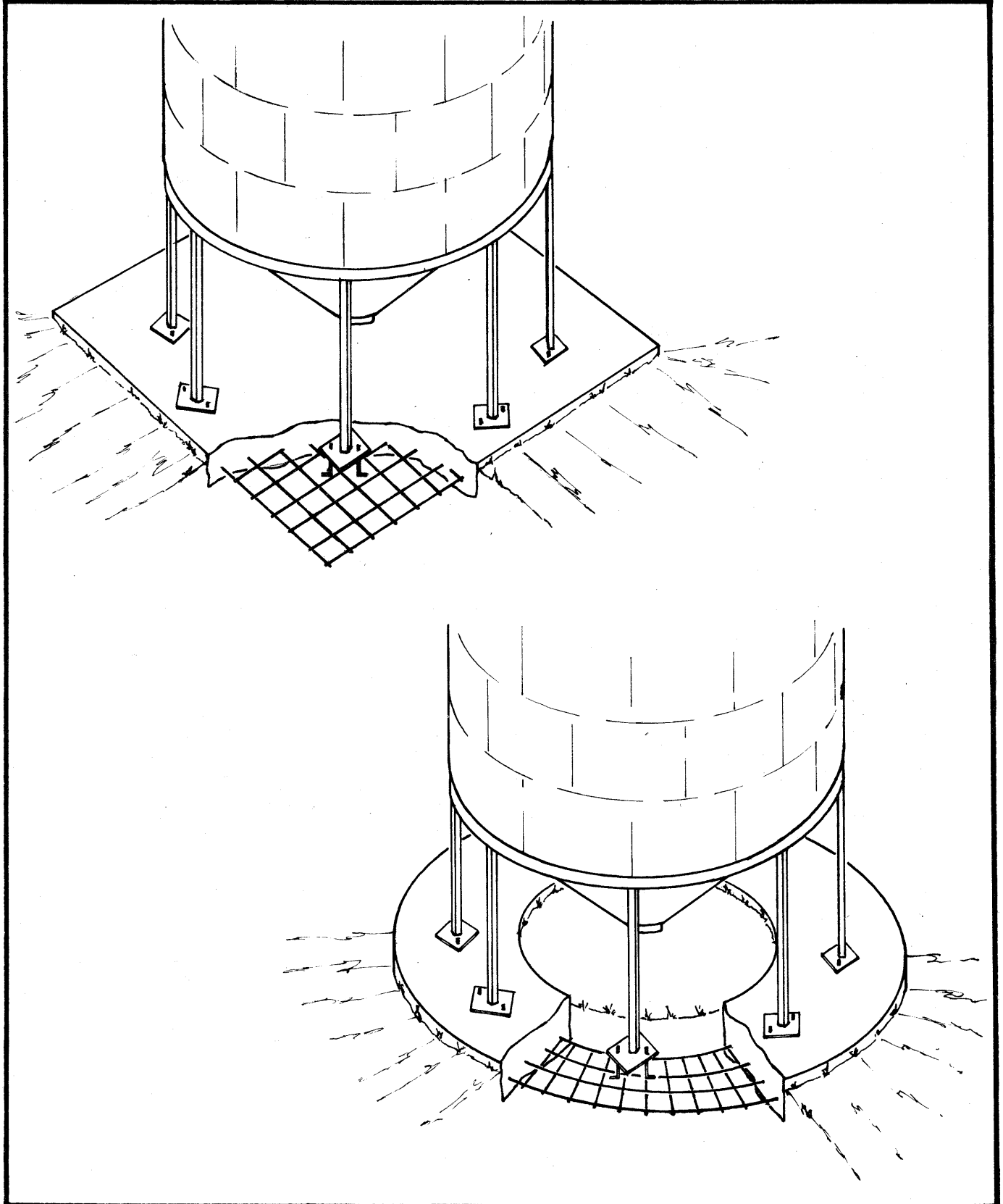


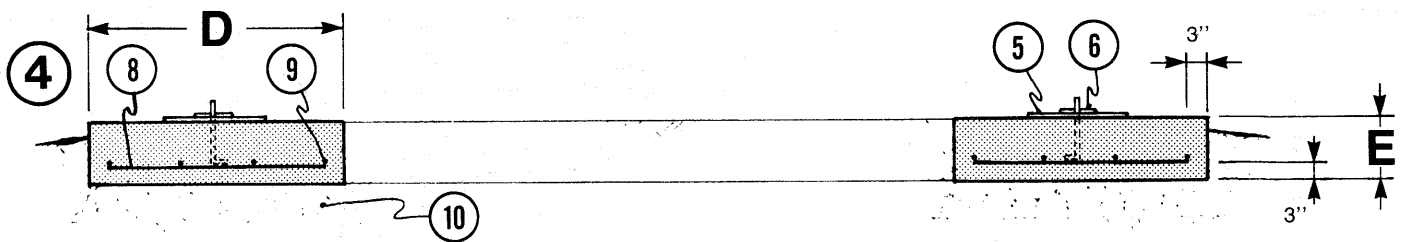
