. PROVIDE AN ELECTRONIC TANK GAUGING SYSTEM THAT PERFORMS THE FOLLOWING FUNCTIONS:**

1. CONTINUOUS TANK GAUGING.
2. NON-DISCRIMINATING INTERSTITIAL MONITORING.
3. RELAY OUTPUTS FOR REMOTE ALARMING.
4. RS-232 PORT FOR INTERFACE WITH COMPUTERS FOR PROGRAMMING THE UNIT, REMOTE INTERROGATION AND INTERFACE WITH BUILDING AUTOMATION SYSTEMS.
5. WATER DETECTION
6. THE SYSTEM SHALL BE PNEUMATORIC LDE-740P, VEEDER-ROOT TLS 350 OR APPROVED ALTERNATIVE.

**10.0 ALARMS - LATER**

**11.0 GROUNDING**

**11.01 THE PRIMARY PURPOSES FOR INSTALLING A LOW IMPEDANCE GROUNDING SYSTEM ARE PERSONNEL SAFETY BY MINIMIZING THE POSSIBILITY OF ELECTRIC SHOCK, EQUIPMENT PROTECTION FROM FIRE HAZARDS, PROPER EQUIPMENT OPERATION, NOISE REDUCTION IN COMMUNICATION CIRCUITS AND RELIABILITY WITH LITTLE MAINTENANCE REQUIRED. IN ORDER TO INSURE ALL THE ABOVE, THE GROUNDING SYSTEMS SHALL BE DESIGNED AND INSTALLED TO MEET THE MINIMUM STANDARDS AS SET FORTH IN THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE, ARTICLE 250, AND ALSO ACCORDING TO AT&T PRACTICES.**

**11.02 ALL METALLIC OBJECTS ABOVE GRADE ON THE OUTSIDE OF THE BUILDING SHALL BE ATTACHED TO THE EXTERIOR GROUND RING.**

**11.03 ALL CONNECTIONS TO THE EXTERIOR GROUND RING SHALL BE MADE USING CADWELDS.**

**11.04 ALL CONNECTIONS TO THE INTERIOR BUILDING GROUND SHALL MATCH EXISTING CONNECTORS.**

**12.0 RECORD DOCUMENTS**

**12.01 INSTALLATION DOCUMENTATION (5 COPIES) FOR THE SITE SHALL BE REQUIRED AS FOLLOWS:**

- A. TABLE OF CONTENTS
- B. STATE AND LOCAL PERMITS
- C. DAILY WORK LOG
- D. CONTRACTOR'S GUARANTEE
- E. WAIVERS OF LIEN
- F. ORIGINAL COPIES OF INSTALLATION, OPERATING AND MAINTENANCE MANUALS
- G. CERTIFICATION AND COPIES OF TEST RESULTS
- H. PHOTOGRAPHS
- I. AS-BUILT DRAWINGS
- J. PROVIDE PIPING AND VALVE DIAGRAMS AND OPERATING PROCEDURE

**GENERAL CONSTRUCTION/SITE  
STANDARD SYMBOLS AND ABBREVIATIONS**

- EARTH / COMPACT FILL
- CONCRETE
- PEA GRAVEL
- TEST BORING
- MONITORING WELL
- SOIL SAMPLING LOCATION
- SANITARY SEWER
- FOUNDATION DRAIN
- CITY WATER
- BURIED ELECTRICAL
- ABOVEGROUND ELECTRIC
- STORM SEWER
- BURIED TELEPHONE
- EXISTING CHAIN LINK FENCE
- NEW OR TEMPORARY CHAIN LINK FENCE
- CATCH BASIN
- PROPERTY LINE
- CATTLE FENCE

**ELECTRICAL STANDARD  
SYMBOLS AND ABBREVIATION**

- STREET LIGHT
- UTILITY POLE
- MANHOLE
- LIGHTING PANEL
- POWER PANEL
- DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- JUNCTION BOX
- OVERFILL ALARM HORN/LIGHT

**MECHANICAL STANDARD SYMBOLS  
AND ABBREVIATION**

- UNION
- FLEX CONNECTION
- NEW PIPING
- EXISTING PIPING
- WORK BELOW GRADE
- REMOVE EXISTING
- GATE VALVE
- BALL VALVE
- MULTI-PORT BALL VALVE W/MANUAL OPERATOR
- SOLENOID VALVE WITH MANUAL OPERATOR
- SOLENOID VALVE WITHOUT MANUAL OPERATOR
- FUSE LINK VALVE
- PRESSURE RELIEF VALVE
- CHECK VALVE
- VACUUM GAUGE WITH COCK
- PRESSURE GAUGE WITH COCK
- DUPLEX STRAINER (PLAN)
- DUPLEX STRAINER (ELEVATION)
- HAND PUMP
- VENT CAP
- ON CENTER
- GAUGE
- GALVANIZED
- STEEL
- FUEL OIL
- FUEL OIL RETURN
- FUEL OIL SUPPLY
- FUEL OIL VENT
- FUEL OIL OVERFLOW
- GALLON
- ABOVEGROUND STORAGE TANK
- UNDERGROUND STORAGE TANK

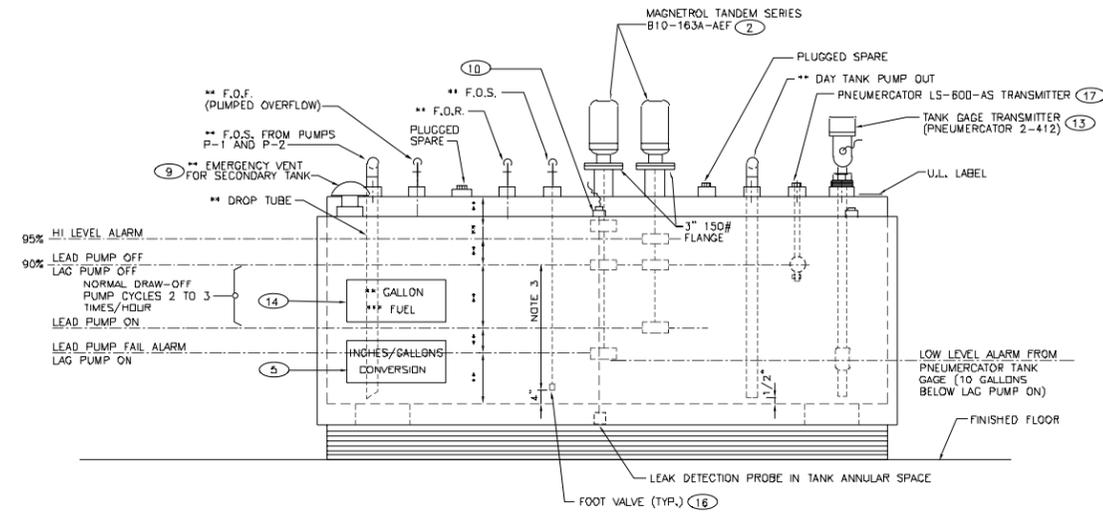
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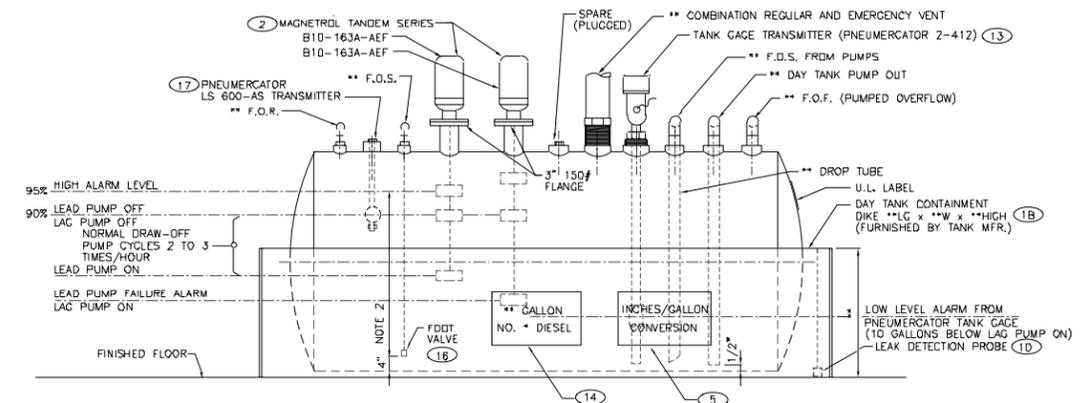
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DRAWING TITLE: <b>DESIGN CRITERIA</b>	
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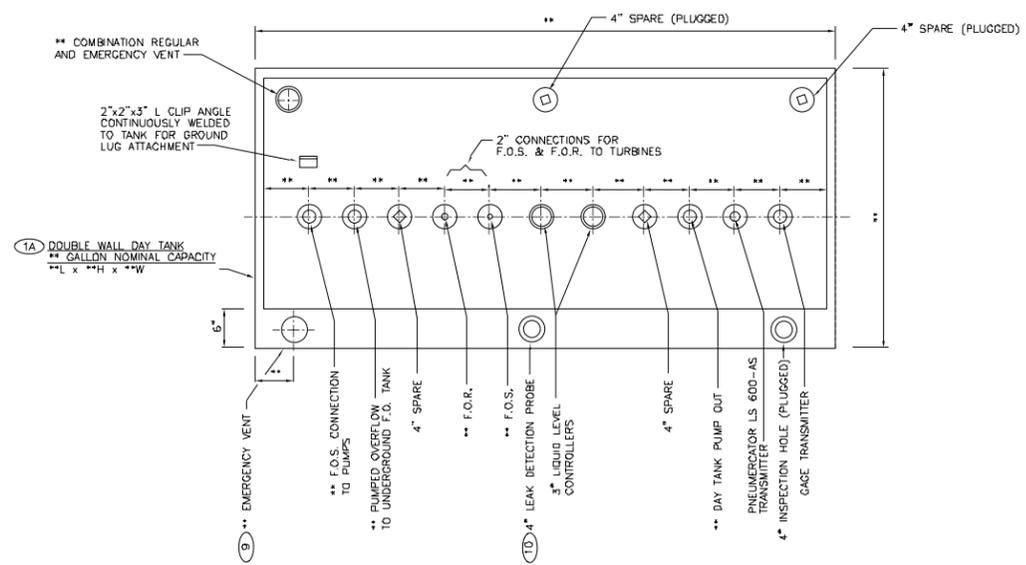
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**DOUBLE WALL DAY TANK ELEVATION**  
(FOR PRESSURES LESS THAN 5 PSIG)  
NOT TO SCALE

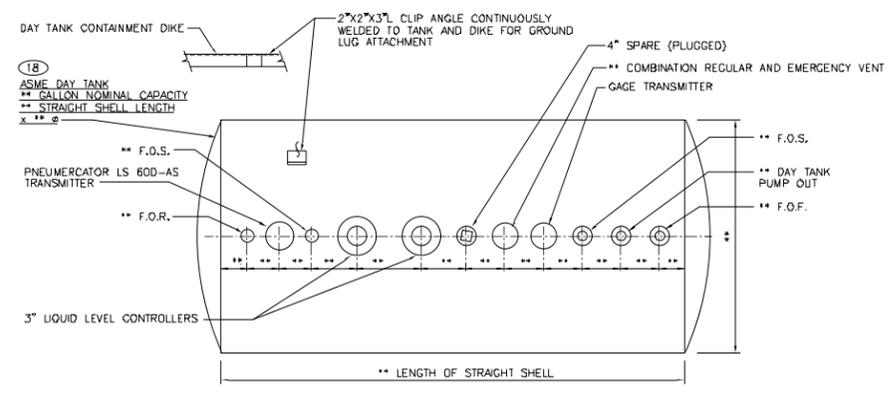


**ASME DAY TANK ELEVATION**  
(FOR PRESSURES GREATER THAN 5 PSIG)  
NOT TO SCALE



**DOUBLE WALL DAY TANK PLAN**  
NOT TO SCALE

- NOTE :
- INTERNAL TANK BRACING TO BE LOCATED TO CLEAR ALL TANK TAPPINGS IN TOP OF TANK.
  - WHERE POSSIBLE, OPENINGS SHOULD BE 4" COUPLINGS.
  - 2 1/2 HOURS RUNNING TIME FOR ALL CONNECTED GENERATORS AT FULL LOAD.
  - FOR MATERIAL AND EQUIPMENT MODEL NUMBERS SEE DWG. T-2.
- \*\* CRITICAL DIMENSION REQUIRED.



**ASME DAY TANK PLAN**  
NOT TO SCALE

- NOTE :
- WHERE POSSIBLE, OPENINGS SHOULD BE 4" HALF COUPLINGS.
  - 2 1/2 HOURS RUNNING TIME FOR ALL CONNECTED GENERATORS AT FULL LOAD.
  - FOR MATERIAL AND EQUIPMENT MODEL NUMBERS SEE DWG. T-2.

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DRAWING TITLE: <b>DAY TANK PLAN AND ELEVATION</b>	
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**VALVE CHART**

VALVE No.	ACTION	DESCRIPTION
V-1, V-9	N.O.	PRIMARY STORAGE TANK SUCTION ISOLATION VALVE (7)
V-2, V-10	N.O.	PRIMARY STORAGE TANK SUCTION ISOLATION BYPASS VALVE (7)
V-3, V-11	N.C.	SPARE STORAGE TANK SUCTION ISOLATION VALVE (7)
V-4, V-12	N.C.	SPARE STORAGE TANK SUCTION BYPASS ISOLATION VALVE (7)
V-5	N.C.	SOLENOID VALVE / ANTI-SYPHON VALVE (11)
V-6	N.C.	SOLENOID VALVE / ANTI-SYPHON BYPASS VALVE (11)
V-7	N.C.	SOLENOID VALVE / ANTI-SYPHON VALVE (12)
V-8	N.C.	SOLENOID VALVE / ANTI-SYPHON BYPASS VALVE (12)
V-13	N.O.	F.O. PUMP SUCTION MANIFOLD TO STORAGE TANK SHUT-OFF VALVE (7)
V-14	N.C.	DAY TANK PUMP OUT SHUT OFF VALVE (7)
V-15	N.O.	F.O. PUMP P-2 SUCTION ISOLATION VALVE (7)
V-16	N.O.	F.O. PUMP P-1 SUCTION ISOLATION VALVE (7)
V-17	N.O.	F.O. PUMP P-1 DISCHARGE ISOLATION VALVE (7)
V-18	N.O.	F.O. PUMP P-2 DISCHARGE ISOLATION VALVE (7)
V-19	N.O.	F.O. PUMP DISCHARGE MANIFOLD SHUT-OFF (7)
V-20	N.C.	F.O.R. ISOLATION VALVE (7)
V-21	N.C.	HAND PUMP DISCHARGE ISOLATION VALVE (7)
V-22	N.C.	HAND PUMP SUCTION ISOLATION VALVE (7)
V-23	N.O.	FUSE LINK VALVE (25)
V-24	N.O.	FUSE LINK VALVE (25)
V-25	N.O.	FUSE LINK VALVE (25)
V-26	N.O.	FUSE LINK VALVE (25)
V-27	N.O.	FUSE LINK VALVE (25)
V-28	N.O.	FUSE LINK VALVE (25)
V-29	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE (26)
V-30	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE (26)
V-31	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE (26)
V-32	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE (26)
V-33	N.O.	ANTI-SYPHON VALVE (27)
V-34	N.O.	ANTI-SYPHON VALVE (27)
V-35	N.O.	ANTI-SYPHON VALVE (27)
V-36	N.O.	ANTI-SYPHON VALVE (27)

NOTE: VALVE CHART AND DESCRIPTION OF OPERATION PROCEDURE TO BE FRAMED AND MOUNTED.

FUEL OIL PUMP SCHEDULE										
PUMP No.	GPM	DISCHARGE PRESSURE	RPM	MOTOR				TYPE	CONFIGURATION	MANUFACTURER & MODEL No.
				VOLTS	PHASE	HERTZ	H.P.			
P-1	17	100 PSI	1150	480	3	60	3	GEAR	SIDE SUCTION TOP DISCHARGE	(8) VIKING HL 4125D
P-2	17	100 PSI	1150	480	3	60	3	GEAR	SIDE SUCTION SIDE DISCHARGE	(8) VIKING HL 4125D
HP	HAND PUMP 25 GALLONS PER 100 STROKES									(3) CASBOY MODEL 377

**FUEL OIL SYSTEM DESCRIPTION OF OPERATION**

**NORMAL OPERATION** - ALL VALVE ACTIONS SHOULD CORRESPOND TO THE VALVE CHART. FUEL OIL PUMPS P-1 OR P-2 WILL CYCLE IN RESPONSE TO THE DAY TANK CONTROLS TO MAINTAIN A NORMAL LEVEL OF FUEL OIL IN THE DAY TANK.

**FAILURE OF PRIMARY STORAGE TANK SUCTION LINE** - CLOSE VALVES V-1, V-2, V-9, & V-10 OPEN VALVES V-3, V-4, V-11 & V-12

**TO PUMP OUT DAY TANK** - CLOSE VALVE V-13  
- OPEN VALVE V-14  
- CLOSE VALVE V-19  
- OPEN VALVE V-20  
- START F.O. PUMP P-1 OR P-2 MANUALLY TO EMPTY DAY TANK INTO PRIMARY STORAGE TANK.

**OPERATING HAND PUMP TO FILL DAY TANK** - CLOSE VALVE V-13  
- OPEN VALVE V-22  
- OPEN VALVE V-21  
- MANUALLY OPEN SOLENOID VALVES V-5 AND V-6

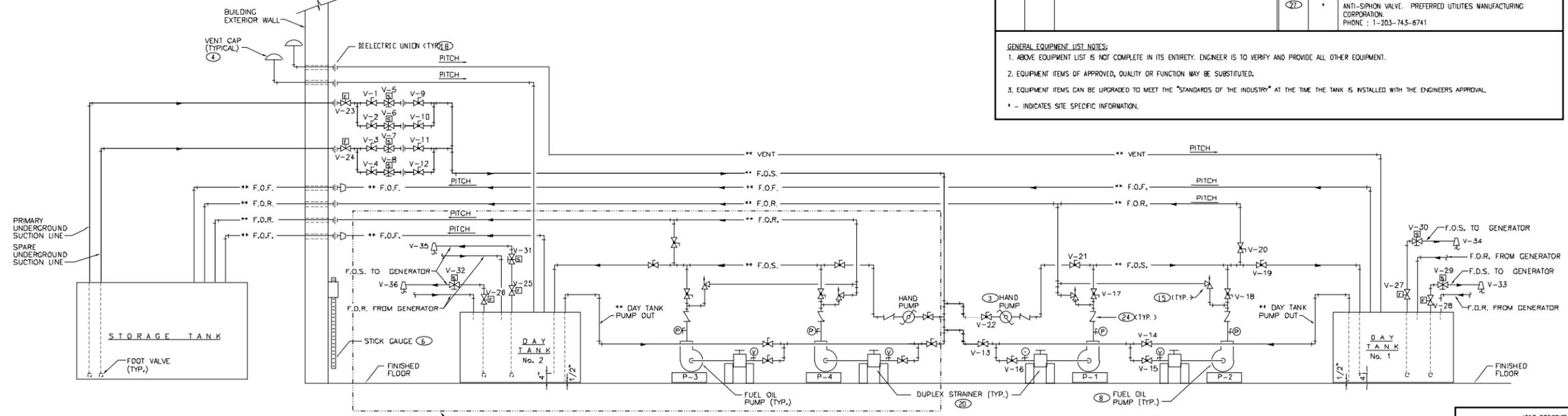
**EQUIPMENT LIST**

MARK	QUANTITY	DESCRIPTION	MARK	QUANTITY	DESCRIPTION
(1A)	1-***	U/L 142 CONSTRUCTED DOUBLE WALL OIL STORAGE TANK AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON STANDARD OPENINGS.) LUBE CUBE INC. SEE DWG. T-1 PH: 1-800-777-2823	(12)	1	SOLENOID VALVE WITHOUT MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2
(1B)	1	U/L 142 AND ASME PRESSURE VESSEL CODE CONSTRUCTED FOR A MAXIMUM ALLOWABLE WORKING PRESSURE OF 125 PSI SINGLE WALL FUEL STORAGE TANK WITH STEEL DYKE AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON STANDARD OPENINGS.) HIGHLAND TANK AND MANUFACTURING CO. PH: 1-516-473-0826 SEE DWG. T-1	(13)	1	TANK LEVEL SENSOR-PNEUMATOR. MODEL 2-412 WITH WATER SWITCH. PH: 1-516-293-8450 SEE DWG. T-1
(2)	2	PUMP CONTROLS. MACNETROL TANDEM SERIES B10-163A-AEF. SEE DWG. T-1	(14)	2	TANK SIGNAGE. SEE DWG. T-1
(3)	1	HAND PUMP. CASBOY MODEL 377, 25 GALLONS PER 100 STROKES. SEE DWG. T-2	(15)	2	PRESSURE RELIEF VALVE. KUNKLE FIG. 20-1, ASME CERTIFIED. SEE DWG. T-2
(4)	2	3" DIAMETER UPFLOW VENT. OPW FUELING COMPONENTS MODEL 23, ALUMINUM CAP WITH BRASS SCREEN. SEE DWG. T-2	(16)	1	FOOT VALVE. EBW MODEL 76 *** DOUBLE POPPET VALVE WITH METAL TO METAL SEAT, AND 24 MESH SCREEN, BRASS BODY. BRONZE POPPETS AND SEATS. VALVE SHALL PASS THROUGH A 2" PIPE. SEE DWG. T-1 PH: 1-800-422-2525
(5)	1	TANK SIGNAGE. VOLUME CONVERSION CHART, PROVIDE TANK VOLUME, INCHES TO GALLONS CONVERSION TABLES UNDER HEAVY PLASTIC LAMINATE, MOUNT TO TANK WITH DOUBLE SIDED PRESSURE SENSITIVE FOAM TAPE. TURN OVER OTHER COPY TO OWNER. SEE DWG. T-1	(17)	1	PNEUMATOR LS-600-AS TRANSMITTER. SEE DWG. T-1
(6)	1	TANK LEVEL GAUGE STICK. MOUNT ON WALL WITH CLIP. BABBY GAGE STICK, INC. MODEL 25-B TWO SECTION GAUGE STICK CALIBRATED IN INCHES. 8'-0" EXTENDED LENGTH, 4'-4" FOLDED LENGTH. PH: 1-800-445-0774 SEE DWG. T-2	(18)	1	DIELECTRIC PIPE UNIONS. WATTS REGULATOR COMPANY. PH: 1-508-688-1811 FOR SIZE AND QUANTITY SEE DWG. T-2
(7)	1	ISOLATION VALVE. * TWO PIECE BRONZE BODY, THREADED, BRONZE BALL FIRE SAFE SEATS, H-TEMP BODY GASKETS, H-TEMP STEM PACKING, LOCKABLE HANDLE, PBM INC. MODEL SS-B-5-54. FOR SIZE AND QUANTITY SEE DWG. T-2	(19)	1	TANK MONITORING PANEL-PNEUMATOR. E-700-1 WITH INTEGRAL PRINTER, RS-232 INTERFACE, AND AUTOMATIC ALARM SILENCE. PH: 1-516-293-8450 SEE DWG. T-3
(8)	2	FUEL OIL PUMPS. VIKING HL 4125D 17GPM @ 100PSI DISCHARGE PRESSURE, 1150RPM, 480V/3PH/60HZ, 3HP, DIRECT DRIVE. SEE DWG. T-2	(20)	2	DUPLEX STRAINER. HAYWARD MODEL 50 W/3/84 WITH PERFORATED BRASS BASKETS. SEE DWG. T-2
(9)	1	3" DIAMETER EMERGENCY VENT. (SECONDARY TANK) N.C. OPEN ON 8 OZ. PRESSURE. MORRISON MODEL NO. 244 PH: 1-319-583-5701 SEE DWG. T-2	(21)	1	DAY TANK TANK CONTROL PANEL. KNICKERBOCKER ELECTRIC. CUSTOM PANEL UL-LABELED. PHONE: 1-516-567-5411
(10)	1	LEAK DETECTOR PROBE. PNEUMATOR MODEL NO. LS-600D BN. ALARM AT BOTTOM OF PROBE NORMALLY OPEN THEN CLOSE ON RISE. SEE DWG. T-1 PH: 1-516-293-8450	(22)	1	NEW MANUAL TRANSFER SWITCH. SQUARE "D" CLASS 3140 SIZE AS REQUIRED FOR 600V 3Ø AC -OPERATION IN NEMA-1 ENCLOSURE. SEE DWG. T-3
(11)	1	SOLENOID VALVE WITH MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2	(23)	1	SAFETY SWITCH. SQUARE "D" CLASS 3110, 600V, 3Ø SINGLE THROW FUSIBLE IN NEMA-1 ENCLOSURE. SEE DWG. T-3
			(24)	1	CHECK VALVE. JENKINS MODEL 119. LIFT CHECK. RATED 300 PSI W.D.G. FOR SIZE AND QUANTITY SEE DWG. T-2 PHONE: 1-212-286-2908
			(25)	1	FUSE LINK VALVE. PREFERRED FUSIMATIC VALVE FOR 3/4" AND 1" FOR LARGER THAN 1" USE PREFERRED LEVER GATE VALVE, TYPE 110. VALVES SHALL INCLUDE A REPLACEMENT FUSIBLE ELEMENT WHICH MELTS AT 165°F. PHONE: 1-203-743-6741
			(26)	1	SOLENOID VALVE WITH MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2
			(27)	1	ANTI-SYPHON VALVE. PREFERRED UTILITES MANUFACTURING CORPORATION. PHONE: 1-203-743-6741

**GENERAL EQUIPMENT LIST NOTES:**

- ABOVE EQUIPMENT LIST IS NOT COMPLETE IN ITS ENTIRETY. ENGINEER IS TO VERIFY AND PROVIDE ALL OTHER EQUIPMENT.
- EQUIPMENT ITEMS OF APPROVED QUALITY OR FUNCTION MAY BE SUBSTITUTED.
- EQUIPMENT ITEMS CAN BE UPGRADED TO MEET THE STANDARDS OF THE INDUSTRY\* AT THE TIME THE TANK IS INSTALLED WITH THE ENGINEERS APPROVAL.

\* - INDICATES SITE SPECIFIC INFORMATION.



**TYPICAL DAY TANK PIPING SCHEMATIC**

NOT TO SCALE

4-DRAWINGS/TANK-STD/DAY-TANK/DIT-2/DWG. 08/26/96 11:50 DAB

ISSUE	
NOVEMBER 16, 1992	1.
DECEMBER 1, 1995	2.

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: T-2
JOB TITLE AND LOCATION: <b>DESIGN CRITERIA FOR DAY TANKS AND DAY TANK CONTROLS</b>	
DRAWING TITLE: <b>PIPING SCHEMATIC TWO ENGINES PER DAY TANK</b>	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 5 OF 8

FOR DESIGN ONLY, NOT FOR CONSTRUCTION.



FUEL OIL PUMP SCHEDULE										
PUMP No.	GPM	DISCHARGE PRESSURE	RPM	M O T O R				TYPE	CONFIGURATION	MANUFACTURER & MODEL No.
				VOLTS	PHASE	HERTZ	H.P.			
P-1	17	100 PSI	1150	480	3	60	3	GEAR	SIDE SUCTION TOP DISCHARGE	⑧ VIKING HL 4125D
P-2	17	100 PSI	1150	480	3	60	3	GEAR	SIDE SUCTION SIDE DISCHARGE	⑧ VIKING HL 4125D
HP	HAND PUMP 25 GALLONS PER 100 STROKES									③ CASBOY MODEL 377

**VALVE CHART**

VALVE No.	ACTION	DESCRIPTION
V-1, V-9	N.O.	PRIMARY STORAGE TANK SUCTION ISOLATION VALVE ⑦
V-2, V-10	N.O.	PRIMARY STORAGE TANK SUCTION ISOLATION BYPASS VALVE ⑦
V-3, V-11	N.C.	SPARE STORAGE TANK SUCTION ISOLATION VALVE ⑦
V-4, V-12	N.C.	SPARE STORAGE TANK SUCTION BYPASS ISOLATION VALVE ⑦
V-5	N.C.	SOLENOID VALVE / ANTI-SYPHON VALVE ⑪
V-6	N.C.	SOLENOID VALVE / ANTI-SYPHON BYPASS VALVE ⑪
V-7	N.C.	SOLENOID VALVE / ANTI-SYPHON VALVE ⑫
V-8	N.C.	SOLENOID VALVE / ANTI-SYPHON BYPASS VALVE ⑫
V-13	N.O.	F.O. PUMP SUCTION MANIFOLD TO STORAGE TANK SHUT-OFF VALVE ⑦
V-14	N.C.	DAY TANK PUMP OUT SHUT OFF VALVE ⑦
V-15	N.O.	F.O. PUMP P-2 SUCTION ISOLATION VALVE ⑦
V-16	N.O.	F.O. PUMP P-1 SUCTION ISOLATION VALVE ⑦
V-17	N.O.	F.O. PUMP P-1 DISCHARGE ISOLATION VALVE ⑦
V-18	N.O.	F.O. PUMP P-2 DISCHARGE ISOLATION VALVE ⑦
V-19	N.O.	F.O. PUMP DISCHARGE MANIFOLD SHUT-OFF ⑦
V-20	N.C.	F.O.R. ISOLATION VALVE ⑦
V-21	N.C.	HAND PUMP DISCHARGE ISOLATION VALVE ⑦
V-22	N.C.	HAND PUMP SUCTION ISOLATION VALVE ⑦
V-23	N.O.	FUSE LINK VALVE ⑫
V-24	N.O.	FUSE LINK VALVE ⑫
V-25	N.O.	FUSE LINK VALVE ⑫
V-26	N.O.	FUSE LINK VALVE ⑫
V-27	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE ⑫
V-28	N.O.	SOLENOID VALVE / FUEL SHUTOFF VALVE ⑫
V-29	N.C.	ANTI-SYPHON VALVE ⑫
V-30	N.C.	ANTI-SYPHON VALVE ⑫

NOTE: VALVE CHART AND DESCRIPTION OF OPERATION PROCEDURE TO BE FRAMED AND MOUNTED.

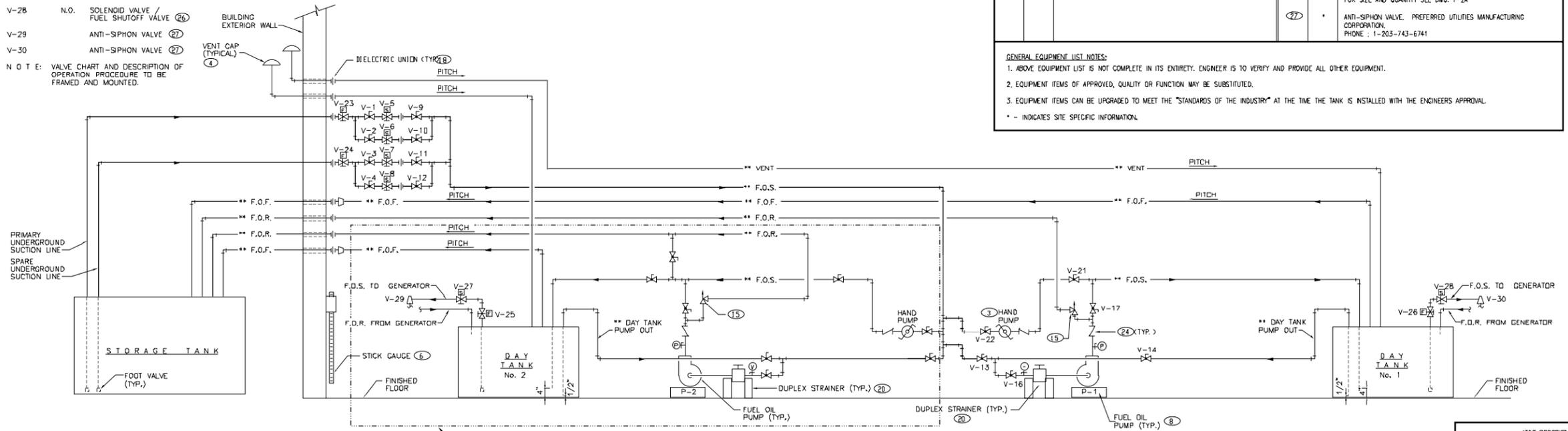
**FUEL OIL SYSTEM DESCRIPTION OF OPERATION**

**NORMAL OPERATION**  
- ALL VALVE ACTIONS SHOULD CORRESPOND TO THE VALVE CHART. FUEL OIL PUMPS P-1 OR P-2 WILL CYCLE IN RESPONSE TO THE DAY TANK CONTROLS TO MAINTAIN A NORMAL LEVEL OF FUEL OIL IN THE DAY TANK.

**FAILURE OF PRIMARY STORAGE TANK SUCTION LINE**  
- CLOSE VALVES V-1, V-2, V-9, & V-10 OPEN VALVES V-3, V-4, V-11 & V-12

**TO PUMP OUT DAY TANK**  
- CLOSE VALVE V-13  
- OPEN VALVE V-14  
- CLOSE VALVE V-19  
- OPEN VALVE V-20  
- START F.O. PUMP P-1 OR P-2 MANUALLY TO EMPTY DAY TANK INTO PRIMARY STORAGE TANK.

**OPERATING HAND PUMP TO FILL DAY TANK**  
- CLOSE VALVE V-13  
- OPEN VALVE V-22  
- OPEN VALVE V-21  
- MANUALLY OPEN SOLENOID VALVES V-5 AND V-6



**TYPICAL DAY TANK PIPING SCHEMATIC**

NOT TO SCALE

**EQUIPMENT LIST**

MARK	QUANTITY	DESCRIPTION	MARK	QUANTITY	DESCRIPTION
①A	1-***	U/L 142 CONSTRUCTED DOUBLE WALL OIL STORAGE TANK AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON STANDARD OPENINGS.) LUBE CUBE INC. SEE DWG. T-1 PH: 1-800-777-2823	⑫	1	SOLENOID VALVE WITHOUT MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2A
①B	1	U/L 142 AND ASME PRESSURE VESSEL CODE CONSTRUCTED FOR A MAXIMUM ALLOWABLE WORKING PRESSURE OF 125 PSI SINGLE WALL FUEL STORAGE TANK WITH STEEL DYKE AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON STANDARD OPENINGS.) HIGHLAND TANK AND MANUFACTURING CO. PH: 1-516-473-0826 SEE DWG. T-1	⑬	1	TANK LEVEL SENSOR-PNEUMATOR. MODEL 2-412 WITH WATER SWITCH. PH: 1-516-293-8450 SEE DWG. T-1
②	2	PUMP CONTROLS, MACNETROL TANDEN SERIES B10-163A-AEF. SEE DWG. T-1	⑭	2	TANK SIGNAGE. SEE DWG. T-1
③	1	HAND PUMP, CASBOY MODEL 377, 25 GALLONS PER 100 STROKES. SEE DWG. T-2A	⑮	2	PRESSURE RELIEF VALVE, KUNKLE FIG. 20-1, ASME CERTIFIED. SEE DWG. T-1
④	2	3" DIAMETER UPFLOW VENT, OPW FUELING COMPONENTS MODEL 23, ALUMINUM CAP WITH BRASS SCREEN. SEE DWG. T-2A	⑯	1	FOOT VALVE, EBW MODEL 76 ** DOUBLE POPPET VALVE WITH METAL TO METAL SEAT, AND 24 MESH SCREEN, BRASS BODY, BRONZE POPPETS AND SEATS. VALVE SHALL PASS THROUGH A 2" PIPE. SEE DWG. T-1 PH: 1-800-422-2525
⑤	1	TANK SIGNAGE, VOLUME CONVERSION CHART, PROVIDE TANK VOLUME, INCHES TO GALLONS CONVERSION TABLES UNDER HEAVY PLASTIC LAMINATE, MOUNT TO TANK WITH DOUBLE SIDED PRESSURE SENSITIVE FOAM TAPE. TURN OVER OTHER COPY TO OWNER. SEE DWG. T-1	⑰	1	PNEUMATOR LS-600-AS TRANSMITTER. SEE DWG. T-1
⑥	1	TANK LEVEL GAUGE STICK, MOUNT ON WALL WITH CLIP, BABY GAGE STICK, INC. MODEL 25-B TWO SECTION GAUGE STICK CALIBRATED IN INCHES, 8'-0" EXTENDED LENGTH, 4'-4" FOLDED LENGTH. PH: 1-800-445-0734 SEE DWG. T-2A	⑱	1	DIELECTRIC PIPE UNIONS, WATTS REGULATOR COMPANY. PH: 1-508-688-1811 FOR SIZE AND QUANTITY SEE DWG. T-2A
⑦	1	ISOLATION VALVE, ** TWO PIECE BRONZE BODY, THREADED, BRONZE BALL FIRE SAFE SEATS, H-TEMP BODY GASKETS, H-TEMP STEM PACKING, LOCKABLE HANDLE, PBM INC. MODEL SS-B-5-54, FOR SIZE AND QUANTITY SEE DWG. T-2A	⑲	1	TANK MONITORING PANEL-PNEUMATOR, E-700-1 WITH INTEGRAL PRINTER, RS-232 INTERFACE, AND AUTOMATIC ALARM SILENCE. PH: 1-516-293-8450 SEE DWG. T-3
⑧	2	FUEL OIL PUMPS, VIKING HL 4125D 17GPM @ 100PSI DISCHARGE PRESSURE, 1150RPM, 480V/3PH/60HZ, 3HP, DIRECT DRIVE. SEE DWG. T-2A	⑳	2	DUPLEX STRAINER, HAYWARD MODEL 50 W/3/84 WITH PERFORATED BRASS BASKETS. SEE DWG. T-2A
⑨	1	** DIAMETER EMERGENCY VENT, (SECONDARY TANK) N.C. OPEN ON 8 OZ. PRESSURE. MORRISON MODEL NO. 244 PH: 1-319-583-5701 SEE DWG. T-2A	㉑	1	DAY TANK TANK CONTROL PANEL KNICKERBOCKER ELECTRIC. CUSTOM PANEL UL-LABELED. PHONE: 1-516-567-5411
⑩	1	LEAK DETECTOR PROBE, PNEUMATOR MODEL NO. LS-600LD BN ALARM AT BOTTOM OF PROBE NORMALLY OPEN THEN CLOSE ON RISE. SEE DWG. T-1 PH: 1-516-293-8450	㉒	1	NEW MANUAL TRANSFER SWITCH SQUARE ** D' CLASS 3140 SIZE AS REQUIRED FOR 600V 3ØC -OPERATION IN NEMA-1 ENCLOSURE. SEE DWG. T-3
⑪	1	SOLENOID VALVE WITH MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2A	㉓	1	SAFETY SWITCH, SQUARE ** D' CLASS 3110, 600V, 3Ø SINGLE THROW FUSIBLE IN NEMA-1 ENCLOSURE. SEE DWG. T-3
			㉔	1	CHECK VALVE, JENKINS MODEL 119, LIFT CHECK, RATED 300 PSI W.D.G. FOR SIZE AND QUANTITY SEE DWG. T-2A. PHONE: 1-212-286-2908
			㉕	1	FUSE LINK VALVE, PREFERRED FUSIONATIC VALVE FOR 3/4" AND 1" FOR LARGER THAN 1" USE PREFERRED LEVER GATE VALVE, TYPE 110. VALVES SHALL INCLUDE A REPLACEABLE FUSIBLE ELEMENT WHICH MELTS AT 165°F. PHONE: 1-203-743-6741
			㉖	1	SOLENOID VALVE WITH MANUAL OPERATOR, ASCO MODEL 8210 WATER TIGHT AND EXPLOSION PROOF. FOR SIZE AND QUANTITY SEE DWG. T-2A
			㉗	1	ANTI-SYPHON VALVE, PREFERRED UTILITIES MANUFACTURING CORPORATION. PHONE: 1-203-743-6741

**GENERAL EQUIPMENT LIST NOTES:**  
 1. ABOVE EQUIPMENT LIST IS NOT COMPLETE IN ITS ENTIRETY. ENGINEER IS TO VERIFY AND PROVIDE ALL OTHER EQUIPMENT.  
 2. EQUIPMENT ITEMS OF APPROVED, QUALITY OR FUNCTION MAY BE SUBSTITUTED.  
 3. EQUIPMENT ITEMS CAN BE UPGRADED TO MEET THE "STANDARDS OF THE INDUSTRY" AT THE TIME THE TANK IS INSTALLED WITH THE ENGINEERS APPROVAL.  
 \* - INDICATES SITE SPECIFIC INFORMATION.

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NOVEMBER 16, 1992	1.
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4. DRAWINGS TANK-STD/DAY-TANK/DIT-2/DWG 08/26/94 11:35 DAB

AT&T PROPRIETARY  
 USE PURSUANT TO COMPANY INSTRUCTIONS  
 DRAWING No.: T-2A

JOB TITLE AND LOCATION:  
**DESIGN CRITERIA FOR DAY TANKS AND DAY TANK CONTROLS**

DRAWING TITLE:  
**PIPING SCHEMATIC ONE ENGINE PER DAY TANK**

SCALE: AS NOTED  
 SHEET 6 OF 8

FOR DESIGN ONLY, NOT FOR CONSTRUCTION.











ISSUE	
NOVEMBER 16, 1992	1
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AT&T

# INTERIOR FUEL STORAGE TANK LESS THAN 660 GALLONS DESIGN CRITERIA

## SHEET INDEX

SHEET NUMBER	SHEET TITLE
CS-1	COVER SHEET
C-1	DESIGN CRITERIA
C-2	SYMBOLS & LEGEND
T-1	TYPICAL SITE PLAN
T-2	MECHANICAL PLAN
T-3	ELECTRICAL PLAN
T-4	MECHANICAL DETAILS
T-5	ELECTRICAL DETAILS
T-6	MONITOR/ALARM WIRING DIAGRAM
T-7	ALTERNATIVE INTERIOR FUEL STORAGE TANK

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CONSTRUCTION

<small>AT&amp;T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS</small>	CS-1
Interior Fuel Storage Tank Less Than 660 Gallons Design Criteria	
COVER SHEET	
AT&T	SCALE: AS NOTED SHEET 1 OF 10

