

This drawing is based on a design prepared by the Midwest Plan Service (MWPS) at Iowa State University. For more specific details concerning the design refer to Midwest Plan Service Publication TR-9, Circular Concrete Manure Tanks (March 1998). This drawing may be used for tanks which are above or below ground. The design is in accordance with ultimate strength design requirements detailed in ACI 318-95.

**Design Loading:**

1. Manure load: 65 psf/ft. of depth.
2. Soil backfill loads: 85 psf/ft. of depth with no surcharge or 60 psf/ft. of depth with 120 psf lateral surcharge. This requires the structure backfill to be adequately drained. To meet this requirement see backfill details on this sheet.

**Construction Notes:**

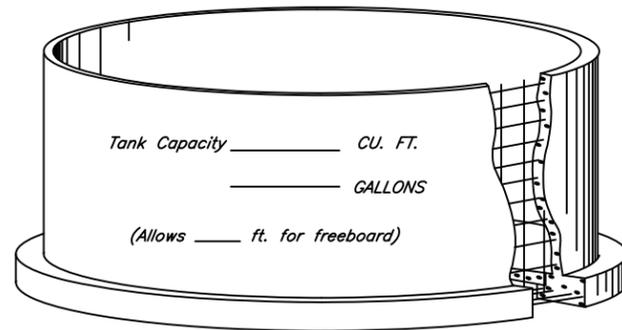
1. Reinforcing steel for footing and walls shall have a tension yield point of  $f_y = 60,000$  psi. Refer to Sheet 2 for floor reinforcing steel grades.
2. For splice lengths refer to the table on Sheet 2. All bends in reinforcing steel shall have a minimum inside radius of 3 bar diameters.
3. All concrete shall have a minimum 28 day compressive strength of 4,000 psi. The mix design shall be submitted to NRCS prior to placement. Unless shown otherwise in the construction specifications, the following requirements shall apply:
  - Minimum cement content - 6 bags per Cu. Yd.
  - Slump - 4 inches plus or minus 1 inch.
  - Air content from 5 to 7 percent.
  - Aggregate size - maximum of 1 inch diameter.
  - Construction joints - cleaned prior to subsequent concrete placement.
  - Cure concrete for a minimum of 7 days - acceptable methods are:
    - membrane forming curing compound
    - leaving the forms in place
    - soaking / continuous spray
4. Construction joints may be used to ease construction. The location of construction joints shall be approved by the Engineer prior to placing the concrete.
5. The 1/4" x 6" steel plate in the wall to ring foundation joint shall be continuous. Steel plate sections may be butt welded or lapped & bolted with a minimum lap length of 12 inches to make them continuous.
6. Refer to manufacturers recommendation for placing waterstop material.
7. Backfill shall be brought up uniformly around the tank. The maximum difference in the finished backfill elevations around the tank shall be 3 feet.
8. All construction methods shall meet OSHA regulations.
9. See Section 302, MWPS 1, "Foundations for Farm Structures", Revised 1987, for tanks with backfill less than frost depth (Section 901, MWPS 1).
10. Installation of this structure shall conform to NRCS Construction Specifications.

