Attachment A to the Engineering Report
(Checklist Item #5)

Leachate/Facility Washdown Water Collection Piping and Storage Tank Technical Specifications

SECTION 15062

DUAL CONTAINMENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall furnish all labor, materials, tools, equipment and incidentals required to provide high-density polyethylene (HDPE) dual-containment pipe and appurtenances as shown, specified and required to complete the Work.
   2. It is the intention of the Drawings and of these Specifications to provide complete and workable piping systems and any miscellaneous fittings and specials required for proper completion of the Work shall be considered as having been included under this Section.
   3. Piping shall be of the sizes and extent shown on the Drawings or indicated in these Specifications.
   4. All jointing materials and other miscellaneous appurtenances and accessories shall be provided.

B. Coordination: Review requirements and procedures under other sections and coordinate with Work that is related to this Section.

C. Related Sections:
   1. Section 02220, Excavation and Backfill.
   2. Section 15051, Buried Piping Installation.
   3. Section 15515, Piping, Valves, and Accessories.
   4. Section 15542, Storage Tanks.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: The piping specified herein shall be provided by a manufacturer who has thoroughly familiarized himself with the design intent of the overall system and will provide piping suitable for the service intended.

B. Piping shall be obtained from one qualified manufacturer for each type of piping system.

C. Reference Standards: Comply with applicable provisions and recommendation of the following, except as otherwise shown or specified.
   1. ASTM F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
   2. ASTM D 1248, Polyethylene Plastics Molding and Extrusion Materials.

3. ASTM D 3035, Specification of Polyethylene (PE) Plastic Pipe (SDR-PR) Based on outside Diameter.
4. ASTM D 3261, Specifications for Butt Heat Fusion Polyethylene (PE) Plastic Fitting for Polyethylene (PE) Plastic Pipe and Tubing.
5. ASTM D 2683, Specification for Socket, Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
6. ASTM F 439, Socket-Type Chlorinated Poly(vinyl chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
7. ASTM F 441, Chlorinated Poly(vinyl chloride) (CPVC) Plastic Pipe. Schedules 40 and 80.
8. ASTM F 493, Solvent Cements for Chlorinated Poly(vinyl chloride) (CPVC) Plastic Pipe and Fittings.

D. Inspection: The quality of all materials, process of manufacture and the finished pipe, fittings and specials shall be subject to the inspection and approval of ENGINEER.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval detailed drawings and data on pipe, fittings, specials and appurtenances.

B. Certificates: Submit certificates of compliance with referenced standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. HDPE Pipe and Fittings:
1. The HDPE piping systems shall be made from polyethylene resin compound qualified as Type III, Category 5, Class C, Grade P34 in ASTM D 1248. The HDPE piping, fittings and other devices for the dual containment system shall be made from the specified pipe grade, PPI listed, Extra High Molecular Weight, High Density PE 3408 material.
2. The pipe shall be manufactured in accordance with ASTM F 714 or ASTM D 3035.
3. The raw material shall contain carbon black, well dispersed, with a minimum of 2%. Additives which can be conclusively proven not to be detrimental to the pipe may also be used, provided the pipe produced meets the requirements of this standard.
4. The piping system shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material supplier.
5. Fittings shall be molded or fabricated type, constructed of the same resin used for the piping.
6. Fittings shall be pressure derated.

7. Fittings shall be pressure rated for the pipe SDR in which the fittings are installed.
8. Manufacturer shall provide affidavit of successful pressure test of all fittings.

B. HDPE piping will be manufactured by:
   1. Polypipe Industries, EHMW PE3408.
   2. Or equal.

C. Schedule 80 PVC Pipe and Fittings:
   1. The schedule 80 PVC piping system shall be made of Type 1, Grade 1 Polyvinyl Chloride conforming to ASTM D 1784 and all Schedule 80 piping shall also conform to ASTM D 1785.
   2. All Socket type Schedule 80 PVC fittings shall be made of Type 1, Grade 1 Polyvinyl Chloride conforming to ASTM D 1784 and ASTM D 2467.

D. All PVC materials and components will be manufactured and appropriated from any qualified source.

2.2 PIPING SYSTEMS

A. HDPE Pipe:
   1. Pipe: HDPE SDR 17, conforming to ASTM F 714.
   2. Fittings: HDPE SDR 17, conforming to ASTM F 714.
   3. Joints:
      a. Thermal butt-fusion:
         1) Reference: ASTM D 2567.

B. Exposed Piping:
   1. Pipe: Schedule 80 PVC.
   2. Joints: Socket.
   3. Size and Extent: Pipe size as shown on Drawings.

2.3 IDENTIFICATION

A. All HDPE pipeline materials shall be stamped, marked or identified with the following:
   1. Name of manufacturer.
   2. Date of manufacture.
   3. Nominal pipe size.
   4. Dimension ratio.
   5. The letters PE followed by the polyethylene grade per ASTM D 1248, followed by the Hydrostatic Design basis in 100's of psi, e.g. PE 3408.
   6. Manufacturing Standard Reference, e.g. ASTM F 714-85.