\*P:\DYNAMIC\1\HW\_102\HW\_102\HW\_102\HW\_102.DWG 08/29/95 15:38:48



2. DRAWINGS | TANK STD INT. L000 | C-1.DWG | 08/20/98 | 14.24.DWG

		ISSUE	
		NOVEMBER 16, 1992	1
		DECEMBER 1, 1995	2
1.0 GENERAL			
1.01 SCOPE	<p>A. THIS DESIGN CRITERIA, TOGETHER WITH THE SUPPLEMENTARY INFORMATION LISTED HEREIN, COVERS THE EQUIPMENT AND DESIGN REQUIREMENTS TO BE USED IN THE ENGINEERING, MANUFACTURE, AND INSTALLATION OF INDOOR FUEL OIL TANKS AND THEIR CONNECTION TO EMERGENCY STANDBY POWER PLANTS AND HEATING SYSTEMS. THE MAIN OBJECTIVE IS TO PROVIDE AN AUTOMATIC UNATTENDED RELIABLE FUEL STORAGE SYSTEM.</p> <p>B. THE FUEL OIL STORAGE SYSTEM SHOULD BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS AND DIRECTIVES FROM AIBT PRACTICES AND WITH CONSIDERATIONS INDICATED IN PARAGRAPH 2.02. UNENCLOSED ABOVEGROUND FUEL OIL STORAGE TANKS SHOULD HAVE A MAXIMUM CAPACITY OF 660 GALLONS PER TANK AND NOT EXCEED 1,320 GALLONS AGGREGATE SUBJECT TO LOCAL AGENCY APPROVALS.</p> <p>C. THE RECOMMENDATIONS IN THIS SECTION ARE BASED, IN GENERAL, ON THE NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, NFPA SECTION 30, 31, 37, 110, AND 321. MANY DETAILS FEATURED IN THESE SOURCE DOCUMENTS HAVE NOT BEEN COVERED HEREIN. REVIEW THESE AND OTHER APPLICABLE DOCUMENTS FOR COMPLETE DETAILS.</p> <p>D. FEDERAL, STATE, LOCAL, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS SHOULD BE FULLY COMPLIED WITH AT ALL TIMES, INCLUDING INTERFERING WITH AND UPGRADING EXISTING FUEL SYSTEMS.</p> <p>E. THE USE OF TANKS MUST PROVIDE A SAFE AND ENVIRONMENTALLY SOUND STORAGE SYSTEM. IT IS ESSENTIAL THAT FEATURES FOR RELIABILITY, SAFETY, FIRE PROTECTION, ENVIRONMENTAL PROTECTION, STRUCTURAL INTEGRITY, SEISMIC PROTECTION, AND ISOLATION SHOULD BE INCORPORATED AND ADDRESSED.</p> <p>F. PLANS AND SPECIFICATIONS SHOULD BE SUBMITTED FOR PROPOSED INSTALLATIONS OF FUEL OIL TANK LOCATIONS ILLUSTRATING SUCH FEATURES AS TANK SIZE, UTILITIES DISTANCES FROM THE FACILITIES, PROPERTY LINES, BUILDING PENETRATIONS, ROOM LAYOUTS, DOORS, WINDOWS, AND WATER WAYS IF APPLICABLE. PRELIMINARY PLANS SHOULD BE SUBMITTED TO THE OWNER FOR THEIR APPROVAL AND THEN SUBMITTED TO LOCAL AUTHORITIES FOR REVIEW AND APPROVAL.</p> <p>G. TANK AREAS, ENCLOSURES, AND ADJACENT SPACES SHOULD BE KEPT FREE FROM DEBRIS AND OTHER MATERIALS WHICH MAY BE COMBUSTIBLE OR FLAMMABLE.</p> <p>H. PROPER SIGNS AND BEDS SHALL BE SPECIFIED. THE PURPOSE OF THE SIGNAGE IS TO ADVISE OCCUPANTS THAT OPEN FLAMES AND SMOKING ARE PROHIBITED WITHIN AND AROUND THE TANK AREA.</p> <p>I. SEISMIC BRACING AND NECESSARY FLEXIBLE CONNECTORS SHOULD BE SPECIFIED TO PREVENT DAMAGE TO TRANSFER PIPING OR TANKS, DURING PERIODS OF SEISMIC ACTIVITY.</p> <p>J. IF THE SPECIFIC PROJECT INVOLVES CLOSURE AND REMOVAL OF EXISTING TANK REFER TO AIBT REMOVAL AND ABANDONMENT CRITERIA.</p> <p>K. SOIL SAMPLING SHALL BE AT THE DISCRETION OF THE OWNER AND ENGINEERING.</p> <p>L. REFERENCE TO SPECIFIC MANUFACTURER WHERE SHOWN, AN APPROVED ALTERNATE WAY BE SUBSTITUTED.</p>		
1.02 OWNER INVOLVEMENT	<p>A. DETAILED INVOLVEMENT WITH THE OWNER SHOULD TRANSLATE INTO OVERALL COST SAVINGS DUE TO THE ANTICIPATED REDUCTION IN ENGINEERING COSTS AND CONSTRUCTION DELAYS, DUE TO POTENTIAL DESIGN CHANGES REQUESTED BY THE OWNER.</p> <p>B. THE OWNER SHOULD BE CONSULTED DURING THE DESIGN/INSTALLATION PROCESS BECAUSE THEY ARE FAMILIAR WITH EQUIPMENT OPERATION AND AVAILABLE SPACE AT THE BUILDING TO PROVIDE FOR A SUITABLE FUEL OIL TANK LOCATION OR CONVERSELY RENDER SOME LOCATIONS UNSUITABLE. AS A MINIMUM, THE OWNER SHOULD BE INVOLVED WITH THE FOLLOWING:</p> <ol style="list-style-type: none"> <li>FIELD VERIFY LOCATION OF FUEL OIL TANK.</li> <li>REVIEW OF PRELIMINARY AND FINAL DESIGN PLANS AND SPECIFICATIONS.</li> <li>CONSULTATION, DEVELOPMENT, AND ACKNOWLEDGEMENT OF A WORK METHOD OF PROCEDURES (WOP) NEEDED FOR THE PROJECT.</li> <li>PROJECT OVERSIGHT DURING CONSTRUCTION, INCLUDING SITE ACCESS.</li> <li>ACCEPTANCE OF THE COMPLETED WORK.</li> </ol> <p>B. MAINTAIN DOCUMENTATION IN ACCORDANCE WITH PART 12.</p>		
2.0 TANK REQUIREMENTS			
2.01 TANK LOCATION	<p>A. TANKS SHOULD NOT BE LOCATED ADJACENT TO OUTDOOR AIR INLETS OR FIRE ESCAPE EXITS.</p> <p>B. TANK LOCATIONS SHALL BE IN ACCORDANCE WITH LOCAL CODES AND STANDARDS. SUFFICIENT CLEARANCES SHALL BE MAINTAINED AROUND THE TANKS AS REQUIRED FOR MAINTENANCE AND AS REQUIRED BY APPLICABLE CODES.</p> <p>C. CONSIDERATION SHOULD BE GIVEN TO TANK CLEARANCES AND ACCESS INTO THE BUILDING.</p>		
2.02 SIZING TANKS	<p>A. STANDARD TANK SIZING CRITERIA FOR EMERGENCY STANDBY GENERATORS ARE AS FOLLOWS:</p> <p>HOURLY CONSUMPTION CONNECTED LOAD X 72 HRS. X 4 = 90% OF TANK VOLUME</p> <p>B. OWNER SHALL VERIFY AND APPROVE CALCULATED VOLUMES.</p>		
3.0 STORAGE TANK			
3.01 GENERAL	<p>A. VERIFY LOCAL CODE REQUIREMENTS.</p> <p>B. VERIFY A PATH FOR NEW TANK INTO BUILDING.</p>		
3.02 TANK SELECTION	<p>A. SPECIFY A STANDARD DOUBLE WALL UL-142 TANK.</p> <p>B. EVALUATE THE POTENTIAL FOR ENGINE CYLINDER FUEL LOADING IN INSTALLATIONS WHERE THE STATIC LEVEL OF FUEL IN THE TANK EXCEEDS THE HEIGHT OF THE FUEL INJECTORS.</p>		
3.03 VENTING	<p>A. NORMAL AND EMERGENCY VENTING SHOULD COMPLY WITH NFPA 30 SIZING REQUIREMENTS. NORMAL AND EMERGENCY VENTS FOR THE PRIMARY TANK SHOULD TERMINATE OUTSIDE THE BUILDING.</p>		
3.04 SECONDARY CONTAINMENT	<p>A. SECONDARY CONTAINMENT BASINS SHALL BE SIZED ACCORDING TO NFPA-30 OR LOCAL CODES.</p>		
4.0 PIPING			
4.01 PRODUCT PIPING	<p>A. FUEL OIL SUPPLY AND RETURN PIPING SHALL BE SUITABLE FOR USE AS ABOVEGROUND FUEL OIL PIPING.</p> <ol style="list-style-type: none"> <li>ACCEPTABLE CARRIER PIPE: <ol style="list-style-type: none"> <li>SCHEDULE 40 BLACK CARBON STEEL (GALVANIZED UNACCEPTABLE).</li> <li>TYPE "K" HARD COPPER.</li> <li>ACCEPTABLE ALTERNATE.</li> </ol> </li> <li>ACCEPTABLE SECONDARY CONTAINMENT PIPE: <ol style="list-style-type: none"> <li>SCHEDULE 40 STEEL.</li> <li>HOPE (EXTERIOR ONLY).</li> <li>ACCEPTABLE ALTERNATE.</li> </ol> </li> </ol>		
4.02 VENT PIPING	<p>A. TANK VENTING SYSTEMS SHALL BE DESIGNED ACCORDING TO NFPA 30 AND LOCAL CODES.</p> <p>B. VENT PIPING SHALL BE GALVANIZED SCHEDULE 40 STEEL.</p>		
4.03 PIPING MATERIALS:	<p>A. COPPER PIPING:</p> <ol style="list-style-type: none"> <li>COPPER PIPE SOLDER JOINTS SHALL BE OF TYPE CONFORMING TO ANSI B16.22. COPPER PIPE UNIONS SHALL BE WROUGHT COPPER, CAST BRONZE, OR BRASS.</li> <li>INSULATING UNIONS FOR COPPER PIPE SHALL BE PROVIDED AT ALL EQUIPMENT HAVING FERROUS CONNECTIONS.</li> <li>FLARE FITTINGS FOR COPPER PIPE ARE NOT ACCEPTABLE. SOLDER SHALL BE A SILVER ALLOY SOLDER WITH A MELTING POINT OF NOT LESS THAN 1100° F.</li> <li>SILVER BRAZING FLUX SHALL BE USED FOR SOLDER OF 1100° F. OR HIGHER MELTING POINT.</li> <li>DIELECTRIC COUPLINGS AND/OR FLANGED KITS SHALL BE PROVIDED AT ALL COPPER TO STEEL CONNECTIONS AND AS REQUIRED TO ELECTRICALLY ISOLATE THE PIPING FROM THE TANK.</li> <li>UNDERGROUND COPPER PIPING SHALL BE TYPE K SOFT, ROLLED COPPER INSTALLED WITHOUT JOINTS IN THE UNDERGROUND SECTIONS.</li> <li>ABOVEGROUND COPPER PIPING SHALL BE TYPE K HARD DRAWN COPPER.</li> </ol> <p>B. STEEL PIPING:</p> <ol style="list-style-type: none"> <li>STEEL PIPE SHALL BE CARBON STEEL SEAMLESS ASTM A53.</li> <li>PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40.</li> <li>PIPE FINISH SHALL BE GALVANIZED OR BLACK.</li> <li>FITTINGS FOR JOINTS 2 1/2 INCHES IN DIAMETER OR SMALLER SHALL BE THREADED OR WELDED.</li> <li>FITTINGS FOR JOINTS 3 INCHES IN DIAMETER OR LARGER SHALL BE FLANGED OR WELDED.</li> <li>THREADED JOINTS: <ol style="list-style-type: none"> <li>FITTINGS SHALL BE 300 LB. MALLEABLE IRON, SCREWED - ANSI B16.3.</li> <li>PIPE THREADING SHALL BE IN ACCORDANCE WITH USAS B 2.1 - 1968. SCREWED JOINTS SHALL HAVE STANDARD THREADS, CLEAN CUT AND TAPERED WITH ALL BURRS REMOVED. JOINT COMPOUND SHALL BE APPLIED TO THE MALE THREADS.</li> <li>JOINT COMPOUND FOR THREADED JOINTS SHALL BE GASOLIA SOFT-SET WITH TEFLON® OR AS APPROVED.</li> </ol> </li> <li>WELDED JOINTS: <ol style="list-style-type: none"> <li>2 1/2 INCHES AND SMALLER: SOCKET WELDED STEEL FITTINGS ANSI B16.11.</li> <li>3 INCHES AND LARGER: BUTT-WELDED FITTINGS ANSI B16.3.</li> </ol> </li> </ol>		
4.04 INSTALLATION:	<p>A. ABOVEGROUND PIPING:</p> <ol style="list-style-type: none"> <li>DESIGN EXPOSED PIPING TO RUN PARALLEL TO WALL OF STRUCTURES.</li> <li>SUPPORTS AND ANCHORS SHALL BE ADEQUATE TO SUPPORT THE PIPE FILLED WITH WATER WITH A MINIMUM SAFETY FACTOR OF 12 AND FOR THE TEST PRESSURE SPECIFIED. SPECIFY FACTORY ENGINEERED SUPPORTS, BRACES AND ANCHORS, WHERE REQUIRED.</li> <li>FUEL OIL TRANSFER PIPING SHOULD BE ARRANGED TO PREVENT GRAVITY FEED FROM THE FUEL OIL STORAGE TANK TO THE ENGINE.</li> <li>ALL PIPING CONNECTIONS TO THE ABOVEGROUND STORAGE TANK SHOULD BE AT THE HIGHEST POINT. NO PIPING CONNECTIONS SHOULD BE MADE BELOW THE HIGHEST POSSIBLE FULL STORAGE LEVEL.</li> <li>PROPERLY SIZED ANTI-SYPHON VALVES WITH VALVED BY-PASS SHOULD BE PROVIDED TO PREVENT LOSS OF FUEL OIL INTO UNDESIRABLE AREAS (THE ENVIRONMENT OR THE FACILITY).</li> <li>FILL PIPING SHALL BE INSTALLED FOR TOP-LOADING OF THE ABOVEGROUND STORAGE TANKS. METALLIC FILL PIPES SHALL BE DESIGNED AND INSTALLED TO MINIMIZE THE GENERATION OF STATIC ELECTRICITY BY TERMINATING THE PIPE WITHIN 4 TO 6 INCHES FROM THE BOTTOM OF THE TANK.</li> </ol>		
5.0 ACCESSORIES/SPECIALTIES			
5.01 ACCESSORIES AND SPECIALTIES SHALL BE PROVIDED AS REQUIRED FOR THE SPECIFIED SITE.			
5.02 VALVES	<p>A. DOUBLE POPPET FOOT VALVE SHALL BE INSTALLED AT THE BASE OF THE SUCTION DROP TUBE TO PREVENT FUEL IN THE SUCTION PIPING TO THE ENGINE, FROM DRAINING OR SIPHONING BACK TO THE STORAGE TANK.</p> <p>B. A PRESSURE BYPASS VALVE IS TO BE INSTALLED AT THE ENGINE IF AUTOMATIC SHUTOFF VALVES ARE INSTALLED IN THE RETURN PIPING BACK TO THE TANK.</p> <p>C. ALL CONTROL VALVES SHOULD BE PROVIDED WITH A MANUAL OVERRIDE DEVICE TO ENABLE THE SYSTEM OPERATOR TO OVERRIDE A MALFUNCTIONING VALVE DURING AN EMERGENCY OR CONTROL SYSTEM FAILURE.</p> <p>D. AN EMERGENCY SHUT-OFF VALVE WITH A FUSIBLE LINK MAY BE REQUIRED AT THE ENTRANCE OF THE FUEL OIL PIPING INTO THE FACILITY. THIS VALVE SHALL CLOSE IN THE EVENT OF A FIRE WITHIN THE ENGINE ROOM, THEREBY TERMINATING THE FUEL SUPPLY.</p>		
5.03 ABOVEGROUND TANKS ACCESSORIES	<p>A. FOR PIPING OR TANK INSTALLATIONS WHICH ARE LOCATED ABOVE THE ENGINE INJECTORS, ANTI-HEAD PRESSURE VALVES SHALL BE INSTALLED IN BOTH SUPPLY AND RETURN LINES.</p> <p>B. EMERGENCY VENT FOR PRIMARY TANK. MORRISON BROS. NO. 244, 8 OZ./SQ. IN.</p> <p>C. FILL PIPE CONTAINMENT BOX FOR ABOVEGROUND TANKS SHALL BE FABRICATED ACCORDING TO THE DRAWING DETAILS AND PROVIDED WITH A LOCKABLE LID AND LOCKABLE FILL CAP.</p> <p>D. FILL CAP ASSEMBLY - MORRISON BROS. COMPANY, MODEL 17B.</p> <p>E. FLEXIBLE CONNECTORS - INTERLEX, UL LISTED FOR ABOVEGROUND PETROLEUM SERVICE.</p> <p>F. VENT CAPS SHALL BE OPW FUELING COMPONENTS MODEL 25 OR EMCO-WHEATOR MODEL A634 OR MORRISON MODEL 354.</p> <p>G. A STRIP GAUGE, CALIBRATED IN INCHES AND GALLONS, SHALL BE PROVIDED TO MANUALLY DETERMINE THE LEVEL OF FUEL IN THE TANK. WATER PASTE, TO DETERMINE THE AMOUNT OF WATER IN THE TANK, SHALL BE PROVIDED.</p>		
6.0 EXCAVATION AND BACKFILL			
6.01 GENERAL (NOT USED)			
7.0 RIGGING AND HOISTING			
7.01 THE ENGINEER SHOULD ASSESS THE DEGREE OF DIFFICULTY ASSOCIATED WITH THE RIGGING AND HOISTING FOR TANK REMOVALS AND INSTALLATIONS. THE FOLLOWING ITEMS, AT MINIMUM SHOULD BE CONSIDERED:	<p>A. WEIGHT AND PHYSICAL SIZE OF TANK OR OBJECT TO BE LIFTED.</p> <p>B. PROXIMITY OF RIGGING AND HOISTING EQUIPMENT TO ADJACENT STRUCTURES.</p> <p>C. DIFFICULTY IN ACCESSING THE AREA FROM THE STANDPOINT OF OVERHEAD UTILITIES, UNDERGROUND UTILITIES, ROADS, DRIVEWAYS AND OTHER OBSTACLES.</p> <p>D. EVALUATE THE POSSIBILITY OF IMPACTING ADJACENT PROPERTY DURING MOBILIZATION AS WELL AS THE ACTUAL RIGGING AND HOISTING OPERATION.</p>		
7.02 THE MINIMUM FOLLOWING STATEMENT SHOULD BE INCLUDED IN THE SPECIFICATIONS.	<p>A. RIGGING AND HOISTING SHALL BE PERFORMED IN ACCORDANCE WITH OSHA EQUIPMENT RIGGING REGULATIONS (29 CFR PART 1926 CHAPTER XVI, 7-1-90 EDITION, PAGES 203-207) AND WITH OSHA CRANE AND DERRICK REGULATIONS (29 CFR PART 1926 CHAPTER XVI, 7-1-90 EDITION, PAGES 120-131).</p> <p>B. WHERE THE DESIGN ENGINEER FEELS THE DEGREE OF DIFFICULTY WARRANTS THAT SPECIAL PRECAUTIONS SHOULD BE TAKEN, THE SPECIFICATIONS SHOULD INCLUDE PROVISIONS FOR A LICENSED PROFESSIONAL ENGINEER TO DESIGN AND SUPERVISE THE RIGGING AND HOISTING OPERATION.</p> <p>C. IN ADDITION TO "A" ABOVE, THE FOLLOWING STATEMENT SHOULD BE INCLUDED:</p> <p>"PROFESSIONAL ENGINEER'S RESPONSIBILITY"</p> <ol style="list-style-type: none"> <li>THE CONTRACTOR SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER WHO WILL TAKE ON THE FOLLOWING RESPONSIBILITIES: <ol style="list-style-type: none"> <li>SUBMIT A "RIGGING PROCEDURE PLAN" TO THE OWNER FOR APPROVAL.</li> <li>OBTAIN COPIES OF THE DATA SHEETS, EQUIPMENT CATALOGS AND SPECIFICATIONS FOR THE RIG TO BE USED ON THE JOB. COPIES SHALL BE SUBMITTED WITH THE "RIGGING PROCEDURE PLAN" TOGETHER WITH CALCULATIONS TO CONFIRM THE SAFE OPERATION OF THE RIGGING EQUIPMENT DURING THE VARIOUS STAGES, FROM LIFTING TO PLACING THE OBJECT IN ITS FINAL POSITION.</li> <li>INSPECT THE RIG AND OTHER EQUIPMENT AND DEVICES TO BE USED IN THE RIGGING OPERATION TO VERIFY THAT THE EQUIPMENT, ETC. IS IN A SAFE CONDITION.</li> <li>WITNESS TEST LOADING OF RIGGING EQUIPMENT WHEN REQUIRED BY OSHA REQUIREMENTS.</li> <li>SUPERVISE THE RIGGING OPERATION TO ENSURE THAT IT FOLLOWS THE APPROVED "RIGGING PROCEDURE PLAN" AND TO MAKE DECISIONS ACCORDINGLY TO ENSURE SAFETY DURING THE RIGGING OPERATION.</li> </ol> </li> </ol>		
8.0 CONCRETE			
8.01 GENERAL	<p>THESE STANDARDS SHALL APPLY TO CONCRETE ANCHOR SLABS, TOP SLABS AND OTHER MISCELLANEOUS CAST-IN-PLACE CONCRETE.</p> <p>A. DESIGN REFERENCES SHALL INCLUDE:</p> <ol style="list-style-type: none"> <li>ACI 304.2R - PLACING CONCRETE BY PUMPING METHODS</li> <li>ACI 305R - HOT WEATHER CONCRETING</li> <li>ACI 306R - COLD WEATHER CONCRETING</li> <li>ACI 315 - MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES</li> <li>ACI 318 - SPECIFICATIONS FOR STRUCTURE CONCRETE FOR BUILDINGS</li> <li>ASTM A 615 - SPECIFICATIONS FOR DEFORMED AND PLAN BULLET STEEL BARS FOR CONCRETE REINFORCEMENT</li> <li>ASTM C 31 - TEST METHODS FOR MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD</li> <li>ASTM C 39 - TEST METHODS FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS</li> </ol> <p>B. ENGINEER SHALL EVALUATE PROJECT LOCATION FOR SEISMIC RISK. REFERENCE SEISMIC RISK MAPS PRODUCED BY APPLIED TECHNOLOGY COUNCIL, 480 CALIFORNIA AVENUE, PALO ALTO, CALIFORNIA 94306 OR OTHER NATIONALLY ACCEPTED RISK MAPS.</p> <p>C. MISCELLANEOUS DESIGN CRITERIA AS FOLLOWS:</p> <ol style="list-style-type: none"> <li>ALL CONCRETE SHOULD BE DESIGNED UTILIZING A MINIMUM OF 3000 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C-31 OR C-39.</li> <li>DETERMINE AVERAGE FROST DEPTHS FOR THE PROJECT SITE AND EXTEND FOOTING 6" LOWER THAN AVERAGE DEPTH.</li> <li>REINFORCEMENT BARS SHALL BE ASTM A 615, GRADE 60.</li> <li>ALL CONCRETE EXPOSED TO FREEZE/THAW CYCLES SHOULD BE AIR ENTRAINED.</li> <li>EVALUATE NEED, IF ANY, FOR WATERPROOFING OR DAMPROOFING SYSTEMS AS WELL AS WATERSTOPS.</li> </ol>		
9.0 MONITORING SYSTEMS			
9.01 GENERAL	<p>A. PROVIDE AN ELECTRONIC TANK GAUGING SYSTEM THAT PERFORMS THE FOLLOWING FUNCTIONS:</p> <ol style="list-style-type: none"> <li>CONTINUOUS TANK GAUGING.</li> <li>NON-DISCRIMINATING INTERSTITIAL MONITORING.</li> <li>RELAY OUTPUTS FOR REMOTE ALARMING.</li> <li>RS-232C PORT FOR INTERFACE WITH COMPUTERS FOR PROGRAMMING THE UNIT, REMOTE INTERROGATION AND INTERFACE WITH BUILDING AUTOMATION SYSTEMS.</li> <li>WATER DETECTION</li> <li>INTEGRAL PRINTER AND TAKE-UP REEL.</li> <li>THE SYSTEM SHALL BE PNEUMATORIC LDE-740P, VEEDER-ROOT T1S 350 OR APPROVED ALTERNATE.</li> </ol>		
10.0 ALARMS			
10.01 ALARMS -LATER			
11.0 RECORDING			
11.01 THE PRIMARY PURPOSES FOR INSTALLING A LOW IMPEDANCE GROUNDING SYSTEM ARE PERSONNEL SAFETY BY MINIMIZING THE POSSIBILITY OF ELECTRIC SHOCK, EQUIPMENT PROTECTION FROM FIRE HAZARDS, PROPER EQUIPMENT OPERATION, MOST REDUCTION IN COMMUNICATION CIRCUITS AND RELIABILITY WITH LITTLE MAINTENANCE REQUIRED. IN ORDER TO INSURE ALL THE ABOVE, THE GROUNDING SYSTEMS SHALL BE DESIGNED AND INSTALLED TO MEET THE MINIMUM STANDARDS AS SET FORTH IN THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE, ARTICLE 250, AND ALSO ACCORDING TO AIBT PRACTICES.			
11.02 ALL METALLIC OBJECTS ABOVE GRADE ON THE OUTSIDE OF THE BUILDING SHALL BE ATTACHED TO THE EXTERIOR GROUND RING.			
11.03 ALL CONNECTIONS TO THE EXTERIOR GROUND RING SHALL BE MADE USING CROWFEELS.			
11.04 ALL CONNECTIONS TO THE INTERIOR BUILDING GROUND SHALL MATCH EXISTING CONNECTORS			
12.0 RECORD DOCUMENTS			
12.01 INSTALLATION DOCUMENTATION (5 COPIES) FOR THE SITE SHALL BE REQUIRED AS FOLLOWS:			
A. TABLE OF CONTENTS			
B. STATE AND LOCAL PERMITS			
C. DAILY WORK LOG			
D. CONTRACTOR'S GUARANTEE			
E. NAMES OF LIEN			
F. ORIGINAL COPIES OF INSTALLATION, OPERATING AND MAINTENANCE MANUALS			
G. CERTIFICATION AND COPIES OF TEST RESULTS			
H. PHOTOGRAPHS			
I. AS-BUILT DRAWINGS			
J. PROVIDE VALVE CHARTS AND SEQUENCE OF OPERATION.			
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GENERAL CONSTRUCTION/SITE  
SYMBOLS AND ABBREVIATIONS

-  EARTH / COMPACT FILL
-  CONCRETE
-  PEA GRAVEL
-  TEST BORING
-  MONITORING WELL
-  SOIL SAMPLING LOCATION
- S— SANITARY SEWER
- D— FOUNDATION DRAIN
- CW— CITY WATER
- E— BURIED ELECTRICAL
- SS— STORM SEWER
- T— BURIED TELEPHONE
- X—X— EXISTING CHAIN LINK FENCE
- AE— ABOVEGROUND ELECTRIC
- //— CATTLE FENCE
- o—o— NEW OR TEMPORARY CHAIN LINK FENCE
- R—- PROPERTY LINE
- CB CATCH BASIN
-  NORTH ARROW
-  EXISTING CONTOURS ELEVATION NOTED ON HIGH SIDE
-  NEW CONTOURS ELEVATION NOTED ON HIGH SIDE

MECHANICAL SYMBOLS  
AND ABBREVIATION

-  UNION
-  FLEX CONNECTION
- NAME (N)— NEW PIPING
- NAME (E)— EXISTING PIPING
- - - - - WORK BELOW GRADE
- X—X— REMOVE EXISTING
-  GATE VALVE
-  BALL VALVE
-  MULTI-PORT BALL VALVE W/MANUAL OPERATOR
-  SOLENOID VALVE WITH MANUAL OPERATOR
-  SOLENOID VALVE WITHOUT MANUAL OPERATOR
-  FUSE LINK VALVE
-  PRESSURE RELIEF VALVE
-  CHECK VALVE
-  VACUUM GAUGE WITH COCK
-  PRESSURE GAUGE WITH COCK
-  DUPLEX STRAINER (PLAN)
-  DUPLEX STRAINER (ELEVATION)
-  HAND PUMP
-  VENT CAP
- O.C. ON CENTER
- GA GAUGE
- GALV GALVANIZED
- STL STEEL
- F.O. FUEL OIL
- F.O.R. FUEL OIL RETURN
- F.O.S. FUEL OIL SUPPLY
- F.O.V. FUEL OIL VENT
- F.O.F. FUEL OIL OVERFLOW
- GAL. GALLON
- A.S.T. ABOVEGROUND STORAGE TANK
- U.S.T. UNDERGROUND STORAGE TANK

ELECTRICAL SYMBOLS  
AND ABBREVIATION

-  STREET LIGHT
- UTILITY POLE
-  MANHOLE
-  LIGHTING PANEL
-  POWER PANEL
-  DISCONNECT SWITCH
-  HOME RUN TO POWER PANEL
-  JUNCTION BOX
-  OVERFILL ALARM HORN/LIGHT

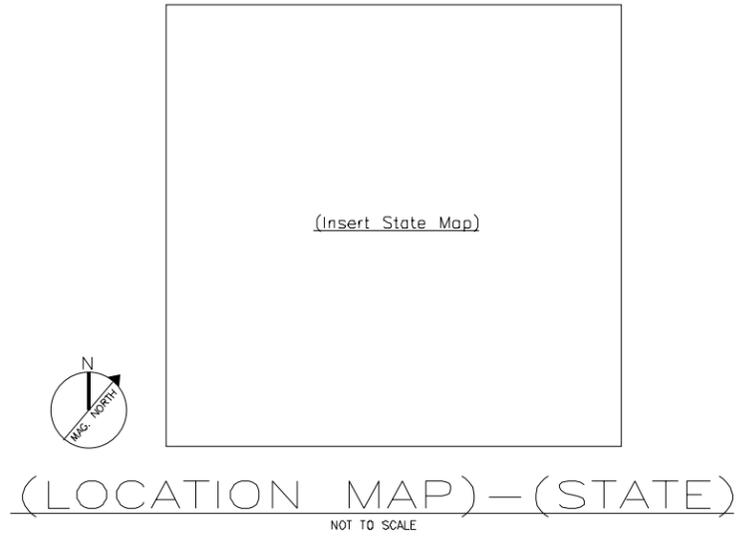
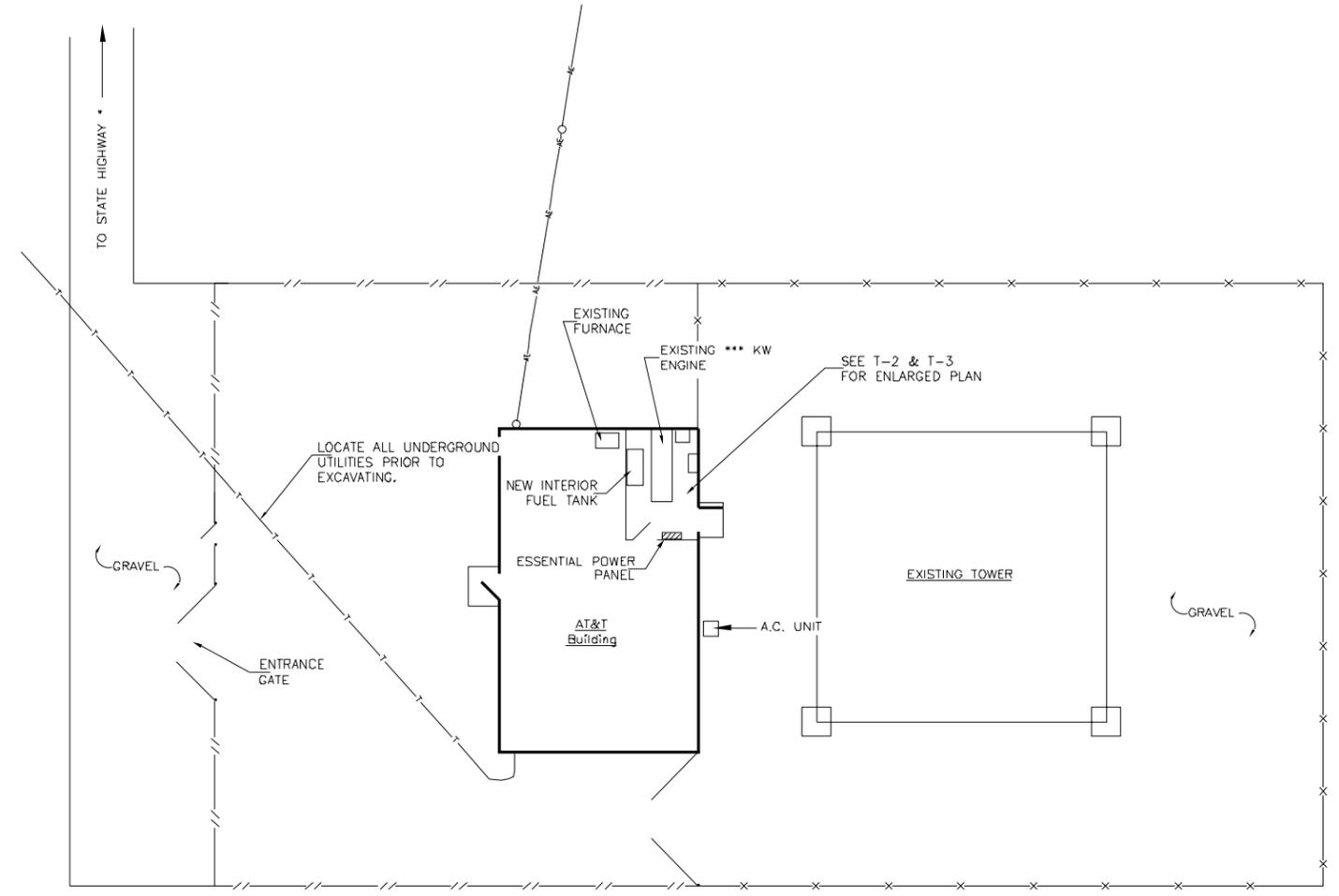
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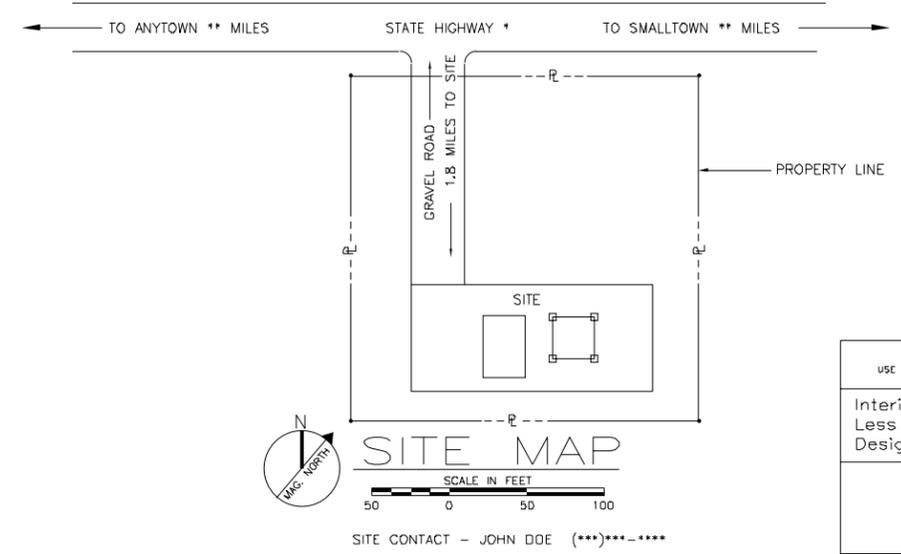
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SYMBOLS & LEGEND	
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- LEGEND**
- T— BURIED TELEPHONE
  - //— CATTLE FENCE
  - E— ABOVEGROUND ELECTRIC
  - x—x— EXISTING CHAIN LINK FENCE
  - P—P— PROPERTY LINE
  - UTILITY POLE
  - ▨ POWER PANEL



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AT&T PROPRIETARY  
USE PURSUANT TO COMPANY INSTRUCTIONS

T-1

Interior Fuel Storage Tank  
Less Than 660 Gallons  
Design Criteria

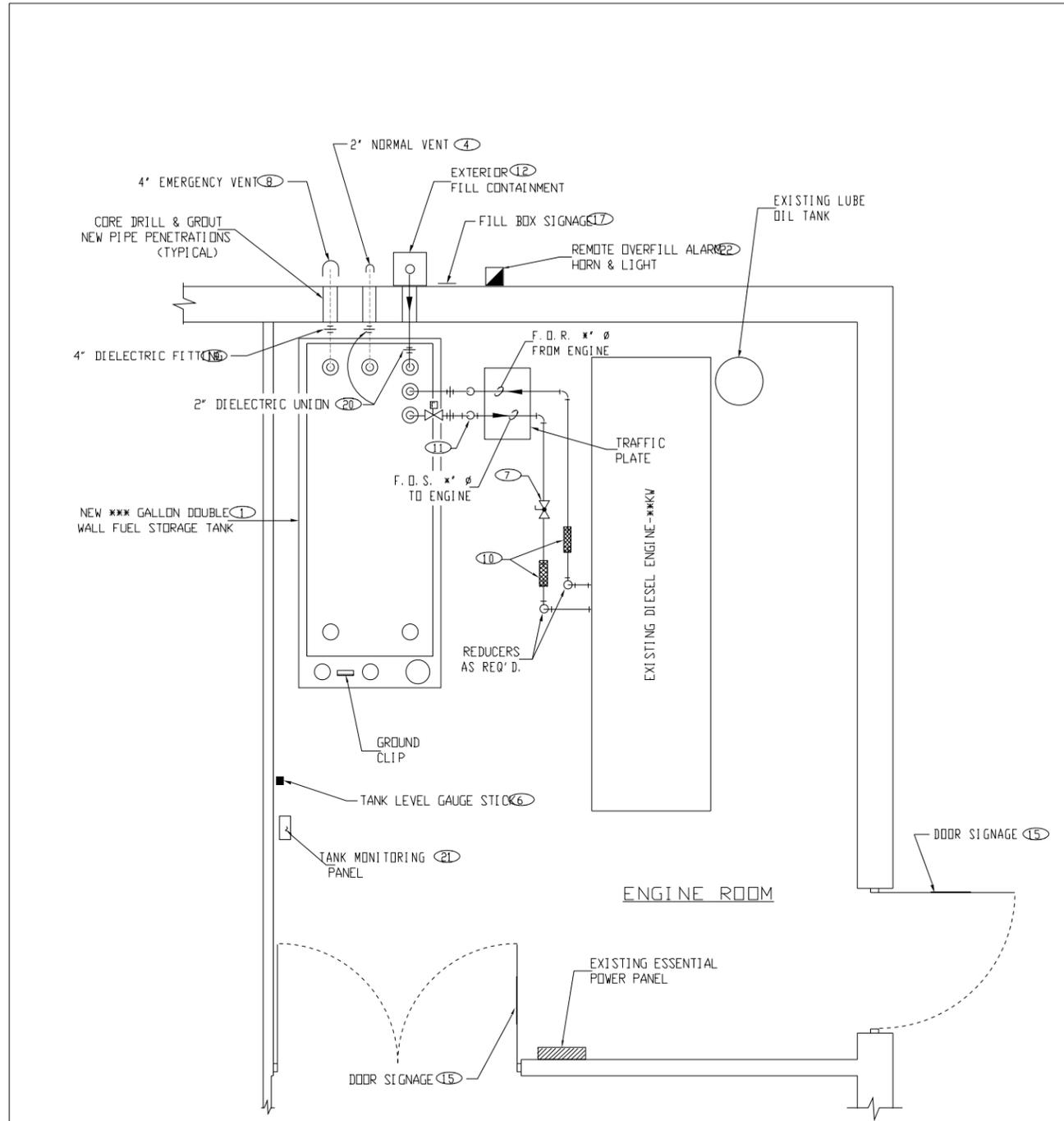
TYPICAL SITE PLAN

AT&T

SCALE: AS NOTED  
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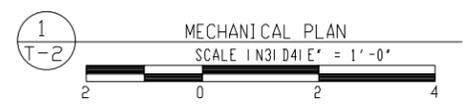
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**LEGEND**

- |—|— UNION
- OVERFILL ALARM HORN/LIGHT
- NAME (ND)— NEW PIPING
- F. D. R. FUEL OIL RETURN
- F. D. S. FUEL OIL SUPPLY
- ▨ POWER PANEL
- ▩ FLEX CONNECTION
- ⊗ BALL VALVE
- ⊕ FUSS LINK VALVE



EQUIPMENT LIST				1 ISSUE	
MARK	QUANTITY	DESCRIPTION	MARK	QUANTITY	DESCRIPTION
①	1-*** GALLON	U/L 142 CONSTRUCTED DOUBLE WALL FUEL STORAGE TANK AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON-STANDARD OPENINGS.) LUBE CUBE INC. PH: 1-800-777-2823 SEE 2/T-4	⑫	1	ABOVE-GRADE FILL PIPE CONTAINMENT. SHOP FABRICATED. SEE 2/T-4
②	1	2" DIAMETER DRY BREAK ADAPTER W/ DUST COVER. CLAY & BAILEY MFG. CO. PH: 1-800-821-6583 SEE 2/T-4	⑬	1	FLUSH MOUNT - FILL PIPE CONTAINMENT. EBW MODEL NO. 705-15-BG WITH 18 in. DIAMETER. COVER & SKIRT. PH: 1-800-475-3291 SEE 2a/T-4
③	1	* FUSIBLE FUEL LINE VALVE. PREFERRED UTILITIES MANUFACTURING CORPORATION 'FUSOMATIC' COMPLETE WITH SPARE REPLACEABLE FUSIBLE ELEMENT. PH: 1-203-743-6741 SEE 5/T-4	⑭	2	LOCKS. KEYED ALIKE. BEST CO. INDUSTRIAL GRADE OR OWNER SELECTED MODEL. VERIFY EXACT REQUIREMENT IN FIELD.
④	1	2" DIAMETER UPFLOW VENT. MORRISON MODEL NO. 354. ALUMINUM BODY AND HOOD WITH SCREEN. PH: 1-319-583-5701 SEE 9/T-4	⑮	2	DOOR SIGNAGE. SEE 3/T-5
⑤	2	TANK SIGNAGE. VOLUME CONVERSION CHART. PROVIDE TANK VOLUME, INCHES TO GALLONS CONVERSION TABLES UNDER HEAVY PLASTIC LAMINATE. MOUNT TO TANK WITH DOUBLE SIDED PRESSURE SENSITIVE FOAM TAPE. TURN OVER OTHER COPY TO OWNER.	⑯	1	TANK SIGNAGE. SEE 4/T-5
⑥	1	TANK LEVEL GAUGE STICK. BAGBY GAGE STICK, INC. MODEL 25-8 TWO SECTION GAUGE STICK CALIBRATED IN INCHES. 8'-0" EXTENDED LENGTH. 4'-4" FOLDED LENGTH. PH: 1-800-445-0774	⑰	1	FILL BOX SIGNAGE. SEE 5/T-5
⑦	2	ISOLATION VALVE, * TWO PIECE BRONZE BODY, THREADED, STAINLESS STEEL BALL TEFLON SEATS, LOCKABLE HANDLE, RATED 400 PSI W. PH: 1-508-688-1811	⑱	1-4'	FOOT VALVE. EBW MODEL 76 1/31 D41 E' DOUBLE POPPET VALVE WITH METAL TO METAL SEAT, AND 24 MESH SCREEN, BRASS BODY, BRONZE POPPETS AND SEATS. VALVE SHALL PASS THROUGH A 2" PIPE. PH: 1-800-422-2525 SEE 4/T-4
⑧	1	* DIAMETER EMERGENCY VENT (PRIMARY TANK) N. C. OPEN ON 8 OZ. PRESSURE. MORRISON MODEL NO. 244 PH: 1-319-583-5701 SEE 12/T-5	⑲	2-2'	DIELECTRIC PIPE UNIONS. WATTS REGULATOR COMPANY. PH: 1-508-688-1811
⑨	1	* DIAMETER EMERGENCY VENT (SECONDARY TANK) N. C. OPEN ON 8 OZ. PRESSURE. MORRISON MODEL NO. 244 PH: 1-319-583-5701 SEE 12/T-5	⑳	1	TANK MONITORING PANEL-PNEUMATOR. LDE-740P WITH INTEGRAL PRINTER, RS-232 INTERFACE, AND AUTOMATIC ALARM SILENCE. PH: 1-516-293-8450 SEE 1/T-6
⑩	2	* x15' FLEXIBLE PIPE CONNECTORS, MEDIUM PRESSURE FLEX HOSE WITH STEEL BRAID REINFORCEMENT DESIGNED FOR USE WITH DIESEL FUEL. PROVIDE HOSE END SWIVEL FITTINGS.	㉑	1	REMOTE OVERFILL ALARM HORN/LIGHT - PNEUMATOR. LC-1001-ASC. PH: 1-516-293-8450 SEE 1/T-6
⑪	1	1/31 D41 E' ANTI-SIPHON VALVE. PREFERRED UTILITIES MANUFACTURING CORPORATION. TYPE A, 0 TO 5 FOOT HEAD SPRING RANGE. PH: 1-203-743-6741 SEE 4/T-4	㉒	1	TANK LEVEL SENSOR-PNEUMATOR. MODEL 2-412W WITH WATER SWITCH. PH: 1-516-293-8450 SEE 1/T-5
			㉓	1	RUPTURE ALARM SWITCH PNEUMATOR. MODEL NO. LS-600LDBN (1 SWITCH). ALARM AT BOTTOM OF PROBE NORMALLY OPEN THEN CLOSE ON RISE. PH: 1-516-293-8450 SEE 2/T-5

**GENERAL EQUIPMENT LIST NOTES:**

- ABOVE EQUIPMENT LIST IS NOT COMPLETE IN ITS ENTIRETY. ENGINEER IS TO VERIFY AND PROVIDE ALL OTHER EQUIPMENT.
- EQUIPMENT ITEMS OF APPROVED QUALITY OR FUNCTION MAY BE SUBSTITUTED.
- EQUIPMENT ITEMS CAN BE UPGRADED TO MEET THE 'STANDARDS OF THE INDUSTRY' AT THE TIME THE TANK IS INSTALLED WITH THE ENGINEER'S APPROVAL.

\* - INDICATES SITE SPECIFIC INFORMATION.

**PIPING NOTES**

- PIPING SHALL BE SCHEDULE 40 STANDARD WEIGHT BLACK STEEL OR TYPE \*K\* HARD COPPER.
- LABEL ALL PIPING WITH FLOW ARROWS AND IDENTIFICATION MARKING F. D. S., F. D. R., FILL, VENT.
- PAINT ALL PIPING AND TANK WITH TWO COATS OF OIL RESISTANT ENAMEL (PER ANSI).
- ATTACH PIPING TO WALLS OR FLOOR AT 5'-0" MAX. SPACING.

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USE PURSUANT TO COMPANY INSTRUCTIONS

T-2

Interior Fuel Storage Tank  
Less Than 660 Gallons  
Design Criteria

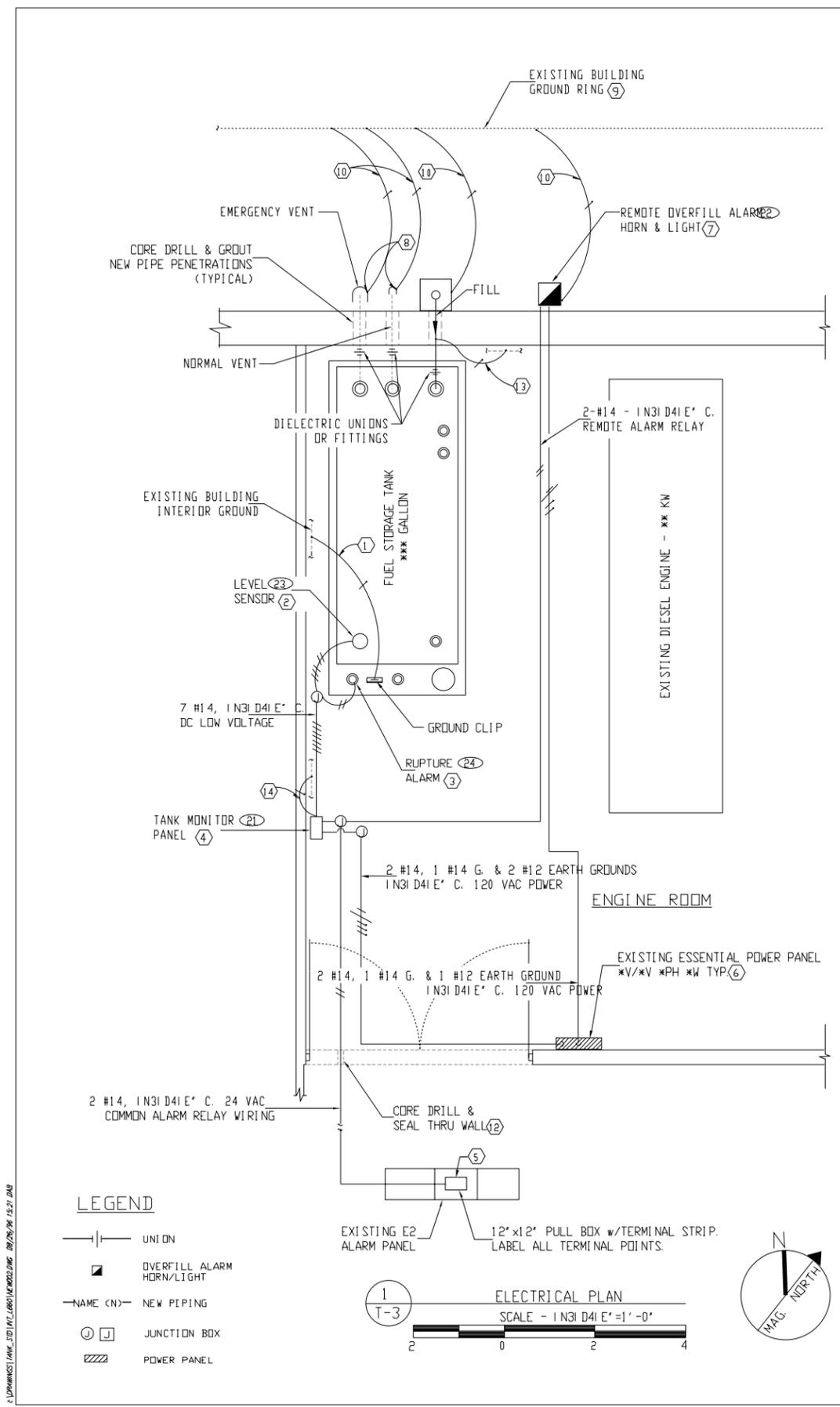
MECHANICAL PLAN

AT&T SCALE: AS NOTED  
SHEET 5 OF 10

C:\DOWNS\TANK\_571\PI\MPL\LOAD\MCHORDR.DWG 08/26/98 15:19 DAB



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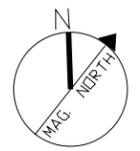
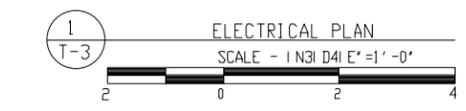


**ELECTRICAL NOTES**

- ① NEW 1#14#6 STRANDED GREEN GROUND WIRE TO FUEL OIL STORAGE TANK. WIRE TO EXISTING EARTH GROUNDING WIRE ON WALL ABOVE. SEE 6/T-5 & 7/T-5
- ② INSTALL AND WIRE TANK LEVEL SENSOR 23 TO NEW MONITOR PANEL. SEE 1/T-5 & 1/T-6
- ③ INSTALL AND WIRE TANK RUPTURE ALARM SWITCH 24 TO NEW MONITOR PANEL. SEE 2/T-5 & 1/T-6
- ④ INSTALL AND WIRE TANK MONITOR PANEL 21. SEE 1/T-6
- ⑤ ALARM RELAY WIRING, FINAL CONNECTION BY OWNER.
- ⑥ WIRE 120 VOLT. POWER SUPPLY TO TANK MONITORING PANEL AND REMOTE OVERFILL ALARM. PROVIDE 2 NEW 20 AMP, 1 POLE BREAKER. SEE 1/T-6
- ⑦ INSTALL AND WIRE WEATHERPROOF/REMOTE OVERFILL ALARM HORN & LIGHT 22 6'-0" ABOVE GROUND. SEE 1/T-6
- ⑧ CADWELD CONNECTION TO VENT PIPE AND TO BUILDING GROUND RING.
- ⑨ APPROXIMATE LOCATION OF EXISTING BURIED EXTERIOR GROUND RING. CONTRACTOR SHALL LOCATE RING IN CONJUNCTION WITH OWNER'S DESIGNATED REPRESENTATIVE.
- ⑩ RUN 1#14#2 SOLID TINNED COPPER GROUND WIRE DOWN WALL OF BUILDING IN 1#14#2" PVC CONDUIT TO 1'-0" BELOW FROST LINE AND CADWELD BOND TO EXTERIOR BURIED GROUND RING. TYPICAL FOR ALL NEW EXTERIOR METAL ITEMS.
- ⑪ FIELD LABEL ALL JUNCTION BOXES AND PANELS.
- ⑫ FIRE STOP ALL NEW PENETRATIONS THROUGH WALLS AND SLABS.
- ⑬ THOMAS AND BETTS #3900 SERIES HEAVY DUTY GROUND CLAMP FOR FILL PIPE. #6 STRANDED GREEN GROUND WIRE CONNECTION TO EXISTING BUILDING GROUND. SEE 7/T-5 & 11/T-5
- ⑭ #6 STRANDED GREEN PANEL GROUND TO EXISTING BUILDING GROUND. SEE 6/T-5 & 7/T-5

**LEGEND**

	UNION
	OVERFILL ALARM HORN/LIGHT
	NEW PIPING
	JUNCTION BOX
	POWER PANEL

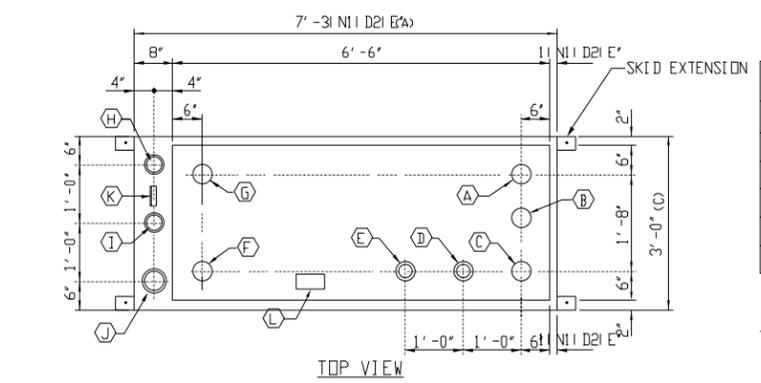


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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-3
Interior Fuel Storage Tank Less Than 660 Gallons Design Criteria	
<b>ELECTRICAL PLAN</b>	
AT&T	SCALE: AS NOTED SHEET 6 OF 10

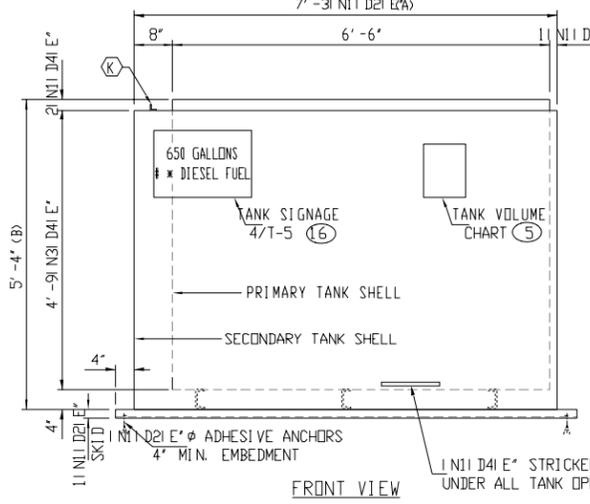
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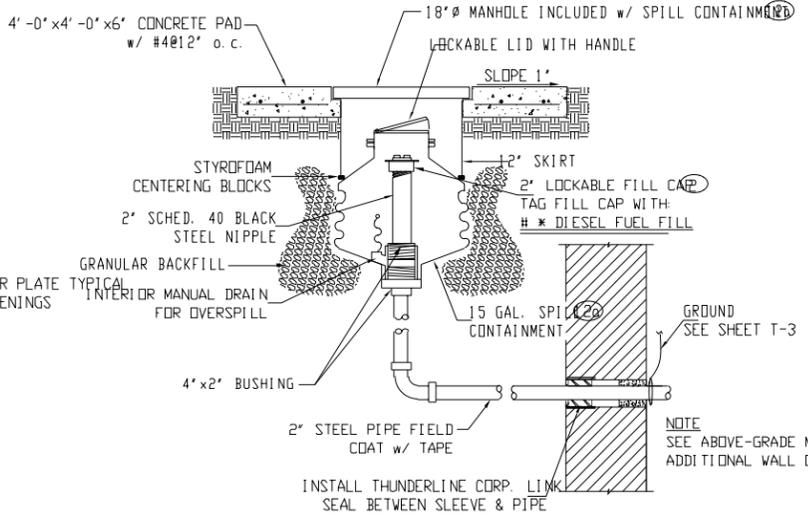


TANK TABLE						
CAPACITY	(A)	(B)	(C)	EMERGENCY VENT SIZE PRIMARY TANK	EMERGENCY VENT SIZE SECONDARY TANK	NORMAL VENT SIZE PRIMARY TANK
120 GALLONS	2'-5"	3'-4" 3'	-1 N11 D21 E"	4"	4"	2"
280 GALLONS	5'-3"	3'-4" 3'	-1 N11 D21 E"	4"	4"	2"
480 GALLONS	7'-6"	3'-0" 3'	-1 01 N11 D21 E"	4"	4"	2"
500 GALLONS	5'-3"	5'-4" 3'	-21 N11 D21 E"	4"	4"	2"
650 GALLONS	7'-3 1/2" N11 D21 E"	5'-4" 3'	3'-0"	4"	6"	2"

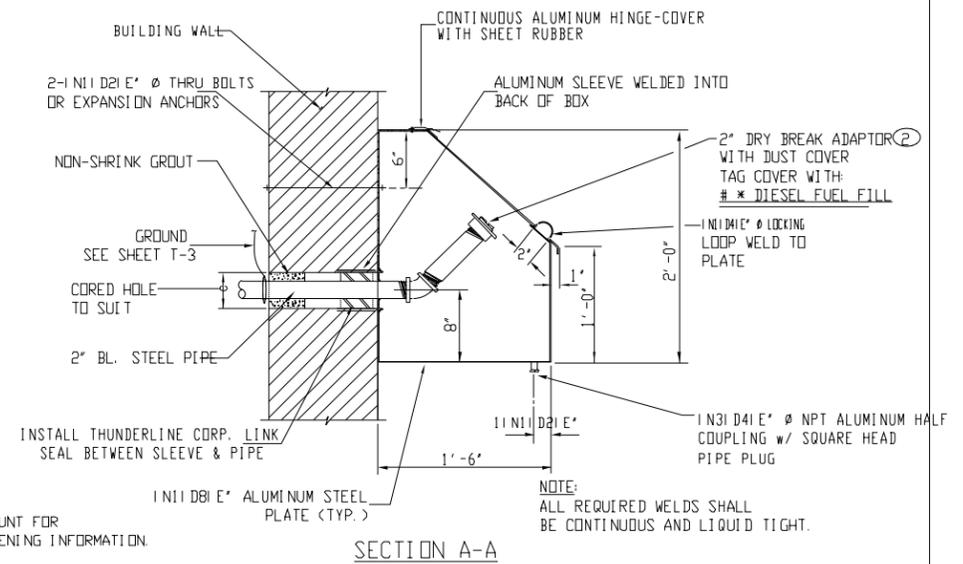
- OPENING SCHEDULE**
- (A) 4" Ø EMERGENCY VENT-PRIMARY TANK
  - (B) 4" Ø NORMAL VENT-PRIMARY TANK
  - (C) 4" Ø FUEL FILL
  - (D) 4" Ø FUEL OIL RETURN
  - (E) 4" Ø FUEL OIL SUPPLY
  - (F) 4" Ø STICK GAGE w/ HEX HEAD PLUG
  - (G) 4" Ø LEVEL SENSOR
  - (H) 4" Ø RUPTURE ALARM SWITCH
  - (I) 4" Ø INSPECTION w/ HEX HEAD PLUG
  - (J) 6" Ø EMERGENCY VENT-SECONDARY TANK
  - (K) GROUND CLIP (ON SECONDARY TANK ONLY)
  - (L) UNDERWRITER'S LABORATORY LABEL



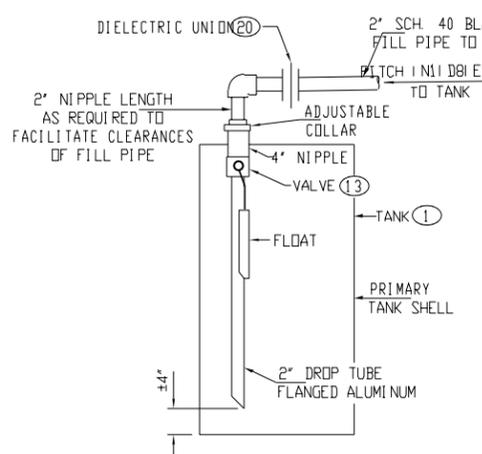
**1 TANK DETAILS**  
 T-4 (650 GALLON U/L DOUBLE WALL TANK SHOWN)  
 SCALE - 1/4" = 1'-0"  
 NOTE: VERIFY SPACE & DOOR RESTRICTIONS BEFORE SELECTING TANK SIZE.



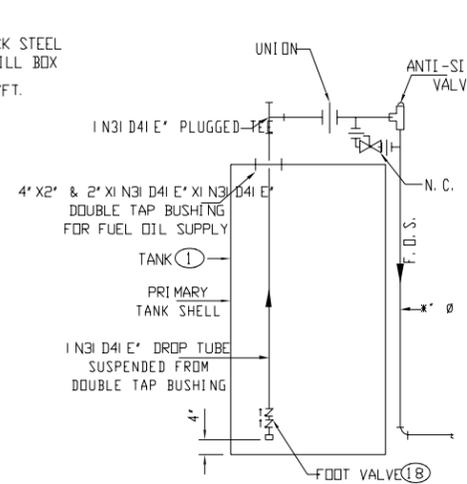
**2 EXTERIOR FILL CONTAINMENT DETAIL (FLUSH MOUNT)**  
 T-4 NO SCALE



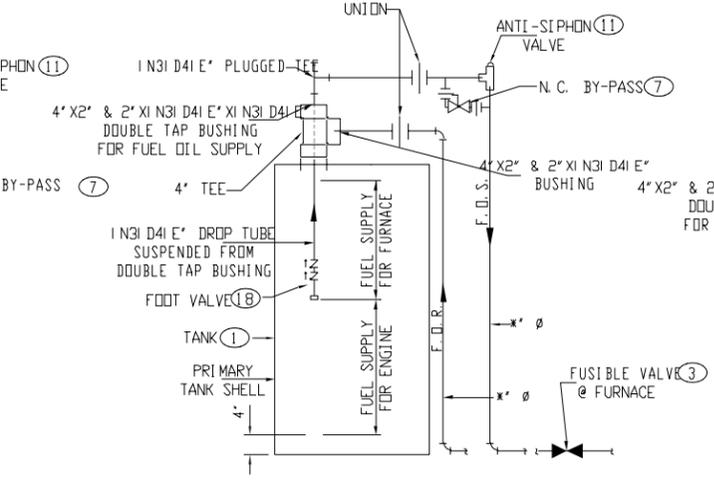
**2 EXTERIOR FILL CONTAINMENT DETAIL (ABOVE-GRADE MOUNT)**  
 T-4 NO SCALE



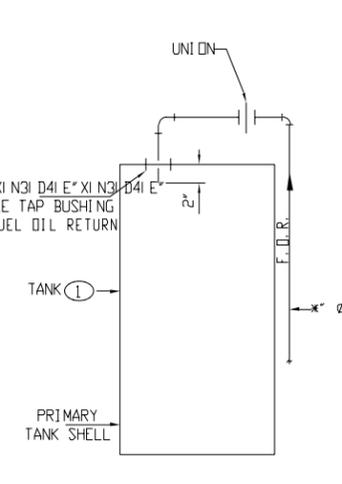
**3 OVERFILL PREVENTOR DETAIL**  
 T-4 NO SCALE



**4 FUEL OIL SUPPLY**  
 T-4 NO SCALE



**5 COMBINED FOS & FOR**  
 T-4 (FOR ENGINE & FURNACE OPERATION)  
 NO SCALE



**6 FUEL OIL RETURN**  
 T-4 NO SCALE

NOTE: SOME ENGINES MAY REQUIRE A CHECK VALVE AT THE ENGINE TO REDUCE THE STATIC FUEL PRESSURE ON INJECTORS.

NOTE: SOME ENGINES MAY REQUIRE A CHECK VALVE AT THE ENGINE TO PREVENT FUEL IN THE RETURN LINE FROM FLOWING BACK TO THE ENGINE DURING SHUT DOWN.

