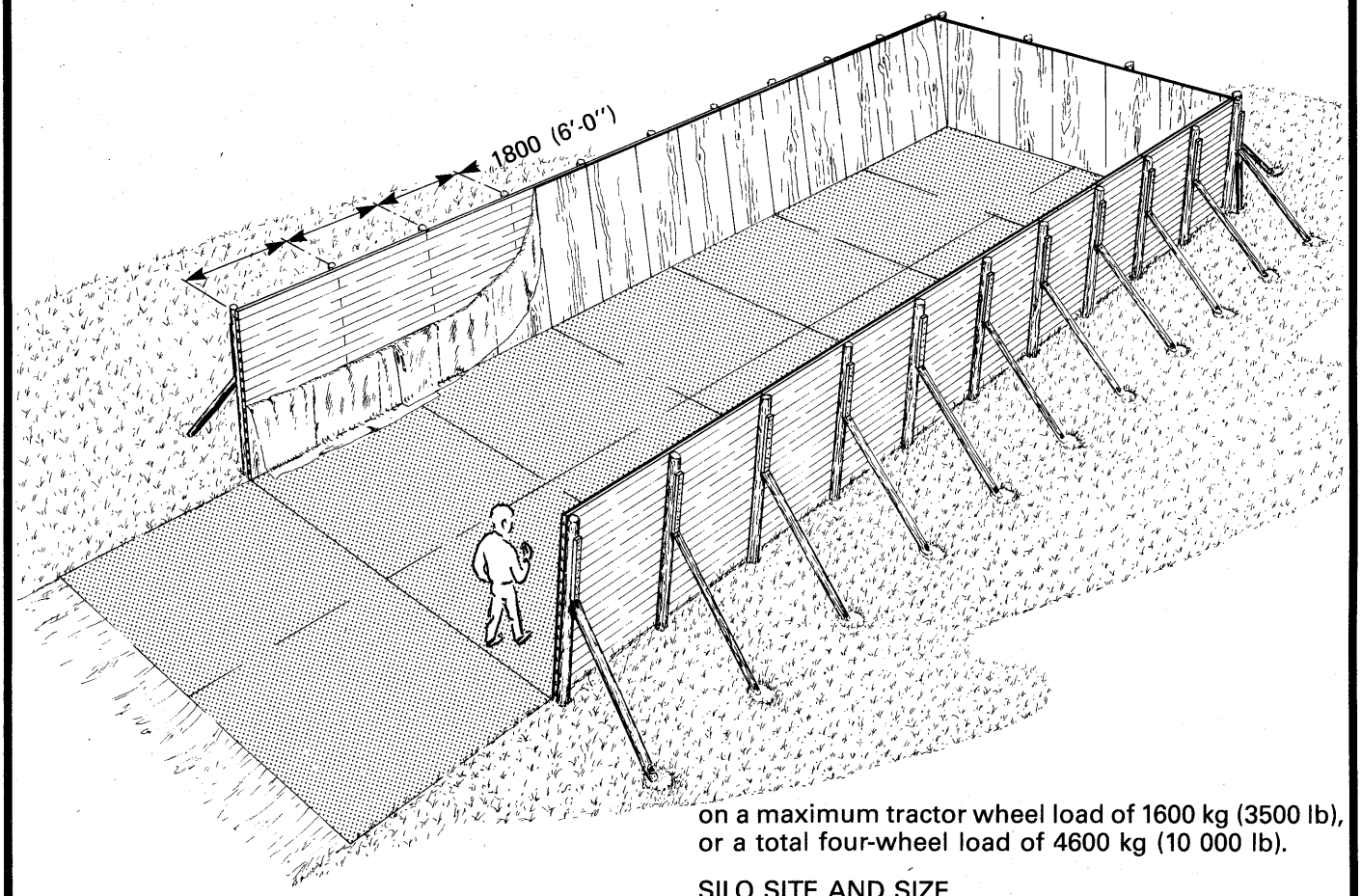
PLAN
M-7432

# POLE-TYPE HORIZONTAL SILO

COMPLETE INSTRUCTIONS




**REVISED 86:04**

This plan gives information for building a horizontal silo with a concrete floor and pole-and-plank walls 2.4 m (8 ft) high. To resist silage pressures when packing with a tractor, the wall poles are anchored with a concrete backfill in post-holes augered at 1.8 m (6 ft) spacing. Additional brace poles support the upper part of the wall poles. The system is designed to hold silage and compaction pressures published in the Canadian Farm Building Code 1983. These pressures are based on a maximum tractor wheel load of 1600 kg (3500 lb), or a total four-wheel load of 4600 kg (10 000 lb).