B. All stainless steel pipe shall be marked with:
   1. Name or trademark of manufacturer.
   2. Pipe class or specification designation.
   3. Size and length dimension.
   4. Date and place of manufacture.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect all materials to ensure proper operation and absence of defects. The compatibility of all pipe, fittings, valves, couplings, and appurtenances shall be verified.

3.2 PREPARATION

A. Excavation required for buried piping systems shall conform to the requirements of Section 02220, Excavation and Backfill and Section 15051, Buried Piping Installation.

3.3 INSTALLATION

A. General:
   1. All piping and appurtenances shall be installed in accordance with the manufacturer's instructions.
   2. If any piping must be cut, the work shall be done in a satisfactory manner so as to avoid damage to the pipe and to leave a smooth end.
   1. All pipe and appurtenances shall be laid or placed to the lines and grades shown. Where not shown, unless otherwise specified, piping shall be made up in neat runs parallel to walls and ceilings, and supported therefrom. All joints shall be made up in the presence of ENGINEER.

++ END OF SECTION ++

SECTION 15542

STORAGE TANKS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install a 5,000 gallon washdown holding tank and a 50,000 gallon firewater holding tank.

B. Related Sections:
   1. Section 02220, Excavation and Backfill.
   2. Section 02230, Crushed Stone and Gravel.
   3. Section 03300, Cast-in-Place Concrete.
   4. Section 15051, Buried Piping Installation.
   5. Section 15062, Dual Containment Piping.
   6. Section 15515, Piping, Valves, and Accessories.

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer shall have a minimum of 5 years experience in the completion of substantially similar tanks, and shall show evidence of satisfactory completion in at least 5 installations.

B. Design and Fabrication Criteria:
   1. Except as otherwise shown or specified, all design, materials, joints, workmanship and all other aspects of the tank design and fabrication shall conform to AWWA D100.

C. Testing Agency:
   1. CONTRACTOR shall employ the services of a qualified testing organization approved by ENGINEER to perform all tests required by these Specifications.

D. Requirements of Regulatory Agencies:
   1. Building Codes: Comply with applicable requirements State and local governing authorities.
   2. National Fire Prevention Protection Association Standards.
   3. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

E. Reference Standards:
   1. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
      a. AWWA D100, Standard for Welded Steel Tanks for Water Storage.
      b. AWWA D102, Standard for Painting Steel Water-Storage Tanks.
      c. AWWA C652, Standard for Disinfection of Water Storage Facilities.
      d. Federal Specification TT-P-86, Standard for Paint, RedLeadBase, Ready Mixed.
      e. SSPC-PA1, Steel Structures Painting Counsel Standard for Shop, Field and Maintenance Painting.
      f. SSPC-SP6, Steel Structures Painting Counsel Standard for Commercial Blast Cleaning.
      g. SSPC-SP10, Steel Structures Painting Counsel Standard for Near-White Blast Cleaning.
      h. SSPC-Vis 1, Steel Structures Painting Counsel Pictorial Surface Preparation Standards for Painting Steel Surfaces.

F. Inspection: The quality of all materials, process of manufacture and the finished pipe, fittings and specials shall be subject to the inspection and approval of ENGINEER.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
   1. Manufacturer's literature, illustrations, specifications, engineering data and materials for the following:
      a. Pipe and fittings.
      b. Valves.
      c. Tank.
   2. Detailed 1/4-inch scale drawings showing materials and dimensions of the complete wastewater pipes and tank.

B. Manufacturer's Design Computations:
   1. CONTRACTOR shall submit for record:
      a. Three copies of manufacturer's design computations signed and sealed by a Registered Professional Engineer, who may be an employee of the manufacturer. The State of his registration, registration number and his name on the seal shall be clearly legible.

C. Test Reports:
   1. Furnish, in duplicate, certified copies of test results from radiographs and inspections of test segments.

D. Certificates:

1. Where CONTRACTOR chooses to design, fabricate and erect tank in accordance with requirements of Appendix C of AWWA D100. submit required certificate of compliance to ENGINEER.
2. Prior to purchasing paint and paint products, submit to ENGINEER a certification from paint manufacturer stating that the quantity of each component of each paint system to be purchased is sufficient to properly coat all surfaces. Such certification shall be based on surface areas furnished by CONTRACTOR to paint manufacturer and ENGINEER.

E. Record Drawings:

1. During progress of the Work keep an up to date set of Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping work submit mylar tracings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the ENGINEER. Drawings shall show all piping in plan and in section, with all reference dimensions and elevations required for complete record drawings of the piping systems. Two paper prints shall also be furnished. The tracings shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store to keep material clean and free from damage.