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T-4

Interior Fuel Storage Tank  
 Less Than 650 Gallons  
 Design Criteria

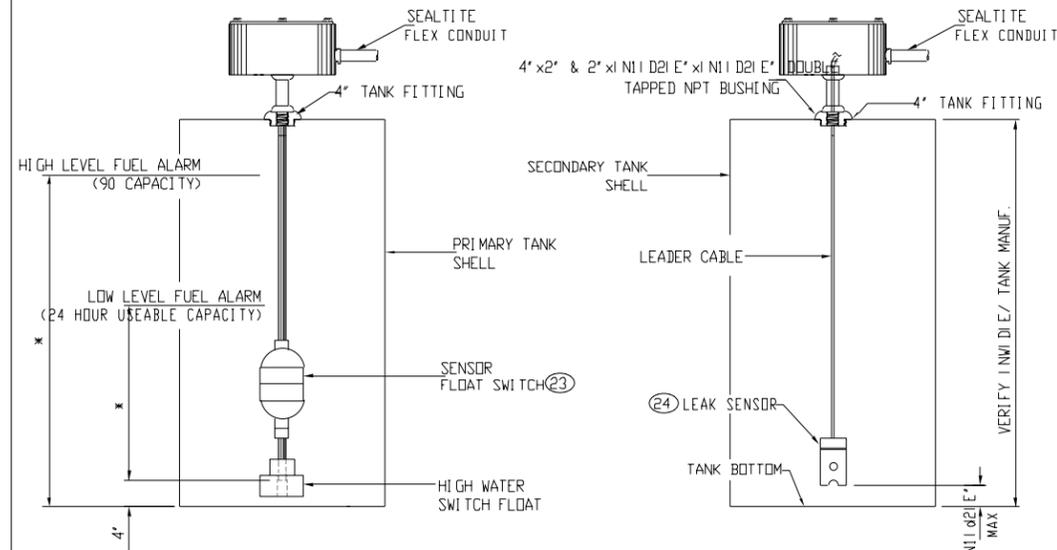
MECHANICAL DETAILS

SCALE: AS NOTED  
 SHEET 7 OF 10

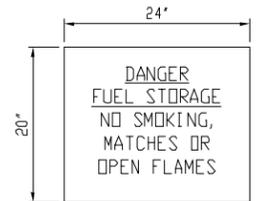
1. DRAWING (TANK SIZE) IN CONFORMANCE WITH 08/20/96 14.59 AIB



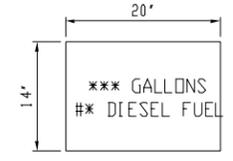
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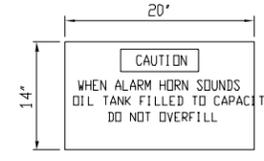
1 LEVEL SENSOR DETAIL NO SCALE  
2 RUPTURE ALARM SWITCH NO SCALE  
NOTE: VERIFY CLEARANCE BETWEEN TANK AND CEILING TO PERMIT INSTALLATION AND REMOVAL OF LEVEL SENSOR AND RUPTURE ALARM SWITCH.



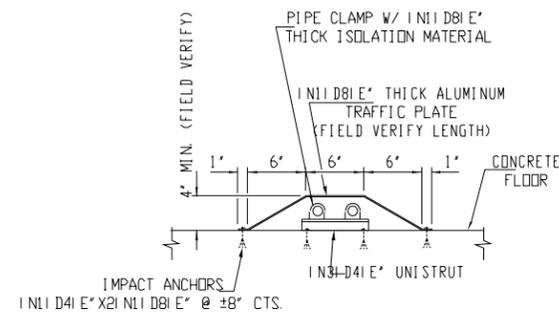
3 DOOR SIGNAGE NO SCALE  
NOTE: 3 INCH TALL BLACK, BLOCK LETTERING ON WHITE LAMICOID BACKGROUND. FASTEN TO DOOR WITH CONSTRUCTION ADHESIVE.



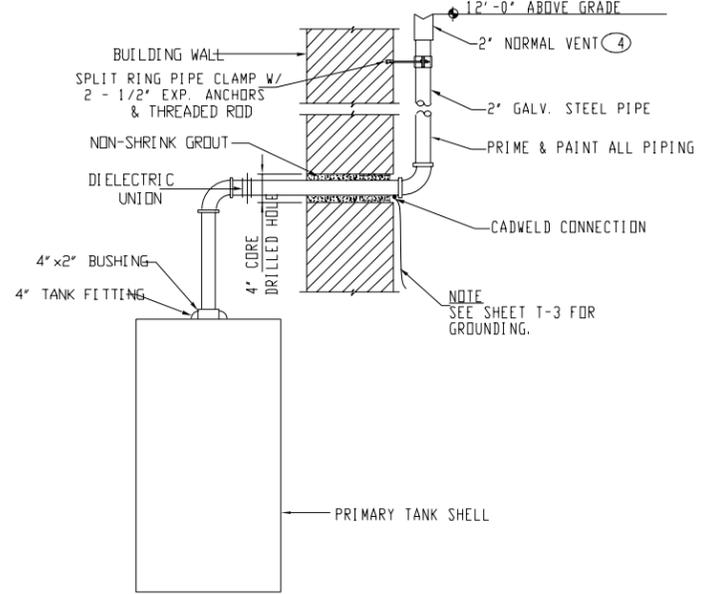
4 TANK SIGNAGE NO SCALE  
NOTE: 3 INCH TALL BLACK, BLOCK LETTERING ON WHITE LAMICOID BACKGROUND. FASTEN TO TANK WITH CONSTRUCTION ADHESIVE.



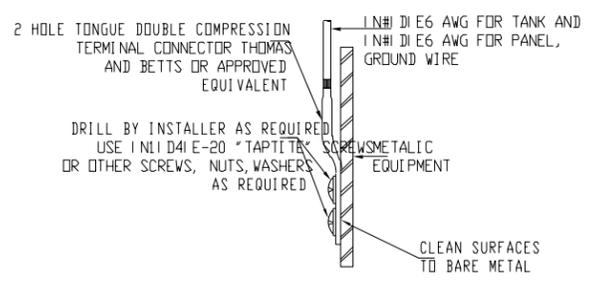
5 FILL BOX SIGNAGE NO SCALE  
NOTE: 2 INCH TALL BLACK, BLOCK LETTERING ON YELLOW LAMICOID BACKGROUND. FASTEN TO BUILDING WALL.



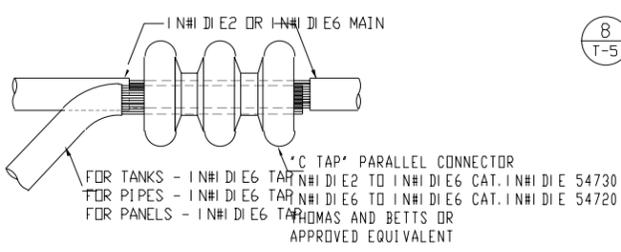
8 TRAFFIC PLATE DETAIL NO SCALE  
NOTE: PAINT WITH TWO COATS OF YELLOW EPOXY PAINT & BLACK SAFETY STRIPES.



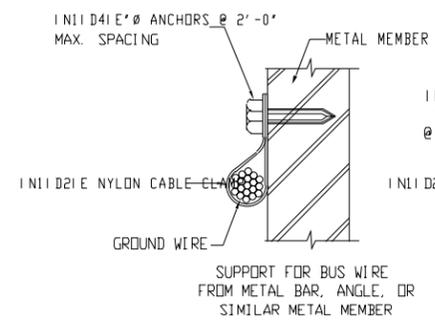
9 NORMAL VENT DETAIL NO SCALE



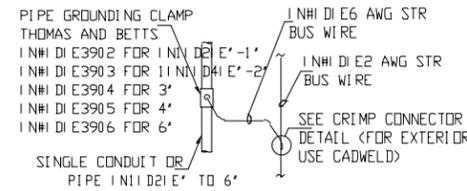
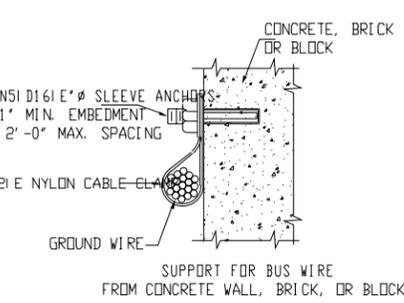
6 TYPICAL GROUND TONGUE COMPRESSION TERMINAL CONNECTION DETAIL NO SCALE



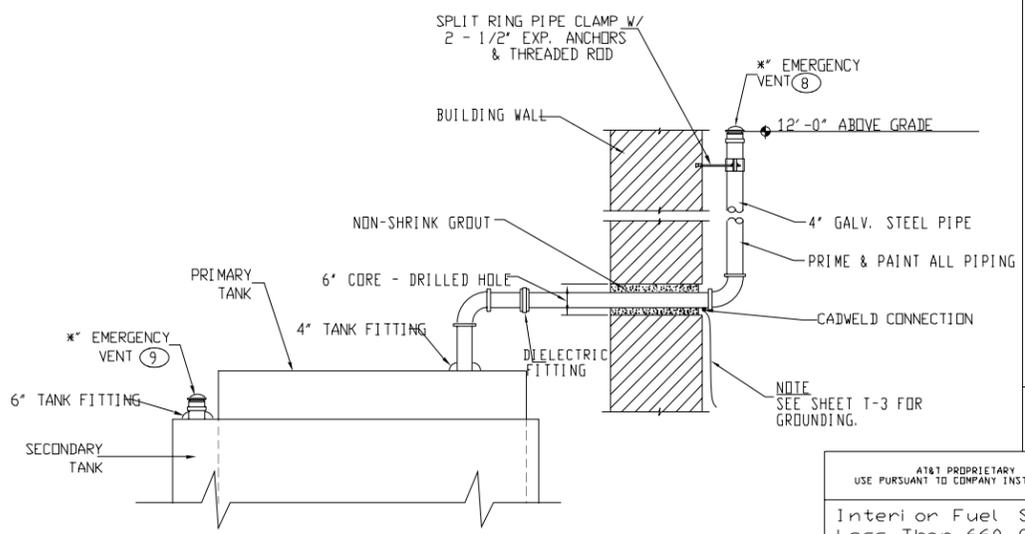
7 GROUND DOUBLE COMPRESSION CONNECTOR DETAIL NO SCALE



10 TYPICAL GROUND WIRE SUPPORT DETAIL NO SCALE



11 CONDUIT / PIPE GROUNDING DETAIL NO SCALE



12 EMERGENCY VENT DETAIL NO SCALE

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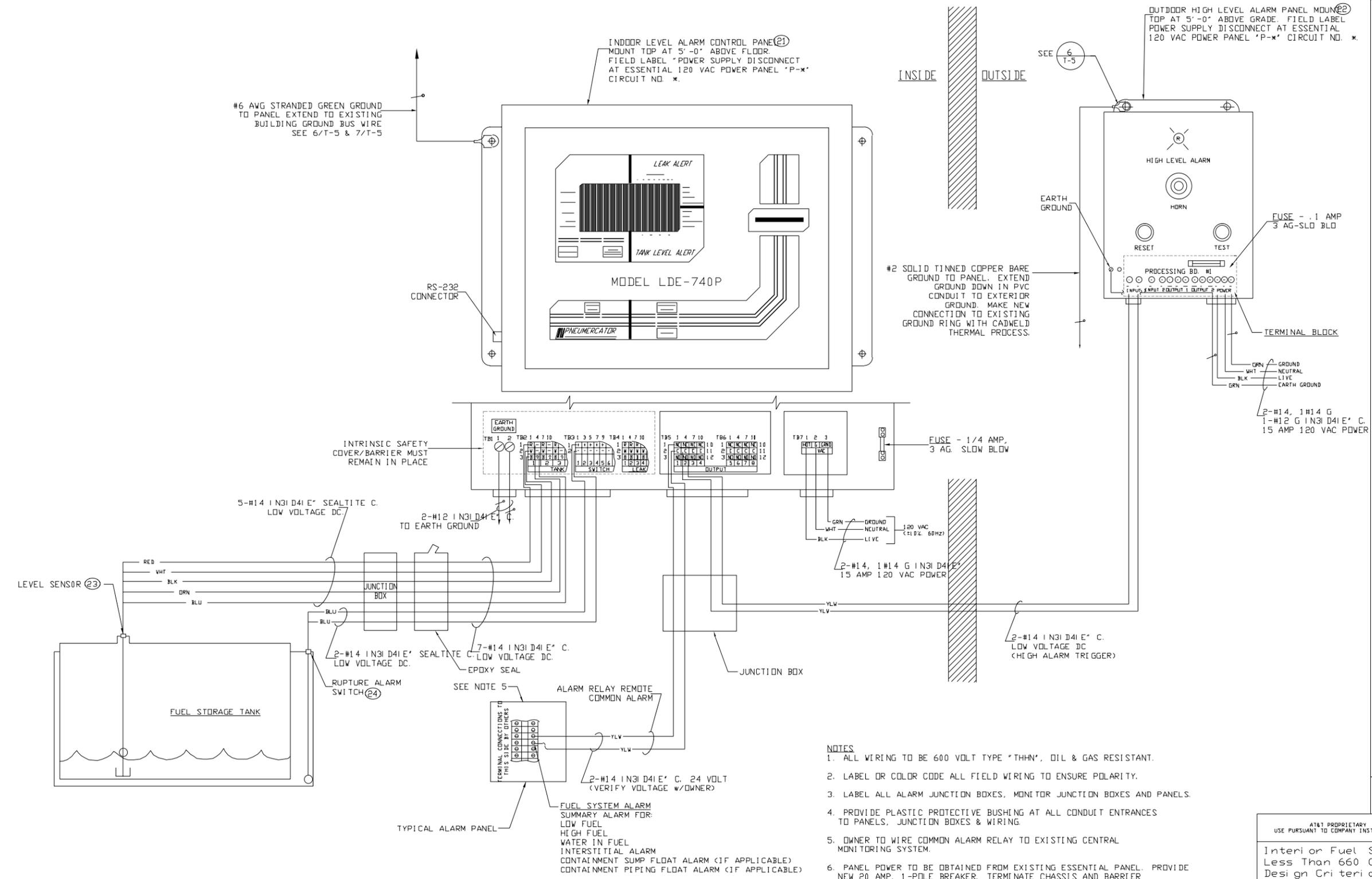
AT&T PROPRIETARY  
USE PURSUANT TO COMPANY INSTRUCTIONS  
T-5  
Interior Fuel Storage Tank  
Less Than 660 Gallons  
Design Criteria

ELECTRICAL DETAILS

1. INTERIOR FUEL STORAGE TANK (LESS THAN 660 GALLONS) 06/20/96 15 OF 248



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- NOTES
1. ALL WIRING TO BE 600 VOLT TYPE "THHN", OIL & GAS RESISTANT.
  2. LABEL OR COLOR CODE ALL FIELD WIRING TO ENSURE POLARITY.
  3. LABEL ALL ALARM JUNCTION BOXES, MONITOR JUNCTION BOXES AND PANELS.
  4. PROVIDE PLASTIC PROTECTIVE BUSHING AT ALL CONDUIT ENTRANCES TO PANELS, JUNCTION BOXES & WIRING.
  5. OWNER TO WIRE COMMON ALARM RELAY TO EXISTING CENTRAL MONITORING SYSTEM.
  6. PANEL POWER TO BE OBTAINED FROM EXISTING ESSENTIAL PANEL. PROVIDE NEW 20 AMP, 1-POLE BREAKER. TERMINATE CHASSIS AND BARRIER GROUND WIRE TO PANEL GROUND BUS.
  7. CONDUIT TO BE RIGID GALVANIZED.
  8. MONITORING WIRES SHALL BE A SINGLE RUN OF WIRE WITH NO SPLICES.

1 MONITOR/ALARM SCHEMATIC WIRING DIAGRAM  
NO SCALE

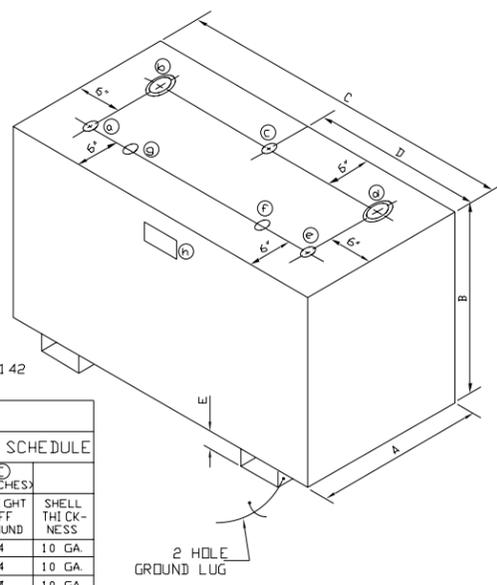
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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-6
Interior Fuel Storage Tank Less Than 660 Gallons Design Criteria	
MONITOR/ALARM WIRING DIAGRAM	
AT&T	SCALE: AS NOTED SHEET 9 OF 10

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- (a) 4" Ø FUEL FILL
- (b) 4" Ø EMERGENCY VENT
- (c) 4" Ø NORMAL VENT
- (d) 4" Ø HIGH/LOW LEVEL ALARM
- (e) 4" Ø FUEL RETURN
- (f) 4" Ø FUEL SUPPLY
- (g) 4" Ø STICK GAGE
- (h) UNDERWRITER'S LABORATORY LABEL UL142

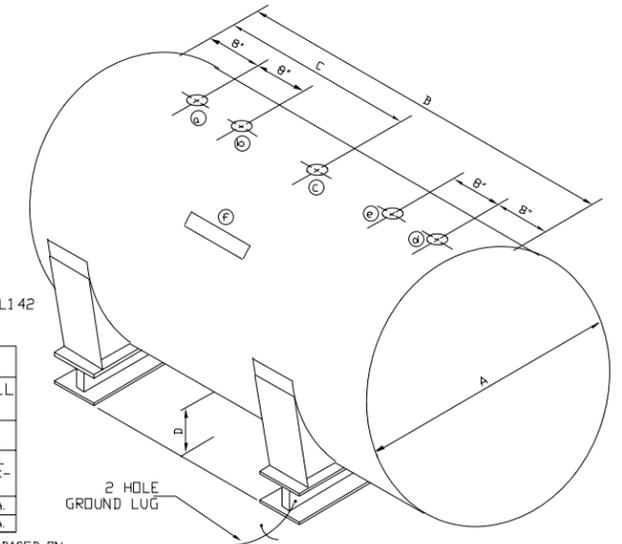


TYPE A						
RECTANGULAR SINGLE-WALL TANK SCHEDULE						
TANK CAPACITY (GALLONS)	(A) WIDTH (INCHES)	(B) HEIGHT (INCHES)	(C) LENGTH (INCHES)	(D) MIDPOINT (INCHES)	(E) HEIGHT OFF GROUND (INCHES)	(F) SHELL THICKNESS (GA.)
120	30	36	26	13	4	10 GA.
280	30	36	60	30	4	10 GA.
480	40	32	87	43 1/2	4	10 GA.
500	32	60	60	30	4	10 GA.
650	32	60	78	39	4	10 GA.

OTHER DIMENSIONS AND OPENING SIZES ARE ALLOWED BASED ON MANUFACTURER SPECIFIC SITE CONDITIONS.

1 RECTANGULAR SINGLE-WALL TANK  
 T-7 NO SCALE

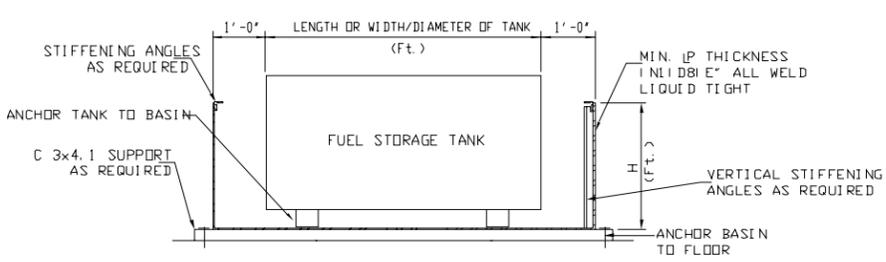
- (a) 4" Ø FUEL FILL OPENING / STICK
- (b) 4" Ø EMERGENCY VENT
- (c) 4" Ø NORMAL VENT
- (d) 4" Ø HIGH/LOW LEVEL ALARM
- (e) 4" Ø FUEL SUPPLY & RETURN
- (f) UNDERWRITER'S LABORATORY LABEL UL142



TYPE B					
HORIZONTAL CIRCULAR SINGLE-WALL TANK SCHEDULE					
TANK CAPACITY (GALLONS)	(A) DIAMETER (INCHES)	(B) LENGTH (INCHES)	(C) MIDPOINT (INCHES)	(D) HEIGHT OFF GROUND (INCHES)	(E) SHELL THICKNESS (GA.)
285	38	60	30	6	12 GA.
500	48	65	32 1/2	6	10 GA.

OTHER DIMENSIONS AND OPENING SIZES ARE ALLOWED BASED ON MANUFACTURER SPECIFIC SITE CONDITIONS.

2 HORIZONTAL CIRCULAR SINGLE-WALL TANK  
 T-7 NO SCALE

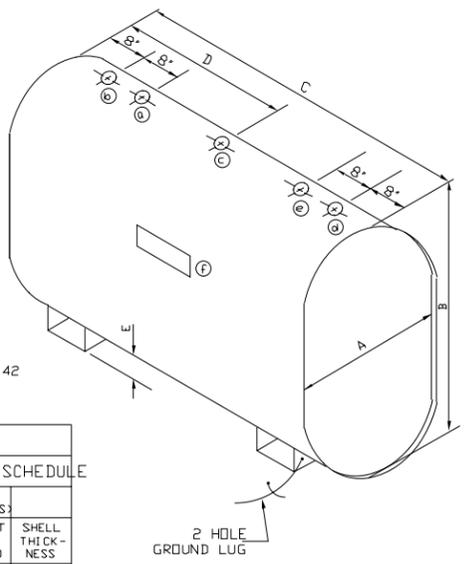


NOTE: FIELD PAINT FUEL STORAGE TANK AND CONTAINMENT BASIN - 2 COATS FINISH PAINT.

3 CONTAINMENT BASIN  
 T-7 NO SCALE

- NOTES:
- ALL TANKS SHALL BEAR U.L. LISTING NUMBER ON LABEL.
  - TANKS TO BE IN CONFORMANCE WITH UL-142.
  - LOW LEVEL ALARM SETTINGS NOT SHOWN. ALLOW MIN. 24 HRS. USABLE FUEL AT LOW ALARM SETTING.
  - REFER TO DETAIL SHEETS FOR PIPING CONNECTION.

- (a) 4" Ø FUEL FILL OPENING / STICK
- (b) 4" Ø EMERGENCY VENT
- (c) 4" Ø NORMAL VENT
- (d) 4" Ø HIGH/LOW LEVEL ALARM
- (e) 4" Ø FUEL SUPPLY & RETURN
- (f) UNDERWRITER'S LABORATORY LABEL UL142

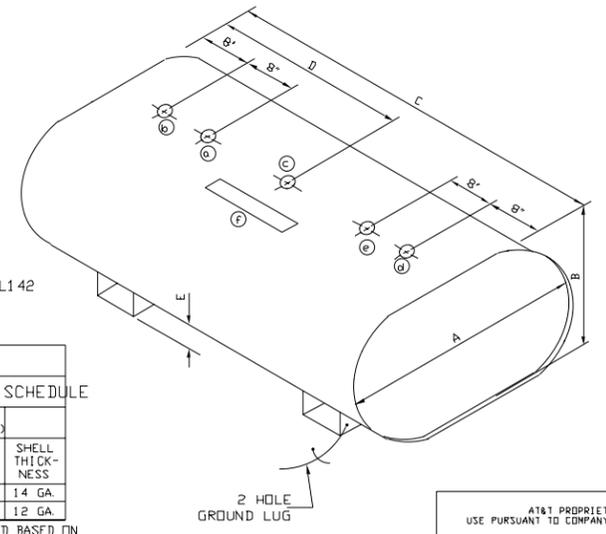


TYPE C						
VERTICAL OVAL SINGLE-WALL TANK SCHEDULE						
TANK CAPACITY (GALLONS)	(A) WIDTH (INCHES)	(B) HEIGHT (INCHES)	(C) LENGTH (INCHES)	(D) MIDPOINT (INCHES)	(E) HEIGHT OFF GROUND (INCHES)	(F) SHELL THICKNESS (GA.)
230	22	44 1/2	D41E2	30	4	14 GA.
275	27	44 1/2	D41E7	30	4	12 GA.

OTHER DIMENSIONS AND OPENING SIZES ARE ALLOWED BASED ON MANUFACTURER SPECIFIC SITE CONDITIONS.

4 VERTICAL OVAL SINGLE-WALL TANK  
 T-7 NO SCALE

- (a) 4" Ø FUEL FILL OPENING / STICK
- (b) 4" Ø EMERGENCY VENT
- (c) 4" Ø NORMAL VENT
- (d) 4" Ø HIGH/LOW LEVEL ALARM
- (e) 4" Ø FUEL SUPPLY & RETURN
- (f) UNDERWRITER'S LABORATORY LABEL UL142



TYPE D						
HORIZONTAL OVAL SINGLE-WALL TANK SCHEDULE						
TANK CAPACITY (GALLONS)	(A) WIDTH (INCHES)	(B) HEIGHT (INCHES)	(C) LENGTH (INCHES)	(D) MIDPOINT (INCHES)	(E) HEIGHT OFF GROUND (INCHES)	(F) SHELL THICKNESS (GA.)
230	44 1/2	D41E2	60	30	6	14 GA.
275	44 1/2	D41E7	60	30	6	12 GA.

OTHER DIMENSIONS AND OPENING SIZES ARE ALLOWED BASED ON MANUFACTURER SPECIFIC SITE CONDITIONS.

5 HORIZONTAL OVAL SINGLE-WALL TANK  
 T-7 NO SCALE

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 T-7

Interior Fuel Storage Tank  
 Less Than 660 Gallons  
 Design Criteria

ALTERNATIVE INTERIOR FUEL STORAGE TANK

1. DRAWING/TANK\_230/275/D41E2/D41E7/08/20/96 15:27:04





# ABOVEGROUND TANKS INSIDE BUILDINGS WITH FIRE RATED ENCLOSURE DESIGN CRITERIA

## SHEET INDEX

SHEET NUMBER	SHEET TITLE
CS-1	COVER SHEET
C-1	DESIGN CRITERIA
C-2	DESIGN CRITERIA
T-1	PIPING PLAN AND ENCLOSURE SECTIONS AND DETAILS
T-2	PIPING SCHEMATIC AND TANK SECTION AND DETAILS
T-3	CONTROLS AND WIRING DIAGRAMS
T-4	EQUIPMENT LIST AND DETAILS

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: <b>CS-1</b>
JOB TITLE AND LOCATION: DESIGN CRITERIA FOR INDOOR ABOVE GRND. TANKS WITH FIRE RATED ENCLOSURE	
DRAWING TITLE:  COVER SHEET	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 1 OF 7

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1.0 GENERAL

1.01 SCOPE

- A. THIS DESIGN CRITERIA, TOGETHER WITH THE SUPPLEMENTARY INFORMATION LISTED HEREIN, COVERS THE EQUIPMENT AND DESIGN REQUIREMENTS TO BE USED IN THE ENGINEERING, MANUFACTURE, AND INSTALLATION OF INDOOR FUEL OIL TANKS AND THEIR CONNECTION TO EMERGENCY STANDBY POWER PLANTS AND HEATING SYSTEMS. THE MAIN OBJECTIVE IS TO PROVIDE AN AUTOMATIC UNATTENDED RELIABLE FUEL STORAGE SYSTEM.
- B. THE FUEL OIL STORAGE SYSTEM SHOULD BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS AND DIRECTIVES FROM A&T PRACTICES AND WITH CONSIDERATIONS INDICATED IN PARAGRAPH 2.02.
- C. THE RECOMMENDATIONS IN THIS SECTION ARE BASED, IN GENERAL, ON THE NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, NFPA SECTION 30, 31, 37, 110, AND 321. MANY DETAILS FEATURED IN THESE SOURCE DOCUMENTS HAVE NOT BEEN COVERED HEREIN. REVIEW THESE AND OTHER APPLICABLE DOCUMENTS FOR COMPLETE DETAILS.
- D. FEDERAL, STATE, LOCAL, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS SHOULD BE FULLY COMPLIED WITH AT ALL TIMES, INCLUDING INTERFACING WITH AND UPGRADING EXISTING FUEL SYSTEMS.
- E. THE USE OF TANKS MUST PROVIDE A SAFE AND ENVIRONMENTALLY SOUND STORAGE SYSTEM. IT IS ESSENTIAL THAT FEATURES FOR RELIABILITY, SAFETY, FIRE PROTECTION, ENVIRONMENTAL PROTECTION, STRUCTURAL INTEGRITY, SEISMIC PROTECTION, AND ISOLATION SHOULD BE INCORPORATED AND ADDRESSED.
- F. PLANS AND SPECIFICATIONS SHOULD BE SUBMITTED FOR PROPOSED INSTALLATIONS OF FUEL OIL TANK LOCATIONS, ILLUSTRATING SUCH FEATURES AS TANK SIZE, UTILITIES, DISTANCES FROM THE FACILITIES, PROPERTY LINES, BUILDING PENETRATIONS, ROOM LAYOUTS, DOORS, WINDOWS, AND WATER MAINS IF APPLICABLE. PRELIMINARY PLANS SHOULD BE SUBMITTED TO THE OWNER FOR THEIR APPROVAL AND THEN SUBMITTED TO LOCAL AUTHORITIES FOR REVIEW AND APPROVAL.
- G. TANK AREAS, ENCLOSURES, AND ADJACENT SPACES SHOULD BE KEPT FREE FROM DEBRIS AND OTHER MATERIALS WHICH MAY BE COMBUSTIBLE OR FLAMMABLE.
- H. PROPER SIGNS AND DECALS SHALL BE SPECIFIED. THE PURPOSE OF THE SIGNAGE IS TO ADVISE OCCUPANTS THAT OPEN FLAMES AND SMOKING ARE PROHIBITED WITHIN AND AROUND THE TANK AREA.
- I. SEISMIC BRACING AND NECESSARY FLEXIBLE CONNECTORS SHOULD BE SPECIFIED TO PREVENT DAMAGE TO TRANSFER PIPING OR TANKS, DURING PERIODS OF SEISMIC ACTIVITY.
- J. IF THE SPECIFIC PROJECT INVOLVES REMOVAL OR CLOSURE OF AN EXISTING TANK, REFER TO UST REMOVAL AND ABANDONMENT CRITERIA.
- K. SOIL SAMPLING SHOULD BE AT THE DISCRETION OF THE OWNER AND ENGINEER.
- L. WHERE REFERENCES TO SPECIFIC MANUFACTURERS ARE SHOWN, AN ALTERNATE MAY BE SUBSTITUTED FOR APPROVAL.

1.02 OWNER INVOLVEMENT

- A. DETAILED INVOLVEMENT WITH THE OWNER SHOULD TRANSLATE INTO OVERALL COST SAVINGS DUE TO THE ANTICIPATED REDUCTION IN ENGINEERING COSTS AND CONSTRUCTION DELAYS, DUE TO POTENTIAL DESIGN CHANGES REQUESTED BY THE OWNER.
- B. THE OWNER SHOULD BE CONSULTED DURING THE DESIGN/INSTALLATION PROCESS BECAUSE THEY ARE FAMILIAR WITH EQUIPMENT OPERATION AND AVAILABLE SPACE AT THE BUILDING TO PROVIDE FOR A SUITABLE FUEL OIL TANK LOCATION, OR CONVERSELY RENDER SOME LOCATIONS UNSUITABLE. AS A MINIMUM, THE OWNER SHOULD BE INVOLVED WITH THE FOLLOWING:
  1. FIELD VERIFY LOCATION OF FUEL OIL TANK.
  2. REVIEW OF PRELIMINARY AND FINAL DESIGN PLANS AND SPECIFICATIONS.
  3. CONSULTATION, DEVELOPMENT, AND ACKNOWLEDGEMENT OF A WORK METHOD OF PROCEDURES (MOP) NEEDED FOR THE PROJECT.
  4. PROJECT OVERSIGHT DURING CONSTRUCTION, INCLUDING SITE ACCESS.
  5. ACCEPTANCE OF THE COMPLETED WORK.
  6. MAINTAIN DOCUMENTATION IN ACCORDANCE WITH PART 12.

2.0 TANK REQUIREMENTS

2.01 TANK LOCATION

- A. TANKS SHOULD NOT BE LOCATED ADJACENT TO OUTDOOR AIR INLETS OR FIRE ESCAPE EXITS.
- B. TANK LOCATIONS SHALL BE IN ACCORDANCE WITH LOCAL CODES AND STANDARDS. SUFFICIENT CLEARANCES SHALL BE MAINTAINED AROUND THE TANKS AS REQUIRED FOR MAINTENANCE AND AS REQUIRED BY APPLICABLE CODES.
- C. CONSIDERATION SHOULD BE GIVEN TO TANK CLEARANCES AND ACCESS INTO THE BUILDING.

2.02 SIZING MAIN STORAGE TANKS

- A. STANDARD TANK SIZING CRITERIA FOR EMERGENCY STANDBY GENERATORS IS AS FOLLOWS:  

$$\text{HOURLY CONSUMPTION CONNECTED LOAD} \times 72 \text{ HRS.} \times 4 = 90\% \text{ OF TANK VOLUME}$$
- B. OWNER SHALL VERIFY AND APPROVE CALCULATED VOLUMES.
- C. ADDITIONAL SUPPLIES SHOULD BE CONSIDERED FOR FACILITIES WHICH ARE REMOTE OR WHERE ACCESS IS NOT AVAILABLE DURING WINTER MONTHS DUE TO POOR WEATHER CONDITIONS OR WHERE CONTRACTUAL OBLIGATIONS REQUIRE GREATER VOLUME.
- D. TANK SYSTEMS SUPPORTING BOTH EMERGENCY STANDBY GENERATORS AND HEATING SYSTEMS SHALL BE SIZED IN ACCORDANCE WITH PARAGRAPHS A OR B ABOVE, PLUS ADDITIONAL FUEL AS REQUIRED TO SUPPORT THE HEATING SYSTEMS.

3.0 STORAGE TANK

3.01 GENERAL

- A. LOCAL CODE REQUIREMENTS
- B. VERIFY A PATH FOR TANK ENTRY INTO THE BUILDING.
- C. STRUCTURAL ENGINEER SHOULD VERIFY THAT THE LOADS FROM THE TANKS AND ENCLOSURE WILL NOT OVERSTRESS THE EXISTING BUILDING STRUCTURE.

3.02 CONTAINMENT AREA

- A. THE CONTAINMENT AREA SHOULD CONTAIN 110% OF THE LARGEST TANK TO BE CONTAINED.
- B. LOCAL CODE REQUIREMENTS MAY REQUIRE THAT THE CAPACITY OF THE CONTAINMENT AREA BE GREATER THAN 110%.

3.03 FIRE RATED ENCLOSURE

- A. MINIMUM FIRE RATING FOR FLOORS, WALLS AND CEILING IS THREE HOURS. CHECK WITH LOCAL CODES FOR OTHER POSSIBLE RATINGS.
- B. PENETRATIONS THROUGH THE ENCLOSURE MUST BE CAULKED WITH A FIRE RATED CAULK EQUAL TO THE ENCLOSURE.

3.04 ABOVEGROUND TANK

- A. THE TANK SHOULD BE HORIZONTAL CYLINDRICAL, SINGLE WALL, FABRICATED TO UL-142 STANDARDS.
- B. THE TANK SHOULD CONTAIN A 24" DIAMETER MAN-HOLE AND AN INTERNAL LADDER FOR ENTRY INTO THE TANK. THIS MAY BE NECESSARY IN ORDER TO INSTALL INTERNAL PIPING FROM THE INSIDE OF THE TANK, IF CLEARANCE ABOVE THE TANK IS NOT ADEQUATE FOR INSTALLATION FROM OUTSIDE.

3.05 VENTING

- A. PRIMARY AND EMERGENCY VENTING SHOULD COMPLY WITH NFPA 30 SIZING REQUIREMENTS. BOTH VENTS SHOULD TERMINATE OUTSIDE THE BUILDING, SEE UNDERGROUND STORAGE TANK CRITERIA.

3.06 MISCELLANEOUS

- A. FILL PIPE
  1. TERMINATE OUTSIDE BUILDING WITH EITHER AN ABOVEGROUND SPILL CONTAINMENT FILL BOX OR IF THE PIPING IS UNDERGROUND, USE A SPILL CONTAINMENT MANHOLE.
- B. LIGHTING
  1. SPECIFY VAPOR PROOF LIGHTING AND EMERGENCY LIGHTING INSIDE THE TANK ENCLOSURE.

4.0 PIPING

4.01 PRODUCT PIPING

- A. FUEL OIL SUPPLY AND RETURN PIPING SHALL BE SUITABLE FOR USE AS ABOVEGROUND FUEL OIL PIPING.
  1. ACCEPTABLE CARRIER PIPE:
    - A. SCHEDULE 40 CARBON STEEL.
    - B. TYPE "K" HARD COPPER.
    - C. ACCEPTABLE ALTERNATE.
  2. ACCEPTABLE SECONDARY CONTAINMENT PIPE:
    - A. SCHEDULE 40 STEEL.
    - B. HDPE.
    - C. ACCEPTABLE ALTERNATE.

4.02 VENT PIPING

- A. TANK VENTING SYSTEMS SHALL BE DESIGNED ACCORDING TO NFPA 30 AND LOCAL CODES.
- B. VENT PIPING SHALL BE GALVANIZED SCHEDULE 40 STEEL.

4.03 PIPING MATERIALS:

- A. COPPER PIPING:
  1. COPPER PIPE SOLDER JOINTS SHALL BE OF TYPE CONFORMING TO ANSI B16.22. COPPER PIPE UNIONS SHALL BE WROUGHT COPPER, CAST BRONZE, OR BRASS.
  2. INSULATING UNIONS FOR COPPER PIPE SHALL BE PROVIDED AT ALL EQUIPMENT HAVING FERROUS CONNECTIONS.
  3. FLARE FITTINGS FOR COPPER PIPE ARE NOT ACCEPTABLE. SOLDER SHALL BE A SILVER ALLOY SOLDER WITH A MELTING POINT OF NOT LESS THAN 1100° F.
  4. SILVER BRAZING FLUX SHALL BE USED FOR SOLDER OF 1100° F. OR HIGHER MELTING POINT.
  5. DIELECTRIC COUPLINGS AND/OR FLANGED KITS SHALL BE PROVIDED AT ALL COPPER TO STEEL CONNECTIONS AND AS REQUIRED TO ISOLATE THE PIPING FROM THE TANK.
  6. ABOVEGROUND COPPER PIPING SHALL BE HARD DRAWN COPPER.
- B. STEEL PIPING:
  1. STEEL PIPE SHALL BE CARBON STEEL SEAMLESS ASTM A53 GRADE A OR GRADE B CARBON STEEL BUTT WELDED ASTM A120.
  2. PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40 OR EXTRA HEAVY WEIGHT SCHEDULE 80.
  3. PIPE FINISH SHALL BE GALVANIZED OR BLACK.
  4. FITTINGS FOR JOINTS 2-1/2 INCHES IN DIAMETER OR SMALLER SHALL BE THREADED OR WELDED.
  5. FITTINGS FOR JOINTS 3 INCHES IN DIAMETER OR LARGER SHALL BE FLANGED OR WELDED.

6. THREADED JOINTS:

- A. FITTINGS SHALL BE 300 LB. MALLEABLE IRON, SCREWED - ANSI B16.3.
- B. PIPE THREADING SHALL BE IN ACCORDANCE WITH USAS B 2.1 - 1988. SCREWED JOINTS SHALL HAVE STANDARD THREADS, CLEAN CUT AND TAPERED WITH ALL BURRS REMOVED. JOINT COMPOUND SHALL BE APPLIED TO THE MALE THREADS.
- C. JOINT COMPOUND FOR THREADED JOINTS SHALL BE "GASOLIA SOFT-SET WITH TEFLON" OR AS APPROVED.

7. WELDED JOINTS:

- A. 2-1/2 INCHES AND SMALLER: SOCKET WELDED STEEL FITTINGS ANSI B16.11.
- B. 3 INCHES AND LARGER: BUTT WELDED FITTINGS ANSI B16.9.

8. FLANGED JOINTS:

- A. FITTINGS SHALL BE SLIP ON TYPE STEEL WELDED FLANGES. WELDED NECK FITTINGS MAY BE USED FOR WELDED FITTINGS WHERE REQUIRED. FITTINGS SHALL BE CLASS 150 STEEL PIPE FLANGES AND FLANGED FITTINGS, ANSI B16.5.
- B. STEEL BOLTS AND NUTS SHALL BE CADMIUM PLATED - ASTM A307 GRADE B.
- C. GASKETS SHALL BE RING TYPE, 1/8 INCH THICK, GASOLINE RESISTANT.

4.04 INSTALLATION:

- A. ABOVEGROUND PIPING:
  1. DESIGN EXPOSED PIPING TO RUN PARALLEL TO WALL OF STRUCTURES.
  2. SUPPORTS AND ANCHORS SHALL BE ADEQUATE TO SUPPORT THE PIPE FILLED WITH WATER WITH A MINIMUM SAFETY FACTOR OF 1.2 AND FOR THE TEST PRESSURE SPECIFIED, SPECIFY FACTORY ENGINEERED SUPPORTS, BRACES AND ANCHORS, WHERE REQUIRED.
  3. FUEL OIL TRANSFER PIPING SHOULD BE ARRANGED TO PREVENT GRAVITY FEED FROM THE FUEL OIL STORAGE TANK TO THE ENGINE.
  4. ALL PIPING CONNECTIONS TO THE ABOVEGROUND STORAGE TANK SHOULD BE AT THE HIGHEST POINT. NO PIPING CONNECTIONS SHOULD BE MADE BELOW THE HIGHEST POSSIBLE FUEL STORAGE LEVEL.
  5. ANTI-SYPHON VALVES SHOULD BE PROVIDED TO PREVENT LOSS OF FUEL OIL INTO UNDESIRABLE AREAS (THE ENVIRONMENT OR THE FACILITY).
  6. SUPPLY PIPING SHALL BE INSTALLED FOR TOP-LOADING OF THE DAY TANKS. METALLIC FILL PIPES SHALL BE DESIGNED AND INSTALLED TO MINIMIZE THE GENERATION OF STATIC ELECTRICITY BY TERMINATING THE PIPE WITHIN 4 TO 6 INCHES FROM THE BOTTOM OF THE TANK.

4.05 TESTING

- A. PIPING SHALL BE LEAKAGE TESTED PRIOR TO BEING COVERED, ENCLOSED OR PLACED INTO SERVICE.
- B. FUEL OIL PIPING SHALL BE HYDROSTATICALLY TESTED TO THE GREATER OF: 100 PSIG OR 150% OF WORKING PRESSURE FOR 1 HOUR WITH NO READABLE PRESSURE DROP ON A 1/2 OF 1% ACCURACY GAUGE. TANK SHALL BE ISOLATED FROM PIPING DURING THIS TEST.
- C. SECONDARY CONTAINMENT PIPING SHALL BE PRESSURE TESTED TO FIVE POUNDS OF AIR FOR TWO HOURS.
- D. ALL JOINTS SHALL BE SOAPED AND VISUALLY INSPECTED DURING TESTING. NO LOSS IN PRESSURE WILL BE ALLOWED.
- E. ALL TESTING SHALL BE WITNESSED BY THE OWNER.
- F. EACH PIPING SYSTEM SHALL, AFTER ALL TESTING IS SATISFACTORILY COMPLETED, BE FLUSHED, BLOWN OUT OR OTHERWISE CLEANED IN ACCORDANCE WITH THE REQUIREMENT OF THE PIPE FABRICATION STANDARD ES 5.
- G. ALL LOCAL CODES SHALL BE ADHERED TO.

5.00 ACCESSORIES/SPECIALTIES

5.01 ACCESSORIES AND SPECIALTIES SHALL BE PROVIDED AS REQUIRED FOR THE SPECIFIED SITE.

5.02 VALVES

- A. DOUBLE POPPET FOOT VALVE SHALL BE INSTALLED AT THE BASE OF THE SUCTION DROP TUBE TO PREVENT FUEL, IN THE SUCTION PIPING TO THE ENGINE, FROM DRAINING OR SIPHONING BACK TO THE STORAGE TANK.
- B. A PRESSURE BYPASS VALVE IS TO BE INSTALLED AT THE ENGINE IF AUTOMATIC SHUTOFF VALVES ARE INSTALLED IN THE RETURN PIPING BACK TO THE TANK.
- C. ALL CONTROL VALVES SHOULD BE PROVIDED WITH A MANUAL OVERRIDE DEVICE TO ENABLE THE SYSTEM OPERATOR TO OVERRIDE A MALFUNCTIONING VALVE DURING AN EMERGENCY OR CONTROL SYSTEM FAILURE.
- D. AN EMERGENCY SHUT-OFF VALVE WITH A FUSIBLE LINK MAY BE REQUIRED AT THE ENTRANCE OF THE FUEL OIL PIPING INTO THE FACILITY. THIS VALVE SHALL CLOSE IN THE EVENT OF A FIRE WITHIN THE ENGINE ROOM, THEREBY TERMINATING THE FUEL SUPPLY.

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- 5.03 ABOVEGROUND TANKS ACCESSORIES
- FOR PIPING OR TANK INSTALLATIONS WHICH ARE LOCATED ABOVE THE ENGINE INJECTORS, ANTI-HEAD PRESSURE VALVES SHALL BE INSTALLED IN BOTH SUPPLY AND RETURN LINES.
  - EMERGENCY VENT FOR PRIMARY TANK. MORRISON BROS. NO. 244, 8 OZ./SQ.IN.
  - FLEXIBLE CONNECTORS - TITFLEX, UL LISTED FOR ABOVEGROUND PETROLEUM SERVICE.
  - VENT CAPS SHALL BE OPW FUELING COMPONENTS MODEL 23 OR EMCO-WHEATON MODEL A634.
- 6.0 EXCAVATION AND BACKFILL - NOT USED
- 7.0 RIGGING AND HOISTING
- 7.01 THE ENGINEER SHOULD ASSESS THE DEGREE OF DIFFICULTY ASSOCIATED WITH THE RIGGING AND HOISTING FOR TANK REMOVALS AND INSTALLATIONS. THE FOLLOWING ITEMS, AT MINIMUM SHOULD BE CONSIDERED.
- WEIGHT AND PHYSICAL SIZE OF TANK OR OBJECT TO BE LIFTED.
  - PROXIMITY OF RIGGING AND HOISTING EQUIPMENT TO ADJACENT STRUCTURES.
  - DIFFICULTY IN ACCESSING THE AREA FROM THE STANDPOINT OF OVERHEAD UTILITIES, UNDERGROUND UTILITIES, ROADS, DRIVEWAYS AND OTHER OBSTACLES.
  - EVALUATE THE POSSIBILITY OF IMPACTING ADJACENT PROPERTY DURING MOBILIZATION AS WELL AS THE ACTUAL RIGGING AND HOISTING OPERATION.
- 7.02 THE MINIMUM FOLLOWING STATEMENT SHOULD BE INCLUDED IN THE SPECIFICATIONS.
- RIGGING AND HOISTING SHALL BE PERFORMED IN ACCORDANCE WITH OSHA EQUIPMENT RIGGING REGULATIONS (29 CFR PART 1926 CHAPTER XVII, 7-1-90 EDITION, PAGES 203-207) AND WITH OSHA CRANE AND DERRICK REGULATIONS (29 CFR PART 1926 CHAPTER XVII, 7-1-90 EDITION, PAGES 120-131).
  - WHERE THE DESIGN ENGINEER FEELS THE DEGREE OF DIFFICULTY WARRANTS THAT SPECIAL PRECAUTIONS SHOULD BE TAKEN, THE SPECIFICATIONS SHOULD INCLUDE PROVISIONS FOR A LICENSED PROFESSIONAL ENGINEER TO DESIGN AND SUPERVISE THE RIGGING AND HOISTING OPERATION.
  - IN ADDITION TO "A" ABOVE, THE FOLLOWING STATEMENT SHOULD BE INCLUDED:  
"PROFESSIONAL ENGINEER'S RESPONSIBILITY"  
1. THE CONTRACTOR SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER WHO WILL TAKE ON THE FOLLOWING RESPONSIBILITIES:  
    - SUBMIT A "RIGGING PROCEDURE PLAN" TO THE OWNER FOR APPROVAL.
    - OBTAIN COPIES OF THE DATA SHEETS, EQUIPMENT CATALOGS AND SPECIFICATIONS FOR THE RIG TO BE USED ON THE JOB. COPIES SHALL BE SUBMITTED WITH THE "RIGGING PROCEDURE PLAN" TOGETHER WITH CALCULATIONS TO CONFIRM THE SAFE OPERATION OF THE RIGGING EQUIPMENT DURING THE VARIOUS STAGES, FROM LIFTING TO PLACING THE OBJECT IN ITS FINAL POSITION.
    - INSPECT THE RIG AND OTHER EQUIPMENT AND DEVICES TO BE USED IN THE RIGGING OPERATION TO VERIFY THAT THE EQUIPMENT, ETC. IS IN A SAFE CONDITION.
    - WITNESS TEST LOADING OF RIGGING EQUIPMENT WHEN REQUIRED BY OSHA REQUIREMENTS.
    - SUPERVISE THE RIGGING OPERATION TO ENSURE THAT IT FOLLOWS THE APPROVED "RIGGING PROCEDURE PLAN" AND TO MAKE DECISIONS ACCORDINGLY TO ENSURE SAFETY DURING THE RIGGING OPERATION.

- 8.0 CONCRETE
- 8.01 GENERAL
- THESE STANDARDS SHALL APPLY TO CONCRETE ANCHOR SLABS, TOP SLABS AND OTHER MISCELLANEOUS CAST-IN-PLACE CONCRETE.
- DESIGN REFERENCES SHALL INCLUDE:
    - ACI 304.2R - PLACING CONCRETE BY PUMPING METHODS
    - ACI 305R - HOT WEATHER CONCRETING
    - ACI 306R - COLD WEATHER CONCRETING
    - ACI 315 - MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES
    - ACI 318 - SPECIFICATIONS FOR STRUCTURE CONCRETE FOR BUILDINGS
    - ASTM A 615 - SPECIFICATION FOR DEFORMED AND PLAIN BILLET STEEL BARS FOR CONCRETE REINFORCEMENT
    - ASTM C 31 - TEST METHODS FOR MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD
    - ASTM C 39 - TEST METHOD FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS
  - ENGINEER SHALL EVALUATE PROJECT LOCATION FOR SEISMIC RISK. REFERENCE SEISMIC RISK MAPS PRODUCED BY APPLIED TECHNOLOGY COUNCIL, 480 CALIFORNIA AVENUE, PALO ALTO, CALIFORNIA 94306 OR OTHER NATIONALLY ACCEPTED RISK MAPS.