**Safety Considerations:**

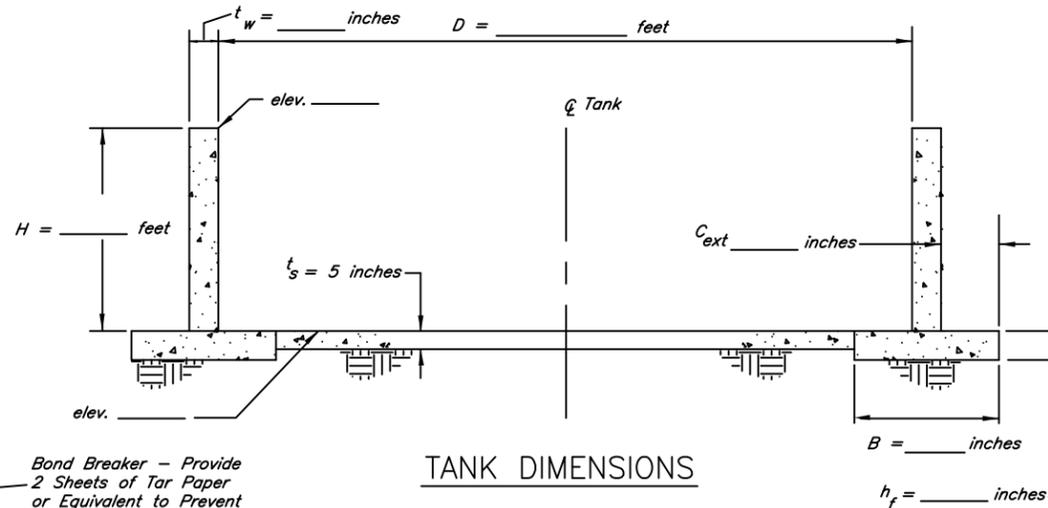
1. The tank shall be surrounded by a chain link or woven wire fence.
2. Posts shall not be cast into the concrete wall.
3. Safety stops shall be installed at pushoff locations to prevent accidental entry of equipment.
4. Warning signs shall be erected around the tank stating that entry may result in injury or death.

**Unloading Station:**

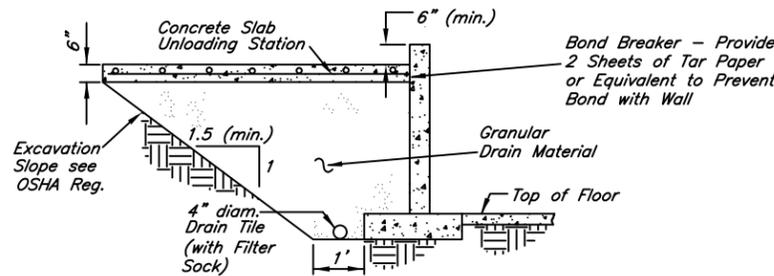
If tractors, heavy tank wagons, or trucks will be driven along the edge of the tank, cast a 6 inch thick concrete slab along the traffic route by the tank. The concrete slab should be large enough to eliminate any wheel loads directly on the natural ground or backfill by the tank. The purpose of the slab is to distribute the loading along the tank wall and prevent mud and erosion. The concrete slab should have T&S reinforcement equivalent to No. 3 bars at 18 inches C-C (steel shall be placed at or above the mid-depth of the slab). Granular backfill is required under slab.