B. Handle to prevent damage during installation and storage.

1.5 JOB CONDITIONS

A. Protection: Properly plug or cap the open ends of all pipe at the end of each days work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

PART 2 - PRODUCTS

2.1 WASHDOWN WATER TANK

A. Furnish and install a 5,000-gallon aboveground single wall storage tank. The tank will have:

1. Manhole with nuts and bolts and gasket for lid.
2. Internal ladder.
3. Bolts to secure tank.
4. Vent line.
5. Fill line.
6. Drawoff.
7. Level monitor.
8. Concrete base slab.

B. An air test of the tank should be completed aboveground prior to installation. Refer to instructions from tank manufacturer.

C. Equipment to lift the tank shall be of adequate size to lift and lower the tank without dragging and dropping to ensure no damage to the tank or the coating. Tanks shall be carefully lifted and lowered by use of cables or chains of adequate length (not less than 45 including angle) attached to the lifting lugs provided. A spreader bar should be used where necessary. Under no circumstances use chains or slings around the tank shell.

D. The plugs at unused tank openings shall be removed, a pipe compound shall be added and the plugs shall be reinstalled in the unused openings. The plugs in tank openings, which are to be used, should not be overtightened as this may cause the bushing to unscrew with the plug. Care should be taken not to cross-thread or damage the non-metallic bushings when replacing plugs or installing required tank piping.

2.2 FIRE WATER STORAGE TANK

A. Furnish and install a 50,000 below ground single wall fiberglass tank. The tank will have:
1. Manhole with nuts and bolts and gasket for lit.
2. Internal ladder.
3. Hold down straps.
4. Vent line.
5. Fill line.
6. Draw-off line.
7. Float and level monitor.
8. Concrete tie-down slab.

B. If tank is to be placed on a concrete pad for anchoring purposes, the tank must not be placed directly on the pad. A layer of fine gravel, pad gravel, or sand at least 6" deep must be spread evenly over the dimensions of the pad to separate the tank from the pad. If installation area is in a tidal area, the tank "bedding" material should be fine gravel or pea gravel rather than sand.

C. All exposed gravity sanitary waste piping located in concrete slabs or underground to tank as shown shall be ductile iron pipe.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas to receive piping, valves and accessories for:
1. Defects that adversely affect execution and quality of Work.

2. Deviations beyond allowable tolerances for piping, valves and accessories.
3. Start work only when conditions are satisfactory.

B. Material Cleaning: Thoroughly clean all piping, fittings, valves and accessories prior to installation.

3.2 INSTALLATION

A. General:
1. Install all items such as shown, specified, and as recommended by the manufacturer.
2. Request instructions from ENGINEER when there is a conflict between the manufacturer's recommendations and the Drawings or Specifications.
3. Present conflicts between piping systems and equipment or structures to ENGINEER who will determine corrective measures to be taken.
4. Do not modify structures to facilitate installation of piping unless specifically approved by ENGINEER.
5. Installation to conform to requirements of all local and state codes.

B. Conform to applicable requirements in Sections 15051, Buried Piping Installation.

C. Care shall be taken so as not to leave tool marks or abrasions on plated, polished or soft metal piping.

D. Wherever changes in sizes of piping occur, changes shall be made with reducing fittings. Use of bushings is not permitted unless otherwise shown.

E. All exposed unfurred pipes, whether insulated or not, shall be identified with pipe labels and the direction of flow indicated. Labels may be omitted from piping where the use is obvious, due to its connection to fixtures and where the appearance would be its connection to fixtures and where the appearance would be objectionable in finished rooms; as approved by ENGINEER. Identification labels shall be placed as follows:
1. Near each valve and branch connection.
2. Wherever piping emerges or disappears from view, when viewed from the Floor of the room in which it is installed.
3. At no more than 50-foot intervals.

F. Provide shutoff valves to each piece of equipment furnished.

3.3 FIELD QUALITY CONTROL

A. Tests: Water or smoke test in accordance with Building Code State of Delaware and all other applicable codes.

3.4 CLEANING

A. Remove all debris, dirt and waste materials resulting from installation.

B. Remove dirt, dust, rust, etc. from piping in preparation for painting, testing and insulating.

+ + END OF SECTION + +

Attachment B to the Engineering Report
(Checklist Item #5)

Calculations for Secondary Containment Leachate/Facility Washdown Water

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY: JCP DATE 6/6/03 SHEET NO. 1 OF 2
CHKD. BY ..... DATE ..... JOB NO. .....
SUBJECT DSWA - Calcs for Tank

PROBLEM Statement -

Calculate the volume of the secondary containment area for the 5,000 gallon leachate storage tanks at Route 5 and Milford transfer stations.

Assumptions -

1. Refer to attached Drawings - utilities details from sheet G-9 for RS.
2. Refer to attaced DRawings - utilities details for sheet G-9 for Milford.
3. The volume around the tank will be neglected.

