PNEG-318

CONCRETE FOUNDATION
RECOMMENDATIONS
FOR GSI GRAIN BINS

"FARM-COM" SERIES BINS
4.00" ("W") SERIES FARM BINS
2.66" ("N") SERIES FARM BINS
INSIDE STIFFENED COMMERCIAL TANKS
OUTSIDE STIFFENED COMMERCIAL TANKS
COMMERCIAL HOPPER TANKS

REVISED: 8/18/2003

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of the GSI
Group, INC.

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ATTENTION
READ BEFORE USING THIS MANUAL

All instructions shall be construed as recommendations only. Because the actual installation may vary according to local conditions, The GSI Group, Inc. assumes no liability for the results arising from the use of such recommendations.

Always make sure to use the correct tables and charts for the bin and soil conditions that you have.

Determine the following before using this manual:

-Bin Style
- Farm-Com series
- W-Series Farm Bin (4.00” Corrugation)
- N-Series Farm Bin (2.66” Corrugation)
- Inside Stiffened Commercial Tanks
- Outside Stiffened Commercial Tanks
- Commercial Hopper Tanks

-Foundation Style
- Floating Monolithic Pad
- Frost Free Pad
- Inverted “T” Foundation

-In Foundation Aeration Systems
- Tunnel Sizing and Forming
- Transition Opening Requirements

If a foundation for your bin height is not provided, always use the foundation for the next taller tank.

Note: A “Frost Free” pad does not mean the foundation will not shift or be damaged by freezing and thawing. It is only a term used by GSI to describe that foundation. Always use the inverted “T” foundation for frost susceptible soils.

GSI engineering also has recommendations available for the following foundation options:

Hopper Cones
Tunnels
Seismic Specifications
in Foundation Aeration System

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Reinforcement Bar Properties

Bar Designation Number	Weight Per Foot (lb.)	Standard Nominal Dimensions	
		Diameter in. (mm.)	Cross Sectional Area (sq. in.)
3	0.367	0.375 (9)	0.110
4	0.668	0.500 (13)	0.200
5	1.043	1.625 (16)	0.310
6	1.502	0.750 (19)	0.440
7	2.044	0.875 (22)	0.600
8	2.670	1.000 (25)	0.790

Notes:

-Lap all circumferential bars 35 diameters and stagger all laps in plan 3'0"

-All reinforcement bar estimates do not include end laps.

General Foundation Requirements for G.S.I. Bins

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1. REQUIREMENTS

The following foundation recommendations are a revision to earlier manuals distributed by Grain Systems.

2. SELECTING THE PROPER SITE

The selected site should be level, firm, and free from underlying debris. The bin can be installed satisfactorily on slopes, but as the slope increases, additional labor and materials are required for the foundation. The concrete foundation surface must be level. If some fill is required, it should be watered and tamped thoroughly to prevent uneven settling from the weight of the bin. Naturally, the site must allow convenient access for easy loading and unloading, plus provide additional space for future units. Also consider the positioning of handling equipment, availability of electricity, and the placement of fans, heaters, and gas tanks.

Note: There are changes in foundation dimensions from past publications. These dimensions are critical to the proper installation and function of each foundation.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.

3. SCRIBE THE DIAMETER (figure 1)

Having determined the center of the site, drive a small 2 x 4 in the ground to mark the center point of the foundation. The top of the stake should be the same height as the finished foundation will be. Using one large spike, nail a straight 2 x 4 (approximately 2 ft. longer than the radius of the bin) to the top of the center stake. The swiveling 2 x 4 will act as a compass, enabling you to scribe the correct diameter of your foundation and later locate the anchor and stiffener bolt locations. (Note: Making the 2 x 4 two feet longer than the radius will allow the 2 x 4 to also be used as a leveling device and for pulling concrete).

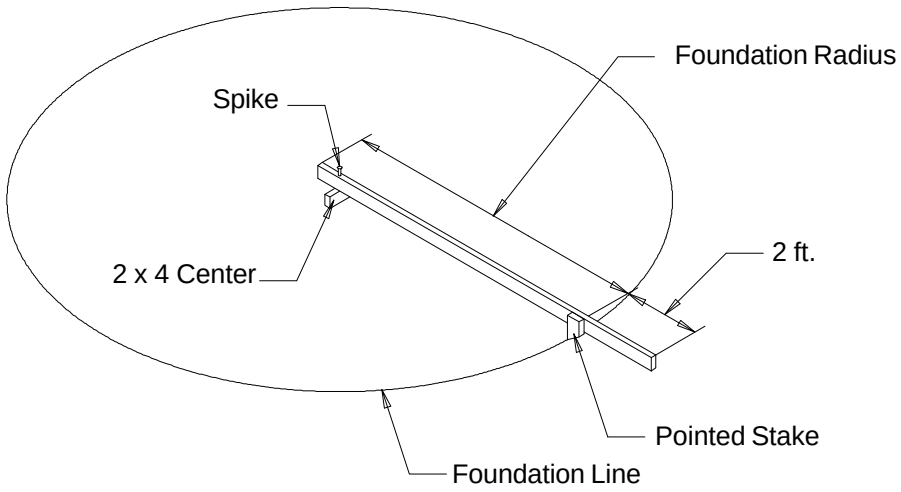

Figure 1: Scribe the Diameter

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4. PREPARE THE FOUNDATION FORMS

Having scribed the diameter of your foundation, proceed by digging the foundation's footing. This consists of a large circular trench dug just inside the foundation line, (Refer to foundation details for necessary information). Once the footing has been dug, you are ready to build the forms. It is most important that your form be rigid enough to hold its shape against the poured concrete. Also, the foundation must be flat. Sloped floors cannot be used in drying bins. A carpenter's level placed atop your compass 2 x 4 will enable you to set the top of the forms to match the top of the center stake (see figure 2). Check the form work with a transit to insure a uniform elevation for the entire foundation. The foundation should be level within 1/8" on non-stiffened tanks and 1/4" on stiffened tanks at bin wall perimeter. Stiffened tanks must be shimmed level.

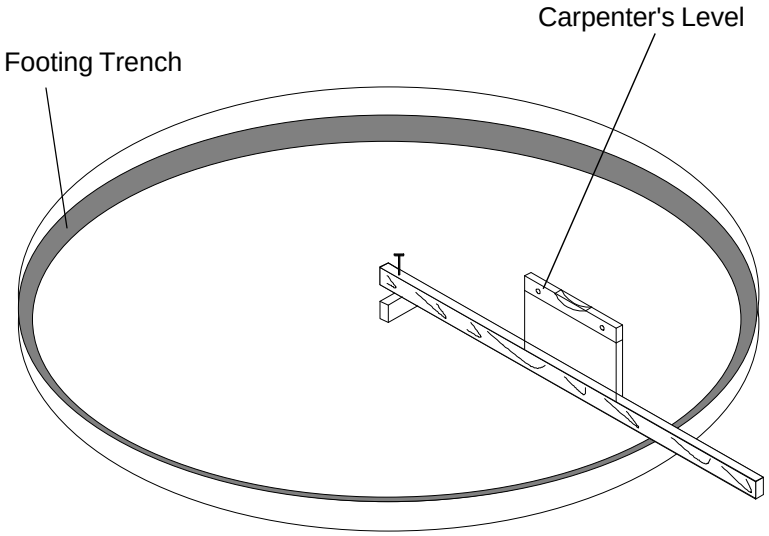


Figure 2: Level the forms

(ALTERNATE FOUNDATION FORMS)

There are two styles of foundation forms commonly used. The first is the circular form shown on the this page. The second style of foundation can be made of 2" x 8" boards set into a square with the corners blocked off to form an octagon (figure 3 shown on next page). This eight sided form will approximate a circle and can also be constructed easily.

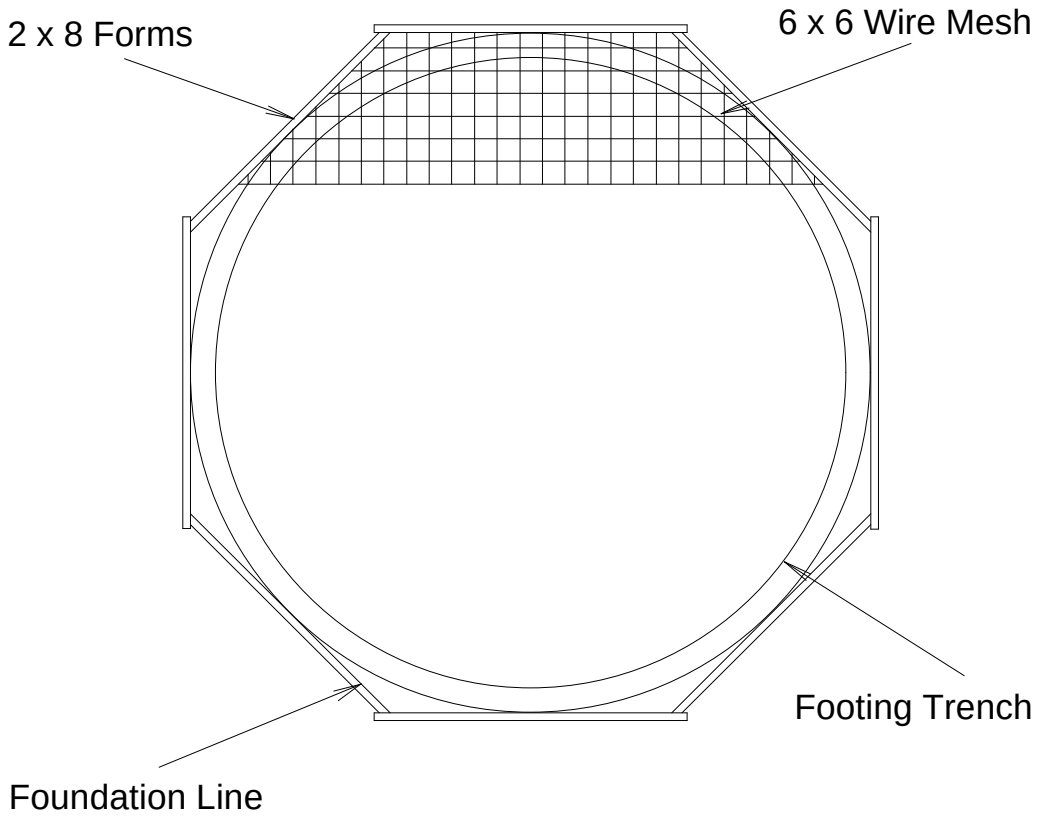


Figure 3: Alternate Foundation Form

5. PLACE THE REINFORCEMENT

Once the forms and trench have been prepared, begin the placement of reinforcement rods at various levels in your foundation's footing. See the appropriate charts and drawings for your bin to determine requirements and positions of the reinforcement. The reinforcement rods offer their greatest strength when lapped properly and connected by wiring or welding. Next, place a minimum of 2" of compacted sand on the inside section of the foundation to provide a good base for the concrete and protect against rodents. The sand should then be covered with 4 mil polyethylene plastic which will act as a moisture barrier. Two layers of 6 x 6 wire mesh should then be added to the entire area of the foundation to complete your preparation of the bin's foundation.

VANE AXIAL FAN PAD

6. PLACEMENT OF THE FAN PAD: TRANSITIONS / FANS / HEATERS ONLY.

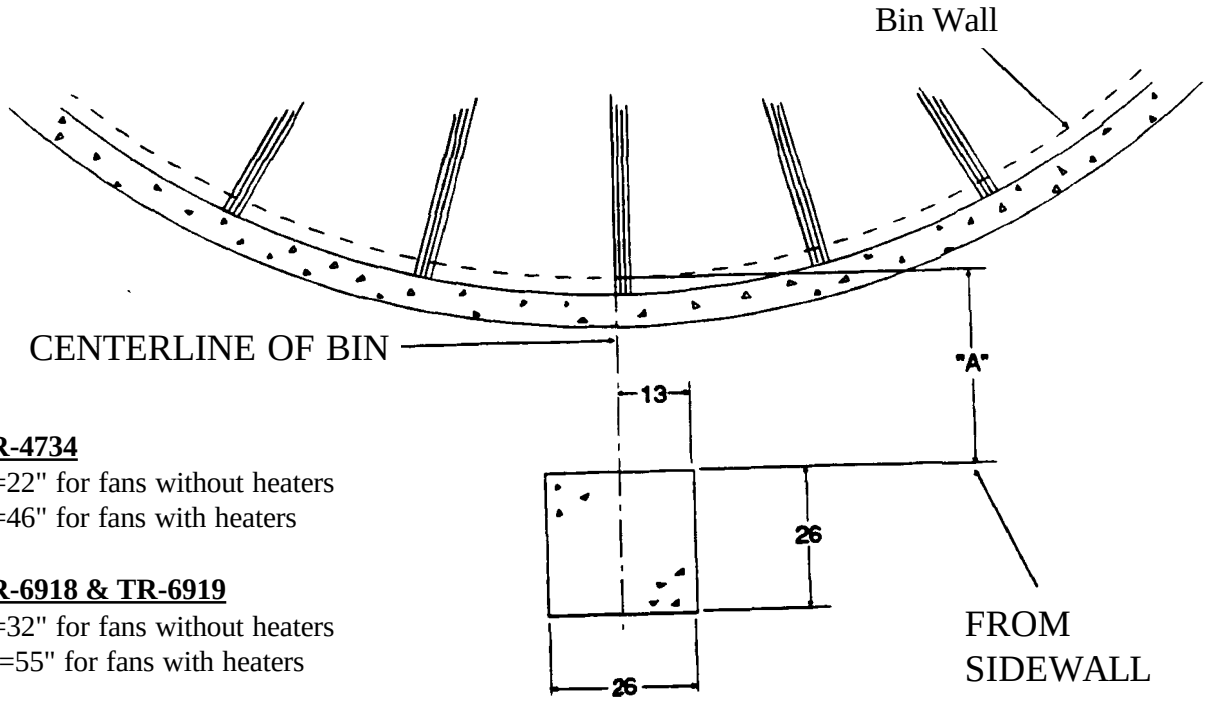
If a fan or fan and heater is to be installed, refer to the following diagram to determine the concrete pad size.

The top of this pad should be level with the top of the bin's foundation.
Recommended pad thickness is 4" minimum.
Front of pad should be perpendicular to bin wall.
Pad for heater not required, but if it is to added, pour the pad to cover both locations.

For fans and transitions used in aeration duct system applications, reference the transition and aeration installation instructions.

IMPORTANT!

FAN PAD AND FAN MUST BE LEVEL AND SMOOTH FOR PROPER OPERATION. VIBRATION PROBLEMS CAN RESULT FROM IMPROPER FAN LEVELING.



TR-4734
A=22" for fans without heaters
A=46" for fans with heaters

TR-6918 & TR-6919
A=32" for fans without heaters
A=55" for fans with heaters

TR-7048
A=48" for fans without heaters
A=72" for fans with heaters

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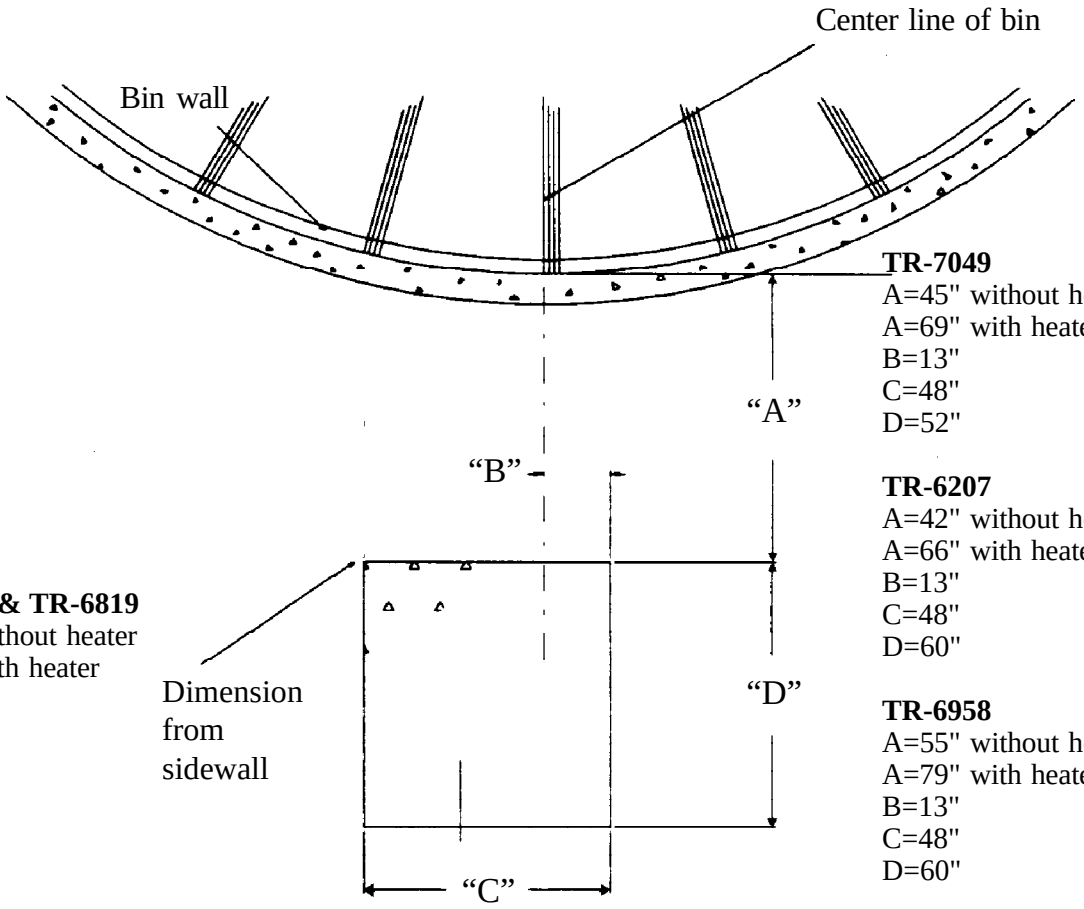
CENTRIFUGAL FAN PAD

Fan pad should be poured 2” below the top of bin foundation for all centrifugal fans. The pad for the heaters is not required. If a downwind heater is to be installed at a later date, then it would be recommended to pour fan pad 48" wide and 84" long. Fan discharge should be centered on line of bin.

IMPORTANT! FAN PAD AND FAN MUST BE LEVEL AND SMOOTH FOR PROPER OPERATION. VIBRATION PROBLEMS CAN RESULT FROM IMPROPER FAN LEVELING.



TR-4734
A=20"
B=10"
C=40"
D=40"

TR-7048
A=45"
B=10"
C=40"
D=48"

TR-6818 & TR-6819
A=32" without heater
A=56" with heater
B=13"
C=48"
D=52"

TR-7049
A=45" without heater
A=69" with heater
B=13"
C=48"
D=52"

TR-6207
A=42" without heater
A=66" with heater
B=13"
C=48"
D=60"

TR-6958
A=55" without heater
A=79" with heater
B=13"
C=48"
D=60"

TR-6853 (double inlet)
A=54" without heater
A=78" with heater
B=28"
C=100"
D=60"

Note: Front of pad should be perpendicular to bin wall. Recommended thickness for fan pad is 4" minimum. Surface of pad should be 2” below the bin foundation. Pad for heater not required.

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Anchor Bolt Placement

Having poured and leveled the concrete, use the center stake and straight 2 x 4 again to find the bolt circle radius for the outside hold down brackets. Select a starting point and stretch a pre measured chord along the imaginary circle formed by the bolt circle radius. Take into consideration the placement of these bolts so as not to interfere with the positions of bin doors and transitions. (Refer to the charts in the following chapters for necessary radii and chord lengths.) Take your time and work carefully:

ACCURACY IS IMPORTANT!

FOR STIFFENER ANCHOR BOLT LOCATIONS ON COMMERCIAL TANKS, REFER TO THE COMMERCIAL TANK SECTION IN THIS MANUAL OR CALL THE G.S.I. ENGINEERING DEPARTMENT

NOTE: Top edge of slab where the bin wall sets must be held to within 1/8" of level.

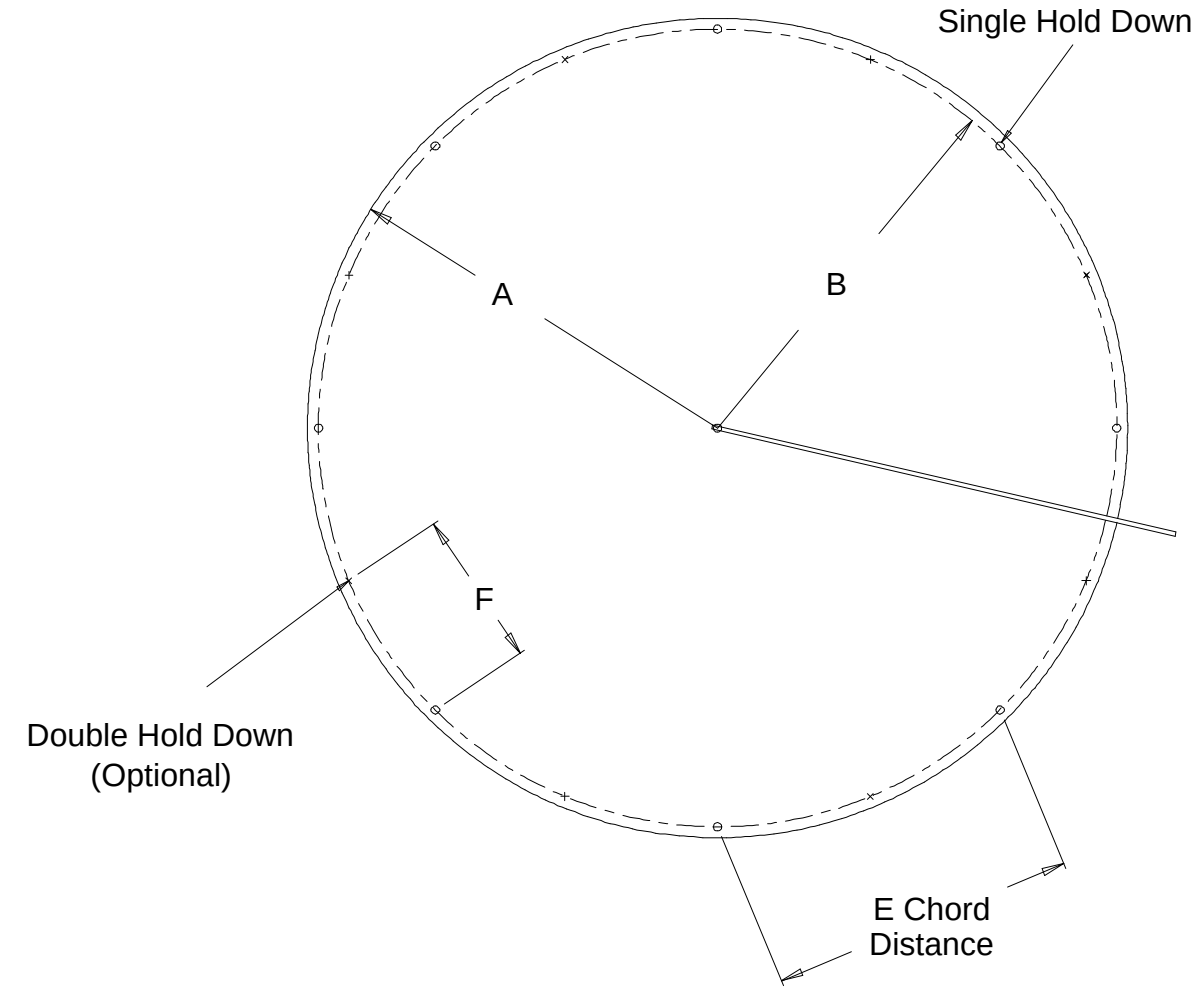

Figure 6: Anchor Bolt Placement

FARM-COM ANCHOR BOLT DETAIL

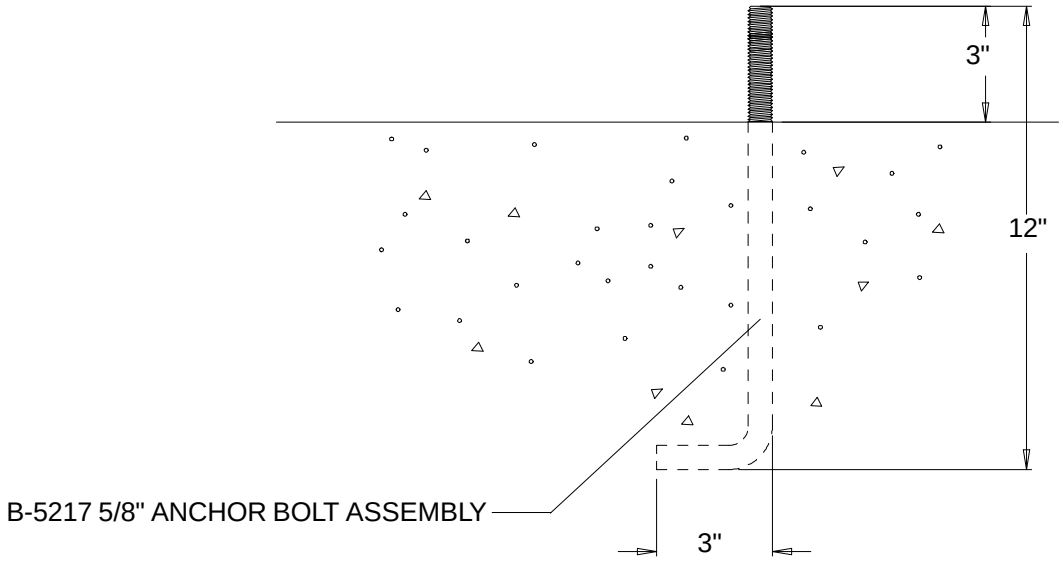

Figure 7

COMMERCIAL TANK ANCHOR BOLT DETAIL

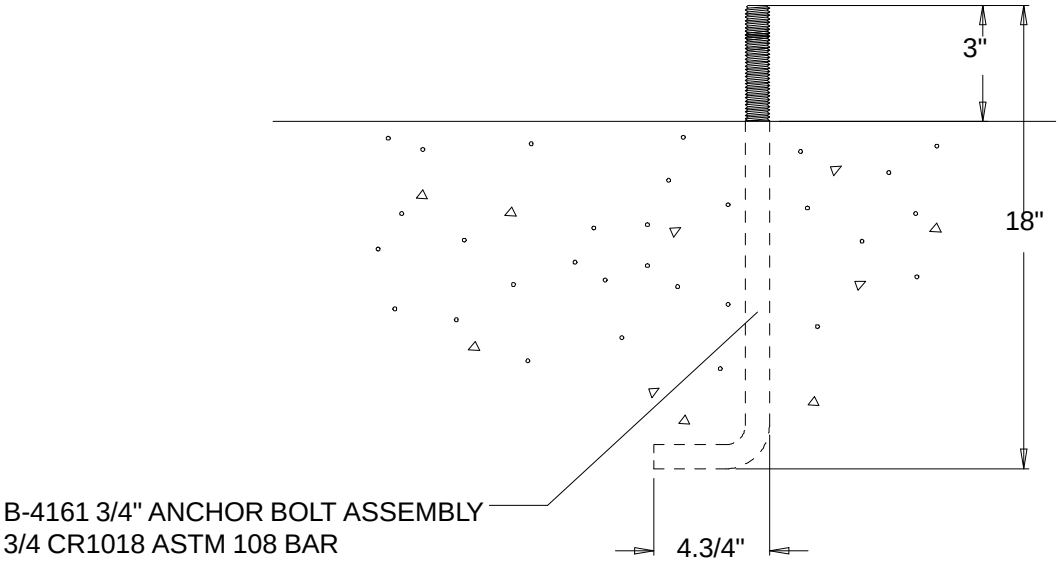

Figure 8

Note: This is a general case anchor bolt detail. Some situations, conditions and storage tanks may have different anchor bolt or anchoring requirements.

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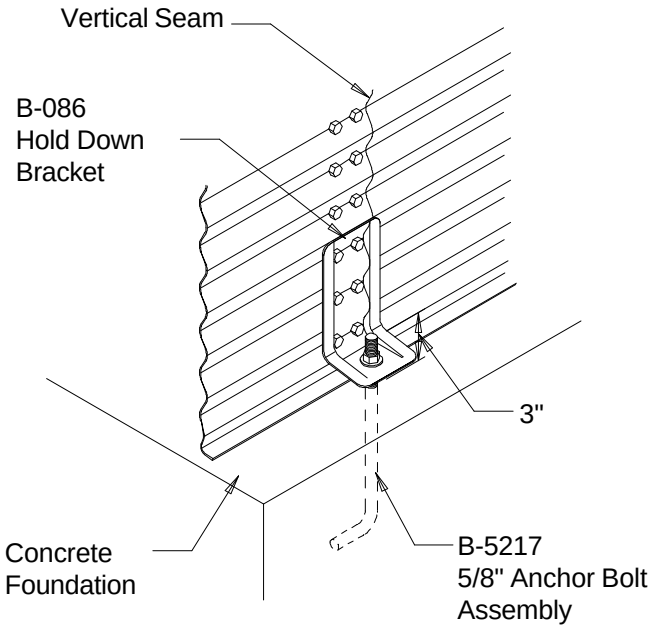
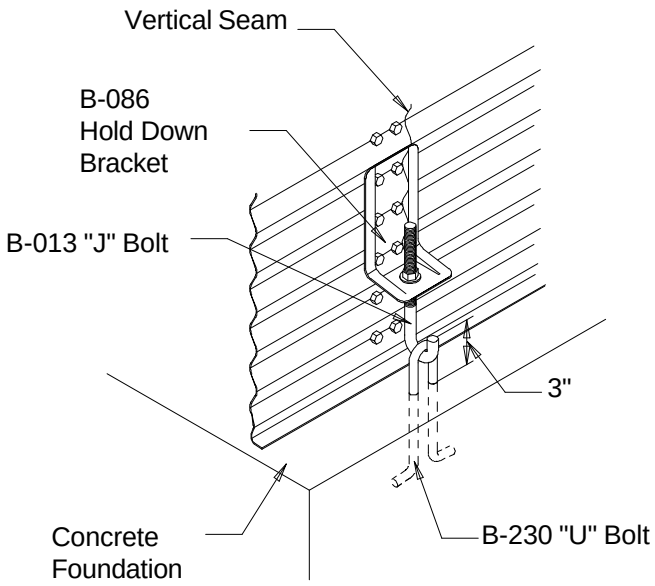
OUTSIDE BIN HOLD DOWN DETAILS (UNSTIFFENED 2.66" CORRUGATION)



Single Anchor Bolt

Figure 9



"U" BOLT/"J" BOLT Combination

Figure 10

Outside bin hold downs should be used on all non-stiffened GSI bins. When anchoring the bin, be sure the vertical seams of the bin align with the U-Bolts in the foundation. They may be anchored to the foundation using either the U-Bolt and J-Bolt combination or the single anchor bolt, except on 42' diameter and larger bins.

NOTE: All non-stiffened 42' and larger bins should use single anchor bolts, not the U-Bolt /J-Bolt combination. (Double U-Bolt / J-Bolt may be used on non-stiffened 42' and larger bins as an option.)

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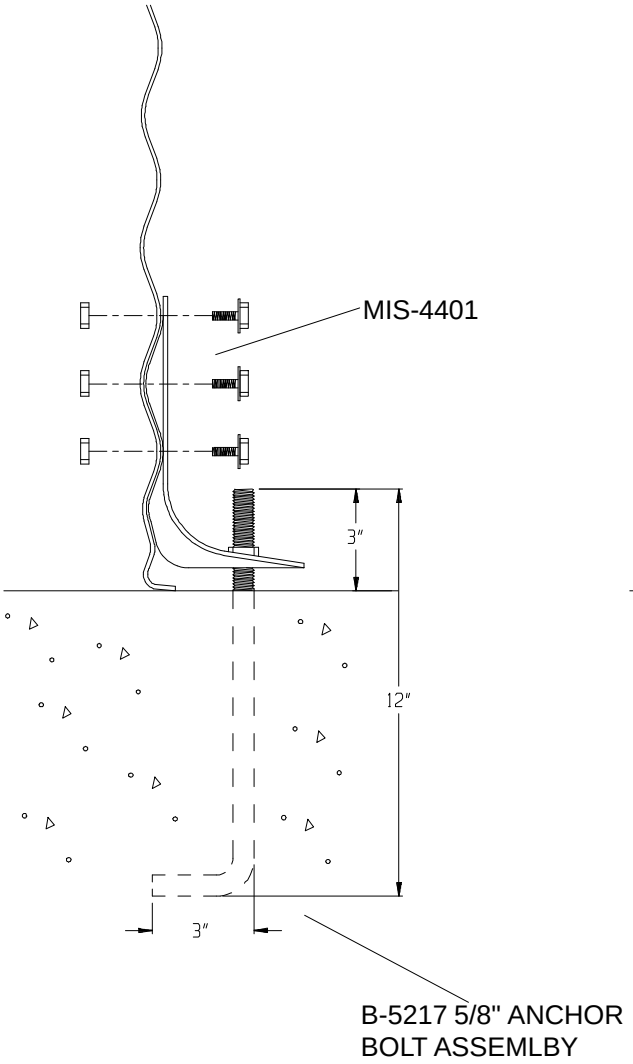
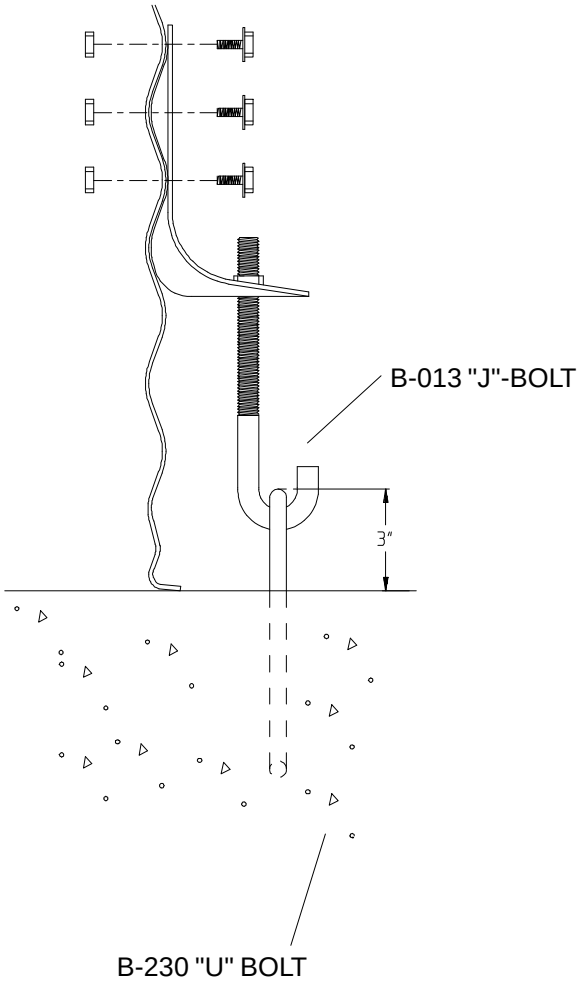
OUTSIDE BIN HOLD DOWN DETAILS
(UNSTIFFENED 4.00" CORRUGATION)



SINGLE ANCHOR BOLT

Figure 11



"U" BOLT / "J"-BOLT COMBINATION

Figure 12

Outside bin hold downs should be used on all non-stiffened GSI bins. When anchoring the bin, be sure the vertical seams of the bin align with the U-Bolts in the foundation. They may be anchored to the foundation using either the U-Bolt and J-Bolt combination or the single anchor bolt, except on 42' diameter and larger bins.

NOTE: All non-stiffened 42' and larger bins should use single anchor bolts, not the U-Bolt / J-Bolt combination. (Double U-Bolt / J-Bolt may be used on non-stiffened 42' and larger bins as an option.)

Floating Monolithic Pad Recommendations For "FARM-COM" [FCDL & FCRL] Series Bins

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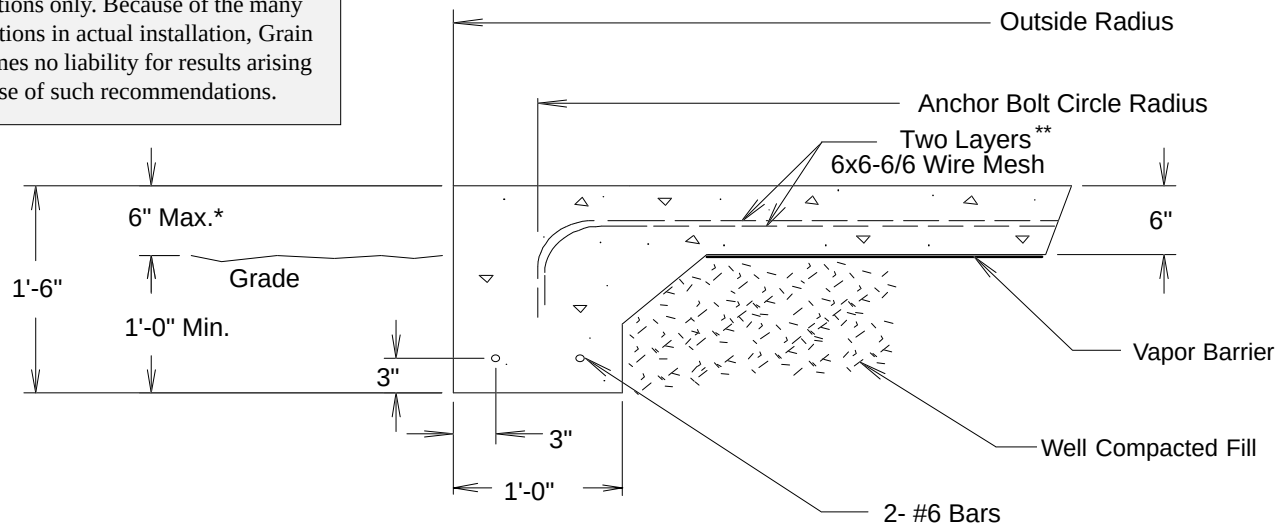
FLOATING MONOLITHIC PAD
FOR
G.S.I. FARM-COM BINS UP TO 5 RINGS

Monolithic Pad Notes:

1. The Foundation design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



Contact GSI Engineering for heights greater than 6".

****The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18" c/c each way***

Bin Dia.	Outside Radius	Single Bolt Radius	Anchor Chord	No. of Anchors	Total Cu. Yds. Concrete	Sq. Ft. Mesh	Length #6 Bar	Optional #4 Grid (Ft.)
12'	6'-9"	6'-3.1/4"	4'-9.9/16"	8	4.5	300	100	200
15'	8'-3"	7'-9.1/8"	4'-9.9/16"	10	6	500	100	300
18'	9'-9"	9'-3.1/16"	4'-9.1/2"	12	8	700	200	400
21'	11'-3"	10'-8.15/16"	4'-9.3/8"	14	10	900	200	600
24'	12'-9"	12'-2.7/8"	4'-9.5/16"	16	12.5	1100	200	700
27'	14'-3"	13'-8.3/4"	4'-9.1/4"	18	15	1200	200	900
30'	15'-9"	15'-2.11/16"	4'-9.1/8"	20	18	1600	200	1100
33'	17'-3"	16'-8.9/16"	4'-9.1/16"	22	21.5	1800	300	1300
36'	18'-9"	18'-2.1/2"	4'-9.1/16"	24	25	2300	300	1500

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Frost Free Pad Recommendations for "FARM-COM" [FCDL & FCRL] Series Bin

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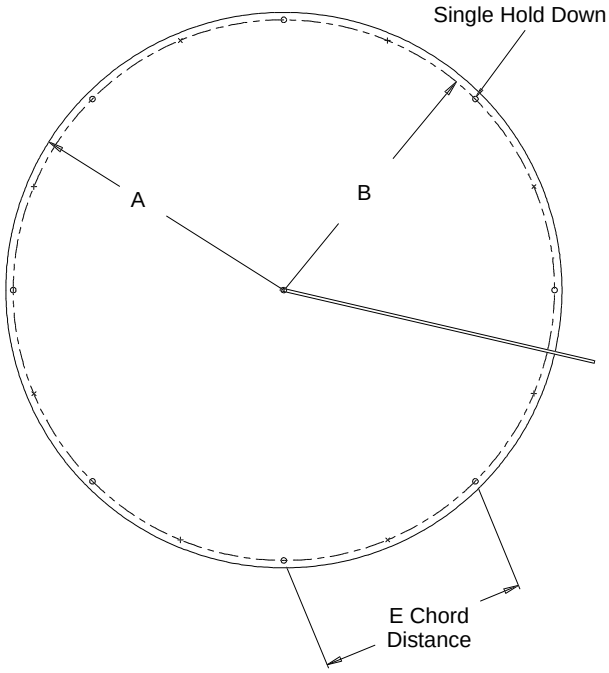
Anchor Bolt Placement

Having poured and leveled the concrete, use the center stake and straight 2 x 4 again to find the bolt circle radius for the outside hold down brackets. Select a starting point and stretch a premeasured chord along the imaginary circle formed by the bolt circle radius. Take into consideration the placement of these bolts so as not to interfere with the positions of bin doors and transitions. (Refer to the following chart for necessary radii and chord lengths.) Take your time and work carefully since accuracy is important.

<u>NOTE:</u> Top edge of slab where the bin wall sets must be held to within 1/8" of level.

Bin Dia	"B" Bolt Circle Radius	No. of Anchors	"E" Chord Distance
12'	6'-3.1/4"	8	4'-9.9/16"
15'	7'-9.1/8"	10	4'-9.9/16"
18'	9'-3.1/16"	12	4'-9.1/2"
21'	10'-8.15/16	14	4'-9.3/8"
24'	12'-2.7/8"	16	4'-9.5/16"
27'	13'-8.3/4"	18	4'-9.1/4"
30'	15'-2.11/16"	20	4'-9.1/8"
33'	16'-8.9/16"	22	4'-9.1/16"
36'	18'-2.1/2"	24	4'-9.1/16"
42'	21'-2.5/16"	28	4'-8.15/16"
48'	24'-2.1/8"	32	4'-8.7/8"
54'	27'-1.15/16"	36	4'-8.13/16"
60'	30'-1.3/4"	40	4'-8.3/4"



FOR STIFFENER ANCHOR BOLT LOCATIONS ON COMMERCIAL TANKS, REFER TO THE COMMERCIAL TANK SECTION FOUND LATER IN THIS MANUAL OR CALL THE G.S.I. ENGINEERING DEPARTMENT.

Frost Free Pad Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

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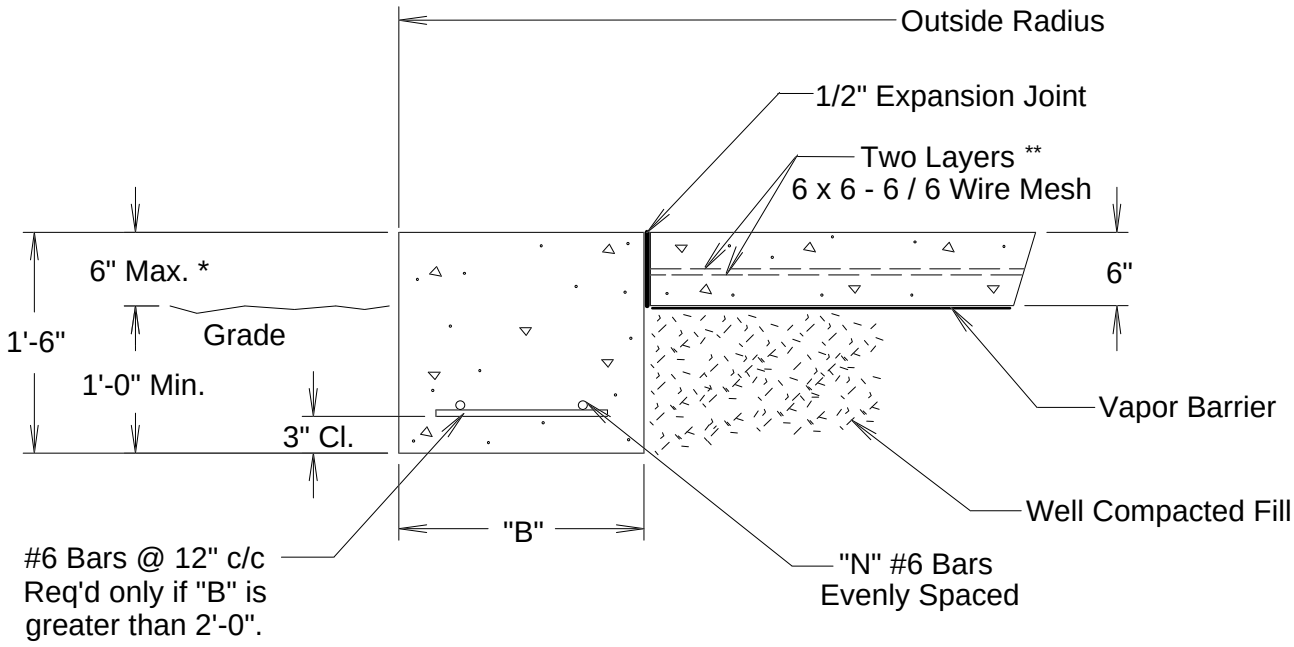

* Contact GSI Engineering for heights greater than 6".
**The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18" c/c each way.