- C. MISCELLANEOUS DESIGN CRITERIA AS FOLLOWS:
- ALL CONCRETE SHOULD BE DESIGNED UTILIZING A MINIMUM OF 3000 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C-39.
  - REINFORCEMENT BARS SHALL BE ASTM A 615, GRADE 60.
  - EVALUATE NEED, IF ANY, FOR WATERPROOFING OR DAMPPROOFING SYSTEMS AS WELL AS WATERSTOPS.
- 9.0 MONITORING SYSTEMS
- 9.1 GENERAL
- PROVIDE AN ELECTRONIC TANK GAUGING SYSTEM THAT PERFORMS THE FOLLOWING FUNCTIONS.
    - CONTINUOUS TANK GAUGING.
    - NON-DISCRIMINATING INTERSTITIAL MONITORING.
    - RELAY OUTPUTS FOR REMOTE ALARMING.
    - RS-232 PORT FOR INTERFACE WITH COMPUTERS FOR PROGRAMMING THE UNIT, REMOTE INTERROGATION AND INTERFACE WITH BUILDING AUTOMATION SYSTEMS.
    - WATER DETECTION
    - THE SYSTEM SHALL BE TO PNEUMERCATOR LDE-740P. VEEDEE-ROOT TLS 350 OR APPROVED ALTERNATE.
- 10.0 ALARMS - LATER
- 11.0 GROUNDING
- 11.01 THE PRIMARY PURPOSES FOR INSTALLING A LOW IMPEDANCE GROUNDING SYSTEM ARE PERSONNEL SAFETY BY MINIMIZING THE POSSIBILITY OF ELECTRIC SHOCK, EQUIPMENT PROTECTION FROM FIRE HAZARDS, PROPER EQUIPMENT OPERATION, NOISE REDUCTION IN COMMUNICATION CIRCUITS AND RELIABILITY WITH LITTLE MAINTENANCE REQUIRED. IN ORDER TO INSURE ALL THE ABOVE, THE GROUNDING SYSTEMS SHALL BE DESIGNED AND INSTALLED TO MEET THE MINIMUM STANDARDS AS SET FORTH IN THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE, ARTICLE 250, AND ALSO ACCORDING TO AT&T PRACTICES.
- 11.02 ALL METALLIC OBJECTS ABOVE GRADE ON THE OUTSIDE OF THE BUILDING SHALL BE ATTACHED TO THE EXTERIOR GROUND RING.
- 11.03 ALL CONNECTIONS TO THE EXTERIOR GROUND RING SHALL BE MADE USING CADWELDS.
- 11.04 ALL CONNECTIONS TO THE INTERIOR BUILDING GROUND SHALL MATCH EXISTING CONNECTORS.
- 12.0 RECORD DOCUMENTS
- 12.01 INSTALLATION DOCUMENTATION (5 COPIES) FOR THE SITE SHALL BE REQUIRED AS FOLLOWS:
- TABLE OF CONTENTS
  - STATE AND LOCAL PERMITS
  - DAILY WORK LOG
  - CONTRACTOR'S GUARANTEE
  - WARRANTS OF LIEN
  - ORIGINAL COPIES OF INSTALLATION, OPERATING AND MAINTENANCE MANUALS
  - CERTIFICATION AND COPIES OF TEST RESULTS
  - PHOTOGRAPHS
  - AS-BUILT DRAWINGS
  - FLOW DIAGRAMS AND SYSTEM DISCREPTION OF OPERATIONS

**GENERAL CONSTRUCTION/SITE STANDARD SYMBOLS AND ABBREVIATIONS**

- EARTH / COMPACT FILL
- CONCRETE
- PEA GRAVEL
- TEST BORING
- MONITORING WELL
- SOIL SAMPLING LOCATION
- SANITARY SEWER
- FOUNDATION DRAIN
- CITY WATER
- BURIED ELECTRICAL
- STORM SEWER
- BURIED TELEPHONE
- EXISTING CHAIN LINK FENCE
- NEW OR TEMPORARY CHAIN LINK FENCE
- CATCH BASIN

**ELECTRICAL STANDARD SYMBOLS AND ABBREVIATION**

- STREET LIGHT
- UTILITY POLE
- MANHOLE
- LIGHTING PANEL
- POWER PANEL
- DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- JUNCTION BOX
- OVERFILL ALARM HORN/LIGHT

**MECHANICAL STANDARD SYMBOLS AND ABBREVIATION**

- UNION
- FLEX CONNECTION
- NEW PIPING
- EXISTING PIPING
- WORK BELOW GRADE
- REMOVE EXISTING
- GATE VALVE
- BALL VALVE
- MULTI-PORT BALL VALVE W/MANUAL OPERATOR
- SOLENOID VALVE WITH MANUAL OPERATOR
- SOLENOID VALVE WITHOUT MANUAL OPERATOR
- FUSE LINK VALVE
- PRESSURE RELIEF VALVE
- CHECK VALVE
- VACUUM GAUGE WITH COCK
- PRESSURE GAUGE WITH COCK
- DUPLEX STRAINER (PLAN)
- DUPLEX STRAINER (ELEVATION)
- HAND PUMP
- VENT CAP
- ON CENTER
- GAUGE
- GALVANIZED
- STEEL
- FUEL OIL
- FUEL OIL RETURN
- FUEL OIL SUPPLY
- FUEL OIL VENT
- FUEL OIL OVERFLOW
- GALLON
- ABOVEGROUND STORAGE TANK
- UNDERGROUND STORAGE TANK

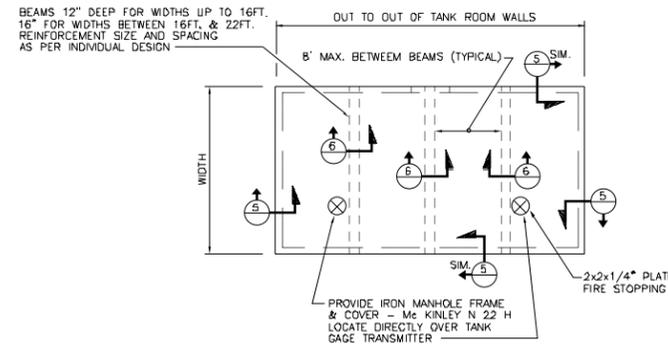
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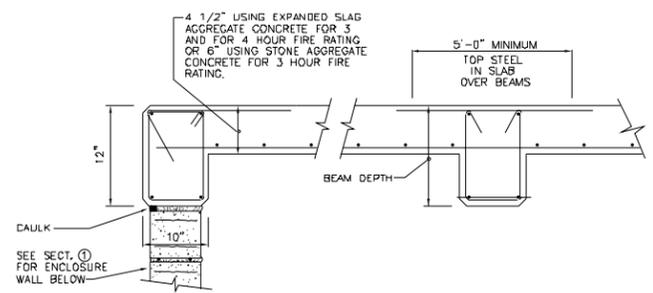


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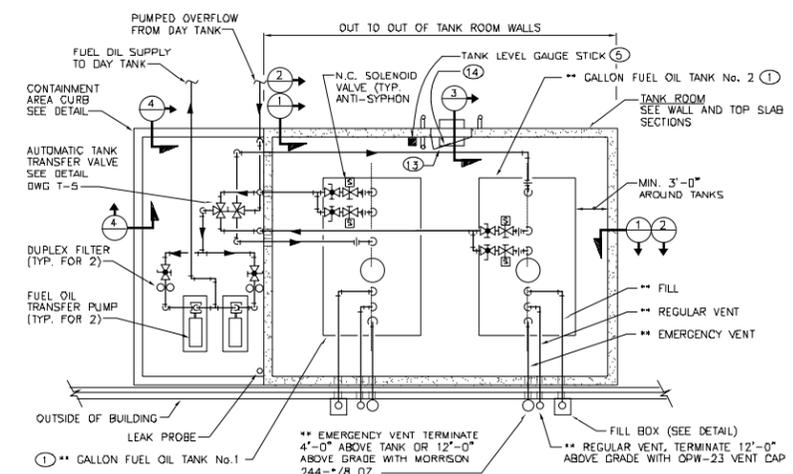


**ALTERNATE CEILING FRAMING PLAN**  
(CAST-IN-PLACE)

(ALTERNATE TO PRE-CAST (+TOPPING SLAB) CEILING CONSTRUCTION SHOWN IN SECT. ①)



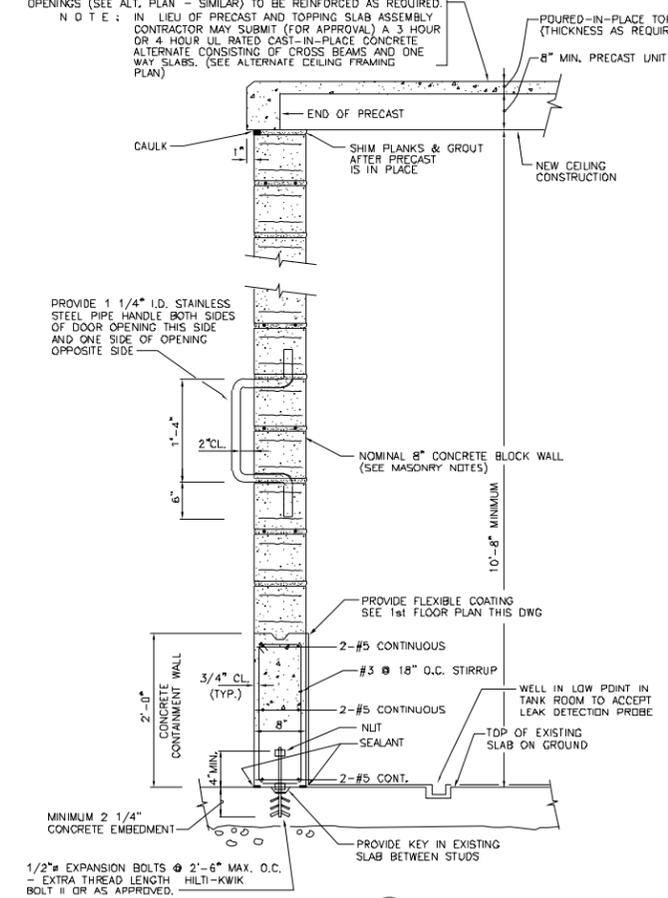
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**SECTION ⑥** SCALE: 1"=1'-0"



**TYPICAL TANK ROOM FLOOR PLAN**  
(TWO-\*\*\*\* GALLON ABOVE GROUND TANKS)  
NOT TO SCALE

UL APPROVED 3 HOUR OR 4 HOUR (AS REQ'D BY CODE) FIRE RATED ASSEMBLY, CONSISTING OF HOLLOW CORED, PRECAST CONCRETE UNITS WITH UNRESTRAINED ENDS AND APPROPRIATE CONCRETE TOPPING SLAB. ASSEMBLY SHALL SUPPORT A MINIMUM LIVE LOAD OF 80 PSF WITHOUT OVERSTRESS OR UNDEQ. DEFLECTION. PRECAST PLANKS WITH MANHOLE OPENINGS (SEE ALT. PLAN - SIMILAR) TO BE REINFORCED AS REQUIRED.

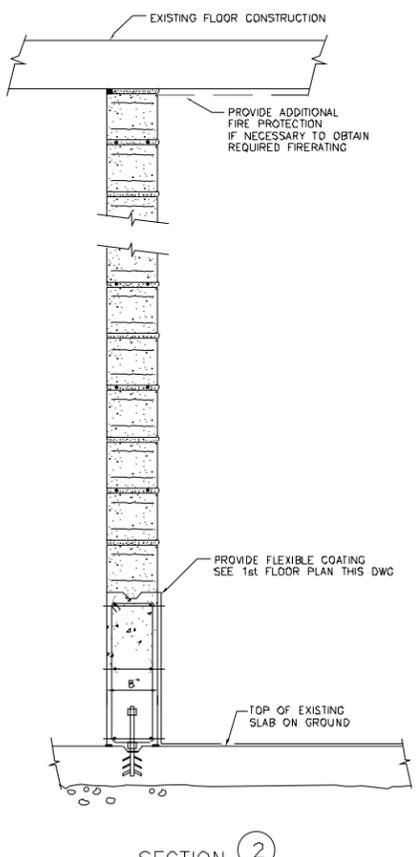
N O T E : IN LIEU OF PRECAST AND TOPPING SLAB ASSEMBLY CONTRACTOR MAY SUBMIT (FOR APPROVAL) A 3 HOUR OR 4 HOUR UL RATED CAST-IN-PLACE CONCRETE ALTERNATE CONSISTING OF CROSS BEAMS AND ONE WAY SLABS. (SEE ALTERNATE CEILING FRAMING PLAN)



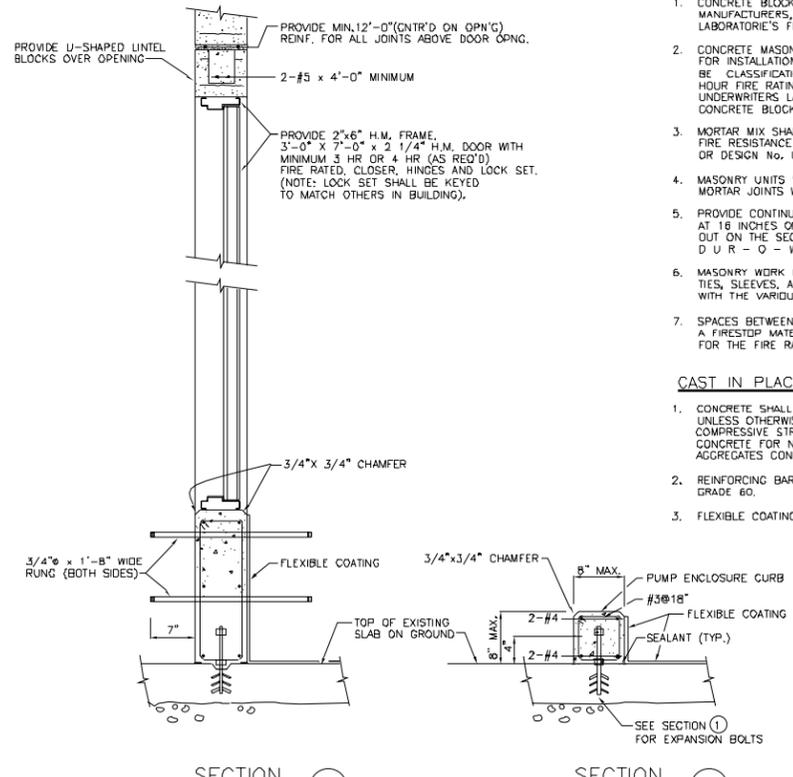
**SECTION ①**  
**WHERE NEW CEILING CONSTRUCTION IS REQUIRED**  
SCALE: 1"=1'-0"

N O T E : 1. NEW CEILING CONSTRUCTION IS NECESSITATED WHEN EXISTING DUCTWORK, PIPING ETC. ABOVE PROPOSED TANK ROOM AREA CANNOT BE RELOCATED TO ALLOW THE TANK ROOM ENCLOSURE WALLS TO EXTEND UP TO THE UNDERSIDE OF EXISTING FLOOR FRAMING ABOVE (AS SHOWN IN SECTION 2)

2. EXISTING PIPING, COLUMNS ETC. EXTENDING THROUGH THE NEW CEILING CONSTRUCTION SHALL BE ISOLATED FROM THE CEILING CONSTRUCTION BY SPLIT SLEEVES FOR PIPING OR EXPANSION MATERIAL AROUND EXISTING COLUMNS. OPENINGS SHALL BE FIRE STOPPED.



**SECTION ②**  
**WHERE NEW CEILING CONSTRUCTION IS NOT REQUIRED**  
SCALE: 1"=1'-0"  
N O T E : FOR INFORMATION NOT SHOWN SEE SECTION ①



**SECTION ③** SCALE: 1"=1'-0"  
**SECTION ④** SCALE: 1"=1'-0"  
N O T E : FOR INFORMATION NOT SHOWN SEE SECTION ①  
N O T E : \*\* CRITICAL DIMENSIONS REQUIRED.

**MASONRY NOTES:**

1. CONCRETE BLOCKS SHALL BE MANUFACTURED BY ONE OF THE ELIGIBLE MANUFACTURERS, LISTED IN THE LATEST EDITION OF THE UNDERWRITERS LABORATORIES FIRE RESISTANCE DIRECTORY.
2. CONCRETE MASONRY UNITS SHALL BE CLASSIFICATION C-3 (3 HOUR) FOR INSTALLATIONS REQUIRING A THREE HOUR FIRE RATING. UNITS SHALL BE CLASSIFICATION B-4 (4 HOUR) FOR INSTALLATIONS REQUIRING A FOUR HOUR FIRE RATING. MANUFACTURER SHALL SUBMIT A CERTIFICATE OF UNDERWRITERS LABORATORIES IDENTIFYING THE CLASSIFICATION OF THE CONCRETE BLOCK UNITS SUPPLIED.
3. MORTAR MIX SHALL BE AS SPECIFIED IN THE UNDERWRITERS LABORATORIES FIRE RESISTANCE DESIGN No. U 904 FOR A 3 HOUR FIRE RATING OR DESIGN No. U 901 FOR A 4 HOUR FIRE RATING.
4. MASONRY UNITS SHALL BE LAID UP IN RUNNING BOND ON FULLY BEDDED MORTAR JOINTS WITH 3/8" THICK CONCAVE JOINTS.
5. PROVIDE CONTINUOUS TRUSS TYPE, HORIZONTAL JOINT REINFORCEMENT SPACED AT 18 INCHES ON CENTER (EXCEPT WHERE A CLOSER SPACING IS CALLED OUT ON THE SECTIONS) REINFORCEMENT SHALL BE EXTRA HEAVY D U R - O - W A L OR THE EQUIVALENT.
6. MASONRY WRK INCLUDES THE BUILDING IN OF DOOR FRAMES, REQUIRED TIES, SLEEVES, ANCHORS, HANDLES, INSERTS ETC. IN COOPERATION WITH THE VARIOUS TRADES.
7. SPACES BETWEEN SLEEVES AND PIPING SHALL BE FILLED SOLID WITH A FIRESTOP MATERIAL SUCH AS HILTI'S CS 240 FIRE STOP MATERIAL FOR THE FIRE RATING REQUIRED.

**CAST IN PLACE CONCRETE NOTES:**

1. CONCRETE SHALL BE OF NATURAL AGGREGATES CONFORMING TO ASTM C 33 UNLESS OTHERWISE NOTED. ALL CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4000 POUNDS PER SQUARE INCH AT 28 DAYS. CONCRETE FOR NEW CEILING CONSTRUCTION MAY BE OF LIGHT WEIGHT AGGREGATES CONFORMING TO ASTM C330.
2. REINFORCING BARS SHALL BE DEFORMED BARS CONFORMING TO ASTM A 615, GRADE 60.
3. FLEXIBLE COATING - SEMSTONE 805 BY SENTRY POLYMERS NOMINAL THICKNESS 60-70 MILS.

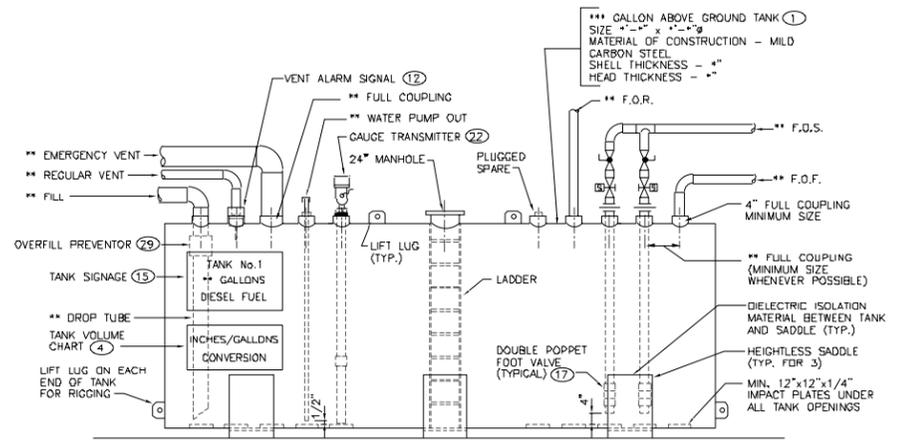
**ABOVEGROUND INTERIOR FUEL TANK INSTALLATION**  
**TYPICAL 3 HOUR OR 4 HOUR FIRE RATED ENCLOSURE**

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: T-1
JOB TITLE AND LOCATION: <b>DESIGN CRITERIA FOR INDOOR ABOVE GRND. TANKS WITH FIRE RATED ENCLOSURE</b>	
DRAWING TITLE: PIPING PLAN AND ENCLOSURE, SECTIONS AND DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 4 OF 7

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DECEMBER 1, 1995	2.



ABOVEGROUND FUEL OIL TANK SECTION

NOT TO SCALE

VALVE CHART

VALVE No.	ACTION	DESCRIPTION
V-1	-	F.O.R. ISOLATION VALVE (3 WAY) ⑳
V-2	N.O.	TANK No.2 PRIMARY SUCTION ISOLATION VALVE ⑥
V-3	N.G.	TANK No.2 SPARE SUCTION ISOLATION VALVE ⑥
V-4	N.C.	TANK No.2 SOLENOID/ANTI-SIPHON VALVE ⑳
V-5	N.G.	TANK No.2 SOLENOID/ANTI-SIPHON VALVE ⑳
V-6	N.O.	TANK No.1 PRIMARY SUCTION ISOLATION VALVE ⑥
V-7	N.G.	TANK No.1 SPARE SUCTION ISOLATION VALVE ⑥
V-8	N.C.	TANK No.1 SOLENOID/ANTI-SIPHON VALVE ⑳
V-9	N.C.	TANK No.1 SOLENOID/ANTI-SIPHON VALVE ⑳
V-10	-	AUTOMATIC TANK SELECTOR VALVE
V-11	-	SEE CONTROL DIAGRAM ON DRAWING T-5 ⑮
V-12	N.O.	F.O. PUMP SUCTION MANIFOLD TO PRIMARY TANK SHUT-OFF VALVE ⑥
V-13	N.C.	DAY TANK PUMP OUT SHUT OFF VALVE ⑥
V-14	N.O.	F.O. PUMP P-2 SUCTION ISOLATION VALVE ⑥
V-15	N.O.	F.O. PUMP P-1 SUCTION ISOLATION VALVE ⑥
V-16	N.O.	F.O. PUMP P-1 DISCHARGE ISOLATION VALVE ⑥
V-17	N.O.	F.O. PUMP P-2 DISCHARGE ISOLATION VALVE ⑥
V-18	N.O.	F.O. PUMP DISCHARGE MANIFOLD SHUT-OFF ⑥
V-19	N.C.	F.O.R. ISOLATION VALVE ⑥
V-20	N.C.	HAND PUMP DISCHARGE ISOLATION VALVE ⑥
V-21	N.C.	HAND PUMP SUCTION ISOLATION VALVE ⑥
V-22	N.O.	FUSE LINK VALVE ⑳
V-23	N.O.	FUSE LINK VALVE ⑳
V-24	N.O.	FUSE LINK VALVE ⑳

FUEL OIL SYSTEM

DESCRIPTION OF OPERATION

**NORMAL OPERATION**

- ALL VALVE ACTIONS SHOULD CORRESPOND TO THE VALVE CHART. FUEL OIL PUMPS P-1 OR P-2 WILL CYCLE IN RESPONSE TO THE DAY TANK CONTROLS TO MAINTAIN A NORMAL LEVEL OF FUEL OIL IN THE DAY TANK. FOR ADDITIONAL DAY TANK, DAY TANK CONTROLS AND F.O. PUMP DESIGN CRITERIA SEE "DESIGN CRITERIA FOR DAY TANK AND DAY TANK CONTROLS."

**FAILURE OF PRIMARY STORAGE TANK SUCTION LINE**

- (TANK No.1) CLOSE VALVE V-6, OPEN VALVE V-7
- (TANK No.2) CLOSE VALVE V-2, OPEN VALVE V-3

**TO PUMP OUT DAY TANK**

- CLOSE VALVE V-12
- OPEN VALVE V-13
- CLOSE VALVE V-18
- OPEN VALVES V-19
- POSITION VALVE No.1 TO DISCHARGE INTO THE APPROPRIATE TANK
- START F.O. PUMP P-1 OR P-2 MANUALLY TO EMPTY DAY TANK INTO PRIMARY TANK.

**OPERATING HAND PUMP TO FILL DAY TANK**

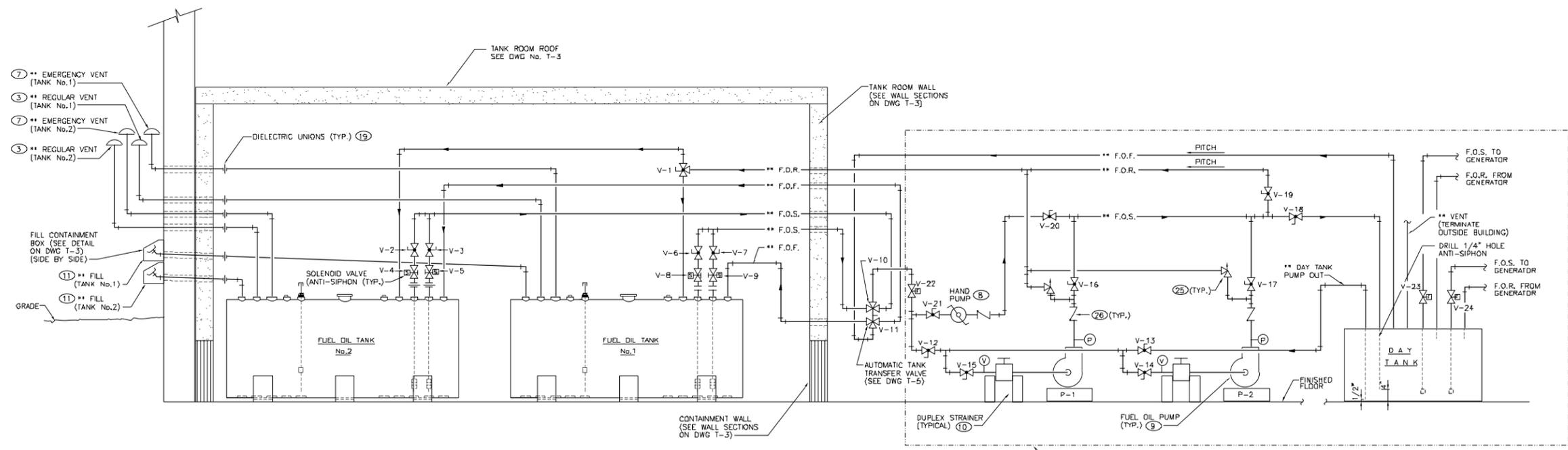
- CLOSE VALVE V-12
- OPEN VALVE V-20
- OPEN VALVE V-21
- MANUALLY OPEN APPROPRIATE SOLENOID VALVES.

**TO TRANSFER FUEL FROM TANK No.1 TO TANK No.2**

- SELECT TANK No.1, AT THE AUTOMATIC TRANSFER VALVE
- CLOSE VALVES V-18
- OPEN VALVES V-19
- POSITION VALVE V-1 TO DISCHARGE INTO TANK No.2

**TO TRANSFER FUEL FROM TANK No.2 TO TANK No.1**

- SELECT TANK No.2, AT THE AUTOMATIC TRANSFER VALVE
- CLOSE VALVES V-18
- OPEN VALVES V-19
- POSITION VALVE V-1 TO DISCHARGE INTO TANK No.1



TYPICAL DUAL ABOVEGROUND TANK WITH AUTOMATIC TANK TRANSFER VALVE PIPING SCHEMATIC

NOT TO SCALE

FOR ADDITIONAL DAY TANK DAY TANK CONTROLS, AND F.O. PUMP DESIGN CRITERIA SEE "DESIGN CRITERIA FOR DAY TANK AND DAY TANK CONTROLS."

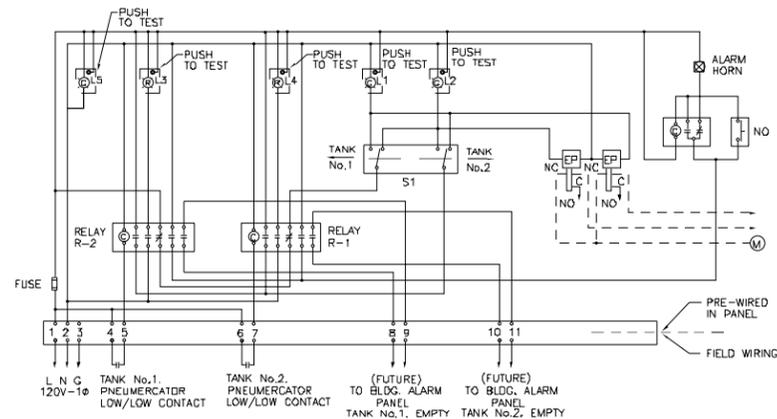
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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: T-2
JOB TITLE AND LOCATION: DESIGN CRITERIA FOR INDOOR ABOVE GRND. TANKS WITH FIRE RATED ENCLOSURE	
DRAWING TITLE: PIPING SCHEMATIC AND TANK SECTION AND DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED
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TANK TRANSFER VALVE CONTROL PANEL WIRING DIAGRAM (23)

CONTROL PANEL NOTES

- A: INSIDE PANEL
- (3) RELAYS - PROVIDE ONE EXTRA CONTACT FOR EACH RELAY
  - FUSES, FUSE BLOCKS
  - POWER TERMINAL STRIP
  - ALL INTERNAL WIRING COLOR CODED, MIN. WIRE SIZE #14 - SOLDERLESS CONNECTORS
  - POCKET FOR WIRING DIAGRAM
  - GROUND LUG WELD
  - PANEL SHALL BE UL INSPECTED AND APPROVED AND SHALL HAVE A UL LABEL
- B. EP SWITCHES

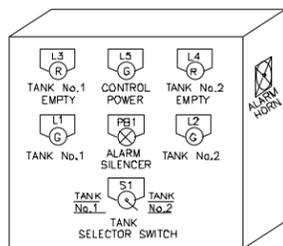
- B: PANEL FACE
- SWITCHES, PUSH BUTTNS, AND PILOT LIGHTS AS INDICATED. ONE INCH SIZE, OIL TIGHT TYPE.
  - ALARM HORN.
  - PILOT LIGHTS SHALL BE PRESS TO TEST TYPE.

SYMBOLS

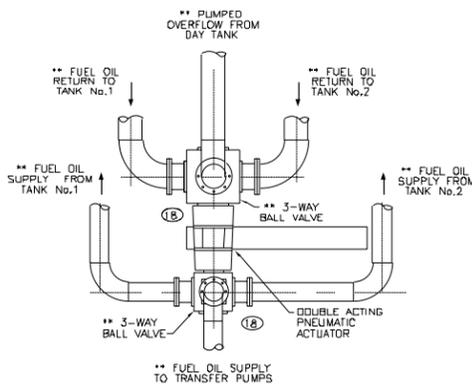
- (M) 20# MAIN AIR
- CONTROL WIRING
- - - PNEUMATIC TUBING

NAMEPLATE LEGEND:

- PB1 ALARM SILENCER
- L1 FUEL TANK No.1 EMPTY
- L2 FUEL TANK No.2 EMPTY
- L3 TANK No.1, EMPTY
- L4 TANK No.2 EMPTY
- S1 TANK SELECTOR SWITCH
- CONTROL POWER



TANK TRANSFER VALVE CONTROL PANEL



PIPING DETAIL  
NOT TO SCALE  
AUTOMATIC TANK TRANSFER VALVE

MULTI-PORT BALL VALVE

MANUFACTURER - PBM, SANDY HILL ROAD  
IRWIN, PA. 15642-9409  
(412) 863-0550

- VALVE BODY - BRONZE
- BALL - BRONZE
- SEAT - REINFORCED TEFLON
- BODY SEAL - REINFORCED TEFLON
- STEM PACKING - REINFORCED TEFLON
- WORKING PRESSURE - 300 PSIG
- WORKING TEMPERATURE - 450 °F MAX
- END FITTINGS - 150# FLANGE

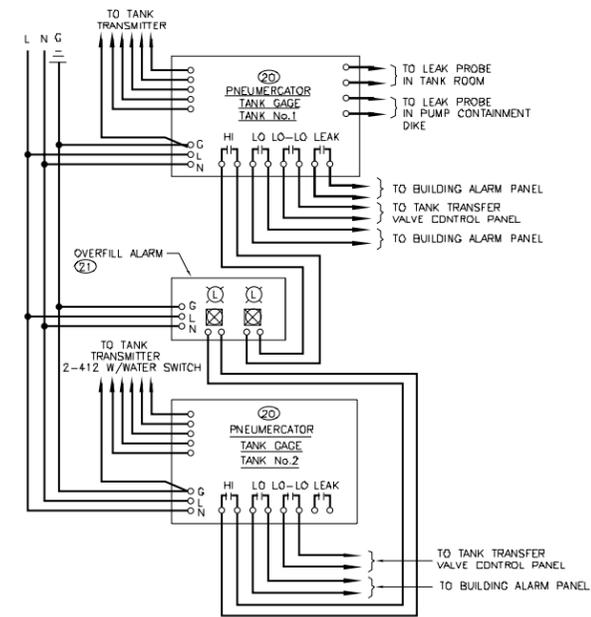
TANK TRANSFER VALVE AND ACTUATOR

THE VALVE MANUFACTURER SHALL FURNISH A COMPLETE VALVE AND ACTUATOR ASSEMBLY CONSISTING OF:

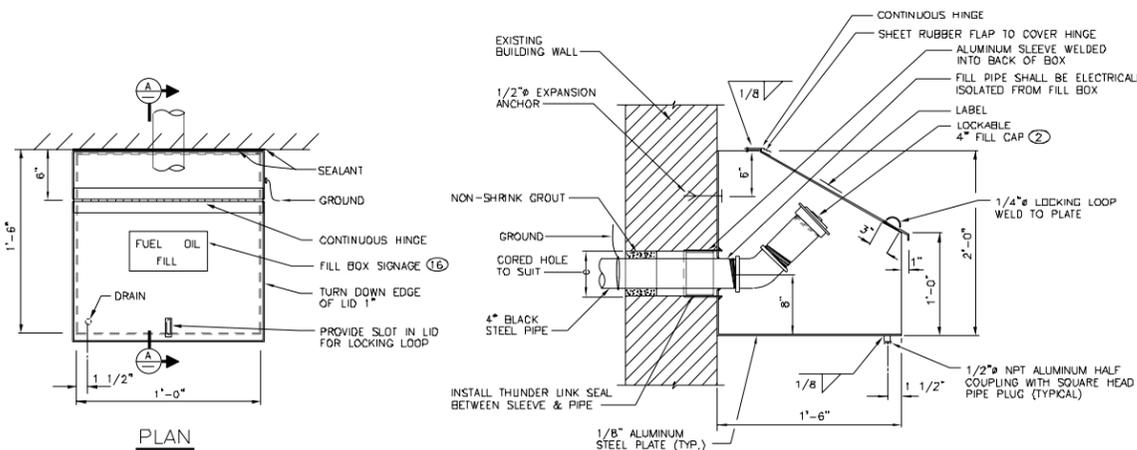
- (1) - 2" 3-WAY MULTIPORT BALL VALVE
- (1) - 3" 3-WAY MULTIPORT BALL VALVE
- (1) - DOUBLE ACTING PNEUMATIC ACTUATOR
- (1) - ALL NECESSARY BRACKETS, HARDWARE, LINKAGES, ETC. TO FORM A COMPLETE AND OPERATING ASSEMBLY. THE COMPLETE ASSEMBLY SHALL BE FABRICATED BY THE VALVE MANUFACTURER.

WORK NOTES:

- TANK GAUGE MONITORING SYSTEM
  - PNEUMERCATOR MODEL No. E 700-1
  - 4 - OUTPUT RELAYS FOR REMOTE ALARMS
  - RS 232 PORT FOR REMOTE PROGRAMING
  - INDICATING LIGHTS FOR LOW LEVEL, HIGH LEVEL, LEAK, AND WATER
  - LEVEL TRANSMITTER : 2-412 WITH WATER DETECTION
  - LEAK DETECTION SENSOR : LS-600-LDBN
  - OVERFILL ALARM : LC 1002
- SOLENOID VALVES
  - SOLENOID VALVES SHALL BE ASCO SERIES B211, WITH MANUAL OPERATOR.
  - A. ENCLOSURE - EXPLOSION PROOF
  - B. BODY - FORGED BRASS
  - C. SEATING - BUNA 'N'
  - D. VOLTAGE - TO MATCH FUEL OIL PUMP CONTROL VOLTAGE
  - E. ACTION - NORMALLY CLOSED
- PAINTING (NEW FUEL OIL TANK)
  - THE NEW FUEL OIL TANK AND SADDLES SHALL BE FACTORY PAINTED WITH TWO COATS OF RUST INHIBITING PRIMER.
  - THE CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY PRIMER DAMAGED DURING SHIPPING AND ROGING. AREAS WHERE THE PRIMER IS DAMAGED SHALL BE THOROUGHLY CLEANED AND REPAINTED WITH TWO COATS OF RUST INHIBITING PRIMER.
  - THE PRIMER SHALL BE FOLLOWED BY TWO FINISHED COATS OF RUST INHIBITING ENAMEL. APPLICATION OF PAINT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION. COLOR SHALL BE AS SPECIFIED.
- PAINTING (NEW FUEL PIPING)
  - ALL NEW FUEL PIPING SHALL BE CLEANED, PRIMED WITH TWO COATS OF RUST INHIBITING PRIMER, FOLLOWED BY TWO FINISH COATS OF RUST INHIBITING PAINT.
  - APPLICATION OF PAINT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION. COLOR SHALL BE AS SPECIFIED.
  - ANSI STANDARDS FOR PIPING.
- LABELING (PIPING)
  - ALL NEW PIPING SHALL BE LABELED IN ACCORDANCE WITH THE SPECIFICATIONS.
- LABELING (TANK)
  - THE NEW TANK SHALL BE LABELED IN ACCORDANCE WITH THE DRAWINGS.
- TANK TESTING
  - PRIOR TO CONNECTING PIPING TO THE NEW ABOVE GROUND STORAGE TANK CONTRACTOR SHALL TEST TANK IN ACCORDANCE WITH API STANDARD 650.
  - TANK SHALL BE PRESSURIZED TO 5 P.S.I. ALL FITTINGS, WELDS AND JOINTS SHALL BE COATED WITH A SOAP SOLUTION AND INSPECTED FOR LEAKS. THIS TEST SHALL BE PERFORMED IN THE PRESENCE OF THE OWNER.
- PIPE TESTING
  - ALL NEW PIPING SHALL BE TESTED IN ACCORDANCE WITH SPECIFICATIONS.



MONITORING SYSTEM WIRING DIAGRAM



EXTERIOR FILL CONTAINMENT DETAIL (1)

NOT TO SCALE

- NOTE: 1. ALL REQUIRED WELDS TO BE CONTINUOUS AND LIQUID TIGHT  
2. PROVIDE PHYSICAL PROTECTION WHERE REQUIRED.

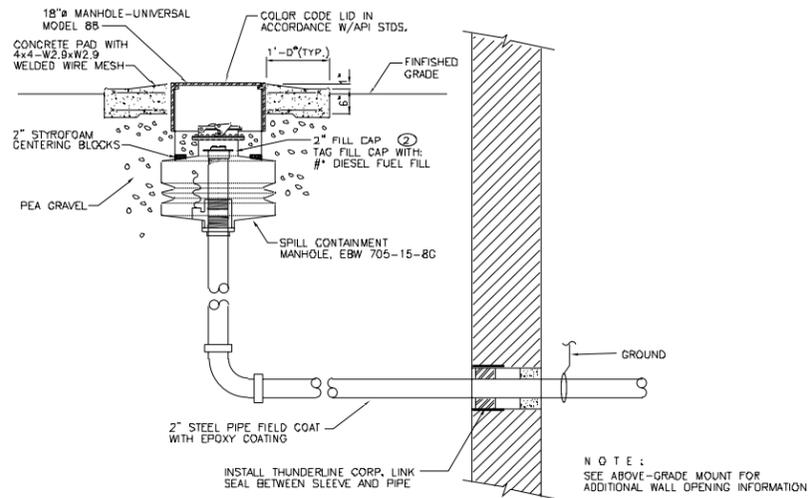
SECTION A  
T-3

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: T-3
JOB TITLE AND LOCATION: DESIGN CRITERIA FOR INDOOR ABOVE GRND. TANKS WITH FIRE RATED ENCLOSURE	
DRAWING TITLE: CONTROLS AND WIRING DIAGRAMS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 6 OF 7

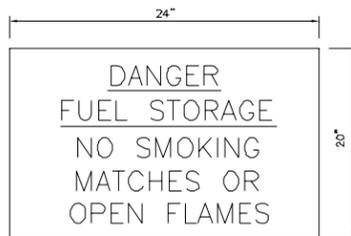
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EXTERIOR FILL CONTAINMENT DETAIL (FLUSH MOUNT)

NOT TO SCALE



DOOR SIGNAGE 14

NOT TO SCALE

NOTE: 3" TALL BLACK BLOCK LETTERING ON WHITE LAMINATED BACKGROUND. FASTEN WITH DOUBLE SIDED PRESSURE SENSITIVE FOAM TAPE.

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EQUIPMENT LIST

MARK	QUANTITY	DESCRIPTION	MARK	QUANTITY	DESCRIPTION
1	1-*** GALLON	U/L 142 CONSTRUCTED SINGLE WALL OIL STORAGE TANK AND *** GALLONS NEW FUEL. (NOTE SPECIAL ORDER DUE TO NON STANDARD OPENINGS.) HIGHLAND TANK AND MANUFACTURING CO. PHONE : 1-516-473-0826 SEE DWG T-1	17	1	FOOT VALVE. EBW MODEL 76 ** DOUBLE POPPET VALVE WITH METAL TO METAL SEAT, AND 24 MESH SCREEN, BRASS BODY, BRONZE POPPETS AND SEATS. VALVE SHALL PASS THROUGH A 2" PIPE. PHONE : 1-800-422-2525 SEE DWG. T-2
2	1	4" DIAMETER LOCKABLE FILL CAP. MORRISON MODEL NO. 178 - BRASS BODY GASKET AND COVER. PHONE : 1-319-583-5701 SEE DWG T-3	18	*	MULTIPORT BALL VALVE WITH PNEUMATIC OPERATOR. PEM INC. MODEL MP-B-S-1, RATED 300 PSI W.O.G. FOR SIZE AND QUANTITY SEE DWG T-2.
3	2	** DIAMETER UPFLOW VENT. MORRISON MODEL NO. 354, ALUMINUM BODY AND HOOD WITH SCREEN. PHONE : 1-319-583-5701 SEE DWG. T-2	19	*	ELECTRIC PIPE UNIONS, WATTS REGULATOR COMPANY. PHONE : 1-508-688-1811 FOR SIZE AND QUANTITY SEE DWG T-2
4	2	TANK SIGNAGE VOLUME CONVERSION CHART. PROVIDE TANK VOLUME, INCHES TO GALLONS CONVERSION TABLES UNDER HEAVY PLASTIC LAMINATE. MOUNT TO TANK WITH DOUBLE SIDED PRESSURE SENSITIVE FOAM TAPE. TURN OVER OTHER COPY TO OWNER. SEE DWG. T-2	20	2	TANK MONITORING PANEL - PNEUMATOR. E-700-1 WITH INTEGRAL PRINTER, RS-232 INTERFACE, AND AUTOMATIC ALARM SILENCE. PHONE : 1-516-293-8450 SEE DWG T-3
5	1	TANK LEVEL GAUGE STICK. BAGBY CASE STICK, INC. MODEL 25-B TWO SECTION GAUGE STICK CALIBRATED IN INCHES. 8'-0" EXTENDED LENGTH. 4'-0" FOLDED LENGTH. PHONE : 1-800-445-0774 SEE DWG T-1	21	1	REMOTE OVERFILL ALARM, HORN/LIGHT - PNEUMATOR. LC-1001-ASC. PHONE : 1-516-293-8450 SEE DWG. T-3
6	*	ISOLATION VALVE, ** TWO PIECE BRONZE BODY, THREADED, BRONZE BALL FINE SEAT, 14-TEMP BODY GASKETS, HI-TEMP STEAM PACKING, LOCKABLE HANDLE, RATED 400 PSI W.O.G. WATTS MODEL B-6400 SS-LI. PHONE : 1-508-688-1811 SEE DWG. T-2	22	1	GAUGE TRANSMITTER PNEUMATOR. MODEL 2-412 WITH WATER SWITCH. PHONE : 1-516-293-8450 SEE DWG. T-2
7	2	4" DIAMETER EMERGENCY VENT. N.C. OPEN ON 8 OZ. PRESSURE. MORRISON MODEL NO. 244. PHONE : 1-319-583-5701 SEE DWG. T-2	23	*	SOLENOID VALVE WITH MANUAL OPERATOR. ASCO MODEL 8210 WATER TIGHT AND EXPOSITION PROOF. FOR SIZE AND QUANTITY SEE DWG T-2. PHONE : 1-201-966-2000
8	1	HAND PUMP. CASBOY MODEL 377 HAND PUMP, 25 GALLONS PER 100 STROKES SEE DWG. T-2	24	1	TANK TRANSFER VALVE CONTROL PANEL. KNICKERBOCKER ELECTRIC WITH UL LABEL. PHONE : 1-516-567-5411 SEE DWG T-2
9	2	FUEL OIL PUMPS. WIKING HL 41250, 17 GPM @ 100 PSI DISCHARGE PRESSURE, 1150 RPM 480V/3PH/60Hz, 3HP, DIRECT DRIVE. SEE DWG. T-2	25	2	PRESSURE RELIEF VALVE. KUNKLE FIG. 20-1, ASME CERTIFIED. SEE DWG. T-2.
10	2	DUPLEX STRAINER. HAYWARD MODEL 50 W/3/64 WITH PERFORATED BRASS BASKETS. SEE DWG. T-2	26	*	CHECK VALVE. JENKENS MODEL 119, LIFT CHECK, RATED 300 PSI W.O.G. FOR SIZE AND QUANTITY SEE DWG T-2. PHONE : 1-215-286-2908
11	2	ABOVE GRADE FILL PIPE CONTAINMENT. SHOP FABRICATED. SEE DWG. T-3	27	*	THREE WAY BALL VALVE. PEM INC. MP-B-S-(P) RATED 300 PSI W.O.G. FOR SIZE AND QUANTITY SEE DWG T-2
12	1	2" DIAMETER VENT WHISTLE. SULLY MODEL NO. VS270 WITH LONG TUBE. PHONE : 1-800-272-8599 SEE DWG. T-2	28	*	FUSE LINK VALVE. PREFERRED FUSIONATIC VALVE FOR 3/4" AND 1". FOR LARGER THAN 1" USE PREFERRED LEVER GATE VALVE, TYPE 110. VALVES SHALL INCLUDE A REPLACEMENT FUSIBLE ELEMENT WHICH MELTS AT 165° F. PHONE : 1-203-743-6741
13	1	LOCKS, KEYED ALIKE. BEST CO. INDUSTRIAL GRADE OR OWNER SELECTED MODEL. VERIFY EXACT REQUIREMENT IN FIELD.	29	1	2" DIA. OVERFILL PREVENTION VALVE. CLAY & BAILEY MODEL NO F-30. PHONE : 1-800-821-8583 SEE DWG T-2
14	1	DOOR SIGNAGE. (NOT SHOWN)			
15	2	TANK SIGNAGE. SEE DWG T-2			
16	1	FILL BOX SIGNAGE. SEE DWG T-3			

GENERAL EQUIPMENT LIST NOTES:

1. ABOVE EQUIPMENT LIST IS NOT COMPLETE IN ITS ENTIRETY. ENGINEER IS TO VERIFY AND PROVIDE ALL OTHER EQUIPMENT.
2. EQUIPMENT ITEMS OF APPROVED QUALITY OR FUNCTION MAY BE SUBSTITUTED.
3. EQUIPMENT ITEMS CAN BE UPGRADED TO MEET THE "STANDARDS OF THE INDUSTRY" AT THE TIME THE TANK IS INSTALLED WITH THE ENGINEERS APPROVAL.

\* - INDICATES SITE SPECIFIC INFORMATION.

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NOVEMBER 16, 1992	1.
DECEMBER 1, 1995	2.

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	DRAWING No.: T-4
JOB TITLE AND LOCATION: DESIGN CRITERIA FOR INDOOR ABOVE GRND. TANKS WITH FIRE RATED ENCLOSURE	
DRAWING TITLE: EQUIPMENT LIST AND DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 7 OF 7



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# ABOVE GROUND FUEL STORAGE TANK OUTSIDE OF BUILDINGS DESIGN CRITERIA

## SHEET INDEX

SHEET NUMBER	SHEET TITLE
CS-1	COVER SHEET
C-1	DESIGN CRITERIA
C-2	DESIGN CRITERIA
C-3	SYMBOLS AND LEGEND
T-1	SITE PLAN, LOCATION MAP, VICINITY MAP, FUEL OIL TANK PLAN, NOTES & LEGEND
T-2	FUEL OIL TANK DETAILS
T-3	FUEL OIL TANK DETAILS
T-4	FUEL OIL ELECTRICAL, FUEL OIL TANK CONTROL PANEL, LEGEND & NOTES
T-5	COLD WEATHER ACCESSORIES MECHANICAL SHEET
T-6	COLD WEATHER ACCESSORIES ELECTRICAL SHEET
T-7	EQUIPMENT LIST AND FUEL OIL TANK CONTROLS

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<small>AT&amp;T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS</small>	CS-1
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
COVER SHEET	
<small>AT&amp;T</small>	<small>SCALE: AS NOTED SHEET 1 OF 11</small>

