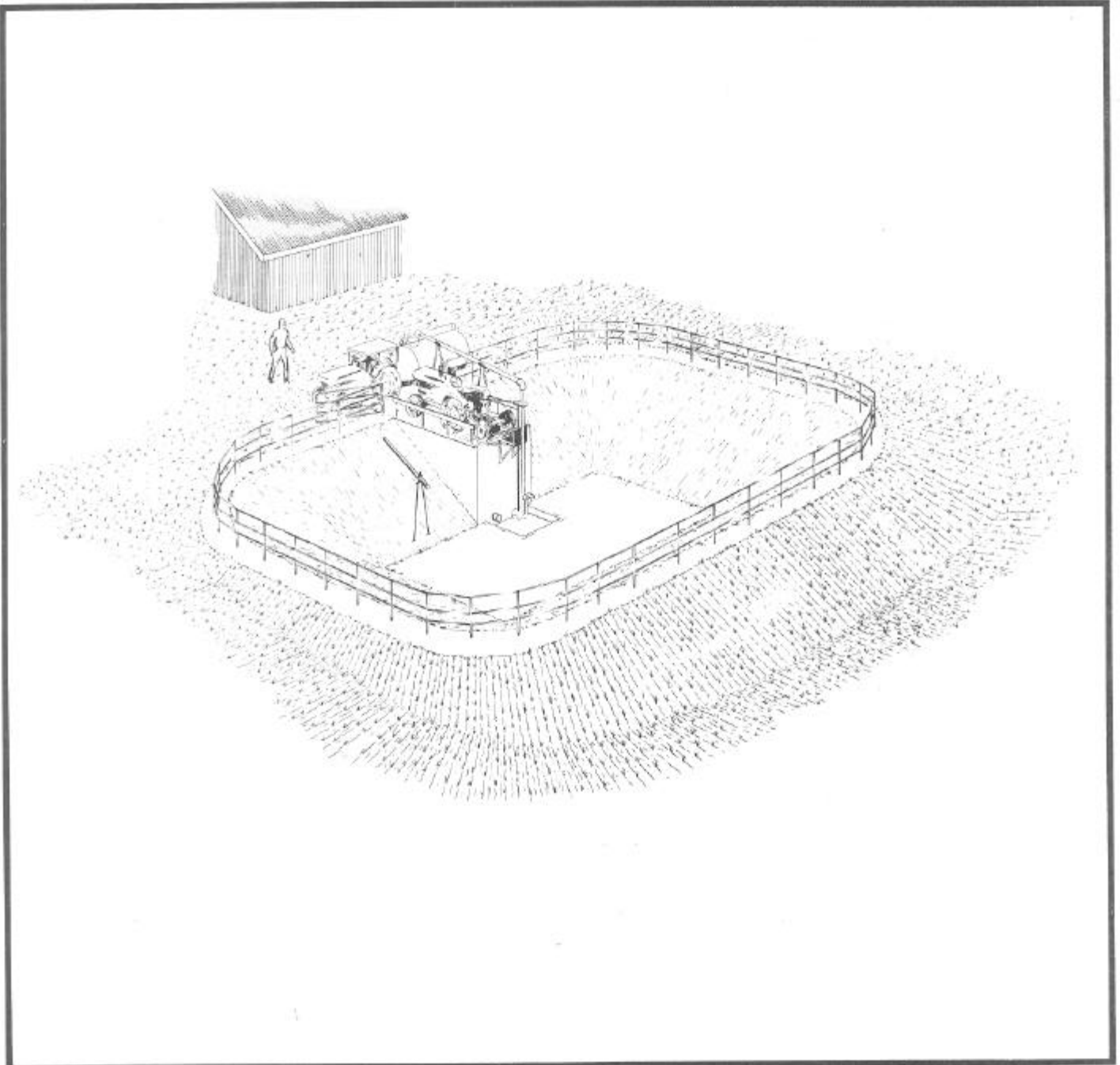


CLAY-LINED MANURE STORAGE POND WITH PUMPING DOCK

M-10706



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.

For more information, contact your local provincial agricultural engineer or extension advisor.