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Frost Free Pad
Farm-Com

Diameter of Bin: 12'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 0 in.	2	6 ft. 9 in.	300	200	100	5
7,8	1 ft. 7 in.	2	6 ft. 9 in.	300	200	100	5
9,10	2 ft. 0 in.	2	7 ft. 0 in.	300	200	200	6
11,12	2 ft. 10 in.	3	7 ft. 6 in.	300	200	300	8

Diameter of Bin: 15'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 0 in.	2	8 ft. 3 in.	400	300	100	6
7,8	1 ft. 7 in.	2	8 ft. 3 in.	400	300	100	7
9,10	2 ft. 0 in.	2	8 ft. 7 in.	400	300	200	8
11,12	2 ft. 0 in.	2	8 ft. 7 in.	400	300	200	8

Diameter of Bin: 18'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 0 in.	2	9 ft. 9 in.	500	400	200	8
7,8	1 ft. 7 in.	2	9 ft. 9 in.	500	400	200	9
9,10	2 ft. 0 in.	2	10 ft. 1 in.	500	400	200	11
11,12	2 ft. 6 in.	3	10 ft. 6 in.	500	400	300	12

Diameter of Bin: 21'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 1 in.	2	11 ft. 3 in.	700	500	200	11
7,8	1 ft. 7 in.	2	11 ft. 3 in.	700	500	200	12
9,10	2 ft. 0 in.	2	11 ft. 6 in.	700	500	300	13
11,12	2 ft. 6 in.	3	11 ft. 9 in.	700	500	400	15

Diameter of Bin: 24'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 1 in.	2	12 ft. 9 in.	900	600	200	13
7,8	1 ft. 9 in.	2	12 ft. 9 in.	900	600	200	15
9,10	2 ft. 6 in.	3	13 ft. 2 in.	900	600	400	18
11,12	2 ft. 9 in.	3	13 ft. 4 in.	900	600	500	18

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Diameter of Bin: 27'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 2 in.	2	14 ft. 3 in.	1100	800	200	16
7,8	1 ft. 10 in.	2	14 ft. 4 in.	1100	800	200	18
9,10	2 ft. 7 in.	3	14 ft. 7 in.	1100	800	500	21

Diameter of Bin: 30'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 2 in.	2	15 ft. 9 in.	1400	900	200	19
7,8	1 ft. 10 in.	2	15 ft. 10 in.	1400	900	200	21
9,10	2 ft. 8 in.	3	16 ft. 1 in.	1400	900	500	25
11,12	3 ft. 8 in.	4	16 ft. 5 in.	1400	900	700	29

Diameter of Bin: 33'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 3 in.	2	17 ft. 3 in.	1700	1100	300	23
7,8	1 ft. 11 in.	2	17 ft. 4 in.	1700	1100	300	25
9,10	2 ft. 9 in.	3	17 ft. 6 in.	1700	1100	600	29
11,12	3 ft. 10 in.	4	18 ft. 0 in.	1700	1100	800	34

Diameter of Bin: 36'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (Ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 3 in.	2	18 ft. 9 in.	2000	1300	300	26
7,8	2 ft. 0 in.	2	18 ft. 11 in.	2000	1300	400	30
9,10	2 ft. 10 in.	3	19 ft. 0 in.	2000	1300	600	33
11,12	3 ft. 11 in.	4	19 ft. 6 in.	2000	1300	900	39
13	4 ft. 10 in.	5	19 ft. 9 in.	2000	1300	1100	43

Diameter of Bin: 42'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 4 in.	2	21 ft. 8 in.	2600	1800	300	34
7,8	2 ft. 1 in.	3	21 ft. 11 in.	2600	1800	700	39
9	3 ft. 1 in.	4	22 ft. 2 in.	2600	1800	900	44
10,11	4 ft. 2 in.	5	22 ft. 7 in.	2600	1800	1200	50
12,13	4 ft. 10 in.	5	22 ft. 11 in.	2600	1800	1300	54

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Diameter of Bin: 48'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 5 in.	2	24 ft. 8 in.	3400	2300	400	44
7,8	2 ft. 3 in.	3	24 ft. 11 in.	3400	2300	800	49
9	3 ft. 3 in.	4	25 ft. 2 in.	3400	2300	1100	55
10,11	4 ft. 5 in.	5	25 ft. 8 in.	3400	2300	1400	63
12,13	5 ft. 1 in.	5	25 ft. 11 in.	3400	2300	1500	67

Diameter of Bin: 54'
Corrugation: 4.00"

Ring No.	B	N	Outside Raduis	Sq. ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 5 in.	2	27 ft. 9 in.	4800	3300	400	56
7,8	2 ft. 3 in.	3	28 ft. 1 in.	4800	3300	600	63
9,10	3 ft. 3 in.	4	28 ft. 4 in.	4800	3300	700	69
11,12	4 ft. 5 in.	4	28 ft. 7 in.	4800	3300	1400	75

Diameter of Bin: 60'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. ft. Mesh 6x6 - 6/6	Optional 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 6 in.	2	30 ft. 7 in.	5400	3600	400	65
7,8	2 ft. 10 in.	3	31 ft. 3 in.	5400	3600	1100	77
9,10	3 ft. 8 in.	4	31 ft. 7 in.	5400	3600	1400	82
11,12	4 ft. 7 in.	5	31 ft. 9 in.	5400	3600	1700	91

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Inverted “T” Foundation Recommendations for “Farm-Com” [FCDL & FCRL] Series Bin

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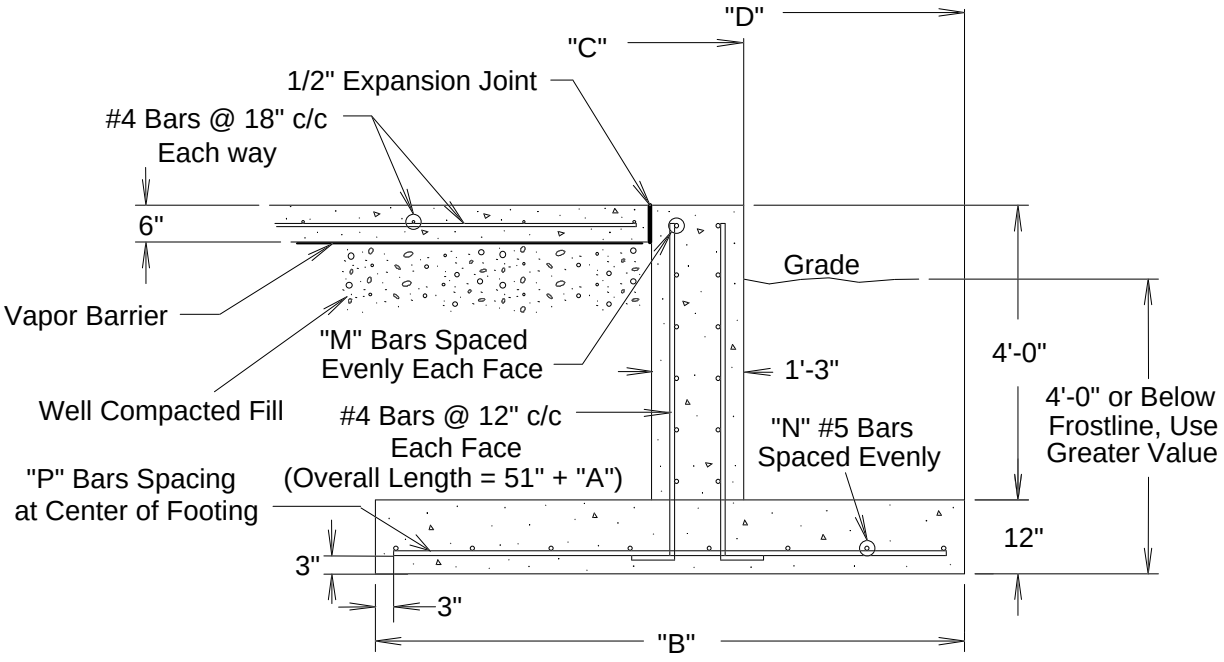
Inverted "T" foundation Notes:

3000 PSF Soil Bearing Capacity

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

ALL INSTRUCTIONS SHALL BE CONSTRUED AS RECOMMENDATIONS ONLY. BECAUSE THE ACTUAL INSTALLATION MAY VARY ACCORDING TO LOCAL CONDITIONS, THE GSI GROUP, INC. ASSUMES NO LIABILITY FOR RESULTS ARISING FROM THE USE OF SUCH RECOMMENDATIONS.



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Inverted "T"
Farm-Com

Diameter of Bin: 18'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-3"	9'-8"	9'-8"	5 - #4's	2 - #5's	# 5 @ 14" c/c	1600	300	18
7,8	1'-7"	9'-8"	9'-10"	5 - #4's	2 - #5's	#5 @ 14" c/c	1600	300	19
9,10	2'-2"	9'-8"	10'-1"	5 - #4's	3 - #5's	#5 @ 14" c/c	1600	300	20
11,12	2'-4"	9'-8"	10'-2"	5 - #4's	3 - #5's	#5 @ 14"c/c	1600	300	21

Diameter of Bin: 21'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-3"	11'-2"	11'-2"	5 - #4's	2 - #5's	# 5 @ 14" c/c	2000	300	22
7,8	1'-8"	11'-2"	11'-4"	5 - #4's	2 - #5's	#5 @ 14" c/c	2000	300	23
9,10	2'-3"	11'-2"	11'-7"	5 - #4's	3 - #5's	#5 @ 14" c/c	2000	400	25
11,12	2'-6"	11'-2"	11'-8"	5 - #4's	3 - #5's	#5 @ 14"c/c	2000	400	27

Diameter of Bin: 24'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-3"	12'-8"	12'-8"	5 - #4's	2 - #5's	# 5 @ 14" c/c	2300	300	26
7,8	1'-9"	12'-8"	13'-1"	5 - #4's	2 - #5's	#5 @ 14" c/c	2300	300	27
9,10	2'-5"	12'-8"	13'-2"	5 - #4's	3 - #5's	#5 @ 14" c/c	2300	500	29
11,12	2'-9"	12'-8"	13'-5"	5 - #4's	3 - #5's	#5 @ 14" c/c	2300	500	31

Diameter of Bin: 27'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-3"	14'-2"	14'-2"	5 - #4's	2 - #5's	# 5 @ 14" c/c	2600	300	31
7,8	1'-10"	14'-2"	14'-5"	5 - #4's	2 - #5's	#5 @ 14" c/c	2600	400	33
9,10	2'-6"	14'-2"	14'-8"	5 - #4's	3 - #5's	#5 @ 14" c/c	2600	500	35
11,12	3'-4"	14'-2"	15'-1"	5 - #4's	4 - #5's	#5 @14" c/c	2600	700	37

Diameter of Bin: 30'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-3"	15'-8"	15'-8"	5 #4's	2 #5's	# 5 @ 14" c/c	3000	300	36
7,8	1'-11"	15'-8"	16'-0"	5 #4's	2 #5's	#5 @ 14" c/c	3000	400	39
9,10	2'-7"	15'-8"	16'-3"	5 #4's	3 #5's	#5 @ 14" c/c	3000	500	42
11,12	3'-6"	15'-8"	16'-10"	5 #4's	4 #5's	#5 @ 14"c/c	3000	700	44
13	3'-11"	15'-8"	17'-0"	5 #4's	4 #5's	#5 @ 14"c/c	3000	700	46

Diameter of Bin: 33'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-4"	17'-1"	17'-1"	5 #4's	2 #5's	# 5 @ 14" c/c	3400	400	40
7,8	1'-11"	17'-1"	17'-4"	5 #4's	2 #5's	#5 @ 14" c/c	3400	500	42
9,10	2'-8"	17'-1"	17'-8"	5 #4's	3 #5's	#5 @ 14" c/c	3400	600	45
11,12	3'-8"	17'-1"	18'-2"	5 #4's	4 #5's	#5 @ 14"c/c	3400	800	48
13	4'-2"	17'-1"	18'-7"	5 #4's	4 #5's	#5 @ 14"c/c	3400	900	51

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Diameter of Bin: 36'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-4"	18'-7"	18'-7"	5 - #4's	2 - #5's	# 5 @ 14" c/c	3800	400	44
7,8	2'-0"	18'-7"	18'-11"	5 - #4's	2 - #5's	#5 @ 14" c/c	3800	500	47
9,10	2'-10"	18'-7"	19'-3"	5 - #4's	3 - #5's	#5 @ 14" c/c	3800	700	50
11,12	3'-9"	18'-7"	19'-8"	5 - #4's	4 - #5's	#5 @14" c/c	3800	1000	55

Diameter of Bin: 42'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-5"	21'-7"	21'-8"	5 - #4's	2 - #5's	# 5 @ 14" c/c	4700	500	56
7,8	2'-2"	21'-7"	22'-0"	5 - #4's	3 - #5's	#5 @ 14" c/c	4700	600	60
9	3'-0"	21'-7"	22'-4"	5 - #4's	3 - #5's	#5 @ 14" c/c	4700	700	64
10,11	4'-0"	21'-7"	22'-9"	5 - #4's	4 - #5's	#5 @ 14" c/c	4700	1000	69

Diameter of Bin: 48'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	1'-6"	24'-7"	24'-8"	5 - #4's	2 - #5's	#5 @ 14" c/c	5600	600	68
7,8	2'-3"	24'-7"	25'-0"	5 - #4's	3 - #5's	#5 @ 14" c/c	5600	800	72
9	3'-2"	24'-7"	25'-5"	6 - #4's	3 - #5's	#5 @ 14" c/c	5800	900	77
10,11	4'-2"	24'-7"	25'-10"	6 - #4's	4 - #5's	#5 @ 14" c/c	5800	1200	84

Diameter of Bin: 54'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	2'-0"	27'-7"	28'-1"	5 #4's	3 #5's	#5 @ 14" c/c	6600	900	85
7, 8	2'-9"	27'-7"	28'-4"	5 #4's	3 #5's	#5 @ 14" c/c	6600	1000	90
9, 10	3'-6"	27'-7"	28'-7"	5 #4's	4 #5's	#5 @ 14" c/c	6600	1200	94

Diameter of Bin: 60'

Ring No.	B	C	D	M	N	P	#4 Bar Ft.	#5 Bar Ft.	Cu. Yds. Concrete
6	2'-0"	30'-9"	31'-3"	5 #4's	3 #5's	#5 @ 14" c/c	7700	900	101
7, 8	2'-10"	30'-9"	31'-6"	5 #4's	3 #5's	#5 @ 14" c/c	7700	1000	106
9, 10	3'-6"	30'-9"	31'-9"	5 #4's	4 #5's	#5 @ 14" c/c	7700	1300	111

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Floating Monolithic Pad Recommendations For 4.00” Corrugation “W” Series, Unstiffened Farm Bins

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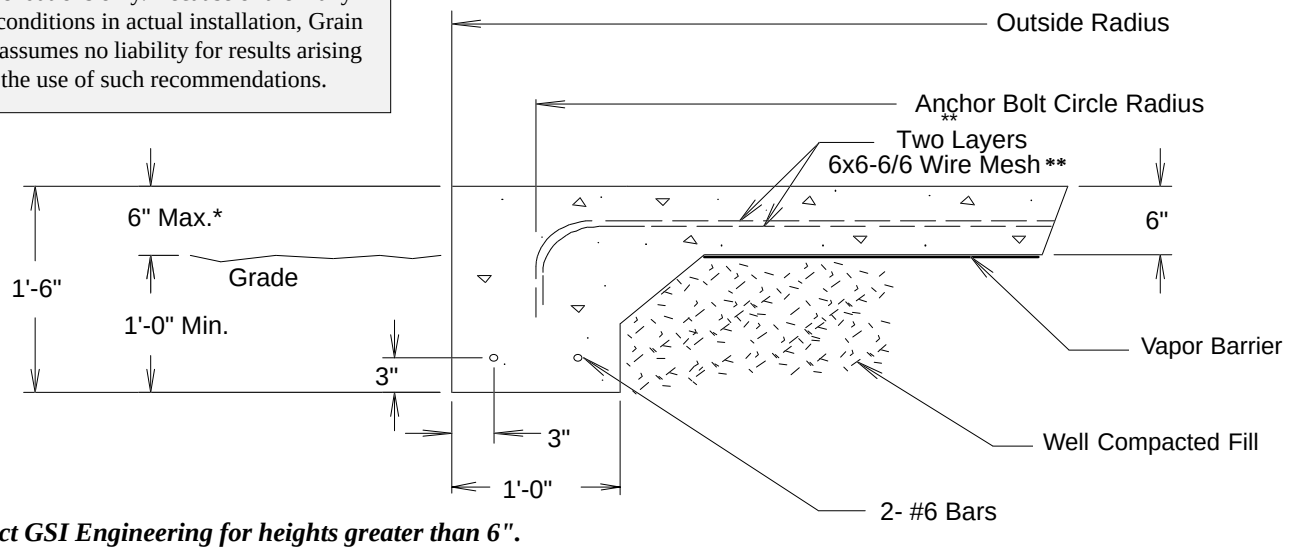
Floating Monolithic Pad for Unstiffened G.S.I Bins Up To 5 Rings (4.00" Corrugation)

Monolithic Pad Notes:

1. The Foundation design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



Contact GSI Engineering for heights greater than 6".

****The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18" c/c each way***

Bin Dia	Outside Radius	U/J Anchor Bolt Radius	Anchor Chord	No. of Anchor	Tot. Cu. Yds. Concrete	Sq. Ft. Mesh	Length #6 Bar	Optional #4 Grd (ft)
12'	6' - 6"	6'-3 1/4"	8'-10 7/16"	4	4.0	300	100	200
15'	8' - 0"	7-9 1/4"	9'-1 1/2"	5	5.5	500	100	300
18'	9' - 6"	9'-3 1/16"	9'-3 1/16"	6	7.5	700	200	400
21'	11' - 2"	10'-8 15/16"	9'-3 15/16"	7	9.5	900	200	600
24'	12' - 6"	12' 2 7/8"	9'-4 3/8"	8	12.0	1100	200	700
27'	14' - 0"	13'-8 3/4"	9'-4 11/16"	9	14.5	1200	200	900
30'	15' - 7"	15'-2 11/16"	9'-4 7/8"	10	17.5	1600	200	1100
33'	17' - 0"	16'-8 9/16"	9'-5"	11	20.5	1800	300	1300
36'	18' - 8"	18'-2 7/16"	9'-5 1/16"	12	24.0	2300	300	1500

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Frost Free Pad Recommendations for 4.00” Corrugation “W” Series, Unstiffened Farm Bins

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Frost Free Pad
Unstiffened 4.00" Farm Bin

OUTSIDE BIN HOLD DOWN CHARTS (4.00" CORRUGATION)

Outside bin hold down should be used on all non-stiffened G.S.I bins. When anchoring the bin, be sure the vertical seams of the bin align with the U-Bolts in the foundation. They may be anchored to the foundation using either the U-Bolt and J-Bolt combination or the single anchor bolt except on the 42' and larger bins.

NOTE: All non-stiffened 42' and larger bins should use single anchor bolts not the U-Bolt /J-Bolt combination. (Double U-Bolt / J-Bolt may be used on non-stiffened 42' and larger bins as an option. Extra hold downs required with this option.)

SINGLE ANCHOR BOLT CHART

Bin Dia.	"B" Bolt Circle Radius	3-9 Rings		Optional Double Hold Down Anchors	
		No. of Anchors	"E" Chord Distance	No. of Anchors	"F" Chord Distance
12'	6'- 2.7/16"	4	8'-9.1/4"	8	4'-9"
15'	7'-8.5/16"	5	9'-0.9/16"	10	4'-9.1/16"
18'	9'-2.1/4"	6	9'-2.1/4"	12	4'-9.1/16"
21'	10'-8.1/8"	7	9'-3.3/16"	14	4'-9"
24'	12'-2.1/16"	8	9'-3.13/16"	16	4'-9"
27'	13'-7.15/16"	9	9'-4.1/8"	18	4'-8.15/16"
30'	15'-1.7/8"	10	9'-4.3/8"	20	4'-8.7/8"
33'	16'-7.3/4"	11	9'-4.9/16"	22	4'-8.7/8"
36'	18'-1.11/16"	12	9'-4.11/16"	24	4'-8.13/16"
42'	21'-1.1/2"	14	9'-4.13/16"	28	4'-8.3/4"
48'	24'-1.5/16"	16	9'-4.7/8"	32	4'-8.11/16"

U-BOLT/J-BOLT COMBINATION CHART

Bin Dia.	"B" Bolt Circle Radius	3-9 Rings		Optional Double Hold Down Anchors	
		No. of Anchors	"E" Chord Distance	No. of Anchors	"F" Chord Distance
12'	6'-3.1/4"	4	8'-10.7/16"	8	4'-9.5/8"
15'	7'-9.1/4"	5	9'-1.1/2"	10	4'-9.9/16"
18'	9'-3.1/16"	6	9'-3.1/16"	12	4'-9.1/2"
21'	10'-8.15/16"	7	9'-3.15/16"	14	4'-9.3/8"
24'	12'-2.7/8"	8	9'-4.3/8"	16	4'-9.5/16"
27'	13'-8.3/4"	9	9'-4.11/16"	18	4'-9.1/4"
30'	15'-2.11/16"	10	9'-4.7/8"	20	4'-9.3/16"
33'	16'-8.9/16"	11	9'-5"	22	4'-9.1/16"
36'	18'-2.7/16"	12	9'-5.1/16"	24	4'-9.1/16"
42'	21'-2.5/16"	28	4'-8.15/16"		
48'	24'-2.1/8"	32	4'-8.7/8"		

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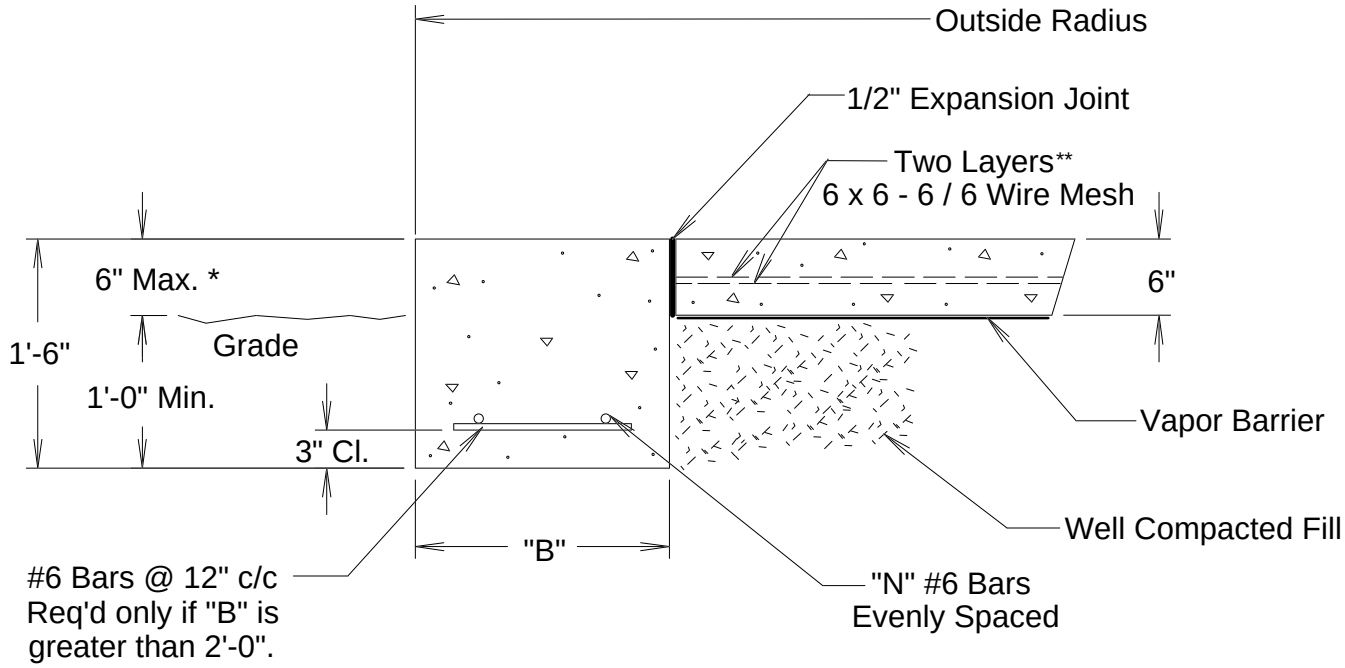
Frost Free Pad
Unstiffened 4.00” Farm Bin

Frost Free Pad Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3’-0”. Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



* Contact GSI Engineering for heights greater than 6".

**The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18” c/c each way.

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Frost Free Pad
Unstiffened 4.00" Farm Bin

Diameter of Bin: 18'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 0 in.	2	9 ft. 6 in.	600	400	200	8
8	1 ft. 7 in.	2	9 ft. 9 in.	600	400	200	9

Diameter of Bin: 21'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 1 in.	2	10 ft. 11 in.	800	500	200	10
8	1 ft. 8 in.	2	11 ft. 3 in.	800	500	200	12

Diameter of Bin: 24'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 1 in.	2	12 ft. 5 in.	1000	600	200	12
8	1 ft. 9 in.	2	12 ft. 9 in.	1000	600	200	15
9	2 ft. 6 in.	3	13 ft. 2 in.	1000	600	400	18

Diameter of Bin: 27'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 2 in.	2	14 ft. 0 in.	1200	700	200	16
8	1 ft. 10 in.	2	14 ft. 4 in.	1200	700	200	18
9	2 ft. 7 in.	3	14 ft. 7 in.	1200	700	500	21

Diameter of Bin: 30'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 2 in.	2	15 ft. 6 in.	1400	900	200	19
8	1 ft. 10 in.	2	15 ft. 10 in.	1400	900	200	21
9	2 ft. 8 in.	3	16 ft. 1 in.	1400	900	500	25

Frost Free Pad
Unstiffened 4.00" Farm Bin

Diameter of Bin: 33'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 3 in.	2	17 ft. 0 in.	1700	1100	300	22
8	1 ft. 11 in.	2	17 ft. 4 in.	1700	1100	300	25
9	2 ft. 9 in.	3	17 ft. 6 in.	1700	1100	600	29

Diameter of Bin: 36'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 3 in.	2	18 ft. 6 in.	2000	1300	300	26
8	2 ft. 0 in.	2	18 ft. 11 in.	2000	1300	400	30
9	2 ft. 10 in.	3	19 ft. 0 in.	2000	1300	600	33

Diameter of Bin: 42'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 4 in.	2	21 ft. 7 in.	2700	1800	300	34
8	2 ft. 1 in.	3	21 ft. 11 in.	2700	1800	700	39
9	3 ft. 1 in.	4	22 ft. 2 in.	2700	1800	900	44

Diameter of Bin: 48'
Corrugation: 4.00"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
6	1 ft. 5 in.	2	24 ft. 6 in.	3500	2300	400	43
8	2 ft. 3 in.	3	24 ft. 11 in.	3500	2300	800	49
9	3 ft. 3 in.	4	25 ft. 2 in.	3500	2300	1100	55

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Floating Monolithic Pad Recommendations For 2.66” Corrugation “N” Series, Unstiffened Farm Bins

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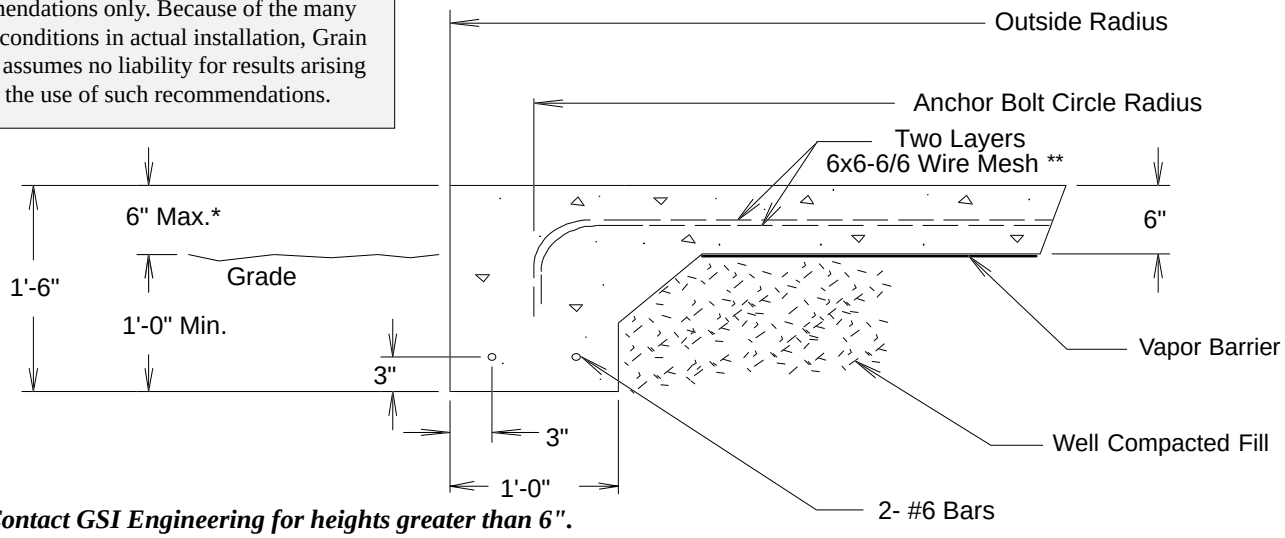
Floating Monolithic Pad for Unstiffened G.S.I Bins Up To 7 Rings (2.66" Corrugation)

Monolithic Pad Notes:

1. The Foundation design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



Contact GSI Engineering for heights greater than 6".

****The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18" c/c each way***

Bin Dia.	Outside Radius	U/J Anchor Bolt Radius	Anchor Chord	No. of Anchors	Total Cu. Yds. Concrete	Sq. Ft. Mesh	Length #6 Bar	Optional #4 Grid (Ft.)
12'	6'-6"	6'-2.3/16"	8'-8.7/8"	4	4	300	100	200
15'	8'-0"	7'-8.1/16"	9'-0.1/4"	5	5.5	500	100	300
18'	9'-6"	9'-2"	9'-2"	6	7.5	700	200	400
21'	11'-2"	10'-7.7/8"	9'-3"	7	9.5	900	200	600
24'	12'-6"	12'-1.13/16"	9'-3.5/8"	8	12	1100	200	700
27'	14'-0"	13'-7.11/16"	9'-4"	9	14.5	1200	200	900
30'	15'-7"	15'-1.5/8"	9'-4.1/4"	10	17.5	1600	200	1100
33'	17'-0"	16'-7.1/2"	9'-4.3/8"	11	20.5	1800	300	1300
36'	18'-8"	18'-1.3/8"	9'-4.1/2"	12	24	2300	300	1500

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Frost Free Pad Recommendations For 2.66” Corrugation “N” Series, Unstiffened Farm Bins

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Frost Free Pad
Unstiffened 2.66" Farm Bin

OUTSIDE BIN HOLD DOWN CHARTS (2.66" CORRUGATION)

Outside bin hold down should be used on all non-stiffened G.S.I bins. When anchoring the bin, be sure the vertical seams of the bin align with the U-Bolts in the foundation. They may be anchored to the foundation using either the U-Bolt and J-Bolt combination or the single anchor bolt except on the 42' and larger bins.

NOTE: All non-stiffened 42' and larger bins should use single anchor bolts not the U-Bolt /J-Bolt combination. (Double U-Bolt / J-Bolt may be used on non-stiffened 42' and larger bins as an option. Extra hold downs required with this option.)

SINGLE ANCHOR BOLT CHART

BIN DIAMETER	"B" BOLT CIRCLE RADIUS	FOR 3 - 12 RINGS NO. OF ANCHORS	FOR 3 - 12 RINGS "E" CHORD DISTANCE
12'	6'-1.3/8"	4	8'-7.3/4"
15'	7'-7.1/4"	5	8'-11.5/16"
18'	9'-1.3/16"	6	9'-1.3/16"
21'	10'-7.1/16"	7	9'-2.1/4"
24'	12'-1"	8	9'-2.15/16"
27'	13'-6.7/8"	9	9'-3.7/16"
30'	15'-0.13/16"	10	9'-3.3/4"
33'	16'-6.11/16"	11	9'-3.15/16"
36'	18'-0.9/16'	12	9'-4.1/8"
42'	21'-0.7/16"	14	9'-4.3/8"
48'	24'-0.1/4"	16	9'-4.1/2"
60'	29'-11.7/8"	20	9'-4.9/16"

DOUBLE HOLD DOWN ANCHORS RECOMMENED FOR 12 -15 RINGS	
NO. OF ANCHORS	"F" CHORD DISTANCE
8	4'-8.3/16"
10	4'-8.3/8"
12	4'-8.1/2"
14	4'-8.9/16"
16	4'-8.9/16"
18	4'-8.9/16"
20	4'-8.9/16"
22	4'-8.9/16"
24	4'-8.9/16"
28	4'-8.1/2"
32	4'-8.1/2"
40	4'-8.1/2"

U-BOLT/J-BOLT COMBINATION CHART

BIN DIAMETER	"B" BOLT CIRCLE RADIUS	FOR 3 - 12 RINGS NO. OF ANCHORS	FOR 3 - 12 RINGS "E" CHORD DISTANCE
12'	6'-2.3/16"	4	8'-8.7/8"
15'	7'-8.1/16"	5	9'-0.1/4"
18'	9'-2"	6	9'-2"
21'	10'-7.7/8"	7	9'-3"
24'	12'-1.13/16"	8	9'-3.5/8"
27'	13'-7.11/16"	9	9'-4"
30'	15'-1.5/8"	10	9'-4.1/4"
33'	16'-7.1/2"	11	9'-4.3/8"
36'	18'-1.3/8'	12	9'-4.1/2"
42'	21'-1.1/4"	28	4'-8.11/16"
48'	24'-1.1/16"	32	4'-8.11/16"
60'	30'-0.11/16"	40	4'-8.5/8"

OPTIONAL DOUBLE HOLD DOWN ANCHORS	
NO. OF ANCHORS	"F" CHORD DISTANCE
8	4'-8.3/4"
10	4'-8.15/16"
12	4'-8.15/16"
14	4'-8.15/16"
16	4'-8.7/8"
18	4'-8.7/8"
20	4'-8.13/16"
22	4'-8.13/16"
24	4'-8.3/4"

REV. 1/5/2001

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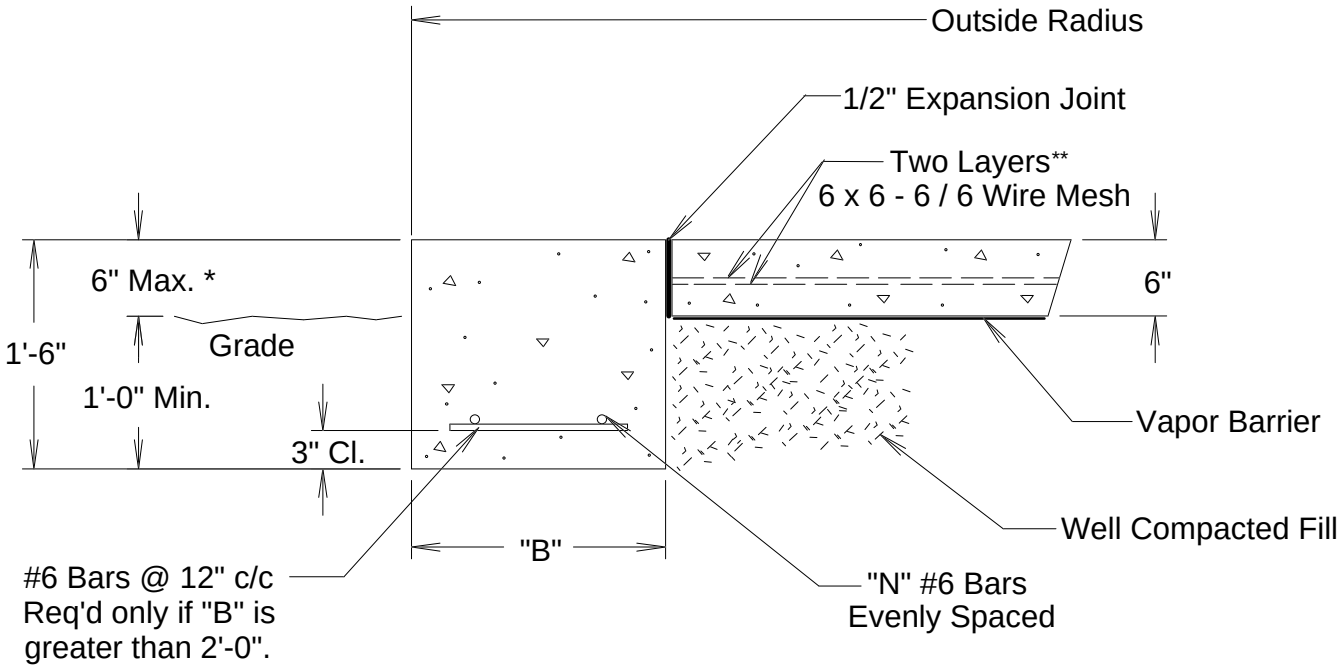
Frost Free Pad
Unstiffened 2.66” Farm Bin

Frost Free Pad Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3’-0”. Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



* Contact GSI Engineering for heights greater than 6".

**The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18” c/c each way.

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Frost Free Pad
Unstiffened 2.66" Farm Bin

Diameter of Bin: 18'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 0 in.	2	9 ft. 6 in.	600	400	200	8
10	1 ft. 4 in.	2	9 ft. 8 in.	600	400	200	9
12	1 ft. 10 in.	2	9 ft. 10 in.	600	400	200	10

Diameter of Bin: 21'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 0 in.	2	10 ft. 11 in.	800	500	200	10
10	1 ft. 5 in.	2	11 ft. 1 in.	800	500	200	11
12	1 ft. 11 in.	2	11 ft. 4 in.	800	500	200	13

Diameter of Bin: 24'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 1 in.	2	12 ft. 5 in.	1000	600	200	12
10	1 ft. 6 in.	2	12 ft. 8 in.	1000	600	200	14
12	2 ft. 0 in.	2	12 ft. 11 in.	1000	600	300	16

Diameter of Bin: 27'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 1 in.	2	13 ft. 11 in.	1200	700	200	15
10	1 ft. 6 in.	2	14 ft. 2 in.	1200	700	200	17
12	2 ft. 1 in.	3	14 ft. 5 in.	1200	700	400	19

Diameter of Bin: 30'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	15 ft. 6 in.	1400	900	200	19
10	1 ft. 7 in.	2	15 ft. 8 in.	1400	900	200	20
12	2 ft. 2 in.	3	16 ft. 0 in.	1400	900	500	23
14	2 ft. 9 in.	3	16 ft. 0 in.	1400	900	500	25
15	3 ft. 6 in.	4	16 ft. 4 in.	1400	900	700	28

Diameter of Bin: 33'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	17 ft. 0 in.	1700	1100	300	22
10	1 ft. 8 in.	2	17 ft. 3 in.	1700	1100	300	24
12	2 ft. 3 in.	3	17 ft. 6 in.	1700	1100	500	27
14	2 ft. 10 in.	3	17 ft. 6 in.	1700	1100	600	29
15	3 ft. 7 in.	4	17 ft. 10 in.	17	1100	800	32

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Frost Free Pad
Unstiffened 2.66" Farm Bin

Diameter of Bin: 36'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	18 ft. 6 in.	2000	1300	300	25
10	1 ft. 8 in.	2	18 ft. 9 in.	2000	1300	300	28
12	2 ft. 3 in.	3	19 ft. 0 in.	2000	1300	600	31
14	2 ft. 2 in.	3	19 ft. 1 in.	2000	1300	700	35
15	3 ft. 11 in.	4	19 ft. 5 in.	2000	1300	900	38

Diameter of Bin: 42'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 4 in.	2	21 ft. 7 in.	2700	1800	300	34
10	1 ft. 10 in.	2	21 ft. 10 in.	2700	1800	300	37
12	2 ft. 5 in.	3	22 ft. 1 in.	2700	1800	700	41
14	3 ft. 2 in.	4	22 ft. 2 in.	2700	1800	900	44
15	3 ft. 11 in.	4	22 ft. 6 in.	2700	1800	100	49

Diameter of Bin: 48'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 4 in.	2	24 ft. 6 in.	3500	2300	400	43
10	1 ft. 11 in.	2	24 ft. 9 in.	3500	2300	400	47
12	2 ft. 7 in.	3	25 ft. 1 in.	3500	2300	800	51
14	3 ft. 4 in.	4	25 ft. 2 in.	3500	2300	1100	56

Diameter of Bin: 54'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 5 in.	2	27 ft. 6 in.	4300	2900	400	53
10	2 ft. 1 in.	2	27 ft. 9 in.	4300	2900	700	58
12	2 ft. 9 in.	3	28 ft. 1 in.	4300	2900	900	63
14	3 ft. 6 in.	4	28 ft. 2 in.	4300	2900	1200	68

Diameter of Bin: 60'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 6 in.	2	30 ft. 7 in.	5400	3600	400	65
10	2 ft. 2 in.	3	30 ft. 11 in.	5400	3600	900	71
12	2 ft. 10 in.	3	31 ft. 3 in.	5400	3600	1100	77

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Frost Free Pad Recommendations For 2.66” Corrugation Commercial Tanks

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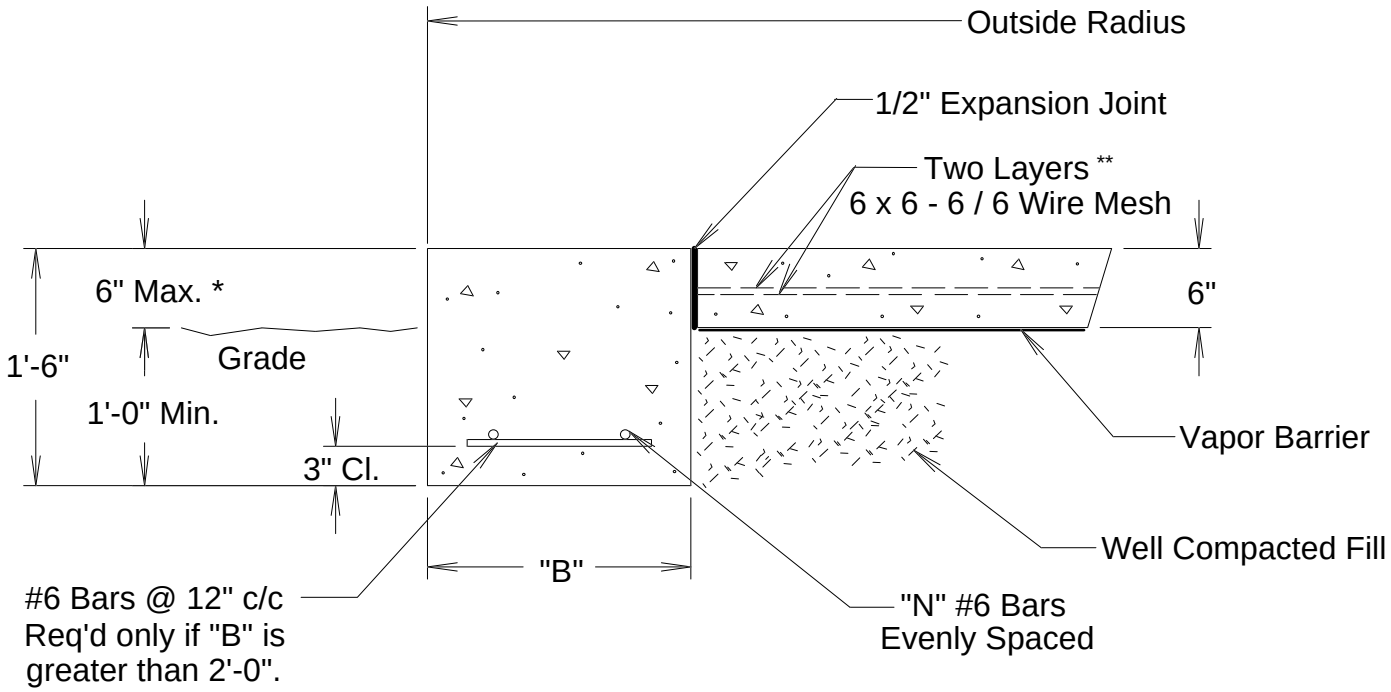
Frost Free Pad
Commercial Tank

Frost Free Pad Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3’-0”. Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



* Contact GSI Engineering for heights greater than 6".

**The optional #4 rebar grid can be substituted for the wire mesh in most cases. Place the #4 bars in the pad at 18” c/c each way.