## SILO SITE AND SIZE

The silo can be filled to almost 2.4 m (8 ft) deep at the walls. With wide silos, silage can be heaped slightly to shed rainwater. To keep ahead of spoilage, calculate the silo width and length for feeding at least 75 mm (3 in.) per day in winter and 100 mm (4 in.) per day in warm weather. Calculate your silo dimensions and volume needs based on a settled dry-matter density of 224 kg/m$^3$ (14 lb/cu ft) if tractor-packed, or 160 kg/m$^3$ (10 lb/cu ft) if unpacked. Typical wet densities will be about three times these values (assuming 67% moisture).

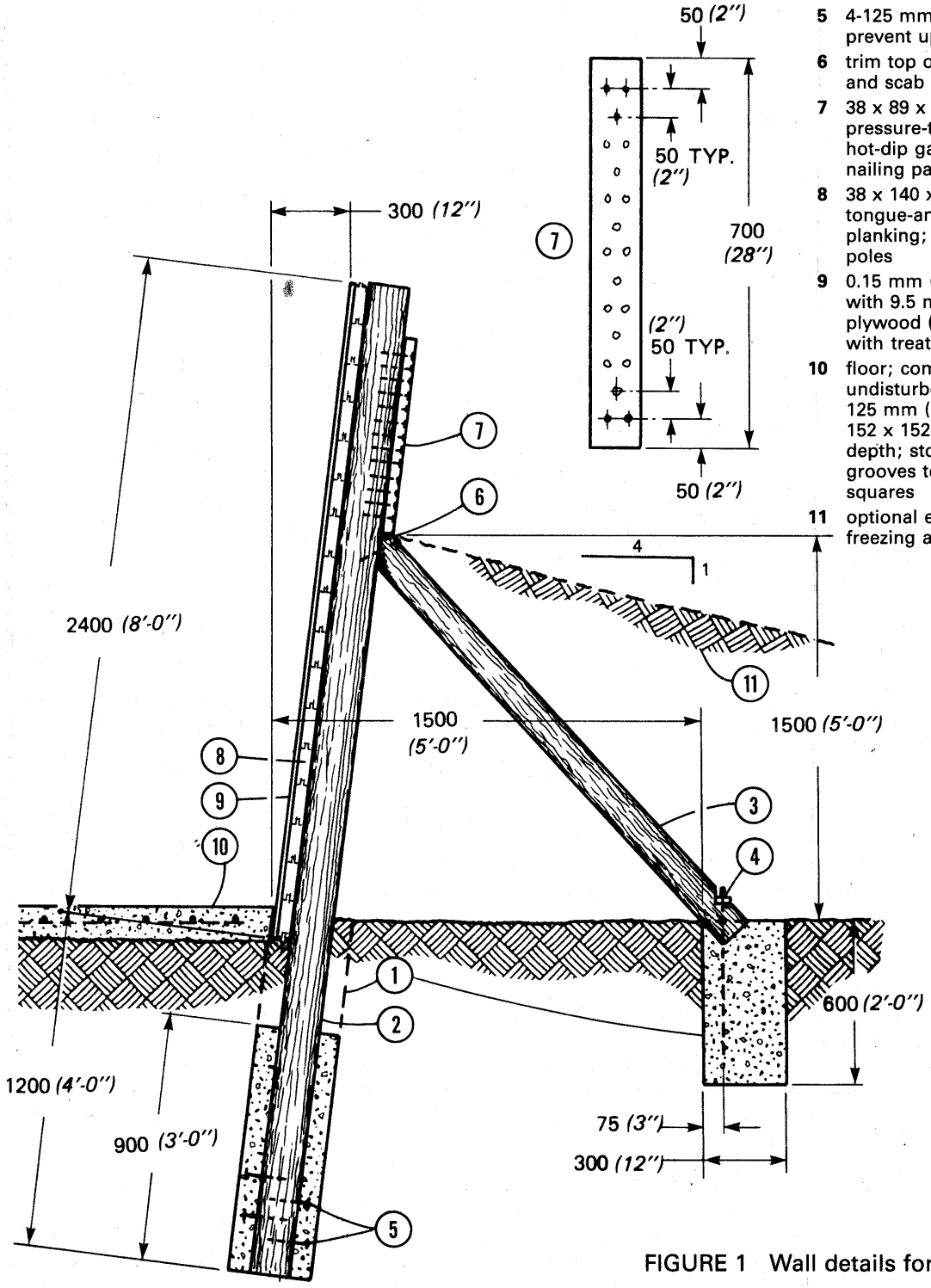
CANADA PLAN SERVICE

The Canada Plan Service prepares detailed plans showing how to construct modern farm buildings, livestock housing systems, storages and equipment for Canadian Agriculture.

**This leaflet gives the details for a farm building component or piece of farmstead equipment. To obtain another copy of this leaflet, contact your local provincial agricultural engineer or extension advisor.**

## POLE-TYPE HORIZONTAL SILO

You may take silage from one or both ends, although the more common arrangement is to face the feeding end south and to close the north end. To avoid trapping rainwater and silage juices at the feeding face of the silage, slope the floor 1-2% toward the open end. If silage juice finds its way into streams or ponds, it will kill fish and other marine life. Therefore it is best drained to a liquid manure storage and spread onto cropland together with the manure.




1 holes made with 300 mm (12 in.) posthole auger

2 CCA pressure-treated poles 3600 mm (12 ft) long at 1800 mm (6 ft) oc, Red pine (no. 2 or better); 150 x 150 mm (6 x 6 in.) rough-sawn square, or 150 mm (6 in.) top diameter round poles

