



**40-Series Bin - 2.66" Corrugation  
Commercial Stiffened  
(CTS Stiffened) Inverted "T"  
Concrete Foundation Manual**

**(27'-105' Diameter, 27 Rings and Taller)  
(135' Diameter, 20 Rings and Taller)**

Instructions Manual

PNEG-2073

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**All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.**

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## 1. General Overview

### General Information

The foundation recommendations in this manual are for use with 2.66" Corrugation 40-Series stiffened bins with CTS stiffeners.

Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

Soil bearing shall be confirmed by geotechnical investigation.

This document only provides estimation aids for inverted "T" style foundations for CTS stiffened 2.66" bins. Refer to the other appropriate GSI foundation estimation documents for other style foundations and sizes.

### Anchor Bolt Detail (CTS Stiffeners)

The following is the minimum requirement for anchoring of standard tanks. Refer to sidedraw instructions for special anchoring details.

1. 3/4" Diameter anchor bolt (A) is the minimum allowed, 1" diameter anchor bolt (A) is the minimum with sidedraw flume system.
2. Exposed anchor bolt thread height (B) is 5" (12.7 cm).
3. Overall anchor bolt length (C) for 3/4" and 1" diameter anchor bolt is 18" (45.72 cm). *(See Figure 1A.)*

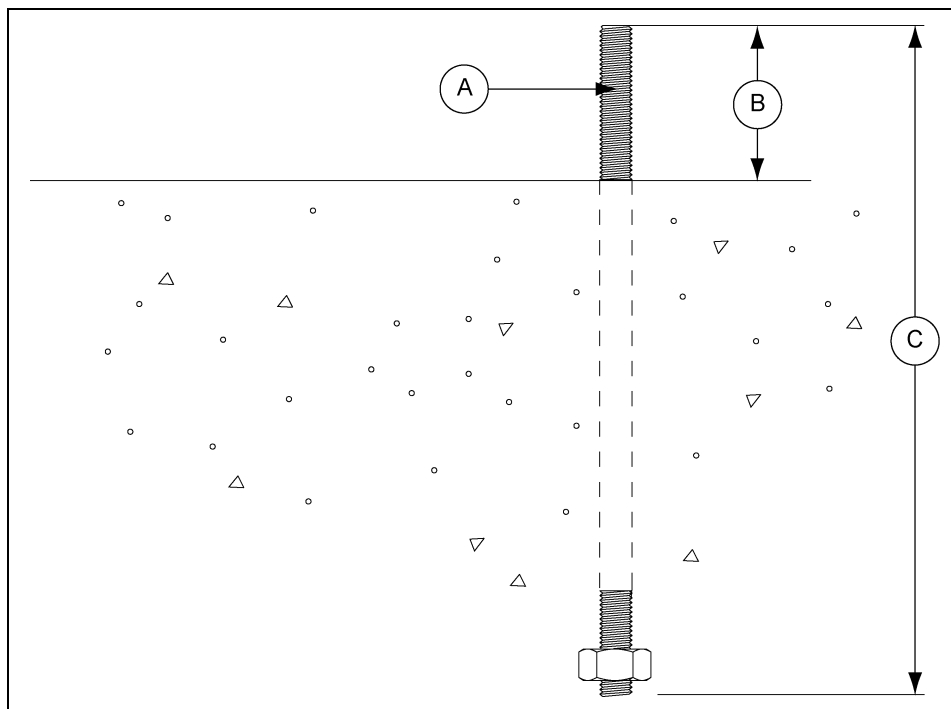


Figure 1A Anchor Bolt Example (3/4" Diameter Anchor Bolt Shown)

Ref #	Description
A	Anchor Bolt
B	Anchor Bolt Thread Height
C	Anchor Bolt Length

## Anchor Bolt Charts (CTS Stiffeners)

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?
- What diameter of bin do you have?

Refer to proper chart on [Pages 6-11](#) 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 (2) quarters. Anchor bolt radius tolerance =  $\pm 1/4"$  (7 mm).