Summary -

Required Volume

5,000 gal - 110% = 5,500 gal

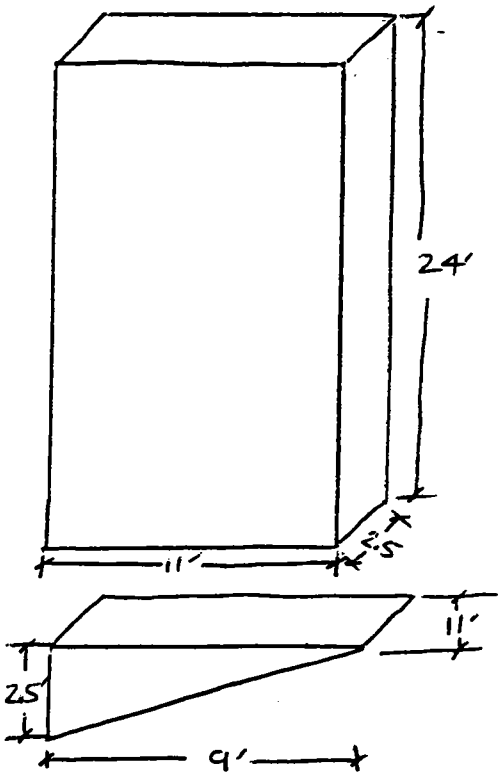
Volume Rounded

5,800 gal

RECYCLED PAPER

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY KU DATE 5/6/03 SHEET NO. 1 OF 1
CHKD. BY CP DATE 5/6/03 JOB NO. 4396003
SUBJECT DSWA Calcs for Tank



$V_1 = 11' \times 24' \times 2.5' = 660\ cf$

$V_2 = 9' \times 2.5' \times 11' = \frac{247.5}{2} =$

$123.75\ cf$

$V_{TOTAL} = 783.75 cf$

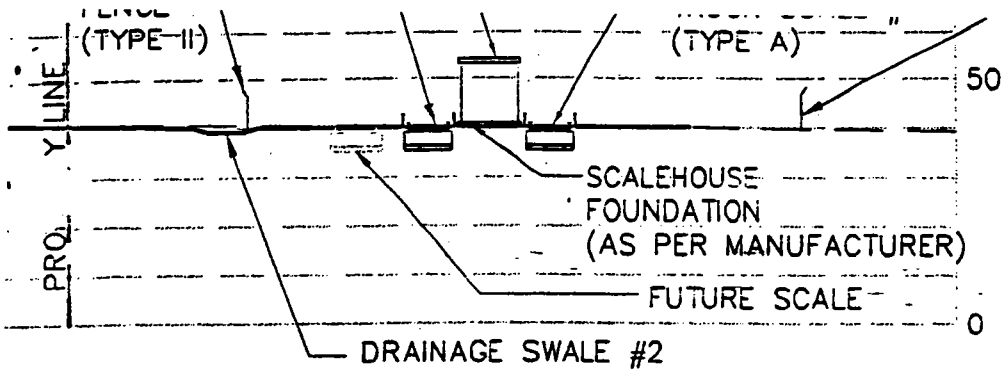
$V_{TOTAL} = (783.75 cf)(7.48 \frac{gal}{cf})$