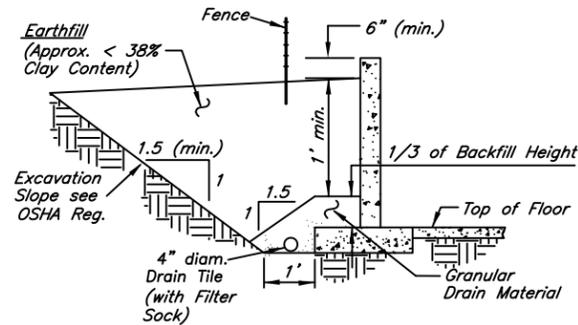
**CIRCULAR CONCRETE MANURE TANK**



**TANK DIMENSIONS**

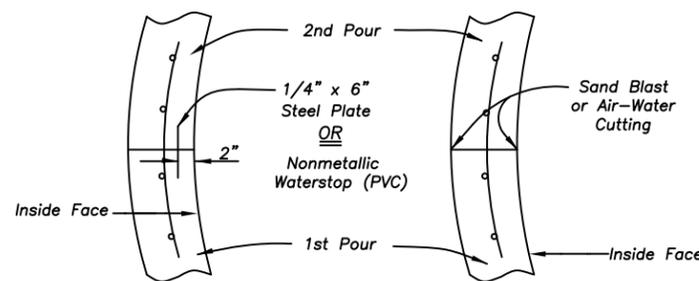


**WALL BACKFILL DETAIL-UNLOADING STATION**



**WALL BACKFILL DETAIL-TYPICAL**

1. Provide a minimum 4 inch diameter perimeter drain tile for wall backfill drainage. Outlet the tile at a location downstream where flow from the outlet may be monitored.
2. If a high water table is present a special drain design will be required under the tank floor to prevent uplift.
3. To provide adequate drainage, the granular drain material shall be clean with maximum 5 percent fines. The maximum particle size shall be 1.5 inches.



**ALTERNATIVE 1 ALTERNATIVE 2  
PLAN VIEW  
TYPICAL WALL JOINT DETAIL**

**TABLE OF QUANTITIES**

| ITEM                  | AMOUNT         | UNITS         |
|-----------------------|----------------|---------------|
| EXCAVATION            | _____          | CU. YD.       |
| SUBGRADE FILL         | _____          | CU. YD.       |
| BACKFILL              | _____          | CU. YD.       |
| DRAIN FILL            | _____          | CU. YD.       |
| DRAIN TILE            | _____          | LIN. FT.      |
| FENCE                 | _____          | LIN. FT.      |
| SHEAR PLATE           | _____          | LIN. FT.      |
| CONCRETE CHAIRS       | _____          | EACH          |
| CURING COMPOUND       | _____          | GALS.         |
| CONCRETE (4,000 psi)  |                |               |
| Wall Footing          | _____ SQ. FT.  | _____ CU. YD. |
| Tank Floor Slab       | _____ SQ. FT.  | _____ CU. YD. |
| Wall                  | _____ LIN. FT. | _____ CU. YD. |
| Other:                | _____          | _____ CU. YD. |
| <b>TOTAL CONCRETE</b> |                | _____ CU. YD. |

**STEEL REINFORCEMENT (Grade 60 Only)**

| Mark            | Size  | Spacing | Quantity | Length | Total Length |
|-----------------|-------|---------|----------|--------|--------------|
| A <sub>s1</sub> | _____ | _____   | _____    | _____  | _____        |
| A <sub>s2</sub> | _____ | _____   | _____    | _____  | _____        |
| A <sub>sv</sub> | _____ | _____   | _____    | _____  | _____        |
| A <sub>sr</sub> | _____ | _____   | _____    | _____  | _____        |
| Tie Bars        | _____ | _____   | _____    | _____  | _____        |

**FLOOR STEEL (Grade \_\_\_\_\_)**

| Mark                      | Size  | Spacing | Floor Area | Conversion Factor (See Sheet 2) | Total Length |
|---------------------------|-------|---------|------------|---------------------------------|--------------|
| Floor Steel               | _____ | _____   | _____      | _____                           | _____        |
| TOTAL LENGTH OF #3 BARS = | _____ | _____   | _____      | FEET                            | _____ LBS.   |
| TOTAL LENGTH OF #4 BARS = | _____ | _____   | _____      | FEET                            | _____ LBS.   |
| TOTAL LENGTH OF #5 BARS = | _____ | _____   | _____      | FEET                            | _____ LBS.   |

|   |                |              |               |
|---|----------------|--------------|---------------|
| Date _____  | Approved _____ | Title _____  | Title _____   |
| Date _____  | Drawn _____    | Traced _____ | Checked _____ |
| CIRCULAR CONCRETE MANURE TANK   |                |              |               |
| PLAN, CONSTRUCTION NOTES, AND QUANTITIES                                |                |              |               |
| U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES CONSERVATION SERVICE |                |              |               |
| CAD FILE NAME<br>Tr9sht1.dwg  |                |              |               |
| DRAWING NO.<br>IA 1630<br>(Rev. 5/99)                                   |                |              |               |
| SHEET NO. 1 OF 2  |                |              |               |