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Frost Free Pad
Commercial Tank

Diameter of Bin: 18'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 0 in.	2	9 ft. 6 in.	500	400	200	8
10	1 ft. 4 in.	2	9 ft. 8 in.	500	400	200	9
12	1 ft. 10 in.	2	9 ft. 10 in.	500	400	200	10

Diameter of Bin: 21'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 0 in.	2	10 ft. 11 in.	700	500	200	10
10	1 ft. 5 in.	2	11 ft. 1 in.	700	500	200	11
12	1 ft. 11 in.	2	11 ft. 4 in.	700	500	200	13

Diameter of Bin: 24'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 1 in.	2	12 ft. 5 in.	900	600	200	12
10	1 ft. 6 in.	2	12 ft. 8 in.	900	600	200	14
12	2 ft. 0 in.	2	12 ft. 11 in.	900	600	300	16
14	2 ft. 7 in.	3	13 ft. 2 in.	900	600	400	18

Diameter of Bin: 27'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 1 in.	2	13 ft. 11 in.	1100	700	200	15
10	1 ft. 6 in.	2	14 ft. 2 in.	1100	700	200	17
12	2 ft. 1 in.	3	14 ft. 5 in.	1100	700	400	19
14	2 ft. 8 in.	3	14 ft. 5 in.	1100	700	500	21

Diameter of Bin: 30'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	15 ft. 6 in.	1300	900	200	19
10	1 ft. 7 in.	2	15 ft. 8 in.	1300	900	200	20
12	2 ft. 2 in.	3	16 ft. 0 in.	1300	900	500	23
14	2 ft. 9 in.	3	16 ft. 0 in.	1300	900	500	25
16	3 ft. 6 in.	4	16 ft. 4 in.	1300	900	700	28

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Frost Free Pad
Commercial Tank

Diameter of Bin: 33'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	17 ft. 0 in.	1600	1100	300	22
10	1 ft. 8 in.	2	17 ft. 3 in.	1600	1100	300	24
12	2 ft. 3 in.	3	17 ft. 6 in.	1600	1100	500	27
14	2 ft. 10 in.	3	17 ft. 6 in.	1600	1100	600	29
16	3 ft. 7 in.	4	17 ft. 10 in.	1600	1100	800	32

Diameter of Bin: 36'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 2 in.	2	18 ft. 6 in.	1900	1300	300	25
10	1 ft. 8 in.	2	18 ft. 9 in.	1900	1300	300	28
12	2 ft. 3 in.	3	19 ft. 0 in.	1900	1300	600	31
14	3 ft. 2 in.	3	19 ft. 1 in.	1900	1300	700	35
16	3 ft. 11 in.	4	19 ft. 5 in.	1900	1300	900	38
18	4 ft. 10 in.	5	19 ft. 9 in.	1900	1300	1100	43

Diameter of Bin: 39'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 3 in.	2	20 ft. 0 in.	2300	1500	300	29
10	1 ft. 9 in.	2	20 ft. 3 in.	2300	1500	300	32
12	2 ft. 4 in.	3	20 ft. 6 in.	2300	1500	600	35
14	3 ft. 2 in.	3	20 ft. 10 in.	2300	1500	700	40
16	3 ft. 11 in.	4	21 ft. 2 in.	2300	1500	1000	44
18	4 ft. 10 in.	5	21 ft. 6 in.	2300	1500	1200	49

Diameter of Bin: 42'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 4 in.	2	21 ft. 7 in.	2600	1800	300	34
10	1 ft. 10 in.	2	21 ft. 10 in.	2600	1800	300	37
12	2 ft. 5 in.	3	22 ft. 1 in.	2600	1800	700	41
14	3 ft. 2 in.	4	22 ft. 2 in.	2600	1800	900	44
16	3 ft. 11 in.	4	22 ft. 6 in.	2600	1800	1000	49
18	4 ft. 10 in.	5	22 ft. 11 in.	2600	1800	1300	54

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Frost Free Pad
Commercial Tank

Diameter of Bin: 45'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 4 in.	2	23 ft. 0 in.	3000	2000	300	38
10	1 ft. 10 in.	2	23 ft. 3 in.	3000	2000	300	41
12	2 ft. 6 in.	3	23 ft. 6 in.	3000	2000	800	46
14	3 ft. 3 in.	4	23 ft. 7 in.	3000	2000	1000	49
16	4 ft. 1 in.	4	23 ft. 11 in.	3000	2000	1100	55
18	5 ft. 0 in.	5	24 ft. 4 in.	3000	2000	1400	60

Diameter of Bin: 48'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 4 in.	2	24 ft. 6 in.	3400	2300	400	43
10	1 ft. 11 in.	2	24 ft. 9 in.	3400	2300	400	47
12	2 ft. 7 in.	3	25 ft. 1 in.	3400	2300	800	51
14	3 ft. 4 in.	4	25 ft. 2 in.	3400	2300	1100	56
16	4 ft. 2 in.	4	25 ft. 6 in.	3400	2300	1200	61
18	5 ft. 1 in.	5	25 ft. 11 in.	3400	2300	1500	67

Diameter of Bin: 54'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 5 in.	2	27 ft. 6 in.	4300	2900	400	53
10	2 ft. 1 in.	2	27 ft. 9 in.	4300	2900	700	58
12	2 ft. 9 in.	3	28 ft. 1 in.	4300	2900	900	63
14	3 ft. 6 in.	4	28 ft. 2 in.	4300	2900	1200	68
16	4 ft. 5 in.	4	28 ft. 7 in.	4300	2900	1400	75
18	5 ft. 4 in.	5	29 ft. 0 in.	4300	2900	1700	82

Diameter of Bin: 60'
Corrugation: 2.66"

Ring No.	B	N	Outside Radius	Sq. Ft. Mesh 6x6 - 6/6	Optional #4 18"x18" Grid (ft.)	Length #6 Bar (ft.)	Total Cu. Yds. Concrete
8	1 ft. 6 in.	2	30 ft. 7 in.	5400	3600	400	65
10	2 ft. 2 in.	3	30 ft. 11 in.	5400	3600	900	71
12	2 ft. 10 in.	3	31 ft. 3 in.	5400	3600	1100	77
14	3 ft. 8 in.	4	31 ft. 3 in.	5400	3600	1400	82
16	4 ft. 7 in.	5	31 ft. 9 in.	5400	3600	1700	91
18	5 ft. 7 in.	6	32 ft. 2 in.	5400	3600	2100	99

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Inverted “T” Foundation Recommendations For 2.66” Corrugation Inside Stiffened Commercial Tanks

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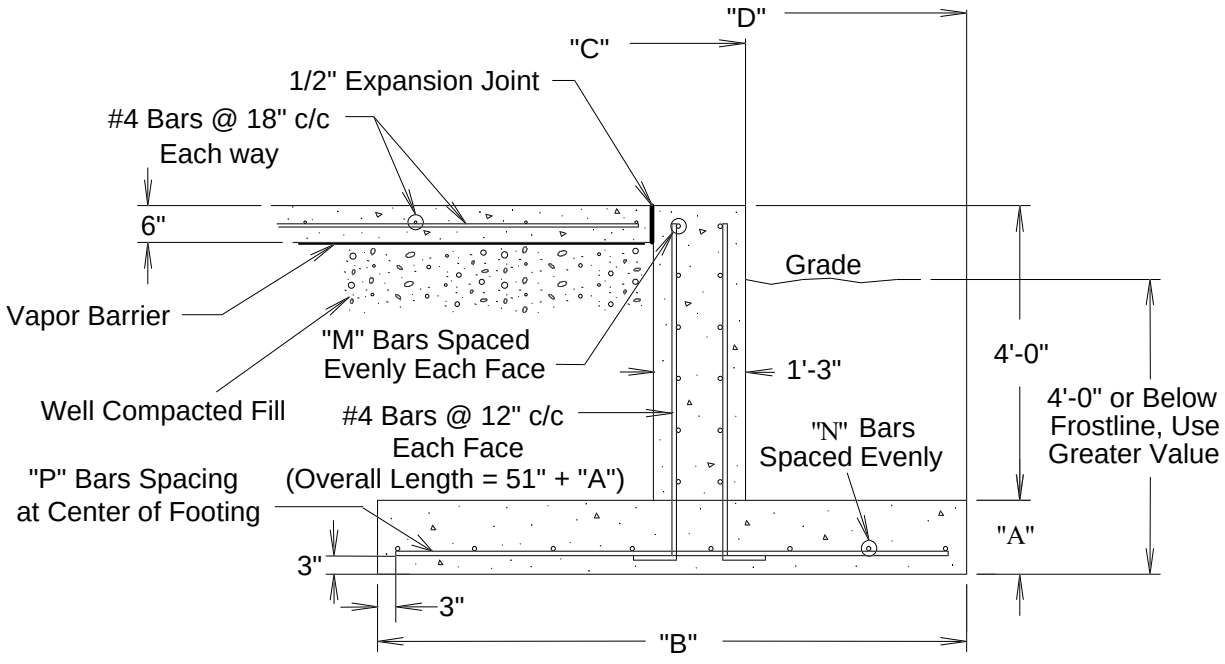
Inverted "T" Foundation
2.66" Inside Stiffened Commercial Tanks

3000 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



REV. 1/5/2001

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 18'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-10"	2'-3"	2'-8"	3'-2"
	C	9'-5"	9'-5"	9'-5"	9'-5"
	D	9'-8"	9'-10"	10'-0"	10'-3"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1600	1600	1600	1600
	#5 (ft.)	300	300	400	400
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	4	5	6	7
Concrete	Wall	10	10	10	10
	Floor	4	4	4	4
	Total	18	19	20	21

Diameter of Bin 21'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-11"	2'-4"	2'-10"	3'-5"
	C	10'-11"	10'-11"	10'-11"	10'-11"
	D	11'-3"	11'-5"	11'-7"	11'-10"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1900	1900	1900	1900
	#5 (ft.)	300	400	400	500
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	5	6	7	9
Concrete	Wall	11	11	11	11
	Floor	6	6	6	6
	Total	23	23	25	26

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 24'

Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-0"	2'-6"	3'-0"	3'-8"	4'-3"	4'-10"	5'-5"
	C	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"
	D	12'-9"	13'-0"	13'-2"	13'-6"	13'-9"	14'-0"	14'-3
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	2300	2300	2300	2300	2300	2300	2300
	#5 (ft.)	300	500	500	500	600	700	900
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	6	7	9	10	12	14	15
Concrete	Wall	13	13	13	13	13	13	13
	Floor	8	8	8	8	8	8	8
	Total	27	28	30	31	33	35	36

Diameter of Bin 27'

Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-1"	2'-7"	3'-2"	3'-9"	4'-6"	5'-1"	5'-7"
	C	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"
	D	14'-4"	14'-6"	14'-9"	15'-0"	15'-4"	15'-7"	15'-10"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c
Rerod	#4 (ft.)	2600	2600	2600	2600	2600	2600	2600
	#5 (ft.)	400	500	500	700	800	900	1000
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	7	8	10	12	14	16	17
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	32	33	35	37	39	41	42

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Inverted "T" Foundation
2.66" Inside Stiffened Commercial Tanks

Diameter of Bin 30'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-2"	2'-8"	3'-4"	3'-11"	4'-8"	5'-3"	6'-0"
	C	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"
	D	15'-10"	16'-0"	16'-4"	16'-7"	16'-11"	17'-2"	17'-6"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c
Rerod	#4 (ft.)	3000	3000	3000	3000	3000	3000	3000
	#5 (ft.)	500	500	700	700	900	900	600
	#6 (ft.)	0	0	0	0	0	0	500
Cu. Yds.	Footing	8	10	12	14	16	18	21
Concrete	Wall	17	17	17	17	17	17	17
	Floor	12	12	12	12	12	12	12
	Total	37	39	41	43	45	47	50

Diameter of Bin 33'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-2"	2'-10"	3'-5"	4'-2"	4'-10"	5'-5"	6'-2"
	C	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"
	D	17'-4"	17'-8"	17'-10"	18'-2"	18'-6"	18'-9"	19'-1"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4 (ft.)	3400	3400	3400	3400	3400	3400	3400
	#5 (ft.)	600	700	800	900	1000	1200	700
	#6 (ft.)	0	0	0	0	0	0	600
Cu. Yds.	Footing	9	11	13	16	19	21	23
Concrete	Wall	18	18	18	18	18	18	18
	Floor	15	15	15	15	15	15	15
	Total	42	44	46	49	52	54	56

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 36'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-3"	2'-11"	3'-7"	4'-4"	5'-1"	5'-10"	6'-4"
	C	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"
	D	18'-10"	19'-2"	19'-5"	19'-9"	20'-1"	20'-5"	20'-8"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	3800	3800	3800	3800	3800	3800	3800
	#5 (ft.)	600	700	800	1000	1100	1400	700
	#6 (ft.)	0	0	0	0	0	0	700
Cu. Yds.	Footing	10	13	15	18	21	24	26
Concrete	Wall	20	20	20	20	20	20	20
	Floor	18	18	18	18	18	18	18
	Total	48	51	53	56	59	62	64

Diameter of Bin 39 '
Soil Bearing Capacity 3000 psf

	Ring No	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-4"	3'-0"	3'-8"	4'-5"	5'-3"	5'-11"	6'-8"
	C	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"
	D	20'-3"	20'-7"	20'-11"	21'-3"	21'-7"	21'-11	22'-3"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	3 #5's	3 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 14" c/c	#6 @ 11" c/c
Rerod	#4 (ft.)	4100	4100	4100	4100	4200	4300	4300
	#5 (ft)	600	700	900	1100	1400	800	1000
	#6 (ft)	0	0	0	0	0	600	900
Cu. Yds.	Footing	11	14	17	20	24	27	30
Concrete	Wall	23	23	23	23	23	23	23
	Floor	21	21	21	21	21	21	21
	Total	55	58	61	64	68	71	74

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 42'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-5"	3'-1"	3'-9"	4'-6"	5'-5"	6'-0"	6'-11"
	C	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"
	D	21'-11"	22'-3"	22'-6"	22'-10"	23'-3"	23'-6"	23'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	3 #5's	3 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 14" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	4700	4700	4700	4700	4900	4900	4900
	#5 (ft.)	700	700	1000	1200	1400	800	900
	#6 (ft.)	0	0	0	0	0	700	1000
Cu. Yds.	Footing	12	15	18	22	26	29	33
Concrete	Wall	24	24	24	24	24	24	24
	Floor	24	24	24	24	24	24	24
	Total	60	63	66	70	74	77	81

Diameter of Bin 45'
Soil Bearing Capacity 3000 psf

	Ring No	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-6"	3'-2"	3'-11"	4'-8"	5'-6"	6'-2"	7'-1"
	C	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"
	D	23'-6"	23'-10"	24'-1"	24'-5"	24'-10"	25'-1"	25'-6"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's
	N	3 #5	4 #5	4 #5	5 #5	6 #5	6 #5	7 #5
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 13" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	5100	5300	5300	5600	5600	3600	3600
	#5 (ft)	800	1000	1100	1400	1600	2400	2500
	#6 (ft)	0	0	0	0	0	800	1100
Cu. Yds.	Footing	13	17	21	24	29	32	37
Concrete	Wall	25	25	25	25	25	25	25
	Floor	28	28	28	28	28	28	28
	Total	66	70	74	77	82	85	90

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 48'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-7"	3'-3"	4'-0"	4'-10"	5'-7"	6'-4"	7'-3"
	C	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"
	D	25'-0"	25'-4"	25'-8"	26'-0"	26'-4"	26'-8"	27'-1"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	5500	5800	5800	6100	4000	4000	4000
	#5 (ft.)	800	1000	1100	1400	3200	2400	2600
	#6 (ft.)	0	0	0	0	0	900	1500
Cu. Yds.	Footing	15	18	23	27	31	35	40
Concrete	Wall	27	27	27	27	27	27	27
	Floor	32	32	32	32	32	32	32
	Total	74	77	82	86	90	94	99

Diameter of Bin 54'
Soil Bearing Capacity 3000 psf

	Ring No	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-9"	3'-5"	4'-3"	5'-1"	5'-11"	6'-9"	7'-7"
	C	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"
	D	27'-9"	28'-1"	28'-5"	28'-9"	29'-1"	29'-5"	29'-9"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's
	N	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	6500	6900	6900	7200	7200	4800	4800
	#5 (ft)	900	1200	1500	1600	1900	2900	3100
	#6 (ft)	0	0	0	0	0	1100	1400
Cu. Yds.	Footing	17	21	27	32	36	41	50
Concrete	Wall	31	31	31	31	31	31	31
	Floor	40	40	40	40	40	40	40
	Total	88	92	98	103	107	112	121

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 60'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-10"	3'-6"	4'-5"	5'-3"	6'-2"	7'-1"	8'-0"
	C	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"
	D	31'-1"	31'-4"	31'-9"	32'-1"	32'-6"	32'-11"	33'-4"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's
	N	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	7600	8000	8000	8400	8400	5700	5700
	#5 (ft.)	1000	1300	1700	1800	2300	3200	3400
	#6 (ft.)	0	0	0	0	0	1300	1700
Cu. Yds.	Footing	20	25	31	36	43	49	60
Concrete	Wall	34	34	34	34	34	34	34
	Floor	50	50	50	50	50	50	50
	Total	104	109	115	120	127	133	144

Diameter of Bin 72'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	3'-0"	3'-10"	4'-8"	5'-9"	6'-9"	7'-8"	8'-7"
	C	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"
	D	37'-1"	37'-6"	37'-10"	38'-4"	38'-9"	39'-2"	39'-7"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	5 #5's	5 #5's	7 #5's	8 #5's	9 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	10400	10900	7700	7700	7700	7700	7700
	#5 (ft.)	1200	1600	4300	4600	5300	4500	4700
	#6 (ft.)	0	0	0	0	0	1600	2200
Cu. Yds.	Footing	25	32	39	48	56	64	77
Concrete	Wall	41	41	41	41	41	41	41
	Floor	72	72	72	72	72	72	72
	Total	138	145	152	161	169	177	190

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 75'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	3'-1"	3'-11"	4'-10"	5'-10"	6'-9"	7'-8"	8'-9"
	C	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"
	D	38'-8"	39'-0"	39'-5"	39'-10"	40'-3"	40'-8"	41'-2"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	11200	11600	8300	8300	8300	8300	8400
	#5 (ft.)	1300	1700	4500	4900	6200	4800	5300
	#6 (ft.)	0	0	0	0	0	1900	2300
Cu. Yds.	Footing	27	34	42	51	58	66	88
Concrete	Wall	43	43	43	43	43	43	43
	Floor	78	78	78	78	78	78	78
	Total	148	155	163	172	179	187	209

Diameter of Bin 78'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	3'-2"	4'-0"	4'-10"	5'-10"	6'-11"	7'-10"	8'-11"
	C	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"
	D	40'-2"	40'-7"	40'-11"	41'-4"	41'-10"	42'-3"	42'-9"
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 9" c/c
Rerod	#4 (ft.)	12300	8800	8800	8800	8800	8800	8900
	#5 (ft.)	1400	4300	4700	5200	6400	5000	6000
	#6 (ft.)	0	0	0	0	0	2000	2700
Cu. Yds.	Footing	29	36	44	53	62	70	93
Concrete	Wall	45	45	45	45	45	45	45
	Floor	85	85	85	85	85	85	85
	Total	159	166	174	183	192	200	223

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 90'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	24*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"
	B	3'-5"	4'-4"	5'-3"	6'-2"	7'-3"	8'-5"	9'-6"
	C	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"
	D	46'-3"	46'-8"	47-'1"	47'-6"	48'-0"	48'-6"	49'-1"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's
	N	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	9 #5's	11 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 13" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	11300	11300	11300	11300	11300	11300	11300
	#5 (ft.)	4800	5800	6000	7100	2000	2600	3100
	#6 (ft.)	0	0	0	0	4700	5600	7200
Cu. Yds.	Footing	36	45	55	64	75	94	115
Concrete	Wall	52	52	52	52	52	52	62
	Floor	114	114	114	114	114	114	114
	Total	202	211	221	230	241	260	291

*** 1'-6" Wall Width**

Diameter of Bin 105'
Soil Bearing Capacity 3000 psf

	Ring No.	12	14	16	18	20	22	23*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"	1'-2"
	B	3'-9"	4'-8"	5'-9"	6'-9"	7'-10"	8'-11"	9'-7"
	C	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"
	D	53'-10"	54'-3"	54'-9"	55'-2"	55'-8"	56'-2"	56'-8"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's
	N	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's	11 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#5 @ 11" c/c	#6 @ 9" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	14800	14800	14800	14800	14800	14900	14800
	#5 (ft.)	6400	2900	3500	4400	5400	3300	3600
	#6 (ft.)	0	3300	2900	4000	4000	8300	9100
Cu. Yds.	Footing	46	57	70	82	95	126	135
Concrete	Wall	60	60	60	60	60	60	72
	Floor	155	155	155	155	155	155	155
	Total	261	272	285	297	310	341	362

*** 1'-6" Wall Width**

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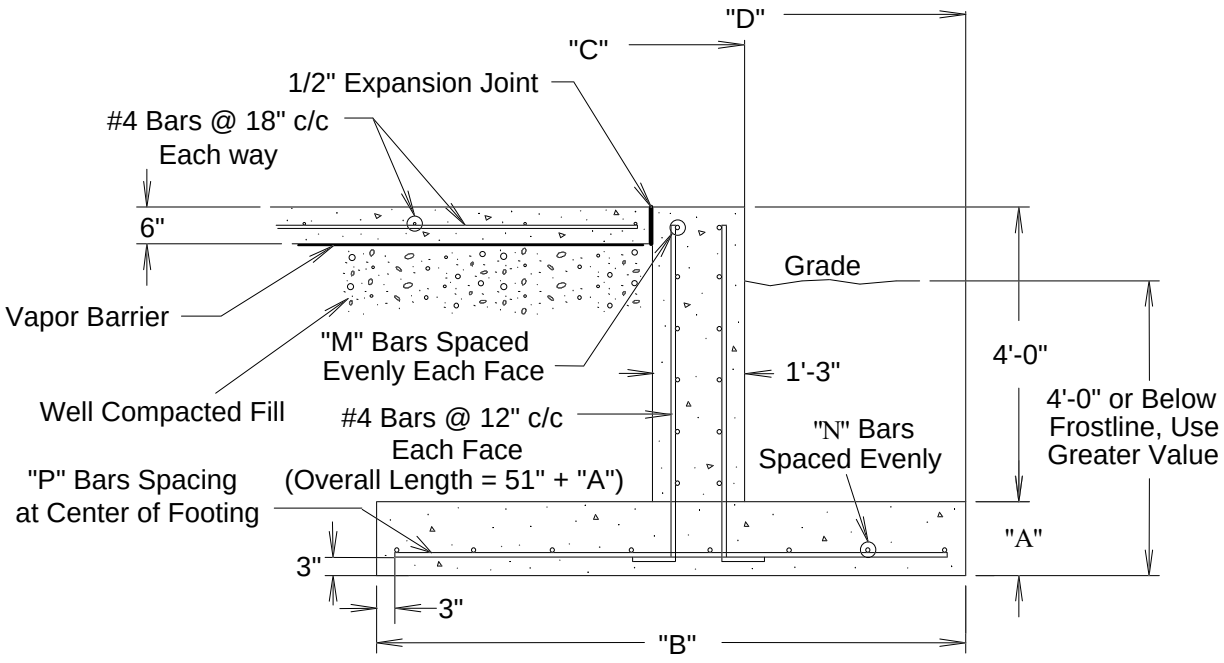
Inverted "T" Foundation
2.66" Inside Stiffened Commercial Tanks

3500 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3500 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 18'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-10"	2'-3"	2'-8"
	C	9'-5"	9'-5"	9'-5"	9'-5"
	D	9'-6"	9'-8"	9'-10"	10'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1600	1600	1600	1600
	#5 (ft.)	300	300	300	400
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	4	4	5	6
Concrete	Wall	10	10	10	10
	Floor	4	4	4	4
	Total	18	18	19	20

Diameter of Bin 21'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-7"	2'-0"	2'-5"	2'-10"
	C	10'-11"	10'-11"	10'-11"	10'-11"
	D	11'-1"	11'-3"	11'-5"	11'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1900	1900	1900	1900
	#5 (ft.)	300	300	400	400
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	4	5	6	7
Concrete	Wall	11	11	11	11
	Floor	6	6	6	6
	Total	22	23	24	25

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 24'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-1"	2'-6"	3'-0"	3'-6"	4'-1"	4'-8"
	C	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"
	D	12'-7"	12'-9"	12'-11"	13'-2"	13'-5"	13'-8"	13'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	2300	2300	2300	2300	2300	2300	2300
	#5 (ft.)	300	300	500	500	500	600	700
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	5	6	7	9	10	12	13
Concrete	Wall	13	13	13	13	13	13	13
	Floor	8	8	8	8	8	8	8
	Total	26	27	28	30	31	33	34

Diameter of Bin 27'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-8"	3'-2"	3'-9"	4'-4"	4'-10"
	C	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"
	D	14'-2"	14'-4"	14'-7"	14'-9"	15'-0"	15'-3"	15'-6"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	2600	2600	2600	2600	2600	2600	2600
	#5 (ft.)	300	500	500	500	700	800	900
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	6	7	9	10	12	14	15
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	31	32	34	35	37	39	40

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 30'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-3"	2'-9"	3'-4"	3'-11"	4'-6"	5'-1"	6'-6"
	C	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"
	D	15'-7"	15'-10"	16'-1"	16'-4"	16'-7"	16'-10"	17'-10"	18'-8"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	3000	3000	3000	3000	3000	3000	3000	3000
	#5 (ft.)	300	500	500	700	700	900	1000	600
	#6 (ft.)	0	0	0	0	0	0	0	600
Cu. Yds.	Footing	6	8	10	12	14	16	19	24
Concrete	Wall	17	17	17	17	17	17	17	17
	Floor	12	12	12	12	12	12	12	12
	Total	35	37	39	41	43	45	48	53

Diameter of Bin 33'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-10"	2'-4"	2'-10"	3'-5"	4'-1"	4'-8"	5'-3"	7'-3"
	C	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"
	D	17'-2"	17'-5"	17'-7"	17'-10"	18'-2"	18'-5"	18'-8"	19'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	3400	3400	3400	3400	3400	3400	3400	3400
	#5 (ft.)	500	600	700	800	900	1000	1100	700
	#6 (ft.)	0	0	0	0	0	0	0	700
Cu. Yds.	Footing	7	9	11	13	16	18	20	27
Concrete	Wall	18	18	18	18	18	18	18	18
	Floor	15	15	15	15	15	15	15	15
	Total	40	42	44	46	49	51	53	60

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 36'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-11"	2'-5"	2'-11"	3'-7"	4'-3"	4'-10"	5'-5"	7'-0"
	C	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"
	D	18'-9"	18'-11"	19'-2"	19'-4"	19'-9"	20'-0"	20'-3"	20'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	3800	3800	3800	3800	3800	3800	3800	3800
	#5 (ft.)	500	600	700	800	900	1100	1300	700
	#6 (ft.)	0	0	0	0	0	0	0	800
Cu. Yds.	Footing	8	10	13	15	18	20	23	29
Concrete	Wall	20	20	20	20	20	20	20	20
	Floor	18	18	18	18	18	18	18	18
	Total	46	48	51	53	56	58	61	67

Diameter of Bin 39'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-0"	2'-6"	3'-1"	3'-8"	4'-5"	5'-1"	5'-10"	7'-3"
	C	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"
	D	20'-3"	20'-7"	20'-11"	21'-3"	21'-7"	21'-11"	22'-3"	22'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4 (ft.)	4200	4200	4200	4200	4400	4400	4400	4400
	#5 (ft.)	500	700	700	900	1200	1300	800	900
	#6 (ft.)	0	0	0	0	0	0	700	900
Cu. Yds.	Footing	9	12	14	17	20	23	27	35
Concrete	Wall	22	22	22	22	22	22	22	22
	Floor	21	21	21	21	21	21	21	21
	Total	52	55	57	60	63	66	70	78

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 42'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-0"	2'-6"	3'-2"	3'-9"	4'-6"	5'-3"	6'-0"	7'-6"
	C	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"
	D	21'-9"	21'-11"	22'-3"	22'-6"	22'-10"	23'-2"	23'-6"	24'-2"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	4700	4700	4700	4700	4900	4900	4900	4900
	#5 (ft.)	500	700	700	1000	1200	1400	800	900
	#6 (ft.)	0	0	0	0	0	0	800	1100
Cu. Yds.	Footing	10	13	16	18	22	26	29	39
Concrete	Wall	24	24	24	24	24	24	24	24
	Floor	24	24	24	24	24	24	24	24
	Total	58	61	64	66	70	74	77	87

Diameter of Bin 45'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-1"	2'-7"	3'-3"	3'-11"	4'-7"	5'-4"	6'-1"	7'-10"
	C	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"
	D	23'-3"	23'-7"	23'-10"	24'-2"	24'-5"	24'-9"	25'-1"	25'-8"
	M	5 #4's	6 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	9 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4 (ft.)	5100	5300	5300	5300	5600	3600	3600	3700
	#5 (ft.)	500	800	1000	1100	1200	3100	2400	300
	#6 (ft.)	0	0	0	0	0	0	800	1100
Cu. Yds.	Footing	11	14	17	21	24	28	32	47
Concrete	Wall	25	25	25	25	25	25	25	25
	Floor	28	28	28	28	28	28	28	28
	Total	64	67	70	74	77	81	85	100

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 48'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-1"	2'-8"	3'-4"	4'-0"	4'-8"	5'-5"	6'-2"	8'-0"
	C	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"
	D	24'-9"	25'-1"	25'-4"	25'-8"	25'-11"	26'-3"	26'-7"	27'-1"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 11" c/c
Rerod	#4 (ft.)	5500	5800	5800	6100	4000	4000	4000	4100
	#5 (ft.)	600	800	1000	1100	2900	3200	2400	3300
	#6 (ft.)	0	0	0	0	0	0	1000	1200
Cu. Yds.	Footing	12	15	19	23	26	30	34	51
Concrete	Wall	27	27	27	27	27	27	27	27
	Floor	32	32	32	32	32	32	32	31
	Total	71	74	78	82	85	89	93	109

Diameter of Bin 54'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-3"	2'-10"	3'-6"	4'-3"	5'-1"	5'-9"	6'-6"	8'-9"
	C	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"
	D	27'-9"	28'-1"	28'-5"	28'-9"	29'-1"	29'-5"	29'-9"	30'-1"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 10" c/c
Rerod	#4 (ft.)	6500	6900	6900	7200	4800	4800	4800	4800
	#5 (ft.)	700	100	1200	1500	3300	3700	2900	3800
	#6 (ft.)	0	0	0	0	0	0	1100	1600
Cu. Yds.	Footing	14	18	22	27	32	36	41	53
Concrete	Wall	31	31	31	31	31	31	31	31
	Floor	40	40	40	40	40	40	40	40
	Total	85	89	93	98	103	107	112	124

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 60'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-4"	2'-11"	3'-7"	4'-5"	5'-3"	6'-0"	6'-11"	9'-3"
	C	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"
	D	30'-10"	31'-1"	31'-4"	31'-9"	32'-1"	32'-5"	32'-10"	33'-11"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	7600	8000	8000	8400	5700	5700	5700	5800
	#5 (ft.)	900	1000	1300	1700	3700	4300	3200	4200
	#6 (ft.)	0	0	0	0	0	0	1300	2500
Cu. Yds.	Footing	17	21	25	31	36	42	48	74
Concrete	Wall	34	34	34	34	34	34	34	34
	Floor	50	50	50	50	50	50	50	49
	Total	101	105	109	115	120	126	132	157

Diameter of Bin 72'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-6"	3'-2"	3'-11"	4'-9"	5'-7"	6'-6"	7'-6"	9'-2"
	C	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"
	D	36'-11"	37'-2"	37'-6"	37'-11"	38'-3"	38'-8"	39'-11"	40'-1"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	5 #5's	6 #5's	6 #5's	8 #5's	12 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c	#6 @ 11" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	10400	10900	7700	7700	7700	7700	7700	7800
	#5 (ft.)	1100	1300	3900	4400	4700	8000	4600	5400
	#6 (ft.)	0	0	0	0	0	0	1800	2900
Cu. Yds.	Footing	21	27	33	40	47	54	69	95
Concrete	Wall	41	41	41	41	41	41	41	41
	Floor	72	72	72	72	72	72	72	72
	Total	134	140	146	153	160	167	182	208

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 75'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-7"	3'-3"	4'-0"	4'-10"	5'-9"	6'-6"	7'-8"	10'-5"
	C	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"
	D	38'-5"	38'-9"	39'-1"	39'-5"	39'-10"	40'-2"	40'-8"	42'-3"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	8 #5's	13 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	11200	11600	8300	8300	8300	8300	8300	8400
	#5 (ft.)	1200	1600	4100	4500	5400	6000	4800	6000
	#6 (ft.)	0	0	0	0	0	0	2000	3500
Cu. Yds. Concrete	Footing	23	29	35	42	50	56	72	113
	Wall	43	43	43	43	43	43	43	43
	Floor	78	78	78	78	78	78	78	78
	Total	144	150	156	163	171	177	193	234

Diameter of Bin 78'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-7"	3'-3"	4'-0"	4'-11"	5'-10"	6'-9"	7'-8"	9'-0"
	C	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"
	D	39'-11"	40'-3"	40'-7"	41'-0"	41'-4"	41'-9"	42'-2"	42'-11"
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's	7 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	11 #6's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	12300	8800	8800	8800	8800	8800	8800	8900
	#5 (ft.)	1300	4100	4300	4800	5700	4700	5500	3500
	#6 (ft.)	0	0	0	0	0	1300	2100	5800
Cu. Yds. Concrete	Footing	24	30	36	45	53	61	75	101
	Wall	45	45	45	45	45	45	45	45
	Floor	85	85	85	85	85	85	85	85
	Total	154	160	166	175	183	191	205	231

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 90'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	24*	27*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-4"
	B	2'-10"	3'-7"	4'-4"	5'-3"	6'-2"	7'-1"	8'-2"	9'-7"
	C	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-5"	45'-5"
	D	46'-1"	46'-5"	46'-8"	47'-1"	47'-6"	47'-11"	48'-6"	49'-3"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's	6 #6's
	N	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	8 #5's	12 #6's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	11300	11300	11300	11300	11300	11300	11200	11500
	#5 (ft.)	4400	5400	5800	6600	3300	2000	2300	0
	#6 (ft.)	0	0	0	0	2900	4800	6000	10700
Cu. Yds.	Footing	30	38	45	55	64	74	92	133
Concrete	Wall	52	52	52	52	52	52	62	52
	Floor	114	114	114	114	114	114	114	114
	Total	196	204	211	221	230	240	268	299

***1'-6" Wall Width**

Diameter of Bin 105'
Soil Bearing Capacity 3500 psf

	Ring No.	12	14	16	18	20	22	23*	27*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-1"	1'-9"
	B	3'-1"	3'-10"	4'-9"	5'-7"	6'-9"	7'-8"	8'-1"	11'-3"
	C	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-10"	52'-10"
	D	53'-7"	53'-11"	54'-4"	54'-8"	55'-2"	55'-7"	55'-10"	57'-3"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's	8 #6's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	8 #5's	12 #6's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 14" c/c	#6 @ 10" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4 (ft.)	14800	14800	14800	14800	14800	14800	14700	15300
	#5 (ft.)	5800	2400	2900	3700	2300	2700	2700	0
	#6 (ft.)	0	3300	2900	4000	5800	7400	7600	14500
Cu. Yds.	Footing	38	47	58	68	82	101	106	237
Concrete	Wall	60	60	60	60	60	60	72	72
	Floor	155	155	155	155	155	155	155	155
	Total	253	262	273	283	297	316	333	464

***1'-6" Wall Width**

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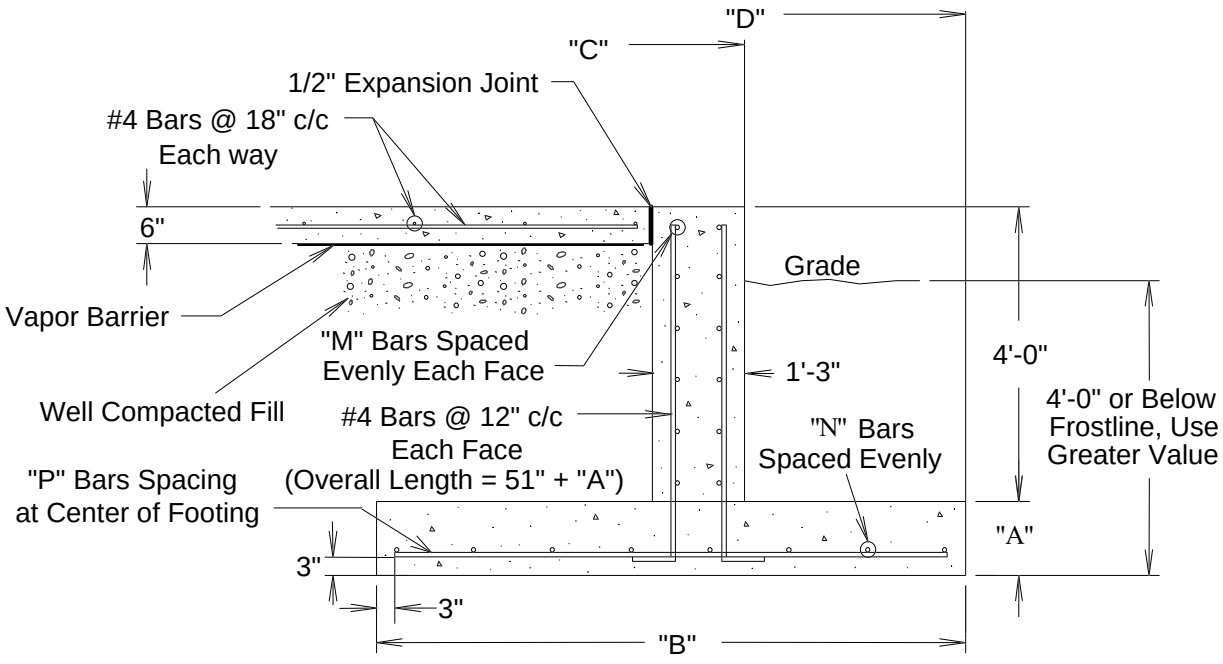
Inverted "T" Foundation
2.66" Inside Stiffened Commercial Tanks

4000 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 4000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



REV. 1/5/2001

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 18'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-4"	1'-7"	1'-11"	2'-4"
	C	9'-5"	9'-5"	9'-5"	9'-5"
	D	9'-5"	9'-7"	9'-8"	9'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	2 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1600	1600	1600	1600
	#5 (ft.)	300	300	300	300
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	3	4	4	5
Concrete	Wall	10	10	10	10
	Floor	4	4	4	4
	Total	17	18	18	19

Diameter of Bin 21'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-4"	1'-8"	2'-1"	2'-5"
	C	10'-11"	10'-11"	10'-11"	10'-11"
	D	10'-11"	11'-1"	11'-3"	11'-5"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	2 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	1900	1900	1900	1900
	#5 (ft.)	300	300	300	400
	#6 (ft.)	0	0	0	0
Cu. Yds.	Footing	4	4	5	6
Concrete	Wall	11	11	11	11
	Floor	6	6	6	6
	Total	21	22	23	24

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 24'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-5"	1'-9"	2'-2"	2'-7"	3'-0"	3'-5"	3'-11"
	C	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"	12'-5"
	D	12'-6"	12'-7"	12'-10"	13'-0"	13'-2"	13'-4"	13'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	2300	2300	2300	2300	2300	2300	2300
	#5 (ft.)	300	300	500	500	500	500	600
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	4	5	6	8	9	10	11
Concrete	Wall	13	13	13	13	13	13	13
	Floor	8	8	8	8	8	8	8
	Total	25	26	27	29	30	31	32

Diameter of Bin 27'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-10"	2'-3"	2'-8"	3'-2"	3'-7"	4'-2"
	C	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"	13'-11"
	D	14'-0"	14'-2"	14'-4"	14'-6"	14'-9"	14'-11"	15'-2"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	2600	2600	2600	2600	2600	2600	2600
	#5 (ft.)	300	300	500	500	500	700	700
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	5	6	7	9	10	11	13
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	30	31	32	34	35	36	38

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 30'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-11"	2'-4"	2'-10"	3'-4"	3'-10"	4'-5"
	C	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"	15'-5"
	D	15'-6"	15'-8"	15'-11"	16'-1"	16'-4"	16'-7"	16'-10"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	3000	3000	3000	3000	3000	3000	3000
	#5 (ft.)	300	400	500	500	700	700	900
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	6	7	9	10	12	14	16
Concrete	Wall	17	17	17	17	17	17	17
	Floor	12	12	12	12	12	12	12
	Total	35	36	38	39	41	43	45

Diameter of Bin 33'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-7"	2'-0"	2'-5"	2'-11"	3'-6"	4'-0"	4'-7"
	C	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"	16'-11"
	D	17'-1"	17'-3"	17'-5"	17'-8"	17'-11"	18'-2"	18'-5"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4 (ft.)	3400	3400	3400	3400	3400	3400	3400
	#5 (ft.)	400	500	600	700	800	900	1000
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	7	8	10	12	14	16	18
Concrete	Wall	18	18	18	18	18	18	18
	Floor	15	15	15	15	15	15	15
	Total	40	41	43	45	47	49	51

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 36'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-8"	2'-1"	2'-6"	3'-0"	3'-7"	4'-2"	4'-10"
	C	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"	18'-5"
	D	18'-7"	18'-10"	19'-0"	19'-2"	19'-5"	19'-8"	20'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c
Rerod	#4 (ft.)	3800	3800	3800	3800	3800	3800	3800
	#5 (ft.)	500	500	600	700	800	900	1100
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	7	9	11	13	15	18	20
Concrete	Wall	20	20	20	20	20	20	20
	Floor	18	18	18	18	18	18	18
	Total	45	47	49	51	53	56	58

Diameter of Bin 39'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-7"	3'-2"	3'-9"	4'-4"	5'-0"
	C	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"	19'-11"
	D	20'-1"	20'-4"	20'-6"	20'-9"	21'-0"	21'-3"	21'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c
Rerod	#4 (ft.)	4200	4200	4200	4200	4200	4400	4400
	#5 (ft.)	500	600	700	800	900	1000	1200
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	8	10	12	15	17	20	23
Concrete	Wall	22	22	22	22	22	22	22
	Floor	21	21	21	21	21	21	21
	Total	51	53	55	58	60	63	66

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 42'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-8"	3'-3"	3'-10"	4'-6"	5'-2"
	C	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"	21'-5"
	D	21'-8"	21'-10"	22'-1"	22'-4"	22'-7"	22'-10"	23'-2"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c
Rerod	#4 (ft.)	4700	4700	4700	4700	4900	4900	4900
	#5 (ft.)	500	600	700	1000	1000	1200	1500
	#6 (ft.)	0	0	0	0	0	0	0
Cu. Yds.	Footing	9	11	13	16	19	22	25
Concrete	Wall	24	24	24	24	24	24	24
	Floor	24	24	24	24	24	24	24
	Total	57	59	61	64	67	70	73

Diameter of Bin 45'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-9"	3'-4"	3'-11"	4'-8"	5'-4"
	C	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"	22'-11"
	D	23'-2"	23'-4"	23'-8"	23'-11"	24'-1"	24'-4"	24'-9"
	M	5 #4's	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c
Rerod	#4 (ft.)	5100	5100	5300	5300	5600	3600	3600
	#5 (ft.)	500	700	800	1000	1100	2700	2200
	#6 (ft.)	0	0	0	0	0	0	600
Cu. Yds.	Footing	10	12	15	18	21	24	28
Concrete	Wall	25	25	25	25	25	25	25
	Floor	28	28	28	28	28	28	28
	Total	63	65	68	71	74	77	81

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 48'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-10"	2'-3"	2'-10"	3'-5"	4'-0"	4'-9"	5'-5"
	C	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"	24'-5"
	D	24'-8"	24'-10"	25'-2"	25'-5"	25'-8"	26'-0"	26'-3"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4 (ft.)	5500	5800	5800	6100	4000	4000	4000
	#5 (ft.)	500	800	800	1000	2600	2900	2400
	#6 (ft.)	0	0	0	0	0	0	700
Cu. Yds.	Footing	11	13	16	19	23	27	30
Concrete	Wall	27	27	27	27	27	27	27
	Floor	32	32	32	32	32	32	32
	Total	70	72	75	78	82	86	89

Diameter of Bin 54'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-11"	2'-5"	3'-0"	3'-7"	4'-3"	5'-0"	5'-10"
	C	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"	27'-5"
	D	27'-8"	27'-10"	28'-2"	28'-6"	28'-9"	29'-1"	29'-5"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4 (ft.)	6500	6900	6900	7200	4800	4800	4800
	#5 (ft.)	700	900	1000	1200	3000	3300	2700
	#6 (ft.)	0	0	0	0	0	0	900
Cu. Yds.	Footing	12	15	19	23	27	31	36
Concrete	Wall	31	31	31	31	31	31	31
	Floor	40	40	40	40	40	40	40
	Total	83	86	90	94	98	102	107

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 60'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-0"	2'-6"	3'-1"	3'-9"	4'-5"	5'-2"	6'-0"
	C	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"	30'-4"
	D	30'-8"	30'-11"	31'-2"	31'-6"	31'-9"	32'-1"	32'-5"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4 (ft.)	7600	8000	8000	8400	5700	5700	5700
	#5 (ft.)	700	1000	1100	1400	3600	3700	3100
	#6 (ft.)	0	0	0	0	0	0	1000
Cu. Yds.	Footing	14	18	22	26	31	36	42
Concrete	Wall	34	34	34	34	34	34	34
	Floor	50	50	50	50	50	50	50
	Total	98	102	106	110	115	120	126

Diameter of Bin 72'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-2"	2'-8"	3'-4"	4'-0"	4'-9"	5'-7"	6'-4"
	C	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"	36'-4"
	D	36'-9"	37'-0"	37'-3"	37'-7"	37'-11"	38'-3"	38'-7"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4 (ft.)	10400	10900	7700	7700	7700	7700	7700
	#5 (ft.)	1100	1200	3800	3900	4400	5200	4100
	#6 (ft.)	0	0	0	0	0	0	1200
Cu. Yds.	Footing	18	23	28	34	40	47	57
Concrete	Wall	41	41	41	41	41	41	41
	Floor	72	72	72	72	72	72	72
	Total	131	136	141	147	153	160	170

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 75'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-3"	2'-9"	3'-5"	4'-1"	4'-10"	5'-9"	6'-6"
	C	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"	37'-10"
	D	38'-4"	38'-6"	38'-10"	39'-1"	39'-5"	39'-10"	40'-2"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	11200	11600	8300	8300	8300	8300	8300
	#5 (ft.)	1200	1200	4000	4200	5000	5600	4600
	#6 (ft.)	0	0	0	0	0	0	1400
Cu. Yds.	Footing	20	24	30	36	42	50	61
Concrete	Wall	43	43	43	43	43	43	43
	Floor	78	78	78	78	78	78	78
	Total	141	145	151	157	163	171	182

Diameter of Bin 78'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-3"	2'-10"	3'-5"	4'-2"	4'-11"	5'-9"	6'-9"
	C	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"	39'-4"
	D	39'-10"	40'-1"	40'-4"	40'-8"	41'-0"	41'-4"	41'-9"
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	12300	8800	8800	8800	8800	8800	8800
	#5 (ft.)	1200	3800	4200	4300	5300	5800	5200
	#6 (ft.)	0	0	0	0	0	0	1600
Cu. Yds.	Footing	21	26	31	38	45	52	66
Concrete	Wall	45	45	45	45	45	45	45
	Floor	85	85	85	85	85	85	85
	Total	151	156	161	168	175	182	196

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Inverted “T” Foundation
2.66” Inside Stiffened Commercial Tanks

Diameter of Bin 90'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	24*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"
	B	2'-5"	3'-0"	3'-8"	4'-5"	5'-3"	6'-2"	7'-1"
	C	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-4"	45'-5"
	D	45'-10"	46'-1"	46'-5"	46'-9"	47'-1"	47'-6"	48'-0"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's
	N	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c	#6 @ 12" c/c
Rerod	#4 (ft.)	11300	11300	11300	11300	11300	11300	11300
	#5 (ft.)	4300	5000	5400	6400	2600	3600	2300
	#6 (ft.)	0	0	0	0	2900	2900	5300
Cu. Yds.	Footing	26	32	39	46	55	70	86
Concrete	Wall	52	52	52	52	52	52	62
	Floor	114	114	114	114	114	114	114
	Total	192	198	205	212	221	236	262

***1'-6" Wall Width**

Diameter of Bin 105'
Soil Bearing Capacity 4000 psf

	Ring No.	12	14	16	18	20	22	23*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"
	B	2'-8"	3'-4"	4'-0"	4'-10"	5'-8"	6'-8"	7'-1"
	C	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-9"	52'-10"
	D	52'-5"	53'-9"	54'-0"	54'-4"	54'-9"	55'-2"	55'-5"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4 (ft.)	14800	14800	14800	14800	14800	14800	14800
	#5 (ft.)	5600	2200	2400	3000	3700	2300	2700
	#6 (ft.)	0	3300	2900	4000	4000	6700	7000
Cu. Yds.	Footing	32	41	49	59	69	88	100
Concrete	Wall	60	60	60	60	60	60	72
	Floor	155	155	155	155	155	155	155
	Total	247	256	264	274	284	303	327

***1"-6" Wall Width**

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T-Cap Foundation Recommendations For 2.66” Corrugation Inside Stiffened Commercial Tanks

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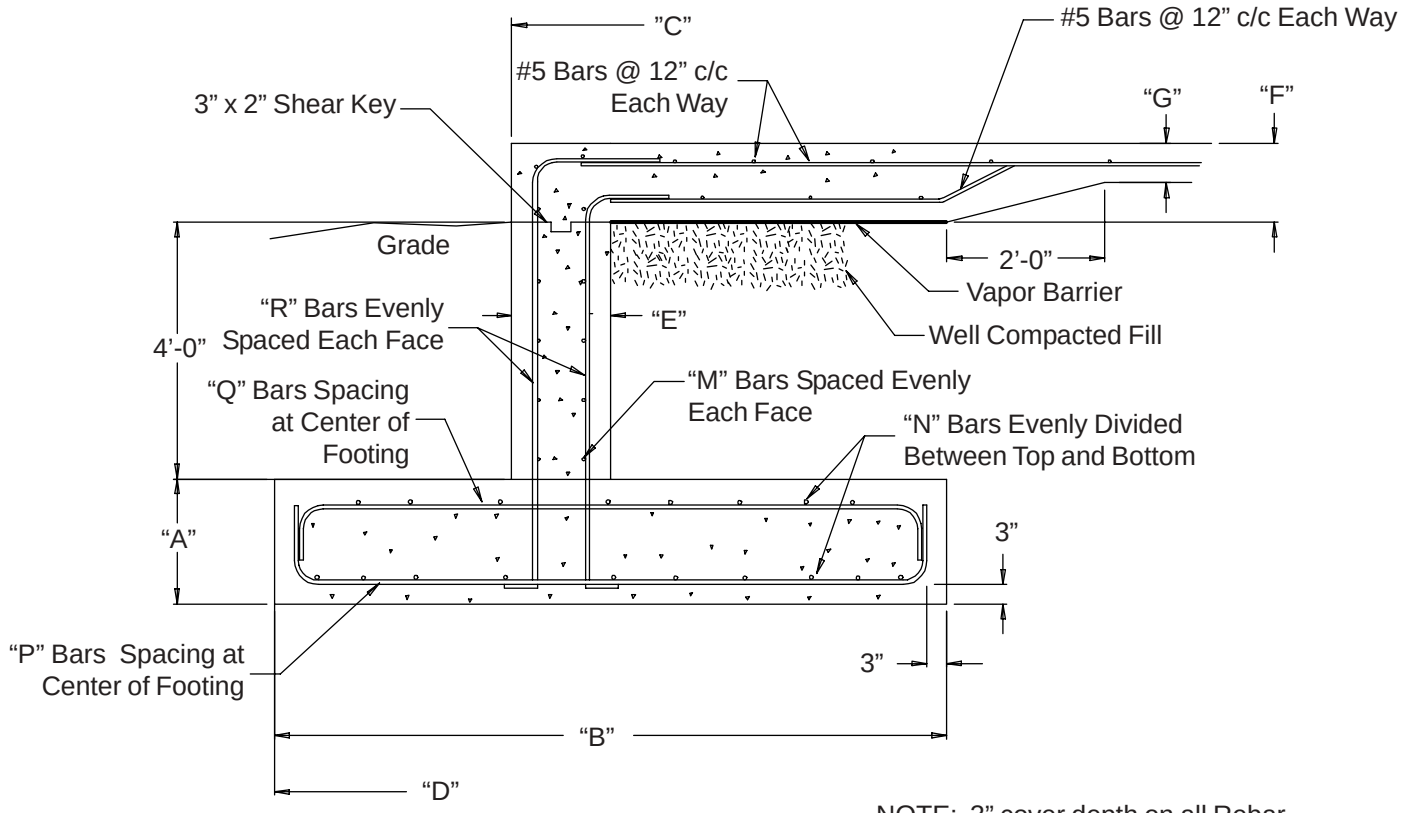
T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks

T-Cap Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity as specified on each chart. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3’-0”. Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



NOTE: 3” cover depth on all Rebar

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T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	27		30			33		
	Rings	28	30	28	30	32	28	30	32
	A	1'-0"	1'-1"	1'-1"	1'-2"	1'-3"	1'-2"	1'-3"	1'-4"
	B	5'-4"	5'-10"	5'-10"	6'-6"	7'-0"	6'-2"	6'-10"	7'-6"
	C	13'-11"	13'-11"	15'-5"	15'-5"	15'-5"	16'-11"	16'-11"	16'-11"
	D	15'-11"	16'-2"	17'-2"	18'-0"	18'-2"	19'-4"	19'-8"	20'-0"
	E	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"
	F	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	4 #4's	4 #4's	4 #4's	4 #4's	4 #4's	4 #4's	4 #4's	4 #4's
	N	5 #5's	6 #5's	6 #5's	8 #5's	9 #5's	7 #5's	8 #5's	10 #5's
	P	#5 @ 11" c/c	#5 @ 10" c/c	#5 @ 10" c/c	#5 @ 9" c/c	#5 @ 9" c/c	#5 @ 10" c/c	#5 @ 9" c/c	#5 @ 9" c/c
	Q	#5 @ 22" c/c	#5 @ 20" c/c	#5 @ 20" c/c	#5 @ 18" c/c	#5 @ 18" c/c	#5 @ 20" c/c	#5 @ 18" c/c	#5 @ 18" c/c
	R	#4 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#5 @ 12" c/c
Rebar	#4 (ft.)	2000	2000	2200	2200	2200	2500	2500	900
	#5 (ft.)	3500	3800	4400	5100	5400	5300	5900	8100
	#6 (ft.)	0	0	0	0	0	0	0	0
Concrete	Footing	17	20	22	27	31	28	33	38
(Cu yds)	Wall	16	16	18	18	19	21	19	19
	Floor	20	20	24	25	25	29	29	29
	Total	53	56	64	70	75	78	81	86

Soil Bearing Capacity: 4000 psf

	DIA	36			42			45		
	Rings	28	30	32	28	30	32	28	30	32
	A	1'-2"	1'-3"	1'-5"	1'-3"	1'-5"	1'-6"	1'-4"	1'-5"	1'-7"
	B	6'-6"	7'-0"	7'-10"	7'-0"	7'-10"	8'-6"	7'-0"	8'-0"	9'-0"
	C	18'-5"	18'-5"	18'-5"	21'-5"	21'-5"	21'-5"	22'-11"	22'-1"	22'-11"
	D	21'-0"	21'-3"	21'-8"	24'-3"	24'-8"	25'-0"	25'-9"	26'-3"	26'-9"
	E	1'-3"	1'-3"	1'-3"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"	1'-0"	1'-1"	1'-3"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	4 #4	4 #4's	4 #4's	5 #4's	5 #4's	5 #4's	5 #4's	4 #5's	4 #5's
	N	8 #5	9 #5's	11 #5's	9 #5's	11 #5's	9 #6's	9 #5's	10 #5's	10 #6's
	P	#5 @ 9" c/c	#5 @ 9" c/c	#6 @ 10" c/c	#5 @ 9" c/c	#6 @ 10" c/c	#6 @ 9" c/c	#5 @ 9" c/c	#6 @ 10" c/c	#6 @ 9" c/c
	Q	#5 @ 18" c/c	#5 @ 18" c/c	#6 @ 20" c/c	#5 @ 18" c/c	#6 @ 20" c/c	#6 @ 18" c/c	#5 @ 18" c/c	#6 @ 20" c/c	#6 @ 18" c/c
	R	#4 @ 12" c/c	#4 @ 12" c/c	#5 @ 12" c/c	#4 @ 12" c/c	#4 @ 12" c/c	#5 @ 12" c/c	#4 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rebar	#4 (ft.)	2700	2700	1000	3300	3500	1400	3400	0	0
	#5 (ft.)	6400	6900	7300	8400	3900	6300	9200	10700	8200
	#6 (ft.)	0	0	2000	0	2200	5000	0	2500	5800
Concrete	Footing	32	37	46	43	55	63	50	60	76
(Cu yds)	Wall	21	22	21	27	27	27	29	29	29
	Floor	34	34	34	45	48	51	52	55	62
	Total	87	93	101	115	130	141	131	144	167

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T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	48			54		
	Rings	28	30	32	28	30	32
	A	1'-4"	1'-6"	1'-7"	1'-5"	1'-7"	1'-10"
	B	7'-6"	8'-6"	9'-4"	8'-0"	9'-0"	10'-0"
	C	24'-5"	24'-5"	24'-5"	27'-5"	27'-5"	27'-5"
	D	27'-6"	28'-0"	28'-5"	30'-9"	32'-3"	31'-9"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-1"	1'-2"	1'-4"	1'-1"	1'-3"	1'-6"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	6 #4's	4 #5's	4 #5's	5 #5's	5 #5's	5 #5's
	N	10 #5's	9 #6's	10 #6's	10 #5's	10 #6's	12 #6's
	P	#5 @ 8 "c/c	#6 @ 9" c/c	#6 @ 9" c/c	#5 @ 8" c/c	#6 @ 9" c/c	#6 @ 9" c/c
	Q	#5 @ 16 "c/c	#6 @ 18" c/c	#6 @ 18" c/c	#5 @ 16" c/c	#6 @ 18" c/c	#6 @ 18" c/c
	R	#4 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c	#4 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rebar	#4 (ft.)	4300	0	0	2800	0	0
	#5 (ft.)	10900	8800	9000	12300	10900	11200
	#6 (ft.)	0	5700	6300	0	7000	8100
Concrete	Footing	57	72	83	72	90	116
(Cu yds)	Wall	31	31	31	35	35	35
	Floor	61	65	71	75	83	95
	Total	149	168	185	182	208	246

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T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	60	72	75	78	90	105
	Rings	28	28	28	28	28	28
	A	1'-6"	1'-9"	1'-9"	1'-9"	1'-11"	2'-1"
	B	8'-6"	9'-6"	10'-0"	10'-0"	11'-0"	12'-0"
	C	30'-5"	36'-5"	37'-11"	39'-5"	45'-5"	52'-11"
	D	34'-0"	40'-6"	42'-3"	43'-9"	50'-3"	58'-2"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-6"
	F	1'-3"	1'-6"	1'-6"	1'-6"	1'-8"	1'-11"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	5 #5	6 #5	6 #5	5 #6	6 #6	7 #6
	N	9 #6	11 #6	12 #6	12 #6	14 #6	16 #6
	P	#5@ 8" c/c	#6@ 9" c/c	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c
	Q	#5@ 16" c/c	#6@ 18" c/c	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c
	R	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	3100	4000	4100	4300	0	0
	#5 (ft.)	13600	13500	14400	12500	21400	28100
	#6 (ft.)	0	10000	11100	14700	22200	25500
Concrete	Footing	90	140	153	160	221	306
(Cu yds)	Wall	38	46	48	50	57	74
	Floor	99	152	164	175	240	342
	Total	227	338	365	385	518	722

Soil Bearing Capacity: 4000 psf

	DIA	60	72	75	78	90	105
	Rings	30	30	30	30	30	30
	A	1'-8"	1'-11"	1'-11"	2'-0"	2'-2"	2'-3"
	B	9'-10"	11'-0"	11'-4"	11'-6"	12'-0"	13'-0"
	C	30'-5"	36'-5"	37'-11"	39'-5"	45'-5"	52'-11"
	D	34'-6"	41'-3"	42'-11"	44'-6"	50'-9"	58'-8"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-6"
	F	1'-5"	1'-7"	1'-8"	1'-9"	1'-11"	2'-1"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-10"	0'-10"
	M	6 #5	6 #5	5 #6	5 #6	6 #6	7 #6
	N	11 #6	14 #6	15 #6	15 #6	16 #6	19 #6
	P	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 7" c/c
	Q	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 14" c/c
	R	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	0	0	0	0	0	0
	#5 (ft.)	13300	17700	15700	17200	21900	28600
	#6 (ft.)	8400	12800	16400	17200	22500	29950
Concrete	Footing	115	177	190	210	272	360
(Cu yds)	Wall	38	46	48	50	57	74
	Floor	109	161	180	197	291	405
	Total	262	384	418	457	620	839

Rev: 12-9-2003

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T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks

Soil Bearing Capacity: 4500 psf

	DIA	60	72	75	78	90
	Rings	32	32	32	32	32
	A	1'-9"	1'-11"	2'-0"	2'-0"	2'-3"
	B	9'-6"	10'-6"	10'-10"	10'-10'	12'-0"
	C	30'-5"	36'-5"	37'-11"	39'-5"	45'-5"
	D	34'-6"	41'-0"	42'-8"	44'-2"	50'-9"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-5"	1'-8"	1'-8"	1'-9"	1'-11"
	G	0'-8"	0'-8"	0'-10"	0'-10"	0'-10"
	M	6 #5	5 #6	5 #6	6 #6	6 #6
	N	11 #6	14 #6	14 #6	14 #6	18 #6
	P	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c
	Q	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c
	R	#5@ 12" C/C	#5@ 12" C/C	#5@ 12" C/C	#5@ 12" C/C	#5@ 12" C/C
Rebar	#4 (ft.)	0	0	0	0	0
	#5 (ft.)	13300	14900	16100	17200	22000
	#6 (ft.)	8400	14800	15700	16800	22600
Concrete	Footing	117	170	190	197	283
(Cu yds)	Wall	38	46	48	50	57
	Floor	108	165	194	213	291
	Total	263	381	432	460	631

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T-Cap Foundation
2.66” Inside Stiffened Commercial Tanks
SOIL BEARING CAPACITY: 5000 psf

	Bin Diameter (ft):	60	72	75	78
	Rings	34	34	34	34
	A	1'-10"	2'-0"	2'-1"	2'-4"
	B	9'-9"	10'-10"	11'-3"	11'-3"
	C	30'-5"	36'-5"	37'-11"	39'-5"
	D	34'-7"	41'-2"	42'-10"	44'-5"
	E	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-6"	1'-8"	1'-9"	1'-9"
	G	0'-8"	0'-8"	0'-10"	0'-10"
	M	6- #5's EACH FACE	5- #6's EACH FACE	5- #6's EACH FACE	6- #6's EACH FACE
	N	12-#6's EACH FACE	16-#6's EACH FACE	16-#6's EACH FACE	16-#6's EACH FACE
	P	#6 @ 8"C/C	#6 @ 8"C/C	#6 @ 8"C/C	#6 @ 8"C/C
	Q	#6@16"C/C	#6@16"C/C	#6@16"C/C	#6@16"C/C
	R	#5@12"C/C	#5@12"C/C	#5@12"C/C	#5@12"C/C
Rebar	#4 (ft.)	0	0	0	0
	#5 (ft.)	13,400	15,300	16,100	17,200
	#6 (ft.)	7,100	12,200	13,100	14,200
Concrete yd^3	Footing	124	181	204	220
	Wall	37	45	47	49
	Floor	111	164	200	214
	Total	272	390	451	483

	Bin Diameter (ft):	90
	Rings	34
	A	2'-4"
	B	12'-3"
	C	45'-5"
	D	50'-10"
	E	1'-4"
	F	2'-0"
	G	0'-10"
	M	7- #6's EACH FACE
	N	20-#6's EACH FACE
	P	#7 @ 9"C/C
	Q	#6@18"C/C
	R	#5@12"C/C
Rebar	#5 (ft.)	22,000
	#6 (ft.)	11,700
	#7 (ft.)	5,900
Concrete yd^3	Footing	298
	Wall	56
	Floor	298
	Total	652

	Bin Diameter (ft):	105
	Rings	33
	A	2'-5"
	B	13'-9"
	C	52'-11"
	D	59'-0"
	E	1'-6"
	F	2'-3"
	G	0'-10"
	M	6- #7's EACH FACE
	N	22-#6's EACH FACE
	P	#7 @ 8"C/C
	Q	#6@16"C/C
	R	#5@12"C/C
Rebar	#5 (ft.)	29,000
	#6 (ft.)	10,700
	#7 (ft.)	12,500
Concrete yd^3	Footing	404
	Wall	73
	Floor	425
	Total	902

Rev: 12-9-2003

A Division of the GSI Group, INC.

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Inside Stiffened Anchor Bolt Chord Charts 2-Post & 3-Post Commercial Tanks

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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks

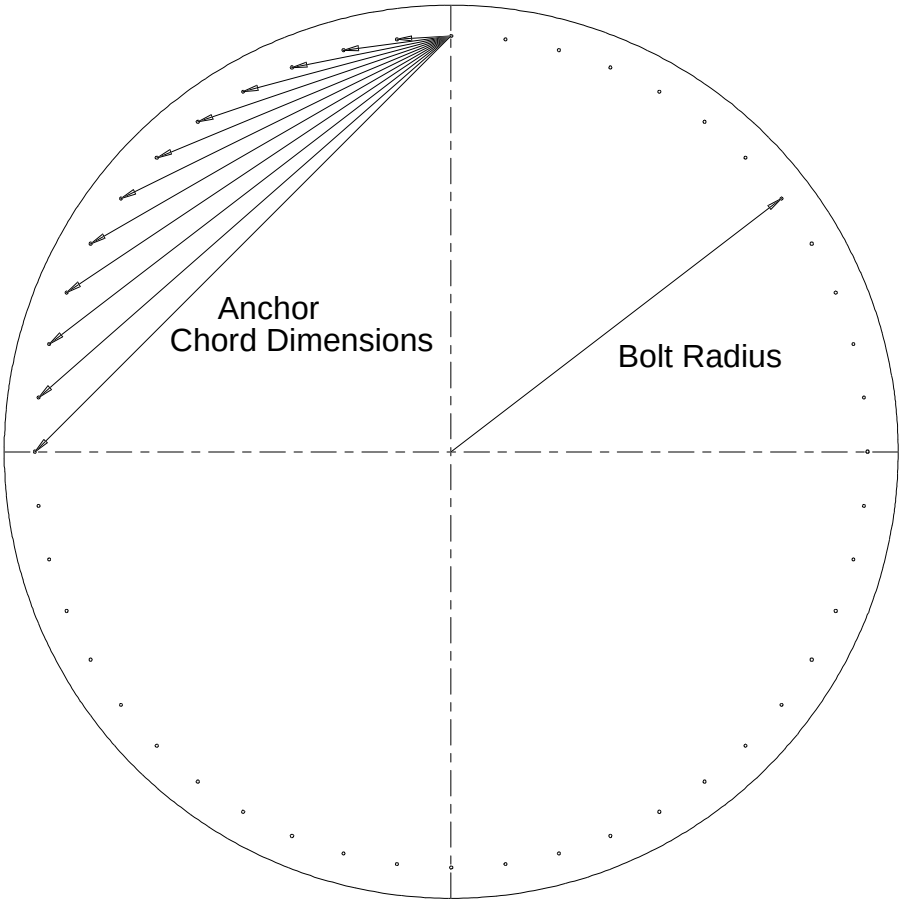
Prior to setting any anchor bolts, you must be sure to have the correct anchor bolt placement chart. This is very critical for stiffener alignment during erection.

The charts are divided up based on the following criteria:

- **Does your bin have 2 or 3 stiffeners per sidewall sheet?**
- **Does your bin have stiffeners on the inside or outside?**
- **What diameter of bin do you have?**

Refer to the proper chart to find the anchor chord that corresponds to the bin that is going to be built.

Start with one anchor bolt and work from it to the left to locate one quarter of the anchor bolts then to the right to locate another quarter of the bolts. Now work off of the last anchor bolts in each quarter to locate remaining anchor bolts in the last two quarters.



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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks

2 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	12 Anchors 18 ' 2 post
Bolt Radius =	8 ' - 7 3 /16 "
Anchor chord:	4 ' - 5 7 /16 "
	8 ' - 7 3 /16 "
	12 ' - 1 15 /16 "

Nominal Diameter =	14 Anchors 21 ' 2 post
Bolt Radius =	10 ' - 1 1 /16 "
Anchor chord:	4 ' - 5 7 /8 "
	8 ' - 9 1 /16 "
	12 ' - 7"
	15 ' - 9 3 /8 "

Nominal Diameter =	16 Anchors 24 ' 2 post
Bolt Radius =	11 ' - 7"
Anchor chord:	4 ' - 6 1 /4 "
	8 ' - 10 3 /8 "
	12 ' - 10 7 /16 "
	16 ' - 4 9 /16 "

Nominal Diameter =	18 Anchors 27 ' 2 post
Bolt Radius =	13 ' - 7 /8 "
Anchor chord:	4 ' - 6 1 /2 "
	8 ' - 11 5 /16 "
	13 ' - 7 /8 "
	16 ' - 9 11 /16 "
	20 ' - 3 /8"

Nominal Diameter =	20 Anchors 30 ' 2 post
Bolt Radius =	14 ' - 6 13 /16 "
Anchor chord:	4 ' - 6 11 /16 "
	8 ' - 0"
	13 ' - 2 3 /4 "
	17 ' - 1 1 /2 "
	20 ' - 7 3 /16 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 2-POST INSIDE STIFFENED TANKS ONLY.

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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	18 Anchors 18 '	3 post
Bolt Radius =	8 ' - 7	3/16 "
Anchor chord:	2 ' - 11	13/16 "
	5 ' - 10	9/16 "
	8 ' - 7	3/16 "
	11 ' -	5/8 "
	13 ' - 2	1/16 "

Nominal Diameter =	21 Anchors 21 '	3 post
Bolt Radius =	10 ' - 1	1/16 "
Anchor chord:	3 ' - 0	1/8 "
	5 ' - 11	3/8 "
	8 ' - 9	1/16 "
	11 ' - 4	7/16 "
	13 ' - 8	3/4 "
	15 ' - 9	3/8 "

Nominal Diameter =	24 Anchors 24 '	3 post
Bolt Radius =	11 ' - 7 "	
Anchor chord:	3 ' - 0	1/4 "
	5 ' - 11	15/16 "
	8 ' - 10	3/8 "
	11 ' - 6	15/16 "
	14 ' - 1	1/4 "
	16 ' - 4	9/16 "

Nominal Diameter =	27 Anchors 27 '	3 post
Bolt Radius =	13 ' - 0	7/8 "
Anchor chord:	3 ' - 0	7/16 "
	6 ' - 0	1/4 "
	8 ' - 11	1/8 "
	11 ' - 8	5/8 "
	14 ' - 4	1/8 "
	16 ' - 9	3/8 "
	18 ' - 11	7/8 "

Nominal Diameter =	30 Anchors 30 '	3 post
Bolt Radius =	14 ' - 6	13/16 "
Anchor chord:	3 ' - 0	9/16 "
	6 ' - 0	11/16 "
	8 ' - 0 "	
	11 ' - 10	3/16 "
	14 ' - 6	13/16 "
	17 ' - 1	1/2 "
	19 ' - 5	15/16 "
	21 ' - 7	13/16 "

Nominal Diameter =	33 Anchors 33 '	3 post
Bolt Radius =	16 ' - 0	7/16 "
Anchor chord:	3 ' - 0	9/16 "
	6 ' - 0	7/8 "
	9 ' - 0	7/16 "
	11 ' - 11	1/16 "
	14 ' - 8	3/8 "
	17 ' - 4	1/8 "
	19 ' - 9	15/16 "
	22 ' - 1	5/8 "
	24 ' - 2	7/8 "

Nominal Diameter =	36 Anchors 36 '	3 post
Bolt Radius =	17 ' - 6	5/8 "
Anchor chord:	3 ' - 0	3/4 "
	6 ' - 1	1/8 "
	9 ' - 1 "	
	12 ' - 0	1/16 "
	14 ' - 10 "	
	17 ' - 6	5/8 "
	20 ' - 1	5/8 "
	22 ' - 6	3/4 "
	24 ' - 9	7/8 "

Nominal Diameter=	39 Anchors 39	3 post
Bolt Radius=	19 ' - 0	1/2 "
Anchor chord:	3 ' - 0	3/4 "
	6 ' - 1	1/4 "
	9 ' - 1	5/16 "
	12 ' - 0	11/16 "
	14 ' - 11	1/8 "
	17 ' - 8	3/8 "
	20 ' - 4	1/4 "
	22 ' - 10	1/2 "
	25 ' - 3 "	
	27 ' - 5	9/16 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 3-POST INSIDE STIFFENED TANKS ONLY.

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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	42 Anchors 42 '	3 post
Bolt Radius=	20 ' - 6	7/16 "
Anchor chord:	3 ' - 0	13/16 "
	6 ' - 1	7/16 "
	9 ' - 1	11/16 "
	12 ' - 1	1/4 "
	15 ' - 0	1/16 "
	17 ' - 9	13/16 "
	20 ' - 6	7/16 "
	23 ' - 1	5/8 "
	25 ' - 7	1/4 "
	27 ' - 11	1/4 "
	30 ' - 1	1/4 "

Nominal Diameter=	45 45 '	3 post
Bolt Radius=	22 ' -	5/16 "
Anchor chord:	3 ' - 0	7/8
	6 ' - 1	9/16 "
	9 ' - 1	7/8 "
	12 ' - 1	11/16 "
	15 ' - 0	3/4 "
	17 ' - 11 "	
	20 ' - 8	1/8 "
	23 ' - 4	1/8 "
	25 ' - 10	11/16 "
	28 ' - 3	3/4 "
	30 7	3/16 "
	32 8	13/16 "

Nominal Diameter=	48 Anchors 48 '	3 post
Bolt Radius=	23 ' - 6	1/4 "
Anchor chord:	3 ' - 0	15/16 "
	6 ' - 1	11/16 "
	9 ' - 2	1/8 "
	12 ' - 2	1/8 "
	15 ' - 1	7/16 "
	18 ' - 0 "	
	20 ' - 9	5/8 "
	23 ' - 6	1/4 "
	26 ' - 1	5/8 "
	28 ' - 7	5/8 "
	31 ' - 0	3/16 "
	33 ' - 3	1/8 "

Nominal Diameter=	54 54 '	3 post
Bolt Radius=	26 ' - 6 "	
Anchor chord:	3 ' - 0	15/16 "
	6 ' - 1	13/16 "
	9 ' - 2	7/16 "
	12 ' - 2	5/8 "
	15 ' - 2	3/8 "
	18 ' - 1	1/2 "
	20 ' - 11	7/8 "
	23 ' - 9	7/16 "
	26 ' - 6 "	
	29 ' - 1	1/2 "
	31 ' - 7	13/16 "
	34 ' - 0	13/16 "
	36 ' - 4	7/16 "
	38 ' - 6	5/8 "

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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter=	60 Anchors 60 ' 3 post
Bolt Radius=	29 ' - 5 7/8 "
Anchor chord:	3 ' - 1 "
	6 ' - 2 "
	9 ' - 2 11/16 "
	12 ' - 3 1/8 "
	15 ' - 3 3/16 "
	18 ' - 2 11/16 "
	21 ' - 1 5/8 "
	23 ' - 11 7/8 "
	26 ' - 9 5/16 "
	29 ' - 5 7/8 "
	32 ' - 1 7/16 "
	34 ' - 8 "
	37 ' - 1 3/8 "
	39 ' - 5 1/2 "
	41 ' - 8 7/16 "

Nominal Diameter=	72 Anchors 72 ' 3 post
Bolt Radius=	35 ' - 5 3/4 "
Anchor chord:	3 ' - 1 3/16 "
	6 ' - 2 1/4 "
	9 ' - 3 3/16 "
	12 ' - 3 7/8 "
	15 ' - 4 5/16 "
	18 ' - 4 3/8 "
	21 ' - 4 1/16 "
	24 ' - 3 1/4 "
	27 ' - 1 7/8 "
	29 ' - 11 7/8 "
	32 ' - 9 3/16 "
	35 ' - 5 3/4 "
	38 ' - 1 1/2 "
	40 ' - 8 3/8 "
	43 ' - 2 3/8 "
	45 ' - 7 5/16 "
	47 ' - 11 1/4 "
	50 ' - 2 1/16 "

Nominal Diameter=	75 Anchors 75 ' 3 post
Bolt Radius=	36 ' - 11 5/8 "
Anchor chord:	3 ' - 1 3/16 "
	6 ' - 2 1/4 "
	9 ' - 3 1/4 "
	12 ' - 4 "
	15 ' - 4 1/2 "
	18 ' - 4 11/16 "
	21 ' - 4 1/2 "
	24 ' - 3 13/16 "
	27 ' - 2 5/8 "
	30 ' - 0 15/16 "
	32 ' - 10 9/16 "
	35 ' - 7 7/16 "
	38 ' - 3 5/8 "
	40 ' - 11 "
	43 ' - 5 9/16 "
	45 ' - 11 1/8 "
	48 ' - 3 3/4 "
	50 ' - 7 3/8 "

Nominal Diameter=	78 Anchors 78 ' 3 post
Bolt Radius=	38 ' - 5 1/2 "
Anchor chord:	3 ' - 1 3/16 "
	6 ' - 2 5/16 "
	9 ' - 3 5/16 "
	12 ' - 4 1/8 "
	15 ' - 4 11/16 "
	18 ' - 4 15/16 "
	21 ' - 4 13/16 "
	24 ' - 4 5/16 "
	27 ' - 3 3/8 "
	30 ' - 1 13/16 "
	32 ' - 11 3/4 "
	35 ' - 9 "
	38 ' - 5 9/16 "
	41 ' - 1 3/8 "
	43 ' - 8 3/8 "
	46 ' - 2 9/16 "
	48 ' - 7 13/16 "
	51 ' - 0 1/8 "
	53 ' - 3 7/16 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 3-POST INSIDE STIFFENED TANKS ONLY.

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Inside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter=	90 Anchors 90 '	3 post
Bolt Radius=	44 ' - 5	1/8 "
Anchor chord:	3 ' - 1	1/4 "
	6 ' - 2	7/16 "
	9 ' - 3	1/2 "
	12 ' - 4	7/16 "
	15 ' - 5	3/16 "
	18 ' - 5	3/4 "
	21 ' - 6 "	
	24 ' - 5	15/16 "
	27 ' - 5	9/16 "
	30 ' - 4	3/4 "
	33 ' - 3	1/2 "
	36 ' - 1	3/4 "
	38 ' - 11	7/16 "
	41 ' - 8	5/8 "
	44 ' - 5	3/16 "
	47 ' - 1	1/16 "
	49 ' - 8	5/8 "
	52 ' - 2	13/16 "
	54 ' - 8	1/2 "
	57 ' - 1	7/16 "
	59 ' - 5	1/2 "
	61 ' - 8	3/4 "

Nominal Diameter=	105 Anchors 105 '	3 post
Bolt Radius=	51 ' - 10	11/16 "
Anchor chord:	3 ' - 1	5/16 "
	6 ' - 2	1/2 "
	9 ' - 3	11/16 "
	12 ' - 4	11/16 "
	15 ' - 5	5/8 "
	18 ' - 6	3/8 "
	21 ' - 6	15/16 "
	24 ' - 7	1/4 "
	27 ' - 7	5/16 "
	30 ' - 7	1/8 "
	33 ' - 6	9/16 "
	36 ' - 5	5/8 "
	39 ' - 4	5/16 "
	42 ' - 2	9/16 "
	45 ' - 0	3/8 "
	47 ' - 9	11/16 "
	50 ' - 6	1/2 "
	53 ' - 2	3/4"
	55 ' - 10	7/16 "
	58 ' - 5	9/16 "
	61 ' - 0 "	
	63 ' - 5	13/16 "
	65 ' - 11 "	
	68 ' - 3	3/8 "
	70 ' - 7	1/16 "
	72 ' - 10 "	

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Inverted “T” Foundation Recommendations For 2.66” Corrugation Outside Stiffened Commercial Tanks

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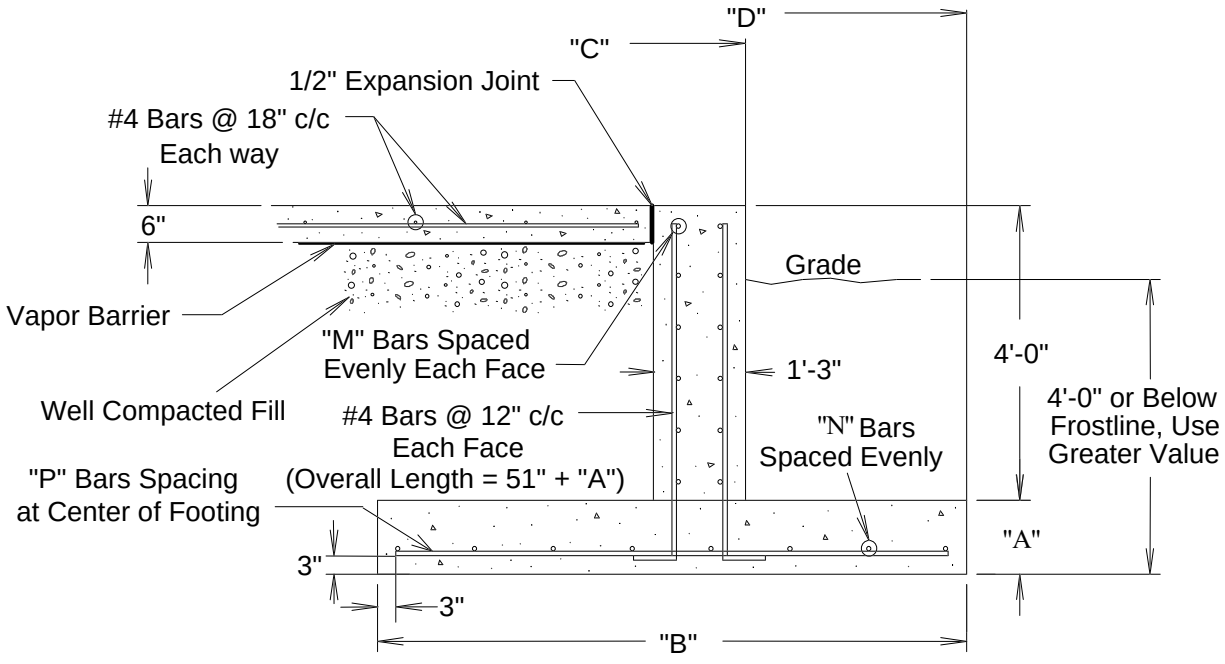
Inverted "T" Foundation
2.66" Outside Stiffened Commercial Tanks

3000 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin:18'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-10"	2'-3"	2'-8"	3'-2"
	C	9'-10"	9'-10"	9'-10"	9'-10"
	D	10'-1"	10'-3"	10'-5"	10'-8"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	1700	1700	1700	1700
	#5(ft)	300	300	400	400
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	4	5	6	7
Concrete	Wall	10	10	10	10
	Floor	5	5	5	5
	Total	19	20	21	22

Diameter of Bin: 21'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-11"	2'-4"	2'-10"	3'-5"
	C	11'-4"	11'-4"	11'-4"	11'-4"
	D	11'-8"	11'-10"	12'-0"	12'-3"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	2100	2100	2100	2100
	#5(ft)	300	500	400	500
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	5	6	7	9
Concrete	Wall	12	12	12	12
	Floor	6	6	6	6
	Total	34	25	26	27

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 24'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-0"	2'-6"	3'-0"	3'-8"	4'-3"	4'-10"	5'-5"
	C	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"
	D	13'-2"	13'-5"	13'-7"	13'-11"	14'-2"	14'-5"	14'-8"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c
Rerod	#4(ft)	2300	2300	2300	2300	2300	2300	2300
	#5(ft)	300	500	500	700	700	700	900
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	6	8	9	11	12	14	16
Concrete	Wall	14	14	14	14	14	14	14
	Floor	8	8	8	8	8	8	8
	Total	28	30	31	33	34	36	38

Diameter of Bin: 27'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-1"	2'-7"	3'-2"	3'-9"	4'-6"	5'-1"	5'-7"
	C	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"
	D	14'-9"	14'-11"	15'-2"	15'-5"	15'-9	16'-0"	16'-3"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c
Rerod	#4(ft)	2800	2800	2800	2800	2800	2800	2800
	#5(ft)	400	500	500	700	800	900	1100
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	7	9	11	12	15	16	18
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	32	34	36	37	40	41	43

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 30'
Soil Bearing Capacity 3000 psf

	Ring no.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-2"	2'-8"	3'-4"	3'-11"	4'-8"	5'-3"	6'-0"
	C	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"
	D	16'-3"	16'-5"	16'-9"	17'-0"	17'-4"	17'-7"	17'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c
Rerod	#4(ft)	3000	3000	3000	3000	3000	3000	3000
	#5(ft)	500	500	700	700	900	900	600
	#6(ft)	0	0	0	0	0	0	500
Cu. Yd's.	Footing	8	10	12	14	17	19	21
Concrete	Wall	17	17	17	17	17	17	17
	Floor	13	13	13	13	13	13	13
	Total	38	40	42	44	47	49	51

Diameter of Bin: 33'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-2"	2'-10"	3'-5"	4'-2"	4'-10"	5'-5"	6'-2"
	C	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"
	D	17'-9"	18'-1"	18'-3"	18'-7"	18'-11"	19'-2"	19'-6"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c
Rerod	#4(ft)	3400	3400	3400	3400	3400	3400	3400
	#5(ft)	600	700	800	900	1000	1200	700
	#6(ft)	0	0	0	0	0	0	600
Cu. Yd's.	Footing	9	11	14	16	19	21	24
Concrete	Wall	19	19	19	19	19	19	19
	Flooring	16	16	16	16	16	16	16
	Total	44	46	49	51	54	56	59

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 36'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-3"	2'-11"	3'-7"	4'-4"	5'-1"	5'-10"	6'-4"
	C	18'-10"	18'-10"	18'-10"	18'-10"	18'-10	18'-10"	18'-10"
	D	19'-3"	19'-7"	19'-10"	20'-2"	20'-6"	20'-11"	21'-1"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 12" c/c
Rerod	#4(ft)	3800	3800	3800	3800	3800	3800	3800
	#5(ft)	600	700	800	1000	1100	1400	700
	#6(ft)	0	0	0	0	0	0	700
Cu. Yd's.	Footing	10	13	16	19	22	25	27
Concrete	Wall	21	21	21	21	21	21	21
	Floor	18	18	18	18	18	18	18
	Total	49	52	55	58	61	64	66

Diameter of Bin: 39'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-4"	3'-0"	3'-8"	4'-5"	5'-3"	5'-11"	6'-8"
	C	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"
	D	20'-8"	21'-0"	21'-4"	21'-8"	22'-0"	22'-4"	22'-8"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	3 #5's	3 #5's	4 #5's	5's #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 14" c/c	#6 @ 11" c/c
Rerod	#4(ft)	4200	4200	4200	4200	4400	4400	4400
	#5(ft)	650	700	900	1100	1400	800	1000
	#6(ft)	0	0	0	0	0	600	900
Cu. Yd's.	Footing	11	15	18	21	23	28	31
Concrete	Wall	24	24	24	24	24	24	24
	Floor	22	22	22	22	22	22	22
	Total	57	61	64	67	69	74	77

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 42'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-5"	3'-1"	3'-9"	4'-6"	5'-5"	6'-0"	6'-11"
	C	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"
	D	22'-4"	22'-8"	22'-11"	23'-3"	23'-8"	23'-11"	24'-4"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	3 #5's	3 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 14" c/c	#6 @ 10" c/c
Rerod	#4(ft)	4700	4700	4700	4700	4900	4900	4900
	#5(ft)	700	700	1000	1200	1400	800	1000
	#6(ft)	0	0	0	0	0	700	1100
Cu. Yd's.	Footing	12	16	19	22	27	30	34
Concrete	Wall	24	24	24	24	24	24	24
	Floor	25	25	35	25	25	25	25
	Total	61	65	68	71	76	79	83

Diameter of Bin: 45'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-6"	3'-2"	3'-11"	4'-8"	5'-6"	6'-2"	7'-1"
	C	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"
	D	23'-11"	24'-3"	24'-6"	24'-10"	25'-3"	25'-6"	25'-11"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 13" c/c	#6 @ 9" c/c
Rerod	#4(ft)	5100	5400	5400	5600	5600	3600	3600
	#5(ft)	750	1000	1100	1300	1700	2400	2500
	#6(ft)	0	0	0	0	0	800	1300
Cu. Yd's.	Footing	14	17	21	25	29	33	37
Concrete	Wall	27	27	27	27	27	27	27
	Floor	29	29	29	29	29	29	29
	Total	70	73	77	81	85	89	93

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 48'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	2'-7"	3'-3"	4'-0"	4'-10"	5'-7"	6'-4"	7'-3"
	C	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"
	D	25'-5"	25'-9"	26'-1"	26'-5"	26'-9"	27'-1"	27'-6"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 8" c/c
Rerod	#4(ft)	5700	6000	6000	6300	4100	4100	4100
	#5(ft)	800	1100	1200	1400	3400	2600	2700
	#6(ft)	0	0	0	0	0	900	1600
Cu. Yd's.	Footing	15	19	23	27	32	36	41
Concrete	Wall	28	28	28	28	28	28	28
	Floor	33	33	33	33	33	33	33
	Total	76	80	80	84	93	97	102

Diameter of Bin: 54'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-9"	3'-5"	4'-3"	5'-1"	6'-0"	6'-9"	7'-8"
	C	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"
	D	28'-2"	28'-6"	28'-10"	29'-2"	29'-6"	29'-10"	30'-2"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's
	N	3 #5's	4 #5's	4 #5's	5's #5's	6 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 13" c/c	#6 @ 9" c/c
Rerod	#4(ft)	6500	6900	6900	7200	7200	4800	4800
	#5(ft)	900	1200	1300	1600	2000	3800	3100
	#6(ft)	0	0	0	0	0	0	1700
Cu. Yd's.	Footing	18	23	28	33	38	43	52
Concrete	Wall	33	33	33	33	33	33	33
	Floor	42	42	42	42	42	42	42
	Total	93	98	103	108	113	118	127

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 60'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-10"	3'-6"	4'-5"	5'-3"	6'-2"	7'-1"	8'-0"
	C	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"
	D	31'-6"	31'-9"	32'-2"	32'-6"	32'-11"	33'-4"	33'-9"
	M	5 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's	6 #5's
	N	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c	#6 @ 11" c/c
Rerod	#4(ft)	7700	8100	8500	8500	5800	5800	5900
	#5(ft)	1000	1300	1700	1800	4100	3300	3800
	#6(ft)	0	0	0	0	0	1100	1600
Cu. Yd's.	Footing	20	25	31	37	43	50	61
Concrete	Wall	35	35	35	35	35	35	35
	Floor	52	51	51	51	51	51	51
	Total	106	111	117	123	129	136	147

Diameter of Bin: 72'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	3'-0"	3'-10"	4'-8"	5'-9"	6'-9"	7'-8"	8'-7"
	C	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"
	D	37'-6"	37'-11"	38'-3"	38'-9"	39'-7"	40'-0"	40'-0"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	9 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4(ft)	10600	11000	7800	7800	7800	7800	7900
	#5(ft)	1200	1700	4400	4800	5400	4700	4900
	#6(ft)	0	0	0	0	0	1700	2200
Cu. Yd's.	Footing	26	33	40	49	57	65	78
Concrete	Wall	42	42	42	42	42	42	42
	Floor	74	74	74	74	74	74	74
	Total	142	149	156	165	173	181	194

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 75'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	3'-1"	3'-11"	4'-10"	5'-10"	6'-9"	7'-8"	8'-9"
	C	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"
	D	39'-1"	39'-5"	39'-10"	40'-3"	40'-8"	41'-1"	41'-7"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 10" c/c
Rerod	#4(ft)	11300	11800	8400	8400	8400	8400	8500
	#5(ft)	1400	1700	4500	5000	6200	4800	5300
	#6(ft)	0	0	0	0	0	1900	2400
Cu. Yd's.	Footing	27	35	43	51	59	67	89
Concrete	Wall	43	43	43	43	43	43	43
	Floor	80	80	80	80	80	80	80
	Total	150	158	166	174	182	190	212

Diameter of Bin: 78'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	3'-2"	4'-0"	4'-10"	5'-10"	6'-11"	7'-10"	8'-11"
	C	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"
	D	40'-7"	41'-0"	41'-4"	41'-9"	42'-3"	42'-8"	43'-1
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 9" c/c
Rerod	#4(ft)	12500	9000	9000	9000	9000	9000	9100
	#5(ft)	1400	4300	4800	5200	6600	5000	6000
	#6(ft)	0	0	0	0	0	2000	2800
Cu. Yd's.	Footing	29	37	44	53	63	71	94
Concrete	Wall	45	45	45	45	45	45	45
	Floor	87	87	87	87	87	87	87
	Total	161	169	176	185	195	203	226

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 90'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	24*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"
	B	3'-5"	4'-4"	5'-3"	6'-2"	7'-3"	8'-5"	9'-6"
	C	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-10"
	D	46'-8"	47'-1"	47'-6"	47'-11"	48'-5"	48'-11"	49'-6"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's
	N	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	9 #5's	11 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 13" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4(ft)	11400	11400	11400	11400	11400	11500	11500
	#5(ft)	4900	6000	6200	7100	2000	2600	3100
	#6(ft)	0	0	0	0	4700	5600	7200
Cu. Yd's.	Footing	36	46	55	65	76	95	116
Concrete	Wall	52	52	52	52	52	52	62
	Floor	116	113	116	116	116	116	116
	Total	204	214	223	233	244	263	294

*** 1'-6" Wall Width**

Diameter of Bin: 105'
Soil Bearing Capacity: 3000 psf

	Ring No.	12	14	16	18	20	22	23*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"	1'-2"
	B	3'-9"	4'-8"	5'-9"	6'-9"	7'-10"	8'-11"	9'-7"
	C	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"
	D	54'-3"	54'-8"	55'-2"	55'-7"	56'-1"	56'-7"	57'-1"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's
	N	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	10 #5's	11 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#5 @ 11" c/c	#6 @ 9" c/c	#6 @ 8" c/c
Rerod	#4(ft)	14900	14900	14900	14900	14900	15000	14900
	#5(ft)	6400	2900	3500	4400	5400	3300	3700
	#6(ft)	0	3400	2900	4000	4000	8400	9200
Cu. Yd's.	Footing	46	57	70	83	96	127	137
Concrete	Wall	61	61	61	61	61	61	73
	Floor	157	157	157	157	157	157	157
	Total	264	275	288	301	314	345	367

*** 1'-6" Wall Width**

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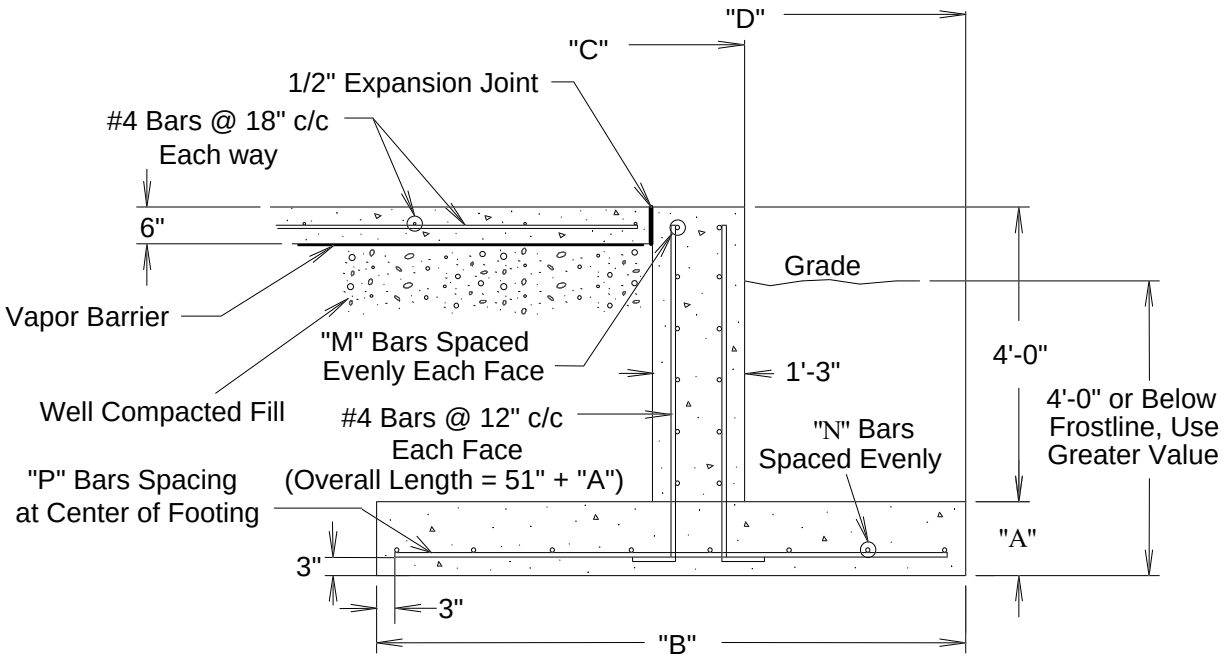
Inverted "T" Foundation
2.66" Outside Stiffened Commercial Tanks

3500 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 3500 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin:18'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-10"	2'-3"	2'-8"
	C	9'-10"	9'-10"	9'-10"	9'-10"
	D	9'-11"	10'-1"	10'-3"	10'-5"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	1700	1700	1700	1700
	#5(ft)	300	300	300	400
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	4	4	5	6
Concrete	Wall	10	10	10	10
	Floor	5	5	5	5
	Total	19	19	20	21

Diameter of Bin: 21'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-7"	2'-0"	2'-5"	2'-10"
	C	11'-4"	11'-4"	11'-4"	11'-4"
	D	11'-6"	11'-8"	11'-10"	12'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14"c/c	#5 @ 14"c/c
Rerod	#4(ft)	2100	2100	2100	2100
	#5(ft)	300	300	500	400
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	4	5	6	7
Concrete	Wall	12	12	12	12
	Floor	6	6	6	6
	Total	23	24	25	26

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 24'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-1"	2'-6"	3'-0"	3'-6"	4'-1"	4'-8"
	C	12'-10	12'-10	12'-10	12'-10	12'-10	12'-10	12'-10
	D	13'-0"	13'-2"	13'-4"	13'-7"	13'-10"	14'-1"	14'-4"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	2300	2300	2300	2300	2300	2300	2300
	#5(ft)	300	400	500	500	600	700	700
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	5	6	8	9	10	12	14
Concrete	Wall	14	14	14	14	14	14	14
	Floor	8	8	8	8	8	8	8
	Total	27	28	30	31	32	34	36

Diameter of Bin: 27'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-8"	3'-2"	3'-9"	4'-4"	4'-10"
	C	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"
	D	14'-7"	14'-9"	15'-0"	15'-2"	15'-5"	15'-8"	15'-11"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	2800	2800	2800	2800	2800	2800	2800
	#5(ft)	300	500	500	500	700	800	900
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	6	7	9	11	12	14	16
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	31	32	34	36	37	39	41

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 30'
Soil Bearing Capacity 3500 psf