4. LARMINCAST TANK-SID (AST) CS-1 (CS-1) 08/26/96 1A.51 DAB



		ISSUE	
		NOVEMBER 16, 1992	1
		DECEMBER 1, 1995	2
1.0 GENERAL	2.02 TANK SIZING	J. FITTINGS SHALL BE PROVIDED AS REQUIRED FOR SITE SPECIFIC REQUIREMENTS. SPARE FITTINGS ARE NOT RECOMMENDED DUE TO THE FACT THAT CONTAMINATION OF THE FUEL SUPPLY BY AN UNAUTHORIZED PARTY COULD EASILY BE ACCOMPLISHED BY THE REMOVAL OF A THREADED CAP.	9. WELDED JOINTS:
1.01 SCOPE	A. STANDARD TANK SIZING CRITERIA FOR EMERGENCY STANDBY GENERATORS IS AS FOLLOWS: HOURLY CONSUMPTION CONNECTED LOAD X 72 HRS. X 4 = 90% OF TANK VOLUME	K. A GROUNDING LUG SHALL BE WELDED TO THE TANK IN A LOCATION EASILY ACCESSIBLE. THE BUILDING GROUND NETWORK SHALL BE EXTENDED AND CONNECTED TO THE VESSELS' GROUNDING LUG. ALL CONNECTIONS SHALL BE GAD-WELDED WITH NO CLAMPS OR COMPRESSION FITTINGS.	a. 2 1/2" INCHES AND SMALLER: SOCKET WELDED FITTINGS ANSI B16.11.
A. THIS DESIGN CRITERIA, TOGETHER WITH THE SUPPLEMENTARY INFORMATION LISTED HEREIN, COVERS THE EQUIPMENT AND DESIGN REQUIREMENTS TO BE USED IN THE ENGINEERING, MANUFACTURE, AND INSTALLATION OF ABOVE GROUND FUEL OIL TANKS AND THEIR CONNECTION TO EMERGENCY STANDBY POWER PLANTS AND HEATING SYSTEMS. THE MAIN OBJECTIVE IS TO PROVIDE AN AUTOMATIC UNATTENDED RELIABLE FUEL STORAGE SYSTEM.	B. OWNER SHALL VERIFY AND APPROVE CALCULATED VOLUMES.	L. ALL FUEL STORAGE SYSTEMS SHOULD BE ACCOMPANIED BY ADEQUATE SIGNAGE. THE SIGNING PLAN SHOULD INDICATE THE HAZARDS ASSOCIATED WITH FUEL STORAGE. WARN AGAINST OPEN FLAMES AND SMOKING. DESCRIBE THE NATURE OF THE STORED PRODUCT AND SHOW THE TANK FILL LOCATION. HAZARD WARNING SIGNS SHOULD BE AFFIXED TO THE EXTERIOR WALL OF THE BUILDING IN A READILY VISIBLE LOCATION AND IN ACCORDANCE WITH NFPA 30 SECTION NO. 704.	b. 3 INCHES AND LARGER: BUTT WELDED FITTINGS ANSI B16.9.
B. THE FUEL OIL STORAGE SYSTEM SHOULD BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS AND DIRECTIVES FROM AT&T PRACTICES AND WITH CONSIDERATIONS INDICATED IN PARAGRAPH 2.02.	C. ADDITIONAL SUPPLIES SHOULD BE CONSIDERED FOR FACILITIES WHICH ARE REMOTE OR WHERE ACCESS IS NOT AVAILABLE DURING WINTER MONTHS DUE TO POOR WEATHER CONDITIONS OR WHERE CONTRACTUAL OBLIGATIONS REQUIRE GREATER VOLUME.	M. FASTENING DEVICES SHALL BE INSTALLED BY THE TANK MANUFACTURER FOR SECURING PIPING COVERS.	10. FLANGED JOINTS:
C. THE RECOMMENDATIONS IN THIS SECTION ARE BASED IN GENERAL ON THE NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, NFPA SECTION 30, 31, 37, 110, AND 329. MANY DETAILS FEATURED IN THESE SOURCE DOCUMENTS HAVE NOT BEEN COVERED HEREIN. REVIEW THESE AND OTHER APPLICABLE DOCUMENTS FOR COMPLETE DETAILS.	D. TANK SYSTEMS SUPPORTING BOTH EMERGENCY STANDBY GENERATORS AND HEATING SYSTEMS SHALL BE SIZED IN ACCORDANCE WITH PARAGRAPHS A AND B ABOVE, PLUS ADDITIONAL FUEL AS REQUIRED TO SUPPORT THE HEATING SYSTEMS.	N. THE ABOVE GROUND STORAGE TANK SHALL MEET WITH THE APPROVAL OF FEDERAL, STATE, AND LOCAL MUNICIPALITY'S REQUIREMENTS PRIOR TO THE FINAL DESIGN PHASE.	a. FITTINGS SHALL BE SLIP ON TYPE STEEL WELDED FLANGES. WELDED NECK FITTINGS MAY BE USED FOR WELDED FITTINGS WHERE REQUIRED. FITTINGS SHALL BE CLASS 150 STEEL PIPE FLANGES AND FLANGED FITTINGS, ANSI B16.9.
D. FEDERAL, STATE, LOCAL, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS SHOULD BE FULLY COMPLIED WITH AT ALL TIMES, INCLUDING INTERFACING WITH AND UPGRADING EXISTING FUEL SYSTEMS.	2.03 INSTALLATIONS IN SEVERE COLD	O. ABOVE GROUND STORAGE TANKS SHALL BE SUPPORTED ON A SUBSTANTIAL CONCRETE PAD DESIGNED TO SUPPORT THE STORAGE TANK AND ITS CONTENTS. DESIGN CONSIDERATION SHALL BE GIVEN TO THE TYPE OF TANK, TEMPERATURE VARIATIONS, AND SEISMIC ACTIVITIES.	b. STEEL BOLTS AND NUTS SHALL BE CADMIUM PLATED - ASTM A307 GRADE B.
E. THE USE OF TANKS MUST PROVIDE A SAFE AND ENVIRONMENTALLY SOUND STORAGE SYSTEM. IT IS ESSENTIAL THAT FEATURES FOR RELIABILITY, SAFETY, FIRE PROTECTION, ENVIRONMENTAL PROTECTION, STRUCTURAL INTEGRITY, SEISMIC PROTECTION, AND ISOLATION SHOULD BE INCORPORATED AND ADDRESSED.	A. EVALUATE AND DETERMINE THE LOWEST EXPECTED TEMPERATURES AT THE FACILITY AND THEN REVIEW FUEL CHARACTERISTICS TO ESTABLISH IF HEATING OF FUEL IS REQUIRED.	P. TANKS SHOULD BE SHIPPED AND HANDLED WITH ALL OPENINGS PLUGGED TO PREVENT DAMAGE TO THE OPENINGS AND TO MINIMIZE THE POSSIBILITY OF FOREIGN MATERIALS BEING INTRODUCED INTO THE TANK.	c. GASKETS SHALL BE RING TYPE, 1/8 INCH THICK, GASOLINE RESISTANT.
F. PLANS AND SPECIFICATIONS SHOULD BE SUBMITTED FOR PROPOSED INSTALLATIONS OF FUEL OIL TANK LOCATIONS ILLUSTRATING SUCH FEATURES AS TANK SIZE, UTILITIES, DISTANCES FROM THE FACILITIES, PROPERTY LINES, EXTERIOR BUILDING WALLS, TANK LOCATION, EXITS, BUILDING PENETRATIONS, AND WATER WAYS. PRELIMINARY PLANS SHOULD BE SUBMITTED TO THE OWNER FOR THEIR APPROVAL AND THEN SUBMITTED TO LOCAL AUTHORITIES FOR REVIEW AND APPROVAL.	B. TYPICAL HEATING OF THE FUEL STORAGE VESSELS AND FUEL OIL TRANSFER PIPING WILL BE REQUIRED AT 20° FAHRENHEIT FOR NO. 2 DIESEL FUEL AND 0° FAHRENHEIT FOR NO. 1 DIESEL FUEL.	Q. TANK SHALL BE FACTORY TESTED AND CERTIFIED SOUND AND TIGHT PRIOR TO SHIPMENT.	4.04 PIPING INSTALLATION:
G. TANK AREAS AND ADJACENT SPACES SHOULD BE KEPT FREE FROM VEGETATION, DEBRIS, AND OTHER MATERIALS WHICH MAY BE COMBUSTIBLE OR FLAMMABLE.	C. THE STORAGE VESSEL SHOULD BE OUTFITTED WITH EXTERIOR INSULATION PANELS TO REDUCE HEATING REQUIREMENTS. THE PANELS SHOULD BE FACED WITH A PROTECTIVE METAL COATING OR SHEETING AND SECURELY FASTENED TO THE VESSEL.	4.0 PIPING	A. ABOVE GROUND PIPING
H. PROPER SIGNS AND DECALS SHALL BE SPECIFIED. THE PURPOSE OF THE SIGNAGE IS TO ADVISE OCCUPANTS THAT OPEN FLAMES AND SMOKING ARE PROHIBITED WITHIN AND AROUND THE TANK AREA.	D. INSULATING THE TOP OF THE VESSEL IS NOT RECOMMENDED UNLESS A FUEL TIGHT SYSTEM IS DEVELOPED.	4.01 PRODUCT PIPING	1. DESIGN EXPOSED PIPING TO RUN PARALLEL TO WALL OF STRUCTURES.
I. SEISMIC BRACING AND NECESSARY FLEXIBLE CONNECTORS SHOULD BE SPECIFIED TO PREVENT DAMAGE TO TRANSFER PIPING OR TANKS, DURING PERIODS OF SEISMIC ACTIVITY.	E. PIPING SHOULD BE INSULATED IN ACCORDANCE WITH STANDARD ENGINEERING PRACTICE IN COLD TEMPERATURE APPLICATIONS.	A. FUEL OIL SUPPLY AND RETURN PIPING SHALL BE SUITABLE FOR USE AS ABOVE GROUND FUEL OIL PIPING.	2. SUPPORTS AND ANCHORS SHALL BE ADEQUATE TO SUPPORT THE PIPE FILLED WITH WATER WITH A MINIMUM SAFETY FACTOR OF 12 AND FOR THE TEST PRESSURE SPECIFIED. SPECIFY FACTORY ENGINEERED SUPPORTS AND ANCHORS, WHERE REQUIRED.
J. IF THE SPECIFIC PROJECT INVOLVES REMOVAL OR CLOSURE OF AN EXISTING TANK, REFER TO OUTSIDE STORAGE TANK REMOVAL AND ABANDONMENT CRITERIA.	F. A HEATING SYSTEM SHOULD BE INSTALLED WHICH IS EASILY REPLACEABLE AND READILY AVAILABLE. TYPICAL PIPING HEAT CABLE IS RECOMMENDED DUE TO ITS AVAILABILITY AND EASE OF INSTALLATION AND/OR REPLACEMENT.	1. ACCEPTABLE CARRIER PIPE:	3. FUEL OIL TRANSFER PIPING SHOULD BE ARRANGED TO PREVENT GRAVITY FEED FROM THE FUEL OIL STORAGE TANK TO THE ENGINE.
K. SOIL SAMPLING SHALL BE AT THE DISCRETION OF THE OWNER AND ENGINEER.	G. A THERMOSTAT CONTROLLER SHOULD BE INSTALLED TO MONITOR FUEL TEMPERATURE. ADJUSTABLE SET POINTS SHOULD BE PROVIDED. IN ADDITION, A LOW TEMPERATURE ALARM SHOULD BE INCORPORATED.	a. SCHEDULE 40 CARBON STEEL.	4. ALL PIPING CONNECTIONS TO THE ABOVE GROUND STORAGE TANK SHOULD BE AT THE HIGHEST POINT. NO PIPING CONNECTIONS SHOULD BE MADE BELOW THE HIGHEST POSSIBLE FUEL STORAGE LEVEL.
L. WHERE REFERENCE TO SPECIFIC MANUFACTURERS ARE SHOWN AN ALTERNATE MAY BE SUBSTITUTED FOR APPROVAL.	H. THE HEATING DEVICES SHOULD BE LOCATED AND INSTALLED IN SUCH A FASHION IN WHICH THEY CAN BE MAINTAINED AND REPLACED EASILY.	b. TYPE "K" HARD COPPER.	5. ANTI-SYPHON VALVES SHOULD BE PROVIDED TO PREVENT LOSS OF FUEL OIL INTO UNDESIRABLE AREAS (THE ENVIRONMENT OR THE FACILITY).
1.02 OWNER INVOLVEMENT	I. ALTERNATE STORAGE TANK DESIGNS SHOULD BE CONSIDERED.	2. ACCEPTABLE SECONDARY CONTAINMENT SYSTEM:	6. FILL PIPING SHALL BE INSTALLED FOR TOP-LOADING OF THE ABOVE GROUND STORAGE TANKS. METALLIC FILL PIPES SHALL BE DESIGNED AND INSTALLED TO MINIMIZE THE GENERATION OF STATIC ELECTRICITY BY TERMINATING THE PIPE WITHIN 4 TO 6 INCHES FROM THE BOTTOM OF THE TANK.
A. DETAILED INVOLVEMENT WITH THE OWNER SHOULD TRANSLATE INTO OVERALL COST SAVINGS DUE TO THE ANTICIPATED REDUCTION IN ENGINEERING COSTS AND CONSTRUCTION DELAYS, DUE TO POTENTIAL DESIGN CHANGES REQUESTED BY THE OWNER.	J. HEATING POWER REQUIREMENTS SHOULD NOT OVERLOAD THE COMMERCIAL OR EMERGENCY POWER SYSTEMS AND AUTOMATIC TEMPERATURE CONTROLS SHALL BE PROVIDED.	a. SCHEDULE 40 STEEL.	4.05 TESTING
B. THE OWNER SHOULD BE CONSULTED DURING THE DESIGN/INSTALLATION PROCESS BECAUSE THEY ARE FAMILIAR WITH EQUIPMENT OPERATION AND AVAILABLE SPACE AT THE BUILDING TO PROVIDE FOR A SUITABLE FUEL OIL TANK LOCATION, OR CONVERSELY RENDER SOME LOCATIONS UNSUITABLE. AS A MINIMUM, THE OWNER SHOULD BE INVOLVED WITH THE FOLLOWING:	K. HEATING ELEMENTS SHOULD BE DESIGNED SO THEIR MAXIMUM OUTPUT DESIGN TEMPERATURES DO NOT EXCEED THE FLASH POINT OF THE MATERIAL STORED WITHIN THE STORAGE TANKS.	4.02 VENT PIPING	A. PIPING SHALL BE LEAKAGE TESTED PRIOR TO BEING COVERED, ENCLOSED OR PLACED INTO SERVICE.
1. FIELD VERIFY LOCATION OF FUEL OIL TANK.	3.0 FUEL TANK	A. TANK VENTING SYSTEMS SHALL BE DESIGNED ACCORDING TO NFPA 30 AND LOCAL CODES.	B. FUEL OIL PIPING SHALL BE HYDROSTATICALLY TESTED TO THE GREATER OF 100: PSIG OR 150% OF WORKING PRESSURE FOR 1 HOUR WITH NO READABLE PRESSURE DROP ON A 1/2 OF 1% ACCURACY GAUGE.
2. REVIEW OF PRELIMINARY AND FINAL DESIGN PLANS AND SPECIFICATIONS.	3.01 ABOVE GROUND STORAGE TANK MANUFACTURING REQUIREMENTS	B. VENT PIPING SHALL BE GALVANIZED SCHEDULE 40 STEEL.	C. SECONDARY CONTAINMENT PIPING SHALL BE PRESSURE TESTED TO FIVE POUNDS OF AIR FOR TWO HOURS.
3. CONSULTATION, DEVELOPMENT, AND ACKNOWLEDGEMENT OF A WORK METHOD OF PROCEDURES (WOP) NEEDED FOR THE PROJECT.	A. TANKS SHOULD CARRY A U.L. 142 LISTING AND CONFORM TO THE PROVISIONS OF U.L. 142 AND NFPA SECTION NO. 30. ADHERENCE TO THESE STANDARDS SHOULD PROVIDE THE BASIS FOR MEETING APPLICABLE REGULATIONS GOVERNING ABOVE GROUND FUEL STORAGE SYSTEMS. HOWEVER, LOCAL CODES OR REGULATIONS MAY BE MORE STRINGENT AND SHOULD BE REVIEWED DURING DESIGN.	4.03 PIPING MATERIALS:	D. TANK SHALL BE ISOLATED FROM PIPING DURING THIS TEST.
4. PROJECT OVERSIGHT DURING CONSTRUCTION, INCLUDING SITE ACCESS.	B. THE TANK SHALL BE OF DOUBLE WALL CONSTRUCTION INCLUDING AN ANNULAR SPACE FOR EARLY LEAK DETECTION AND MONITORING.	A. COPPER PIPING:	E. ALL JOINTS SHALL BE SOAPED AND VISUALLY INSPECTED DURING TESTING. NO LOSS IN PRESSURE WILL BE ALLOWED.
5. ACCEPTANCE OF THE COMPLETED WORK.	C. THE TANK SHALL BE ENCASED IN A MINIMUM OF SIX INCHES OF REINFORCED CONCRETE, TO PROVIDE A 2-HOUR FIRE ENCLOSURE.	1. COPPER PIPE SOLDER JOINTS SHALL BE OF TYPE CONFORMING TO ANSI B16.22. COPPER PIPE UNIONS SHALL BE WROUGHT COPPER, BRONZE, OR BRASS.	F. ALL TESTING SHALL BE WITNESSED BY THE OWNER.
6. MAINTAIN DOCUMENTATION IN ACCORDANCE WITH PART 12.	D. STRUCTURAL CALCULATIONS SHALL BE PROVIDED BY THE MANUFACTURER TO INDICATE THAT THE ABOVE GROUND STORAGE VESSEL MEETS ALL APPLICABLE CODE REQUIREMENTS AND STANDARDS, INCLUDING SEISMIC REQUIREMENTS FOR AREA IN THE 2B ZONE.	2. INSULATING UNIONS FOR COPPER PIPE SHALL BE PROVIDED AT ALL EQUIPMENT HAVING FERROUS CONNECTIONS.	G. EACH PIPING SYSTEM SHALL, AFTER ALL TESTING IS SATISFACTORILY COMPLETED, BE FLUSHED, BLOW OUT OR OTHERWISE CLEANED IN ACCORDANCE WITH THE REQUIREMENT OF THE PIPE FABRICATION STANDARD ES 5.
2.0 TANK REQUIREMENTS	E. A MINIMUM 30-YEAR WARRANTY SHALL BE PROVIDED BY THE TANK MANUFACTURER.	3. FLARE FITTINGS FOR COPPER PIPE ARE NOT ACCEPTABLE.	H. ALL LOCAL CODES SHALL BE ADHERED TO.
2.01 TANK LOCATION	F. A MINIMUM 2-HOUR FIRE RATING ENCLOSURE SHALL BE PROVIDED. BACKUP COMPUTER GENERATED CALCULATIONS OR ACTUAL TEST DATA SHOULD BE AVAILABLE PRIOR TO SELECTING TANK TYPE AND MANUFACTURER.	4. SOLDER SHALL BE SILVER ALLOY SOLDER WITH A MELTING POINT OF NOT LESS THAN 1000° F.	5.0 ACCESSORIES/ SPECIALTIES
A. ABOVE GROUND STORAGE TANKS MAY BE LOCATED A MINIMUM OF FIVE FEET FROM A CONCRETE STRUCTURE UPON APPROVAL OF THE LOCAL FIRE MARSHAL AND BUILDING DEPARTMENT. GREATER DISTANCES BETWEEN FUEL OIL STORAGE TANKS AND THE BUILDING MAY BE REQUIRED BY THE FIRE MARSHAL AND/OR BUILDING DEPARTMENTS HAVING JURISDICTION.	G. BALLISTIC PROTECTION SHALL BE PROVIDED BY A MINIMUM OF SIX INCHES OF 3,000 PSI CONCRETE ENCASEMENT ON ALL SIDES, TOP, AND BOTTOM.	5. SILVER BRAZING FLUX SHALL BE USED FOR SOLDER OF 1100° F OR HIGHER MELTING POINT.	5.01 ACCESSORIES AND SPECIALTIES SHALL BE PROVIDED AS REQUIRED FOR THE SPECIFIC SITE.
B. ABOVE GROUND STORAGE TANKS SHOULD NOT BE LOCATED ADJACENT TO OUTDOOR AIR INLETS, FIRE ESCAPE EXITS, NEAR BRUSH, TREES, OR OTHER COMBUSTIBLES.	H. BUILT-IN OVERFILL PROTECTION SHALL BE PROVIDED WITH MINIMUM CAPACITY OF FIVE GALLONS OR AS REQUIRED BY LOCAL OR FEDERAL CODES.	6. DIELECTRIC COUPLINGS AND/OR FLANGED KITS SHALL BE PROVIDED AT ALL COPPER TO STEEL CONNECTIONS AND AS REQUIRED TO ISOLATE THE PIPING FROM THE TANK.	5.02 VALVES
C. LOCATE THE STORAGE TANK AS CLOSE AS POSSIBLE TO THE EXISTING STANDBY GENERATOR(S) OR AS NEAR AS LOCAL CODES AND AUTHORITIES WILL ALLOW.	I. ALL INSTALLED TANKS MUST BE VENTED TO CONFORM TO NFPA SECTION NO. 30. VENTS SHOULD TERMINATE OUTSIDE OF BUILDINGS AND AT LEAST 12 FEET ABOVE GRADE. SIZING OF ATMOSPHERIC (NORMAL) VENTS MUST BE IN ACCORDANCE WITH NFPA TO INSURE OPERATING PRESSURES BELOW 2.5 PSIG (U.L. 142 REQUIREMENT). VENT SIZE AND LOCATION WILL BE DEPENDENT ON TANK CONSTRUCTION AND CHARACTERISTICS OF THE MATERIAL BEING STORED. EMERGENCY VENTING, IN CASE OF FIRE, MUST ALSO BE ACCOUNTED FOR IN THE DESIGN AND CONFORM TO NFPA SECTION NO. 30 AND TO U.L. 142. EMERGENCY VENTING FOR THE INTERSTITIAL SPACE ON DOUBLE WALLED TANKS MUST ALSO BE PROVIDED.	7. UNDERGROUND COPPER PIPING SHALL BE SOFT, ROLLED COPPER INSTALLED WITHOUT JOINTS IN THE UNDERGROUND SECTIONS.	A. DOUBLE POPPET FOOT VALVE SHALL BE INSTALLED AT THE BASE OF THE SUCTION DROP TUBE TO PREVENT FUEL IN THE SUCTION PIPING TO THE ENGINE, FROM DRAINING OR SIPHONING BACK TO THE STORAGE TANK.
D. GEOGRAPHIC AREAS WHICH RECEIVE LARGE AMOUNTS OF SNOW FALL MAY REQUIRE A SNOW SHED STRUCTURE TO ENABLE SERVICING AND ACCESSIBILITY OF FUEL SYSTEM COMPONENTS DURING PERIODS OF INCLEMENT WEATHER.		8. ABOVE GROUND COPPER PIPING SHALL BE HARD DRAWN COPPER.	B. A PRESSURE BYPASS VALVE IS TO BE INSTALLED AT THE ENGINE IF AUTOMATIC SHUTOFF VALVES ARE INSTALLED IN THE RETURN PIPING BACK TO THE TANK.
		B. STEEL PIPING:	C. ALL CONTROL VALVES SHOULD BE PROVIDED WITH A MANUAL OVERRIDE DEVICE TO ENABLE THE SYSTEM OPERATOR TO OVERRIDE A MALFUNCTIONING VALVE DURING AN EMERGENCY OR CONTROL SYSTEM FAILURE.
		1. STEEL PIPE SHALL BE CARBON STEEL SEAMLESS ASTM A53 GRADE A OR GRADE B CARBON STEEL BUTT WELDED OR ASTM A120.	D. AN EMERGENCY SHUT-OFF VALVE WITH A FUSIBLE LINK MAY BE REQUIRED AT THE ENTRANCE OF THE FUEL OIL PIPING INTO THE FACILITY. THIS VALVE SHALL CLOSE IN THE EVENT OF A FIRE WITHIN THE ENGINE ROOM, THERE BY TERMINATING THE FUEL SUPPLY.
		2. PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40.	
		3. PIPE FINISH SHALL BE BLACK.	
		4. FITTINGS FOR JOINTS 2 1/2 INCHES IN DIAMETER OR SMALLER SHALL BE THREADED OR WELDED.	
		5. FITTINGS FOR JOINTS 3 INCHES IN DIAMETER OR LARGER SHALL BE FLANGED OR WELDED.	
		6. THREADED JOINTS	
		a. SCREWED FITTINGS SHALL BE 300 LB. MALLEABLE IRON, SCREWED ANSI B16.5.	
		b. PIPE THREADING SHALL BE IN ACCORDANCE WITH USAS B 2.1 - 1988. SCREWED JOINTS SHALL HAVE STANDARD THREADS, CLEAN CUT AND TAPERED, WITH ALL BURRS REAMED. JOINT COMPOUND SHALL BE APPLIED TO THE THREADS.	
		c. JOINT COMPOUND FOR THREADED JOINTS SHALL BE "GASOILLA" SOFT-SET WITH "TEFLON" OR APPROVED ALTERNATE.	

6. [UPDATING] TANK...ST01 (AST) (C) - LUNG ON 09/06/95 10:53:04B

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DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
DESIGN CRITERIA	
AT&T	SCALE: AS NOTED SHEET 2 OF 11



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- 5.03 ABOVE GROUND TANKS ACCESSORIES
- A. FOR PIPING OR TANK INSTALLATIONS WHICH ARE LOCATED ABOVE THE ENGINE INJECTORS, ANTI-HEAD PRESSURE VALVES SHALL BE INSTALLED IN BOTH SUPPLY AND RETURN LINES.
  - B. EMERGENCY VENT FOR PRIMARY TANK SHALL BE SIMILAR TO MORRISON BROS. NO. 244, 8 OZ./SQ.IN.
  - C. FILL PIPE CONTAINMENT BOX FOR ABOVE GROUND TANKS SHALL BE FABRICATED ACCORDING TO THE DRAWING DETAILS AND PROVIDED WITH A LOCKABLE LID AND LOCKABLE FILL CAP.
  - D. FILL CAP ASSEMBLY SHALL BE SIMILAR TO MORRISON BROS. COMPANY, MODEL 305-C WITH MODEL 305 ADAPTOR.
  - E. FLEXIBLE CONNECTORS SHALL BE SIMILAR TO TITEFLEX, UL LISTED FIRE RATED FOR ABOVE GROUND PETROLEUM SERVICE.
  - F. VENT CAPS SHALL BE SIMILAR TO OPW FUELING COMPONENTS MODEL 23 OR EMCO-WHEATON MODEL A634.
  - G. A STICK GAUGE, CALIBRATED IN INCHES AND GALLONS, SHALL BE PROVIDED TO MANUALLY DETERMINE THE LEVEL OF FUEL IN THE TANK. WATER PASTE TO DETERMINE THE AMOUNT OF WATER IN THE TANK, SHALL BE PROVIDED.

- 6.0 EXCAVATION AND BACKFILL
- 6.01 GENERAL
- A. CLEARLY DELINEATE ALL INTENDED AREAS OF EXCAVATION ON SITE PLANS. INCLUDE AREAS OF ACCESS TO SITE, ACCESS ROADS, STAGING AREAS AND OBSTRUCTIONS.
  - B. EVALUATE SOIL CHARACTERISTICS OF WORK AREAS AS THEY APPLY TO INTENDED WORK SCOPE. CONSIDER SUCH SOURCES AS:
    - 1. COUNTY SOIL MAPS.
    - 2. STATE GEOLOGICAL SURVEY BORING LOGS.
  - C. IF SUFFICIENT SOIL DATA IS UNAVAILABLE, PERFORM SOIL BORINGS TO DIRECTLY EVALUATE SOIL CHARACTERISTICS BY THE FOLLOWING METHODS:
    - 1. ASTM D 1586 - STANDARD METHOD FOR PENETRATION TEST AND SPLIT BARREL SAMPLING OF SOILS.
    - 2. ASTM D 2487 - TEST METHOD FOR CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES.
    - 3. ASTM D 2488 - PRACTICE FOR DESCRIPTION AND IDENTIFICATION OF SOILS.
    - 4. ASTM D 4220 - PRACTICES FOR PRESERVING AND TRANSPORTING SOIL SAMPLES.
  - D. REVIEW LOCATIONS OF KNOWN UTILITIES IN AND AROUND THE WORK AREA WITH SITE PERSONNEL. INCLUDE LOCATIONS OF ACTIVE, INACTIVE AND ABANDONED UTILITIES RELYING ON THE FOLLOWING SOURCES AS A MINIMUM:
    - 1. RECORD DRAWINGS AT SITE.
    - 2. LOCAL UTILITY COMPANY RECORDS.
    - 3. SITE PERSONNEL INTERVIEWS.
  - E. CLEARLY DISTINGUISH ON THE DRAWINGS WHICH UTILITIES SHALL BE REMOVED, PROTECTED AND/OR REPLACED.
  - F. EVALUATE THE POTENTIAL FOR WATER CONTROL PROBLEMS FROM SURFACE WATER RUNOFF AND GROUND WATER INFILTRATION INTO EXCAVATIONS.

- 6.02 EXCAVATION
- A. INCLUDE IN SPECIFICATIONS A PROVISION FOR CONTRACTOR TO SUBMIT SITE SAFETY PLAN TO OWNER. WITH REGARDS TO THIS SECTION, PLAN SHOULD INCLUDE:
    - 1. DESCRIPTION OF THE METHODS OF EXCAVATION.
    - 2. DESCRIPTION OF METHODS FOR PROTECTION OF WORKERS, EXISTING STRUCTURES AND UTILITIES.
    - 3. PROFESSIONAL ENGINEERING APPROVALS OF SHIELD OR SHORING SYSTEMS AND EXCAVATIONS REQUIRED BY OSHA STANDARDS.
  - B. ENGINEER SHALL BE PRESENT DURING EXCAVATION TO PERFORM CONSTRUCTION OBSERVATION SERVICES. DUTIES SHOULD INCLUDE DAILY DOCUMENTATION OF EXCAVATION SIZE INCLUDING LENGTH, WIDTH, DEPTH AND GENERAL SHAPE OF EXCAVATION. ALSO NOTE SOIL CONDITIONS, PREVIOUSLY UNKNOWN UTILITY LOCATIONS OR UNUSUAL STAINING OR ODOR.
  - C. AVOID PLANNING EXCAVATIONS ADJACENT TO EXISTING UNDERGROUND STORAGE TANKS AND PIPING. WHEN NECESSITATED, REQUIRE HAND DIGGING TO EXPOSE TOP OF TANKS, LINES OR OTHER PIPING.
  - D. SPECIFICATIONS SHALL PROVIDE FOR THE ENVIRONMENTAL ENGINEER TO BE NOTIFIED IMMEDIATELY UPON THE DISCOVERY OF RELEASED HYDROCARBONS IN EXCAVATED MATERIAL.
  - E. ENVIRONMENTAL ENGINEER BE PRESENT AT THE SITE DURING ALL EXCAVATION IN TANK AND PIPING VICINITY. EXCAVATION SHALL BE SCREENED AND SAMPLED BY THE ENVIRONMENTAL ENGINEER AFTER SOILS HAVE BEEN EXCAVATED. SOIL SAMPLES SHOULD BE COLLECTED AND ANALYZED ACCORDING TO OWNER, STATE AND FEDERAL PROTOCOLS AND METHODOLOGIES.
  - F. DISPOSAL OF REGULATED MATERIALS SHALL BE DOCUMENTED IN ACCORDANCE WITH "TANK REMOVAL/CLOSURE GUIDE" PREPARED BY THE OWNER.
  - G. SPECIFICATIONS SHOULD PROVIDE FOR ACCUMULATED WATER IN EXCAVATIONS, REGARDLESS OF SOURCE TO BE PROPERLY DISPOSED OF ADHERING TO ALL STATE, FEDERAL AND LOCAL REGULATIONS.

- 6.03 BACKFILLING
- A. ENGINEER SHALL SPECIFY BACKFILL MATERIALS COMPATIBLE WITH INTENDED FUTURE USE OF FACILITY.
  - B. FOR NEW ABOVE GROUND STORAGE TANK INSTALLATIONS, ONLY THOSE MATERIALS RECOMMENDED BY THE TANK MANUFACTURER SHALL BE SPECIFIED.
  - C. ENGINEER SHALL SPECIFY THAT ALL IMPORTED BACKFILL MATERIALS (EXCEPT WASHED PEA GRAVEL) SHALL BE SAMPLED AND ANALYZED FOR BENZENE, ETHYL BENZENE, TOLUENE, XYLENE, TOTAL PETROLEUM HYDROCARBONS, CYANIDE (TOTAL) AND THE EIGHT RCRA HEAVY METALS (TOTALS).
  - D. ENGINEER SHALL NORMALLY REQUIRE IN SPECIFICATIONS FIELD COMPACTION TESTING BY AN INDEPENDENT LABORATORY OF ALL BACKFILL MATERIALS, NATIVE OR IMPORTED. STANDARDS FOR COMPACTION SHALL BE AS FOLLOWS:
    - 1. DETERMINE THE DENSITY OF SOIL IN PLACE BY THE SAND CONE METHOD, ASTM D 1556, OR BY NUCLEAR METHODS, ASTM D 2922 AND D3017.
    - 2. DETERMINE LABORATORY MOISTURE-DENSITY RELATIONS OF SOILS BY ASTM D1557.
    - 3. DETERMINE THE RELATIVE DENSITY OF COHESIVENESS SOILS BY ASTM D 4253 AND D 4254.
    - 4. SAMPLE BACKFILL MATERIALS BY ASTM D 75.

- 6.04 SURFACE RESTORATION
- A. ENGINEER SHALL SPECIFY A SURFACE RESTORATION FOR THE DISTURBED AREAS.

- 7.0 RIGGING AND HOISTING
- 7.01 THE ENGINEERING SHOULD ASSESS THE DEGREE OF DIFFICULTY ASSOCIATED WITH THE RIGGING AND HOISTING FOR TANK REMOVALS AND INSTALLATIONS. THE FOLLOWING ITEMS, AT MINIMUM SHOULD BE CONSIDERED.
- A. WEIGHT AND PHYSICAL SIZE OF TANK OR OBJECT TO BE LIFTED.
  - B. PROXIMITY OF RIGGING AND HOISTING EQUIPMENT TO ADJACENT STRUCTURES.
  - C. DIFFICULTY IN ACCESSING THE AREA FROM THE STANDPOINT OF OVERHEAD UTILITIES, UNDERGROUND UTILITIES, ROADS, DRIVEWAYS AND OTHER OBSTACLES.
  - D. EVALUATE THE POSSIBILITY OF IMPACTING ADJACENT PROPERTY DURING MOBILIZATION AS WELL AS THE ACTUAL RIGGING AND HOISTING OPERATION.

- 7.02 THE MINIMUM FOLLOWING STATEMENT SHOULD BE INCLUDED IN THE SPECIFICATIONS.
- A. RIGGING AND HOISTING SHALL BE PERFORMED IN ACCORDANCE WITH OSHA EQUIPMENT RIGGING REGULATIONS (29 CFR PART 1928 CHAPTER XVII, 7-1-90 EDITION, PAGES 203-207) AND WITH OSHA CRANE AND DERRICK REGULATIONS (29 CFR PART 1926 CHAPTER XVII, 7-1-90 EDITION, PAGES 120-131).
  - B. WHERE THE DESIGN ENGINEER FEELS THE DEGREE OF DIFFICULTY WARRANTS THAT SPECIAL PRECAUTIONS SHOULD BE TAKEN, THE SPECIFICATIONS SHOULD INCLUDE PROVISIONS FOR A LICENSED PROFESSIONAL ENGINEER TO DESIGN AND SUPERVISE THE RIGGING AND HOISTING OPERATION.
  - C. IN ADDITION TO "A" ABOVE, THE FOLLOWING STATEMENT SHOULD BE INCLUDED: "PROFESSIONAL ENGINEER'S RESPONSIBILITY".
  - D. THE CONTRACTOR SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER WHO WILL TAKE ON THE FOLLOWING RESPONSIBILITIES:
    - 1. SUBMIT A "RIGGING PROCEDURE PLAN" TO THE OWNER FOR APPROVAL.
    - 2. OBTAIN COPIES OF THE DATA SHEETS, EQUIPMENT CATALOGS AND SPECIFICATIONS FOR THE RIG TO BE USED ON THE JOB. COPIES SHALL BE SUBMITTED WITH THE "RIGGING PROCEDURE PLAN" TOGETHER WITH CALCULATIONS TO CONFIRM THE SAFE OPERATION OF THE RIGGING EQUIPMENT DURING THE VARIOUS STAGES, FROM LIFTING TO PLACING THE OBJECT IN ITS FINAL POSITION.
    - 3. INSPECT THE RIG AND OTHER EQUIPMENT AND DEVICES TO BE USED IN THE RIGGING OPERATION TO VERIFY THAT THE EQUIPMENT, ETC. IS IN A SAFE CONDITION.
    - 4. WITNESS TEST LOADING OF RIGGING EQUIPMENT WHEN REQUIRED BY OSHA REQUIREMENTS.
    - 5. SUPERVISE THE RIGGING OPERATION TO ENSURE THAT IT FOLLOWS THE APPROVED "RIGGING PROCEDURE PLAN" AND TO MAKE DECISIONS ACCORDINGLY TO ENSURE SAFETY DURING THE RIGGING OPERATION.

- 8.0 CONCRETE

- 8.01 GENERAL: THESE STANDARDS SHALL APPLY TO CONCRETE ANCHOR SLABS, TOP SLABS AND OTHER MISCELLANEOUS CAST IN-PLACE CONCRETE.
- A. DESIGN REFERENCES SHALL INCLUDE:
    - 1. ACI 304.2R - PLACING CONCRETE BY PUMPING METHODS
    - 2. ACI 305R - HOT WEATHER CONCRETING
    - 3. ACI 306R - COLD WEATHER CONCRETING
    - 4. ACI 315 - MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES
    - 5. ACI 318 - SPECIFICATIONS FOR STRUCTURE CONCRETE FOR BUILDINGS
    - 6. ASTM A 615 - SPECIFICATION FOR DEFORMED AND PLAIN BILLET STEEL BARS FOR CONCRETE REINFORCEMENT

- 7. ASTM C 31 - TEST METHODS FOR MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD
- 8. ASTM C 39 - TEST METHOD FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS
- 9. ENGINEER SHALL EVALUATE PROJECT LOCATION FOR SEISMIC RISK. REFERENCE SEISMIC RISK MAPS PRODUCED BY APPLIED TECHNOLOGY COUNCIL, 480 CALIFORNIA AVENUE, PALO ALTO, CALIFORNIA 94306 OR OTHER NATIONALLY ACCEPTED RISK MAPS.
- 10. MISCELLANEOUS DESIGN CRITERIA AS FOLLOWS:
  - 1. ALL CONCRETE SHOULD BE DESIGNED UTILIZING A MINIMUM OF 3000 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C-31 OR C-39.
  - 2. DETERMINE AVERAGE FROST DEPTHS FOR THE PROJECT SITE AND EXTEND FOOTING 6" LOWER THAN AVERAGE DEPTH.
  - 3. REINFORCEMENT BARS SHALL BE ASTM A 615, GRADE 60.
  - 4. ALL CONCRETE EXPOSED TO FREEZE/THAW CYCLES SHOULD BE AIR ENTRAINED.
  - 5. EVALUATE NEED, IF ANY, FOR WATERPROOFING OR DAMP PROOFING SYSTEMS AS WELL AS WATER STOPS.

9. MONITORING SYSTEM
- 9.01 GENERAL
- A. PROVIDE AN ELECTRICAL TANK GAUGING SYSTEM THAT PERFORMS THE FOLLOWING FUNCTIONS.
    - 1. CONTINUOUS TANK GAUGING.
    - 2. NON-DISCRIMINATING INTERSTITIAL MONITORING.
    - 3. RELAY OUTPUTS FOR REMOTE ALARMING.
    - 4. RS-232 PORT FOR INTERFACE WITH COMPUTERS FOR PROGRAMING THE UNIT. REMOTE INTERROGATION AND INTERFACE WITH BUILDING AUTOMATION SYSTEMS.
    - 5. WATER DETECTION.
    - 6. THE SYSTEM SHALL BE PNEUMATORIC LDE-740P, VEEDER-ROOT TLS 350 OR APPROVED ALTERNATE.

- 10.0 ALARMS - PENDING
- 10.02 ALARM CRITERIA - PENDING
- 11.0 GROUNDING
- 11.01 THE PRIMARY PURPOSES FOR INSTALLING A LOW IMPEDANCE GROUNDING SYSTEM ARE PERSONNEL SAFETY BY MINIMIZING THE POSSIBILITY OF ELECTRIC SHOCK, EQUIPMENT PROTECTION FROM FIRE HAZARDS, PROPER EQUIPMENT OPERATION, NOISE REDUCTION IN COMMUNICATION CIRCUITS AND RELIABILITY WITH LITTLE MAINTENANCE REQUIRED. IN ORDER TO INSURE ALL THE ABOVE, THE GROUNDING SYSTEMS SHALL BE DESIGNED AND INSTALLED TO MEET THE MINIMUM STANDARDS AS SET FORTH IN THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE, ARTICLE 250, AND ALSO ACCORDING TO AT&T PRACTICES.
- 11.02 ALL METALLIC OBJECTS ABOVE GRADE ON THE OUTSIDE OF THE BUILDING SHALL BE ATTACHED TO THE EXTERIOR GROUND RING.
- 11.03 ALL CONNECTIONS TO THE EXTERIOR GROUND RING SHALL BE MADE USING CADWELDS.
- 11.04 ALL CONNECTIONS TO THE INTERIOR BUILDING GROUND SHALL MATCH EXISTING CONNECTORS.
- 12.0 RECORD DOCUMENTS
- 12.01 INSTALLATION DOCUMENTATION ( 5 COPIES ) FOR THE SITE SHALL BE REQUIRED AS FOLLOWS:
- A. TABLE OF CONTENTS
  - B. STATE AND LOCAL PERMITS
  - C. DAILY WORK LOG
  - D. CONTRACTOR'S GUARANTEE
  - E. WAIVERS OF LIEN
  - F. ORIGINAL COPIES OF INSTALLATION, OPERATING AND MAINTENANCE MANUALS
  - G. CERTIFICATION AND COPIES OF TEST RESULTS
  - H. PHOTOGRAPHS
  - I. AS-BUILT DRAWINGS
  - J. FLOW DIAGRAM AND SYSTEM DESCRIPTION OF OPERATIONS.

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS C-2

DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS

DESIGN CRITERIA

AT&T SCALE: AS NOTED SHEET 3 OF 11



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**GENERAL CONSTRUCTION/SITE SYMBOLS AND ABBREVIATIONS**

- EARTH / COMPACT FILL
- CONCRETE
- PEA GRAVEL
- TEST BORING
- MONITORING WELL
- SOIL SAMPLING LOCATION
- SANITARY SEWER
- FOUNDATION DRAIN
- CITY WATER
- BURIED ELECTRICAL
- STORM SEWER
- BURIED TELEPHONE
- EXISTING CHAIN LINK FENCE
- NEW OR TEMPORARY CHAIN LINK FENCE
- PROPERTY LINE
- CATTLE FENCE
- CB CATCH BASIN
- NORTH ARROW
- EXISTING CONTOURS ELEVATION NOTED ON HIGH SIDE
- NEW CONTOURS ELEVATION NOTED ON HIGH SIDE

**MECHANICAL SYMBOLS AND ABBREVIATION**

- UNION
- FLEX CONNECTION
- NEW PIPING
- EXISTING PIPING
- WORK BELOW GRADE
- REMOVE EXISTING
- GATE VALVE
- BALL VALVE
- MULTI-PORT BALL VALVE W/MANUAL OPERATOR
- SOLENOID VALVE WITH MANUAL OPERATOR
- SOLENOID VALVE WITHOUT MANUAL OPERATOR
- FUSE LINK VALVE
- PRESSURE RELIEF VALVE
- CHECK VALVE
- VACUUM GAUGE WITH COCK
- PRESSURE GAUGE WITH COCK
- DUPLEX STRAINER (PLAN)
- DUPLEX STRAINER (ELEVATION)
- HAND PUMP

- VENT CAP
- O.C. ON CENTER
- GA GAUGE
- GALV GALVANIZED
- STL STEEL
- F.O. FUEL OIL
- F.O.R. FUEL OIL RETURN
- F.O.S. FUEL OIL SUPPLY
- F.O.V. FUEL OIL VENT
- F.O.F. FUEL OIL OVERFLOW
- GAL. GALLON
- A.S.T. ABOVEGROUND STORAGE TANK
- U.S.T. UNDERGROUND STORAGE TANK

**ELECTRICAL SYMBOLS AND ABBREVIATION**

- STREET LIGHT
- UTILITY POLE
- MANHOLE
- LIGHTING PANEL
- POWER PANEL
- DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- JUNCTION BOX
- OVERFILL ALARM HORN/LIGHT

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	C-3
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
SYMBOLS AND LEGEND	
AT&T	SCALE: AS NOTED SHEET 4 OF 11

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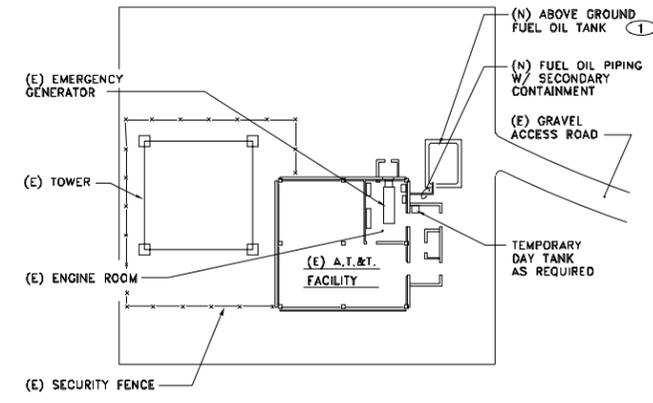
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**GENERAL CONSTRUCTION/SITE SYMBOLS AND ABBREVIATIONS**

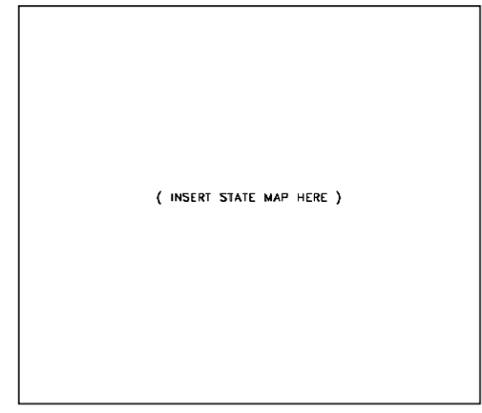
- EARTH / COMPACT FILL
- CONCRETE
- PEA GRAVEL
- TEST BORING
- MONITORING WELL
- SOIL SAMPLING LOCATION
- SANITARY SEWER
- FOUNDATION DRAIN
- CITY WATER
- BURIED ELECTRICAL
- STORM SEWER
- BURIED TELEPHONE
- EXISTING CHAIN LINK FENCE
- NEW OR TEMPORARY CHAIN LINK FENCE
- PROPERTY LINE
- ABOVEGROUND ELECTRICAL
- CATCH BASIN
- NORTH ARROW
- EXISTING CONTOURS ELEVATION NOTED ON HIGH SIDE
- NEW CONTOURS ELEVATION NOTED ON HIGH SIDE

**MECHANICAL SYMBOLS AND ABBREVIATION**

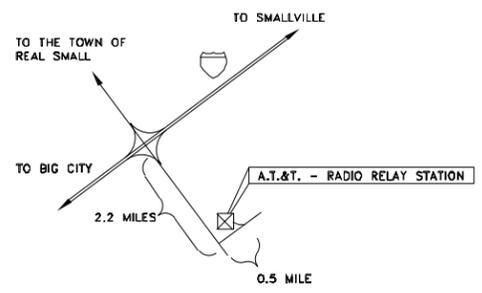
- UNION
- GAUGE
- FLEX CONNECTION
- NAME (N)- NEW PIPING
- NAME (E)- EXISTING PIPING
- WORK BELOW GRADE
- REMOVE EXISTING
- GATE VALVE
- BALL VALVE
- MULTI-PORT BALL VALVE W/MANUAL OPERATOR
- SOLENOID VALVE WITH MANUAL OPERATOR
- SOLENOID VALVE WITHOUT MANUAL OPERATOR
- PRESSURE RELIEF VALVE
- CHECK VALVE
- VACUUM GAUGE WITH COCK
- PRESSURE GAUGE WITH COCK
- DUPLEX STRAINER (PLAN)
- DUPLEX STRAINER (ELEVATION)
- HAND PUMP
- VENT CAP
- O.C. ON CENTER
- GA GAUGE
- GALV GALVANIZED
- STL STEEL
- F.O. FUEL OIL
- F.O.R. FUEL OIL RETURN
- F.O.S. FUEL OIL SUPPLY
- F.O.V. FUEL OIL VENT
- F.O.F. FUEL OIL OVERFLOW
- GAL GALLON
- A.S.T. ABOVEGROUND STORAGE TANK
- U.S.T. UNDERGROUND STORAGE TANK



**SITE PLAN**  
SCALE: 1"=20'-0"

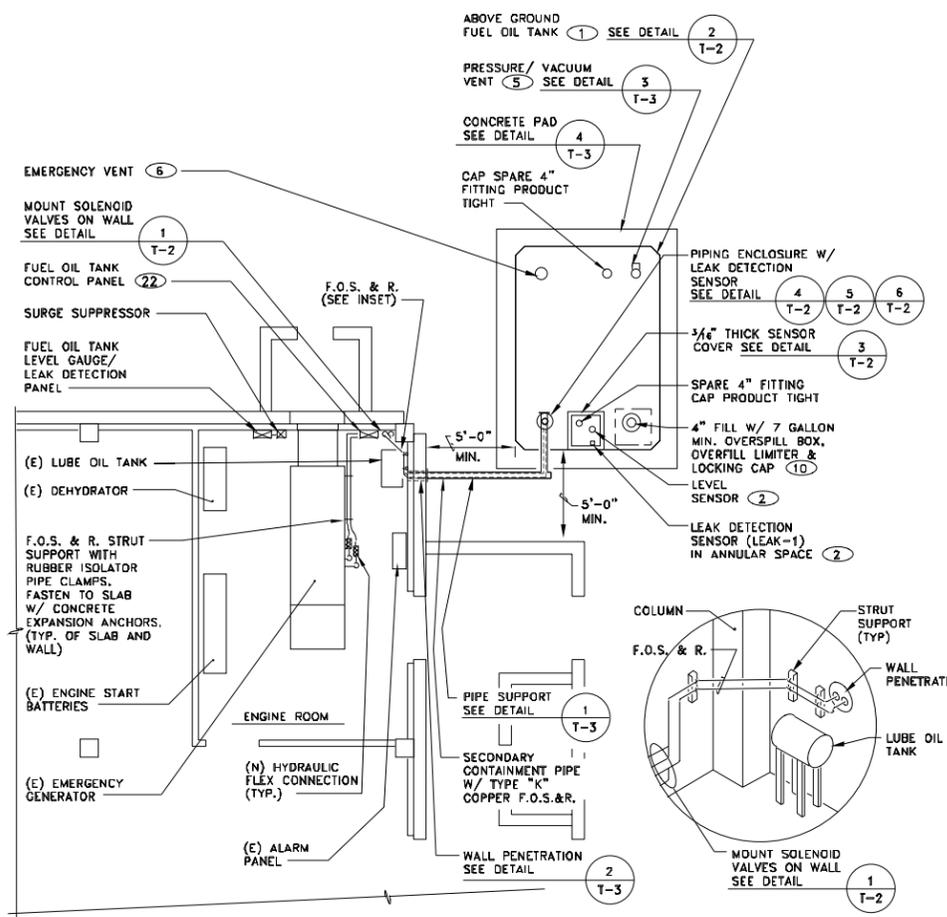


**LOCATION MAP**  
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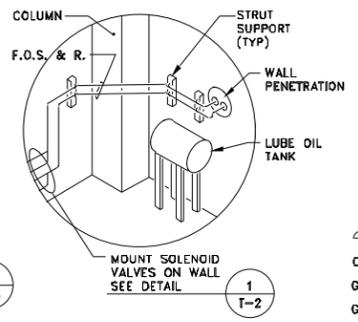


**VICINITY MAP**  
NOT TO SCALE

SITE CONTACT - JOHN DOE (XXX) XXX-XXXX



**FUEL OIL TANK PLAN**  
SCALE: 1/4" = 1'-0"



**INSET**  
ISOMETRIC VIEW

**NOTES:**

1. FIELD VERIFY ALL EXISTING CONDITIONS AND PROVIDE ALL OF THE NECESSARY PARTS, LABOR, MATERIALS, EQUIPMENT AND OVERTIME REQUIRED TO COMPLETE THE PROJECT.
2. ALL PIPING AND CONDUIT RUNS SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO WALLS AND FLOORS.
3. ALL WORK IS NEW UNLESS OTHERWISE NOTED.
4. FIRE STOP ALL RATED WALL PENETRATIONS WITH U.L. TESTED AND LISTED MATERIALS & ASSEMBLIES.
5. SEE SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
6. ALL WORK BELOW GRADE SHALL BE DOCUMENTED WITH PHOTOGRAPHS AND SHALL BE SUBMITTED TO THE ENGINEER FOR PERMANENT RECORD.
7. SUBMIT WORK AND CONSTRUCTION SCHEDULES TO A.T.&T. AND THE ENGINEER PRIOR TO STARTING THE WORK.
8. MAINTAIN A MINIMUM OF 5'-0" CLEARANCE BETWEEN THE OUTER WALL OF THE FUEL OIL VESSEL(S) AND THE FACILITY.

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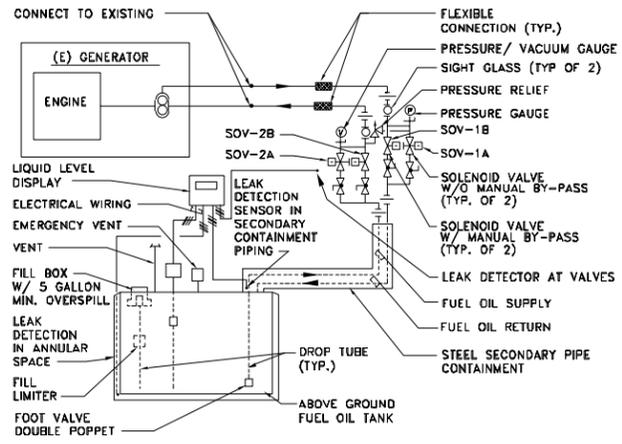
DESIGN CRITERIA FOR OUTSIDE ABOVE  
GROUND FUEL STORAGE TANK  
INSTALLATIONS

SITE PLAN, LOCATION MAP,  
VICINITY MAP, FUEL OIL TANK  
PLAN, NOTES AND LEGEND

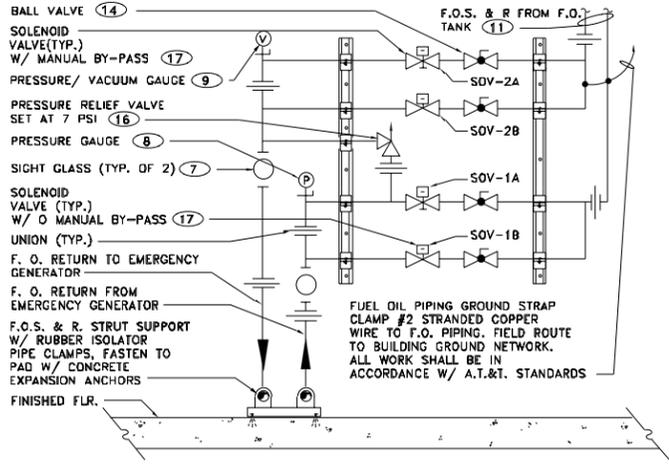
AT&T SCALE: AS NOTED  
SHEET 5 OF 11



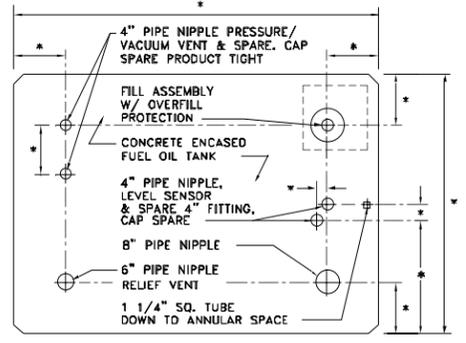
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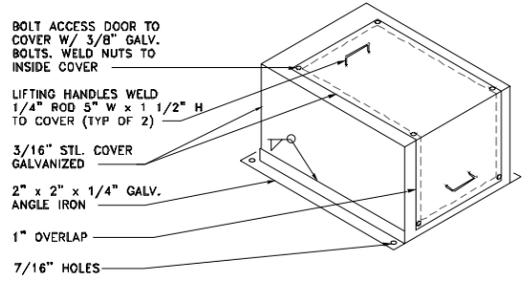
**FUEL OIL FLOW DIAGRAM**  
NOT TO SCALE



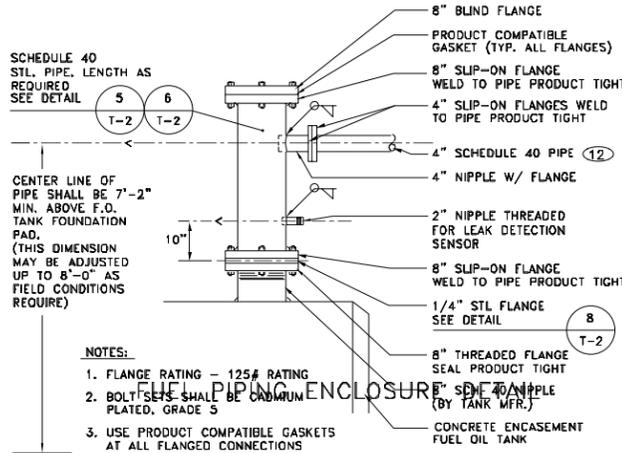
**VALVE MOUNTING DETAIL**  
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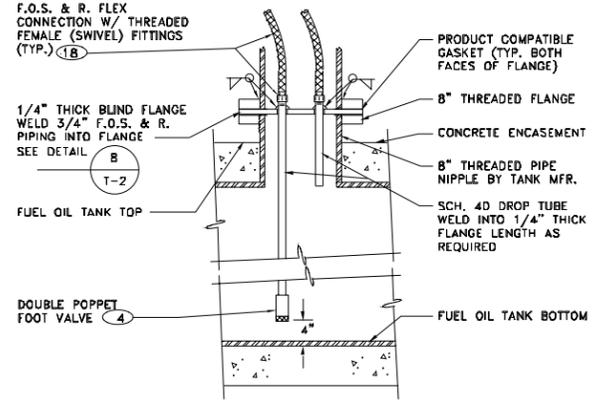
**TANK PLAN DETAIL**  
SCALE: 1/4" = 1'-0"



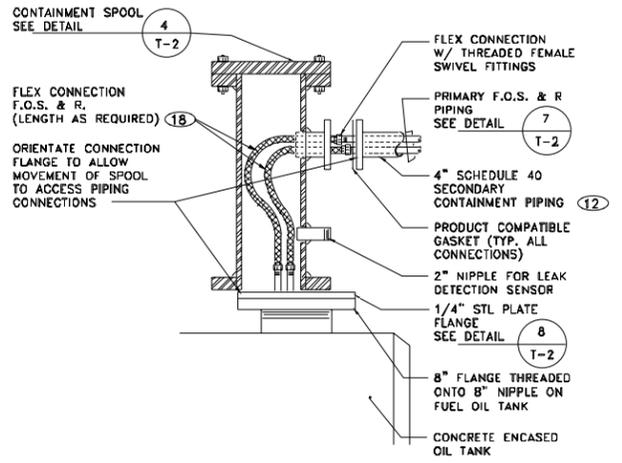
**SENSOR COVER AT TANK DETAIL**  
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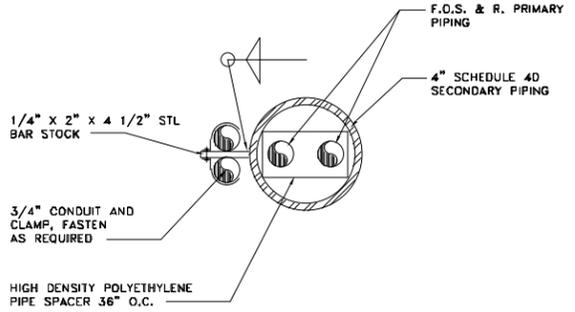
**PIPE ENCASEMENT DETAIL**  
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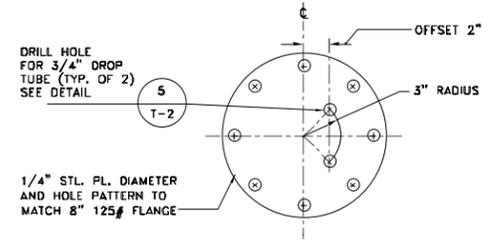
**FUEL PIPING CONNECTION DETAIL**  
NOT TO SCALE



**FUEL PIPING CONNECTION DETAIL**  
NOT TO SCALE



**SECONDARY CONTAINMENT PIPE DETAIL**  
NOT TO SCALE



**CONNECTION FLANGE DETAIL**  
NOT TO SCALE

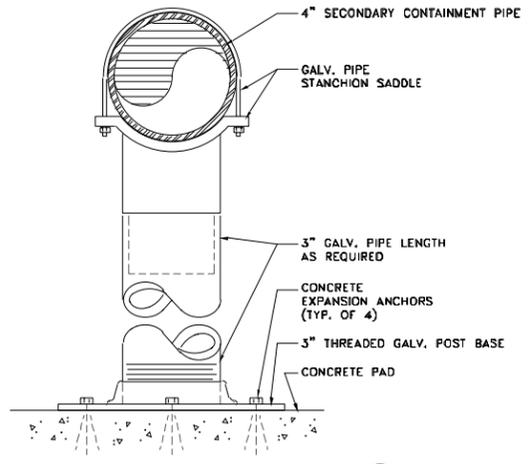
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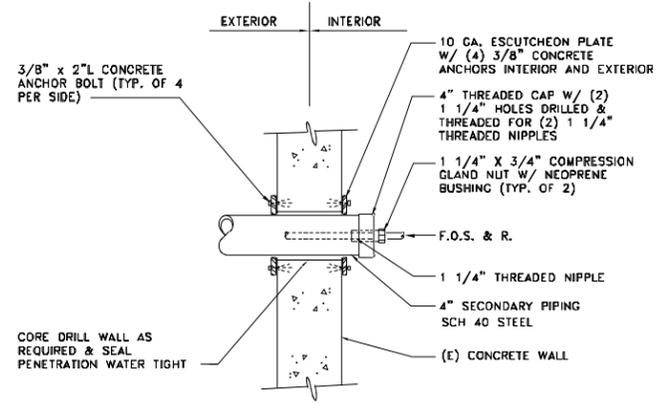
AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-2
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
FUEL OIL TANK DETAILS	
AT&T	SCALE: AS NOTED SHEET 6 OF 11