$V_{TOTAL} = 5862.42\ gal$

5,000 gallon tank

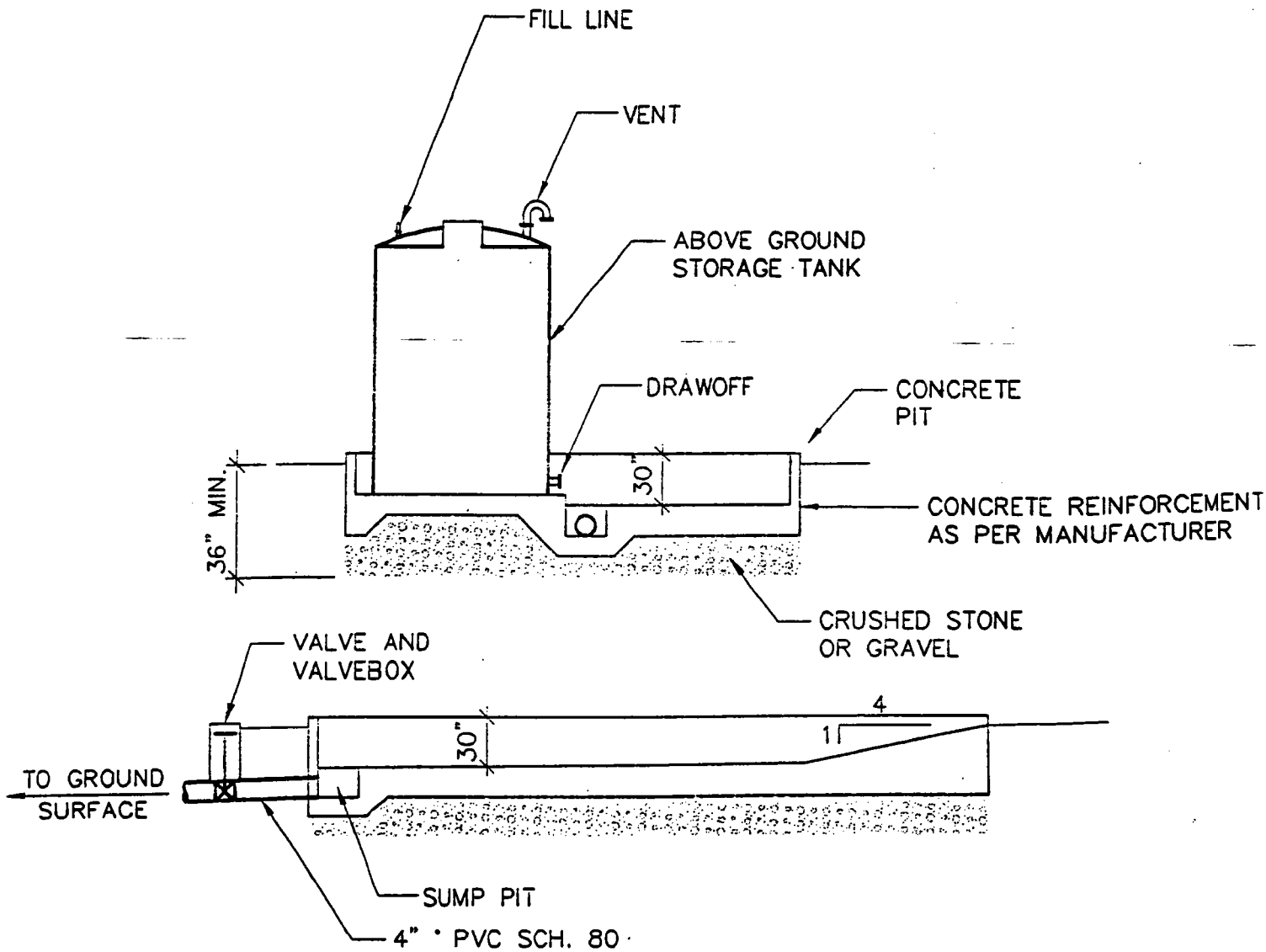
2ND CONTAINMENT MUST BE 110% or 5,500 gallons

5862 > 5500 gal ✓



SECTION 2 / 2 9

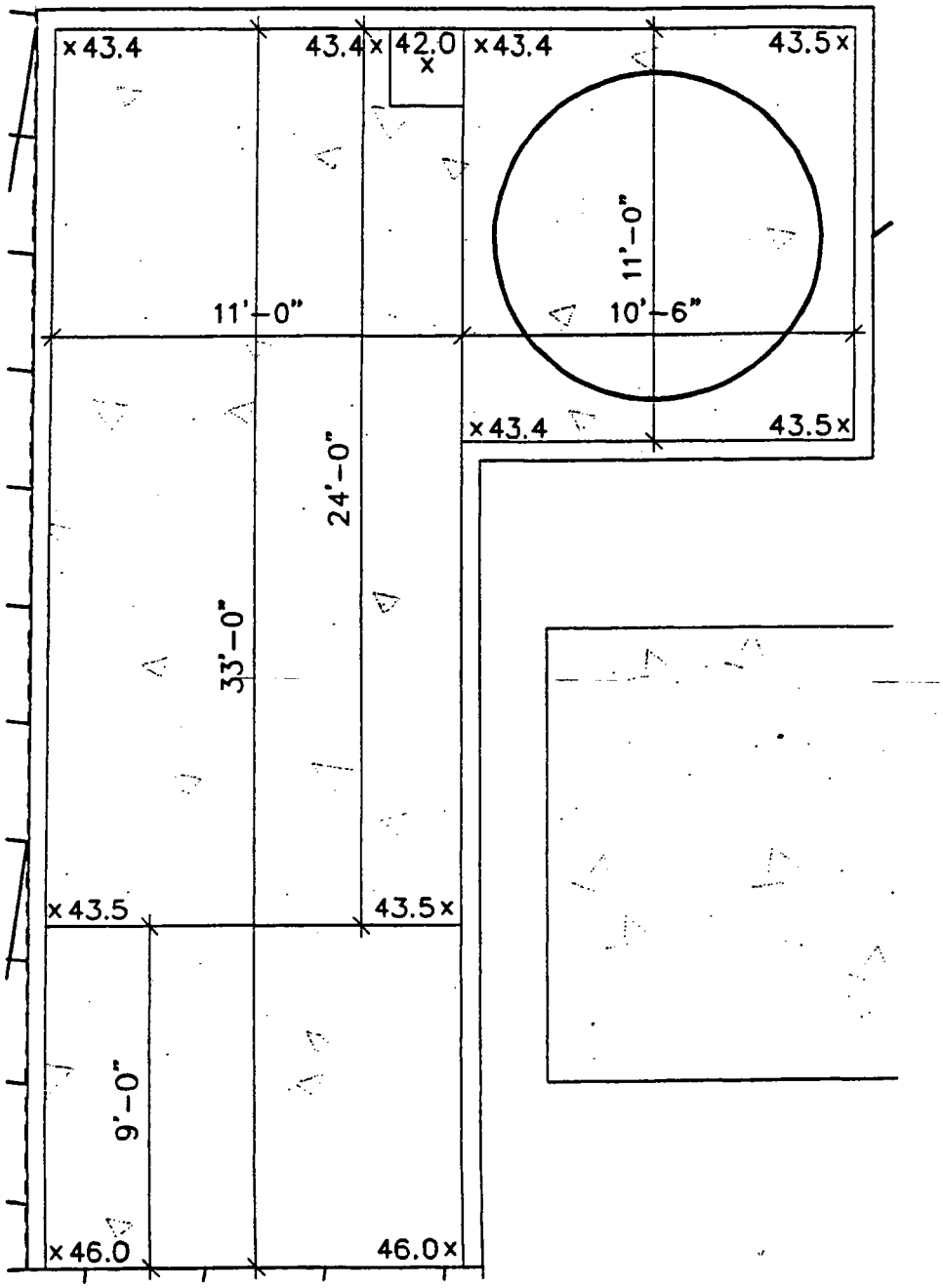
SCALE: 1"=40'