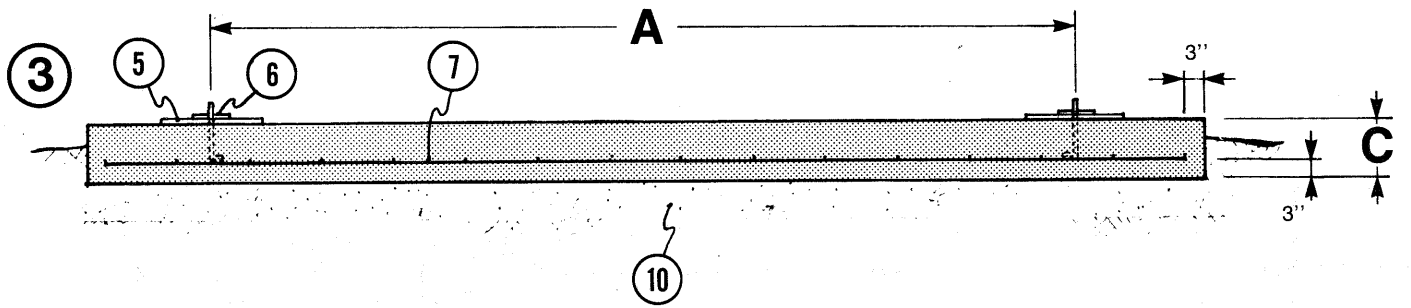
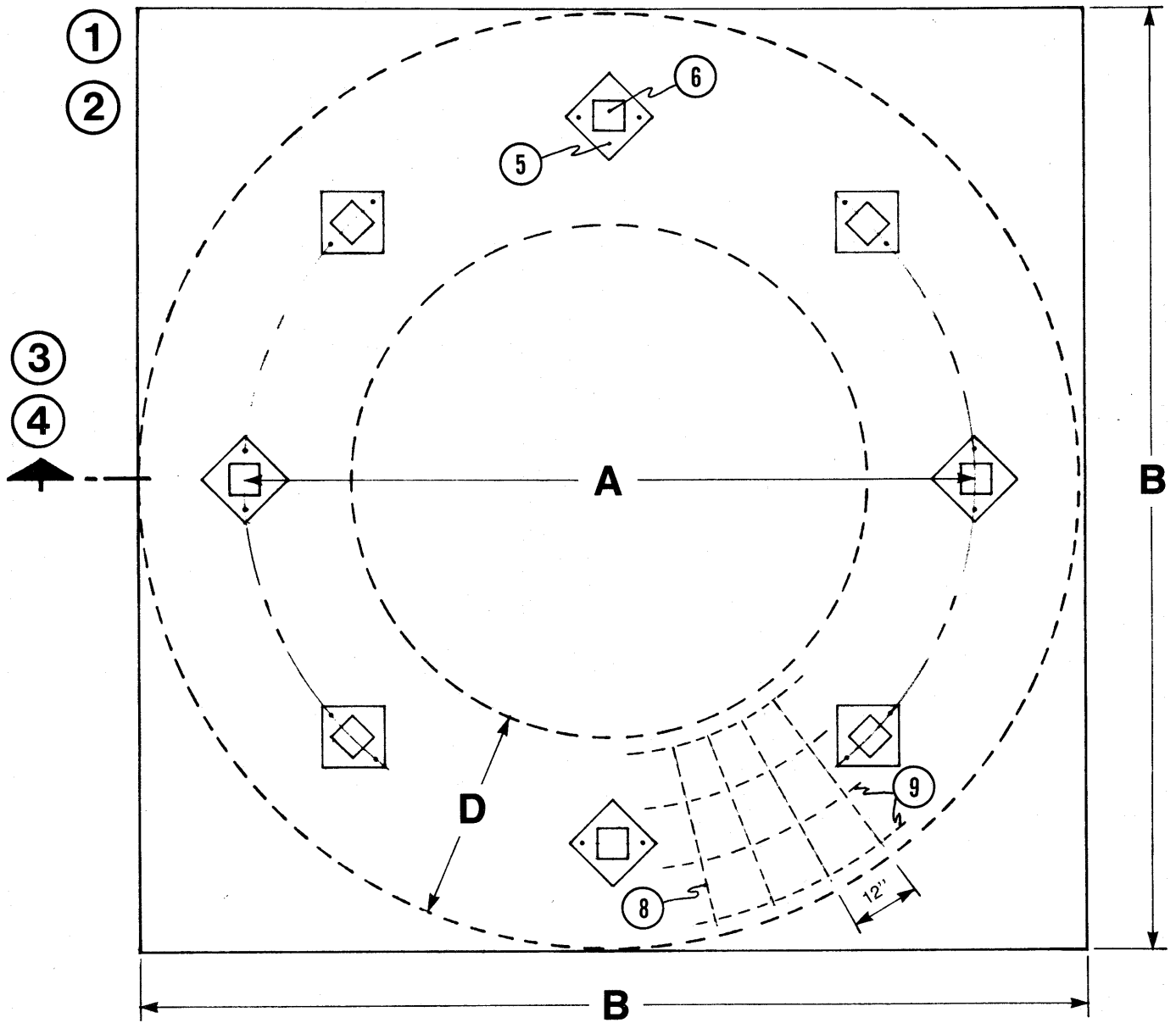