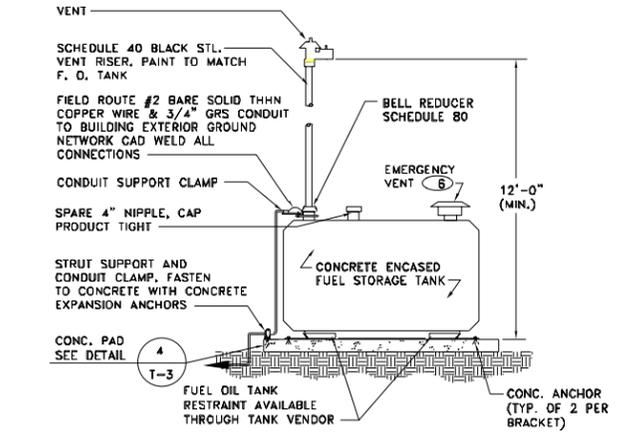
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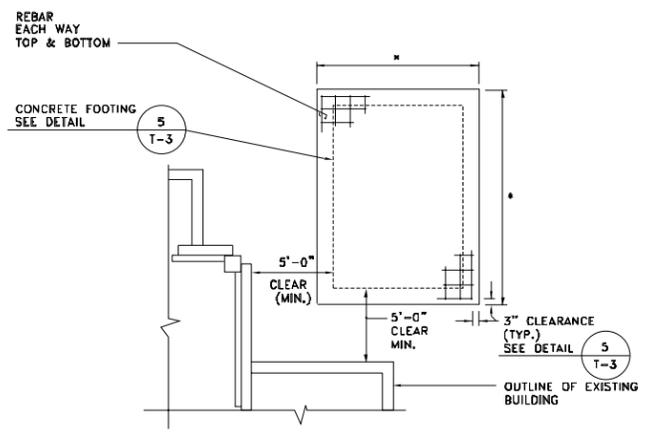
PIPE SUPPORT DETAIL 1  
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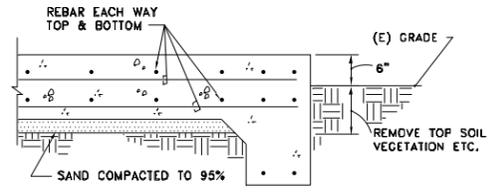
WALL PENETRATION DETAIL 2  
NOT TO SCALE T-3



VENT & RESTRAINT DETAIL 3  
NOT TO SCALE T-3



CONCRETE PAD DETAIL 4  
NOT TO SCALE T-3



CONC. FOOTING DETAIL 5  
NOT TO SCALE T-3

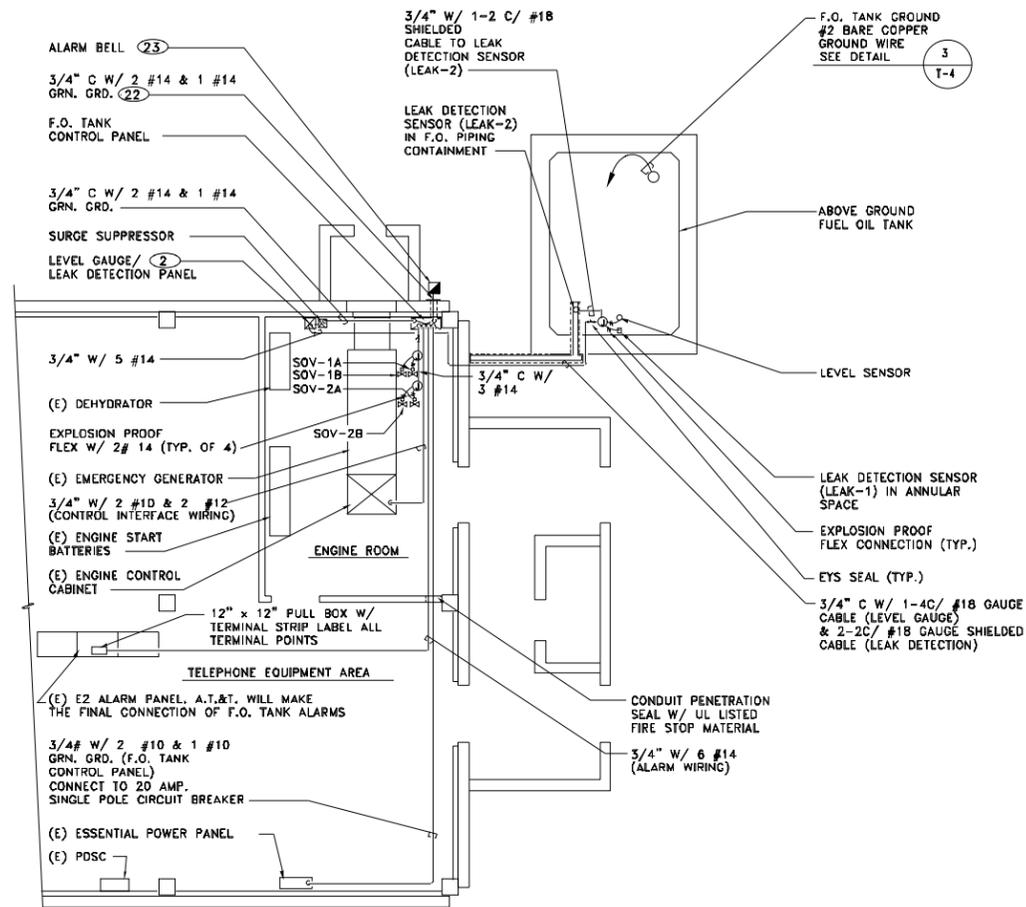
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CONSTRUCTION

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-3
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
FUEL OIL TANK DETAILS	
AT&T	SCALE: AS NOTED SHEET 7 OF 11

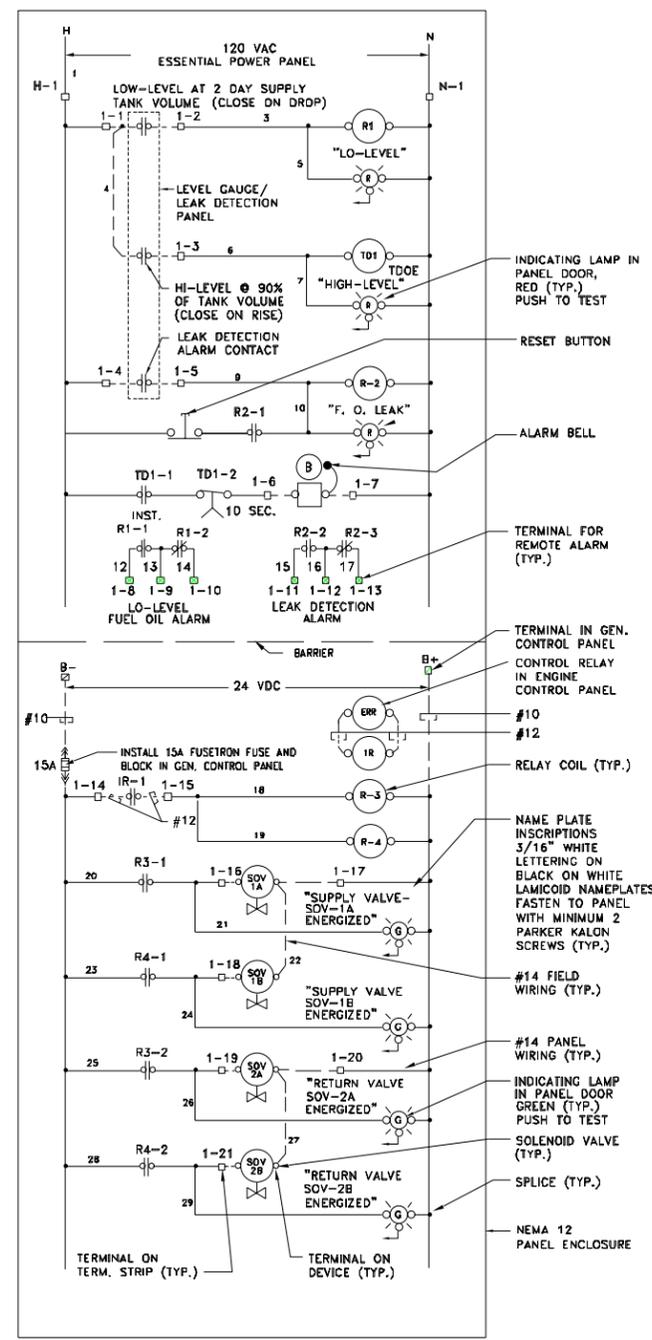
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**FUEL OIL TANK ELECTRICAL PLAN**  
SCALE: 1/4" = 1'-0"



**FUEL OIL TANK CONTROL PANEL**  
NOT TO SCALE

**ELECTRICAL SYMBOLS AND ABBREVIATION**

- ⊠ STREET LIGHT
- UTILITY POLE
- ⊞ MANHOLE
- ▬ LIGHTING PANEL
- ▭ POWER PANEL
- ⊞ DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- ⊞ JUNCTION BOX
- ⊞ OVERFILL ALARM HORN/LIGHT

**NOTES**

1. UPON COMPLETION OF WORK PREPARE AS BUILT DRAWINGS OF ELECTRICAL SYSTEM AND SUBMIT IN TRIPLICATE TO AUTHORIZED OWNER.
2. ALL ELECTRICAL WORK SHALL MEET OR EXCEED THE NEC REQUIREMENTS FOR CLASS 1, DIVISION 2, GROUP "D" HAZARDOUS ENVIRONMENTS
3. ALL WORK SHOWN IS NEW, UNLESS OTHERWISE NOTED.
4. FOR TANK GROUND, SEE DETAIL 3-1-3
5. FIRE STOP ALL RATED WALL PENETRATIONS WITH UL TESTED AND LISTED MATERIALS AND ASSEMBLIES
6. FIELD VERIFY EXISTING POWER PANEL VOLTAGE PRIOR TO CONNECTION OR ORDERING OF ANY NEW EQUIPMENT.
7. FIELD VERIFY ALL NEW CONDUIT RUN AND WALL PENETRATIONS PRIOR TO BIDDING.

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CONSTRUCTION

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-4
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
FUEL OIL TANK ELECTRICAL, FUEL OIL TANK CONTROL PANEL, LEGEND AND NOTES	
AT&T	SCALE: AS NOTED SHEET 8 OF 11

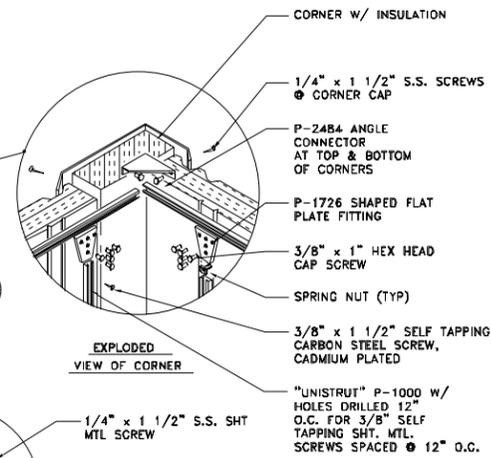
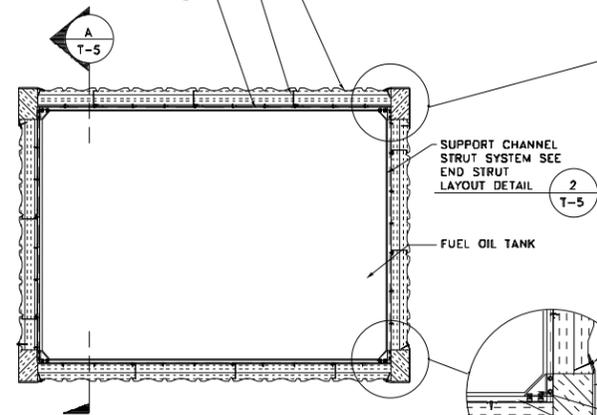
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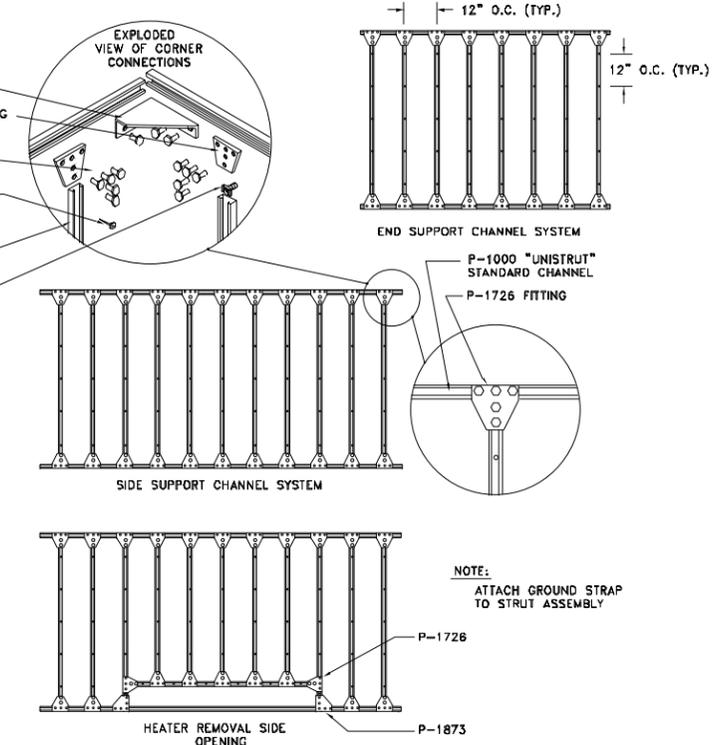
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NOTE: 1. DIMENSIONS AND DETAILS ARE BASED ON APPLICATION TO A 2,000 GALLON CONVAULT TANK. REVISE AS NECESSARY FOR SPECIFIC TANK SIZE AND MANUFACTURER.

INSULATED PANELS 24 GAUGE (MIN.)  
5'-6" x 3' x 6" (TYP.)  
INTERLOCK  
SUPPORT CHANNEL STRUT SYSTEM SEE SIDE STRUT LAYOUT DETAIL



P-2484 ANGLE CONNECTORS AT TOP AND BOTTOM OF THE CORNERS  
P-1726 SHAPED FLAT PLATE FITTING  
3/8" x 1" HEX HEAD CAP SCREW  
3/8" x 1" SELF TAPPING CARBON STEEL SCREWS, CADMIUM PLATED  
"UNISTRUT" P-1000 W/ HOLES DRILLED 12" O.C. FOR 3/8" SELF TAPPING SHT. MTL. SCREWS SPACED @ 12" O.C.  
P-1008-3/8" REGULAR SPRING NUT (TYP.)

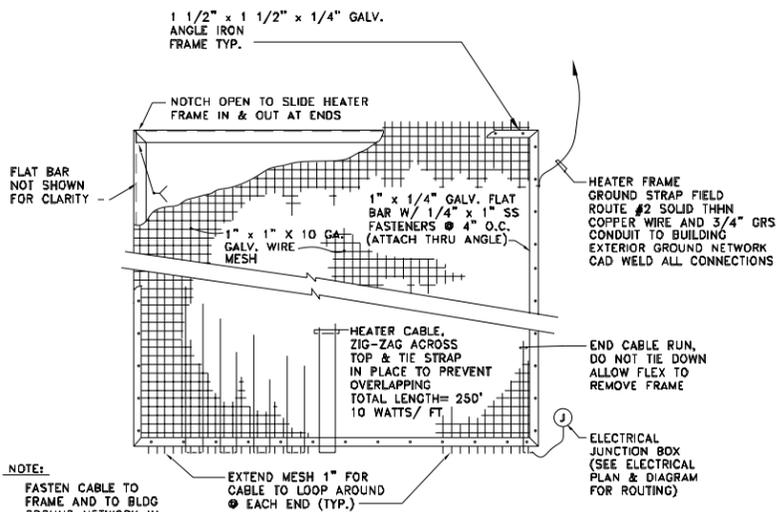


NOTE:  
ATTACH GROUND STRAP TO STRUT ASSEMBLY

PANEL DETAIL

NOT TO SCALE

1  
T-5

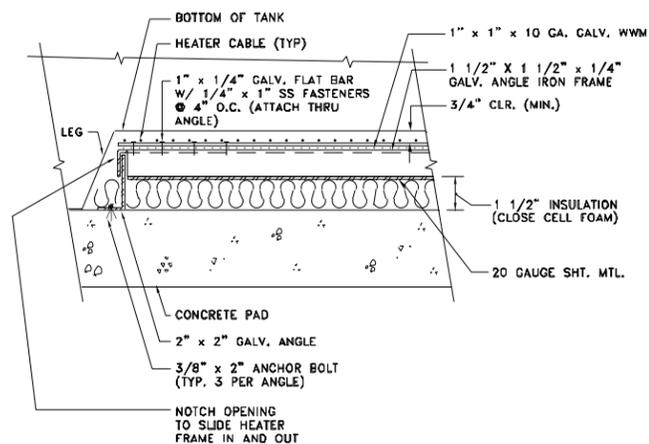


NOTE:  
FASTEN CABLE TO FRAME AND TO BLDG GROUND NETWORK IN ACCORDANCE WITH AT&T STANDARDS  
EXTEND MESH 1" FOR CABLE TO LOOP AROUND @ EACH END (TYP.)

HEATER FRAME DETAIL

SCALE: 1" = 1'-0"

3  
T-5



NOTES: 1. INSULATION SHALL BE PETROLEUM COMPATIBLE AND WATER REPELLENT SUCH AS DOW CHEMICAL INSULATION BOARD.

HEATER FRAME MOUNTING DETAIL

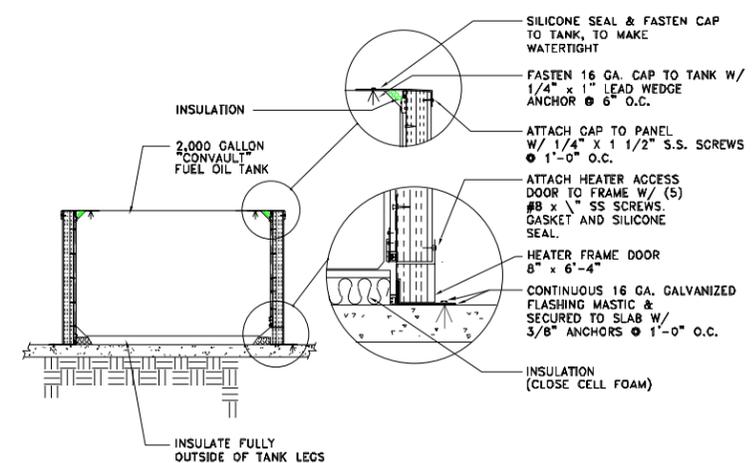
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STRUT LAYOUT DETAIL

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T-5



INSULATION SECTION

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS T-5

DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS

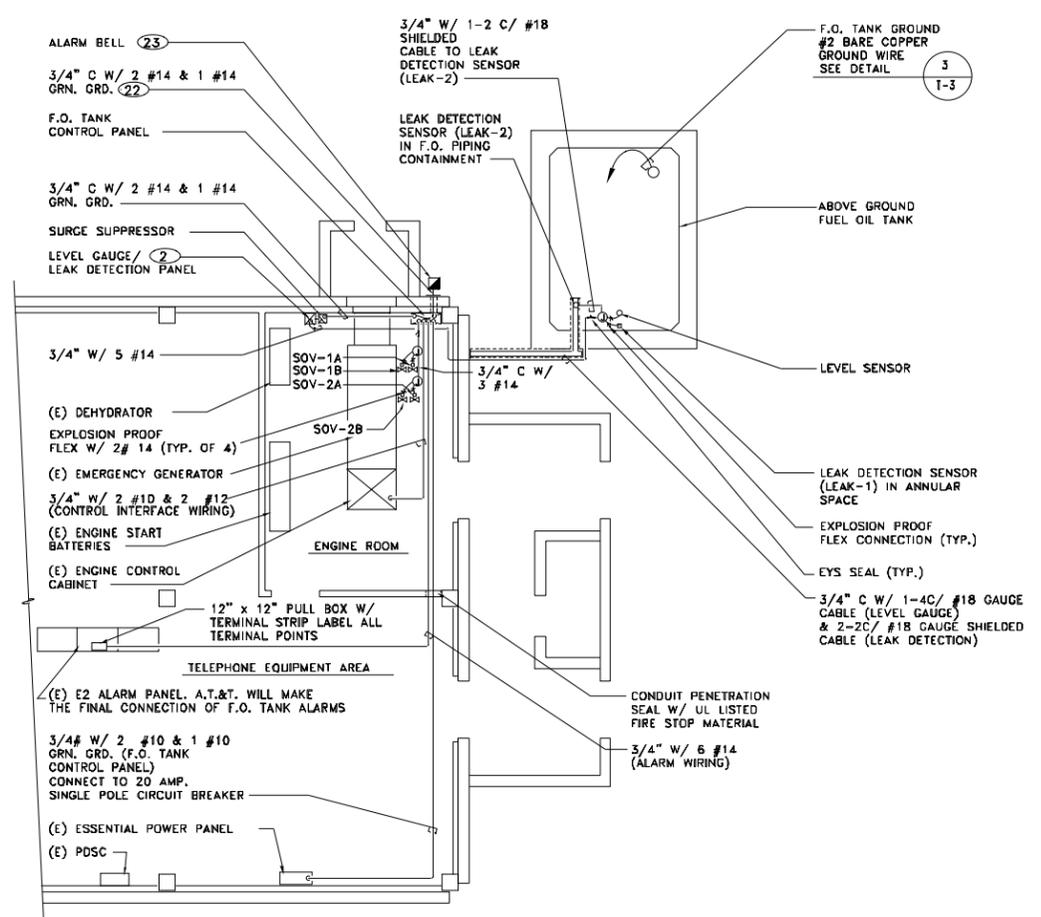
COLD WEATHER ACCESSORIES MECHANICAL SHEET

AT&T SCALE: AS NOTED SHEET 9 OF 11

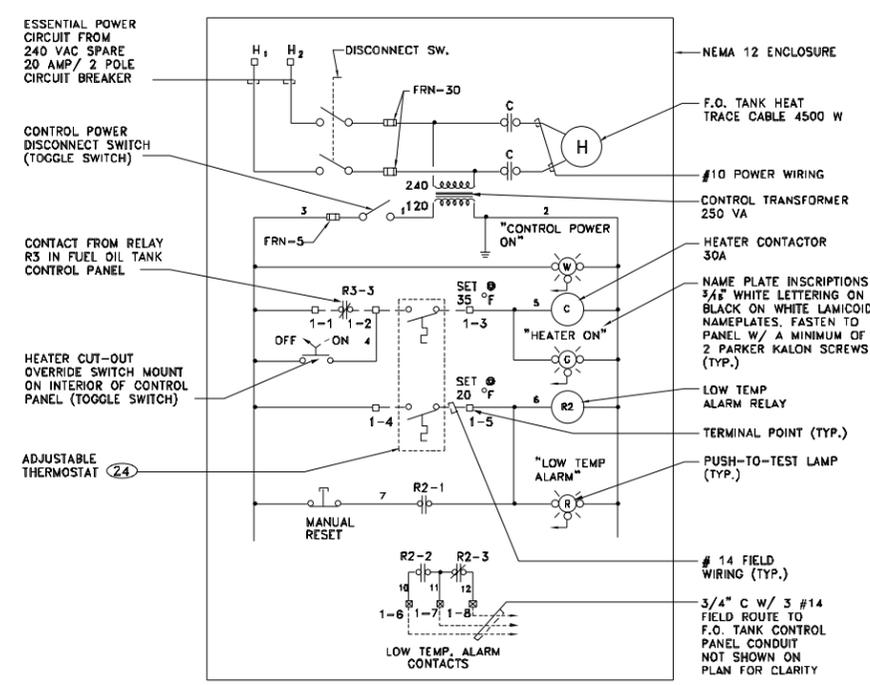
C:\P\PLANS\TANK\_S101\AST1 F-5.DWG ON 2/6/96 11:18 DAB



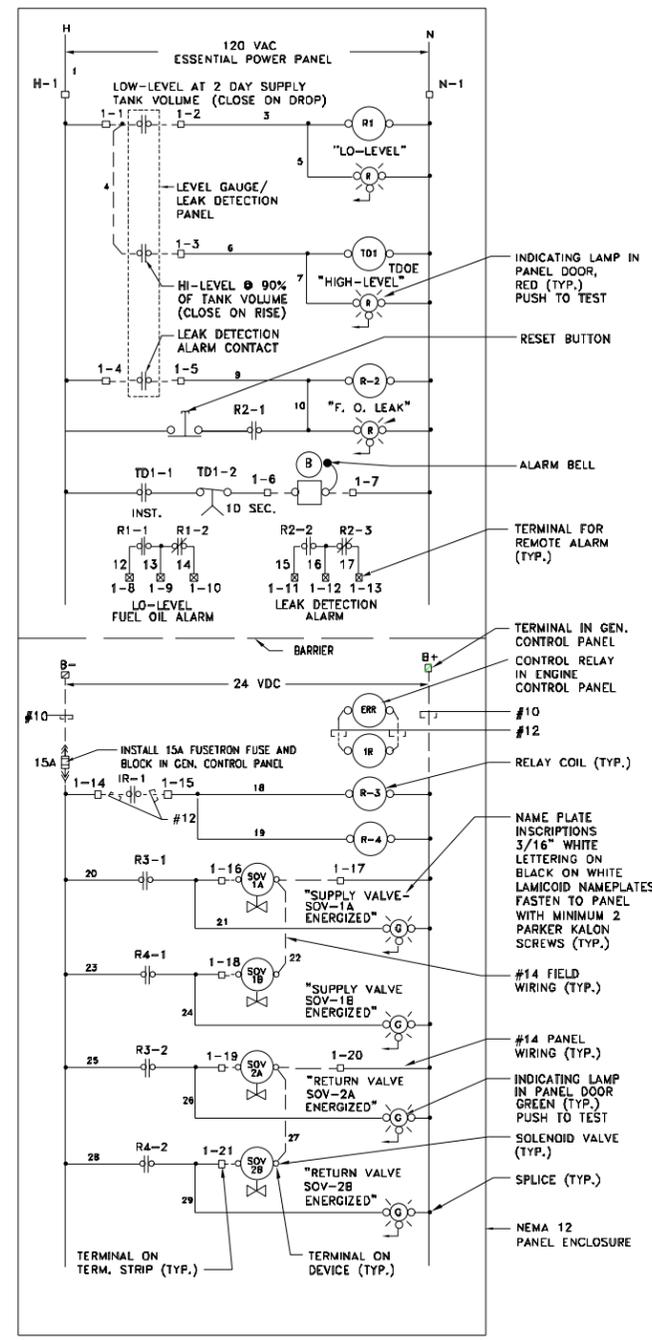
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**FUEL OIL TANK ELECTRICAL PLAN**  
SCALE: 1/4" = 1'-0"



**F. O. TANK HEATER CONTROL & POWER DIAGRAM**  
NOT TO SCALE



**FUEL OIL TANK CONTROL PANEL**  
NOT TO SCALE

**ELECTRICAL SYMBOLS AND ABBREVIATION**

- ☒ STREET LIGHT
- UTILITY POLE
- ⊞ MANHOLE
- ▬ LIGHTING PANEL
- ▨ POWER PANEL
- ⊞ DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- ⊞ JUNCTION BOX
- ⊞ OVERFILL ALARM HORN/LIGHT

**NOTES**

1. UPON COMPLETION OF WORK PREPARE AS BUILT DRAWINGS OF ELECTRICAL SYSTEM AND SUBMIT IN TRIPLICATE TO AUTHORIZED OWNER.
2. ALL ELECTRICAL WORK SHALL MEET OR EXCEED THE NEC REQUIREMENTS FOR CLASS 1, DIVISION 2, GROUP "D" HAZARDOUS ENVIRONMENTS
3. ALL WORK SHOWN IS NEW, UNLESS OTHERWISE NOTED.
4. FOR TANK GROUND, SEE DETAIL T-3
5. FIRE STOP ALL RATED WALL PENETRATIONS WITH UL TESTED AND LISTED MATERIALS AND ASSEMBLIES
6. FIELD VERIFY EXISTING POWER PANEL VOLTAGE PRIOR TO CONNECTION OR ORDERING OF ANY NEW EQUIPMENT.
7. FIELD VERIFY ALL NEW CONDUIT RUN AND WALL PENETRATIONS PRIOR TO BIDDING.

FOR DESIGN ONLY NOT FOR CONSTRUCTION

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-6
DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
COLD WEATHER ACCESSORIES ELECTRICAL SHEET	
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4. LDP/MS/ST/TANK...S/D/AST/1-6/DWG. 08/26/96 11:21 DAB



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EQUIPMENT LIST			
MARK	DESCRIPTION	MARK	DESCRIPTION
①	<p><u>ABOVE GROUND FUEL OIL TANK:</u> CAPACITY OF 500 GALLONS UP TO 6,000 GALLONS. CONSTRUCTION SHALL COMPLY WITH UNIFORM FIRE CODE, ARTICLE 79, FOR ABOVE GROUND STORAGE. THE TANK SHALL BE U.L. LISTED AND LABELED.</p> <p>THE FUEL OIL TANK SHALL BE ENCASED WITH A MINIMUM OF 6" OF REINFORCED CONCRETE. AN ANNULAR SPACE SHALL BE PROVIDED BETWEEN THE CONCRETE AND THE PRIMARY FUEL OIL TANK. THIS ANNULAR SPACE SHALL BE SEALED WITH A POLYETHYLENE GEDMEMBRANE FABRIC. FITTING LOCATIONS SHALL BE PER PLANS. THE TANK SHALL BE PRIMED AND FINISH PAINTED WITH TWO (2) COATS OF REFLECTIVE PAINT WHICH IS PRODUCT COMPATIBLE WITH THE TANK CONTENTS.</p> <p>WARNING LABELS SHALL BE AFFIXED AS REQUIRED BY CODE.</p> <p>THE TANK MANUFACTURER SHALL PROVIDE A 30 YEAR WARRANTY.</p> <p>TANKS SHALL BE MANUFACTURED BY CONVAULT, ENVIRO-Vault, ECO Vault, PHOENIX Vault, SUPER-Vault, OR APPROVED ALTERNATE.</p>	⑩	<p><u>FILL LIMITER:</u> SHALL BE ALUMINUM AND DESIGNED TO LIMIT FILL INPUT AT APPROXIMATELY 90-95% OF THE TOTAL FUEL OIL TANK VOLUME. A DRY COUPLE CONNECTION SYSTEM SHALL BE PROVIDED TO CONNECT THE FILL HOSE NOZZLE TO THE FILL LIMITER. FILL LIMITER SHALL BE MANUFACTURED BY GUILLOTINE OR APPROVED ALTERNATE.</p>
②	<p><u>LEVEL GAUGE AND LEAK DETECTION PANEL:</u></p> <p>UNIT SHALL BE U.L. LISTED AND PROPERLY DESIGNED FOR USE WITH DIESEL FUEL. THE PANEL SHALL PROVIDE LEAK DETECTION ANNUNCIATION WITH A SPDT RELAY TO BE USED FOR REMOTE ALARM INDICATION. LEAK DETECTION SENSORS SHALL BE PROVIDED WHICH WILL FIT WITH THE ACCESS PORTS FOR BOTH THE FUEL OIL TANK ANNULAR SPACE AND SECONDARY FUEL OIL PIPING. LEVEL INDICATION SHALL BE PROVIDED WHICH INCLUDES DIGITAL INDICATION LOW AND HIGH LEVEL ADJUSTABLE FUEL OIL LEVEL ALARMS WITH SPDT RELAYS FOR REMOTE LEVEL ALARM INDICATION.</p> <p>THE LEVEL SENSOR SHALL BE A FLOAT TYPE GUIDED BY A CONTINUOUS TUBE WITH A MINIMUM ACCURACY OF 0.1 INCH. SENSOR HOUSING SHALL BE EXPLOSION PROOF AND AN INTEGRAL PART OF THE SENSOR. ALL INPUTS FROM EITHER LEVEL SENSOR OR LEAK DETECTION PROBES SHALL BE INTRINSICALLY SAFE AND PROTECTED BY THE PROPER BARRIERS.</p> <p>LEVEL GAUGE AND LEAK DETECTION PANELS SHALL BE MANUFACTURED BY PNEUMECATOR, VEEDER ROOT, OR APPROVED ALTERNATE.</p> <p>LEVEL GAUGE AND LEAK DETECTION PANEL SHALL BE SURGE PROTECTED TO PROTECT SENSITIVE CIRCUITRY. THE DEVICE SHALL BE U.L. LISTED AND LABELED, AND MANUFACTURED BY SOLA OR APPROVED ALTERNATE.</p>	⑪	<p><u>PRIMARY FUEL OIL PIPING:</u> SHALL BE HARD DRAWN TYPE "K" COPPER, ASTM B-88. SOLDER SHALL CONTAIN 15% SILVER OR BLACK STEEL, A-53 SEAMLESS THREADED AND SEALED WITH A PRODUCT COMPATIBLE JOINT COMPOUND OR WELDED OR APPROVED ALTERNATE.</p>
③	<p><u>FUEL OIL TANK ACCESSORIES:</u></p>	⑫	<p><u>SECONDARY CONTAINMENT PIPING:</u> SHALL BE SCHEDULE 40 WITH SCREWED OR WELDED, AS REQUIRED BY THE DRAWINGS. THE PRIMARY FUEL OIL PIPING SHALL BE SUPPORTED WITHIN THE SECONDARY CONTAINMENT PIPING TO AVOID DAMAGE TO THE PRIMARY FUEL OIL PIPING.</p>
④	<p><u>FOOT VALVE:</u> SHALL BE MANUFACTURED WITH A BRONZE BODY, DOUBLE POPPET AND MONEL SCREEN, AND MANUFACTURED BY OPW, EMCO WHEATON, MORRISON BROS. CO., OR APPROVED ALTERNATE.</p>	⑬	<p><u>PIPE SUPPORTS:</u> SHALL BE DESIGNED TO ADEQUATELY PERMIT EXPANSION AND CONTRACTION WITHOUT DAMAGE TO CONNECTED EQUIPMENT OR STRUCTURES.</p>
⑤	<p><u>PRESSURE VACUUM VENT:</u> SHALL BE PROVIDED WITH BOTH PRESSURE AND VACUUM RELIEF, TO PREVENT MIGRATION OF MOISTURE INTO THE TANK. PRESSURE SETTING OF 1/2 1/2 OZ./ SQ. INCH, VACUUM SETTING OF 1/2 OZ./ SQ. INCH, AND MANUFACTURED BY GROTH, MORRISON BROS., CO., OR APPROVED ALTERNATE. IF THE TANK IS INSTALLED IN GEOGRAPHICAL LOCATIONS WHERE MOISTURE MIGRATION IS NOT A PROBLEM OR WHERE PROHIBITED BY CODE, USE STANDARD UPFLOW VENT.</p>	⑭	<p><u>BALL VALVES:</u> SHALL BE BRASS THREADED AND SUITABLE FOR DIESEL FUEL, INCLUDE BUNA-N ELASTOMERS, AND BE SIZED TO MATCH FUEL OIL PIPING. BALL VALVES SHALL BE MANUFACTURED BY APOLLO, McDONALD MFG. CO., MORRISON BROS. CO., OR APPROVED ALTERNATE.</p>
⑥	<p><u>EMERGENCY VENT:</u> SHALL BE PROVIDED WITH A TEFLON SEAT SEATING DIAPHRAGM TO MINIMIZE STICKING, A SELF DRAINING BODY HOUSING AND DRIP RINGS TO PROTECT SEATING SURFACE FROM CONDENSATE, AND HAVE PRESSURE SETTING OF 16 OZ./SQ. INCH. VENT DIAMETER SHALL BE IN ACCORDANCE WITH LOCAL FIRE CODES AND SIZED TO PREVENT TANK RUPTURE. VENT SHALL BE MANUFACTURED BY GROTH EQUIPMENT CORP. OR APPROVED ALTERNATE.</p>	⑮	<p><u>CHECK VALVES:</u> WHERE REQUIRED SHALL BE BRASS THREADED AND SUITABLE FOR DIESEL FUEL, INCLUDE BUNA-N ELASTOMERS, AND BE SIZED TO MATCH FUEL OIL PIPING. CHECK VALVES SHALL BE MANUFACTURED BY APOLLO, McDONALD MFG. CO., MORRISON BROS. CO., OR APPROVED ALTERNATE.</p>
⑦	<p><u>SIGHT GLASS:</u> SHALL BE OF BRASS CONSTRUCTION WITH MOLDED PYREX GLASS, SIZED TO MATCH FUEL OIL PIPING, AND MANUFACTURED BY MORRISON BROS. CO., OR APPROVED ALTERNATE.</p>	⑯	<p><u>PRESSURE BYPASS VALVE:</u> SHALL BE CONSTRUCTED OF STEEL, POPPET STYLE, WITH A CRACKING PRESSURE OF 7 PSI. PRESSURE BYPASS VALVE SHALL BE MANUFACTURED BY REXROTH OR APPROVED ALTERNATE.</p>
⑧	<p><u>PRESSURE GAUGE:</u> SHALL BE OF STAINLESS STEEL CONSTRUCTION WITH LIQUID FILLED CENTER AND A PRESSURE RATING OF 0-160 PSI, AND MANUFACTURED BY LHA, METEK, BARBER COLMAN, OR APPROVED ALTERNATE.</p>	⑰	<p><u>SOLENOID VALVE:</u> SHALL BE THREADED BRASS AND SUITABLE FOR DIESEL FUEL, INCLUDE BUNA-N ELASTOMERS, AND A CONTROL VOLTAGE TO MATCH ENGINE START VOLTAGES. MANUAL OVERRIDE SHALL BE PROVIDED AS REQUIRED. SOLENOID VALVE SHALL BE NORMALLY CLOSED AND OPENED UPON ENERGIZATION. SOLENOID COILS SHALL BE REMOVABLE AND INTERCHANGEABLE, AND LOCATED WITHIN AN EXPLOSION PROOF HOUSING. SOLENOID VALVE SHALL BE MANUFACTURED BY MAGNATROL VALVE CORP., OR APPROVED ALTERNATE.</p>
⑨	<p><u>PRESSURE/VACUUM GAUGE:</u> SHALL BE OF STAINLESS STEEL CONSTRUCTION WITH LIQUID FILLED CENTER, HAVE A VACUUM RATING OF 0-30 INCH HG +20 PSI, AND MANUFACTURED BY LHA, METEK, BARBER COLMAN, OR APPROVED ALTERNATE.</p>	⑱	<p><u>FLEX CONNECTIONS:</u> AT THE EXTERIOR OF THE FACILITY, NEAR THE FUEL OIL TANK, SHALL BE FIRE RATED WITH A METAL INNERCORE AND CADMIUM PLATED HEX FITTINGS. FLEX CONNECTIONS AT THE ENGINE SHALL BE A HOSE TYPE TO ABSORB VIBRATION WHICH IS TRANSMITTED FROM THE ENGINE TO THE PIPING, AND SHALL BE A MINIMUM LENGTH OF 12 INCHES. ALL FITTINGS AND FLEX CONNECTION COMPONENTS SHALL BE RATED FOR USE WITH DIESEL FUELS.</p>
		⑲	<p><u>FUEL OIL TANK CONTROLS AND COMPONENTS:</u></p>
		⑳	<p><u>ELECTRICAL EQUIPMENT LIST:</u></p>
		㉑	<p><u>RELAYS:</u> SHALL BE INDUSTRIAL TYPE RELAYS WITH 300 VOLT MAXIMUM RATING. COIL VOLTAGES SHALL MATCH REQUIRED CONTROL VOLTAGES. RELAYS SHALL BE MANUFACTURED BY SQUARE "D", ALLEN-BRADLEY, WESTINGHOUSE, OR APPROVED ALTERNATE.</p>
		㉒	<p><u>TERMINAL STRIPS:</u> SHALL BE PLUG IN T-BAR TYPE AND MANUFACTURED BY SQUARE "D", ALLEN-BRADLEY, WESTINGHOUSE, OR APPROVED ALTERNATE.</p>
		㉓	<p><u>INDICATING LAMP:</u> SHALL BE INDUSTRIAL PUSH TO TEST TYPE, WITH A LENS CAP COLOR MEETING SPECIFIC LOCATION REQUIREMENTS. VOLTAGE SHALL MATCH CONTROL PANEL VOLTAGE(S). INDICATING LAMP SHALL BE MANUFACTURED BY SQUARE "D", ALLEN-BRADLEY, WESTINGHOUSE, OR APPROVED ALTERNATE.</p>
		㉔	<p><u>ENCLOSURE:</u> SHALL BE NEMA 12 AND SIZED AS REQUIRED BY CODE.</p>
		㉕	<p><u>ALARM BELL:</u> SHALL BE 4 INCH DIAMETER AT A MINIMUM, WEATHER PROOF, AND SUITABLE FOR OUTDOOR INSTALLATION.</p>
		㉖	<p><u>ADJUSTABLE THERMOSTAT:</u> SHALL HAVE A SCALE RANGE OF -30°F. TO 170°F. PROVIDE DUAL SCALE WITH INDEPENDENT DUAL ADJUSTABLE SET POINTS AND CONTACTS. CURRENT RATING TO BE MINIMUM 5 AMPS. HOUSING TO BE NEMA 12 WITH NEOPRENE GASKETS. ADJUSTABLE THERMOSTAT TO BE MANUFACTURED BY FENWAL, CHROMALOX OR APPROVED ALTERNATES.</p>

CONTROL CONCEPT:

SOLENOID VALVES ARE PROVIDED AT A MINIMUM TO PREVENT THE SIPHONING OF FUEL FROM AN ABOVE GROUND FUEL OIL TANK INTO THE ENVIRONMENT IN THE EVENT OF A BROKEN FUEL OIL SUPPLY LINE. TO FACILITATE AND INTERFACE WITH THE EMERGENCY ENGINE CONTROLS, A FUEL OIL TANK CONTROL PANEL IS REQUIRED TO OPEN THE FUEL OIL TANK VALVES DURING A TYPICAL ENGINE RUN SEQUENCE AND CLOSE THE VALVE UPON ENGINE SHUTDOWN. CONTROL VOLTAGE FOR THE SOLENOID VALVES SHOULD BE OBTAINED FROM THE ENGINE START BATTERIES AND SPARE CONTACTS SHALL BE LOCATED WITHIN THE ENGINE CONTROL SYSTEM TO ACTIVATE THE SOLENOID VALVE CONTROL PANEL.

MANUAL OVERRIDE OF THE SOLENOID VALVES MAY BE REQUIRED IN ORDER TO FACILITATE FUEL OIL SYSTEM PRIMING OR OVERRIDE DUE TO A CONTROL FAILURE. VISUAL INDICATION SHALL BE PROVIDED AT THE FUEL OIL TANK CONTROL PANEL TO INDICATE THE ENERGIZATION OF THE VALVES OR LOCAL FUEL OIL TANK ALARMS SUCH AS LOW OR HIGH LEVEL ALARMS.

A HIGH LEVEL ALARM WITH EXTERIOR ALARM BELL SHALL BE PROVIDED TO ALLOW THE TANK TRUCK DRIVER ENOUGH TIME TO TERMINATE THE FILLING PROCESS. THE BELL SHALL BE AUTOMATICALLY TERMINATED BY A TIME DELAY RELAY.

A LEAK DETECTION ALARM SHALL BE PROVIDED WITH A CONTROL LATCH TO HOLD AN INTERMITTENT ALARM CONDITION CONSTANT UNTIL MANUALLY RESET AT THE FACILITY BY THE SYSTEM OPERATOR. THIS CONCEPT ELIMINATES CONCERN OVER POSSIBLE INTERMITTENT ALARMS AND REQUIRES ATTENTION BY THE FACILITY TECHNICIAN.

FUEL OIL TANK AND/OR PIPING HEATING SYSTEM:

IN COLD WEATHER LOCATIONS CONSIDERATION SHOULD BE GIVEN TO TANK HEATING. FUEL OIL TANK TEMPERATURE CONTROL IS BASED UPON A THERMOSTAT SENSING THE TEMPERATURE OF THE FUEL WITHIN THE STORAGE TANK. SENSING IS ACCOMPLISHED BY A REMOTE BULB STAT PLACED WITHIN THE FUEL. THE SYSTEM OPERATOR CAN MANUALLY ADJUST THE THERMOSTAT FOR TEMPERATURE AND ALARM SETTINGS.

PROVISIONS SHOULD BE MADE TO ALLOW THE SYSTEM OPERATOR TO ENABLE OR DISABLE THE HEATING SYSTEM DURING AN EMERGENCY ENGINE RUN DUE TO THE ADDITIONAL ELECTRICAL REQUIREMENTS DEMAND OF THE TANK HEATING SYSTEM. THE ADDITIONAL LOAD MAY BE ENOUGH TO OVERLOAD SOME EMERGENCY ENGINE OR PROVIDE AN ARTIFICIAL LOAD FOR OTHERS. SETTINGS WILL THEREFORE BE SITE SPECIFIC AND AUTOMATIC. PROVIDE AN ALARM NETWORK INTERFACE RELAY TO PROVIDE A LOW TEMPERATURE ALARM TO AT&T'S CENTRAL ALARM CENTER AS REQUIRED.

ALARM NETWORKING:

ALARMS OF CRITICAL NATURE SHOULD BE NETWORKED TO AT&T'S CENTRAL ALARM CENTER. IT IS RECOMMENDED THAT THE ALARM WIRING BE ROUTED TO A LOCAL TERMINAL STRIP. AT A MINIMUM, NETWORK THE ALARMS INTO A PARALLEL CONFIGURATION AS A GENERAL FUEL OIL TANK ALARM AND CONNECT THE GENERAL TANK ALARM TO THE EXISTING LOW LEVEL FUEL OIL ALARM NODE AT THE FACILITY. REDESIGNATE THE POINT IN THE CENTRAL ALARM DATABASE FROM LOW FUEL LEVEL ALARM TO GENERAL FUEL OIL TANK ALARM. ADDITIONAL ALARM POINTS MAY BE ADDED AS REQUIRED.

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DESIGN CRITERIA FOR OUTSIDE ABOVE GROUND FUEL STORAGE TANK INSTALLATIONS	
EQUIPMENT LIST AND FUEL OIL TANK CONTROLS	
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AT&T

# UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA

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T-3	TANK DETAILS 2,000 GAL. TO 20,000 GAL. STI-P3 TYPE II COMPOSITE
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UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
COVER SHEET	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 1 OF 14

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1.0 GENERAL

1.01 SCOPE

A. THIS DESIGN CRITERIA, TOGETHER WITH THE SUPPLEMENTARY INFORMATION LISTED HEREIN, COVERS THE EQUIPMENT AND DESIGN REQUIREMENTS TO BE USED IN THE ENGINEERING, MANUFACTURE, AND INSTALLATION OF UNDERGROUND FUEL OIL TANKS AND THEIR CONNECTION TO EMERGENCY STANDBY POWER PLANTS AND HEATING SYSTEMS. THE MAIN OBJECTIVE IS TO PROVIDE AN AUTOMATIC UNATTENDED RELIABLE FUEL STORAGE SYSTEM.

B. THE FUEL OIL STORAGE SYSTEM SHOULD BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS AND DIRECTIVES FROM AT&T PRACTICES AND WITH CONSIDERATIONS INDICATED IN PARAGRAPH 2.02.

C. THE RECOMMENDATIONS IN THIS SECTION ARE BASED, IN GENERAL, ON THE NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, NFPA SECTION 30, 31, 37, 110, AND 329. MANY DETAILS FEATURED IN THESE SOURCE DOCUMENTS HAVE NOT BEEN COVERED HEREIN. REVIEW THESE AND OTHER APPLICABLE DOCUMENTS FOR COMPLETE DETAILS.

D. FEDERAL, STATE, LOCAL AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS SHOULD BE FULLY COMPLIED WITH AT ALL TIMES, INCLUDING INTERFACING WITH AND UPGRADING EXISTING FUEL SYSTEMS.

E. THE USE OF TANKS MUST PROVIDE A SAFE AND ENVIRONMENTALLY SOUND STORAGE SYSTEM. IT IS ESSENTIAL THAT FEATURES FOR RELIABILITY, SAFETY, FIRE PROTECTION, ENVIRONMENTAL PROTECTION, STRUCTURAL INTEGRITY, SEISMIC PROTECTION, AND ISOLATION SHOULD BE INCORPORATED AND ADDRESSED.

F. PLANS AND SPECIFICATIONS SHOULD BE SUBMITTED FOR PROPOSED INSTALLATIONS OF FUEL OIL TANK LOCATIONS ILLUSTRATING SUCH FEATURES AS TANK SIZE, UTILITIES DISTANCES FROM THE FACILITIES, PROPERTY LINES, BUILDING FOUNDATIONS, TANK DEPTH, AND WATER WAYS. PRELIMINARY PLANS SHOULD BE SUBMITTED TO THE OWNER FOR THEIR APPROVAL AND THEN SUBMITTED TO LOCAL AUTHORITIES FOR REVIEW AND APPROVAL.

G. TANK AREAS AND ADJACENT SPACES SHOULD BE KEPT FREE FROM VEGETATION, DEBRIS, AND OTHER MATERIALS WHICH MAY BE COMBUSTIBLE OR FLAMMABLE.

H. PROPER SIGNS AND DECALS SHALL BE SPECIFIED. THE PURPOSE OF THE SIGNAGE IS TO ADVISE OCCUPANTS THAT OPEN FLAMES AND SMOKING ARE PROHIBITED WITHIN AND AROUND THE TANK AREA.

I. SEISMIC BRACING AND NECESSARY FLEXIBLE CONNECTIONS SHOULD BE SPECIFIED TO PREVENT DAMAGE TO TRANSFER PIPING OR TANKS, DURING PERIODS OF SEISMIC ACTIVITY.

J. IF THE SPECIFIC PROJECT INVOLVES REMOVAL OR CLOSURE OF AN EXISTING TANK, REFER TO UST REMOVAL AND ABANDONMENT CRITERIA.

K. SOIL SAMPLING SHALL BE AT DISCRETION OF OWNER AND ENGINEER.

L. WHERE REFERENCES TO SPECIFIC MANUFACTURERS ARE SHOWN, AN APPROVED ALTERNATE MAY BE USED.

1.02 OWNER INVOLVEMENT

A. DETAILED INVOLVEMENT WITH THE OWNER SHOULD TRANSLATE INTO OVERALL COST SAVINGS DUE TO THE ANTICIPATED REDUCTION IN ENGINEERING COSTS AND CONSTRUCTION DELAYS, DUE TO POTENTIAL DESIGN CHANGES REQUESTED BY THE OWNER.

B. THE OWNER SHOULD BE CONSULTED DURING THE DESIGN/INSTALLATION PROCESS BECAUSE THEY ARE FAMILIAR WITH EQUIPMENT OPERATION AND AVAILABLE SPACE AT THE BUILDING TO PROVIDE FOR A SUITABLE FUEL OIL TANK LOCATION, OR CONVERSELY IDENTIFY SOME LOCATIONS UNSUITABLE. AS A MINIMUM, THE OWNER SHOULD BE INVOLVED WITH THE FOLLOWING:

1. FIELD VERIFY LOCATION OF FUEL OIL TANK.
2. REVIEW OF PRELIMINARY AND FINAL DESIGN PLANS AND SPECIFICATIONS.
3. CONSULTATION, DEVELOPMENT, AND ACKNOWLEDGEMENT OF A WORK METHOD OF PROCEDURES (MOP) NEEDED FOR THE PROJECT.
4. PROJECT OVERSIGHT DURING CONSTRUCTION, INCLUDING SITE ACCESS.
5. ACCEPTANCE OF THE COMPLETED WORK.
6. MAINTAIN DOCUMENTATION IN ACCORDANCE WITH PART 12.

2.0 TANK REQUIREMENTS

2.01 TANK LOCATION

LOCATE THE TANK AS CLOSE AS POSSIBLE TO THE BUILDING ENTRY OR AS NEAR AS LOCAL CODES AND AUTHORITIES WILL ALLOW. MAINTAIN A SAFE DISTANCE FROM FOUNDATIONS AT ALL TIMES.

2.02 TANK SIZING

A. STANDARD TANK SIZING CRITERIA FOR EMERGENCY STANDBY GENERATORS IS AS FOLLOWS:

$$\text{HOURLY CONSUMPTION CONNECTED LOAD} \times 72 \text{ HRS.} \times 4 = 90\% \text{ OF TANK VOLUME}$$

B. OWNER SHALL VERIFY AND APPROVE CALCULATED VOLUMES.

C. ADDITIONAL SUPPLIES SHOULD BE CONSIDERED FOR FACILITIES WHICH ARE REMOTE OR WHERE ACCESS IS NOT AVAILABLE DURING WINTER MONTHS DUE TO POOR WEATHER CONDITIONS OR WHERE CONTRACTUAL OBLIGATIONS REQUIRE GREATER VOLUME.

D. TANK SYSTEMS SUPPORTING BOTH EMERGENCY STANDBY GENERATORS AND HEATING SYSTEMS SHALL BE SIZED IN ACCORDANCE WITH PARAGRAPHS A OR C ABOVE, PLUS ADDITIONAL FUEL AS REQUIRED TO SUPPORT THE HEATING SYSTEMS.

2.03 ABOVEGROUND PIPING INSTALLATIONS IN SEVERE COLD

EVALUATE AND DETERMINE THE LOWEST EXPECTED TEMPERATURES AT THE FACILITY THEN REVIEW FUEL CHARACTERISTICS TO ESTABLISH IF HEATING IS REQUIRED. IF APPLICABLE, REFER TO ABOVEGROUND FUEL TANK OUTSIDE OF BUILDING DESIGN CRITERIA.

3.0 UNDERGROUND FUEL STORAGE TANKS

3.01 THE UNDERGROUND FUEL STORAGE TANK SHALL BE INSTALLED AS RECOMMENDED BY MANUFACTURER AND IN ACCORDANCE WITH THE CODES AND REGULATIONS INDICATED ABOVE. THE TANK SHALL BE WARRANTED AGAINST CORROSION AND STRUCTURAL FAILURE FOR 30 YEARS BY THE STEEL TANK INSTITUTE OR THE FIBERGLASS TANK MANUFACTURER AND SHALL BE FURNISHED WITH UNDERWRITERS UNDERGROUND LABEL, STI-P3 LABEL AND MANUFACTURER'S LABEL.