	Ring no.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-3"	2'-9"	3'-4"	3'-11"	4'-6"	5'-1"	6'-6"
	C	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"
	D	16'-0"	16'-3"	16'-6"	16'-9"	17'-0"	17'-3"	18'-3"	19'-1"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#6 @ 9" c/c
Rerod	#4(ft)	3000	3000	3000	3000	3000	3000	3000	3000
	#5(ft)	400	500	500	700	700	900	1000	600
	#6(ft)	0	0	0	0	0	0	0	800
Cu. Yd's.	Footing	7	8	10	12	14	16	19	24
Concrete	Wall	17	17	17	17	17	17	17	17
	Floor	13	13	13	13	13	13	13	13
	Total	37	38	40	42	44	46	49	54

Diameter of Bin: 33'
Soil Bearing Capacitly: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1 10"	2'-4"	2'-10"	3'-5"	4'-1"	4'-8"	5'-3"	7'-3"
	C	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"
	D	17'-7"	17'-10"	18'-0"	18'-3"	18'-7"	18'-10"	19'-1"	20'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5#5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14"c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4(ft)	3400	3400	3400	3400	3400	3400	3400	3400
	#5(ft)	500	600	700	800	900	1000	1100	700
	#6(ft)	0	0	0	0	0	0	0	700
Cu. Yd's.	Footing	8	10	11	14	16	18	21	28
Concrete	Wall	19	19	19	19	19	19	19	19
	Flooring	16	16	16	16	16	16	16	16
	Total	43	45	46	49	51	53	56	63

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 36'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-11"	2'-5"	2'-11"	3'-7"	4'-3"	4'-10"	5'-5"	7'-0"
	C	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"
	D	19'-2"	19'-4"	19'-7"	19'-10"	20'-2"	20'-5"	20'-8"	21'-4"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 12" c/c
Rerod	#4(ft)	3800	3800	3800	3800	3800	3800	3800	3400
	#5(ft)	500	600	700	800	900	1100	1400	700
	#6(ft)	0	0	0	0	0	0	0	800
Cu. Yd's.	Footing	9	11	13	16	18	21	23	30
Concrete	Wall	21	21	21	21	21	21	21	21
	Floor	18	18	18	18	18	18	18	18
	Total	48	50	52	55	57	60	62	69

Diameter of Bin: 39'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-0"	2'-6"	3'-1"	3'-8"	4'-5"	5'-1"	5'-9"	7'-3"
	C	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"
	D	20'-8"	21'-0"	21'-4"	21'-8"	22'-0"	22'-4"	22'-8"	23'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4(ft)	4200	4200	4200	4200	4500	4500	4500	4500
	#5(ft)	500	700	800	900	1100	1300	800	1000
	#6(ft)	0	0	0	0	0	0	900	1000
Cu. Yd's.	Footing	10	13	15	18	22	25	28	34
Concrete	Wall	24	24	24	24	24	24	24	24
	Floor	22	22	22	22	22	22	22	22
	Total	56	59	61	64	68	71	74	80

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 42'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-0"	2'-6"	3'-2"	3'-9"	4'-6"	5'-3"	6'-0"	7'-6"
	C	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"
	D	22'-2"	22'-4"	22'-8"	22'-11"	23'-3"	23'-7	23'-11	24'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c
Rerod	#4(ft)	4700	4700	4700	4700	4900	4900	4900	5000
	#5(ft)	500	700	800	1000	1200	1400	800	1000
	#6(ft)	0	0	0	0	0	0	800	1100
Cu. Yd's.	Footing	10	13	16	19	22	26	30	40
Concrete	Wall	24	24	24	24	24	24	24	24
	Floor	25	25	25	25	25	25	25	25
	Total	59	62	65	68	71	75	79	89

Diameter of Bin: 45'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-1"	2'-7"	3'-3"	3'-11"	4'-7"	5'-4"	6'-1"	7'-10"
	C	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"
	D	23'-8"	24'-0"	24'-4"	24'-8"	25'-0"	25'-4"	25'-8"	26'-0"
	M	5 #4's	6 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4#5's	4 #5's	5 #5's	6 #5's	6 #5's	9 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4(ft)	5100	5300	5300	5300	5600	3600	3600	3600
	#5(ft)	550	750	1000	1100	1300	3100	2400	3100
	#6(ft)	0	0	0	0	0	0	850	1200
Cu. Yd's.	Footing	12	14	18	21	25	29	33	41
Concrete	Wall	27	27	27	27	27	27	27	27
	Floor	29	29	29	29	29	29	29	29
	Total	68	70	74	77	81	85	89	97

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 48'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-3"
	B	2'-1"	2'-8"	3'-4"	4'-0"	4'-8"	5'-5"	6'-2"	8'-0"
	C	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"
	D	25'-2"	25'-6"	25'-9"	26'-1"	26'-4"	26'-8"	27'-0"	27'-6"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c	#6 @ 11" c/c	#6 @ 11" c/c
Rerod	#4(ft)	5700	6000	6000	6300	4100	4100	4100	4200
	#5(ft)	700	800	1100	1200	3000	3500	2600	3400
	#6(ft)	0	0	0	0	0	0	1000	1300
Cu. Yd's.	Footing	12	15	19	23	27	31	35	55
Concrete	Wall	28	28	28	28	28	28	28	28
	Floor	33	33	33	33	33	33	33	33
	Total	73	76	80	84	88	92	96	116

Diameter of Bin: 54'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-3"	2'-10"	3'-6"	4'-3"	5'-1	5'-9"	6'-6"	8'-9"
	C	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"	27'-10"
	D	28'-2"	28'-6"	28'-10"	29'-2"	29'-6"	29'-10"	30'-2"	30'-6"
	M	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's	5 #5's	6 #5's
	N	2 #5's	3 #5's	4#5's	5 #5's	5 #5's	6 #5's	7 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 11" c/c	#6 @ 10" c/c
Rerod	#4(ft)	6500	6900	6900	7200	7200	4800	4800	4900
	#5(ft)	700	900	1200	1500	1600	3700	3000	3400
	#6(ft)	0	0	0	0	0	0	1200	1700
Cu. Yd's.	Footing	15	19	23	28	33	37	42	63
Concrete	Wall	33	33	33	33	33	33	33	33
	Floor	42	42	42	42	42	42	42	42
	Total	90	94	98	103	108	112	117	138

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 60'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"
	B	2'-4"	2'-11"	3'-7"	4'-5"	5'-3"	6'-0"	6'-11"	9'-3"
	C	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"
	D	31'-3"	31'-6"	31'-9"	32'-2"	32'-6"	32'-10"	33'-3"	34'-4"
	M	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's	7 #4's	5 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	10 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13"	#6 @ 11" c/c	#6 @ 8" c/c
Rerod	#4(ft)	7700	7700	8100	8100	8100	8500	5800	5900
	#5(ft)	900	1000	1300	1700	1800	2200	3300	4200
	#6(ft)	0	0	0	0	0	0	1400	2500
Cu. Yd's.	Footing	17	21	25	31	37	42	48	75
Concrete	Wall	35	35	35	35	35	35	35	35
	Floor	51	51	51	51	51	51	51	51
	Total	103	107	111	117	123	128	134	161

Diameter of Bin: 72'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-6"	3'-2"	3'-11"	4'-9"	5'-7"	6'-6"	7'-6"	9'-2"
	C	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"
	D	37'-4"	37'-7"	37'-11"	38'-4"	38'-8"	39'-1"	40'-4"	40'-6"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	12 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c	#6 @ 11" c/c	#6 @ 8" c/c
Rerod	#4(ft)	10600	11000	7800	7800	7800	7800	7900	7900
	#5(ft)	1100	1300	4000	4400	4700	6100	4700	5600
	#6(ft)	0	0	0	0	0	0	1800	3000
Cu. Yd's.	Footing	21	27	33	40	47	55	70	96
Concrete	Wall	42	42	42	42	42	42	42	42
	Floor	74	74	74	74	74	74	74	74
	Total	137	143	149	156	163	171	186	212

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 75'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-2"	1'-3"
	B	2'-7"	3'-3"	4'-0"	4'-10"	5'-9"	6'-6"	7'-8"	10'-5"
	C	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"
	D	38'-10"	39'-2"	39'-6"	39'-10"	40'-3"	40'-7"	41'-1"	42'-8"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's	8 #5's	13 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c	#6 @ 10" c/c	#6 @ 9" c/c
Rerod	#4(ft)	11300	11800	8400	8400	8400	8400	8500	8500
	#5(ft)	1300	1600	4200	4500	5500	6100	4800	6000
	#6(ft)	0	0	0	0	0	0	2100	3200
Cu. Yd's.	Footing	23	29	35	43	51	57	72	114
Concrete	Wall	43	43	43	43	43	43	43	43
	Floor	80	80	80	80	80	80	80	80
	Total	146	152	158	166	174	180	195	237

Diameter of Bin: 78'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24	27
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-3"
	B	2'-7"	3'-3"	4'-0"	4'-11"	5'-10"	6'-9"	7'-8"	9'-0"
	C	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"
	D	40'-4"	40'-8"	41'-0"	41'-5"	41'-9"	42'-2"	42'-7"	43'-4"
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's	7 #5's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	11 #6
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#6 @ 14" c/c	#6 @ 11" c/c	#6 @ 9" c/c
Rerod	#4(ft)	12500	9000	9000	9000	9000	9000	9100	9100
	#5(ft)	1300	4100	4300	4800	5700	4800	5500	3500
	#6(ft)	0	0	0	0	0	1400	2000	5500
Cu. Yd's.	Footing	24	30	37	45	53	61	75	102
Concrete	Wall	45	45	45	45	45	45	45	45
	Floor	87	87	87	87	87	87	87	87
	Total	156	162	169	177	185	193	207	234

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Inverted "T" Foundation
2.66" Outside Stiffened Commercial Tanks

Diameter of Bin: 90'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	24*	27*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-4"
	B	2'-10"	3'-7"	4'-4"	5'-3"	6'-2"	7'-1"	8'-2"	9'-7"
	C	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-10"	45'-10"
	D	46'-6"	46'-10"	47'-1"	47'-6"	47'-11"	48'-4"	48'-11"	49'-8"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's	6 #6's
	N	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	7 #5's	9 #5's	12 #6's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c	#6 @ 8" c/c
Rerod	#4(ft)	11400	11400	11400	11400	11400	11400	11500	11700
	#5(ft)	4400	5500	6000	6700	3300	2000	2600	0
	#6(ft)	0	0	0	0	2900	4800	6000	10800
Cu. Yd's.	Footing	30	38	46	55	65	74	93	134
Concrete	Wall	52	52	52	52	52	52	62	62
	Floor	116	116	116	116	116	116	116	116
	Total	198	206	214	223	233	242	271	312

*** 1'-6" Wall Width**

Diameter of Bin: 105'
Soil Bearing Capacity: 3500 psf

	Ring No.	12	14	16	18	20	22	23*	27*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-1"	1'-9"
	B	3'-1"	3'-10"	4'-9"	5'-7"	6'-9"	7'-8"	8'-1"	11'-3"
	C	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-3"	53'-3"
	D	54'-0"	54'-4	54'-9"	55'-1"	55'-7"	56'-0"	56'-3"	57'-8"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's	8 #6's
	N	3 #5's	4 #5's	5 #5's	6 #5's	7 #5's	8 #5's	8 #5's	12 #6's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 14" c/c	#6 @ 10" c/c	#6 @ 10" c/c	#6 @ 9" c/c
Rerod	#4(ft)	14900	14900	14900	14900	14900	15000	15000	14800
	#5(ft)	5800	2400	2900	3700	2300	2700	2700	0
	#6(ft)	0	3400	2900	4000	5800	7600	7700	14200
Cu. Yd's.	Footing	38	47	58	68	83	101	107	239
Concrete	Wall	61	61	61	61	61	61	73	73
	Floor	157	157	157	157	157	157	158	158
	Total	256	265	276	286	301	319	338	470

*** 1'-6" Wall Width**

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REV. 9/16/02

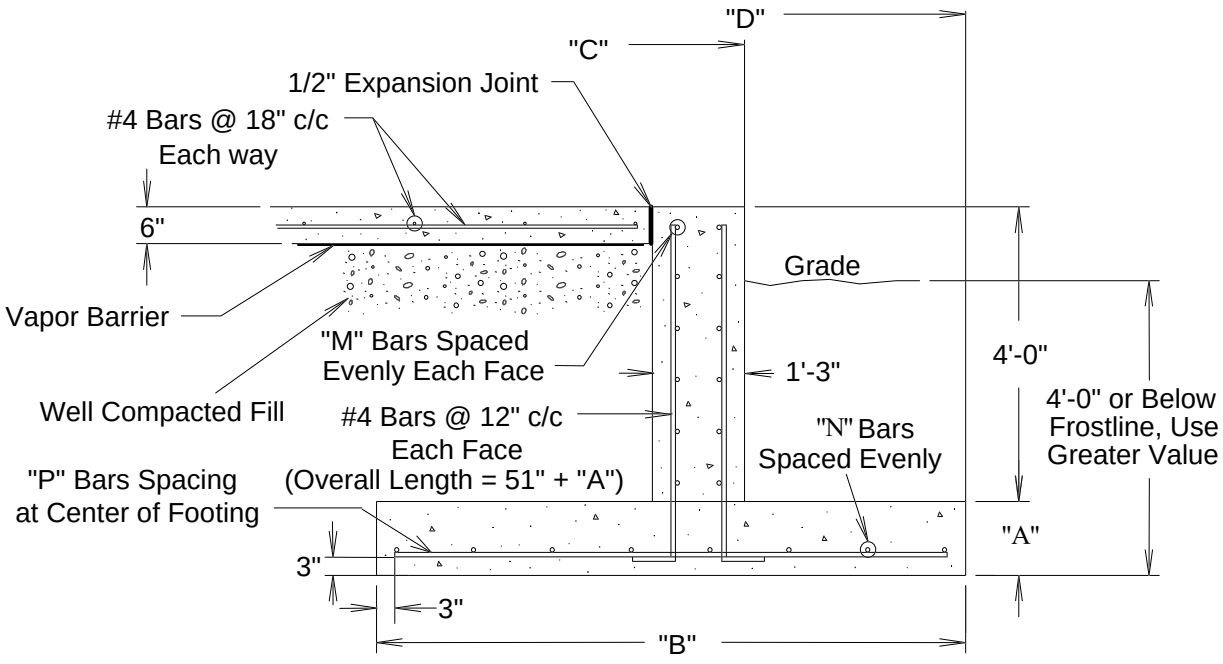
Inverted "T" Foundation
2.66" Outside Stiffened Commercial Tanks

4000 PSF SOIL BEARING CAPACITY

Inverted "T" Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity of 4000 PSF. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



REV. 1/5/2001

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin:18'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-4"	1'-7"	1'-11"	2'-4"
	C	9'-10"	9'-10"	9'-10"	9'-10"
	D	9'-10"	10'-0"	10'-1"	10'-4"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	2#5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	1700	1700	1700	1700
	#5(ft)	300	300	300	300
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	3	4	5	5
Concrete	Wall	10	10	10	10
	Floor	5	5	5	5
	Total	18	19	20	20

Diameter of Bin: 21'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18
	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-4"	1'-8"	2'-1"	2'-5"
	C	11'-4"	11'-4"	11'-4"	11'-4"
	D	11'-4"	11'-6"	11'-8"	11'-10"
	M	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	2 #5's	3 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14"c/c	#5 @ 14"c/c
Rerod	#4(ft)	2100	2100	2100	2100
	#5(ft)	300	300	300	500
	#6(ft)	0	0	0	0
Cu. Yd's.	Footing	4	5	6	6
Concrete	Wall	12	12	12	12
	Floor	6	6	6	6
	Total	22	23	24	25

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 24'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-5"	1'-9"	2'-2"	2'-7"	3'-0"	3'-5"	3'-11"
	C	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"	12'-10"
	D	12'-11"	13'-0"	13'-3"	13'-5"	13'-7"	13'-9"	14'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	2300	2300	2300	2300	2300	2300	2300
	#5(ft)	300	300	500	500	500	600	700
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	5	5	7	8	9	10	11
Concrete	Wall	14	14	14	14	14	14	14
	Floor	8	8	8	8	8	8	8
	Total	27	27	29	30	31	32	33

Diameter of Bin: 27'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-10"	2'-3"	2'-8"	3'-2"	3'-7"	4'-2"
	C	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"	14'-4"
	D	14'-5"	14'-7"	14'-9"	14'-11"	15'-2"	15'-4"	15'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	3 #5's	4 #5's	4 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	2800	2800	2800	2800	2800	2800	2800
	#5(ft)	300	300	500	500	500	700	700
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	5	6	8	9	11	12	14
Concrete	Wall	15	15	15	15	15	15	15
	Floor	10	10	10	10	10	10	10
	Total	30	31	33	34	36	37	39

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 30'
Soil Bearing Capacity 4000 psf

	Ring no.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-6"	1'-11"	2'-4"	2'-10"	3'-4"	3'-10"	4'-5"
	C	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"	15'-10"
	D	15'-11"	16'-1"	16'-4"	16'-6"	16'-9"	17'-0"	17'-3"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	3000	3000	3000	3000	3000	3000	3000
	#5(ft)	300	400	500	500	700	700	900
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	6	7	9	10	12	14	16
Concrete	Wall	17	17	17	17	17	17	17
	Floor	13	13	13	13	13	13	13
	Total	36	37	39	40	42	44	46

Diameter of Bin: 33'
Soil Bearing Capacitly: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-7"	2'-0"	2'-5"	2'-11"	3'-6"	4'-0"	4'-7"
	C	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"	17'-4"
	D	17'-6"	17'-8"	17'-10"	18'-1"	18'-4"	18'-7"	18'-10"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14"c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	3400	3400	3400	3400	3400	3400	3400
	#5(ft)	400	500	600	700	800	900	1000
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	7	8	10	12	14	16	18
Concrete	Wall	19	19	19	19	19	19	19
	Flooring	16	16	16	16	16	16	16
	Total	42	43	45	47	49	51	53

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 36'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-8"	2'-1"	2'-6"	3'-0"	3'-7"	4'-2"	4'-10"
	C	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"	18'-10"
	D	19'-0"	19'-3"	19'-5"	19'-7"	19'-10"	20'-1"	20'-5"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's
	N	2 #5's	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c
Rerod	#4(ft)	3800	3800	3800	3800	3800	3800	3800
	#5(ft)	500	500	600	700	800	900	1100
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	8	9	11	13	16	18	21
Concrete	Wall	21	21	21	21	21	21	21
	Floor	18	18	18	18	18	18	18
	Total	47	48	50	52	55	57	60

Diameter of Bin: 39'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-8"	2'-1"	2'-10"	3'-1"	3'-9"	4'-4"	5'-0"
	C	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"	20'-4"
	D	20'-6"	20'-9"	20'-11"	21'-2"	21'-4"	21'-10"	22'-0"
	M	5 #4's	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's
	N	2 #5's	2 #5's	3 #5's	4 #5's	4 #5's	4 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c
Rerod	#4(ft)	4300	4300	4300	4300	4300	4500	4500
	#5(ft)	500	500	700	700	900	1000	1400
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	8	10	13	15	17	20	23
Concrete	Wall	22	22	22	22	22	22	22
	Floor	22	22	22	22	22	22	22
	Total	52	54	57	59	61	64	67

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 42'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-8"	3'-3"	3'-10"	4'-6"	5'-2"
	C	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"	21'-10"
	D	22'-1"	22'-3"	22'-6"	22'-9"	23'-0"	23'-3"	23'-7"
	M	5 #4's	5 #4's	5 #4's	5 #4's	6 #4's	6 #4's	6 #4's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c
Rerod	#4(ft)	4700	4700	4700	4700	4900	4900	4900
	#5(ft)	500	700	700	1000	1000	1200	1400
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	9	11	14	16	19	22	26
Concrete	Wall	24	24	24	24	24	24	24
	Floor	25	25	35	25	25	25	25
	Total	58	60	63	65	68	71	75

Diameter of Bin: 45'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-9"	2'-2"	2'-9"	3'-4"	3'-11"	4'-8"	5'-3"
	C	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"	23'-4"
	D	23'-7"	23'-9"	24'-0"	24'-4"	24'-7"	24'-10"	25'-1"
	M	5 #4's	5 #4's	6 #4's	6 #4's	7 #4's	7 #4's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	5 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 11" c/c
Rerod	#4(ft)	5200	5200	5500	5500	5700	5700	3700
	#5(ft)	500	800	800	1000	1100	1400	3100
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	10	12	15	18	21	25	28
Concrete	Wall	26	26	26	26	26	26	26
	Floor	29	29	29	29	29	29	29
	Total	65	67	70	73	76	80	83

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 48'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	B	1'-10"	2'-3"	2'-10"	3'-5"	4'-0"	4'-9"	5'-5"
	C	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"	24'-10"
	D	25'-1"	25'-3"	25'-7"	25'-10"	26'-1"	26'-5"	26'-8"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c
Rerod	#4(ft)	5700	6000	6000	6300	4100	4100	4100
	#5(ft)	600	800	900	1100	2800	3000	3500
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	11	13	16	20	23	27	31
Concrete	Wall	28	28	28	28	28	28	28
	Floor	33	33	33	33	33	33	33
	Total	72	74	77	81	84	88	92

Diameter of Bin: 54'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	1'-11"	2'-5"	2'-11"	3'-7"	4'-3"	5'-0"	5'-8"
	C	27'-9"	27'-9"	27'-9"	27'-9"	27'-9"	27'-9"	27'-9"
	D	28'-0"	28'-3"	28'-7"	28'-10"	29'-1"	29'-5"	29'-9"
	M	5 #4's	6 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 10" c/c
Rerod	#4(ft)	6700	7000	7000	7300	4900	4900	4900
	#5(ft)	700	900	1000	1200	3100	3400	4000
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	13	16	19	23	27	32	36
Concrete	Wall	31	31	31	31	31	31	31
	Floor	41	41	41	41	41	41	41
	Total	85	88	91	95	99	104	108

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 60'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-0"	2'-6"	3'-1"	3'-9"	4'-5"	5'-2"	6'-0"
	C	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"	30'-9"
	D	31'-1	31'-4"	31'-7"	31'-11"	32'-2"	32'-6"	32'-10"
	M	5 #4's	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	5 #5's
	N	2 #5's	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 13" c/c	#5 @ 10" c/c
Rerod	#4(ft)	7700	8100	8500	5800	5800	5800	5900
	#5(ft)	700	1000	1100	3300	3600	3700	4400
	#6(ft)	0	0	0	0	0	0	0
Cu. Yd's.	Footing	15	18	22	27	31	36	46
Concrete	Wall	35	35	35	35	35	35	35
	Floor	51	51	51	51	51	51	51
	Total	101	104	108	113	117	122	132

Diameter of Bin: 72'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-2"	2'-8"	3'-4"	4'-0"	4'-9"	5'-7"	6'-4"
	C	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"	36'-9"
	D	37'-2"	37'-5"	37'-8"	38'-0"	38'-4"	38'-8"	39'-0"
	M	6 #4's	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	6 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c
Rerod	#4(ft)	10600	11000	7800	7800	7800	7800	7900
	#5(ft)	1100	1200	3900	4000	4400	5200	4200
	#6(ft)	0	0	0	0	0	0	1200
Cu. Yd's.	Footing	19	23	28	34	40	47	58
Concrete	Wall	42	42	42	42	42	42	42
	Floor	74	74	74	74	74	74	74
	Total	135	139	144	150	156	163	174

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 75'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-3"	2'-9"	3'-5"	4'-1"	4'-10"	5'-9"	6'-6"
	C	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"	38'-3"
	D	38'-9"	38'-11"	39'-3"	39'-6"	39'-10"	40'-3"	40'-7"
	M	6 #4's	7 #4's	5 #5's	5 #5's	6 #5's	6 #5's	6 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4(ft)	11300	11800	8400	8400	8400	8400	8400
	#5(ft)	1200	1300	4000	4200	5000	5700	4600
	#6(ft)	0	0	0	0	0	0	1500
Cu. Yd's.	Footing	20	25	30	36	43	51	62
Concrete	Wall	43	43	43	43	43	43	43
	Floor	80	80	80	80	80	80	80
	Total	143	148	153	159	166	174	185

Diameter of Bin: 78'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-3"	2'-10"	3'-5"	4'-2"	4'-11"	5'-9"	6'-9"
	C	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"	39'-9"
	D	40'-3"	40'-6"	40'-9"	41'-1"	41'-5"	41'-9"	42'-2"
	M	7 #4's	5 #5's	5 #5's	5 #5's	6 #5's	6 #5's	7 #5's
	N	3 #5's	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c
Rerod	#4(ft)	12500	9000	9000	9000	9000	9000	9000
	#5(ft)	1200	3800	4200	4300	5300	5800	5300
	#6(ft)	0	0	0	0	0	0	1600
Cu. Yd's.	Footing	21	26	32	38	45	53	67
Concrete	Wall	45	45	45	45	45	45	45
	Floor	87	87	87	87	87	87	87
	Total	153	158	164	170	177	185	199

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Inverted “T” Foundation
2.66” Outside Stiffened Commercial Tanks

Diameter of Bin: 90'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	24*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-5"	3'-0"	3'-8"	4'-5"	5'-3"	6'-2"	7'-1"
	C	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-9"	45'-10"
	D	46'-3"	46'-6"	46'-10"	47'-2"	47'-6"	47'-11"	48'-5"
	M	5 #5's	6 #5's	6 #5's	7 #5's	5 #6's	5 #6's	6 #6's
	N	3 #5's	3 #5's	4 #5's	5 #5's	5 #5's	6 #5's	8 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#5 @ 10" c/c	#6 @ 12" c/c
Rerod	#4(ft)	11400	11400	11400	11400	11400	11400	11500
	#5(ft)	4300	5100	5500	6500	2700	3700	2300
	#6(ft)	0	0	0	0	2900	2900	5300
Cu. Yd's.	Footing	26	32	39	47	55	65	81
Concrete	Wall	52	52	52	52	52	52	62
	Floor	116	116	116	116	116	116	116
	Total	194	200	207	215	223	233	259

*** 1'-6" Wall Width**

Diameter of Bin: 105'
Soil Bearing Capacity: 4000 psf

	Ring No.	12	14	16	18	20	22	23*
	A	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"
	B	2'-8"	3'-4"	4'-0"	4'-10"	5'-8"	6'-8"	7'-1"
	C	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-2"	53'-3"
	D	52'-10"	54'-2"	54'-5"	54'-9"	55'-2"	55'-7"	55'-10"
	M	6 #5's	5 #6's	5 #6's	6 #6's	6 #6's	7 #6's	7 #6's
	N	3 #5's	4 #5's	4 #5's	5 #5's	6 #5's	7 #5's	7 #5's
	P	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 14" c/c	#5 @ 12" c/c	#6 @ 12" c/c	#6 @ 11" c/c
Rerod	#4(ft)	14900	14900	14900	14900	14900	14900	14900
	#5(ft)	5700	2300	2400	3000	3700	2300	2300
	#6(ft)	0	3400	2900	4000	4000	6800	7100
Cu. Yd's.	Footing	32	41	49	59	70	82	94
Concrete	Wall	61	61	61	61	61	61	73
	Floor	157	157	157	157	157	157	157
	Total	250	259	267	277	288	300	324

*** 1'-6" Wall Width**

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T-Cap Foundation Recommendations For 2.66” Corrugation Outside Stiffened Commercial Tanks

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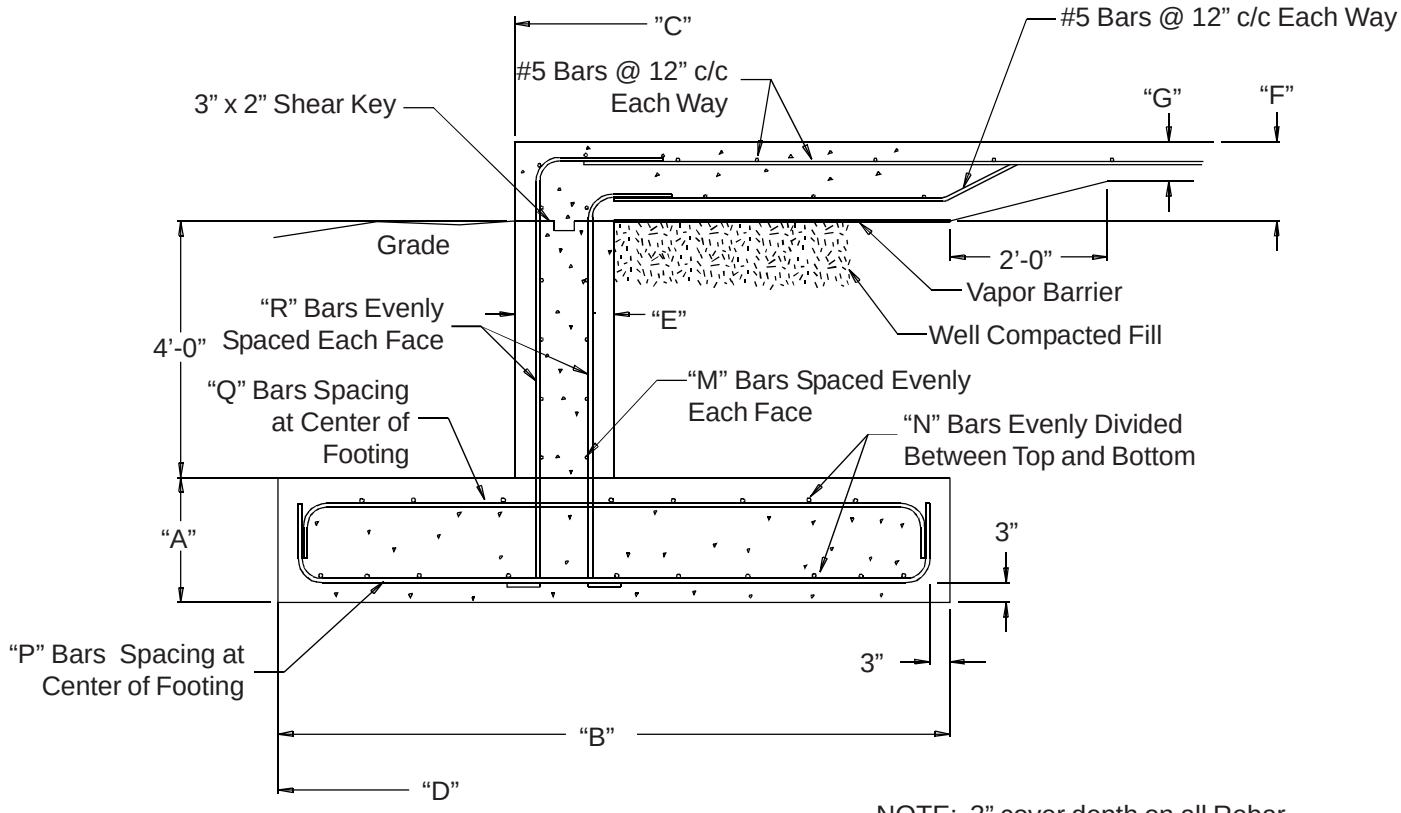
T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks

T-Cap Foundation Notes:

1. The Foundation Design is based on a minimum allowable soil bearing capacity as specified on each chart. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained
3. The Foundation must be founded below the frost line, or place on non expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 Grade 60 deformed bars.
6. Lap all circumferential bars 35 bar diameters and stagger all laps in plans 3’-0”. Estimates do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump.

All foundation specifications shall be construed as recommendations only. Because of the many variable conditions in actual installation, Grain Systems assumes no liability for results arising from the use of such recommendations.



NOTE: 3” cover depth on all Rebar

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T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	27		30			33		
	Rings	28	30	28	30	32	28	30	32
	A	1'-0"	1'-1"	1'-1"	1'-2"	1'-3"	1'-2"	1'-3"	1'-4"
	B	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	6'-6"	7'-0"	7'-6"
	C	14'-4"	14'-4"	15'-10"	15'-10"	15'-10"	17'-4"	17'-4"	17'-4"
	D	16'-5"	16'-8"	18'-2"	18'-5"	18'-8"	19'-11"	20'-2"	20'-5"
	E	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"	1'-3"
	F	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	4 #4	4 #4	4 #4	4 #4	4 #4	4 #4	4 #4	4 #4
	N	6 #5	7 #5	7 #5	8 #5	10 #5	8 #5	9 #5	10 #5
	P	#5@ 10" c/c	#5@ 10" c/c	#5@ 10" c/c	#5@ 9" c/c	#5@ 9" c/c	#5@ 9" c/c	#5@ 9" c/c	#5@ 9" c/c
	Q	#5@ 20" c/c	#5@ 20" c/c	#5@ 20" c/c	#5@ 18" c/c	#5@ 18" c/c	#5@ 18" c/c	#5@ 18" c/c	#5@ 18" c/c
	R	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	2100	2100	2300	2300	2400	2500	2600	900
	#5 (ft.)	3900	4200	4800	5300	5700	6000	6300	8300
	#6 (ft.)	0	0	0	0	0	0	0	0
Concrete	Footing	19	22	24	29	33	32	35	39
(Cu yds)	Wall	17	17	19	19	19	21	21	20
	Floor	23	23	27	27	26	32	32	31
	Total	59	62	70	75	78	85	88	90

Soil Bearing Capacity: 4000 psf

	DIA	36			42			45		
	Rings	28	30	32	28	30	32	28	30	32
	A	1'-2"	1'-3"	1'-5"	1'-3"	1'-5"	1'-6"	1'-4"	1'-5"	1'-7"
	B	6'-8"	7'-2"	8'-0"	7'-4"	8'-0"	9'-0"	7'-0"	8'-0"	9'-0"
	C	18'-10"	18'-10"	18'-10"	21'-11"	21'-11"	21'-11"	23'-5"	23'-5"	23'-5"
	D	21'-6"	21'-9"	22'-2"	24'-11"	25'-3"	25'-9"	26'-3"	26'-9"	27'-3"
	E	1'-3"	1'-3"	1'-3"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-0"	1'-0"	1'-0"	1'-0"	1'-1"	1'-2"	1'-0"	1'-1"	1'-3"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	4 #4	4 #4	4 #4	5 #4	5 #4	5 #4	5 #4	6 #4	4 #5
	N	8 #5	9 #5	10 #5	9 #5	10 #5	10 #6	9 #5	10 #5	10 #6
	P	#5@ 9" c/c	#5@ 9" c/c	#6@ 10" c/c	#5@ 9" c/c	#6@ 10" c/c	#6@ 9" c/c	#5@ 9" c/c	#6@ 10" c/c	#6@ 9" c/c
	Q	#5@ 18" c/c	#5@ 18" c/c	#6@ 20" c/c	#5@ 18" c/c	#6@ 20" c/c	#6@ 18" c/c	#5@ 18" c/c	#6@ 20" c/c	#6@ 18" c/c
	R	#4@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	2800	2800	1000	3500	3600	1500	3800	1900	0
	#5 (ft.)	6700	7200	7400	8800	6900	6500	9500	9900	8400
	#6 (ft.)	0	0	2000	0	2400	5300	0	2500	5900
Concrete	Footing	34	39	49	47	58	68	51	62	78
(Cu yds)	Wall	22	22	22	28	28	28	27	27	27
	Floor	36	37	37	48	51	54	53	57	62
	Total	92	98	108	123	137	150	131	146	167

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T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	48			54		
	Rings	28	30	32	28	30	32
	A	1'-4"	1'-6"	1'-7"	1'-5"	1'-7"	1'-10"
	B	7'-6"	9'-0"	9'-6"	8'-0"	9'-0"	10'-0"
	C	24'-11"	24'-11"	24'-11"	27'-11"	27'-11"	27'-11"
	D	28'-0"	28'-9"	29'-0"	31'-3"	31'-9"	32'-3"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-1"	1'-2"	1'-4"	1'-1"	1'-3"	1'-6"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	6 #4	6 #4	6 #4	5 #5	5 #5	5 #5
	N	10 #5	9 #6	11 #6	10 #5	10 #6	12 #6
	P	#5@ 8" c/c	#6@ 9" c/c	#6@ 9" c/c	#5@ 8" c/c	#6@ 9" c/c	#6@ 9" c/c
	Q	#5@ 16" c/c	#6@ 18" c/c	#6@ 18" c/c	#5@ 16" c/c	#6@ 18" c/c	#6@ 18" c/c
	R	#4@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	4400	2000	2000	2900	0	0
	#5 (ft.)	11200	8000	8100	12600	11200	11500
	#6 (ft.)	0	6000	6500	0	7100	8200
Concrete	Footing	58	78	86	73	92	118
(Cu yds)	Wall	32	32	32	35	35	35
	Floor	63	68	74	78	86	98
	Total	153	178	192	186	213	251

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T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks

Soil Bearing Capacity: 4000 psf

	DIA	60	72	75	78	90	105
	Rings	28	28	28	28	28	28
	A	1'-6"	1'-9"	1'-9"	1'-9"	1'-11"	2'-1"
	B	8'-6"	9'-6"	10'-0"	10'-0"	11'-0"	12'-0"
	C	30'-10"	36'-10"	38'-4"	39'-10"	45'-10"	53'-3"
	D	34'-5"	40'-11"	42'-8"	44'-2"	50'-8"	58'-9"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-6"
	F	1'-3"	1'-6"	1'-6"	1'-6"	1'-8"	1'-11"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"
	M	5 #5	6 #5	6 #5	5 #6	6 #6	7 #6
	N	9 #6	11 #6	12 #6	12 #6	14 #6	16 #6
	P	#5@ 8" c/c	#6@ 9" c/c	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c
	Q	#5@ 16" c/c	#6@ 18" c/c	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c
	R	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#4@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	3200	4100	4200	4400	0	0
	#5 (ft.)	13900	13700	14800	12800	21700	28700
	#6 (ft.)	3500	10100	11200	14900	19600	25800
Concrete	Footing	91	141	155	161	223	308
(Cu yds)	Wall	39	46	48	50	58	75
	Floor	101	154	167	178	244	349
	Total	231	341	370	389	525	732

Soil Bearing Capacity: 4000 psf

	DIA	60	72	75	78	90	105
	Rings	30	30	30	30	30	30
	A	1'-8"	1'-11"	1'-11"	2'-0"	2'-2"	2'-3"
	B	9'-10"	11'-0"	11'-4"	11'-6"	12'-4"	13'-6"
	C	30'-10"	36'-10"	38'-4"	39'-10"	45'-10"	53'-3"
	D	35'-1"	41'-8"	43'-4"	44'11"	51'-4"	59'-6"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-6"
	F	1'-5"	1'-7"	1'-8"	1'-9"	1'-11"	2'-1"
	G	0'-8"	0'-8"	0'-8"	0'-8"	0'-10"	0'-10"
	M	6 #5	6 #5	5 #6	5 #6	6 #6	7 #6
	N	11 #6	14 #6	15 #6	15 #6	18 #6	20 #6
	P	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 7" c/c
	Q	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 14" c/c
	R	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	0	0	0	0	0	0
	#5 (ft.)	13600	18100	16400	17700	22300	29300
	#6 (ft.)	8500	13000	16600	17400	23000	31300
Concrete	Footing	117	180	192	211	282	374
(Cu yds)	Wall	39	46	48	50	58	75
	Floor	111	164	182	200	297	414
	Total	267	390	422	461	637	863

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Rev: 12-9-2003

T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks

Soil Bearing Capacity: 4500 psf

	DIA	60	72	75	78	90
	Rings	32	32	32	32	32
	A	1'-9"	1'-11"	2'-0"	2'-0"	2'-3"
	B	9'-6"	10'-6"	10'-10"	10'-10'	12'-0"
	C	30'-10"	36'-10"	38'-4"	39'-10"	45'-10"
	D	34'-11"	41'-5"	43'-1"	44'-7"	51'-2"
	E	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-5"	1'-8"	1'-8"	1'-9"	1'-11"
	G	0'-8"	0'-8"	0'-10"	0'-10"	0'-10"
	M	6 #5	5 #6	5 #6	6 #6	6 #6
	N	12 #6	14 #6	14 #6	14 #6	18 #6
	P	#6@ 9" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c	#6@ 8" c/c
	Q	#6@ 18" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c	#6@ 16" c/c
	R	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c	#5@ 12" c/c
Rebar	#4 (ft.)	0	0	0	0	0
	#5 (ft.)	13600	15300	16300	17500	22300
	#6 (ft.)	8500	15000	15900	17000	22800
Concrete	Footing	118	171	191	200	285
(Cu yds)	Wall	39	46	48	50	58
	Floor	110	167	198	217	296
	Total	267	384	437	467	639

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Rev: 12-9-2003

T-Cap Foundation
2.66” Outside Stiffened Commercial Tanks
SOIL BEARING CAPACITY: 5000 psf

	Bin Diameter (ft):	60	72	75	78
	Rings	34	34	34	34
	A	1'-10"	2'-0"	2'-1"	2'-4"
	B	9'-9"	10'-10"	11'-3"	11'-3"
	C	30'-10"	36'-10"	38'-4"	39'-10"
	D	35'-0"	41'-6"	43'-4"	44'-9"
	E	1'-4"	1'-4"	1'-4"	1'-4"
	F	1'-6"	1'-8"	1'-9"	1'-9"
	G	0'-8"	0'-8"	0'-10"	0'-10"
	M	6- #5's EACH FACE	6- #6's EACH FACE	5- #6's EACH FACE	6- #6's EACH FACE
	N	12-#6's EACH FACE	16-#6's EACH FACE	16-#6's EACH FACE	16-#6's EACH FACE
	P	#6 @ 8"C/C	#6 @ 8"C/C	#6 @ 8"C/C	#6 @ 8"C/C
	Q	#6@16"C/C	#6@16"C/C	#6@16"C/C	#6@16"C/C
	R	#5@12"C/C	#5@12"C/C	#5@12"C/C	#5@12"C/C
Rebar	#4 (ft.)	0	0	0	0
	#5 (ft.)	13,600	15,300	16,400	17,500
	#6 (ft.)	7,100	12,200	13,200	14,300
Concrete	Footing	126	183	206	222
yd^3	Wall	38	45	47	49
	Floor	114	167	203	217
	Total	278	395	456	488

	Bin Diameter (ft):	90
	Rings	34
	A	2'-4"
	B	12'-3"
	C	45'-10"
	D	51'-3"
	E	1'-4"
	F	2'-0"
	G	0'-10"
	M	7- #6's EACH FACE
	N	20-#6's EACH FACE
	P	#7 @ 9"C/C
	Q	#6@18"C/C
	R	#5@12"C/C
Rebar	#5 (ft.)	22,400
	#6 (ft.)	11,800
	#7 (ft.)	6,000
Concrete	Footing	301
yd^3	Wall	57
	Floor	303
	Total	661

	Bin Diameter (ft):	105
	Rings	33
	A	2'-5"
	B	13'-9"
	C	53'-3"
	D	59'-4"
	E	1'-6"
	F	2'-3"
	G	0'-10"
	M	6- #7's EACH FACE
	N	22-#6's EACH FACE
	P	#7 @ 8"C/C
	Q	#6@16"C/C
	R	#5@12"C/C
Rebar	#5 (ft.)	29,300
	#6 (ft.)	10,700
	#7 (ft.)	12,600
Concrete	Footing	406
yd^3	Wall	74
	Floor	429
	Total	909

Rev: 12-9-2003

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Outside Stiffened Anchor Bolt Chord Charts 2-Post & 3-Post Commercial Tanks

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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks

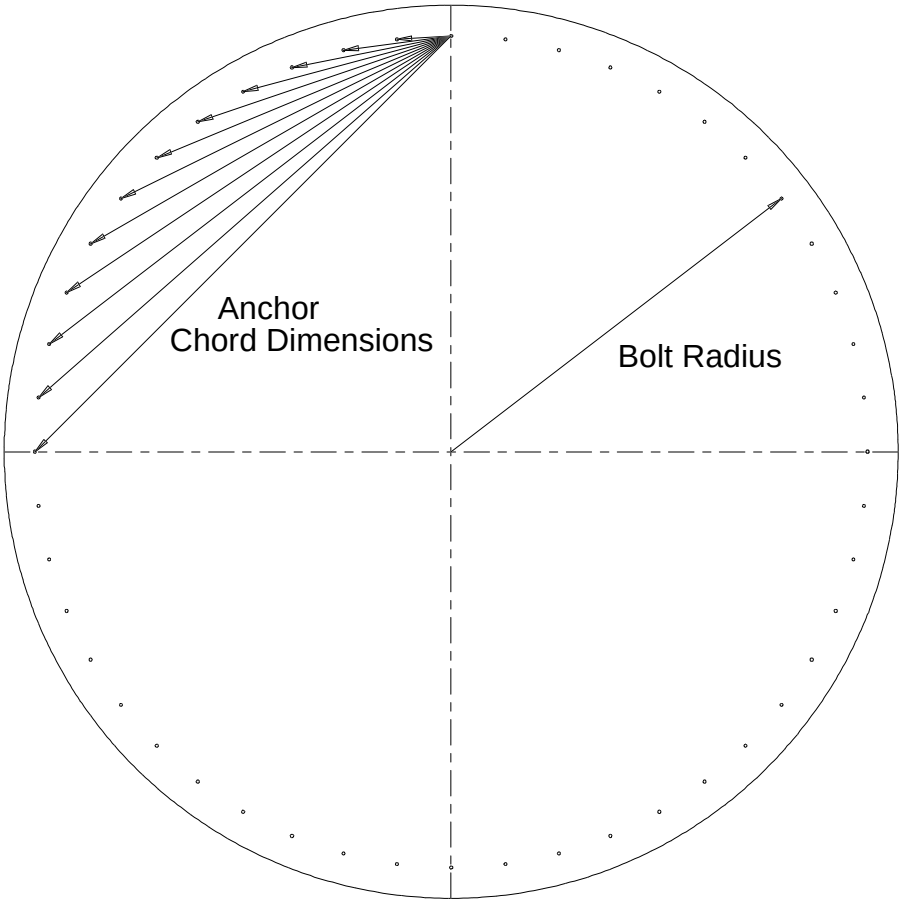
Prior to setting any anchor bolts, you must be sure to have the correct anchor bolt placement chart. This is very critical for stiffener alignment during erection.

The charts are divided up based on the following criteria:

- **Does your bin have 2 or 3 stiffeners per sidewall sheet?**
- **Does your bin have stiffeners on the inside or outside?**
- **What diameter of bin do you have?**

Refer to the proper chart to find the anchor chord that corresponds to the bin that is going to be built.

Start with one anchor bolt and work from it to the left to locate one quarter of the anchor bolts then to the right to locate another quarter of the bolts. Now work off of the last anchor bolts in each quarter to locate remaining anchor bolts in the last two quarters.



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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks

2 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	12 Anchors 18 '	2 post
Bolt Radius =	9 ' - 3	11/16 "
Anchor chord:	4 ' - 9	13/16 "
	9 ' - 3	11/16 "
	13 ' - 1	15/16 "

Nominal Diameter =	14 Anchors 21 '	2 post
Bolt Radius =	10 ' - 9	9/16 "
Anchor chord:	4 ' - 9	11/16 "
	9 ' - 4	7/16 "
	13 ' - 5	9/16 "
	16 ' - 10	5/8 "

Nominal Diameter =	16 Anchors 24 '	2 post
Bolt Radius =	12 ' - 3	1/2 "
Anchor chord:	4 ' - 9	9/16 "
	9 ' - 4	7/8 "
	13 ' - 7	7/8 "
	17 ' - 4	9/16 "

Nominal Diameter =	18 Anchors 27 '	2 post
Bolt Radius =	13 ' - 9	3/8 "
Anchor chord:	4 ' - 9	7/16 "
	9 ' - 5	1/8 "
	13 ' - 9	3/8 "
	17 ' - 8	5/8 "
	21 ' - 1	3/8 "

Nominal Diameter =	20 Anchors 30 '	2 post
Bolt Radius =	15 ' - 3	5/16 "
Anchor chord:	4 ' - 9	3/8 "
	9 ' - 5	5/16 "
	13 ' - 10	7/16 "
	17 ' - 11	1/2 "
	21 ' - 8	9/16 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 2-POST OUTSIDE STIFFENED TANKS ONLY.