Saskatchewan
Agriculture
Family Farm
Improvement Branch

Leaflet Plan S-791

Concrete Footings for Steel Hopper Bottom Bins





1. Plan view of slab footing (solid lines) - see Table 1 for dimensions
2. Plan view of ring footing (dotted lines) - see Table 2 for dimensions
3. Section thru slab footing
4. Section thru ring footing
5. 12" x 12" x 1/2" thick steel plate c/w 2 - 5/8" x 10" anchor bolts embedded in concrete
6. 6" x 6" x 1/4" thick steel plate welded to bottom of bin leg and welded to ⑤
7. rebar both ways - see Table 1
8. rebar across ring footing; 12" o.c. at outside of footing
9. rebar @ 12" o.c. bent to curvature of ring footing
10. 6" well compacted gravel

Notes:

- footings are designed for a minimum of 6 legs per bin
- use 3000 psi (20 MPa) concrete minimum
- design soil strength for slab footing is 1000 lb./ft.² (silt or loam)
- design soil strength for slab ring footing is 2000 lb./ft.² (soft clay or sandy loam)
- if diameter "A" at center of legs falls between values on tables, use design for next higher diameter
- footing designs are based on storing grain (wheat) at a maximum density of 48 lb./ft.³
- other anchor systems may be substituted for anchor bolts - consult manufacturer's technical literature for equivalent strength anchors

Table 1. Sizing for Slab Footing

Diameter Thru Center of Legs "A"	Maximum Bin Wall Height	Maximum Weight	Maximum Capacity	Width "B"	Depth "C"	Rebar Spacing (both ways)	Rebar Size	Volume of Concrete
(ft.)	(ft.)	(tons)	(bu.)	(ft.)	(in.)	(in.)	(both ways)	(yd. ³)
12	20.0	60	2000	15.5	10	12	10M	6.9
14	15.0	66	2200	17.5	10	12	10M	8.9
	22.5	90	3000	18.0	10	12	15M	9.5
16	17.5	100	3300	20.5	10	12	15M	11.7
	20.0	111	3700	21.0	10	12	15M	12.3
	22.5	126	4200	21.0	10	12	20M	12.3
18	22.5	150	5000	23.5	12	12	20M	14.9
20	15.0	150	5000	25.0	12	12	20M	17.8
	17.5	165	5500	25.5	12	12	20M	18.6
	20.0	180	6000	26.0	12	9	20M	19.3

Table 2. Sizing for Ring Footing

Diameter Thru Center of Legs "A"	Maximum Bin Wall Height	Maximum Weight	Maximum Capacity	Width "D"	Depth "E"	Rebar Size (12" o.c. both ways)	Volume of Concrete
(ft.)	(ft.)	(tons)	(bu.)	(ft.)	(in.)		(yd. ³)
12	20.0	60	2000	3.5	10	15M	4.0
14	15.0	66	2200	3.5	10	15M	4.8
	22.5	90	3000	3.5	10	15M	4.8
16	17.5	100	3300	3.5	10	15M	5.4
	20.0	111	3700	4.5	10	20M	7.0
	22.5	126	4200	4.5	10	20M	7.0
18	22.5	150	5000	4.5	12	25M	9.4
20	15.0	150	5000	4.5	12	25M	10.5
	17.5	165	5500	5.5	12	25M	12.8
	20.0	180	6000	5.5	12	25M	12.8

There are three types of footings for steel hopper bottom bins: slab, ring and pile. Each type is best suited for a specific application.

Slab Footing

A slab footing is easy to form. The steel is easy to place. The low pressure on the soil makes it suitable for almost any soil situation. A large slab provides flexibility in placing the bin on the slab and makes clean-up around the bin very easy. However, there is considerable extra cost for steel and concrete.

Ring Footing

The ring footing usually requires the least material, although it may require somewhat more labor to build than the other two types.

Piles

Generally, piles are best suited for situations where an extremely strong layer of soil, gravel or rock is present at 8 to 14 ft. below the surface. These situations are relatively uncommon and are very site specific so piles cannot be recommended without a soil test performed by a geotechnical soil testing firm.

In Saskatchewan, because of frost and drying action on soils, no benefit can be considered from friction on the top 8 ft. of a pile. For a 12 ft. pile, only 4 ft. of friction effect can be considered. This is relatively minor. What is important is the area of the pile. For a pile with a bottom area of 1.77 ft.² (18 in. diameter) on a dry clay subsoil, the allowable load per pile would be 10,000 lb. For a bin with six legs on six piles, the maximum bin size should not exceed 1000 bu. (60,000 lb.).

Construction

When constructing a slab or ring footing, pay careful attention to limits of soil strength, concrete strength, leg pad size, and number of legs. Note the details of slab or ring footing depth, footing width, rebar spacing and number and size of rebar as provided in the tables. It is important that the topsoil be removed to firm subsoil and compacted gravel be placed to bring the level up to the footing base.