3.02 STEEL TANK INSTITUTE PRE-ENGINEERED PROVEN PROTECTION (STI-P3) TANKS SHALL INCLUDE PROVISIONS FOR MONITORING OF THE INTERSTITIAL SPACE FOR OIL PRODUCTS. A 4" STICK GAUGE PIPE SHALL EXTEND UP TO AN ACCESS MANHOLE IN THE CONCRETE PAD PER DRAWING DETAILS.

TANK SHALL INCLUDE HOLD DOWN STRAPS WITH TURNBUCKLES AND THREADED RODS. THESE ITEMS SHALL BE GALVANIZED OR COATED BY TANK MANUFACTURER.

A. THE STI-P3 TANK SHALL BE 360 DEGREE (100% VOLUME) DOUBLE WALL TYPE II TANK WITH INNER AND OUTER TANK CONSTRUCTED OF CARBON STEEL. ALL WELDED CONSTRUCTION. DIAMETER OF EACH TANK SHALL BE AS INDICATED ON THE DRAWINGS. THE TANK SHALL BE EQUIPPED WITH SACRIFICIAL ANODE CATHODIC PROTECTION AS REQUIRED BY STI-P3 CLASSIFICATION. EXTERIOR OF THE TANK SHALL BE CLAD WITH STI-P3 EPOXY OR URETHANE COATING. FINISH SHALL BE TESTED FOR DEFECTS.

B. THE STI-P3 COMPOSITE TANK SHALL BE 360 DEGREE (100% VOLUME) DOUBLE WALL TYPE II TANK WITH INNER AND OUTER TANK CONSTRUCTED OF CARBON STEEL. ALL WELDED CONSTRUCTION. DIAMETER OF EACH TANK SHALL BE AS INDICATED ON THE DRAWINGS. THE TANK SHALL BE EQUIPPED WITH SACRIFICIAL ANODE CATHODIC PROTECTION AS REQUIRED BY STI-P3 CLASSIFICATION. EXTERIOR OF THE TANK SHALL BE CLAD WITH STI-P3 FRP (FIBERGLASS REINFORCED PLASTIC) COATING. FINISH SHALL BE TESTED FOR DEFECTS.

3.03 FIBERGLASS (FRP) TANKS SHALL MEET ALL REQUIREMENTS OF UL 1316 AND ASTM D 4021. TANKS SHALL BE FURNISHED WITH UNDERWRITERS UNDERGROUND LABEL AND MANUFACTURER'S LABEL.

A. THE FIBERGLASS TANK SHALL BE 360 DEGREE DOUBLE WALL GLASS FIBER REINFORCED POLYESTER (FRP) UNDERGROUND DIESEL STORAGE TANK BY OWENS CORNING TANKS CORPORATION OR APPROVED EQUAL. TANK FITTINGS AND CONTAINMENT CHAMBER SHALL BE IN ACCORDANCE WITH DRAWING DETAILS. SIZE OF TANK SHALL BE AS NOMINAL SIZE OF TANK DIMENSIONED ON DRAWINGS. PROVIDE GLASS FIBER REINFORCED POLYESTER HOLD DOWN STRAPS WITH GALVANIZED TURNBUCKLES AND THREADED RODS.

B. THE TANK SHALL INCLUDE PROVISIONS FOR MONITORING OF THE INTERSTITIAL SPACE FOR OIL PRODUCTS. THE TANK SHALL BE EQUIPPED WITH AN INTEGRALLY MOUNTED FRP RESERVOIR FOR HYDROSTATIC MONITORING. TANK SHALL BE DESIGNED TO ALLOW FREE FLOW OF LIQUIDS IN THE INTERSTITIAL SPACE. THE RESERVOIR SHALL BE FILLED WITH BRINE SOLUTION (AS RECOMMENDED BY THE MANUFACTURER) AND EQUIPPED WITH PRESSURE SWITCH TO DETECT AS A MINIMUM CHANGE (INCREASE OR DECREASE) IN THE LEVEL OF LIQUID IN THE RESERVOIR EQUAL TO .05 GPH WITH 95% PROBABILITY OF DETECTION AND 5% PROBABILITY OF FALSE ALARM.

C. THE SWITCH SHALL BE COMPATIBLE WITH AND INTERLOCKED WITH THE TANK GAUGING SYSTEM. A 4" STICK GAUGE PIPE SHALL EXTEND UP TO AN ACCESS MANHOLE IN THE CONCRETE PAD, PER DRAWING DETAILS.

3.04 ALL TANKS SHALL BE FURNISHED WITH OPENINGS AS INDICATED ON THE DRAWINGS. PROVIDE DIELECTRIC SLEEVES OR DIELECTRIC UNIONS AT ALL FLANGED CONNECTIONS TO ISOLATE ALL PIPING FROM THE STEEL TANKS AND ALL PIPING INSIDE THE TANK FROM OUTSIDE PIPING.

3.05 EACH TANK SHALL BE EQUIPPED WITH A CONTAINMENT CHAMBER AS INDICATED ON THE DRAWINGS. THE CHAMBER SHALL INCLUDE PROVISIONS FOR LIQUID TIGHT CONNECTIONS TO THE TANK AND ALL PIPING PENETRATIONS. THE PRIMARY PURPOSE OF THE CHAMBER IS TO PROVIDE AN AREA FOR RETENTION OF ANY FUEL LEAKING FROM THE PIPING SYSTEM. THE CHAMBER MUST ALSO PREVENT ENTRY OF GROUND OR SURFACE WATER INTO THIS AREA, SETTING OFF FALSE LEAK INDICATIONS. NEW AND IMPROVED PRODUCTS AND METHODS OF MAINTAINING A DRY WATER TIGHT ENVIRONMENT ARE CONTINUOUSLY BEING DEVELOPED AND SHOULD BE CONSIDERED FOR USE.

4.0 PIPING

4.01 PRODUCT PIPING

A. FUEL OIL SUPPLY AND RETURN PIPING SHALL BE DOUBLE WALL PIPE AND FITTINGS SUITABLE FOR USE AS UNDERGROUND FUEL OIL PIPING.

1. ACCEPTABLE CARRIER PIPE:
  - a) TYPE "X" SOFT, SEAMLESS COPPER TUBING.
  - b) FRP.
  - c) ENVIROFLEX OR EQUAL.
  - d) STEEL.
  - e) ACCEPTABLE ALTERNATE.
2. ACCEPTABLE SECONDARY CONTAINMENT SYSTEM:
  - a) FIBERGLASS PIPE.
  - b) HIGH DENSITY POLYETHYLENE (HDPE).
  - c) STEEL.
  - d) APPROVED ALTERNATE.

4.02 VENT PIPING

A. TANK VENTING SYSTEMS SHALL BE DESIGNED ACCORDING TO NFPA 30 AND LOCAL CODES.

B. VENT PIPE SHALL BE:

1. UNDERGROUND VENT PIPING SHALL BE FIBERGLASS REINFORCED PLASTIC PIPE (FRP).
2. ABOVEGROUND VENT PIPING SHALL BE GALVANIZED SCHEDULE 40 STEEL.

4.03 PIPING MATERIALS

A. COPPER PIPING:

1. COPPER PIPE SOLDER JOINTS SHALL BE OF TYPE CONFORMING TO ANSI B16.22. COPPER PIPE UNIONS SHALL BE WROUGHT COPPER, CAST BRONZE.
2. INSULATING UNIONS FOR COPPER PIPE SHALL BE PROVIDED AT ALL EQUIPMENT HAVING FERROUS CONNECTIONS.
3. FLARE FITTINGS FOR COPPER PIPE ARE NOT ACCEPTABLE. SOLDER SHALL BE A SILVER ALLOY SOLDER WITH A MELTING POINT OF NOT LESS THAN 1100° F.
4. SILVER BRAZING FLUX SHALL BE USED FOR SOLDER OF 1100° F. OR HIGHER MELTING POINT.
5. DIELECTRIC COUPLINGS AND/OR FLANGED KITS SHALL BE PROVIDED AT ALL COPPER TO STEEL CONNECTIONS AND AS REQUIRED TO ISOLATE THE PIPING FROM THE TANK.
6. UNDERGROUND COPPER PIPING SHALL BE SOFT, ROLLED COPPER INSTALLED WITHOUT JOINTS IN THE UNDERGROUND SECTIONS.
7. ABOVEGROUND COPPER PIPING SHALL BE HARD DRAWN COPPER.

B. STEEL PIPING

1. STEEL PIPE SHALL BE CARBON STEEL SEAMLESS ASTM A53 GRADE A OR GRADE B CARBON STEEL BUTT WELDED ASTM A120.
2. PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40 OR EXTRA HEAVY WEIGHT SCHEDULE 80.
3. PIPE FINISH SHALL BE GALVANIZED OR BLACK.
4. FITTINGS FOR JOINTS 2 1/2 INCHES IN DIAMETER OR SMALLER SHALL BE THREADED OR WELDED.
5. FITTINGS FOR JOINTS 3 INCHES IN DIAMETER OR LARGER SHALL BE FLANGED OR WELDED.
6. THREADED JOINTS:
  - a) FITTINGS SHALL BE 300 LB. MALLEABLE IRON, SCREWED - ANSI B16.3.
  - b) PIPE THREADING SHALL BE IN ACCORDANCE WITH USAS B 2.1 - 1988.
  - c) JOINT COMPOUND FOR THREADED JOINTS SHALL BE "GASLOK" SOFT-SET WITH TEFLOM OR AS APPROVED.
7. WELDED JOINTS:
  - a) 2 1/2 INCHES AND SMALLER: SOCKET WELDED STEEL FITTINGS ANSI B16.11.
  - b) 3 INCHES AND LARGER: BUTT WELDED FITTINGS ANSI B16.9.
8. FLANGED JOINTS:
  - a) FITTINGS SHALL BE SLIP ON TYPE STEEL WELDED FLANGES. WELDED NECK FITTINGS MAY BE USED FOR WELDED FITTINGS WHERE REQUIRED. FITTINGS SHALL BE CLASS 150 STEEL PIPE FLANGES AND FLANGED FITTINGS, ANSI B16.5.
  - b) STEEL BOLTS AND NUTS SHALL BE CADMIUM PLATED - ASTM A307 GRADE B.
  - c) GASKETS SHALL BE RING TYPE, 1/8 INCH THICK, GASOLINE RESISTANT.

C. FRP PIPING: ACCEPTABLE FRP PIPE

1. "RED THREAD II" MANUFACTURED BY A.D. SMITH - INLAND, INC.
2. AMERON
3. FIBERCAST
4. HDRE PIPING.

4.04 INSTALLATION

A. UNDERGROUND PIPING

1. MINIMUM BURIAL DEPTH SHALL BE SPECIFIED.
2. DOUBLE WALL FUEL OIL PIPING SHALL BE INSTALLED FROM THE TANK AND CONTAINMENT CHAMBER INTO THE BUILDING. THE PIPING SHALL SLOPE AND DRAIN TO THE CONTAINMENT CHAMBER UNLESS ALTERNATE LEAK DETECTION METHOD IS UTILIZED. THE PIPING SHALL SLOPE A MINIMUM OF 1" IN TEN FEET WITHOUT SAGS OR TRAPS. SECONDARY PIPE ENDS SHALL BE SEALED AT EXPOSED TERMINATIONS INSIDE THE BUILDING.
3. PROVIDE CATHODIC PROTECTION OF ALL BURIED FERROUS METAL COMPONENTS OF THE SYSTEM IN CONTACT WITH EARTH OR BACKFILL INCLUDING THE VENT PIPING. DESIGN CATHODIC PROTECTION IN ACCORDANCE WITH NACE.

B. ABOVEGROUND PIPING

1. DESIGN EXPOSED PIPING TO RUN PARALLEL TO WALL OF STRUCTURES.
2. SUPPORTS AND ANCHORS SHALL BE ADEQUATE TO SUPPORT THE PIPE FILLED WITH WATER WITH A MINIMUM SAFETY FACTOR OF 12 AND FOR THE TEST PRESSURE SPECIFIED. SPECIFY FACTORY ENGINEERED SUPPORTS, BRACES AND ANCHORS, WHERE REQUIRED.

4.05 TESTING

A. PIPING SHALL BE LEAKAGE TESTED PRIOR TO BEING COVERED, ENCLOSED OR PLACED INTO SERVICE.

B. FUEL OIL PIPING SHALL BE HYDROSTATICALLY TESTED TO THE GREATER OF: 100 PSIG OR 150% OF WORKING PRESSURE FOR 1 HOUR WITH NO READABLE PRESSURE DROP ON A 1/2 OF 1% ACCURACY GAUGE. TANK SHALL BE ISOLATED FROM PIPING DURING THIS TESTING.

C. SECONDARY CONTAINMENT PIPING SHALL BE PRESSURE TESTED TO FIVE POUNDS OF AIR FOR TWO HOURS.

D. ALL JOINTS SHALL BE SOAPED AND VISUALLY INSPECTED DURING TESTING. NO LOSS IN PRESSURE WILL BE ALLOWED.

E. ALL TESTING SHALL BE WITNESSED BY THE OWNER.

F. EACH PIPING SYSTEM SHALL, AFTER ALL TESTING IS SATISFACTORILY COMPLETED, BE FLUSHED, BLOW OUT OR OTHERWISE CLEANED IN ACCORDANCE WITH THE REQUIREMENT OF THE PIPE FABRICATION STANDARD ES 5.

G. ALL LOCAL CODES SHALL BE ADHERED TO.

5.0 ACCESSORIES/SPECIALTIES

5.01 ACCESSORIES AND SPECIALTIES SHALL BE SPECIFIED AS FOR THE SPECIFIC SITE.

5.02 VALVES

A. DOUBLE POPPET FOOT VALVE SHALL BE INSTALLED AT THE BASE OF THE SUCTION DROP TUBE TO PREVENT FUEL IN THE SUCTION PIPING TO THE ENGINE, FROM DRAINING OR SIPHONING BACK TO THE STORAGE TANK.

B. A PRESSURE BYPASS VALVE IS TO BE INSTALLED AT THE ENGINE IF AUTOMATIC SHUTOFF VALVES ARE INSTALLED IN THE RETURN PIPING BACK TO THE TANK.

C. ALL CONTROL VALVES SHOULD BE PROVIDED WITH A MANUAL OVERRIDE DEVICE TO ENABLE THE SYSTEM OPERATOR TO OVERRIDE A MALFUNCTIONING VALVE DURING AN EMERGENCY OR CONTROL SYSTEM FAILURE.

D. AN EMERGENCY SHUT-OFF VALVE WITH A FUSIBLE LINK MAY BE REQUIRED AT THE ENTRANCE OF THE FUEL OIL PIPING INTO THE FACILITY. THIS VALVE SHALL CLOSE IN THE EVENT OF A FIRE WITHIN THE ENGINE ROOM, THEREBY TERMINATING THE FUEL SUPPLY.

5.03 UNDERGROUND TANK ACCESSORIES

A. SPILL PROTECTION SHALL BE PROVIDED TO CONTAIN A MINIMUM OF FIFTEEN GALLONS OF PRODUCT. THE SPILL CONTAINER WITH INTERNAL DRAIN MAY BE PROVIDED TO ALLOW FOR THE DRAINING OF THE FUEL IN THE VESSEL.

B. A MECHANICAL FILL LIMITING DEVICE SHOULD BE PROVIDED WHICH WILL SUBSTANTIALLY REDUCE THE INCOMING RATE OF FUEL FILLING THE TANK. ACTIVATION OF THE DEVICE SHOULD TAKE PLACE AT APPROXIMATELY 90% TO 95% OF THE TOTAL TANK VOLUME. THE DEVICE SHOULD BE FLOAT ACTIVATED WITH THE CAPACITY TO PROVIDE SUCH RESTRICTION OF THE FILL LINE. A DRY COUPLER CONNECTION SYSTEM SHOULD BE USED FOR THE COUPLING OF THE FILL HOSE TO THE TANK TO ALLEVIATE SPILLAGE OF FUEL UPON CLOSURE OF THE FILL LIMITING DEVICE.

C. ANGULAR SPACE MONITORING OR ACCESS PORTS WHICH ARE CURRENTLY UTILIZED SHOULD ALSO BE LOCKED.

D. A STICK GAUGE, CALIBRATED IN INCHES AND GALLONS, SHALL BE SPECIFIED FOR MANUALLY DETERMINING THE LEVEL OF FUEL IN THE TANK. WATER PASTE, TO DETERMINE THE AMOUNT OF WATER IN THE TANK, SHALL BE SPECIFIED.

E. VENT CAPS SHALL BE OF FUELING COMPONENTS MODEL 23 OR EMCO-WHEATON MODEL AB34.

F. FLEX HOSE SHALL BE MEDIUM PRESSURE FLEX HOSE WITH STEEL BRAID REINFORCEMENT DESIGNED FOR USE WITH DIESEL FUEL AND UL LISTED FOR BELOWGROUND SERVICE. PROVIDE HOSE END SWIVEL FITTINGS.

G. A MINIMUM OF TWO OVERFILL PROTECTION DEVICES ABLE TO BE USED, EITHER AN OVERFILL VALVE OR A FLOAT VENT VALVE SHALL BE USED IN CONJUNCTION WITH A VENT WHISTLE.

B.0 EXCAVATION AND BACKFILL

B.01 GENERAL

A. CLEARLY DELINEATE ALL INTENDED AREAS OF EXCAVATION ON SITE PLANS. INCLUDE AREAS OF ACCESS TO SITE, ACCESS ROADS, STAGING AREAS AND OBSTRUCTIONS.

B. EVALUATE SOIL CHARACTERISTICS OF WORK AREAS AS THEY APPLY TO INTENDED WORK SCOPE. CONSIDER SUCH SOURCES AS:

1. COUNTY SOIL MAPS.
2. STATE GEOLOGICAL SURVEY BORING LOGS.
3. SITE PERSONNEL INTERVIEWS.

C. IF SUFFICIENT SOIL DATA IS UNAVAILABLE, PERFORM SOIL BORINGS TO DIRECTLY EVALUATE SOIL CHARACTERISTICS BY THE FOLLOWING METHODS:

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UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA

DESIGN CRITERIA

AT&T NATIONAL STANDARD SCALE: AS NOTED SHEET 2 OF 14

4. UNDERGROUND TANK STD/UST/IC-1/ENG. 08/20/96 18.37 JAB



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- 1. ASTM D 1588 - STANDARD METHOD FOR PENETRATION TEST AND SPLIT BARREL SAMPLING OF SOILS
- 2. ASTM D 2487 - TEST METHOD FOR CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
- 3. ASTM D 2488 - PRACTICE FOR DESCRIPTION AND IDENTIFICATION OF SOILS
- 4. ASTM D 4220 - PRACTICES FOR PRESERVING AND TRANSPORTING SOIL SAMPLES
- D. REVIEW LOCATIONS OF KNOWN UTILITIES IN AND AROUND THE WORK AREA WITH SITE PERSONNEL. INCLUDE LOCATIONS OF ACTIVE, INACTIVE AND ABANDONED UTILITIES RELYING ON THE FOLLOWING SOURCES AS A MINIMUM:
  - 1. RECORD DRAWINGS AT SITE.
  - 2. LOCAL UTILITY COMPANY RECORDS.
  - 3. SITE PERSONNEL INTERVIEWS.
- E. CLEARLY DISTINGUISH ON THE DRAWINGS WHICH UTILITIES SHALL BE REMOVED, PROTECTED AND/OR REPLACED.
- F. EVALUATE THE POTENTIAL FOR WATER CONTROL PROBLEMS FROM SURFACE WATER RUNOFF AND GROUND WATER INFILTRATION INTO EXCAVATIONS.
- 6.02 EXCAVATION
  - A. SPECIFICATIONS SHALL PROVIDE FOR SUBMITTAL OF A SITE SAFETY PLAN TO OWNER WITH REGARDS TO THIS SECTION, PLAN SHOULD INCLUDE:
    - 1. DESCRIPTION OF THE METHODS OF EXCAVATION.
    - 2. DESCRIPTION OF METHODS FOR PROTECTION OF WORKERS, EXISTING STRUCTURES AND UTILITIES, SHIELD OR SHORING SYSTEMS AND EXCAVATIONS REQUIRED BY OSHA STANDARDS.
    - 3. PROFESSIONAL ENGINEERING APPROVALS OF SHIELD, SHORING SYSTEMS AND EXCAVATIONS REQUIRED BY OSHA STANDARDS.
  - B. ENGINEER SHALL BE PRESENT DURING EXCAVATION TO PERFORM CONSTRUCTION OBSERVATION SERVICES. DUTIES SHOULD INCLUDE DAILY DOCUMENTATION OF EXCAVATION SIZE INCLUDING LENGTH, WIDTH, DEPTH AND GENERAL SHAPE OF EXCAVATION, ALSO NOTE SOIL CONDITIONS, PREVIOUSLY UNKNOWN UTILITY LOCATIONS OR UNUSUAL STAINING OR ODOR.
  - C. AVOID PLANNING EXCAVATIONS ADJACENT TO EXISTING UNDERGROUND STORAGE TANKS AND PIPING. WHEN NECESSARY, REQUIRE HAND DIGGING TO EXPOSE TOP OF TANKS, LINES OR OTHER PIPING.
  - D. SPECIFICATIONS SHALL PROVIDE FOR THE ENVIRONMENTAL ENGINEER TO BE NOTIFIED IMMEDIATELY UPON THE DISCOVERY OF RELEASED HYDROCARBONS IN EXCAVATED MATERIAL.
  - E. SPECIFICATIONS SHOULD PROVIDE FOR ACCUMULATED WATER IN EXCAVATIONS, REGARDLESS OF SOURCE TO BE PROPERLY DISPOSED OF ADHERING TO ALL STATE, FEDERAL AND LOCAL REGULATIONS.
- 6.03 BACKFILLING
  - A. ENGINEER SHALL SPECIFY BACKFILL MATERIALS COMPATIBLE WITH INTENDED FUTURE USE OF FACILITY.
  - B. FOR NEW UNDERGROUND STORAGE TANK INSTALLATIONS, ONLY THOSE MATERIALS RECOMMENDED BY THE TANK MANUFACTURER SHALL BE SPECIFIED.
  - C. ENGINEER SHALL SPECIFY THAT ALL IMPORTED BACKFILL MATERIALS (EXCEPT WASHED PEA GRAVEL) SHALL BE SAMPLED AND ANALYZED FOR BENZENE, ETHYL BENZENE, TOLUENE, XYLENE, TOTAL PETROLEUM HYDROCARBONS, CYANIDE (TOTAL) AND THE EIGHT RCRA HEAVY METALS (TOTALS).
  - D. ENGINEER SHALL NORMALLY REQUIRE IN SPECIFICATIONS FOR FIELD COMPACTION TESTING BY AN INDEPENDENT LABORATORY OF ALL BACKFILL MATERIALS, NATIVE OR IMPORTED. STANDARDS FOR COMPACTION SHALL BE AS FOLLOWS:
    - 1. DETERMINE THE DENSITY OF SOIL IN PLACE BY THE SAND CONE METHOD, ASTM D 1556, OR BY NUCLEAR METHODS, ASTM D 2922 AND D 3307.
    - 2. DETERMINE LABORATORY MOISTURE-DENSITY RELATIONS OF SOILS BY ASTM D1557.
    - 3. DETERMINE THE RELATIVE DENSITY OF COHESIONLESS SOILS BY ASTM D 4253 AND D 4254.
    - 4. SAMPLE BACKFILL MATERIALS BY ASTM D 75.
- 6.04 SURFACE RESTORATION
  - ENGINEER SHALL SPECIFY A SURFACE RESTORATION FOR THE DISTURBED AREAS.
- 7.0 RIGGING AND HOISTING
  - 7.01 THE ENGINEER SHOULD ASSESS THE DEGREE OF DIFFICULTY ASSOCIATED WITH THE RIGGING AND HOISTING FOR TANK REMOVALS AND INSTALLATIONS. THE FOLLOWING ITEMS, AT MINIMUM SHOULD BE CONSIDERED.
    - A. WEIGHT AND PHYSICAL SIZE OF TANK OR OBJECT TO BE LIFTED.
    - B. PROXIMITY OF RIGGING AND HOISTING EQUIPMENT TO ADJACENT STRUCTURES.
    - C. DIFFICULTY IN ACCESSING THE AREA FROM THE STANDPOINT OF OVER-HEAD UTILITIES, UNDERGROUND UTILITIES, ROADS, DRIVEWAYS AND OTHER OBSTACLES.
    - D. EVALUATE THE POSSIBILITY OF IMPACTING ADJACENT PROPERTY DURING MOBILIZATION AS WELL AS THE ACTUAL RIGGING AND HOISTING OPERATION.
  - 7.02 THE MINIMUM FOLLOWING STATEMENT SHOULD BE INCLUDED IN THE SPECIFICATIONS.
    - A. RIGGING AND HOISTING SHALL BE PERFORMED IN ACCORDANCE WITH OSHA EQUIPMENT RIGGING REGULATIONS (29 CFR PART 1926 CHAPTER XVII, 7-1-90 EDITION, PAGES 203-207) AND WITH OSHA CRANE AND DERRICK REGULATIONS (29 CFR PART 1926 CHAPTER XVII, 7-1-90 EDITION, PAGES 120-131).
    - B. WHERE THE DESIGN ENGINEER FEELS THE DEGREE OF DIFFICULTY WARRANTS THAT SPECIAL PRECAUTIONS SHOULD BE TAKEN, THE SPECIFICATIONS SHOULD INCLUDE PROVISIONS FOR A LICENSED PROFESSIONAL ENGINEER TO DESIGN AND SUPERVISE THE RIGGING AND HOISTING OPERATION.
    - C. IN ADDITION TO "A" ABOVE, THE FOLLOWING STATEMENT SHOULD BE INCLUDED:
      - "PROFESSIONAL ENGINEER'S RESPONSIBILITY"
      - 1. THE CONTRACTOR SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER WHO WILL ASSUME THE FOLLOWING RESPONSIBILITIES:
        - (A) SUBMIT A "RIGGING PROCEDURE PLAN" TO THE OWNER FOR APPROVAL.
        - (B) OBTAIN COPIES OF THE DATA SHEETS, EQUIPMENT CATALOGS AND SPECIFICATIONS FOR THE RIG TO BE USED ON THE JOB. COPIES SHALL BE SUBMITTED WITH THE "RIGGING PROCEDURE PLAN" TOGETHER WITH CALCULATIONS TO CONFIRM THE SAFE OPERATION OF THE RIGGING EQUIPMENT DURING THE VARIOUS STAGES, FROM LIFTING TO PLACING THE OBJECT IN ITS FINAL POSITION.
        - (C) INSPECT THE RIG AND OTHER EQUIPMENT AND DEVICES TO BE USED IN THE RIGGING OPERATION TO VERIFY THAT THE EQUIPMENT, ETC. IS IN A GOOD CONDITION.
        - (D) WITNESS TEST LOADING OF RIGGING EQUIPMENT WHEN REQUIRED BY OSHA REQUIREMENTS.
        - (E) SUPERVISE THE RIGGING OPERATION TO ENSURE THAT IT FOLLOWS THE APPROVED "RIGGING PROCEDURE PLAN" AND TO MAKE DECISIONS ACCORDINGLY TO ENSURE SAFETY DURING THE RIGGING OPERATION.
- 9.0 MONITORING SYSTEMS
  - 9.01 SPECIFY AN AUTOMATIC TANK GAUGING SYSTEM THAT PERFORMS THE FOLLOWING FUNCTIONS.
    - A. UNDERGROUND TANKS
      - 1. CONTINUOUS TANK GAUGING.
      - 2. INVENTORY CONTROL FOR UP TO 8 TANKS.
      - 3. CONTINUOUS IN TANK MONITORING AND LEAK DETECTION AT A MINIMUM OF 0.1 GALLONS PER HOUR.
      - 4. NON-DISCRIMINATING INTERSTITIAL MONITORING.
      - 5. CONTINUOUS PROGRAMMABLE PRINT OUT.
      - 6. RELAY OUTPUTS FOR REMOTE ALARMING.
      - 7. RS-232 PORT FOR INTERFACE WITH COMPUTERS FOR PROGRAMMING THE UNIT, REMOTE INTERROGATION AND INTERFACE WITH BUILDING AUTOMATION SYSTEMS.
    - B. WATER DETECTION
    - 9. EXTERNAL INPUT FOR HARDWIRED CONNECTION TO GENERATOR/PUMP.
    - 10. THE SYSTEM SHALL BE VEEDER-ROOT TLS-350 OR APPROVED ALTERNATE.
  - 10.0 ALARMS - TO BE ISSUED LATER
  - 11.0 GROUNDING
    - 11.01 THE PRIMARY PURPOSES FOR INSTALLING A LOW-IMPEDANCE GROUNDING SYSTEM ARE:
      - A. PERSONNEL SAFETY (BY MINIMIZING POSSIBILITY OF ELECTRIC SHOCK).
      - B. EQUIPMENT PROTECTION.
      - C. PROPER EQUIPMENT OPERATION.
      - D. NOISE REDUCTION IN COMMUNICATION CIRCUITS.
      - E. RELIABILITY.
    - 11.02 ALL METALLIC OBJECTS ABOVE GRADE ON THE OUTSIDE OF THE BUILDING SHALL BE ATTACHED TO THE EXTERIOR GROUND RING.
    - 11.03 UNDERGROUND COMPONENTS OF UNDERGROUND STORAGE TANK SYSTEMS SHALL NOT BE GROUNDED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
      - A. STORAGE TANK.
      - B. ANCHOR STRAPS.
      - C. CONCRETE REINFORCING STEEL.
      - D. RISERS, MANHOLES AND MANHOLE COVERS.
    - 11.04 ALL CONNECTIONS TO THE EXTERIOR GROUND RING SHALL BE MADE USING CADWELDS.
    - 11.05 ALL CONNECTIONS TO THE INTERIOR BUILDING GROUND SHALL MATCH EXISTING CONNECTORS.
  - 12.0 RECORD DOCUMENTS
    - 12.01 INSTALLATION DOCUMENTATION (5 COPIES) FOR THE SITE SHALL BE REQUIRED AS FOLLOWS:
      - A. TABLE OF CONTENTS.
      - B. STATE AND LOCAL PERMITS.
      - C. DAILY WORK LOG.
      - D. CONTRACTOR'S GUARANTEE.
      - E. WAIVERS OF LIEN.
      - F. ORIGINAL COPIES OF INSTALLATION, OPERATION AND MAINTENANCE MANUALS.
      - G. CERTIFICATION AND COPIES OF TEST RESULTS.
      - H. PHOTOGRAPHS.
      - I. AS BUILT DRAWINGS
      - J. SYSTEM FLOW DIAGRAMS, VALVE CHARTS & SEQUENCE OF OPERATION.

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UNDERGROUND FUEL STORAGE TANK  
INSTALLATION OUTSIDE OF  
BUILDINGS DESIGN CRITERIA

DESIGN CRITERIA

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GENERAL CONSTRUCTION/SITE  
SYMBOLS AND ABBREVIATIONS

- EARTH / COMPACT FILL
- CONCRETE
- PEA GRAVEL
- TEST BORING
- MONITORING WELL
- SOIL SAMPLING LOCATION
- SANITARY SEWER
- FOUNDATION DRAIN
- CITY WATER
- BURIED ELECTRICAL
- STORM SEWER
- BURIED TELEPHONE
- EXISTING CHAIN LINK FENCE
- NEW OR TEMPORARY CHAIN LINK FENCE
- CATCH BASIN
- NORTH ARROW
- EXISTING CONTOURS ELEVATION NOTED ON HIGH SIDE
- NEW CONTOURS ELEVATION NOTED ON HIGH SIDE

MECHANICAL SYMBOLS  
AND ABBREVIATION

- UNION
- FLEX CONNECTION
- NAME (N) NEW PIPING
- NAME (E) EXISTING PIPING
- WORK BELOW GRADE
- REMOVE EXISTING
- GATE VALVE
- BALL VALVE
- MULTI-PORT BALL VALVE W/MANUAL OPERATOR
- SOLENOID VALVE WITH MANUAL OPERATOR
- SOLENOID VALVE WITHOUT MANUAL OPERATOR
- FUSE LINK VALVE
- PRESSURE RELIEF VALVE
- CHECK VALVE
- VACUUM GAUGE WITH COCK
- PRESSURE GAUGE WITH COCK
- DUPLEX STRAINER (PLAN)
- DUPLEX STRAINER (ELEVATION)
- HAND PUMP
- VENT CAP
- O.C. ON CENTER
- GA GAUGE
- GALV GALVANIZED
- STL STEEL
- F.O. FUEL OIL
- F.O.R. FUEL OIL RETURN
- F.O.S. FUEL OIL SUPPLY
- F.O.V. FUEL OIL VENT
- F.O.F. FUEL OIL OVERFLOW
- GAL GALLON
- A.S.T. ABOVEGROUND STORAGE TANK
- U.S.T. UNDERGROUND STORAGE TANK

ELECTRICAL SYMBOLS  
AND ABBREVIATION

- STREET LIGHT
- UTILITY POLE
- MANHOLE
- LIGHTING PANEL
- POWER PANEL
- DISCONNECT SWITCH
- HOME RUN TO POWER PANEL
- JUNCTION BOX
- OVERFILL ALARM HORN/LIGHT

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EQUIPMENT LIST

MARK	QUANTITY	DESCRIPTION	MARK	QUANTITY	DESCRIPTION
①	1	Double-wall STI-P3 360" TYPE 2 steel or Owens-Corning double-wall fiberglass tank (size dependant upon location requirements).	⑬	As reqd.	12" Manhole w/12" Skirt Emco Wheaton A722-001 See 3/T-7, 4/T-7
②	1	Lockable Fill Cap Emco Wheaton A97-001 See 1/T-9	⑭	As reqd.	12" Manhole Lid & Frame & 12" Skirt Emco Wheaton A717-021 See 2/T-6, 2/T-5
③	1	Tight Fill Adapter Emco Wheaton A30-014 See 1/T-9	⑮	As Reqd.	Double Poppel Foot Valve Emco Wheaton A439 See 2/T-6, 2/T-5
④	1	15 Gallon Spill Containment Manhole EBW 705 - 15BG See 1/T-9	⑯	1	Float Vent Valve Extractor Assembly Emco Wheaton A79-001 See 2/T-5
⑤	1	18" Manhole (included with 705-15BG spill containment) See 1/T-9	⑰	1	30" Dia. Manhole Lid & Frame with Type "B" Ring Handle and Type "E" Countersunk Bolts Neenah R-6077 See 2/T-5
⑥	1	Automatic Overfill Prevention Valve Emco Wheaton A1100 See 1/T-9	⑱	1	38" Dia. Containment Chamber Total Containment No. SR 3827 See 1/T-5, 2/T-5
⑦	1	Drop Tube Emco Wheaton A20-003 See 1/T-9	⑲	1	Foot Valve Extractor Emco Wheaton A677 (Optional) See 2/T-5
⑧	1	Vent Cap Emco Wheaton A634-001, or OPW Model 23 See 3/T-8	⑳	1	Tank Level Probe
⑨	1	12" Manhole Emco Wheaton A717-022 See 5/T-8, 6/T-7	㉑	1	Liquid Sensor
⑩	As reqd.	Evron Products, Inc. "Flexible Entry Boot" See 1/T-7	㉒	1	2" Stick Gauge & Water Draw Off w/Lockable Cap
⑪	As reqd.	Total Containment Reducer Boot See 2/T-7	㉓	1	Double Float Sensor See 5/T-8
⑫	As reqd.	4" Test Well Cap Emco Wheaton AT 22 See 3/T-7, 4/T-7	㉔	2	API Fuel Type Tag See 1/T-9
			㉕	1	Tank Gauge and Leak Monitoring Panel. See Specification 9.01, A, 10

GENERAL EQUIPMENT LIST NOTES:

1. ABOVE EQUIPMENT LIST IS NOT COMPLETE IN ITS ENTIRETY. ENGINEER IS TO VERIFY AND SPECIFY ALL OTHER EQUIPMENT.
2. EQUIPMENT ITEMS OF APPROVED QUALITY OR FUNCTION MAY BE SUBSTITUTED.
3. EQUIPMENT ITEMS CAN BE UPGRADED TO MEET THE "STANDARDS OF THE INDUSTRY" AT THE TIME THE TANK IS INSTALLED.

FOR DESIGN  
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CONSTRUCTION

AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	C-3
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
SYMBOLS LEGEND & EQUIPMENT LIST	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 4 OF 14

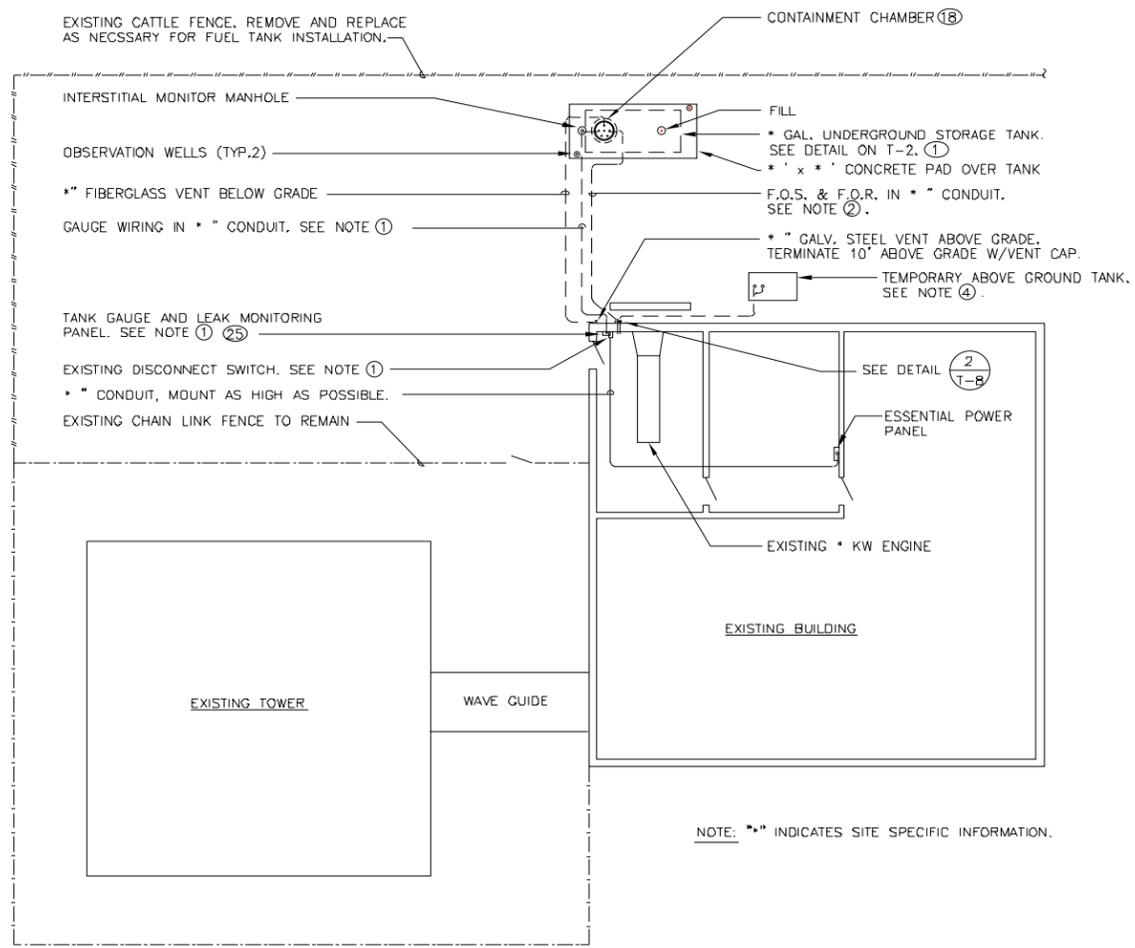
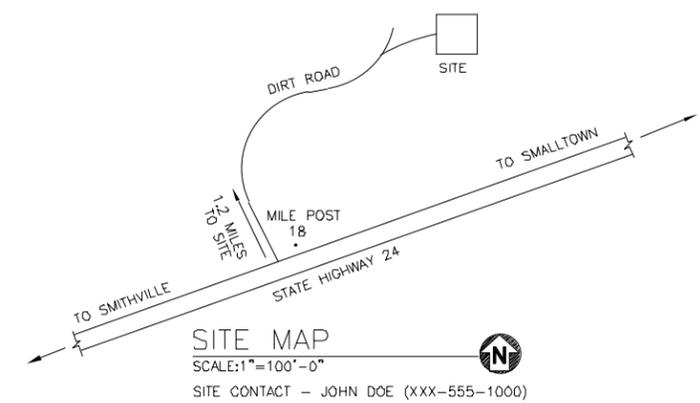
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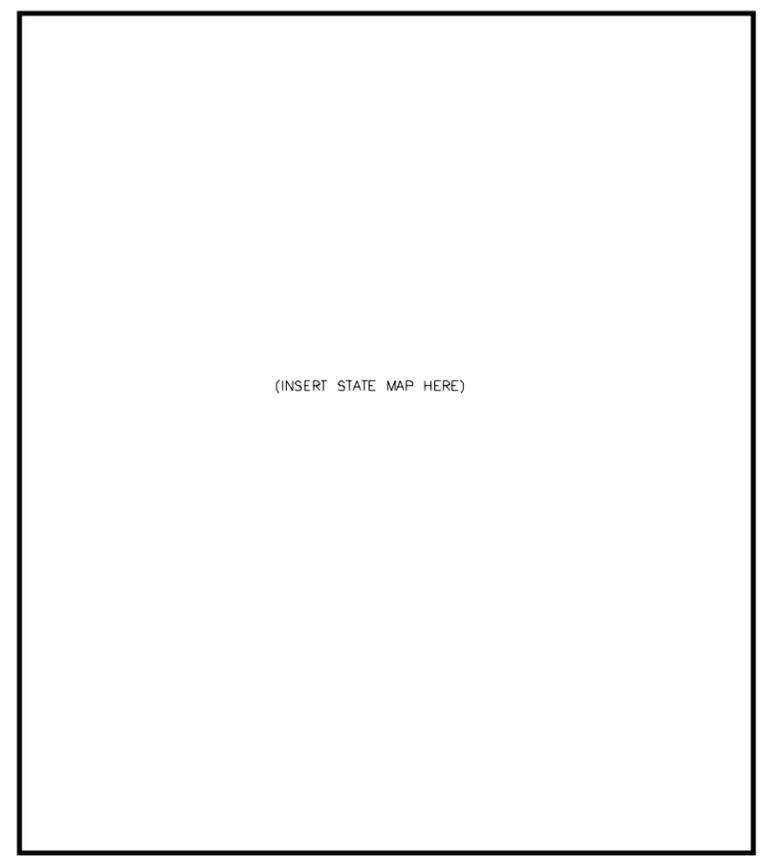
ISSUE	
NOVEMBER 16, 1992	1
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**NOTES**

- ① INSTALL NEW TANK GAUGING AND LEAK MONITORING PANEL. ROUTE NEW GAUGE ELECTRICAL CONDUIT AND WIRING OUT THRU EXISTING 4" CONDUIT. EXTEND GAUGE CONDUIT TO NEW TANK LEVEL PROBE. EXTEND ALARM CONDUIT AND WIRING FROM EXISTING LIQUIDOMETER TO NEW GAUGE. ROUTE 4" CONDUIT AND POWER WIRING FROM EXISTING DISCONNECT SWITCH TO NEW GAUGE PANEL. GROUND AND PROVIDE SURGE PROTECTION FOR NEW TANK GAUGE PANEL PER TANK GAUGE MANUFACTURERS' REQUIREMENTS. SEE SHEET T-10.
- ② PROVIDE 4" F.O.S. & F.O.R. FROM TANK TO CONNECTION WITH ENGINE. PROVIDE 4" SECONDARY CONTAINMENT CONDUIT FROM TANK THRU BUILDING WALL. SEE DETAIL 2  
T-8
- ③ LOCATE ALL UNDERGROUND UTILITIES PRIOR TO DIGGING.
- ④ LOCATE TEMPORARY TANK 5 FEET FROM ANY BUILDING AIR INTAKE.



**NEW WORK**  
 (SITE NAME) - (STATE)  
 SCALE: 1"=10'-0"



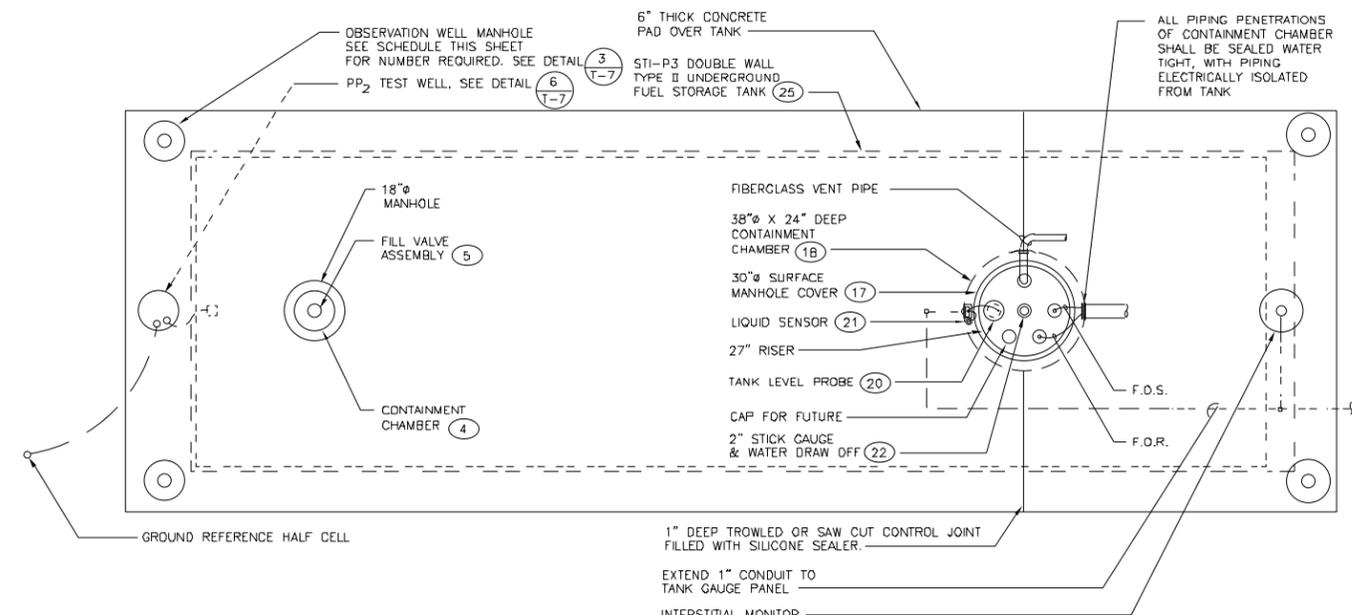
**LOCATION MAP - (STATE)**  
 NOT TO SCALE

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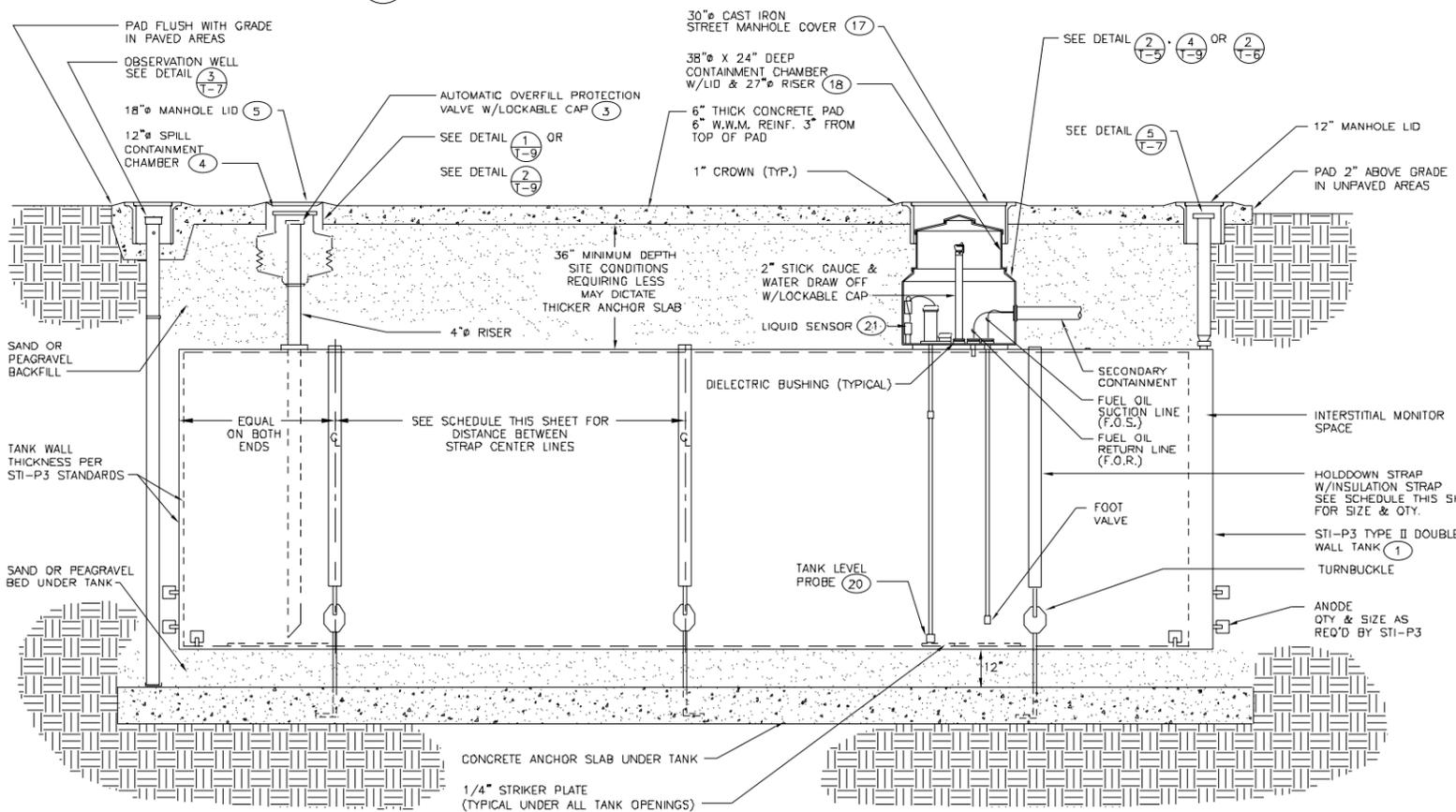
AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-1
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
UNDERGROUND FUEL STORAGE TANK INSTALLATION TYPICAL SITE PLAN	
AT&T NATIONAL STANDARD	SCALE: AS NOTED
	SHEET 5 OF 14

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1 TOP VIEW FUEL TANK - LIGHT TRAFFIC INSTALLATION  
T-2 NOT TO SCALE

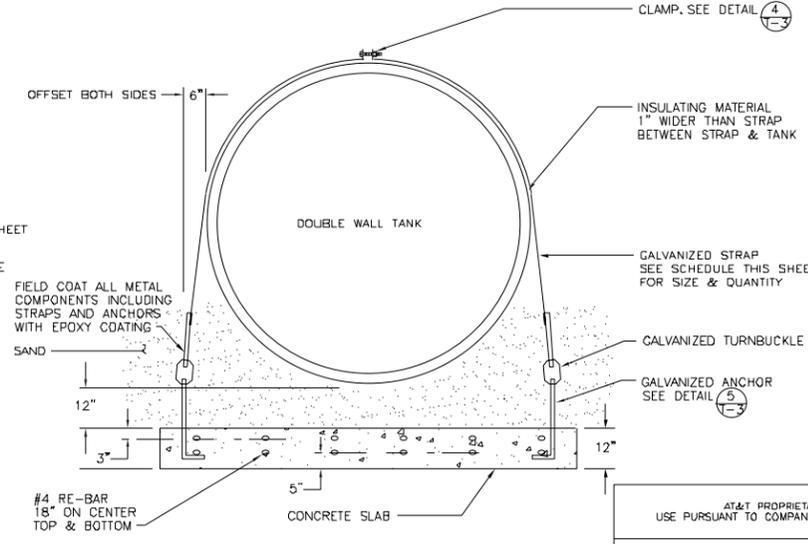


2 SIDE VIEW FUEL TANK - LIGHT TRAFFIC INSTALLATION  
T-2 NOT TO SCALE

FUEL TANK SCHEDULE

TANK CAPACITY	DIA.	NOMINAL LENGTH	NO. & SIZE OF STRAPS	DIST BETWEEN STRAPS ①	NO. & SIZE OF ANCHOR BOLTS	MINIMUM VENT DIA.	CONCRETE ANCHOR SLAB SIZE ⑤	CONCRETE PAD SIZE ⑥	NUMBER OF OBSERVATION WELLS ②③	MINIMUM INNER TANK THICKNESS ④	MINIMUM OUTER TANK THICKNESS SHELL HEADS
2000	64"	12'-0"	(2) 1/4" x 3"	10'-0"	(4) 3/4"	1-1/2"	7' x 15'	7' x 16'	2	.135	.135 .135
3000	72"	14'-0"	(2) 5/8" x 3"	12'-0"	(4) 1"	1-1/2"	8' x 17'	8' x 18'	2	.179	.135 .179
4000	72"	19'-6"	(3) 3/8" x 3"	7'-8"	(6) 1"	2"	8' x 23'	8' x 24'	2	.179	.135 .179
4000	96"	11'-6"	(2) 3/8" x 3"	9'-6"	(4) 1"	2"	10' x 15'	10' x 16'	2	.250	.135 .179
5000	96"	14'-0"	(2) 3/8" x 3"	11'-4"	(4) 1"	2"	10' x 17'	10' x 18'	2	.250	.135 .179
6000	72"	29'-0"	(3) 3/8" x 3"	10'-6"	(6) 1"	2"	8' x 33'	8' x 34'	4	.179	.135 .179
6000	96"	16'-6"	(2) 3/8" x 3"	8'-0"	(4) 1"	2"	10' x 20'	10' x 21'	2	.250	.135 .179
8000	96"	22'-0"	(2) 3/8" x 3"	10'-8"	(4) 1"	2"	10' x 25'	10' x 26'	4	.250	.135 .179
10,000	96"	27'-6"	(3) 3/8" x 3"	9'-3"	(6) 1"	2-1/2"	10' x 31'	10' x 32'	4	.250	.135 .179
10,000	126"	16'-3"	(2) 3/8" x 4"	7'-10"	(4) 1-1/4"	2-1/2"	12'-6" x 20'	12'-6" x 21'	2	.250	.179 .250
12,000	96"	32'-6"	(3) 3/8" x 3"	11'-1"	(6) 1"	2-1/2"	10' x 36'	10' x 37'	4	.250	.135 .179
12,000	126"	19'-0"	(3) 3/8" x 4"	7'-6"	(6) 1-1/4"	2-1/2"	12'-6" x 22'	12'-6" x 23'	2	.250	.179 .250
15,000	96"	40'-6"	(4) 3/8" x 3"	10'-3"	(8) 1"	2-1/2"	10' x 44'	10' x 45'	4	.250	.135 .179
15,000	126"	23'-8"	(3) 3/8" x 4"	7'-11"	(8) 1-1/4"	2-1/2"	12'-6" x 27'	12'-6" x 28'	4	.250	.179 .250
20,000	126"	31'-6"	(4) 3/8" x 4"	8'-1"	(6) 1-1/4"	2-1/2"	12'-6" x 35'	12'-6" x 36'	4	.250	.179 .250

① SHIFT STRAP LOCATION TO AVOID CONFLICT WITH MANWAY OR FUEL FILL.  
② LOCAL CODE MAY REQUIRE ADDITIONAL WELLS.  
③ LOCATE 2 WELLS ON DIAGONAL CORNERS  
④ BASED ON STI-P3 CONSTRUCTION  
⑤ STANDARD ANCHOR PAD THICKNESS IS 12". ANCHOR PAD THICKNESS MUST BE RECALCULATED IF CONCRETE PAD OVER TANK IS OMITTED OR IF TANK BURIAL DEPTH IS REDUCED.  
⑥ STANDARD THICKNESS OF CONCRETE PAD OVER TANK IS SIX INCHES. PAD THICKNESS MUST BE INCREASED IF ANCHOR PAD UNDER TANK IS OMITTED.



