



## COMPLETE INSTRUCTIONS

The Canada Plan Service, a Canadian federal/provincial organization, promotes the transfer of technology through factsheets, design aids and construction drawings that show how to plan and build modern farm structures and equipment for Canadian agriculture.

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## CONCRETE COVERED RECTANGULAR MANURE TANKS

### PLAN M-10712 REV 86:07

This plan gives construction details for various sizes of reinforced concrete tanks designed for placing underground. Tank walls may be 2.4 or 3.0 m (8 or 10 ft) deep, and the outside horizontal dimensions range from 3.6 m (12 ft) square, up to 12.6 x 14.4 m (42 x 48 ft). The top is a cast-in-place concrete slab with one or more access ports for installing a tractor-powered agitator pump. These ports are also used when removing the slab formwork after the top slab has hardened.

### DESIGN CONSIDERATIONS

**TANK FLOOR** Unless the site is extremely welldrained, there is always some possibility of a watertable problem with deep underground tanks. If groundwater rises to a level much above the liquid level in the tank, the entire tank may float up out of the ground, or the floor may break up. To avoid these problems, do not make the floor-to-footing joints watertight. Allow a small construction joint here, so that clean groundwater can seep into the tank whenever the water table rises above the liquid manure level inside. Very little liquid manure leaks back out as long as the cracks are small and easily plugged by manure solids.

**TANK WALLS** The walls are keyed into the bottom footings and top slab to resist the inward pressure of wet soil. Reinforcing steel in the walls is designed to handle external wet soil pressure when the tank is empty; however, it is not strong enough to handle the added pressure of a heavily-loaded truck or liquid manure tanker driven on soft wet soil close to the walls. Locate the tank walls at least 3.6 m (12 ft) away from any roadway where heavy wheel loads can occur. The loaded manure tanker should also be kept at least 3.6 m (12 ft) away from the walls when emptying the storage.

**TANK TOP** The top slab is designed to handle typical ground snow loads and animal traffic (4.8 kPa uniformly distributed live load) but not heavy concentrated wheel loads such as trucks, big tractors and loaded manure tankers. Building the top slab at least 200 mm (8 in.) above the surrounding grade level is a practical way to prevent anyone from driving a loaded vehicle over the tank.

**ACCESS PORTS** One or more access ports are needed for mixing the manure and pumping it out. A rectangular opening 750 x 1800 mm (30 x 72 in.) will accommodate most tractor-powered pit pumps, either trailer-mounted or three-point-hitch mounted. Be sure to consider the effective mixing radius of typical pit pumps when planning the tank dimensions and access port locations. The maximum distance from the center of the access port to the farthest corner of the tank should not exceed 7 m (24 ft), unless the pump manufacturer can demonstrate a greater effective radius.

Access ports must be covered for safety. The plan gives details for a welded steel cover with retracting handles. This cover is too heavy for a small child to lift and is secured to the tank top by a short length of chain so it won't fall into the tank. Alternatively, you can weld hinges to both the cover and the port opening so that the cover can't be removed.

### CONNECTING BARN TO TANK

To fill the tank by gravity from gutters in the barn, place the tank top not higher than the bottom of the deepest gutter in the barn. This allows you to use the storage to its full capacity without manure backing up into the barn gutters.

**MANURE GAS** It is extremely important to isolate the headspace of the manure tank from the barn by some type of gas trap. Otherwise, potentially lethal manure gases could be drawn back into the barn when the tank is opened and agitated. This plan shows three gas trap designs (see also Plan M-8710, Manure Gas).