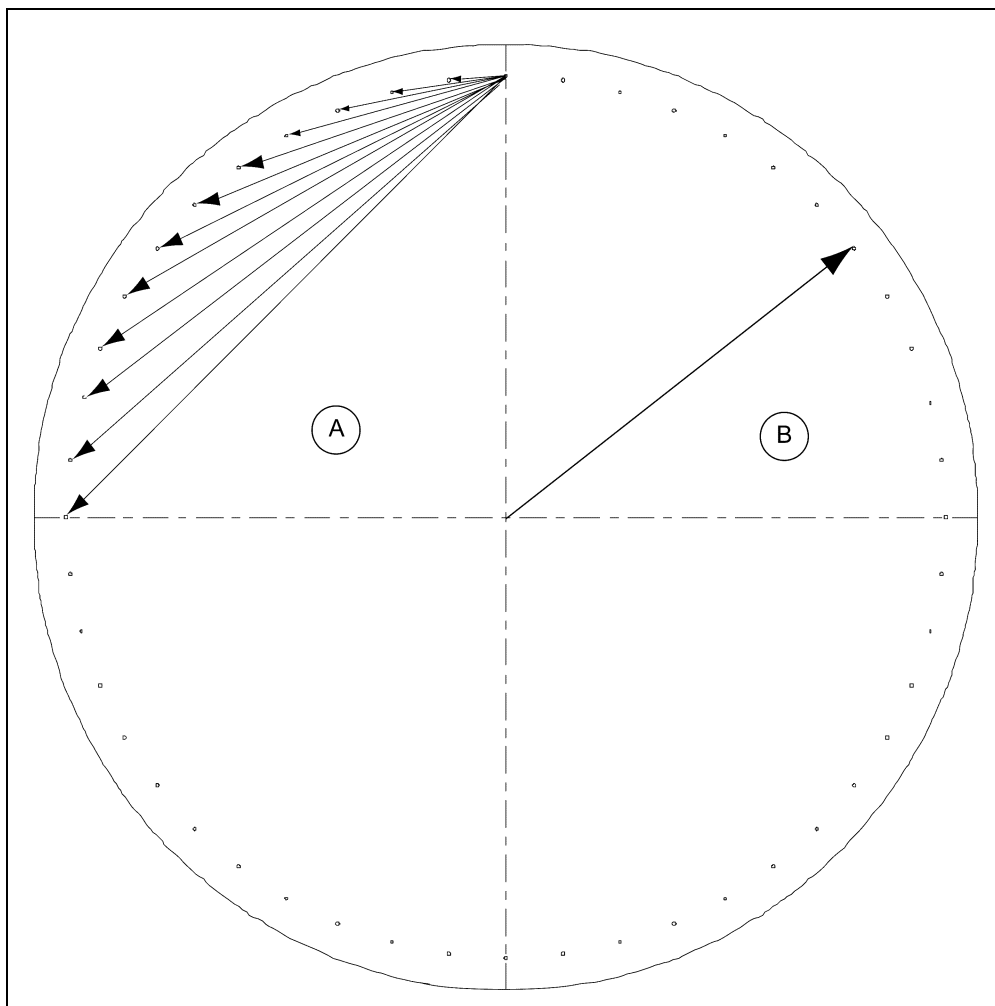


Figure 1B

Ref #	Description
A	Anchor Chord Dimensions
B	Bolt Radius

# 1. General Overview

## 2 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts

Nominal	18 Anchors
Diameter	= 27' 2 Post
Bolt Radius	= 13' - 9-7/8"
Anchor Chord	4' - 9-11/16" 9' - 5-9/16" 13' - 9-15/16" 17' - 9-3/8"

Nominal	22 Anchors
Diameter	= 33' 2 Post
Bolt Radius	= 16' - 9-3/4"
Anchor Chord	4' - 9-7/16" 9' - 5-11/16" 13' - 11-5/8" 18' - 2-3/16" 22'-1/4"

Nominal	20 Anchors
Diameter	= 30' 2 Post
Bolt Radius	= 15' - 3-13/16"
Anchor Chord	4' - 9-9/16" 9' - 5-5/8" 13' - 10-15/16" 18' - 1/8" 21'-8"

Nominal	24 Anchors
Diameter	= 36' 2 Post
Bolt Radius	= 18' - 3-5/8"
Anchor Chord	4' - 9-3/8" 9' - 5-3/4" 14'-1/8" 18' - 3-11/16" 22' - 3-7/16" 25' - 10-11/16"

**NOTE:** The tables on this page are for 2 post outside stiffened tanks only.

2 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts (Continued)

Nominal	28 Anchors
Diameter	= 42' 2 Post
Bolt Radius	= 21' - 3-1/2"
Anchor Chord	4' - 9-1/4"
	9' - 5-3/4"
	14'-3/4"
	18' - 5-11/16"
	22' - 7-7/8"
	26' - 6-3/4"
	30' - 1-5/16"

Nominal	36 Anchors
Diameter	= 54' 2 Post
Bolt Radius	= 27'-3"
Anchor Chord	4' - 9-1/16"
	9' - 5-5/8"
	14' - 1-5/16"
	18' - 7-3/4"
	23'-1/2"
	27' - 3-1/8"
	31' - 3-1/4"
	35'-1/2"
38' - 6-9/16"	

Nominal	32 Anchors
Diameter	= 48' 2 Post
Bolt Radius	= 24' - 3-1/4"
Anchor Chord	4' - 9-1/8"
	9' - 5-11/16"
	14' - 1-1/8"
	18' - 6-15/16"
	22' - 10-5/8"
	26' - 11-11/16"
	30' - 9-9/16"
	34' - 3-15/16"

Nominal	40 Anchors
Diameter	= 60' 2 Post
Bolt Radius	= 30' - 2-7/8"
Anchor Chord	4'-9"
	9' - 5-1/2"
	14' - 1-7/16"
	18' - 8-5/16"
	23' - 1-3/4"
	27' - 5-1/2"
	31' - 7-1/4"
	35' - 6-5/8"
	39' - 3-3/8"
	42' - 9-1/4"

**NOTE:** The tables on this page are for 2 post outside stiffened tanks only.

# 1. General Overview

## 3 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts

Nominal	27 Anchors
Diameter	= 27' 3 Post
Bolt Radius	= 13' - 9-7/8"
Anchor Chord	3' - 2-9/16"
	6' - 4-9/16"
	9' - 5-9/16"
	12'-5"
	15' - 2-3/8"
	17' - 9-3/8"

Nominal	33 Anchors
Diameter	= 33' 3 Post
Bolt Radius	= 16' - 9-3/4"
Anchor Chord	3' - 2-3/8"
	6' - 4-3/8"
	9' - 5-11/16"
	12'-6"
	15' - 4-15/16"
	18' - 2-3/16"
	20' - 9-7/16"
	23' - 2-1/2"

Nominal	30 Anchors
Diameter	= 30' 3 Post
Bolt Radius	= 15' - 3-13/16"
Anchor Chord	3' - 2-7/16"
	6' - 4-1/2"
	9' - 5-5/8"
	12' - 5-9/16"
	15' - 3-7/8"
	18'-1/8"
	20' - 6-1/16"