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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	18 Anchors 18 '	3 post
Bolt Radius =	9 ' - 3	11/16 "
Anchor chord:	3 ' - 2	3/4 "
	6 ' - 4	3/8 "
	9 ' - 3	11/16 "
	11 ' - 11	9/16 "
	14 ' - 3	1/8 "

Nominal Diameter =	21 Anchors 21 '	3 post
Bolt Radius =	10 ' - 9	9/16 "
Anchor chord:	3 ' - 2	5/8 "
	6 ' - 4	3/8 "
	9 ' - 4	7/16 "
	12 ' - 2	"
	14 ' - 8	1/4 "
	16 ' - 10	5/8 "

Nominal Diameter =	24 Anchors 24 '	3 post
Bolt Radius =	12 ' - 3	1/2 "
Anchor chord:	3 ' - 2	1/2 "
	6 ' - 4	3/8 "
	9 ' - 4	7/8 "
	12 ' - 3	1/2 "
	14 ' - 11	9/16 "
	17 ' - 4	9/16 "

Nominal Diameter =	27 Anchors 27 '	3 post
Bolt Radius =	13 ' - 9	3/8 "
Anchor chord:	3 ' - 2	3/8 "
	6 ' - 4	1/4 "
	9 ' - 5	1/8 "
	12 ' - 4	7/16 "
	15 ' - 1	3/4 "
	17 ' - 8	5/8 "
	20 ' - 0	5/8 "

Nominal Diameter =	30 Anchors 30 '	3 post
Bolt Radius =	15 ' - 3	5/16 "
Anchor chord:	3 ' - 2	5/16 "
	6 ' - 4	1/4 "
	9 ' - 5	1/4 "
	12 ' - 5	1/8 "
	15 ' - 3	1/4 "
	17 ' - 11	1/2 "
	20 ' - 5	5/16 "
	22 ' - 8	7/16 "

Nominal Diameter =	33 Anchors 33 '	3 post
Bolt Radius =	16 ' - 9	3/16 "
Anchor chord:	3 ' - 2	1/4 "
	6 ' - 4	3/16 "
	9 ' - 5	3/8 "
	12 ' - 5	9/16 "
	15 ' - 4	3/8 "
	18 ' - 1	9/16 "
	20 ' - 8	3/4 "
	23 ' - 1	11/16 "
	25 ' - 4	1/8 "

Nominal Diameter =	36 Anchors 36 '	3 post
Bolt Radius =	18 ' - 3	1/8 "
Anchor chord:	3 ' - 2	3/16 "
	6 ' - 4	1/16 "
	9 ' - 5	7/16 "
	12 ' - 5	7/8 "
	15 ' - 5	3/16 "
	18 ' - 3	1/8 "
	20 ' - 11	3/8 "
	23 ' - 5	11/16 "
	25 ' - 9	7/8 "

Nominal Diameter=	39 39 '	3 post
Bolt Radius=	19 ' - 9	"
Anchor chord:	3 ' - 2	1/8 "
	6 ' - 4	"
	9 ' - 5	7/16 "
	12 ' - 6	1/16 "
	15 ' - 5	3/4 "
	18 ' - 4	1/4 "
	21 ' - 1	5/16 "
	23 ' - 8	3/4 "
	26 ' - 2	5/16 "
	28 ' - 5	13/16 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 3-POST OUTSIDE STIFFENED TANKS ONLY.

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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter =	42 Anchors 42 '	3 post
Bolt Radius=	21 ' - 2	15/16 "
Anchor chord:	3 ' - 2	1/8 "
	6 ' - 4 "	
	9 ' - 5	7/16 "
	12 ' - 6	1/4 "
	15 ' - 6	1/4 "
	18 ' - 5	1/4 "
	21 ' - 2	15/16 "
	23 ' - 11	3/16 "
	26 ' - 5	7/8 "
	28 ' - 10	3/4 "
	31 ' - 1	3/4 "

Nominal Diameter=	45 45 '	3 post
Bolt Radius=	22 ' - 8	13/16 "
Anchor chord:	3 ' - 2 "	
	6 ' - 3	15/16 "
	9 ' - 5	7/16 "
	12 ' - 6	3/8 "
	15 ' - 6	9/16 "
	18 ' - 5	7/8 "
	21 ' - 4	1/8 "
	24 ' - 1	1/8 "
	26 ' - 8	11/16 "
	29 ' - 2	11/16 "
	31 7 "	
	33 9	4/9 "

Nominal Diameter=	48 Anchors 48 '	3 post
Bolt Radius=	24 ' - 2	3/4 "
Anchor chord:	3 ' - 2 "	
	6 ' - 3	7/8 "
	9 ' - 5	7/16 "
	12 ' - 6	1/2 "
	15 ' - 6	7/8 "
	18 ' - 6	1/2 "
	21 ' - 5	3/16 "
	24 ' - 2	3/4 "
	26 ' - 11	1/16 "
	29 ' - 6 "	
	31 ' - 11	3/8 "
	34 ' - 3	1/8 "

Nominal Diameter=	54 54 '	3 post
Bolt Radius=	27 ' - 2	1/2 "
Anchor chord:	3 ' - 1	15/16 "
	6 ' - 3	13/16 "
	9 ' - 5	3/8 "
	12 ' - 6	9/16 "
	15 ' - 7	1/4 "
	18 ' - 7	5/16 "
	21 ' - 6	5/8 "
	24 ' - 5	1/16 "
	27 ' - 2	1/2 "
	29 ' - 10	13/16 "
	32 ' - 5	15/16 "
	34 ' - 11	3/4 "
	37 ' - 4	1/8 "
	39 ' - 7 "	

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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter=	60 Anchors 60 ' 3 post
Bolt Radius=	30 ' - 2 3/8 "
Anchor chord:	3 ' - 1 15/16 "
	6 ' - 3 3/4 "
	9 ' - 5 3/8 "
	12 ' - 6 11/16 "
	15 ' - 7 9/16 "
	18 ' - 7 15/16 "
	21 ' - 7 11/16 "
	24 ' - 6 3/4 "
	27 ' - 5 "
	30 ' - 2 3/8 "
	32 ' - 10 11/16 "
	35 ' - 6 "
	38 ' - 0 "
	40 ' - 4 15/16 "
	42 ' - 8 7/16 "

Nominal Diameter=	72 Anchors 72 ' 3 post
Bolt Radius=	36 ' - 2 5/16 "
Anchor chord:	3 ' - 1 15/16 "
	6 ' - 3 3/4 "
	9 ' - 5 7/16 "
	12 ' - 6 7/8 "
	15 ' - 8 1/16 "
	18 ' - 8 7/8 "
	21 ' - 9 1/4 "
	24 ' - 9 1/8 "
	27 ' - 8 7/16 "
	30 ' - 7 1/8 "
	33 ' - 5 1/8 "
	36 ' - 2 3/8 "
	38 ' - 10 3/4 "
	41 ' - 6 1/4 "
	44 ' - 0 13/16 "
	46 ' - 6 3/8 "
	48 ' - 10 7/8 "
	51 ' - 2 1/4 "

Nominal Diameter=	75 Anchors 75 ' 3 post
Bolt Radius=	37 ' - 8 1/4 "
Anchor chord:	3 ' - 1 7/8 "
	6 ' - 3 11/16 "
	9 ' - 5 3/8 "
	12 ' - 6 7/8 "
	15 ' - 8 1/16 "
	18 ' - 8 15/16 "
	21 ' - 9 7/16 "
	24 ' - 9 1/2 "
	27 ' - 9 "
	30 ' - 7 7/8 "
	33 ' - 6 3/16 "
	36 ' - 3 3/4 "
	39 ' - 0 9/16 "
	41 ' - 8 9/16 "
	44 ' - 3 5/8 "
	46 ' - 9 13/16 "
	49 ' - 3 "
	51 ' - 7 3/16 "

Nominal Diameter=	78 Anchors 78 ' 3 post
Bolt Radius=	39 ' - 2 1/8 "
Anchor chord:	3 ' - 1 7/8 "
	6 ' - 3 11/16 "
	9 ' - 5 3/8 "
	12 ' - 6 7/8 "
	15 ' - 8 1/8 "
	18 ' - 9 1/16 "
	21 ' - 9 5/8 "
	24 ' - 9 3/4 "
	27 ' - 9 7/16 "
	30 ' - 8 9/16 "
	33 ' - 7 1/8 "
	36 ' - 5 "
	39 ' - 2 3/16 "
	41 ' - 10 9/16 "
	44 ' - 6 3/16 "
	47 ' - 0 7/8 "
	49 ' - 6 11/16 "
	51 ' - 11 9/16 "
	54 ' - 3 3/8 "

NOTE: THE TABLES ON THIS PAGE ARE FOR 3-POST OUTSIDE STIFFENED TANKS ONLY.

REV. 1/8/2001

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Outside Universal Stiffened Anchor Bolt Charts
Commercial Tanks
3 Stiffener Per Sidewall Sheet
Anchor Bolt Placement Charts

Nominal Diameter=	90 Anchors 90 '	3 post
Bolt Radius=	45 ' - 1	13/16 "
Anchor chord:	3 ' - 1	7/8 "
	6 ' - 3	5/8 "
	9 ' - 5	5/16 "
	12 ' - 6	13/16 "
	15 ' - 8	3/16 "
	18 ' - 9	5/16 "
	21 ' - 10	3/16 "
	24 ' - 10	11/16 "
	27 ' - 10	7/8 "
	30 ' - 10	5/8 "
	33 ' - 9	15/16 "
	36 ' - 8	3/4 "
	39 ' - 7	1/16 "
	42 ' - 4	3/4 "
	45 ' - 1	13/16 "
	47 ' - 10	1/4 "
	50 ' - 6 "	
	53 ' - 1 "	
	55 ' - 7	3/16 "
	58 ' - 0	9/16 "
	60 ' - 5	1/8 "
	62 ' - 8	3/4 "

Nominal Diameter=	105 Anchors 105 '	3 post
Bolt Radius=	52 ' - 7	3/8 "
Anchor chord:	3 ' - 1	13/16 "
	6 ' - 3	9/16 "
	9 ' - 5	1/4 "
	12 ' - 6	13/16 "
	15 ' - 8	1/4 "
	18 ' - 9	1/2 "
	21 ' - 10	9/16 "
	24 ' - 11	3/8 "
	27 ' - 12 "	
	31 ' - 0	1/4 "
	34 ' - 0	3/16 "
	36 ' - 11	3/4 "
	39 ' - 10	7/8 "
	42 ' - 9	5/8 "
	45 ' - 7	15/16 "
	48 ' - 5	11/16 "
	51 ' - 3 "	
	53 ' - 11	11/16 "
	56 ' - 7	13/16 "
	59 ' - 3	3/8 "
	61 ' - 10	1/4 "
	64 ' - 4	1/2 "
	66 ' - 10 "	
	69 ' - 2	13/16 "
	71 ' - 6	15/16 "
	73 ' - 10	1/4 "

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Concrete Foundation Recommendations For Commercial Hopper Tanks NCHT Series

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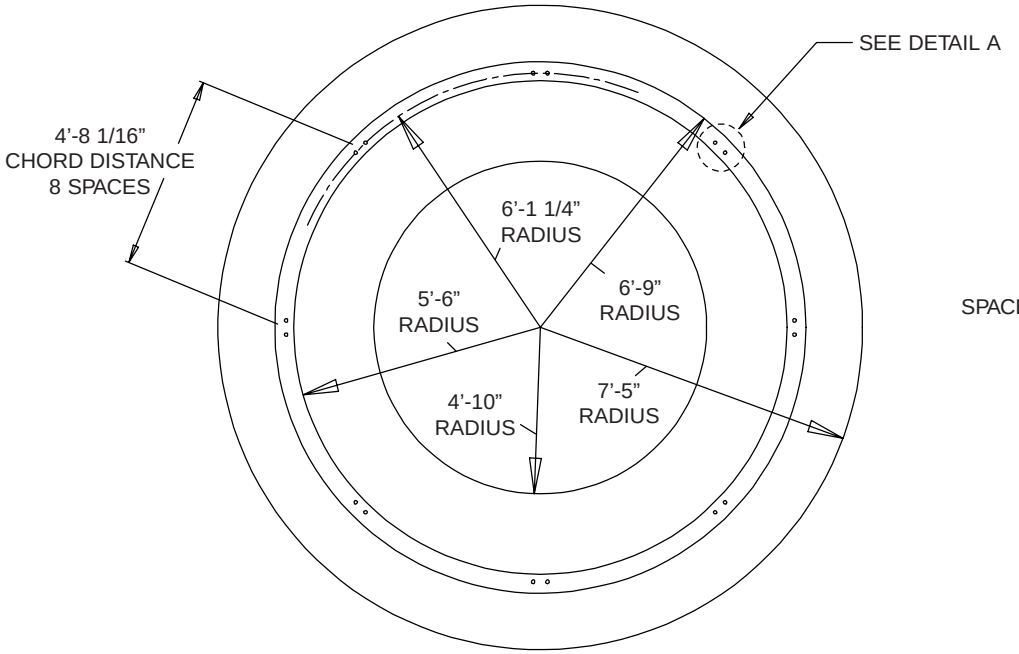
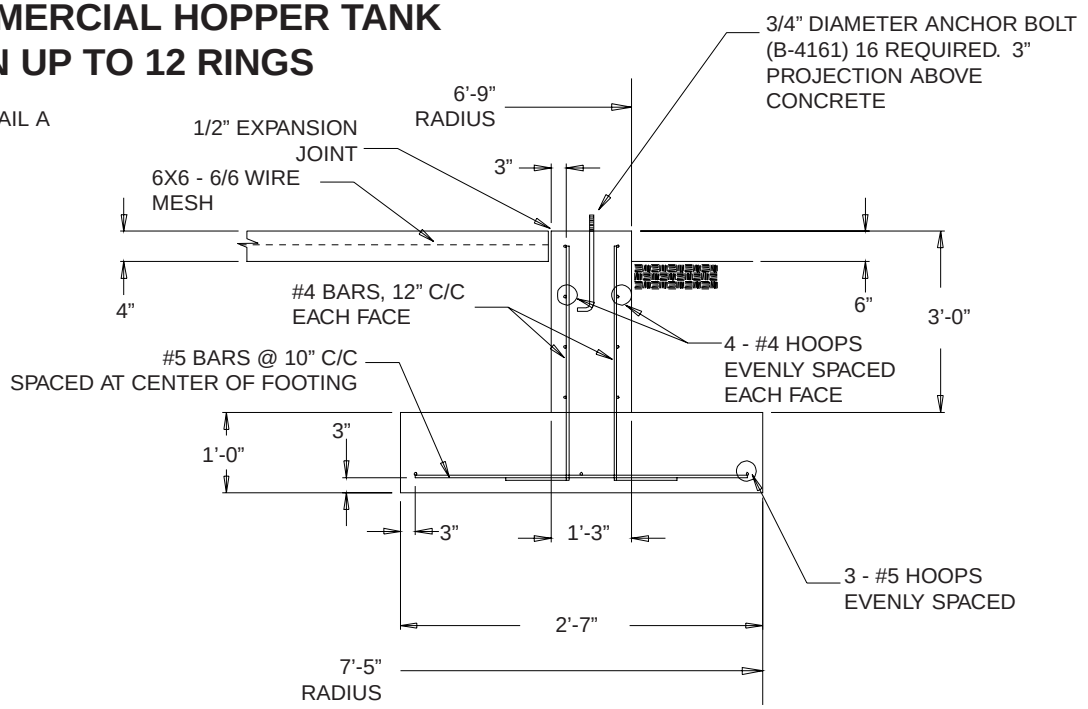
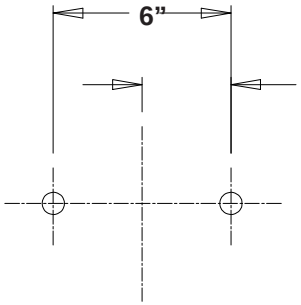
Concrete Foundation
Commercial Hopper Tanks

12’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

12 Cubic Yards of Concrete
800 Feet #4 Bar
300 Feet #5 Bar
150 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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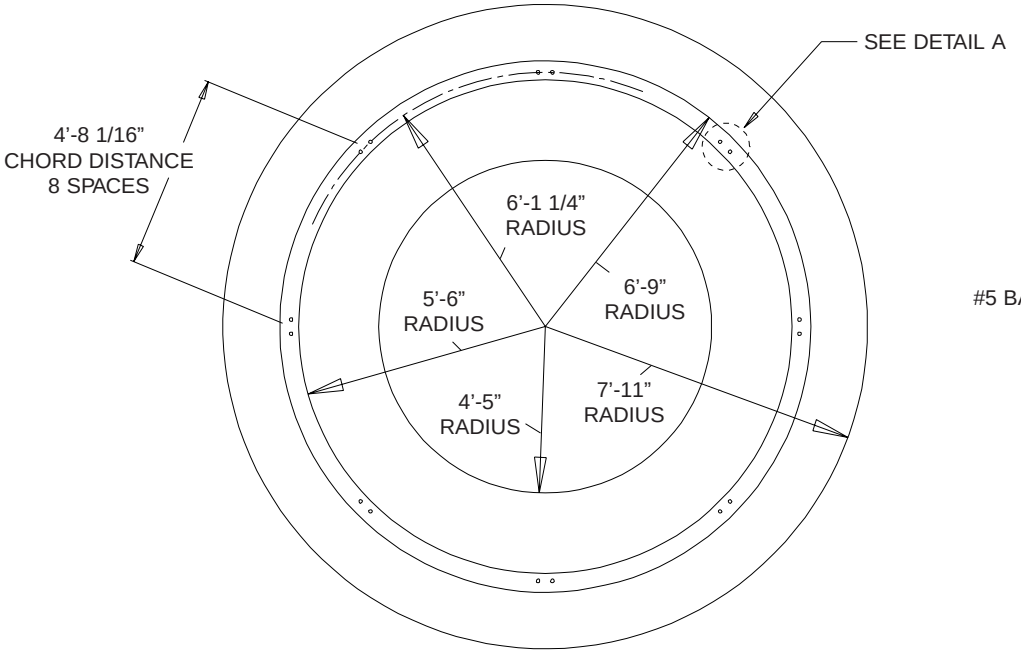
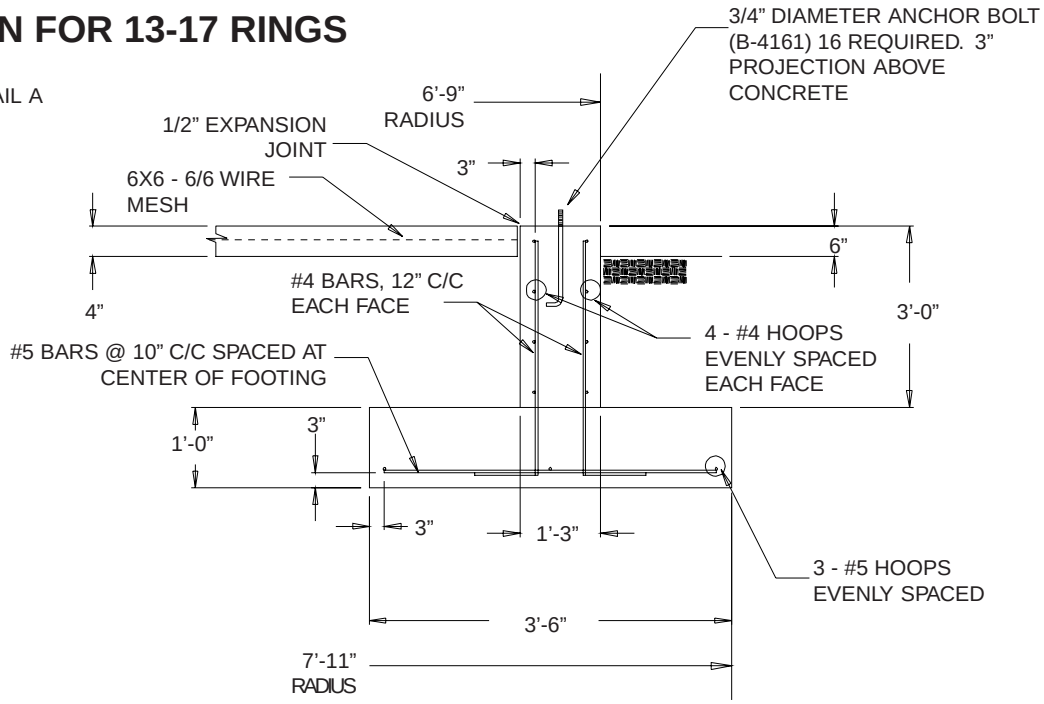
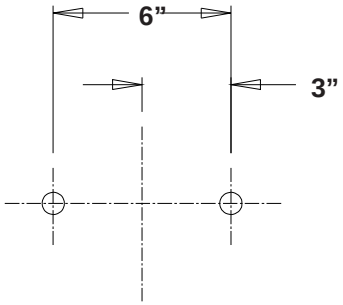
12’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-17 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

14 Cubic Yards of Concrete
800 Feet #4 Bar
400 Feet #5 Bar
150 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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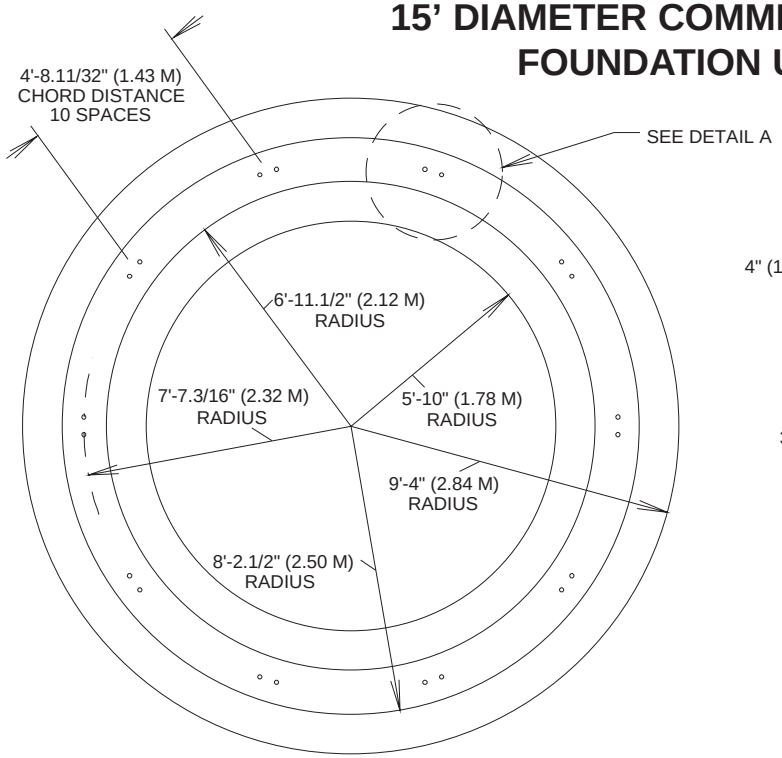
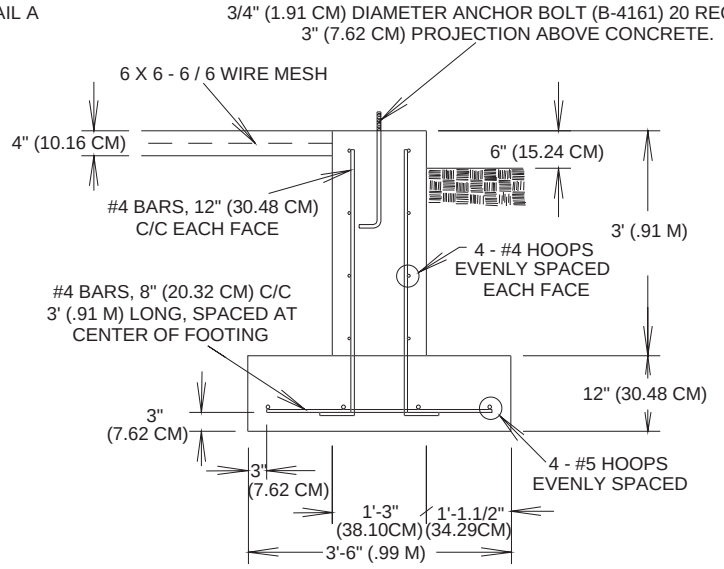
15’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





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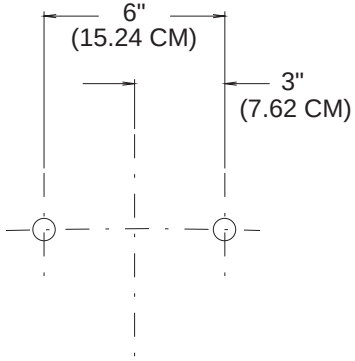

DETAIL A

Materials Required:

16 Cubic Yards of Concrete
800 Feet #4 Bar
400 Feet #5 Bar
200 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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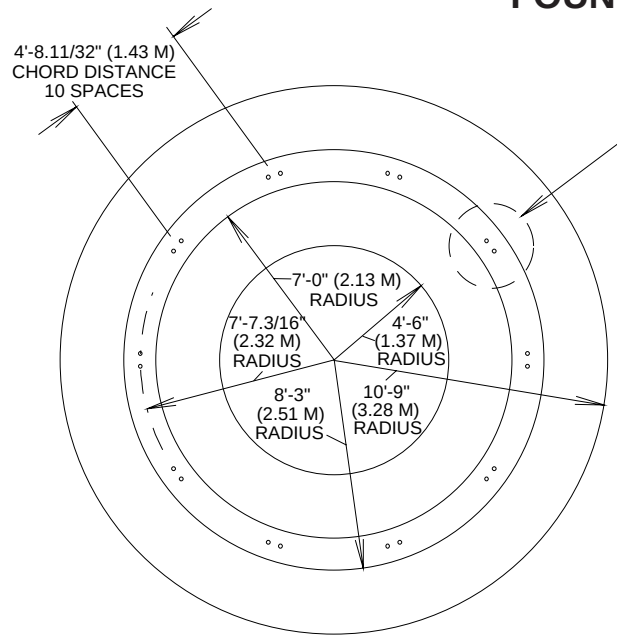
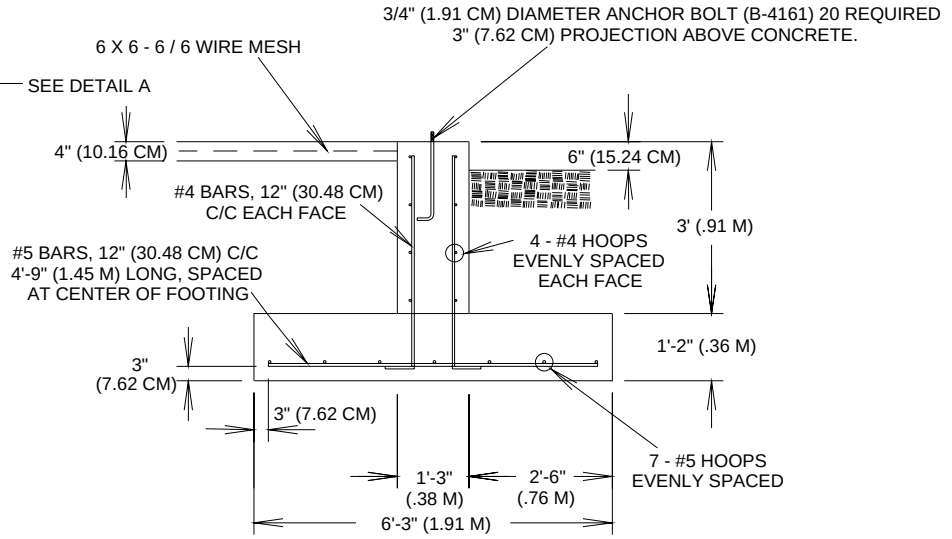
15’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-17 RINGS





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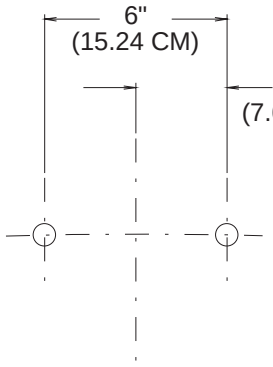

DETAIL A

Materials Required:

22 Cubic Yards of Concrete
800 Feet #4 Bar
700 Feet #5 Bar
200 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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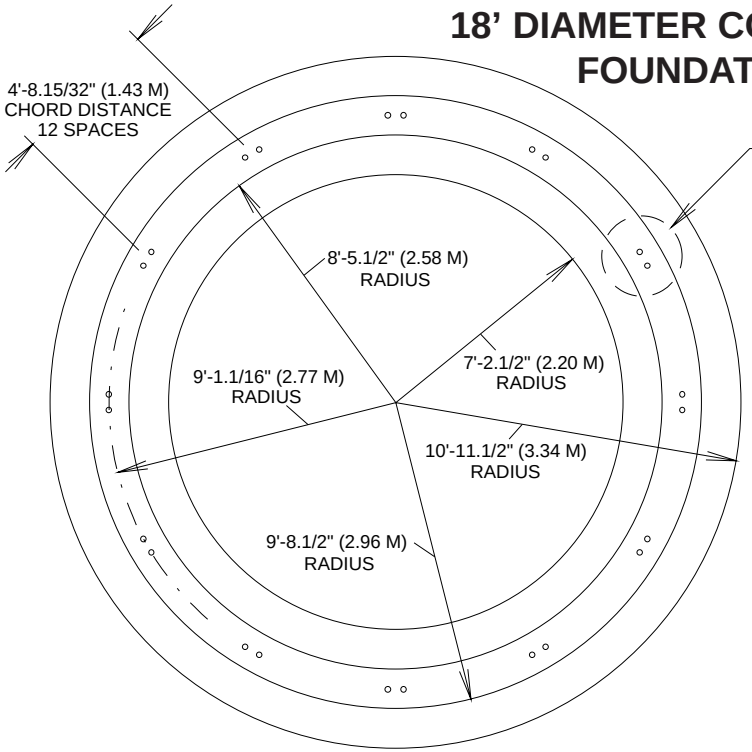
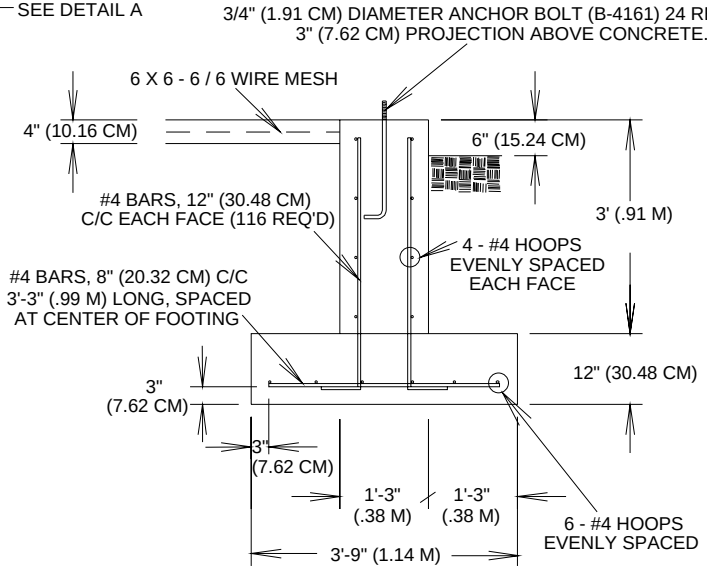
18’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





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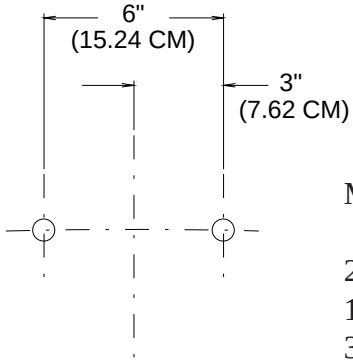

DETAIL A

Materials Required:

20 Cubic Yards of Concrete
1,700 Feet #4 Bar
350 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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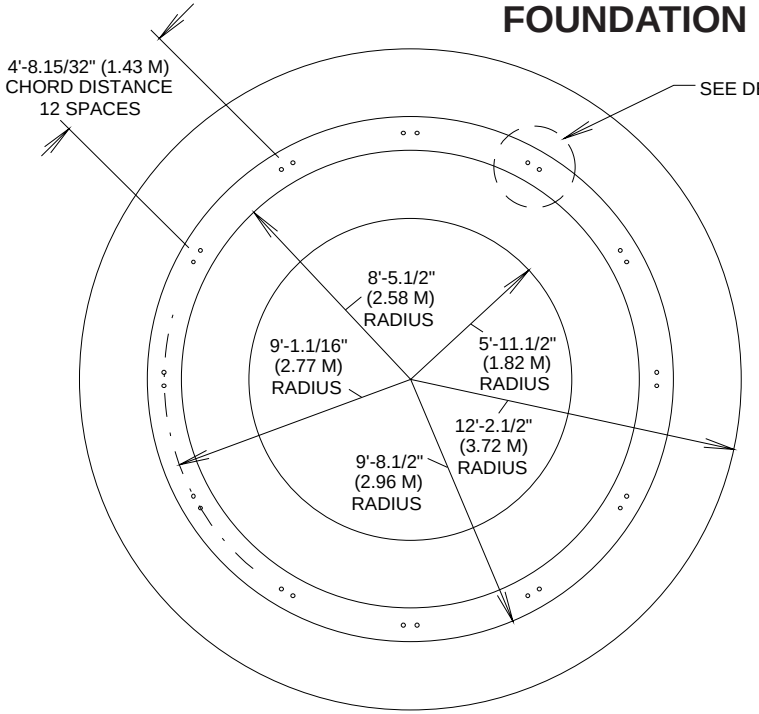
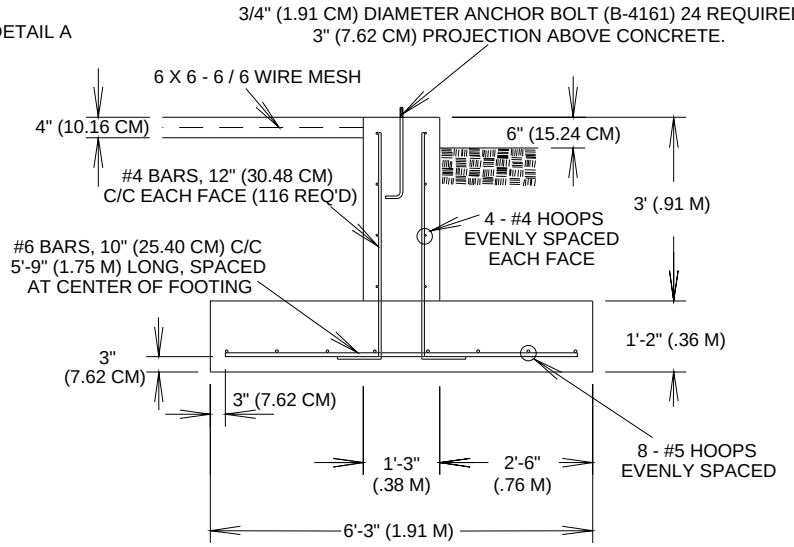
18’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-19 RINGS





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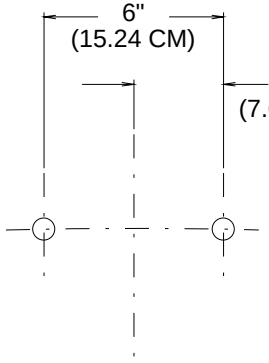

DETAIL A

Materials Required:

29 Cubic Yards of Concrete
1,000 Feet #4 Bar
500 Feet #5 Bar
350 Feet #6 Bar
300 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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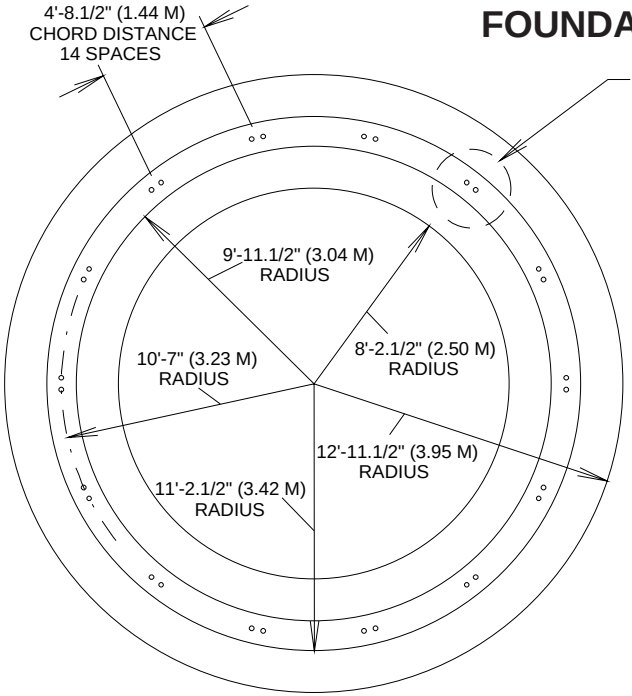
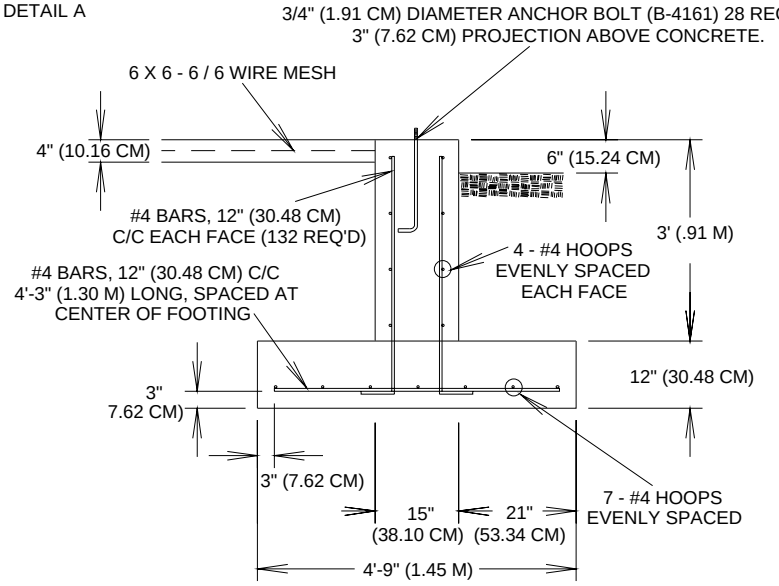
21’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





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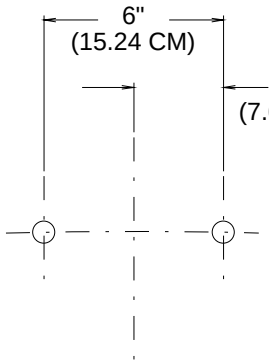

DETAIL A

Materials Required:

25 Cubic Yards of Concrete
2,000 Feet #4 Bar
400 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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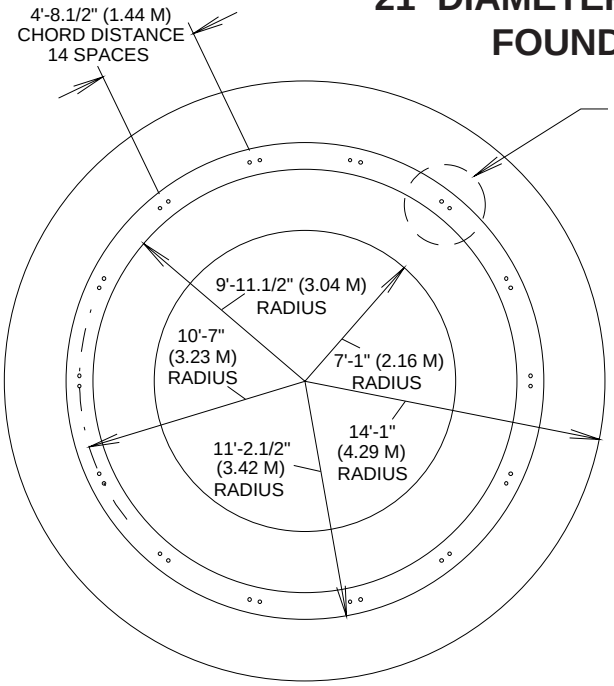
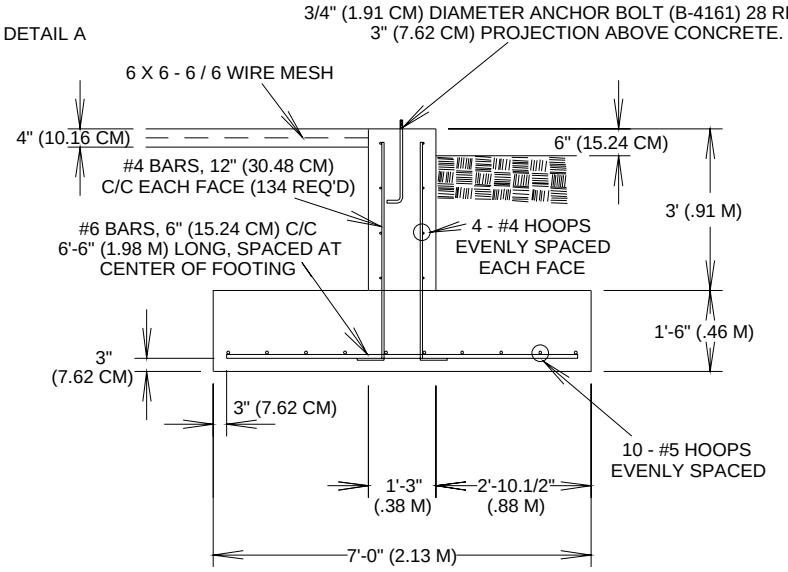
21' DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-19 RINGS





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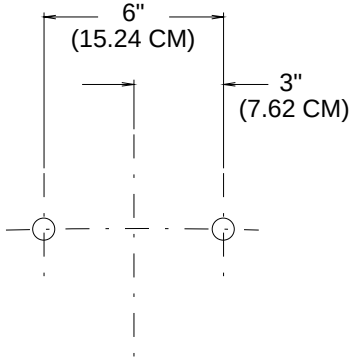

DETAIL A

Materials Required:

40 Cubic Yards of Concrete
1,200 Feet #4 Bar
700 Feet #5 Bar
800 Feet #6 Bar
400 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3'-0". Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2" to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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Concrete Foundation
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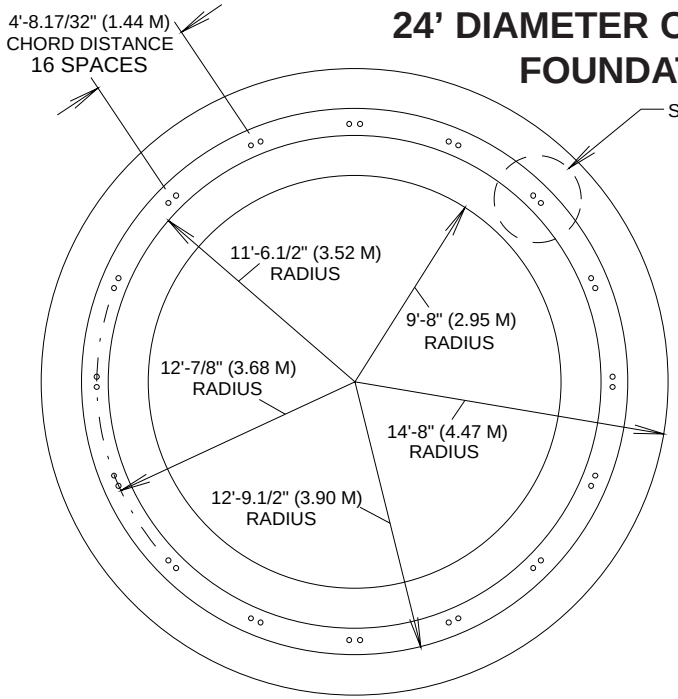
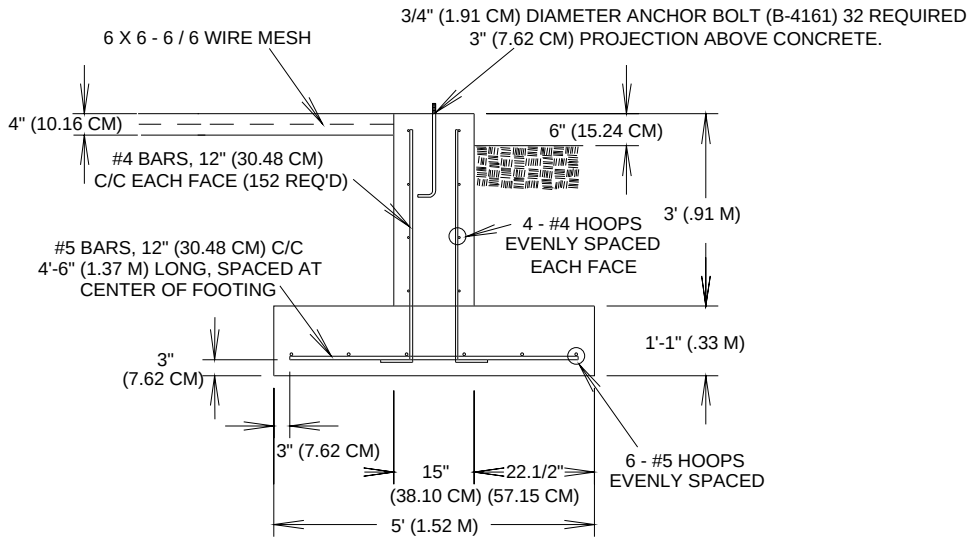
24’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





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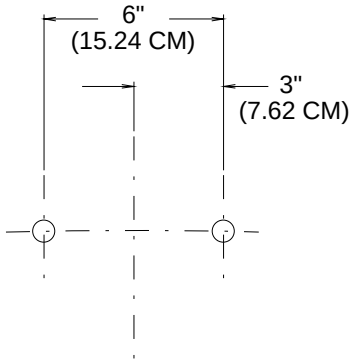

DETAIL A

Materials Required:

25 Cubic Yards of Concrete
1,300 Feet #4 Bar
500 Square Feet 6 x 6 - 6 / 6 Wire Mesh
900 ft. #5

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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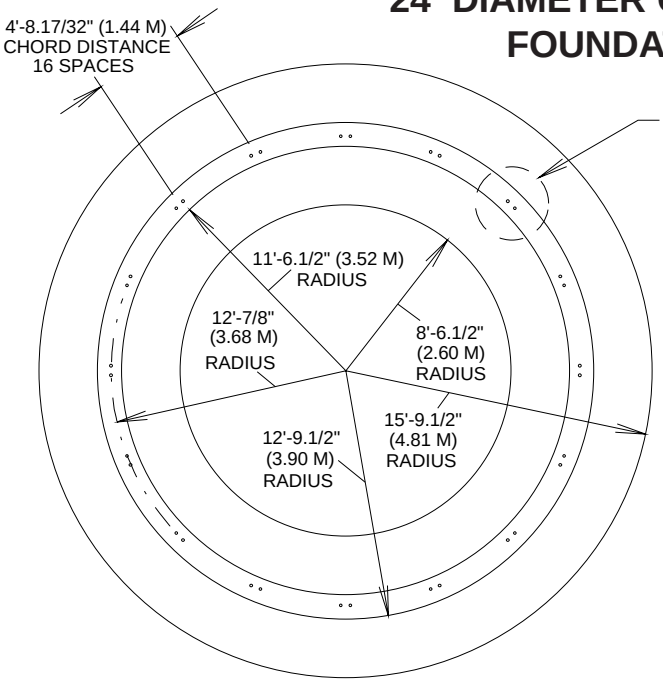
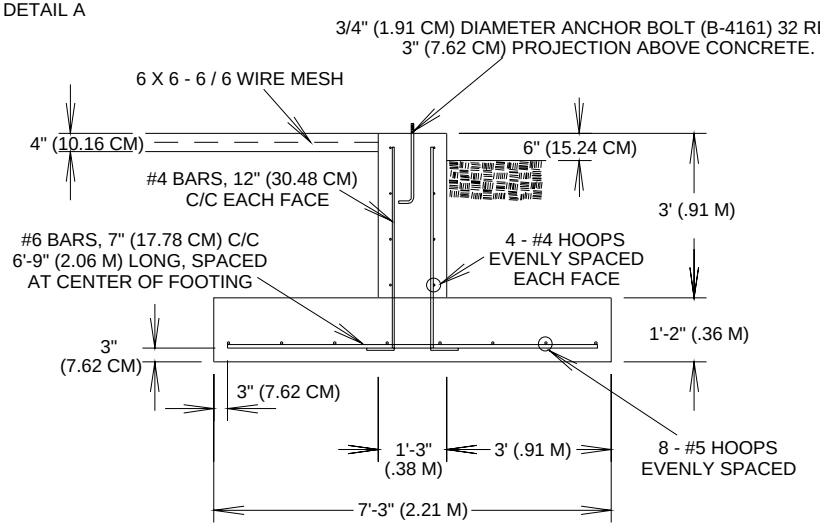
24' DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-19 RINGS





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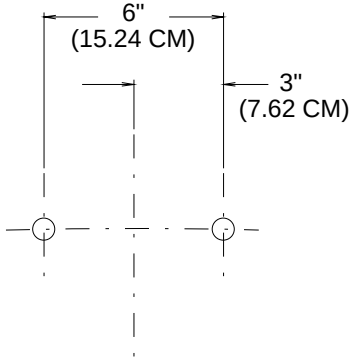

DETAIL A

Materials Required:

40 Cubic Yards of Concrete
1,200 Feet #4 Bar
700 Feet #5 Bar
900 Feet #6 Bar
500 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
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7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2" to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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Concrete Foundation
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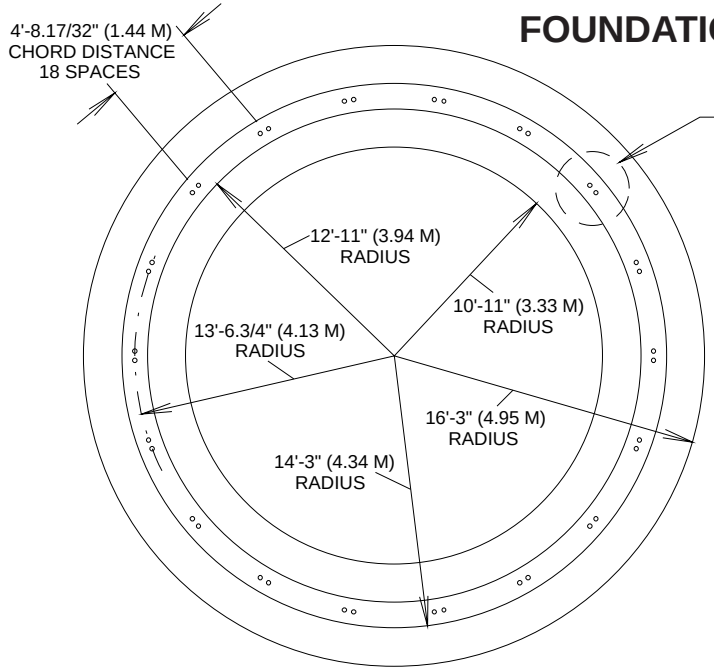
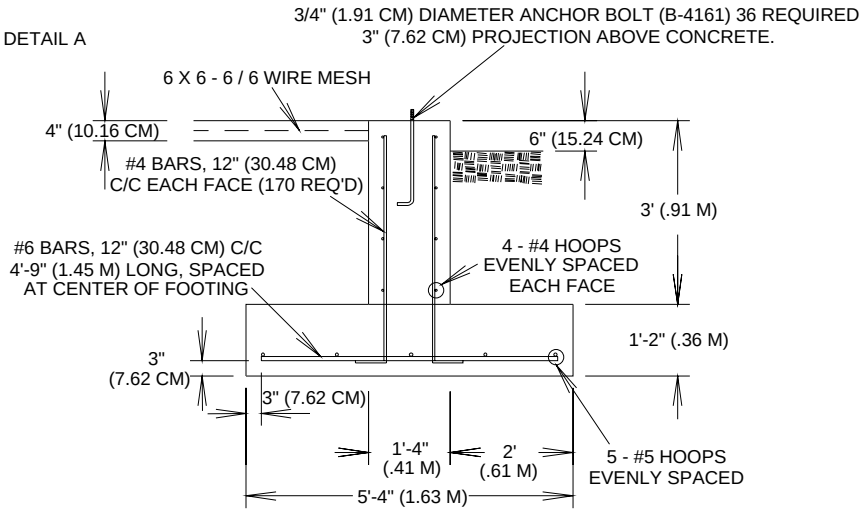
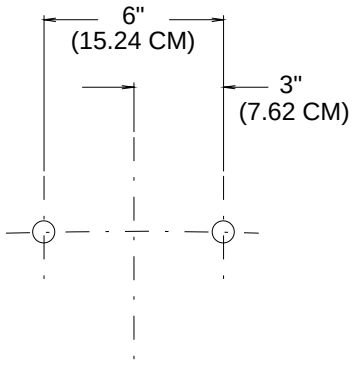
27’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 12 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

36 Cubic Yards of Concrete
1,600 Feet #4 Bar
450 Feet #5 Bar
450 Feet #6 Bar
700 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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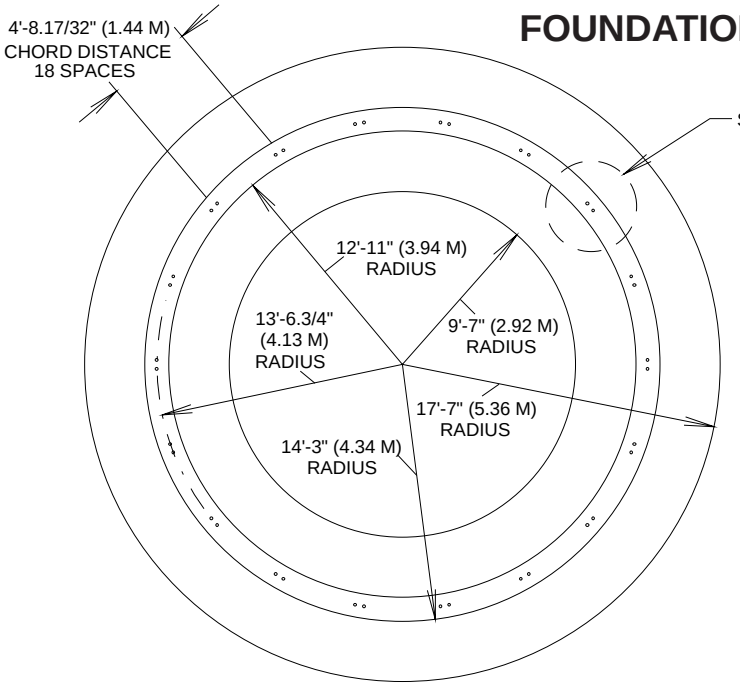
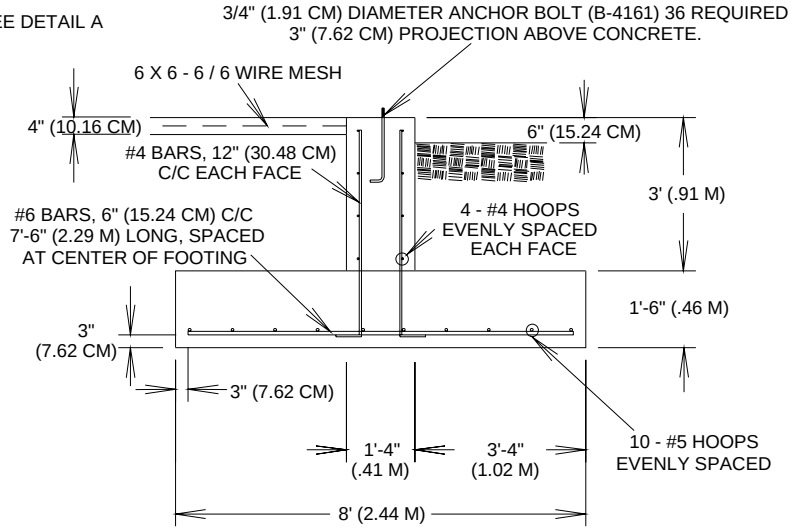
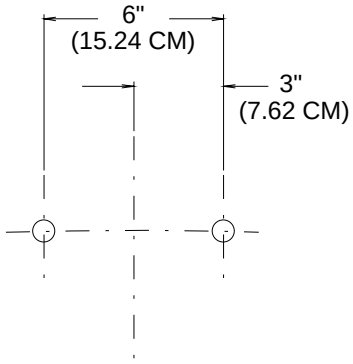
Concrete Foundation
Commercial Hopper Tanks

27’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-19 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

58 Cubic Yards of Concrete
1,600 Feet #4 Bar
900 Feet #5 Bar
1,400 Feet #6 Bar
700 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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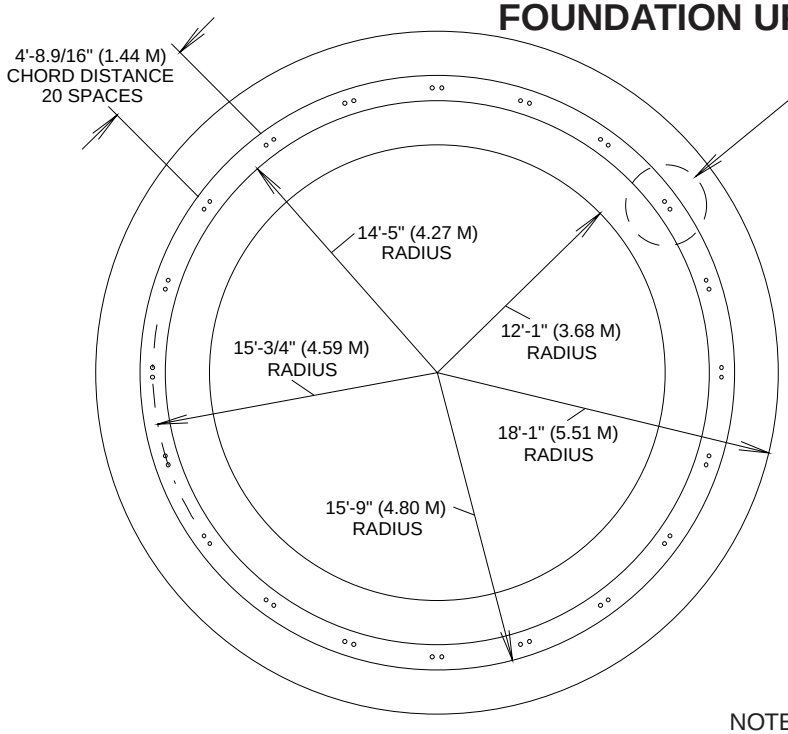
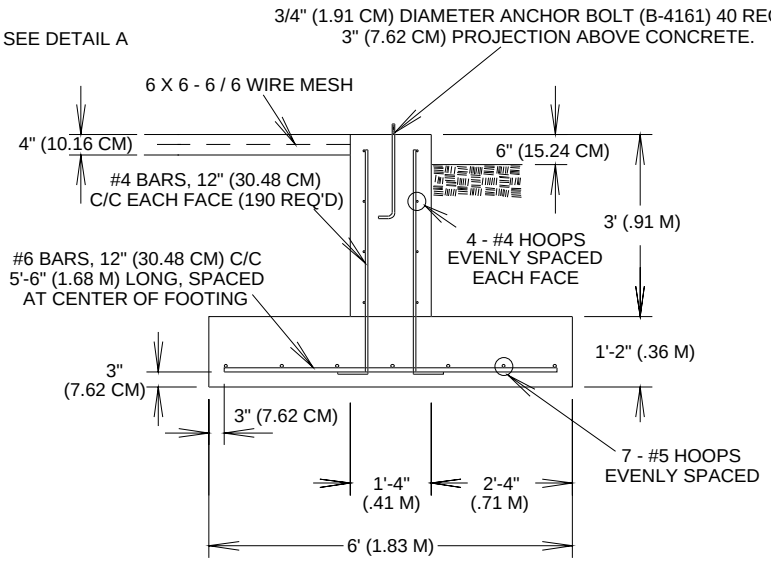
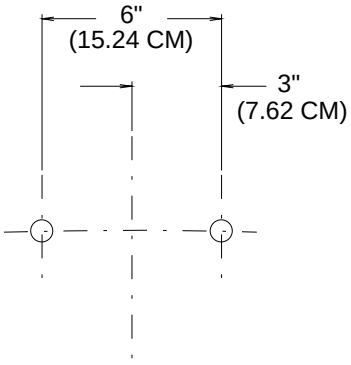
30’ DIAMETER COMMERCIAL HOPPER TANK
FOUNDATION UP TO 12 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

44 Cubic Yards of Concrete
1,700 Feet #4 Bar
700 Feet #5 Bar
550 Feet #6 Bar
850 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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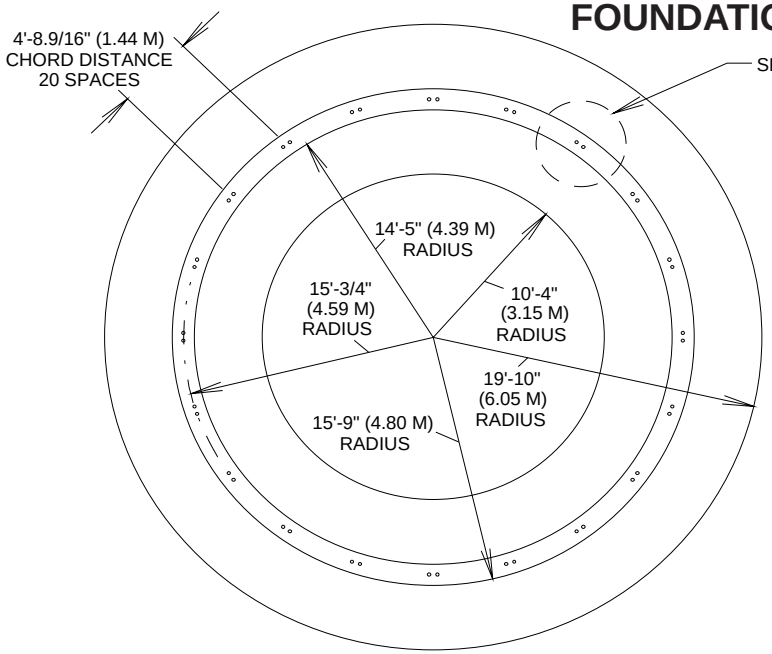
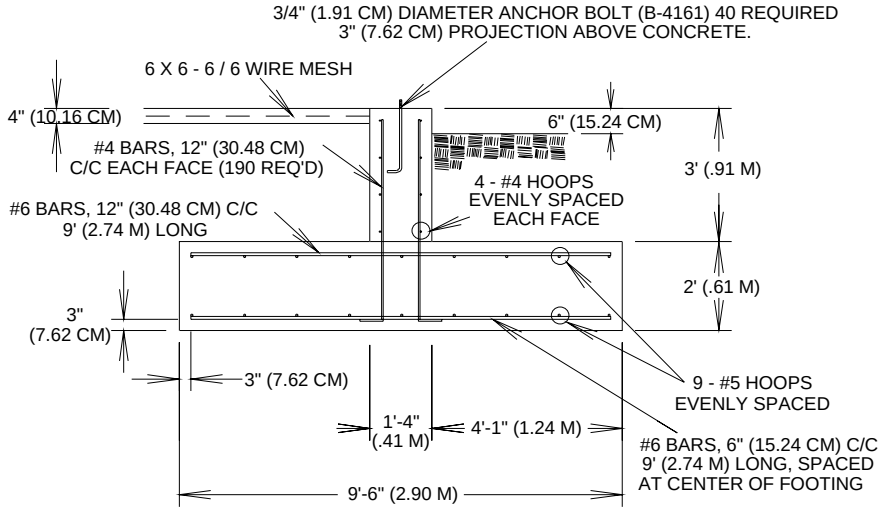
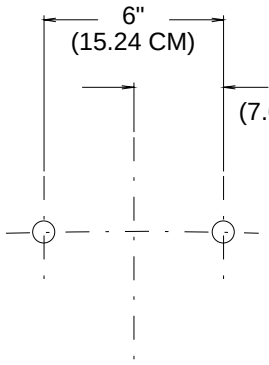
Concrete Foundation
Commercial Hopper Tanks

30’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION FOR 13-19 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)



DETAIL A

Materials Required:

80 Cubic Yards of Concrete
1,600 Feet #4 Bar
1,600 Feet #5 Bar
2,400 Feet #6 Bar
700 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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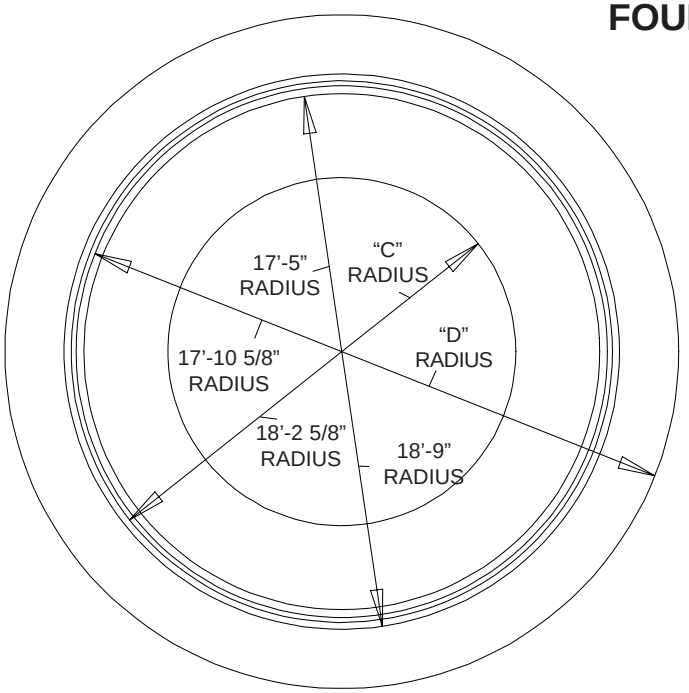
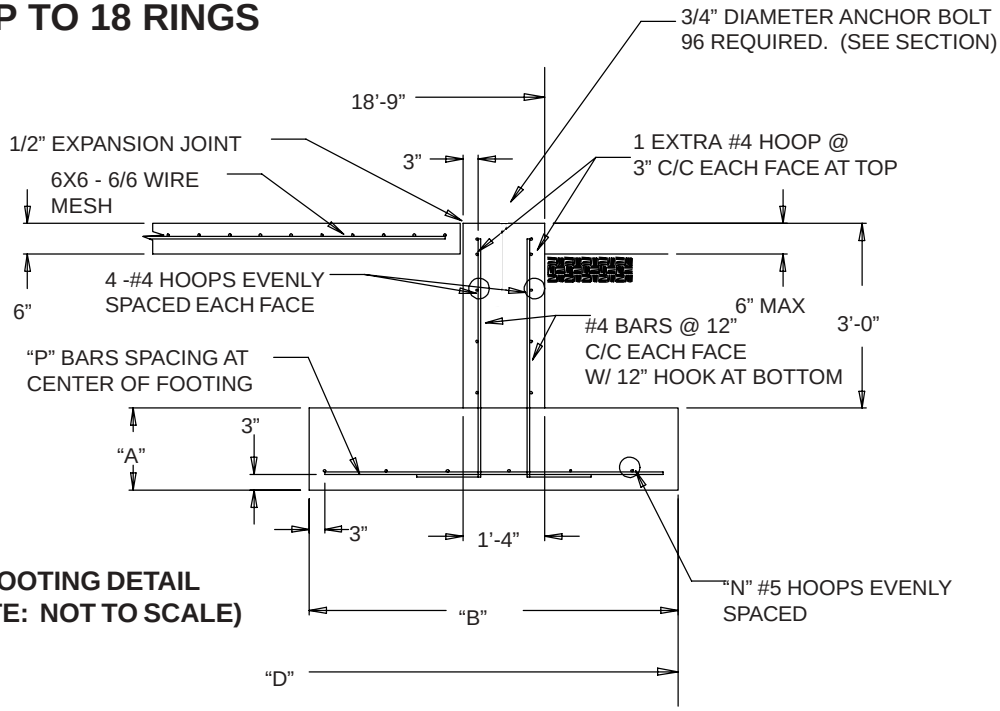
36’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 18 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

NO. OF RINGS	UP TO 10	14	18
A	1'-4"	1'-4"	1'-8"
B	6'-0"	7'-6"	9'-2"
C	14'-11"	13'-11"	12'-11"
D	20'-11"	21'-5"	22'-1"
N	#5 @ 12" c/c	#5 @ 10" c/c	#5 @ 9" c/c
P	#5 @ 10" c/c	#6 @ 10" c/c	#7 @ 8.5" c/c
#4 REBAR (FT)	2400	2400	2400
#5 REBAR (FT)	1500	1000	1400
#6 REBAR (FT)	0	1000	0
#7 REBAR (FT)	0	0	1400
6X6 -6/6 WIRE MESH (FT^2)	960	960	960
CONCRETE (CU. YDS.)	75	80	110

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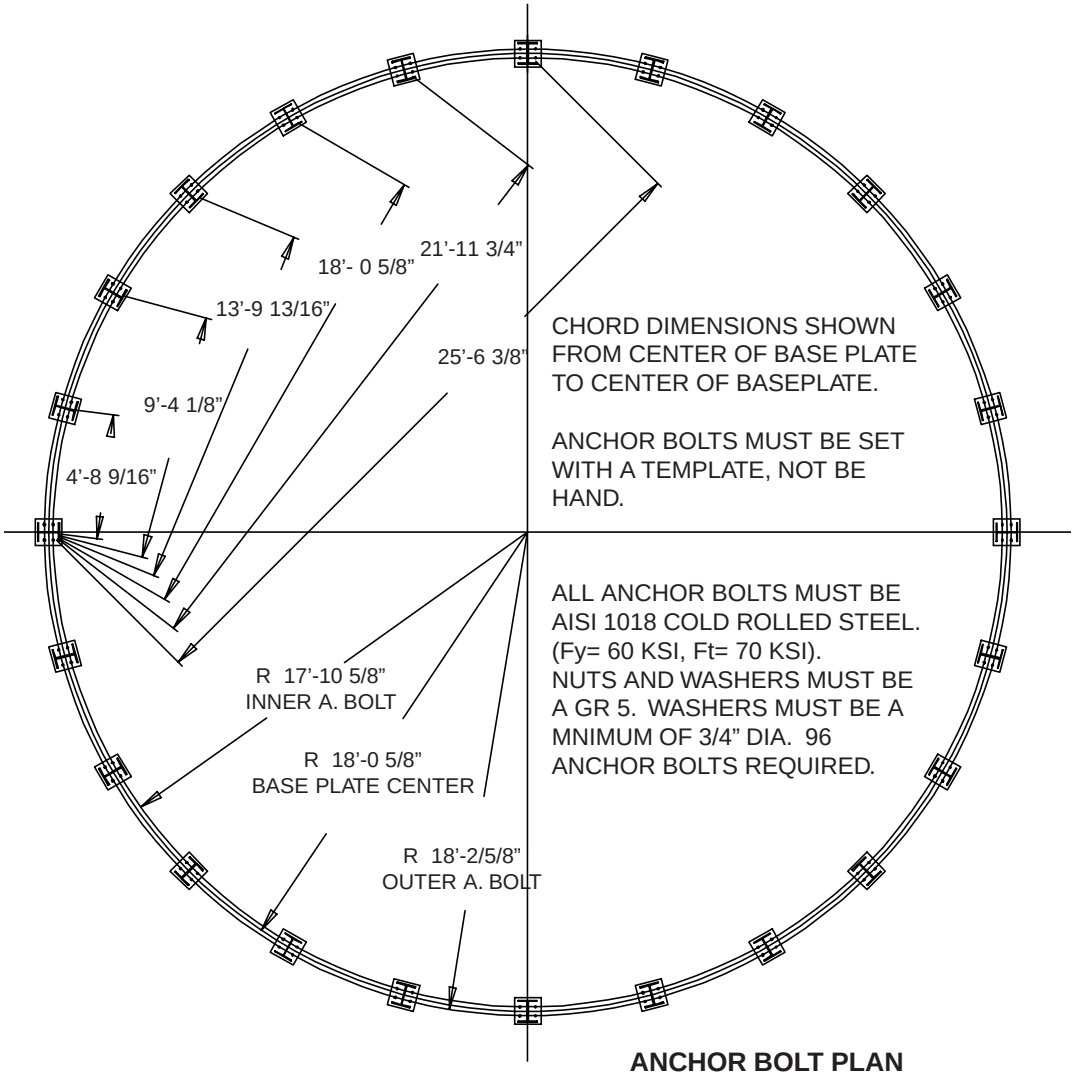
36’ DIAMETER COMMERCIAL HOPPER TANK FOUNDATION UP TO 18 RINGS

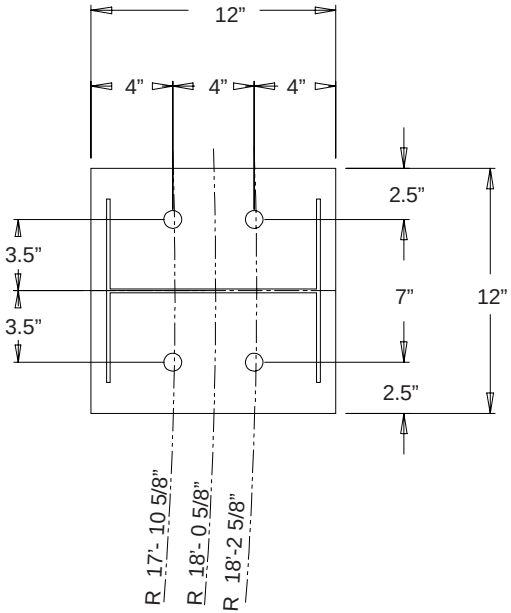


CHORD DIMENSIONS SHOWN FROM CENTER OF BASE PLATE TO CENTER OF BASEPLATE.

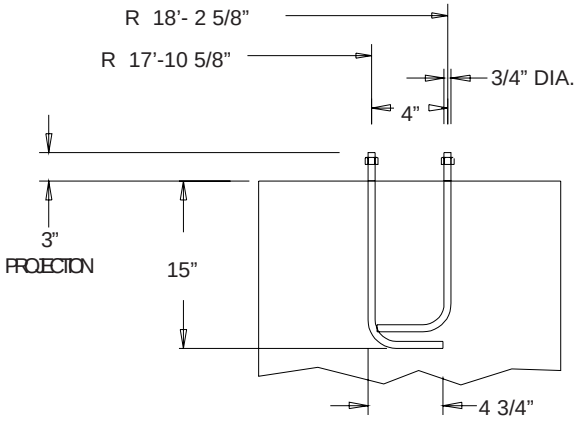
ANCHOR BOLTS MUST BE SET WITH A TEMPLATE, NOT BE HAND.

ALL ANCHOR BOLTS MUST BE AISI 1018 COLD ROLLED STEEL. (Fy= 60 KSI, Ft= 70 KSI). NUTS AND WASHERS MUST BE A GR 5. WASHERS MUST BE A MNIMUM OF 3/4” DIA. 96 ANCHOR BOLTS REQUIRED.

ANCHOR BOLT PLAN



PLAN DETAIL



SECTION DETAIL

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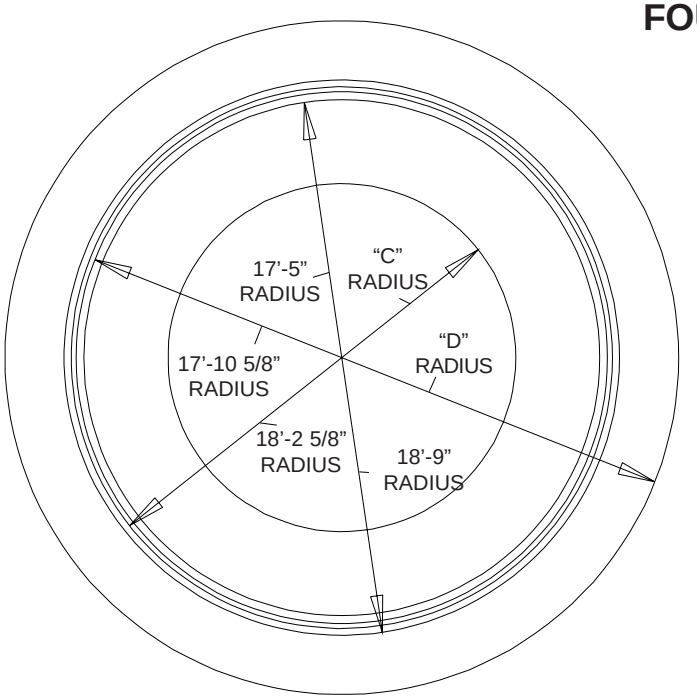
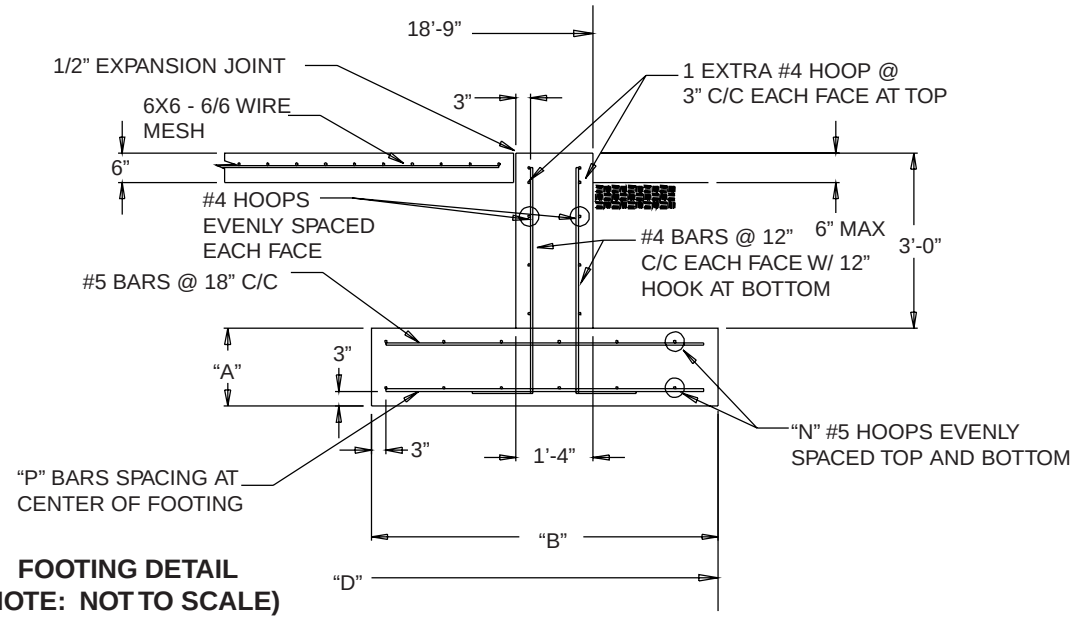
36’ DIAMETER COMMERCIAL HOPPER TANK
FOUNDATION 19-22 RINGS





FOOTING DETAIL
(NOTE: NOT TO SCALE)

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6” lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3’-0”. Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4” slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2” to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

NO. OF RINGS	20	22
A	2'-0"	2'-0"
B	10'-2"	11'-2"
C	11'-7"	11'-7"
D	22'-5"	22'-9"
N	#5 @ 12" c/c	#5 @ 12" c/c
P	#5 @ 6" c/c	#6 @ 5" c/c
#4 REBAR (FT)	2400	2400
#5 REBAR (FT)	3000	3300
#6 REBAR (FT)	2300	3000
6X6 -6/6 WIRE MESH (FT^2)	960	960
CONCRETE (CU. YDS.)	122	128

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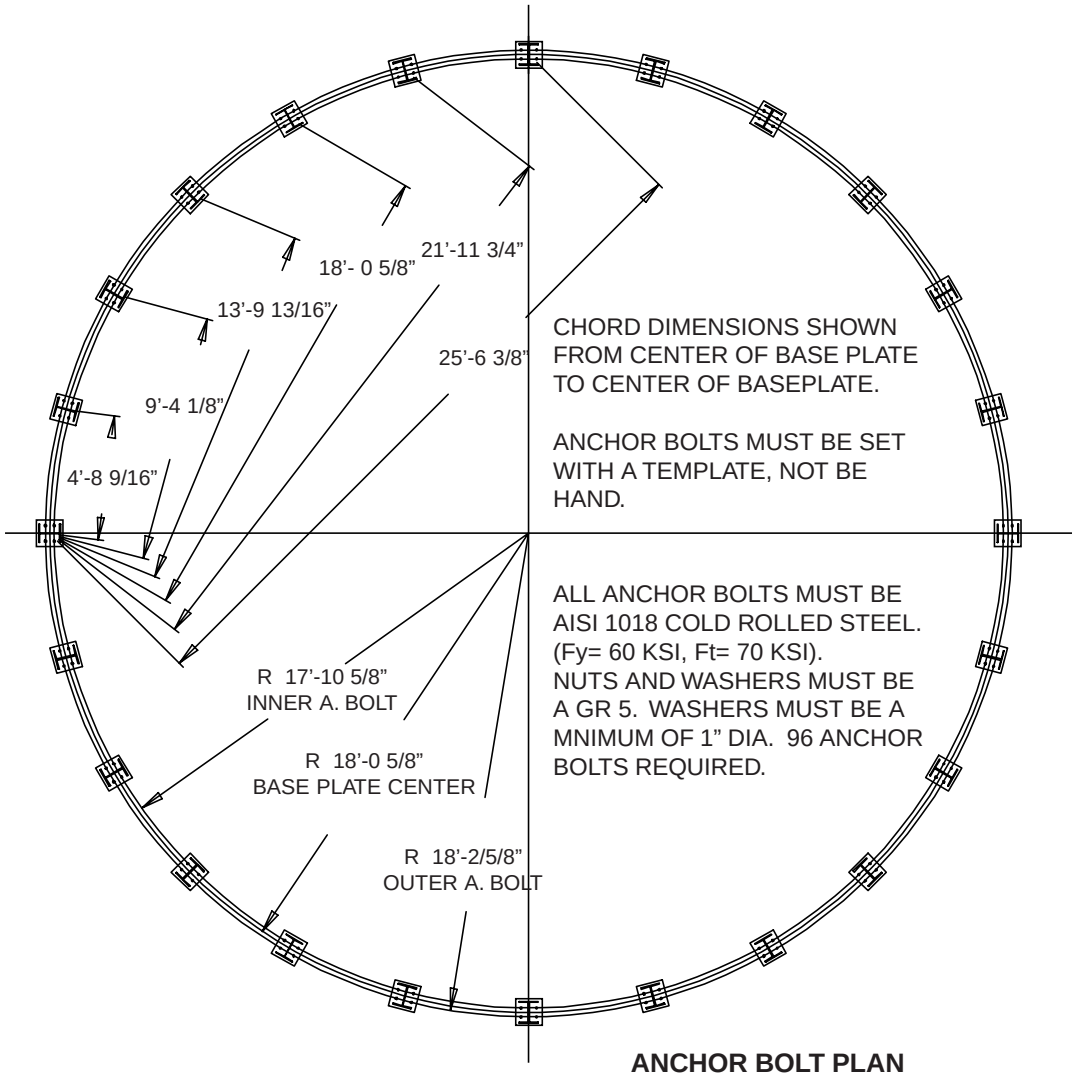
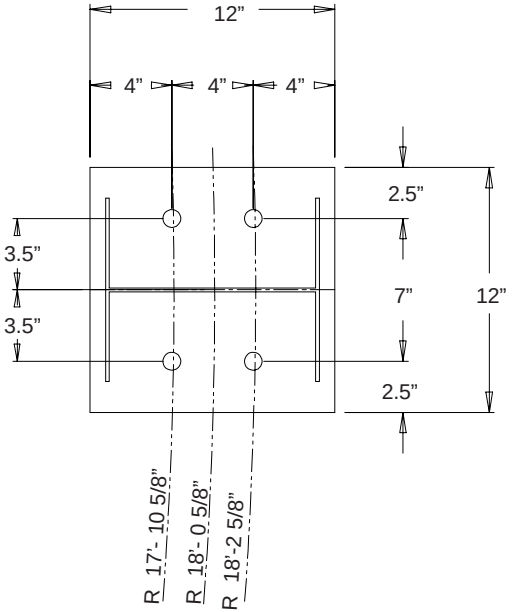
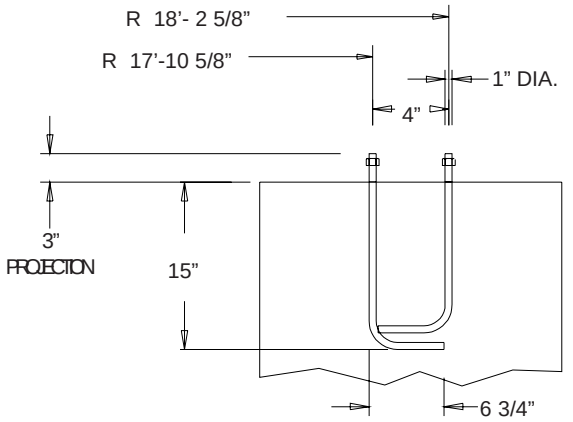
36’ DIAMETER COMMERCIAL HOPPER TANK
FOUNDATION 19-22 RINGS



ANCHOR BOLT PLAN



PLAN DETAIL



SECTION DETAIL

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Frost Free Foundation Recommendations For 4.00” Corrugation Farm-Com Hopper Tanks FCHT Series

A Division
of the GSI
Group, INC.

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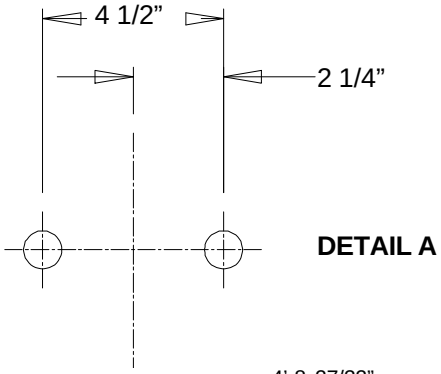
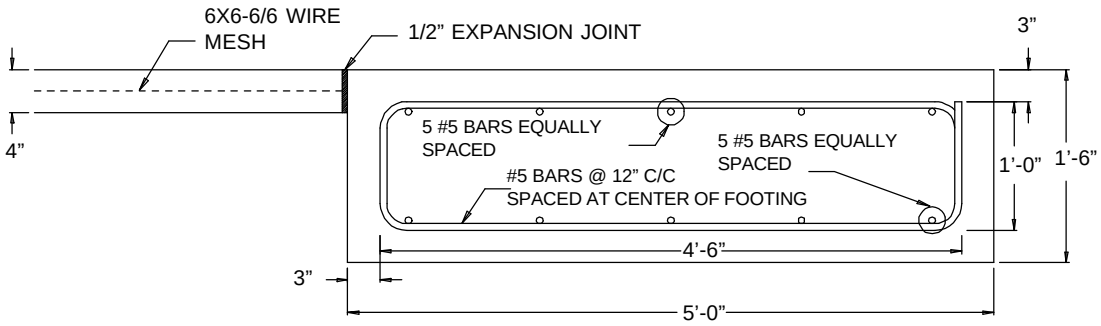
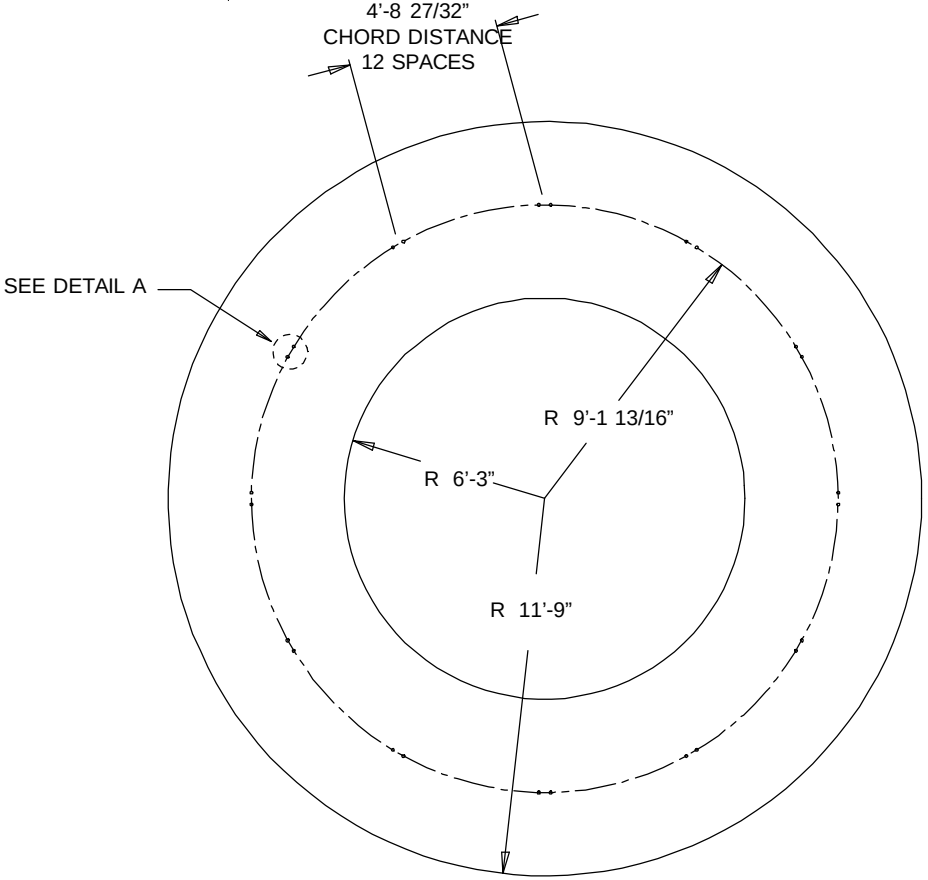
18' DIAMETER FARM-COM HOPPER TANK FOUNDATION



DETAIL A



FOOTING DETAIL
(NOTE: NOT TO SCALE)



Materials Required:

19 Cubic Yards of Concrete
1300 Feet #5 Bar
150 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3'-0". Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2" to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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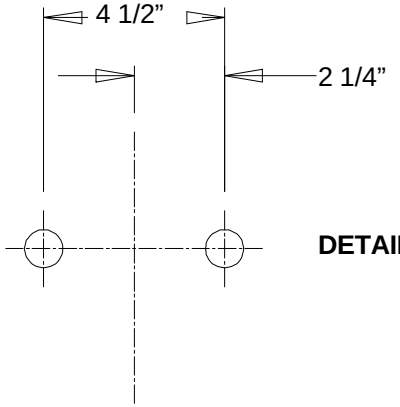
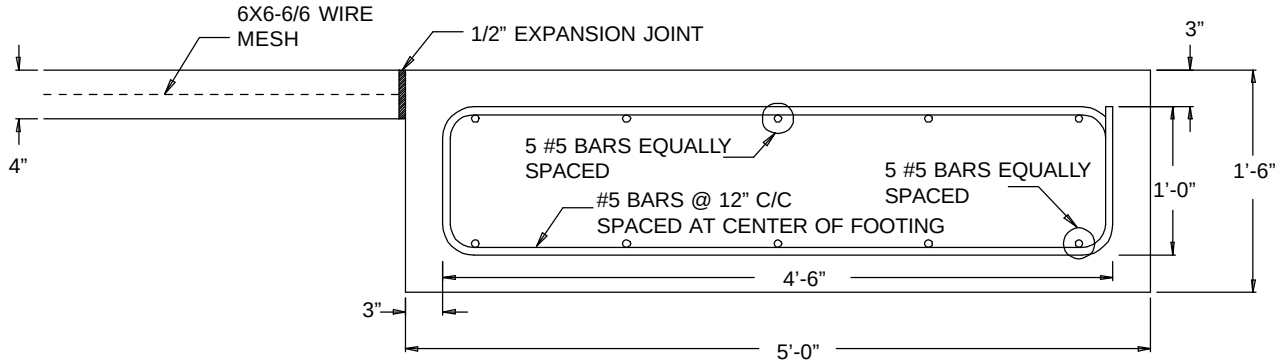
Frost Free Foundation
4.00" Farm-Com Hopper Tanks

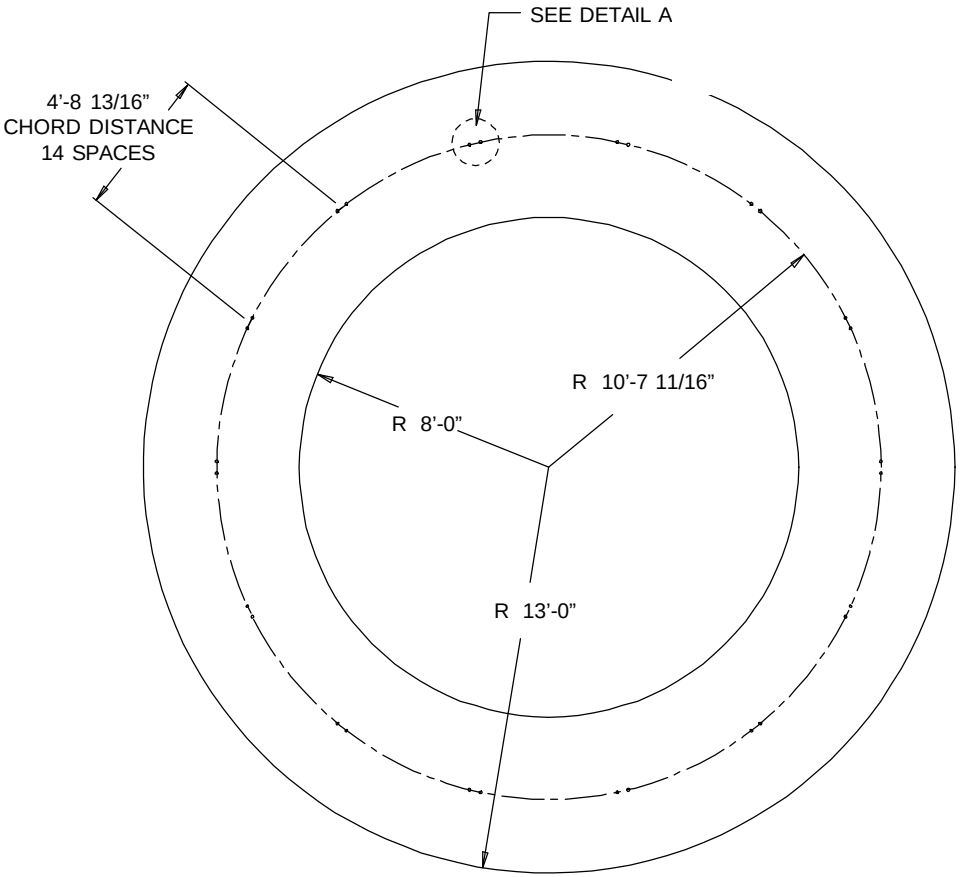
21' DIAMETER FARM-COM HOPPER TANK FOUNDATION



DETAIL A



FOOTING DETAIL
(NOTE: NOT TO SCALE)



Materials Required:

20 Cubic Yards of Concrete
1350 Feet #5 Bar
250 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3'-0". Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2" to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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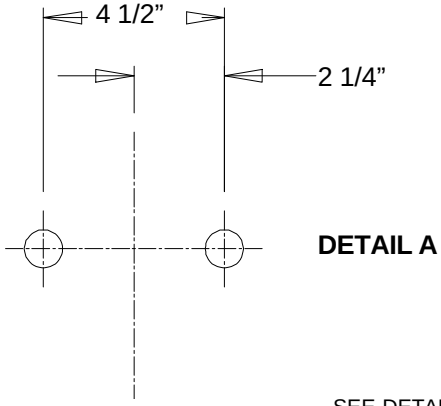
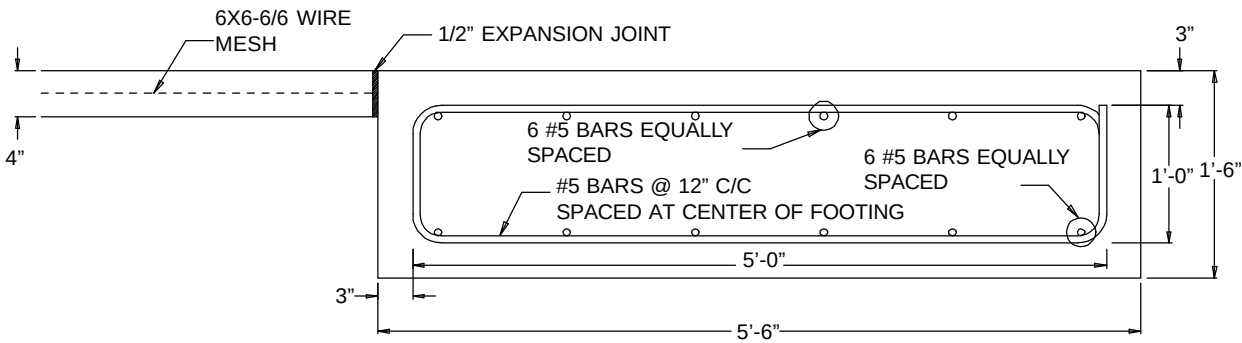
Frost Free Foundation
4.00" Farm-Com Hopper Tanks

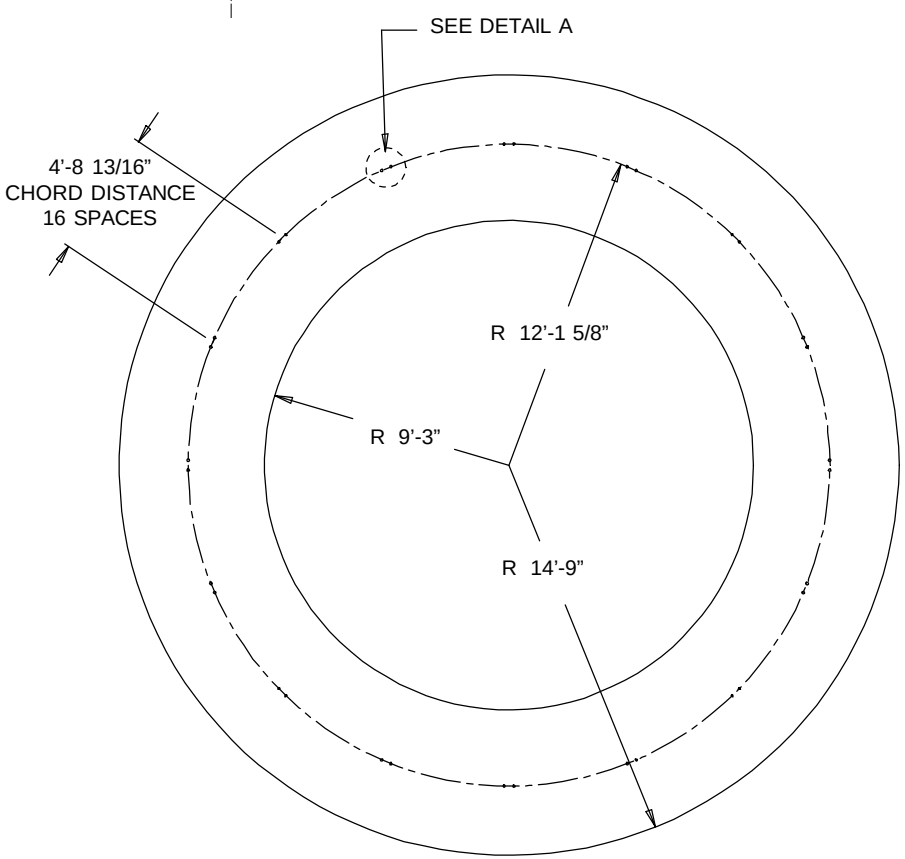
24' DIAMETER FARM-COM HOPPER TANK FOUNDATION



DETAIL A



FOOTING DETAIL
(NOTE: NOT TO SCALE)



Materials Required:

27 Cubic Yards of Concrete
2650 Feet #5 Bar
325 Square Feet 6 x 6 - 6 / 6 Wire Mesh

NOTES:

1. The foundation design is based on a minimum allowable soil bearing capacity of 3000 psf. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
2. The Foundation site must be free of vegetation and debris and well drained.
3. The foundation must be founded below the frost line, or placed on non-expansive frost free fill.
4. All material used for backfill inside the ring wall should be clean, well graded, crushed rock or a sand gravel mixture. Backfill should be placed in 6" lifts, 95% compaction.
5. All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars
6. Lap all circumferencial bars 35 bar diameters and staggger all laps in plans 3'-0". Estimates for material do not include end laps.
7. Concrete must have a minimum compressive strength of 3000 psi at 28 days, 6-8% air entrainment, 4" slump
8. Codes: UBC 97, ACI 318-95
9. Interior top slab may be crowned 2" to provide water drainage away from foundation. Crowning the slab will reduce the clearance under the discharge.