MILFORD

5,000 GALLON WASTEWATER STORAGE TANK DETAIL

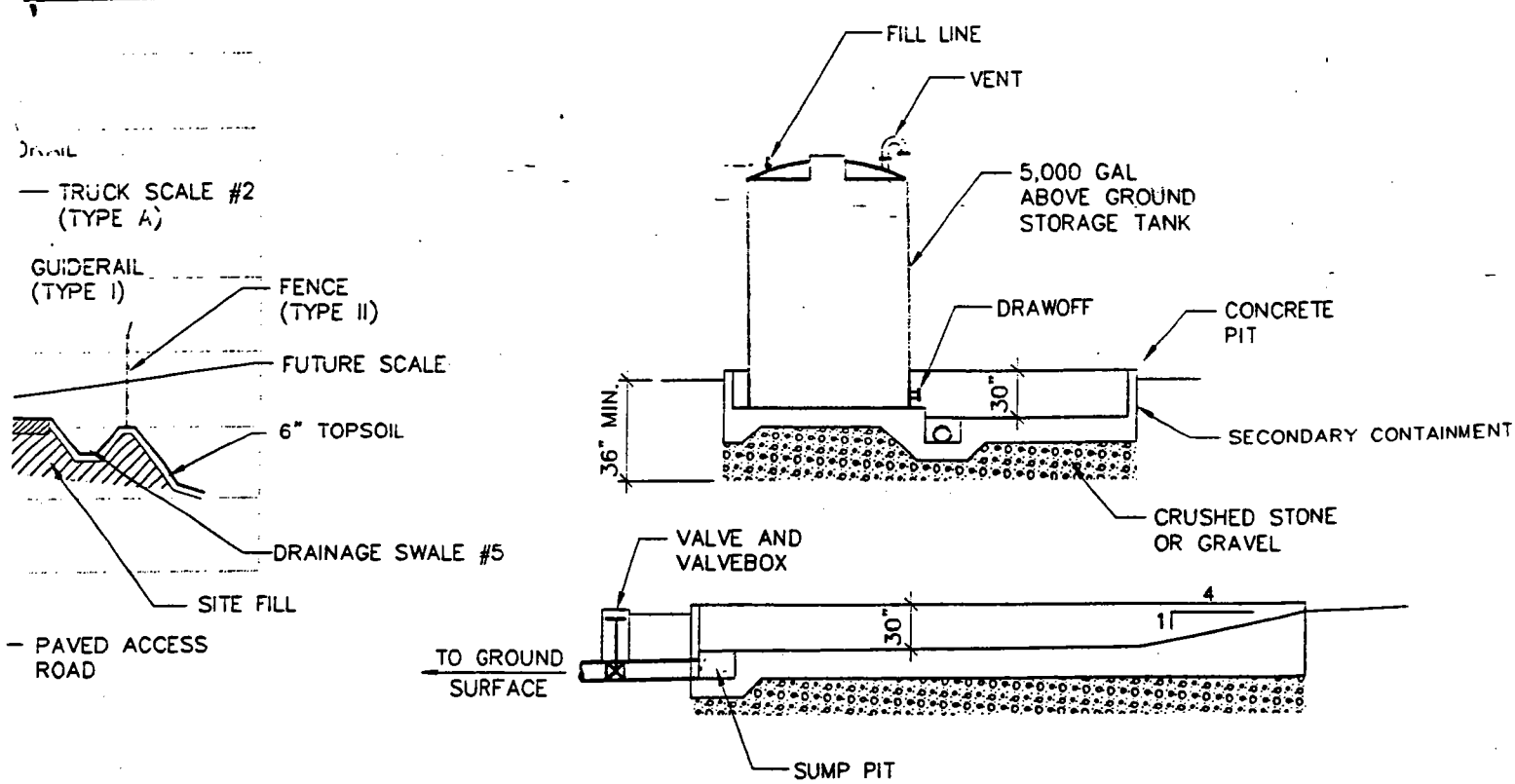
SCALE: HORIZ. 1"=10'