Nominal	36 Anchors
Diameter	= 36' 3 Post
Bolt Radius	= 18' - 3-5/8"
Anchor Chord	3' - 2-5/16"
	6' - 4-5/16"
	9' - 5-3/4"
	12' - 6-1/4"
	15' - 5-11/16"
	18' - 3-11/16"
	21'-0"
	23' - 6-7/16"
	25' - 10-11/16"

**NOTE:** The tables on this page are for 3 post outside stiffened tanks only.



3 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts (Continued)

Nominal	42 Anchors
Diameter	= 42' 3 Post
Bolt Radius	= 21' - 3-1/2"
Anchor Chord	3' - 2-3/16"
	6' - 4-3/16"
	9' - 5-3/4"
	12' - 6-5/8"
	15' - 6-11/16"
	18' - 5-11/16"
	21' - 3-1/2"
	23' - 11-13/16"
	26' - 6-9/16"
28' - 11-9/16"	

Nominal	54 Anchors
Diameter	= 54' 3 Post
Bolt Radius	= 27'-3"
Anchor Chord	3' - 2-1/16"
	6'-4"
	9' - 5-5/8"
	12' - 6-7/8"
	15' - 7-5/8"
	18' - 7-3/4"
	21' - 7-1/8"
	24' - 5-5/8"
	27' - 3-1/8"
	29' - 11-1/2"
	32' - 6-11/16"
	35'-1/2"
37' - 4-15/16"	

Nominal	48 Anchors
Diameter	= 48' 3 Post
Bolt Radius	= 24' - 3-1/4"
Anchor Chord	3' - 2-1/8"
	6' - 4-1/16"
	9' - 5-11/16"
	12' - 6-13/16"
	15' - 7-5/16"
	18' - 6-15/16"
	21' - 5-11/16"
	24' - 3-5/16"
	26' - 11-11/16"
	29' - 6-11/16"
	32'-1/8"
	34' - 3-15/16"

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

**NOTE:** The tables on this page are for 3 post outside stiffened tanks only.

# 1. General Overview

## 3 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts (Continued)

Nominal	72 Anchors
Diameter	= 72' 3 Post
Bolt Radius	= 36' - 2-1/2"
Anchor Chord	3' - 1-15/16"
	6' - 3-3/4"
	9' - 5-7/16"
	12' - 6-15/16"
	15' - 8-1/8"
	18' - 8-15/16"
	21' - 9-3/8"
	24' - 9-1/4"
	27' - 8-9/16"
	30' - 7-5/16"
	33' - 5-5/16"
	36' - 2-9/16"
	38' - 10-15/16"
	41' - 6-1/2"
	44' - 1-1/16"
46' - 6-5/8"	
48' - 11-1/8"	
51' - 2-1/2"	

Nominal	78 Anchors
Diameter	= 78' 3 Post
Bolt Radius	= 39' - 2-5/16"
Anchor Chord	3' - 1-15/16"
	6' - 3-3/4"
	9' - 5-7/16"
	12' - 6-15/16"
	15' - 8-3/16"
	18' - 9-1/8"
	21' - 9-3/4"
	24' - 9-7/8"
	27' - 9-9/16"
	30' - 8-3/4"
	33' - 7-1/4"
	36' - 5-3/16"
	39' - 2-3/8"
	41' - 10-3/4"
	44' - 6-3/8"
47' - 1-1/8"	
49' - 6-15/16"	
51' - 11-13/16"	
54' - 3-5/8"	

Nominal	75 Anchors
Diameter	= 75' 3 Post
Bolt Radius	= 37' - 8-7/16"
Anchor Chord	3' - 1-15/16"
	6' - 3-3/4"
	9' - 5-7/16"
	12' - 6-15/16"
	15' - 8-1/8"
	18' - 9-1/16"
	21' - 9-9/16"
	24' - 9-5/8"
	27' - 9-1/8"
	30' - 8-1/16"
	33' - 6-3/8"
	36' - 3-15/16"
	39'-3/4"
	41' - 8-3/4"
	44' - 3-7/8"
46' - 10-1/16"	
49' - 3-1/4"	
51' - 7-7/16"	

Nominal	90 Anchors
Diameter	= 90' 3 Post
Bolt Radius	= 45' - 1-15/16"
Anchor Chord	3' - 1-7/8"
	6' - 3-5/8"
	9' - 5-5/16"
	12' - 6-7/8"
	15' - 8-1/4"
	18' - 9-3/8"
	21' - 10-1/4"
	24' - 10-13/16"
	27' - 10-15/16"
	30' - 10-3/4"
	33' - 10-1/16"
	36' - 8-7/8"
	39' - 7-3/16"
	42' - 4-7/8"
	45'-2"
47' - 10-3/8"	
50' - 6-1/8"	
53' - 1-1/8"	
55' - 7-5/16"	
58' - 0-3/4"	
60' - 5-5/16"	
62' - 8-15/16"	

**NOTE:** The tables on this page are for 3 post outside stiffened tanks only.

3 Stiffener per Sidewall Sheet Anchor Bolt Placement Charts (Continued)

Nominal	105 Anchors
Diameter	= 105' 3 Post
Bolt Radius	= 52' - 7-1/2"
Anchor Chord	3' - 1-13/16"
	6' - 3-9/16"
	9' - 5-1/4"
	12' - 6-13/16"
	15' - 8-1/4"
	18' - 9-9/16"
	21' - 10-5/8"
	24' - 11-7/16"
	28'-0"
	31' - 0-5/16"
	34' - 0-1/4"
	36' - 11-13/16"
	39' - 10-15/16"
	42' - 9-11/16"
	45'-8"
	48' - 5-13/16"
	51' - 3-1/16"
	53' - 11-13/16"
	56' - 7-15/16"
	59' - 3-7/16"
61' - 10-3/8"	
64' - 4-9/16"	
66' - 10-1/8"	
69' - 2-15/16"	
71' - 7-1/16"	
73' - 10-3/8"	