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Commercial Tank Foundation Tunnels

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4X4 TUNNELS

64' MAXIMUM SIDEWALL HEIGHT (24 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS
ASTM A615 GRADE 60 DEFORMED REINFORCEMENT BAR

DIAMETER	#4 REBAR		#5 REBAR		#6 REBAR		CONCRETE
FT	FT	LBS	FT	LBS	FT	LBS	YD^3
27	1300	868	400	417	500	751	23
30	1400	935	400	417	600	901	25
33	1500	1002	400	417	600	901	27
36	1700	1136	500	522	700	1051	30
39	1800	1202	500	522	700	1051	32
42	1900	1269	600	626	700	1051	34
45	1900	1269	600	626	700	1051	36
48	2200	1470	600	626	800	1202	39
54	2200	1470	700	730	900	1352	42
60	2700	1804	700	730	1000	1502	48
72	3200	2138	900	939	1200	1802	58
75	3300	2204	900	939	1300	1953	60
78	3400	2271	900	939	1300	1953	62
90	4000	2672	1100	1147	1500	2253	72
105	4600	3073	1200	1250	1800	2704	83

1. LAP ALL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"

2. MATERIAL ESTIMATES ARE APPROXIMATIONS ONLY. ESTIMATES DO NOT INCLUDE ALLOWANCES FOR REINFORCEMENT BAR OVERLAPS, CONCRETE SHRINKAGE, OR MATERIAL WASTE.

3. REFERENCE DRAWING 4X4-64' FOR CONSTRUCTION DETAILS AND REBAR/ BEAM DRAWING FOR REBAR/ BEAM DETAILS.

4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS

5. BASED ON A SOIL BEARING CAPACITY OF 3500 PSF.

WHEN A TUNNEL IS ADDED TO THE INVERTED "T" FOUNDATION, INCREASED STEMWALL HEIGHT IS REQUIRED IN ALL CASES. THE FOOTER MUST BE KEPT BELOW THE FROSTLINE TO MINIMIZE MOVEMENT.

DIAMETER	BEAM
72' AND UNDER	W8X58
75' THRU 90'	W8X67
105'	W10X77

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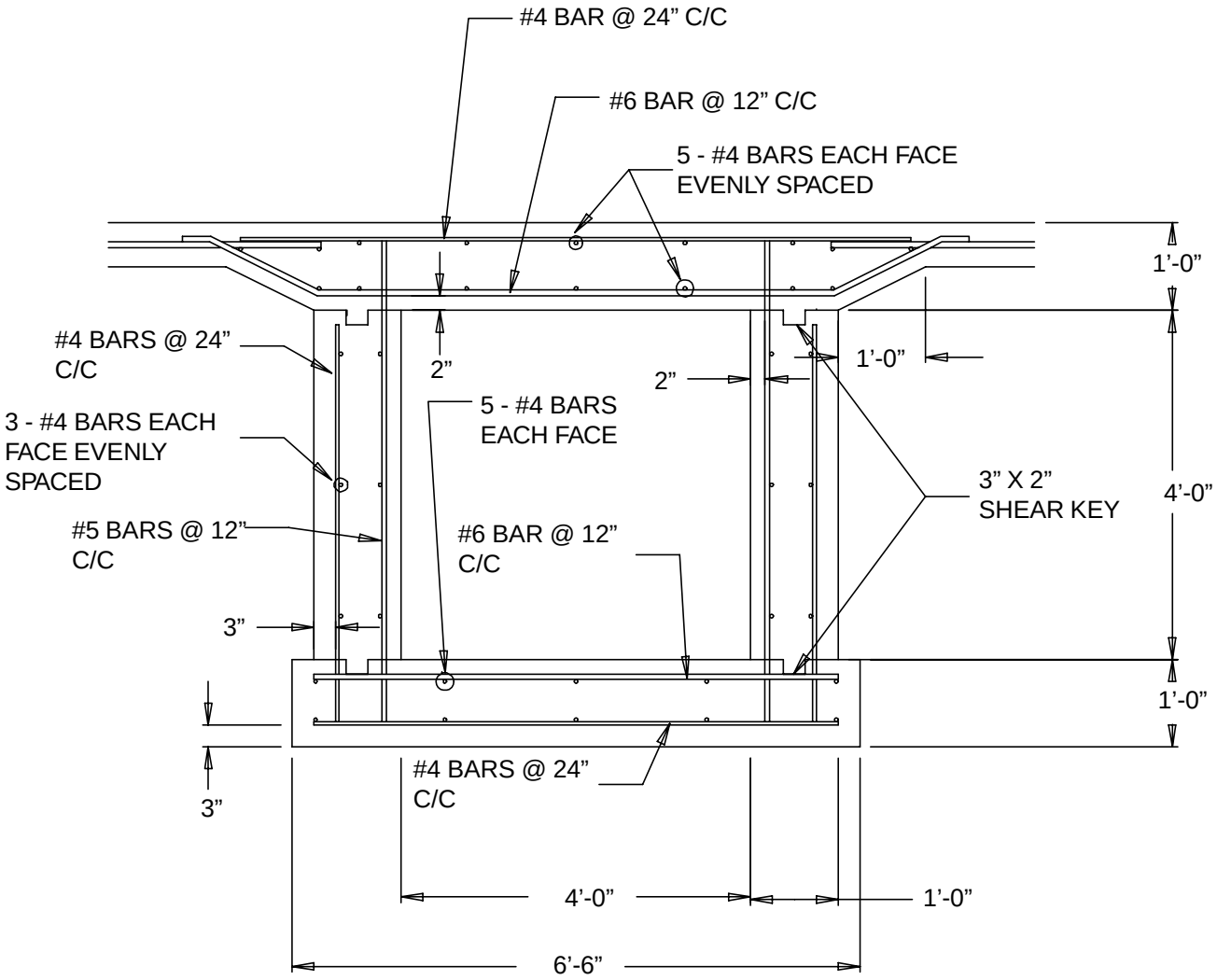
4X4 TUNNEL DETAIL
64' MAXIMUM SIDEWALL HEIGHT (24 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS



NOTE: NOT TO SCALE

NOTES:

1. ALL REINFORCEMENT SHALL MEET THE REQUIRMENTS OF ASTM A615 GRADE 60 DEFORMED BARS.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
3. LAP ALL CIRCUMFERENTIAL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"
4. BASED ON A SOIL BEARING CAPACITY OF 3500 PSF.

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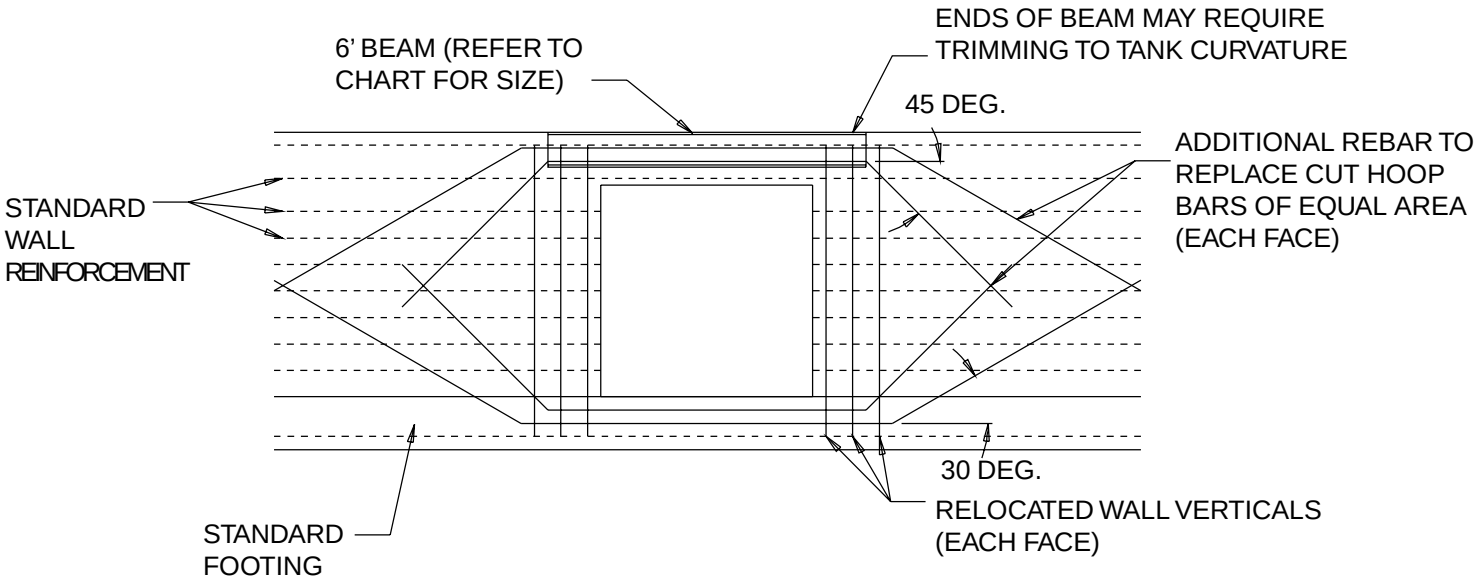
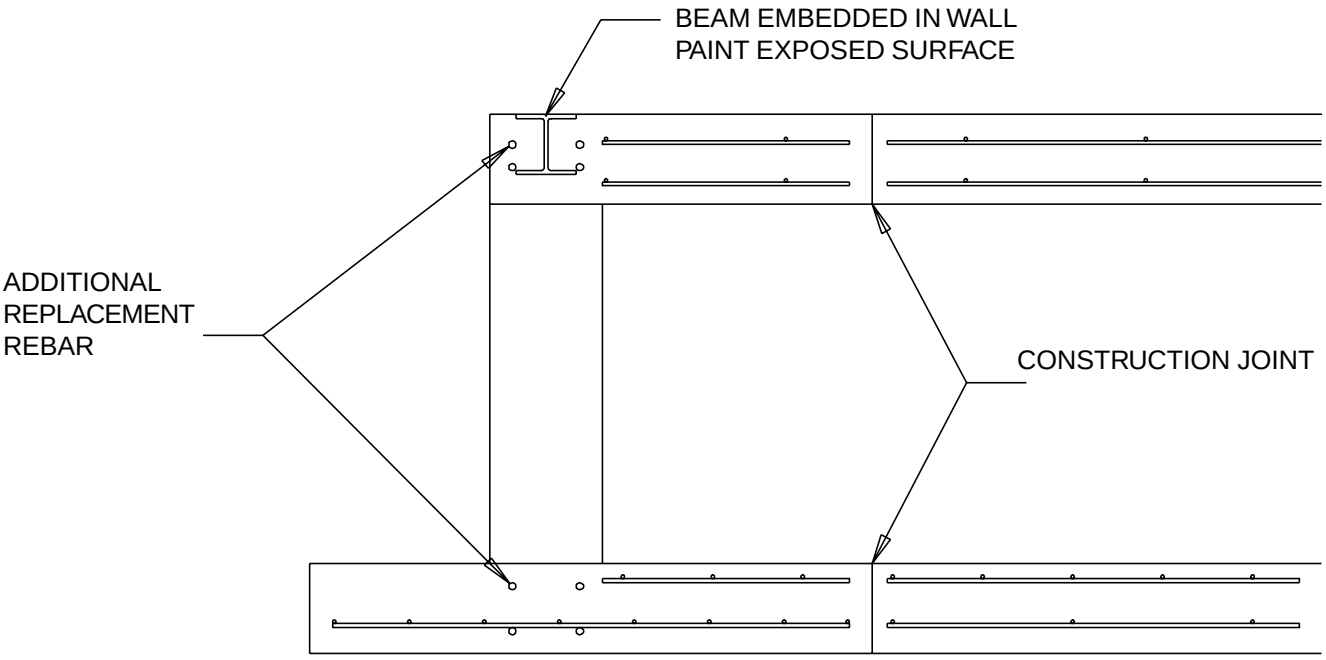
4X4 TUNNEL DETAIL
REBAR/ BEAM DETAILS



FRONT VIEW

NOTE: NOT TO SCALE



SIDE VIEW

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4X4 TUNNELS

72' MAXIMUM SIDEWALL HEIGHT (27 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS
ASTM A615 GRADE 60 DEFORMED REINFORCEMENT BAR

DIAMETER	#4 REBAR		#5 REBAR		#6 REBAR		CONCRETE
FT	FT	LBS	FT	LBS	FT	LBS	YD^3
30	1300	868	400	417	600	901	25
33	1400	935	500	522	600	901	27
36	1500	1002	500	522	600	901	30
39	1700	1136	600	626	700	1051	32
42	1800	1202	600	626	800	1202	34
45	1900	1269	700	730	800	1202	36
48	2100	1403	700	730	900	1352	39
54	2300	1535	800	834	1000	1502	42
60	2600	1737	900	939	1100	1652	48
72	3100	2071	1000	1043	1300	1953	58
75	3200	2138	1100	1147	1300	1953	60
78	3300	2204	1100	1147	1400	2103	62
90	3800	2538	1300	1356	1600	2403	72
105	4400	2939	1500	1565	1800	2704	83

1. LAP ALL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"

2. MATERIAL ESTIMATES ARE APPROXIMATIONS ONLY. ESTIMATES DO NOT INCLUDE ALLOWANCES FOR REINFORCEMENT BAR OVERLAPS, CONCRETE SHRINKAGE, OR MATERIAL WASTE.

3. REFERENCE DRAWING 4X4-72' FOR CONSTRUCTION DETAILS AND REBAR/ BEAM DRAWING FOR REBAR/ BEAM DETAILS.

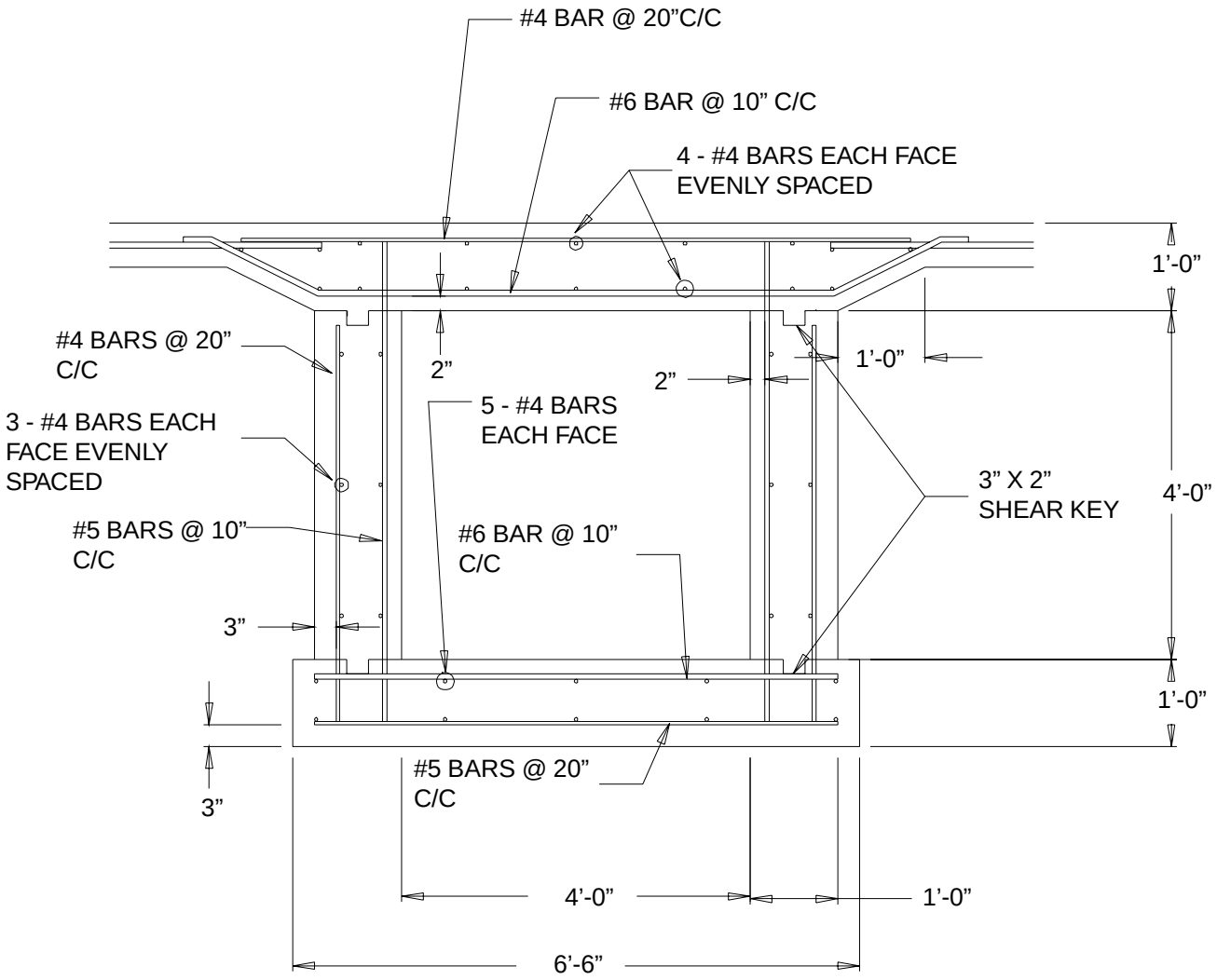
4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS

5. BASED ON A SOIL BEARING CAPACITY OF 3500 PSF.

WHEN A TUNNEL IS ADDED TO THE INVERTED "T" FOUNDATION, INCREASED STEMWALL HEIGHT IS REQUIRED IN ALL CASES. THE FOOTER MUST BE KEPT BELOW THE FROSTLINE TO MINIMIZE MOVEMENT.

DIAMETER	BEAM
60' AND UNDER	W8X67
72' THRU 75'	W10X77
78' THRU 105'	W10X88

4X4 TUNNEL DETAIL
72' MAXIMUM SIDEWALL HEIGHT (27 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS



NOTE: NOT TO SCALE

NOTES:

1. ALL REINFORCEMENT SHALL MEET THE REQUIRMENTS OF ASTM A615 GRADE 60 DEFORMED BARS.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
3. LAP ALL CIRCUMFERENTIAL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"
4. BASED ON A SOIL BEARING CAPACITY OF 3500 PSF.

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4X4 TUNNELS

80' MAXIMUM SIDEWALL HEIGHT (30 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS
ASTM A615 GRADE 60 DEFORMED REINFORCEMENT BAR

DIAMETER	#4 REBAR		#5 REBAR		#6 REBAR		CONCRETE
FT	FT	LBS	FT	LBS	FT	LBS	YD^3
33	1500	1002	500	522	700	1051	27
36	1600	1069	600	626	700	1051	30
39	1700	1136	600	626	800	1202	32
42	1900	1269	700	730	800	1202	34
45	2000	1335	700	730	900	1352	36
48	2100	1403	800	834	900	1352	39
54	2400	1602	900	939	1100	1652	43
60	2600	1737	900	939	1200	1802	48
72	3100	2071	1100	1147	1400	2103	58
75	3300	2204	1200	1252	1500	2253	60
78	3400	2271	1200	1252	1500	2253	62
90	3900	2605	1400	1460	1800	2704	72
105	4600	3073	1600	1669	2000	3004	83

1. LAP ALL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"

2. MATERIAL ESTIMATES ARE APPROXIMATIONS ONLY. ESTIMATES DO NOT INCLUDE ALLOWANCES FOR REINFORCEMENT BAR OVERLAPS, CONCRETE SHRINKAGE, OR MATERIAL WASTE.

3. REFERENCE DRAWING 4X4-80' FOR CONSTRUCTION DETAILS AND REBAR/ BEAM DRAWING FOR REBAR/ BEAM DETAILS.

4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS

5. BASED ON A SOIL BEARING CAPACITY OF 4000 PSF.

WHEN A TUNNEL IS ADDED TO THE INVERTED "T" FOUNDATION, INCREASED STEMWALL HEIGHT IS REQUIRED IN ALL CASES. THE FOOTER MUST BE KEPT BELOW THE FROSTLINE TO MINIMIZE MOVEMENT.

DIAMETER	BEAM
36' AND UNDER	W10X77
42' THRU 78'	W10X88
90' THRU 105'	W10X100

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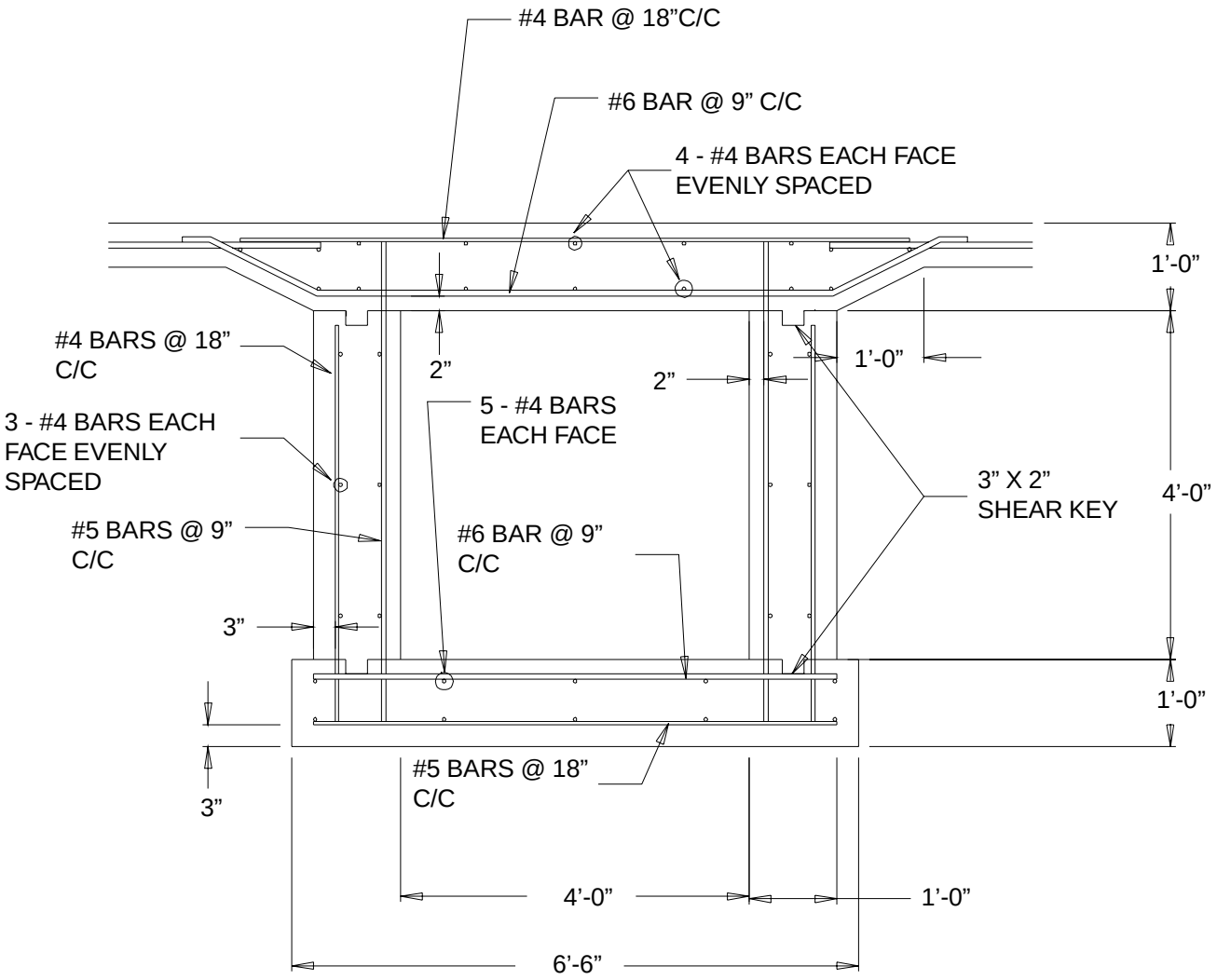
4X4 TUNNEL DETAIL
80' MAXIMUM SIDEWALL HEIGHT (30 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS



NOTE: NOT TO SCALE

NOTES:

1. ALL REINFORCEMENT SHALL MEET THE REQUIRMENTS OF ASTM A615 GRADE 60 DEFORMED BARS.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
3. LAP ALL CIRCUMFERENTIAL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"
4. BASED ON A SOIL BEARING CAPACITY OF 4000 PSF.

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6' WIDE TUNNELS

85' MAXIMUM SIDEWALL HEIGHT (32 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS
ASTM A615 GRADE 60 DEFORMED REINFORCEMENT BAR

32 RING 4000 PSF

DIAMETER	#4 REBAR		#5 REBAR		#6 REBAR		CONCRETE	Tunnel	Slope
FT	FT	LBS	FT	LBS	FT	LBS	YD^3	depth*	length
33	2400	1602	800	834	1300	1953	41	3'-6"	18"
36	2600	1737	900	939	1400	2103	45	3'-6"	18"
42	3100	2071	1100	1147	1700	2553	53	3'-8"	18"
45	3300	2204	1100	1147	1800	2704	57	3'-9"	18"
48	3500	2337	1200	1252	1900	2853	60	3'-10"	18"
54	4000	2671	1400	1460	2100	3154	68	4'-0"	18"
60	4500	3005	1600	1669	2400	3604	76	3'-11"	18"
72	5400	3606	1900	1984	2800	4205	92	4'-2"	18"
75	5600	3739	2000	2088	2800	4205	94	4'-2"	14"
78	5800	3873	2100	2192	3000	4505	99	4'-3"	14"
90	6800	4540	2500	2610	3400	5106	114	4'-5"	14"
105	7900	5275	3000	3132	4000	6007	135	4'-8"	14"

1. LAP ALL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"
2. MATERIAL ESTIMATES ARE APPROXIMATIONS ONLY. ESTIMATES DO NOT INCLUDE ALLOWANCES FOR REINFORCEMENT BAR OVERLAPS, CONCRETE SHRINKAGE, OR MATERIAL WASTE.
3. REFERENCE DRAWING 4X4-80' FOR CONSTRUCTION DETAILS AND DRAWING FND-0001 FOR REBAR/ BEAM DETAILS.
4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
5. BASED ON A SOIL BEARING CAPACITY OF 4500 PSF.

*** WHEN A TUNNEL IS ADDED TO THE INVERTED "T" FOUNDATION, INCREASED STEMWALL HEIGHT IS REQUIRED IN ALL CASES. THE FOOTER MUST BE KEPT BELOW THE FROSTLINE TO MINIMIZE MOVEMENT.**

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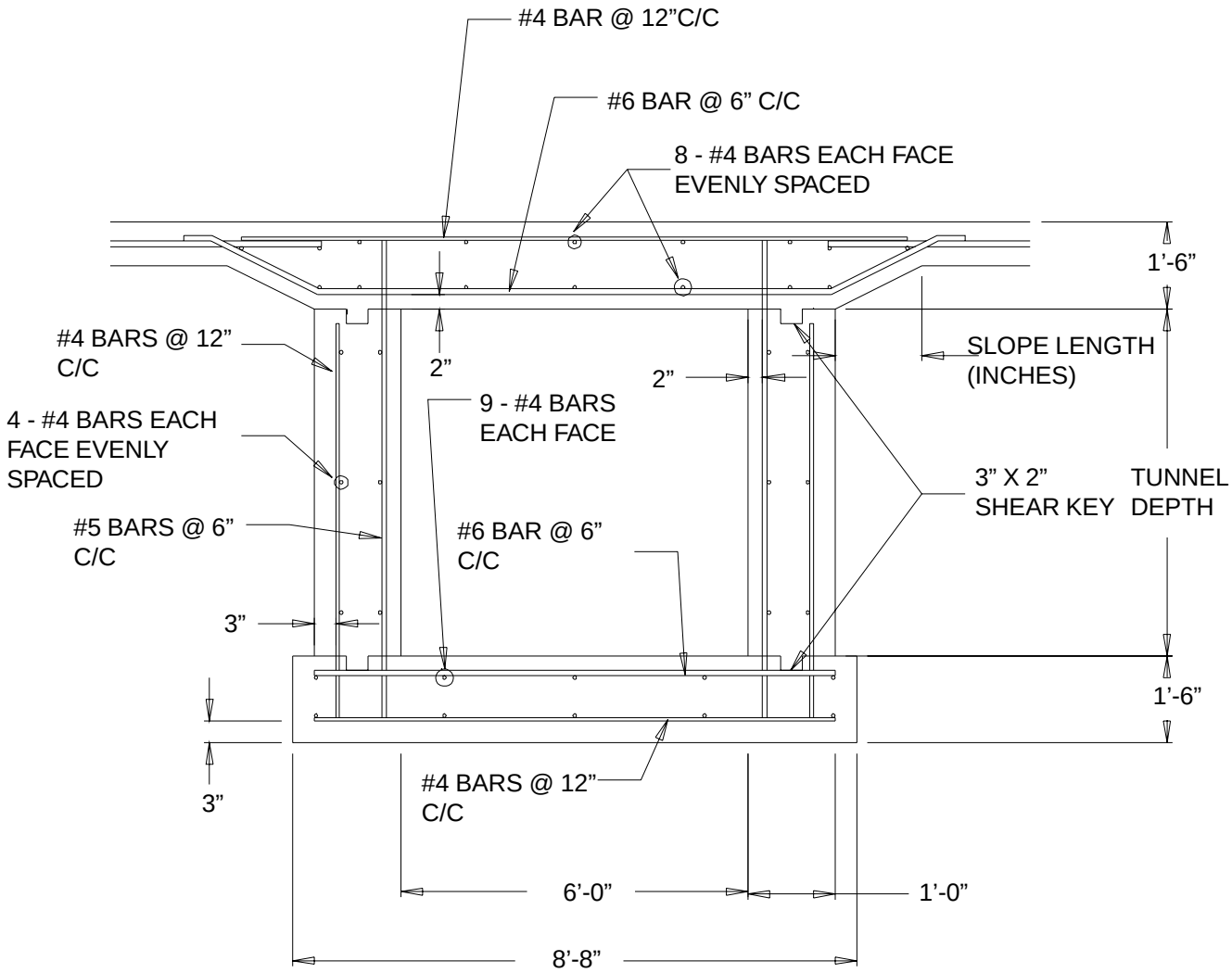
6' WIDE TUNNEL DETAIL
85' MAXIMUM SIDEWALL HEIGHT (32 RING 2.66" CORRUGATION)
3000 PSI CONCRETE @ 28 DAYS



NOTE: NOT TO SCALE

NOTES:

1. ALL REINFORCEMENT SHALL MEET THE REQUIRMENTS OF ASTM A615 GRADE 60 DEFORMED BARS.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
3. LAP ALL CIRCUMFERENTIAL BARS 35 BAR DIAMETERS AND STAGGER ALL LAPS IN PLAN 3'-0"
4. BASED ON A SOIL BEARING CAPACITY OF 4500 PSF.

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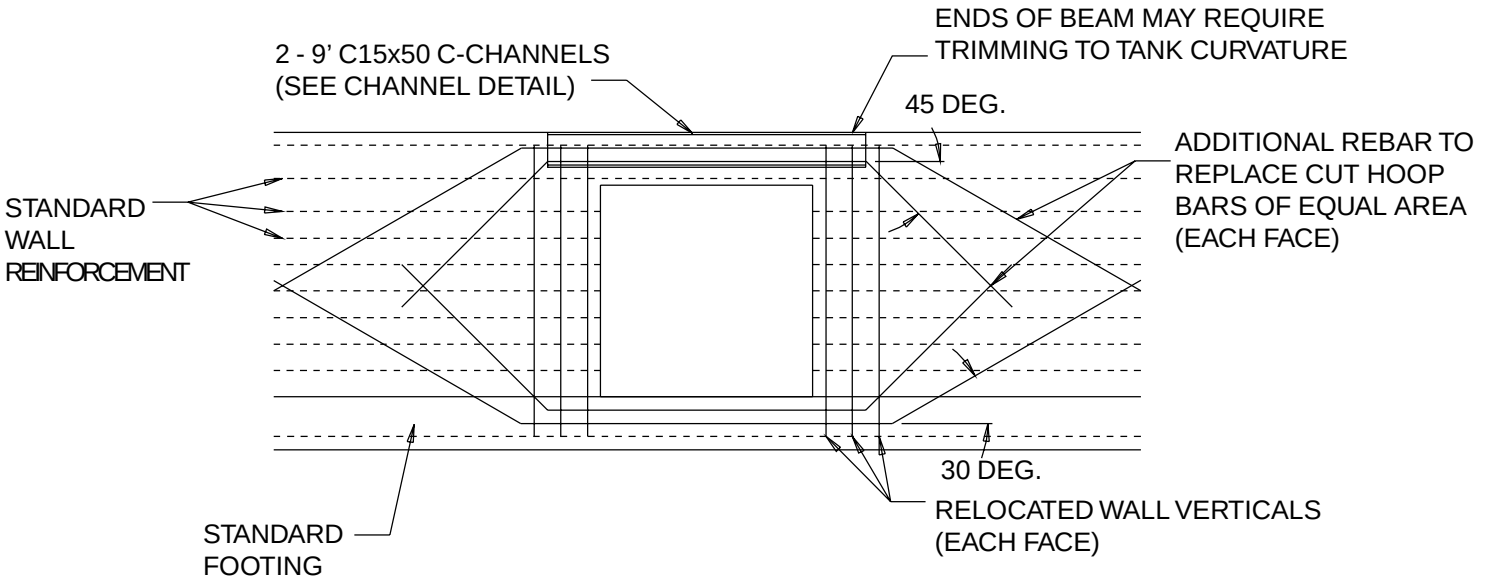
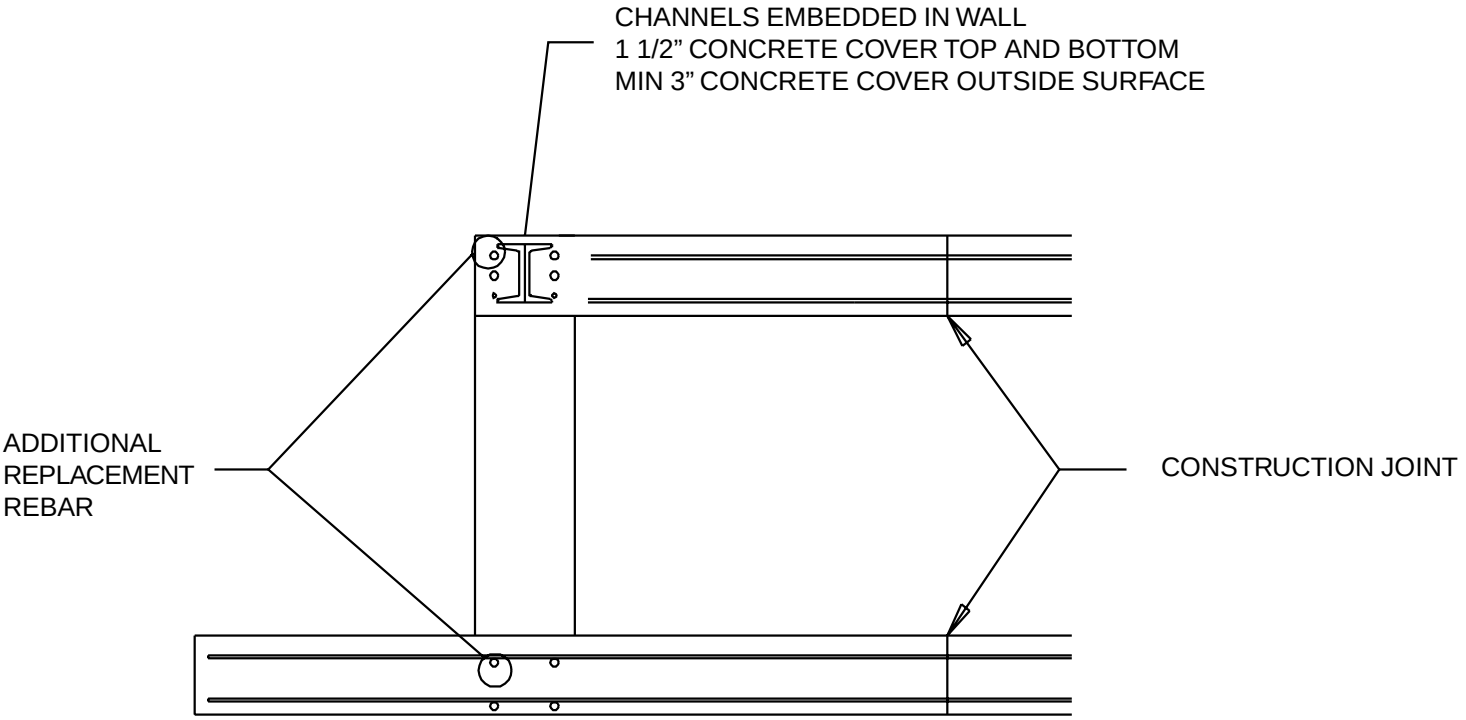
6' WIDE TUNNEL DETAIL
FOR 85' SIDEWALL HEIGHT (32 RING 2.66" CORRUGATION)
REBAR/ BEAM DETAILS



FRONT VIEW

NOTE: NOT TO SCALE



SIDE VIEW

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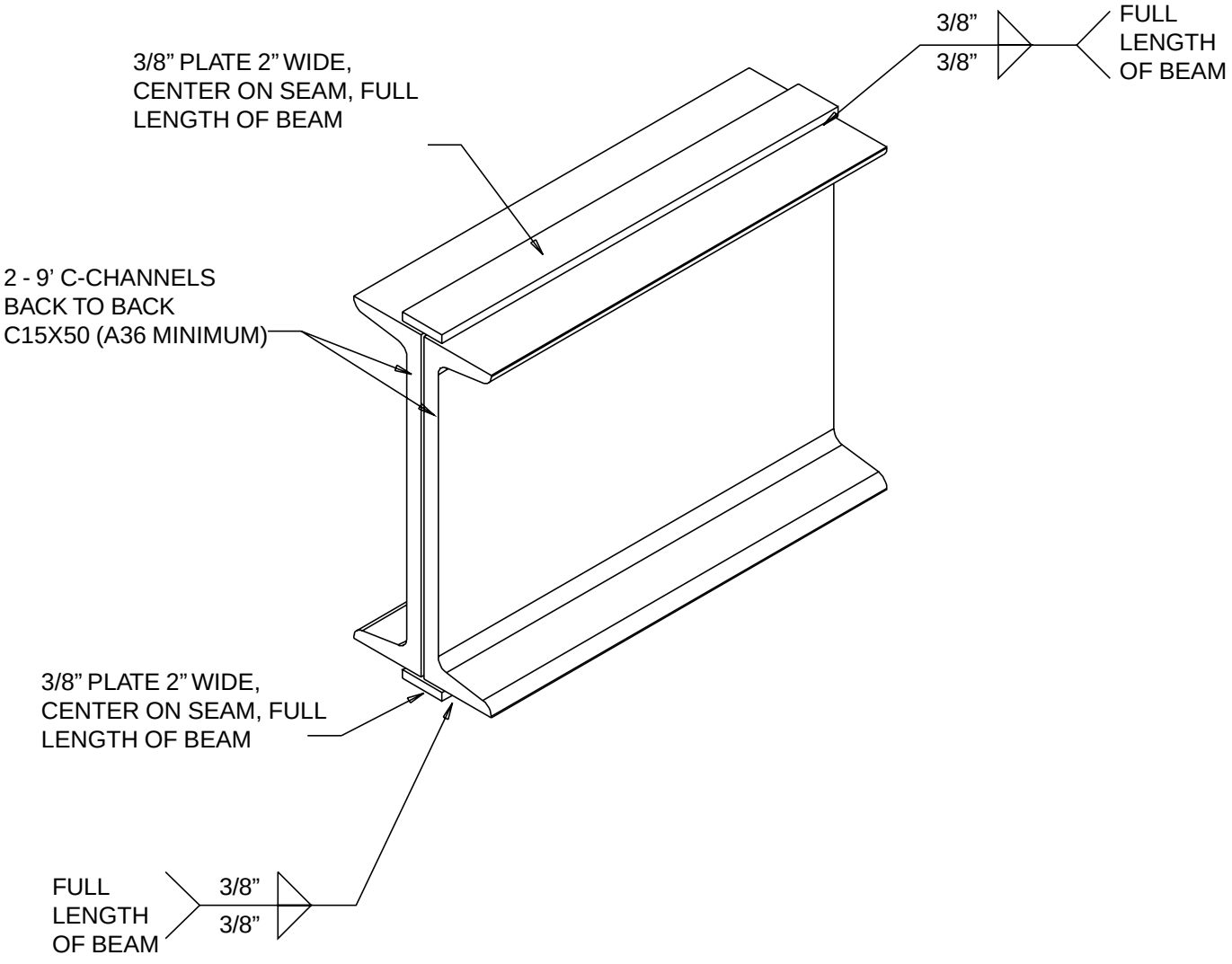
Commercial Tank
Foundation Tunnels

6' WIDE TUNNEL
BEAM DETAIL
FOR 85' SIDEWALL HEIGHT (32 RING 2.66" CORRUGATION)



NOTE: USE E70 ELECTRODES.
WELDING TO BE DONE BY
PROPERLY TRAINED WELDER.

NOTE: NOT TO SCALE

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