3 END VIEW  
T-2 NOT TO SCALE

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AT&T PROPRIETARY  
USE PURSUANT TO COMPANY INSTRUCTIONS

T-2

UNDERGROUND FUEL STORAGE TANK  
INSTALLATION OUTSIDE OF  
BUILDINGS DESIGN CRITERIA

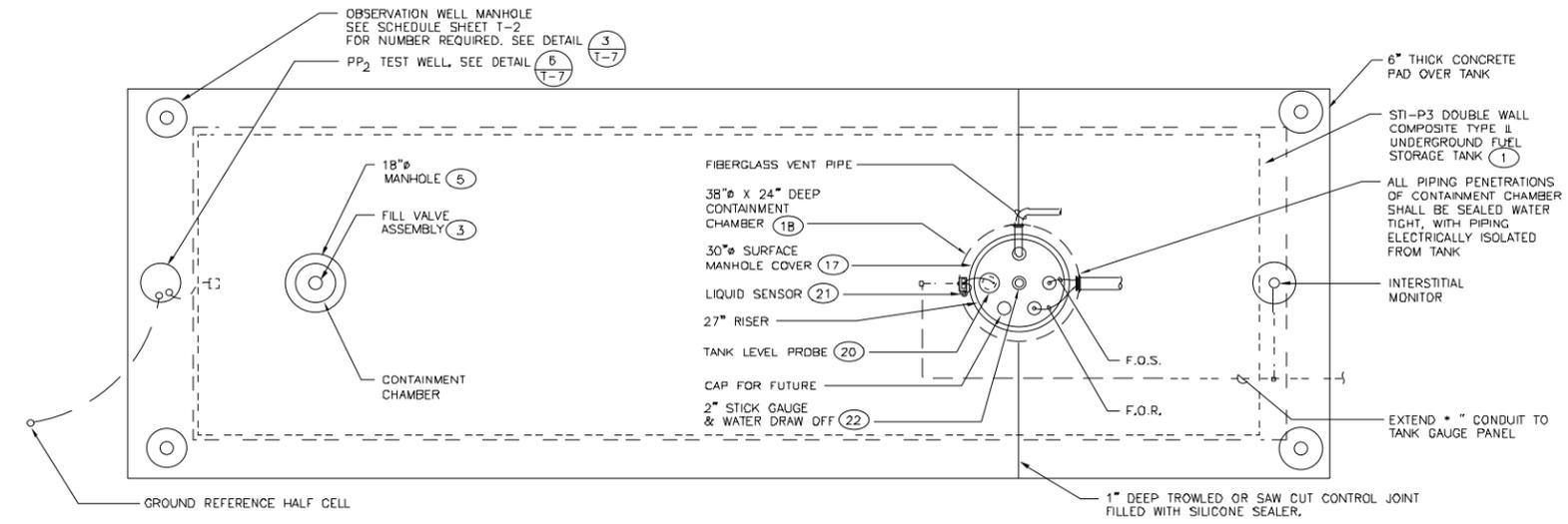
TANK DETAILS 2,000 GAL. TO  
20,000 GAL. STI-P3 TYPE II

AT&T NATIONAL STANDARD SCALE: AS NOTED  
SHEET 6 OF 14

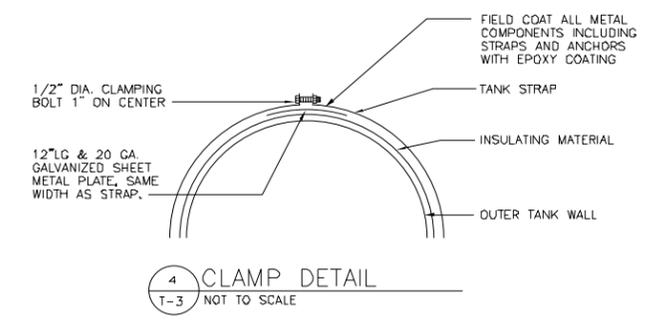
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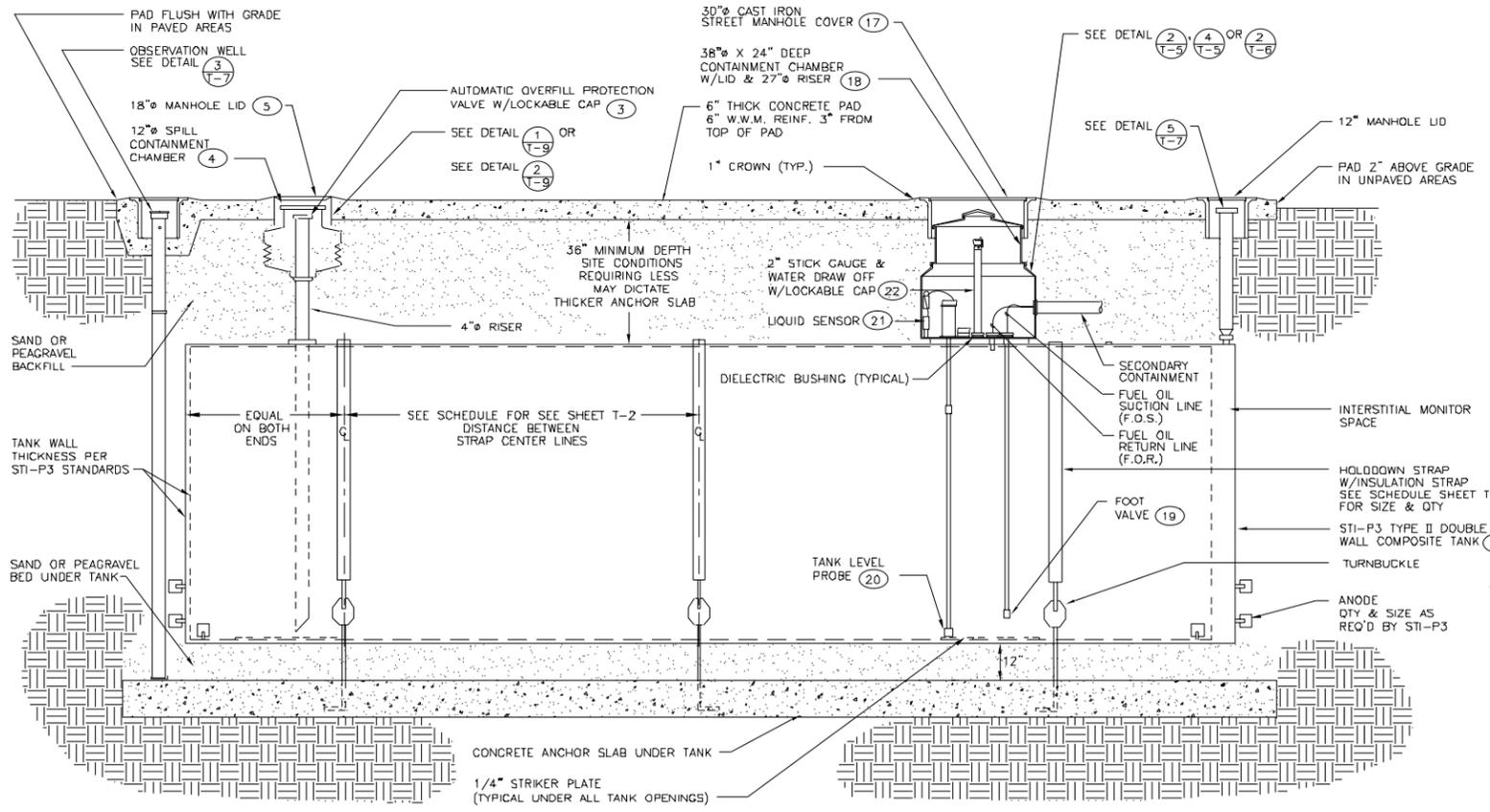
ISSUE	
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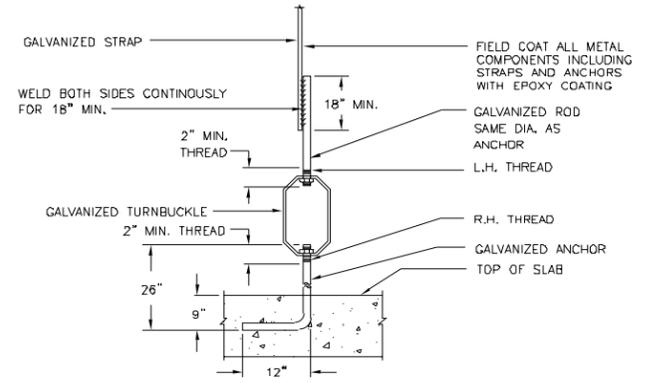
1 TOP VIEW FUEL TANK - LIGHT TRAFFIC INSTALLATION  
T-3 NOT TO SCALE



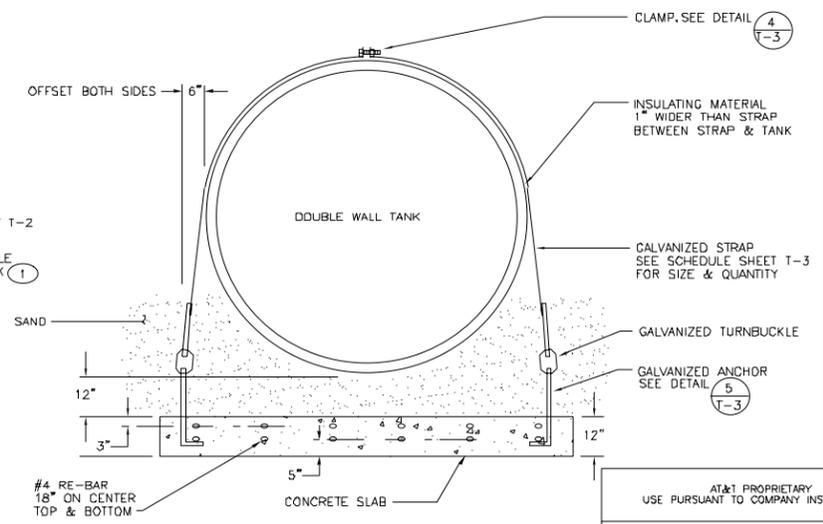
4 CLAMP DETAIL  
T-3 NOT TO SCALE



2 SIDE VIEW FUEL TANK - LIGHT TRAFFIC INSTALLATION  
T-3 NOT TO SCALE



5 TURNBUCKLE DETAIL  
T-3 NOT TO SCALE



3 END VIEW  
T-3 NOT TO SCALE

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-3
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
TANK DETAILS 2,000 GAL. TO 20,000 GAL. STI-P3 TYPE II COMPOSITE	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 7 OF 14

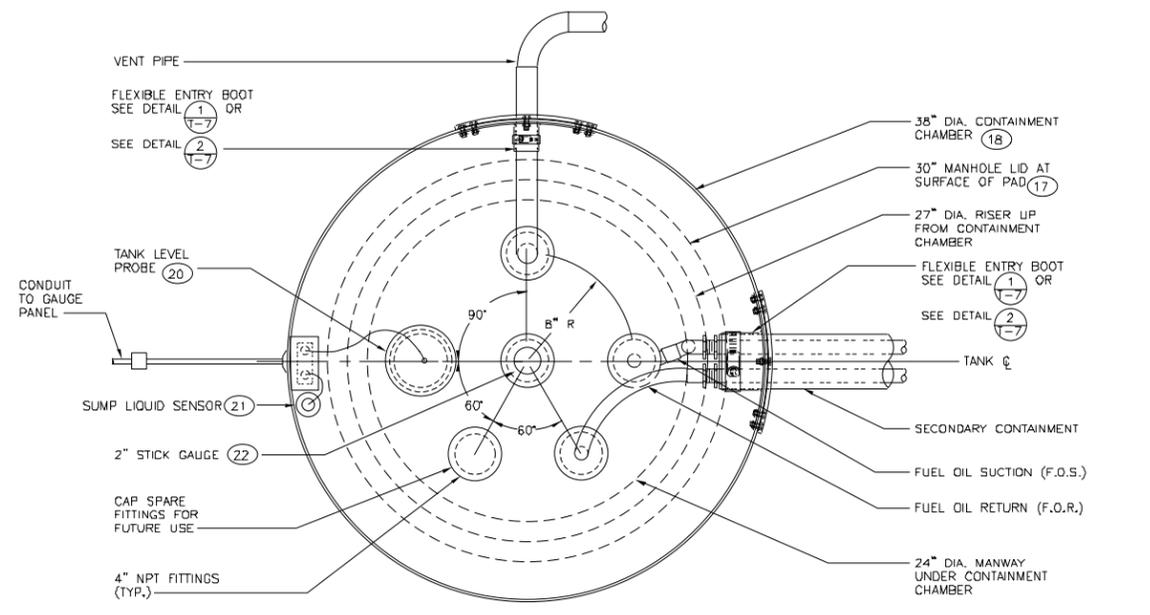
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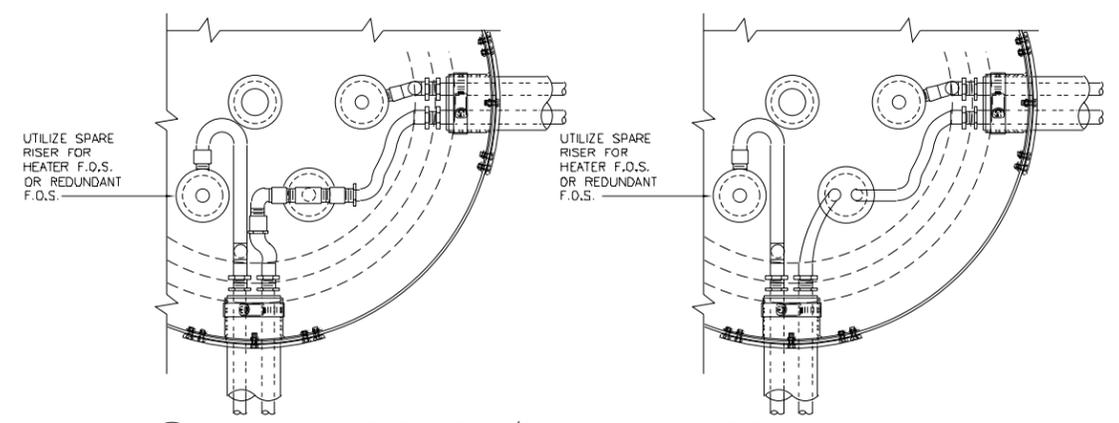




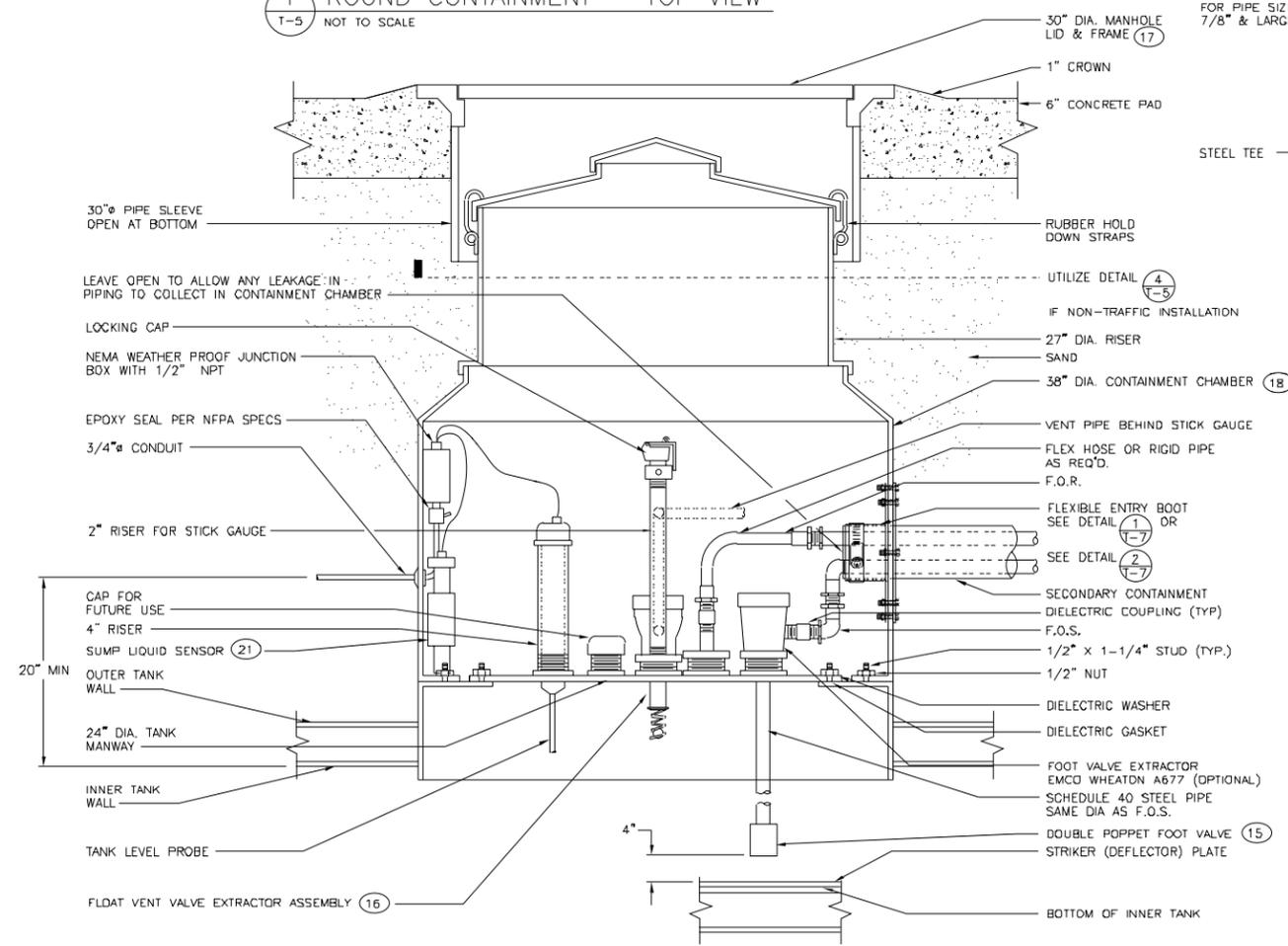
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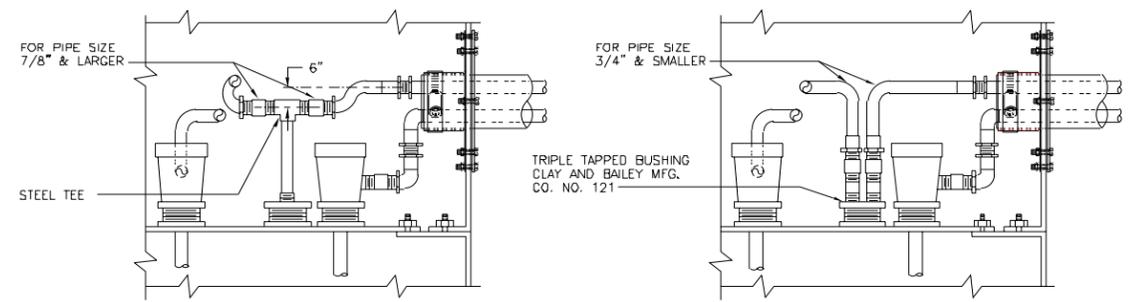
1 ROUND CONTAINMENT - TOP VIEW  
T-5 NOT TO SCALE



3 PIPING CONNECTIONS W/DUAL F.O.S. & F.O.R. - TOP VIEW  
T-5 NOT TO SCALE



2 ROUND CONTAINMENT - SIDE VIEW - LIGHT TRAFFIC INSTALLATION  
T-5 NOT TO SCALE



3 PIPING CONNECTIONS W/DUAL F.O.S. & F.O.R. - SIDE VIEW  
T-5 NOT TO SCALE

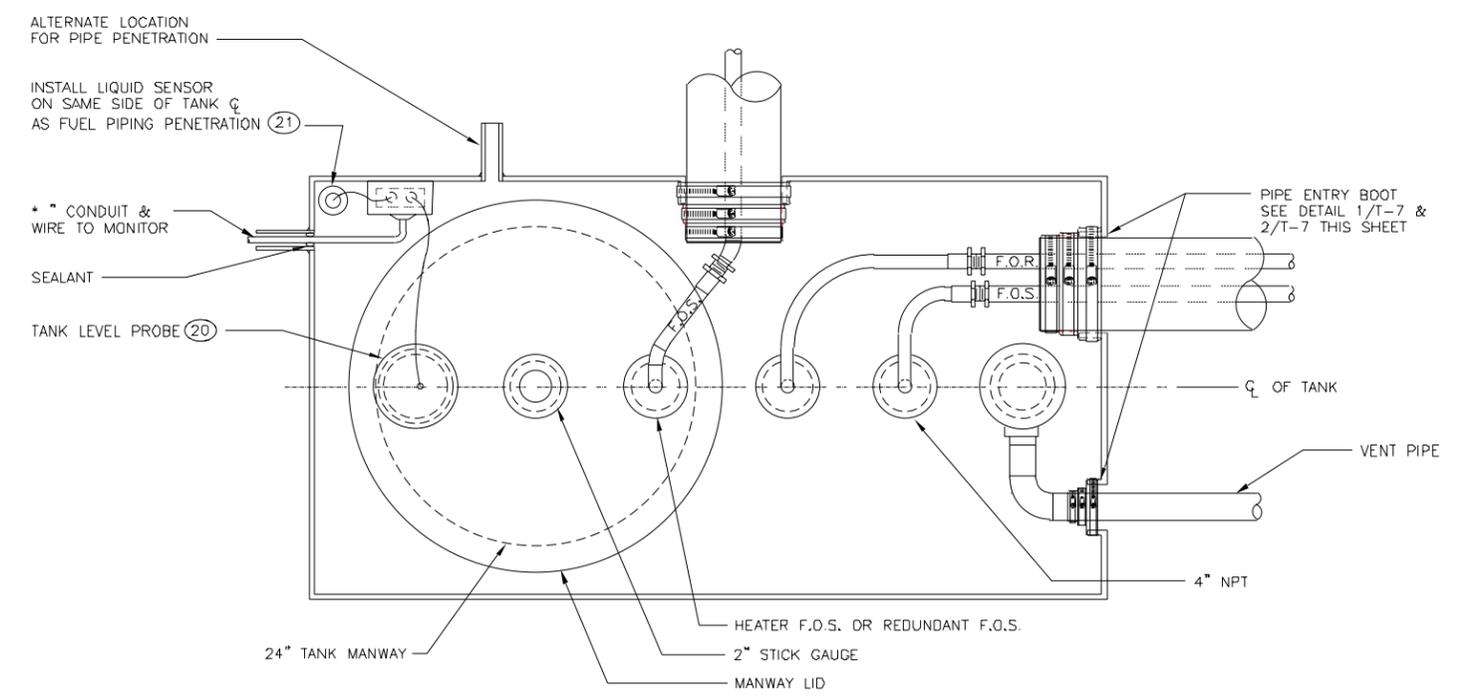
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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-5
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
ROUND CONTAINMENT CHAMBER DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 9 OF 14

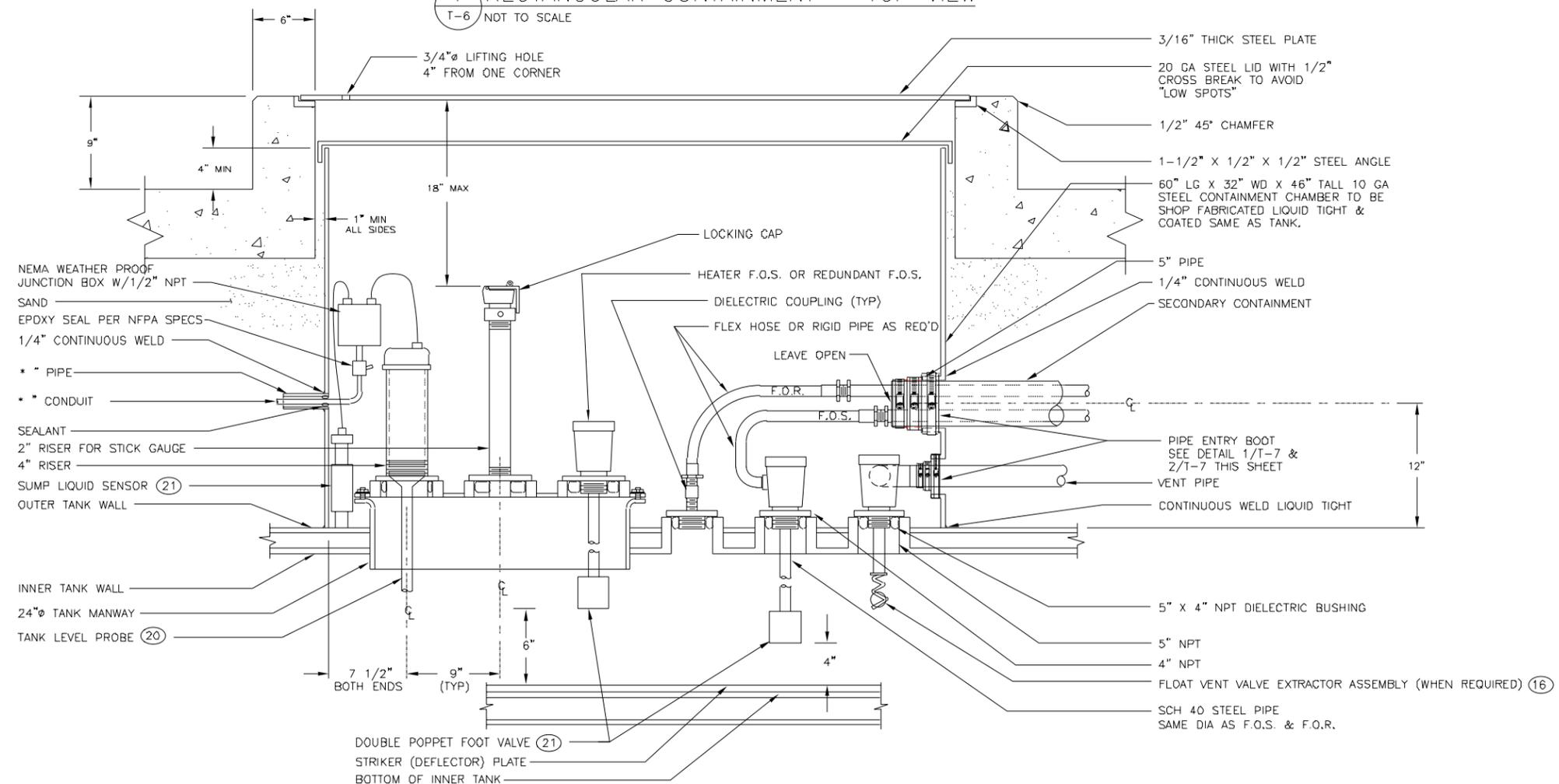
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ISSUE	
NOVEMBER 16, 1992	1
DECEMBER 1, 1995	2



1 RECTANGULAR CONTAINMENT - TOP VIEW  
T-6 NOT TO SCALE



2 RECTANGULAR CONTAINMENT - SIDE VIEW - NON TRAFFIC INSTALLATION  
T-6 NOT TO SCALE

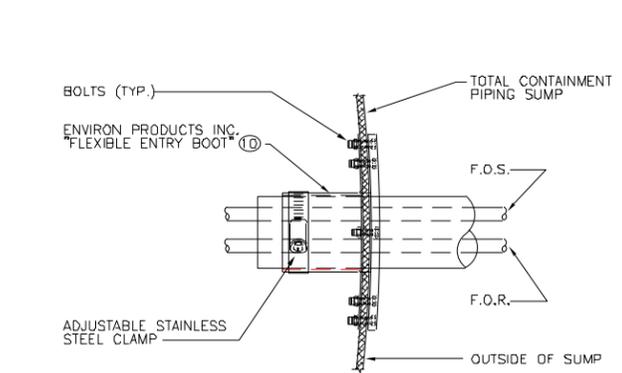
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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-6
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
RECTANGULAR CONTAINMENT CHAMBER DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 10 OF 14

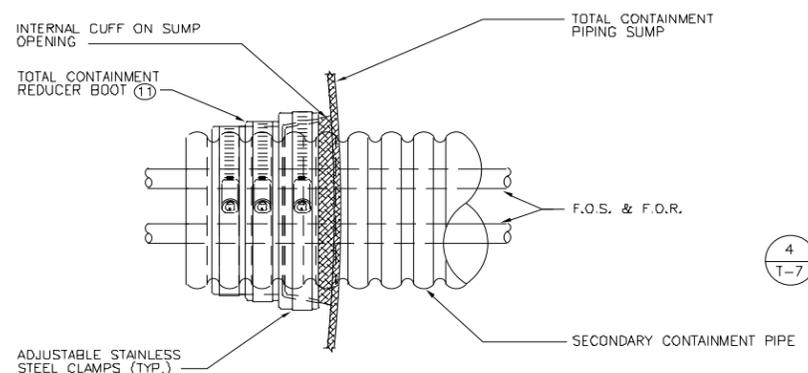
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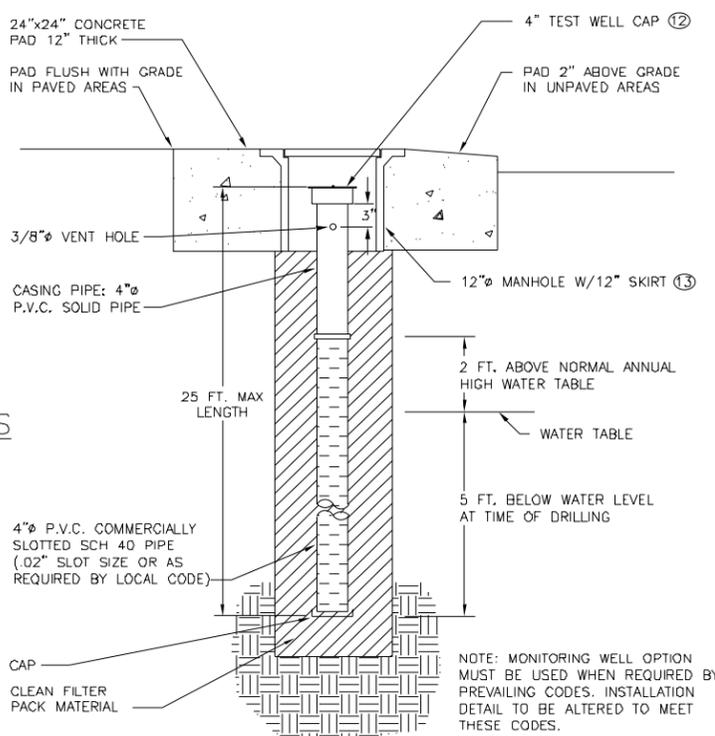
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NOVEMBER 16, 1992	1
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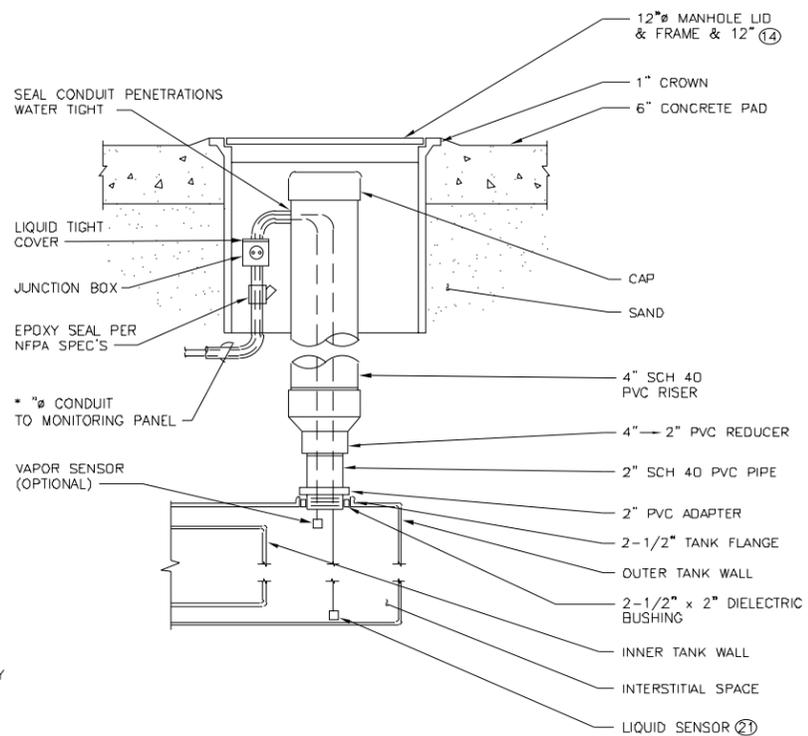
1 DETAIL - PIPE ENTRY TO SUMP BETWEEN CUFFS  
T-7 NO SCALE



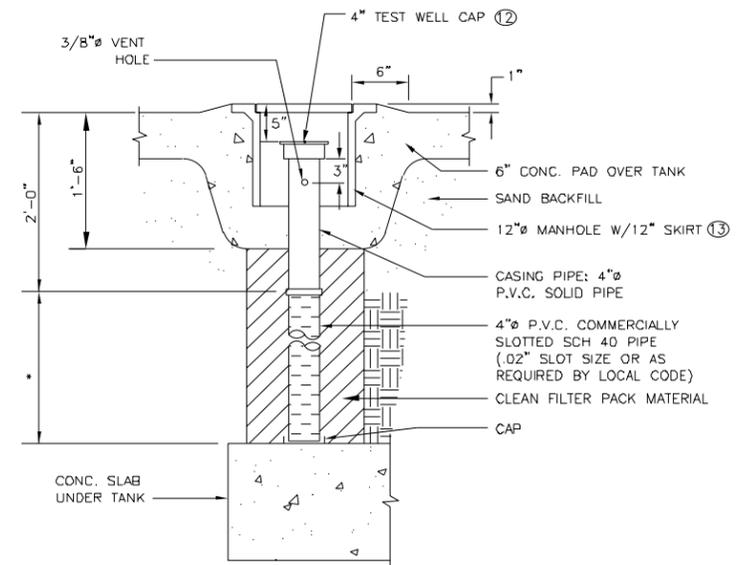
2 DETAIL - PIPE ENTRY TO SUMP AT INTERNAL CUFF  
T-7 NO SCALE



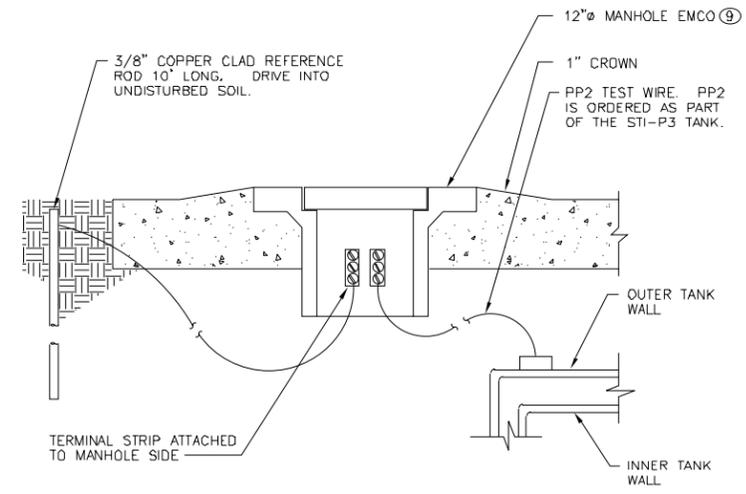
4 MONITORING WELL INSTALLATION DETAIL  
T-7 NOT TO SCALE



5 INTERSTITIAL RISER DETAIL  
T-7 NOT TO SCALE



3 OBSERVATION WELL INSTALLATION DETAIL  
T-7 NOT TO SCALE



6 PP2 TEST WELL  
T-7 NOT TO SCALE

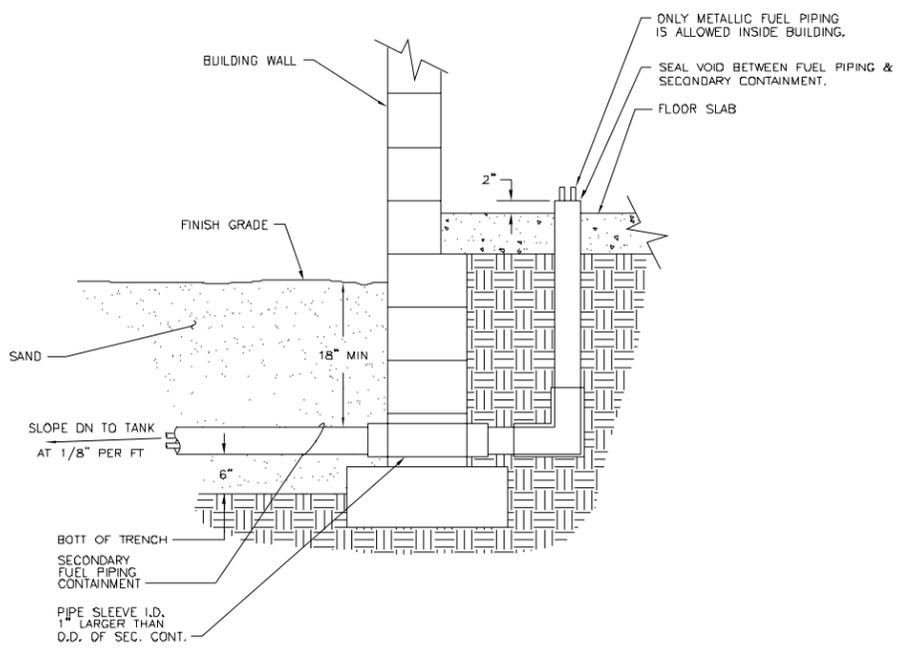
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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-7
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
TANK INSTALLATION ACCESSORIES	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 11 OF 14

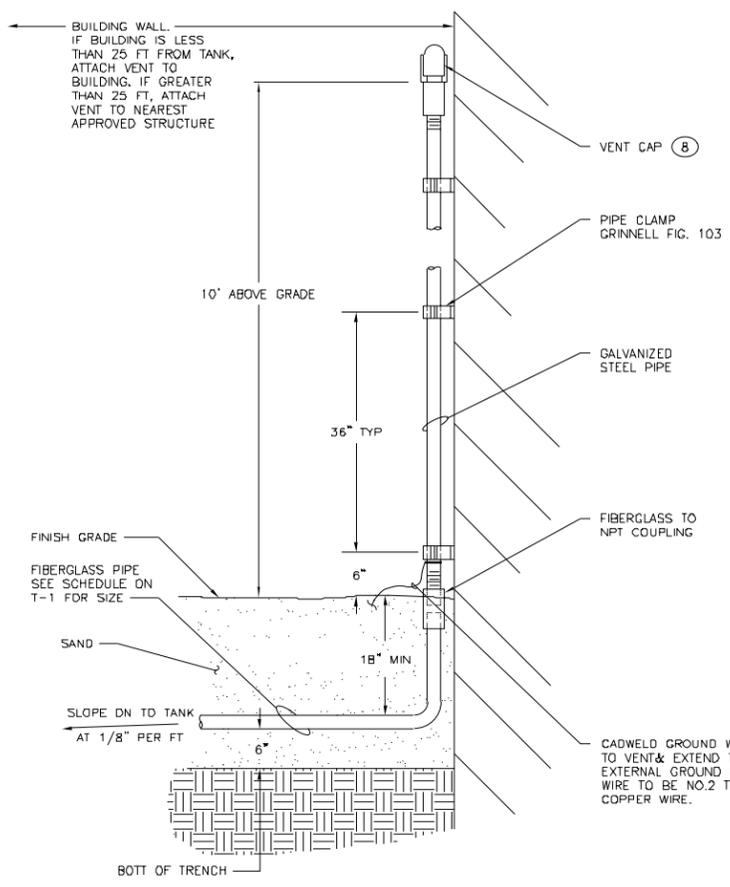
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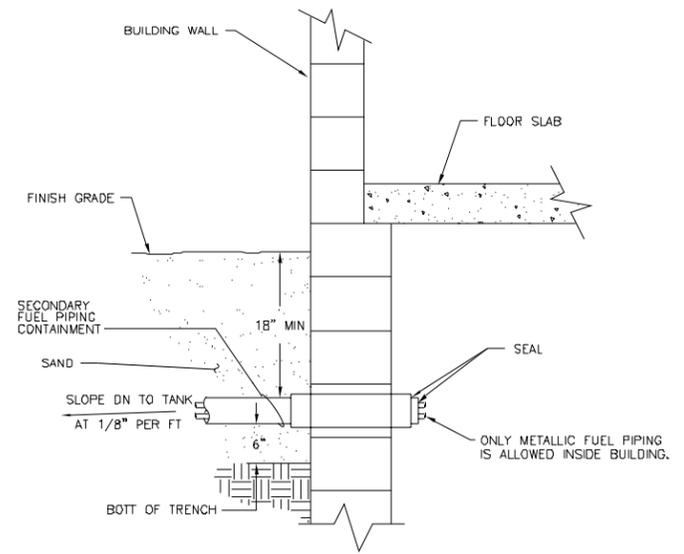
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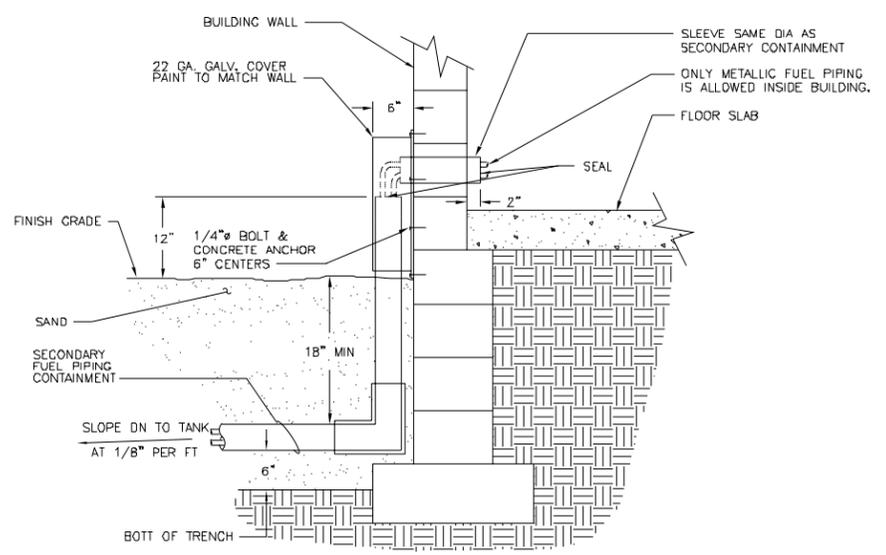
1  
T-8  
SECONDARY CONTAINMENT PENETRATION IN NEW WALL/FLOOR  
SCALE: 1"=1'-0"



3  
T-8  
VENT PIPE  
SCALE: 1"=1'-0"

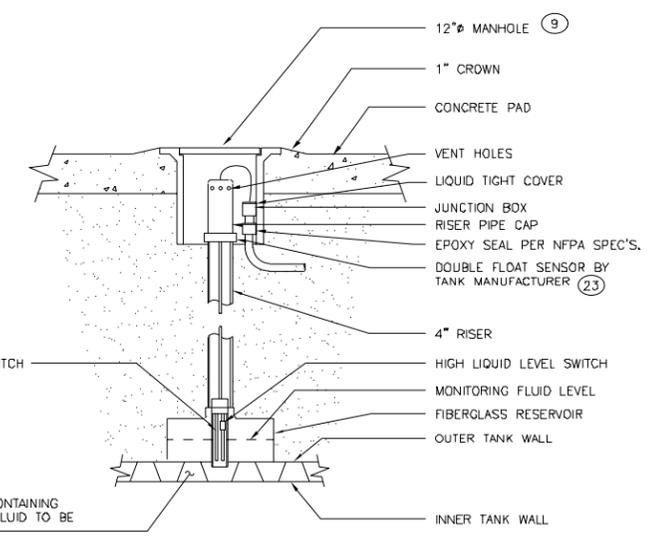


4  
T-8  
SECONDARY CONTAINMENT PENETRATION INTO BUILDING BELOW GRADE  
SCALE: 1"=1'-0"



2  
T-8  
SECONDARY CONTAINMENT PENETRATION IN EXISTING WALL  
SCALE: 1"=1'-0"

FUEL LINE SCHEDULE		
LINE SIZE	MATERIAL	CONTAINMENT SIZE
UP TO 3/4"	COPPER	(1) LINE IN 2" (2) LINES IN 4"
1" TO 1-1/2"	FIBERGLASS	(1) LINE IN 3"
2" TO 3"	FIBERGLASS	(1) LINE IN 4"
1" TO 1-1/2"	STEEL	(1) LINE IN 3"
2" TO 3"	STEEL	(1) LINE IN 4"



5  
T-8  
FIBERGLASS TANK RESERVOIR DETAIL  
NOT TO SCALE

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-8
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
TYPICAL PIPING DETAILS	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 12 OF 14

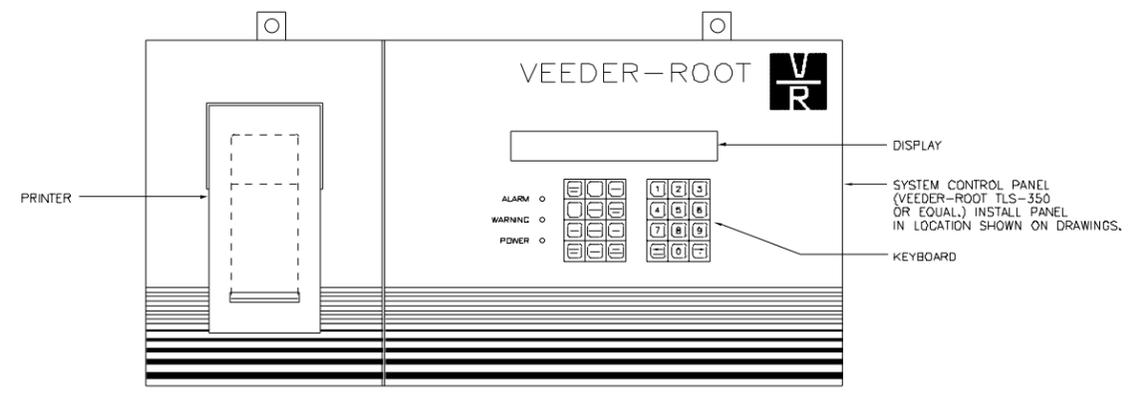
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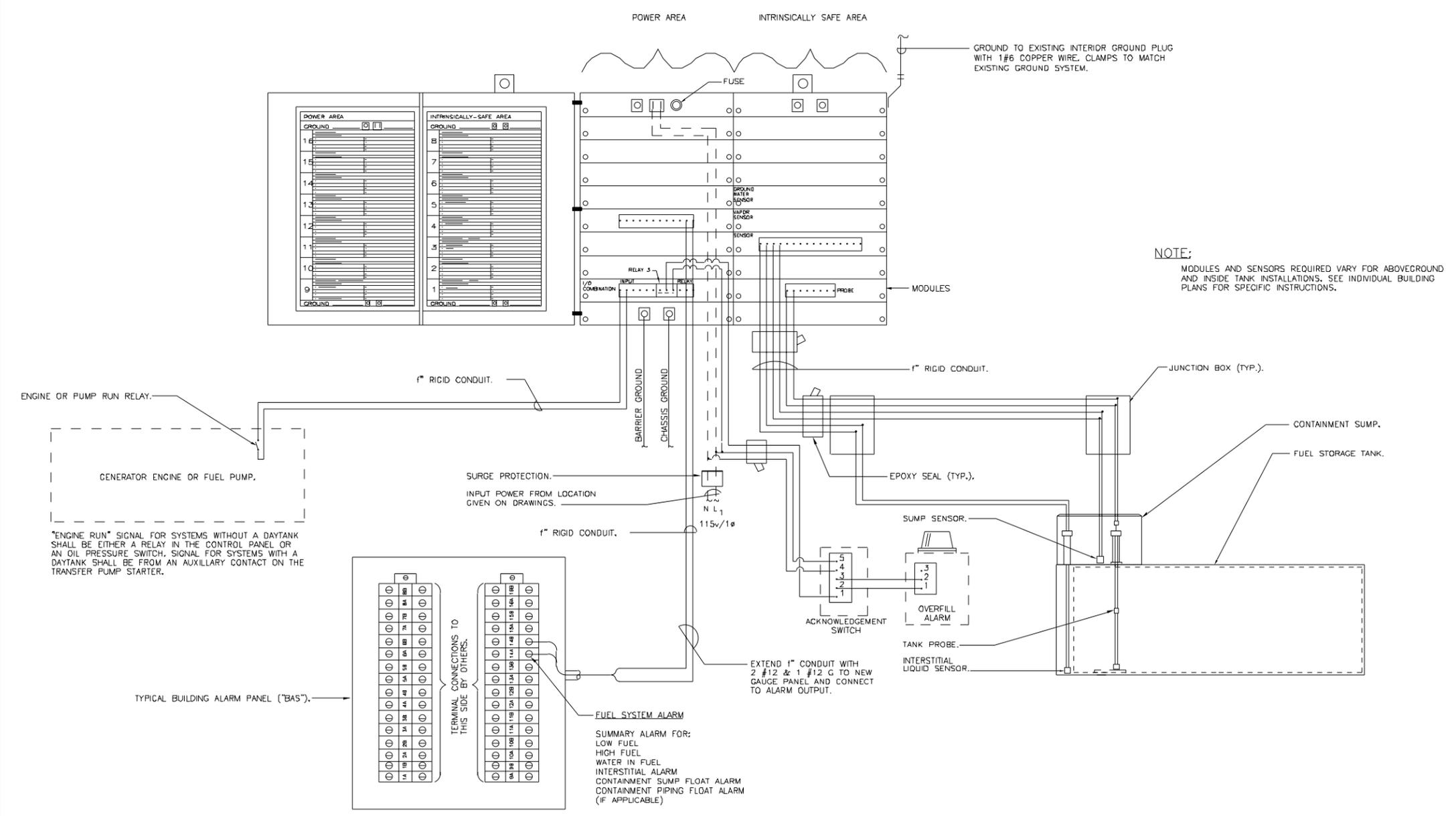


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**NOTES**

1. WIRING TO PROBE AND SENSORS MUST BE 600V AWC #14 THHN, OIL & GAS RESISTANT.
2. LABEL OR COLOR CODE ALL FIELD WIRING TO ENSURE POLARITY.
3. LABEL ALL ALARM JUNCTION BOXES, MONITOR JUNCTION BOXES AND PANELS.
4. PROVIDE PLASTIC PROTECTIVE BUSHING AT ALL CONDUIT ENTRANCES TO PANELS, JUNCTION BOXES & WIRING.
5. PANEL POWER TO BE OBTAINED FROM EXISTING PROTECTED PANEL. PROVIDE NEW 20 AMP, 1-POLE BREAKER. TERMINATE CHASSIS AND BARRIER GROUND WIRE TO PANEL GROUND BUS.
6. CONDUIT TO BE RIGID GALVANIZED.
7. MONITORING WIRES SHALL BE A SINGLE RUN OF WIRE WITH NO SPLICES.



GENERATOR ENGINE OR FUEL PUMP.

"ENGINE RUN" SIGNAL FOR SYSTEMS WITHOUT A DAYTANK SHALL BE EITHER A RELAY IN THE CONTROL PANEL OR AN OIL PRESSURE SWITCH. SIGNAL FOR SYSTEMS WITH A DAYTANK SHALL BE FROM AN AUXILIARY CONTACT ON THE TRANSFER PUMP STARTER.

TERMINAL CONNECTIONS TO THIS SIDE BY OTHERS.

**FUEL SYSTEM ALARM**

SUMMARY ALARM FOR:  
 LOW FUEL  
 HIGH FUEL  
 WATER IN FUEL  
 INTERSTITIAL ALARM  
 CONTAINMENT SUMP FLOAT ALARM  
 CONTAINMENT PIPING FLOAT ALARM (IF APPLICABLE)

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AT&T PROPRIETARY USE PURSUANT TO COMPANY INSTRUCTIONS	T-10
UNDERGROUND FUEL STORAGE TANK INSTALLATION OUTSIDE OF BUILDINGS DESIGN CRITERIA	
MONITOR/ALARM WIRING DIAGRAM	
AT&T NATIONAL STANDARD	SCALE: AS NOTED SHEET 14 OF 14

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