Nominal	135 Anchors
Diameter	= 135' 3 Post
Bolt Radius	= 67' - 6-1/2"
Anchor Chord	3' - 1-3/4"
	6' - 3-7/16"
	9' - 5-1/8"
	12' - 6-11/16"
	15' - 8-1/4"
	18' - 9-5/8"
	21' - 10-15/16"
	25' - 0-1/16"
	28' - 1-1/16"
	31' - 1-7/8"
	34' - 2-7/16"
	37' - 2-7/8"
	40'-3"
	43' - 2-7/8"
	46' - 2-7/16"
	49' - 1-3/4"
	52' - 0-3/4"
	54' - 11-3/8"
	57' - 9-5/8"
	60' - 7-9/16"
	63' - 5-1/16"
	66' - 2-1/8"
	68' - 10-13/16"
	71' - 7-1/16"
	74' - 2-13/16"
	76' - 10-1/16"
79' - 4-7/8"	
81' - 11-1/16"	
84' - 4-13/16"	
86'-10"	
89' - 2-5/8"	
91' - 6-5/8"	
93' - 10-1/16"	

**NOTE:** The tables on this page are for 3 post outside stiffened tanks only.

## 1. General Overview

### Vane Axial Fan Pad

#### Placement of the Fan Pad: Transitions/Fans/Heaters Only.

If a fan or fan and heater will be installed, refer to [Figure 1C](#) to determine the concrete pad size.

1. The top of this pad should be level with the top of the bin's foundation.
2. Recommended pad thickness is 4" minimum.
3. Front of pad should be perpendicular to bin wall.
4. 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, refer 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.*

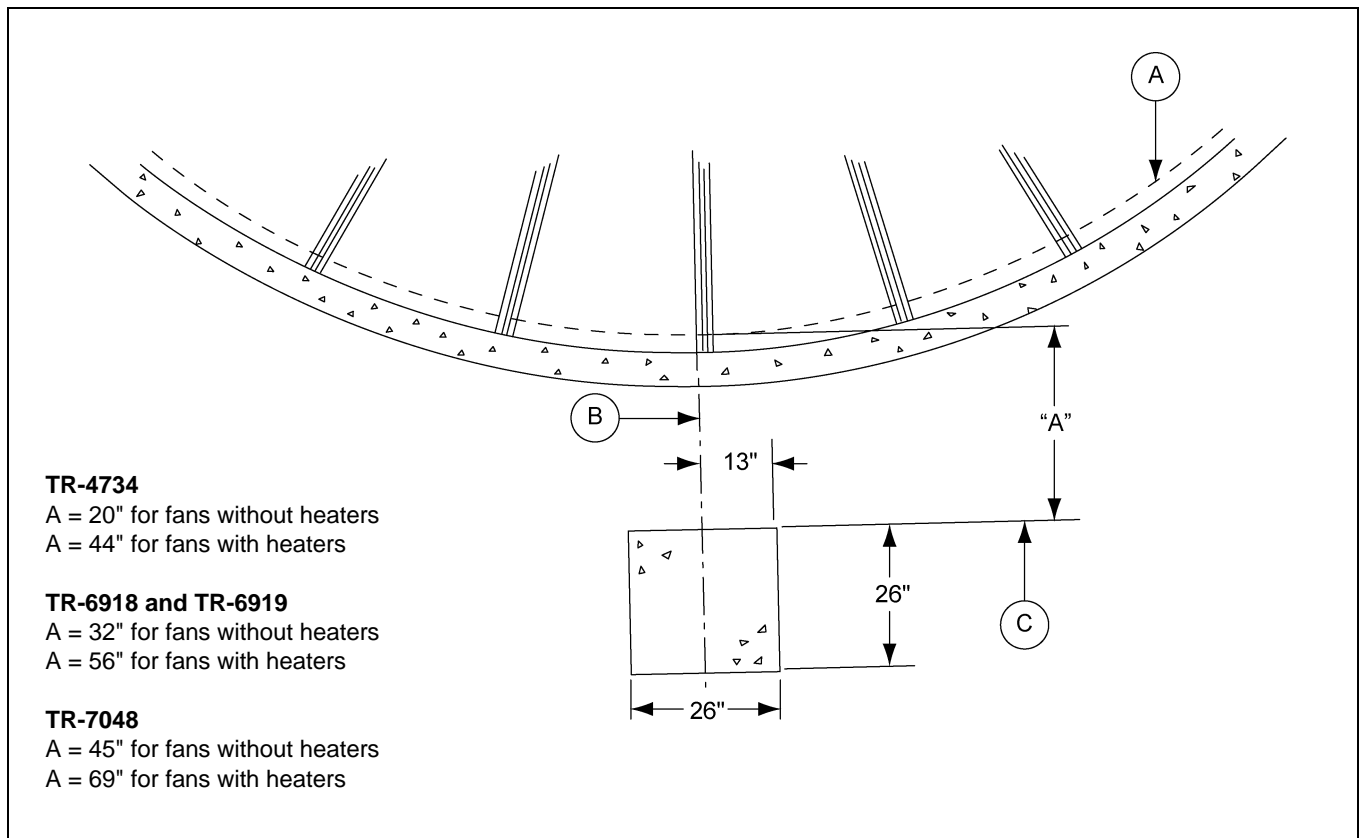


Figure 1C

Ref #	Description
A	Bin Wall
B	Centerline of Bin
C	From Sidewall

## Centrifugal Fan Pad

1. Fan pad should be poured 2" below the top of the bin foundation for all centrifugal fans.
2. A pad for heaters is not required, but is recommended.
3. Recommended pad thickness is 4".
4. If a downwind heater pad is to be installed, the pad width ("C") should be 48" and extended toward the bin by 33".
5. Fan discharge should be centered on centerline of bin.
6. The fan pad should be perpendicular to bin wall.