3 CCA pressure-treated brace poles, 125 mm (5 in.) diameter or 150 x 100 mm (6 x 4 in.) rough-sawn rectangular

4 notch and drill brace pole for ⅝ in. x 600 mm (24 in.) threaded rod; re-treat exposed wood with preservative; place pole and threaded rod in post hole; pour concrete; tighten nut and washer after concrete cures

5 4-125 mm (5 in.) spikes in base of pole to prevent uplift; pour concrete backfill

6 trim top of brace to fit true at pole (2) and scab (7) (do not notch main pole)

7 38 x 89 x 700 mm (2 x 4, 28 in. long) pressure-treated scab; 20-125 mm (5 in.) hot-dip galvanized common nails (see nailing pattern)

8 38 x 140 x 3600 mm (2 x 6, 12 ft long) tongue-and-groove CCA pressure-treated planking; joints staggered at alternate poles

9 0.15 mm (6-mil) polyethylene seal covered with 9.5 mm (⅜ in.) Douglas fir sheathing plywood (to seal and prevent feed contact with treated wood)

10 floor; compacted gravel fill on smoothed undisturbed subsoil; 125 mm (5 in.) concrete with weldmesh 152 x 152 MW18.7 x MW18.7 at center of depth; stop weldmesh at crack control grooves tooled or sawn at 6 m (20 ft) squares

11 optional earth backfill to prevent silage freezing and improve maintenance of site

FIGURE 1 Wall details for a pole-type horizontal silo

## PRESSURE-TREATED WOOD

A temporary silo can be made with untreated wood, but it would be quite unsafe to use after only 4-5 years — a rotted pole could suddenly break when the packing tractor is driven close to the top of the wall. Wood poles and planking pressure-treated with chromated copper arsenate (CCA) or ammoniacal copper arsenate (ACA) will cost more but last 25 years or more, even in the ground. See plan M-9401, Wood Preservatives, for more information. Be sure to use hot-dip galvanized nails and other fasteners, especially with treated wood.