CLAY-LINED MANURE STORAGE POND WITH PUMPING DOCK

PLAN M-10706 NEW 79:12

This plan gives details for a liquid manure storage pond that can be built at the least possible cost. This type of storage is best suited to regions of low to moderate precipitation and where an impervious clay subsoil can be packed to make manure-tight banks and floor. Do not use this type of manure storage over sand, gravel, or fractured bedrock since leakage could cause pollution of underground water supplies.

FILLING AND EMPTYING THE STORAGE

Liquid manure with little or no bedding can be transported from the barn to a nearby storage pond by:

1. gutter cleaner extension or auger (at low slope), or
2. plunger manure pump and underground pipe, or
3. tractor-powered liquid manure agitator pump, or
4. gravity flow through underground pipe.

The method of filling will depend partly on the site. For example, where the storage pond must be located close to the barn and the ground is fairly level, some mechanical system such as 1, 2, or 3 (above) will provide the necessary lift to fill the storage. However, if the site has considerable slope the storage can be gravity-filled. Be sure the gravity-flow pipe has enough slope, that it is flushed regularly, and that it enters the storage above the full liquid level, otherwise plugging will occur.

The plunger manure pump and underground pipe is a newer system. It is especially suitable for very cold weather since the pipe can be buried below frost and the storage is filled from the bottom.

For emptying, the storage must be thoroughly agitated, then pumped to a spreader-tanker by a tractor pto-powered manure pump. The size of the storage is based on the agitation capacity of the larger pto-driven chopper pumps requiring at least a 40 kW tractor. A pumping dock of concrete (or steel and timber) is located at the center of the long side to give the agitator nozzle on the pump enough range to reach the corners. The bottom dimensions (12 x 7.2 m) are based on the agitation capacity of some larger pumps available, and these dimensions should not be increased without adding a second pumping dock. With two docks spaced 12 m apart, bottom dimensions could be increased 24 x 7.2 m.

There is a concrete sump at the foot of the pumping dock. This prevents bottom erosion during mixing operations and allows the pump to completely drain the pond. Use a chopper pump with a nominal shaft length of 3 m (from top of dock to pump inlet opening).

Another alternative is to use one of the longshaft agitator pumps designed to operate from a sloping ramp. For this, build a concrete ramp down one or more corners of the storage, with a concrete sump extending into the bottom. Make sure the ramp slope is flat enough to safely back a pump and tractor down the ramp, and make the concrete surface as rough as possible for traction. Locating these ramps at the corners of the storage as shown helps minimize the slope. To agitate a full pond, recirculate liquid manure until a consider-

able quantity is mixed. Pump and spread this material, then re-agitate the remainder and pump again.

An irrigation pump and sprinkler system spreads liquid manure much faster than tankers if cropland is nearby, but the irrigation pump will probably not be capable of doing the mixing job required before spreading can begin; chunks of solid material such as stones, wood chips, broken hooves or long hay mixed into the liquid manure will cause plugging problems, particularly at the sprinkler nozzle.

STORAGE CAPACITIES

With no precipitation or evaporation, the "single" pond with 12 x 7.2 m bottom and 2.7 m storage depth holds 590 m³ of liquid manure, enough storage for 40 dairy cows, each producing 0.07 m³/day for 80 days. The double pond with two pumping docks, 24 x 7.2 m bottom and 2.7 m storage depth holds 1 000 m³, enough storage for manure from 85 cows for the same 6-month period.

Be sure to allow extra storage for precipitation (rain or snow), and remember that rain falling within the sloping banks will collect in storage. A table on the plan gives the amount of effective manure storage remaining after making deductions for precipitation during the storage period. Because of the sloping banks, about half of the storage capacity would be used up with 60 to 70 cm of precipitation.

ODORS, SAFETY AND LOCAL REGULATIONS

In dry periods, liquid manure storage develops a surface crust which looks much more solid than it really is. Therefore a perimeter fence is recommended to keep out children and farm livestock.

Open manure storages can be sources of bad odors and flies, making life unpleasant around the farmstead, and especially when manure is disturbed at spreading time. Locate the manure storage as far as possible and downwind from the farm residence and from neighbors. When spreading, cover quickly if possible, by plowing or cultivating.

Obtain approval from local authorities while planning improvements to manure systems and livestock housing.