**Fan pad and fan must be level and smooth for proper operation. Vibration problems can result from improper fan leveling.**

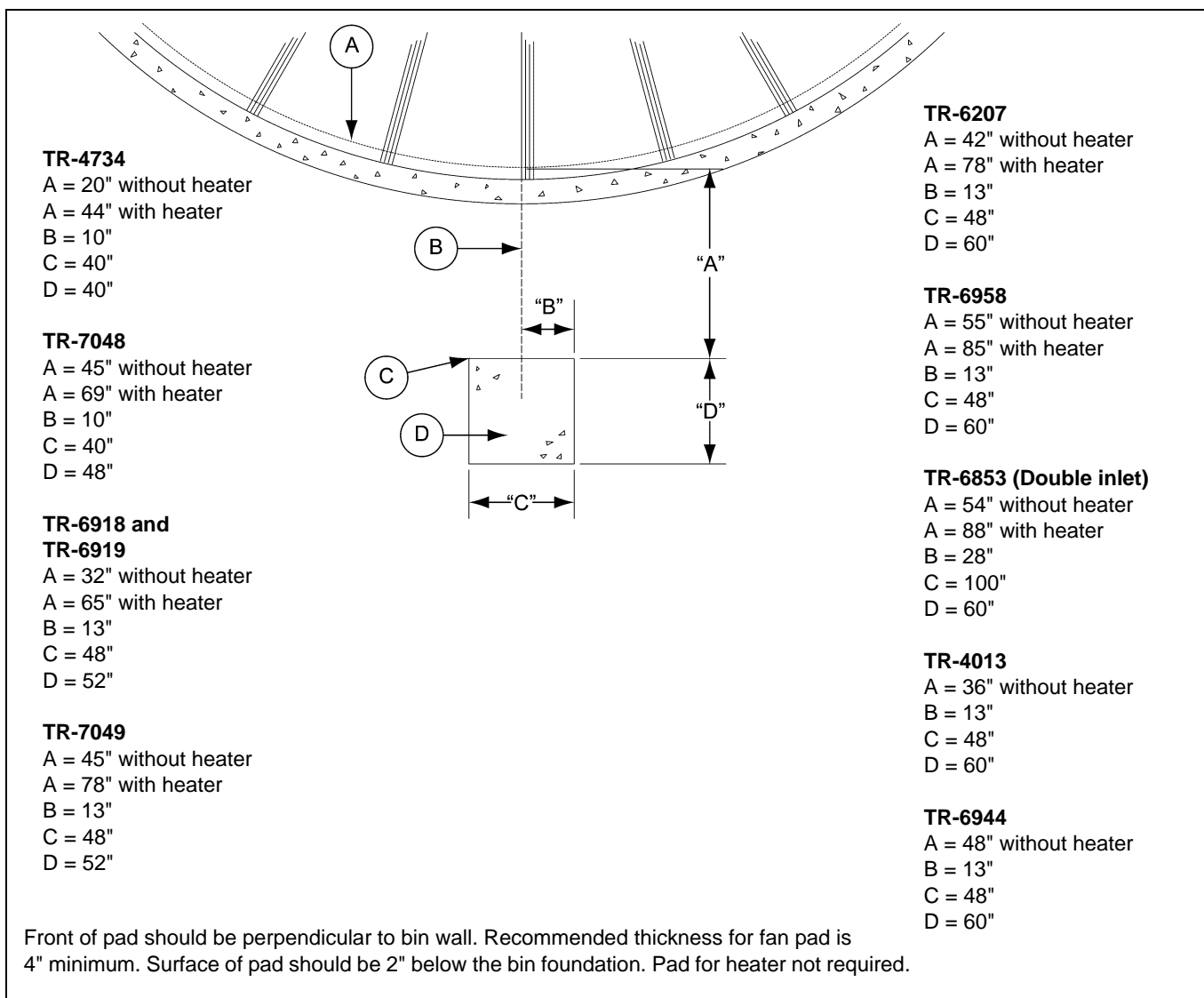


Figure 1D Centrifugal Fan Pad

Ref #	Description	Ref #	Description
A	Bin Wall	C	Dimension From Sidewall
B	Centerline of Bin	D	Fan Pad

## 2. Inverted “T” Foundation for 3500 PSF Allowable Soil Bearing Capacity

### 27'-78' Diameter, 27-28 Ring (2.66" Corrugation), 3500 PSF Allowable Soil Bearing Capacity

- The foundation design is based on a minimum allowable soil bearing capacity of 3500 lbs./ft<sup>2</sup>. Bearing capacity of the soils should be determined by geotechnical investigation and be of uniform bearing capacity.
- The foundation site must be free of vegetation and debris and well drained.
- The foundation must be founded below the frost line or constructed on non-expansive frost free fill.
- 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.
- All reinforcement must meet the requirements of ASTM A615 grade 60 deformed bars.
- Lap all circumferential bars 40 bar diameters and stagger all laps in plans 3'-0". Estimates do not include end laps.
- Concrete must have a minimum compressive strength of 4500 PSI at 28 days.
- Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