## SEALING THE SILAGE

CCA and ACA are the safest and cleanest wood preservatives available but there is still some risk of feed contamination if silage is placed in direct contact with treated planking. The safest procedure is to line the treated plank walls with 0.15 mm (6-mil) black polyethylene plastic, covered with 7.5 or 9.5 mm (5/16 or 3/8 in.) Douglas fir exterior sheathing plywood fastened in place with hot-dip galvanized nails. Douglas fir is naturally more rot-resistant than other common plywoods such as spruce or poplar. This covering also makes silo walls essentially airtight, improving silage preservation.

An alternative method of preventing contact with treated wood is shown in Figure 2. At each filling, cover the walls inside with plastic at least 6 m (20 ft) wide, and lay the excess plastic out over the top of the walls. After filling, pull the free edge of the plastic up over the top perimeter of the silage pile. Overlay the silage top and the perimeter sheet with another cover sheet and secure all tightly in place with ballast, such as old tires, to keep wind from whipping or billowing the plastic. A complete covering layer of old baled hay or straw used as ballast has the added advantage of reducing silage freezing. Another benefit of installing the plastic seal in this way is that rainwater drains off through the plank walls, instead of penetrating the silage and spoiling it along the edge.

## BUILDING THE WALLS

Figure 1 gives dimensions and specifications for the wall structure. Do not change the design without seeking engineering advice. The dimensions given allow treated wood poles to handle the most critical packing pressures. A 300 mm (12 in.) posthole auger is required. Before setting the main poles (2), drive four spikes (5) into the butt of each pole. Leave the spike heads protruding about 25 mm (1 in.) to prevent uplift. Align the poles, tamp in the concrete backfill, but do not fill with concrete to the top of the holes (moisture will expand the poles and crack the concrete). Finish backfilling with earth (or better, gravel) tamped around the poles.

Previous designs showed the brace pole (3) also set deep in the ground, requiring a trench that could not be made with the posthole auger. This new design uses a concrete footing poured in a vertical posthole. Drill the posthole, set the brace (3) and threaded anchor rod (4) in place, then pour the footing. Tighten the anchor nut and washer after the concrete has set.

Note too that the main poles are not notched to fit the brace poles; instead, trim the end of the brace poles using two cuts with a chain saw to fit snugly under a fitted scab (7) nailed to the main pole.

## SITE MAINTENANCE

With the brace poles left exposed, weed cutting around the silo is a tedious chore that is not likely to be done. Earth backfill (11), seeded to grass, is recommended to cover the braces. This has the added advantage of reducing frost penetration into the silage and the pole supports.

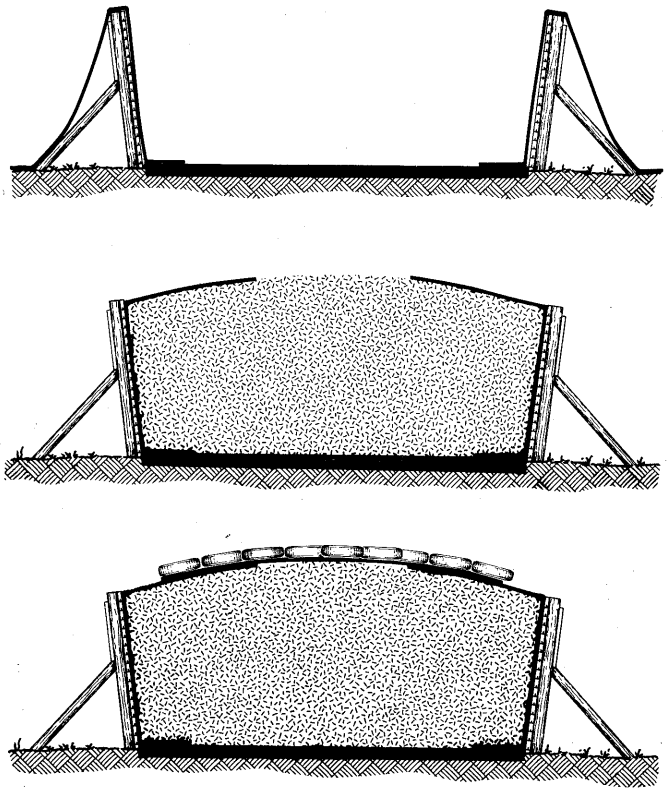


FIGURE 2 Using plastic film to seal the silage and to prevent silage from contacting treated wood