Milford

STORAGE TANK SECONDARY CONTAINMENT AREA

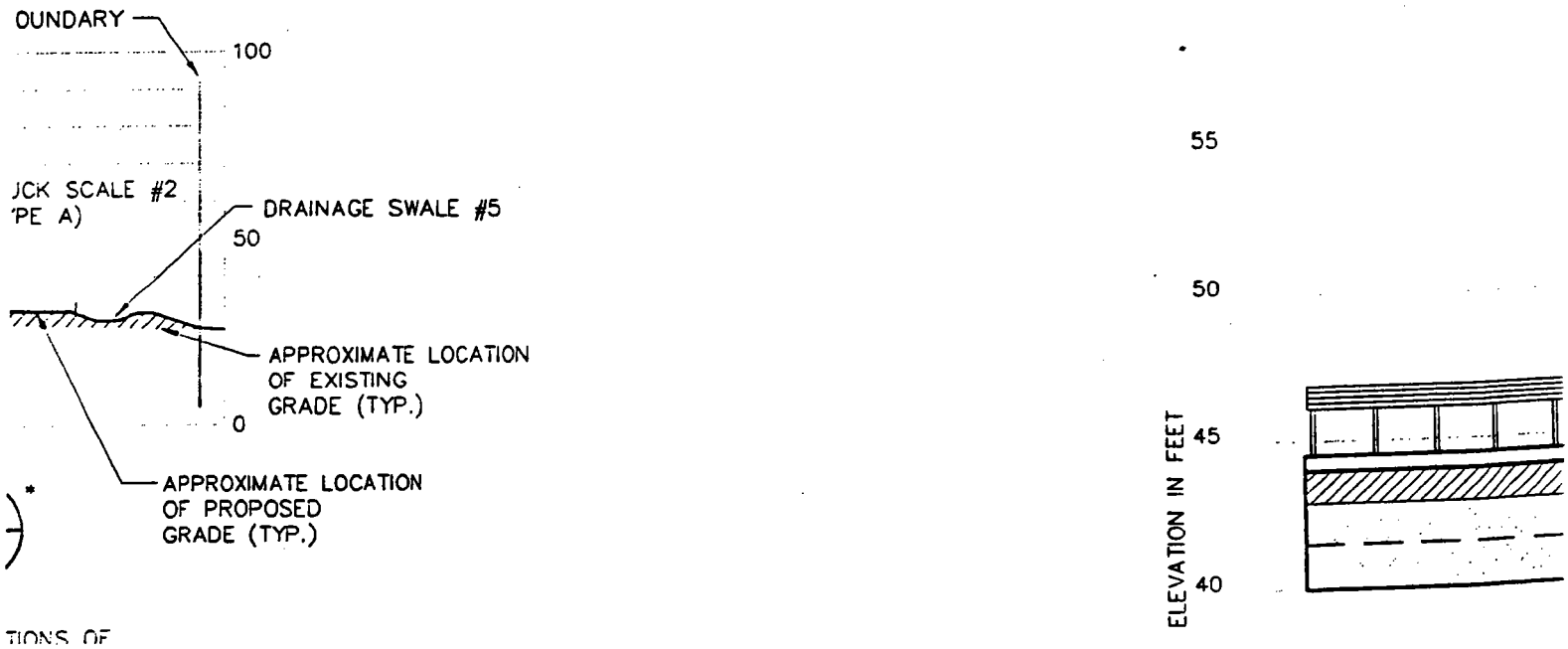
SCALE: HORIZ. 1"=5'



ROUTE 5

5,000 GALLON WASTEWATER STORAGE TANK DETAIL

SCALE: HORIZ. 1"=10'