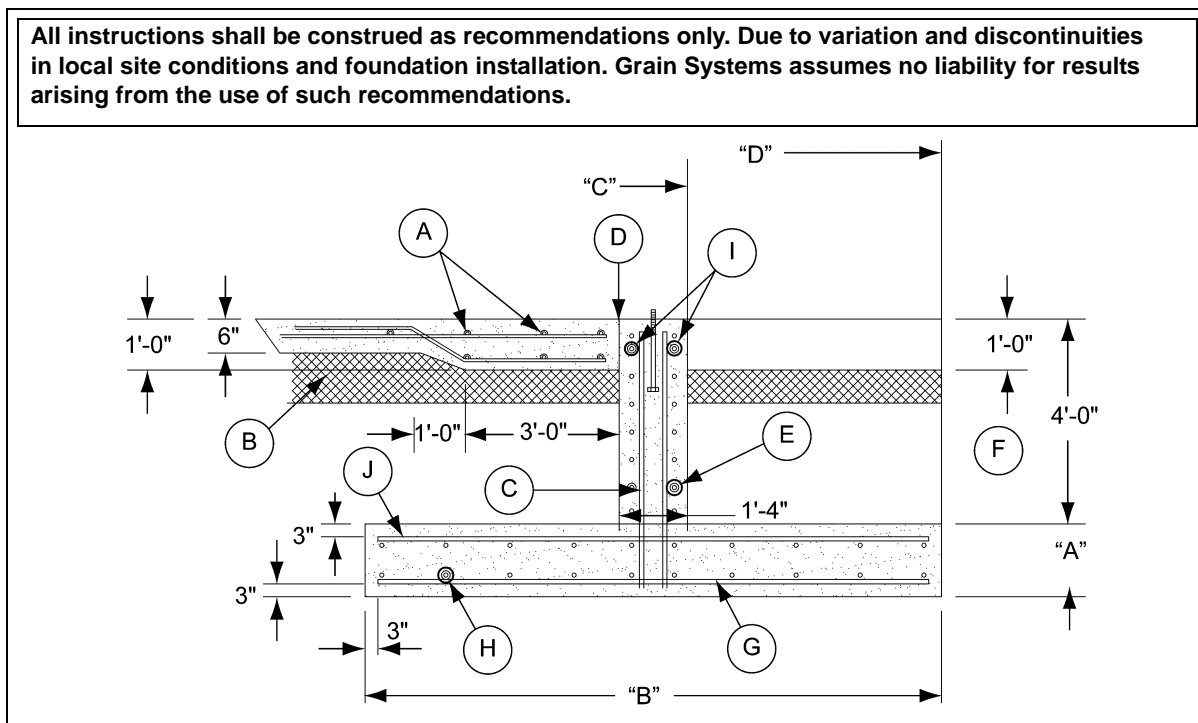


Figure 2A 27'-78' Bins

Ref #	Description
A	# 4 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 2. Inverted "T" Foundation for 3500 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 27'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27
	A	1'-0"
	B	6'-6"
	C	14'-5"
	D	16'-10"
	M	7 #5's
	N	8 #5's
	P	#5 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	1100
	#5 (ft.)	3300
	#6 (ft.)	0
Weight (Lbs.)		4100
Total Cu. Yds. of Concrete	Footing	21
	Wall	17
	Floor	14
	Total	52

**Diameter of Bin: 30'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27
	A	1'-3"
	B	7'-0"
	C	15'-11"
	D	18'-6"
	M	7 #5's
	N	8 #5's
	P	#5 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	1300
	#5 (ft.)	3700
	#6 (ft.)	0
Weight (Lbs.)		4650
Total Cu. Yds. of Concrete	Footing	31
	Wall	19
	Floor	17
	Total	67

**Diameter of Bin: 33'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27
	A	1'-3"
	B	7'-6"
	C	17'-5"
	D	20'-4"
	M	7 #5's
	N	8 #5's
	P	#5 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	1500
	#5 (ft.)	4100
	#6 (ft.)	0
Weight (Lbs.)		5225
Total Cu. Yds. of Concrete	Footing	36
	Wall	21
	Floor	21
	Total	78

**Diameter of Bin: 36'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27
	A	1'-3"
	B	7'-6"
	C	18'-11"
	D	21'-9"
	M	7 #5's
	N	8 #5's
	P	#6 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	1700
	#5 (ft.)	3500
	#6 (ft.)	800
Weight (Lbs.)		5925
Total Cu. Yds. of Concrete	Footing	39
	Wall	23
	Floor	24
	Total	86

## 2. Inverted "T" Foundation for 3500 PSF Allowable Soil Bearing Capacity

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

	Ring #	27
	A	1'-4"
	B	8'-0"
	C	21'-11"
	D	24'-11"
	M	7 #5's
	N	9 #5's
	P	#6 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	2300
	#5 (ft.)	4300
	#6 (ft.)	1000
Weight (Lbs.)		7500
Total Cu. Yds. of Concrete	Footing	52
	Wall	27
	Floor	32
	Total	111

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

	Ring #	27
	A	1'-4"
	B	9'-0"
	C	24'-11"
	D	28'-5"
	M	7 #5's
	N	10 #5's
	P	#6 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	2900
	#5 (ft.)	5200
	#6 (ft.)	1600
Weight (Lbs.)		9725
Total Cu. Yds. of Concrete	Footing	67
	Wall	30
	Floor	41
	Total	138

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

	Ring #	27	28
	A	1'-6"	1'-6"
	B	10'-0"	10'-6"
	C	27'-11"	27'-11"
	D	31'-0"	31'-9"
	M	7 #5's	7 #5's
	N	11 #5's	11 #5's
	P	#6 @ 12" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	3600	3600
	#5 (ft.)	6200	6100
	#6 (ft.)	1700	0
	#7 (ft.)	0	1700
Weight (Lbs.)		11375	12175
Total Cu. Yds. of Concrete	Footing	94	97
	Wall	34	34
	Floor	51	51
	Total	179	182

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

	Ring #	27	28
	A	1'-4"	1'-6"
	B	9'-6"	11'-0"
	C	30'-10"	30'-10"
	D	34'-5"	34'-11"
	M	7 #5's	8 #5's
	N	10 #5's	12 #5's
	P	#7 @ 12" c/c	#7 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	4400	4400
	#5 (ft.)	6500	7500
	#6 (ft.)	0	0
	#7 (ft.)	1700	2400
Weight (Lbs.)		13075	15525
Total Cu. Yds. of Concrete	Footing	88	113
	Wall	38	38
	Floor	61	61
	Total	187	212



## 2. Inverted "T" Foundation for 3500 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 72'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27	28
	A	1'-6"	1'-8"
	B	11'-0"	12'-0"
	C	36'-10"	36'-10"
	D	41'-0"	41'-5"
	M	9 #5's	9 #5's
	N	12 #5's	13 #5's
	P	#7 @ 12" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	6200	6200
	#5 (ft.)	9500	10000
	#6 (ft.)	0	0
	#7 (ft.)	2400	2600
Weight (Lbs.)		18850	19725
Total Cu. Yds. of Concrete	Footing	136	165
	Wall	45	45
	Floor	87	87
	Total	268	297

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27	28
	A	1'-6"	1'-8"
	B	11'-0"	12'-0"
	C	38'-4"	38'-4"
	D	42'-7"	43'-0"
	M	9 #5's	9 #5's
	N	12 #5's	13 #5's
	P	#7 @ 12" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	6700	6700
	#5 (ft.)	9900	10400
	#6 (ft.)	0	0
	#7 (ft.)	2500	2700
Weight (Lbs.)		19825	20750
Total Cu. Yds. of Concrete	Footing	143	173
	Wall	47	47
	Floor	93	93
	Total	283	312

**Diameter of Bin: 78'**  
**Soil Bearing Capacity: 3500 PSF**

	Ring #	27	28
	A	1'-6"	1'-8"
	B	11'-0"	12'-0"
	C	39'-10"	39'-10"
	D	43'-11"	44'-6"
	M	10 #5's	10 #5's
	N	12 #5's	13 #5's
	P	#7 @ 10" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	7200	7200
	#5 (ft.)	10800	11300
	#6 (ft.)	0	0
	#7 (ft.)	3100	2800
Weight (Lbs.)		22250	22225
Total Cu. Yds. of Concrete	Footing	148	179
	Wall	49	49
	Floor	100	100
	Total	297	328

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

## 27'-78' Diameter, 27-28 Ring (2.66" Corrugation), 4000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

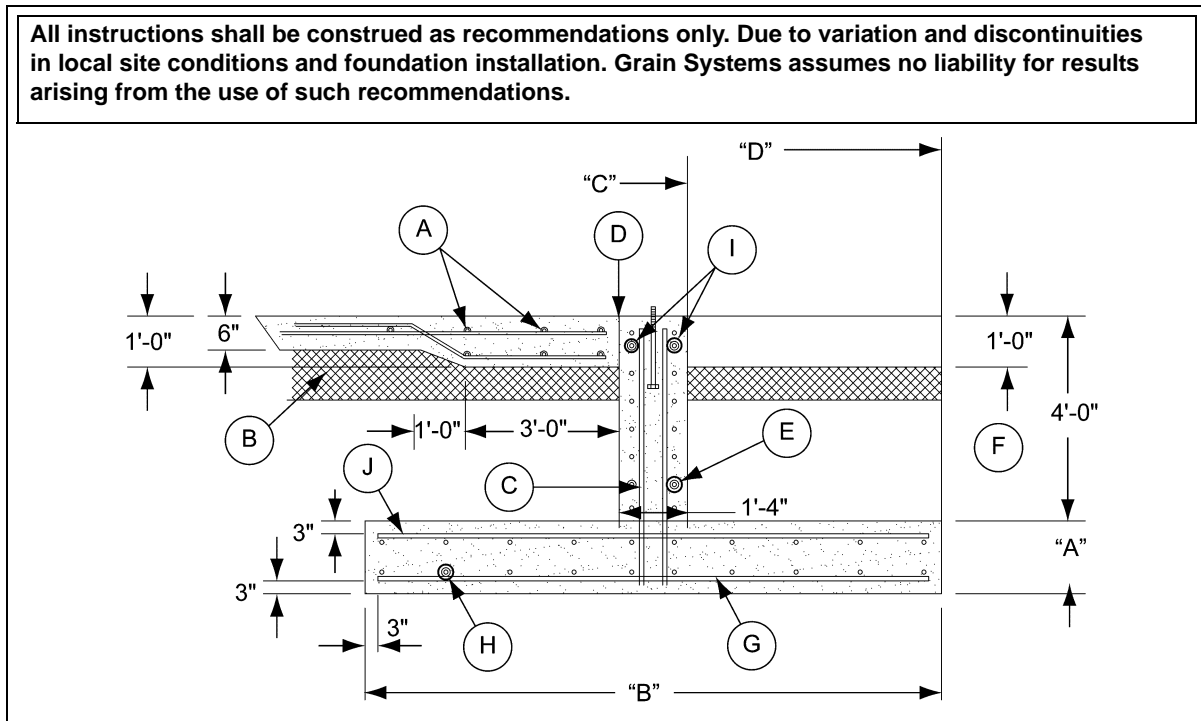


Figure 3A 27'-78' Bins

Ref #	Description
A	# 4 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 27'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	28
	A	1'-0"
	B	6'-0"
	C	14'-5"
	D	16'-8"
	M	7 #5's
	N	7 #5's
	P	#5 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	1100
	#5 (ft.)	3100
	#6 (ft.)	0
Weight (Lbs.)		3875
Total Cu. Yds. of Concrete	Footing	20
	Wall	17
	Floor	14
	Total	51