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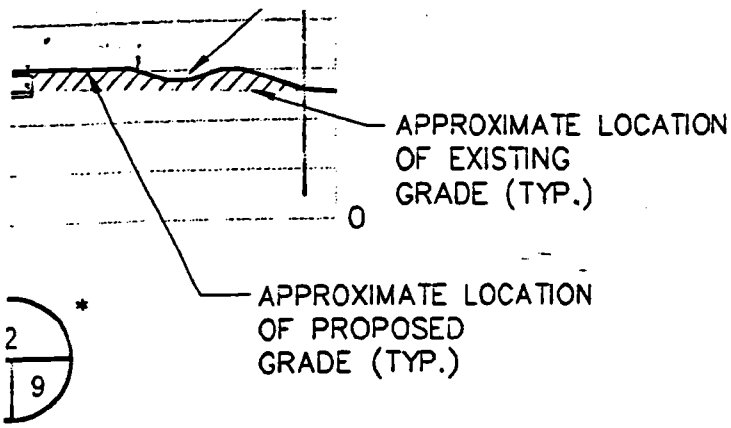

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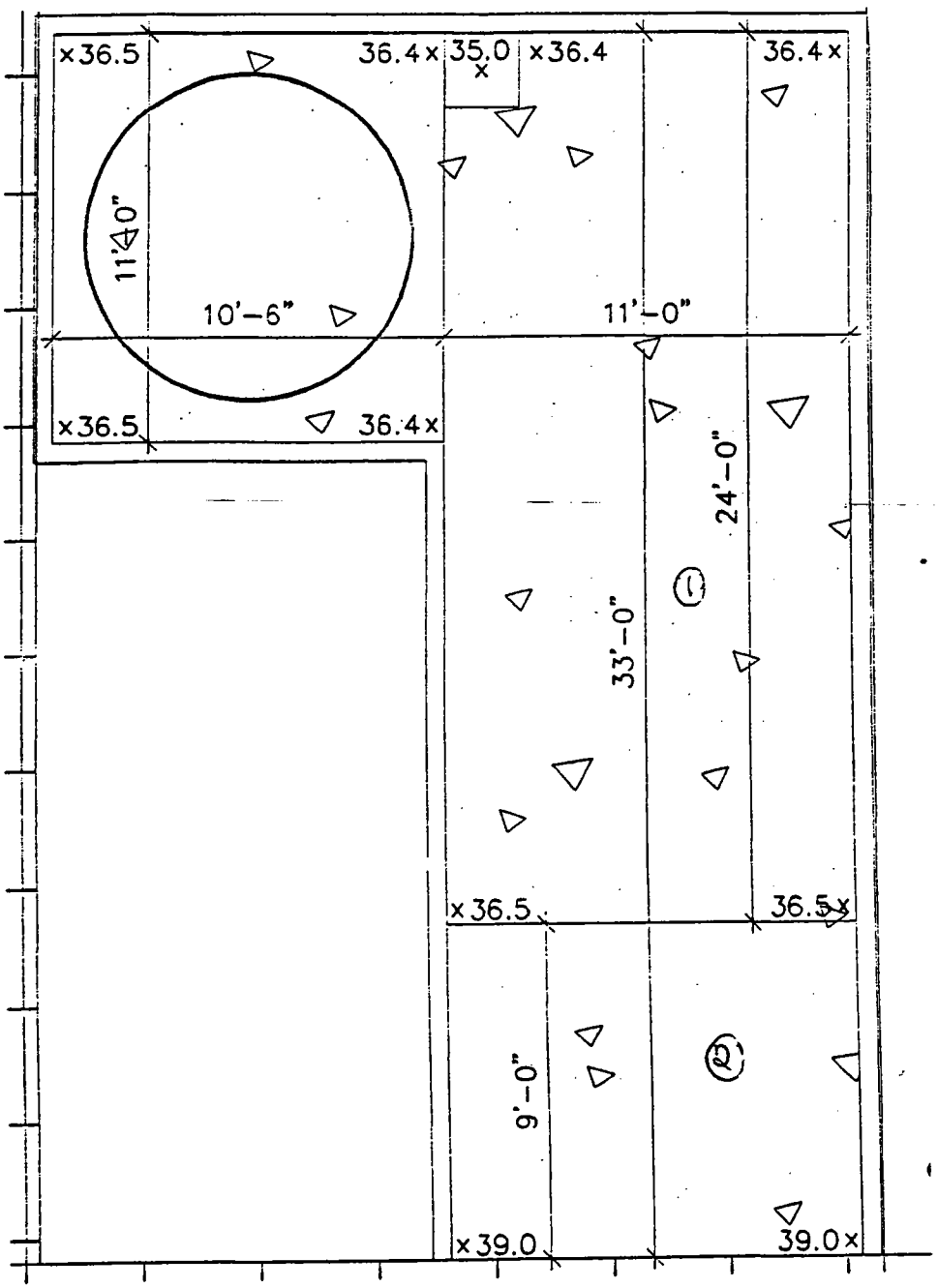

STORAGE TANK SECONDARY CONTAINMENT AREA

SCALE: HORIZ. 1"=5'

ROUTE 5