**Diameter of Bin: 30'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-0"	1'-0"
	B	6'-0"	6'-6"
	C	15'-11"	15'-11"
	D	18'-1"	18'-5"
	M	7 #5's	7 #5's
	N	7 #5's	8 #5's
	P	#5 @ 10" c/c	#5 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	1300	1300
	#5 (ft.)	3400	3600
	#6 (ft.)	0	0
Weight (Lbs.)		4350	4600
Total Cu. Yds. of Concrete	Footing	21	23
	Wall	19	19
	Floor	18	18
	Total	58	60

**Diameter of Bin: 33'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-0"	1'-0"
	B	6'-0"	6'-6"
	C	17'-5"	17'-5"
	D	19'-7"	19'-10"
	M	7 #5's	7 #5's
	N	7 #5's	8 #5's
	P	#5 @ 10" c/c	#6 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	1500	1500
	#5 (ft.)	3700	3200
	#6 (ft.)	0	700
Weight (Lbs.)		4825	5350
Total Cu. Yds. of Concrete	Footing	23	25
	Wall	21	21
	Floor	21	21
	Total	65	67

**Diameter of Bin: 36'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-3"	1'-3"
	B	6'-6"	7'-0"
	C	18'-11"	18'-11"
	D	21'-4"	21'-7"
	M	7 #5's	7 #5's
	N	8 #5's	8 #5's
	P	#5 @ 12" c/c	#5 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	1700	1700
	#5 (ft.)	4200	4400
	#6 (ft.)	0	0
Weight (Lbs.)		5450	5675
Total Cu. Yds. of Concrete	Footing	34	37
	Wall	23	23
	Floor	24	24
	Total	81	84

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 42'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-4"	1'-4"
	B	7'-0"	8'-0"
	C	21'-11"	21'-11"
	D	24'-6"	25'-1"
	M	7 #5's	7 #5's
	N	8 #5's	9 #5's
	P	#5 @ 10" c/c	#6 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	2300	2300
	#5 (ft.)	5100	4300
	#6 (ft.)	0	1000
Weight (Lbs.)		6800	7500
Total Cu. Yds. of Concrete	Footing	45	52
	Wall	27	27
	Floor	32	32
	Total	104	111

**Diameter of Bin: 48'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-4"	1'-4"
	B	7'-6"	8'-6"
	C	24'-11"	24'-11"
	D	27'-8"	28'-1"
	M	7 #5's	7 #5's
	N	8 #5's	9 #5's
	P	#6 @ 12" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	2900	2900
	#5 (ft.)	4600	4900
	#6 (ft.)	1100	1500
Weight (Lbs.)		8350	9250
Total Cu. Yds. of Concrete	Footing	56	63
	Wall	30	30
	Floor	41	41
	Total	128	134

**Diameter of Bin: 54'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-4"	1'-4"
	B	8'-0"	8'-6"
	C	27'-11"	27'-11"
	D	30'-11"	31'-1"
	M	7 #5's	7 #5's
	N	9 #5's	9 #5's
	P	#6 @ 12" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	3600	3600
	#5 (ft.)	5500	5500
	#6 (ft.)	1300	1700
Weight (Lbs.)		10075	10650
Total Cu. Yds. of Concrete	Footing	67	71
	Wall	34	34
	Floor	51	51
	Total	152	156

**Diameter of Bin: 60'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-4"	1'-4"
	B	8'-6"	9'-0"
	C	30'-10"	30'-10"
	D	33'-11"	34'-2"
	M	8 #5's	8 #5's
	N	9 #5's	10 #5's
	P	#6 @ 10" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	4400	4400
	#5 (ft.)	6500	6800
	#6 (ft.)	1800	0
	#7 (ft.)	0	1600
Weight (Lbs.)		12350	13275
Total Cu. Yds. of Concrete	Footing	78	83
	Wall	38	38
	Floor	61	61
	Total	177	182

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 72'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-4"	1'-6"
	B	9'-0"	9'-6"
	C	36'-10"	36'-10"
	D	40'-2"	40'-5"
	M	9 #5's	9 #5's
	N	10 #5's	10 #5's
	P	#7 @ 12" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	6200	6200
	#5 (ft.)	8700	8700
	#6 (ft.)	0	0
	#7 (ft.)	2000	2100
Weight (Lbs.)		17025	17275
Total Cu. Yds. of Concrete	Footing	100	119
	Wall	45	45
	Floor	87	87
	Total	232	251

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-6"	1'-6"
	B	9'-6"	10'-0"
	C	38'-4"	38'-4"
	D	41'-11"	42'-1"
	M	9 #5's	9 #5's
	N	10 #5's	11 #5's
	P	#6 @ 10" c/c	#7 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	6700	6700
	#5 (ft.)	9000	9500
	#6 (ft.)	2600	0
	#7 (ft.)	0	2700
Weight (Lbs.)		17725	19750
Total Cu. Yds. of Concrete	Footing	124	130
	Wall	47	47
	Floor	93	93
	Total	264	270

**Diameter of Bin: 78'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	27	28
	A	1'-6"	1'-6"
	B	9'-6"	10'-0"
	C	39'-10"	39'-10"
	D	43'-5"	44'-6"
	M	10 #5's	9 #5's
	N	10 #5's	11 #5's
	P	#6 @ 10" c/c	#7 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	7200	7200
	#5 (ft.)	9900	9800
	#6 (ft.)	2700	0
	#7 (ft.)	0	2800
Weight (Lbs.)		19100	20675
Total Cu. Yds. of Concrete	Footing	129	135
	Wall	49	49
	Floor	100	100
	Total	278	284

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

## 27'-48' Diameter, 30-32 Ring (2.66" Corrugation), 4000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

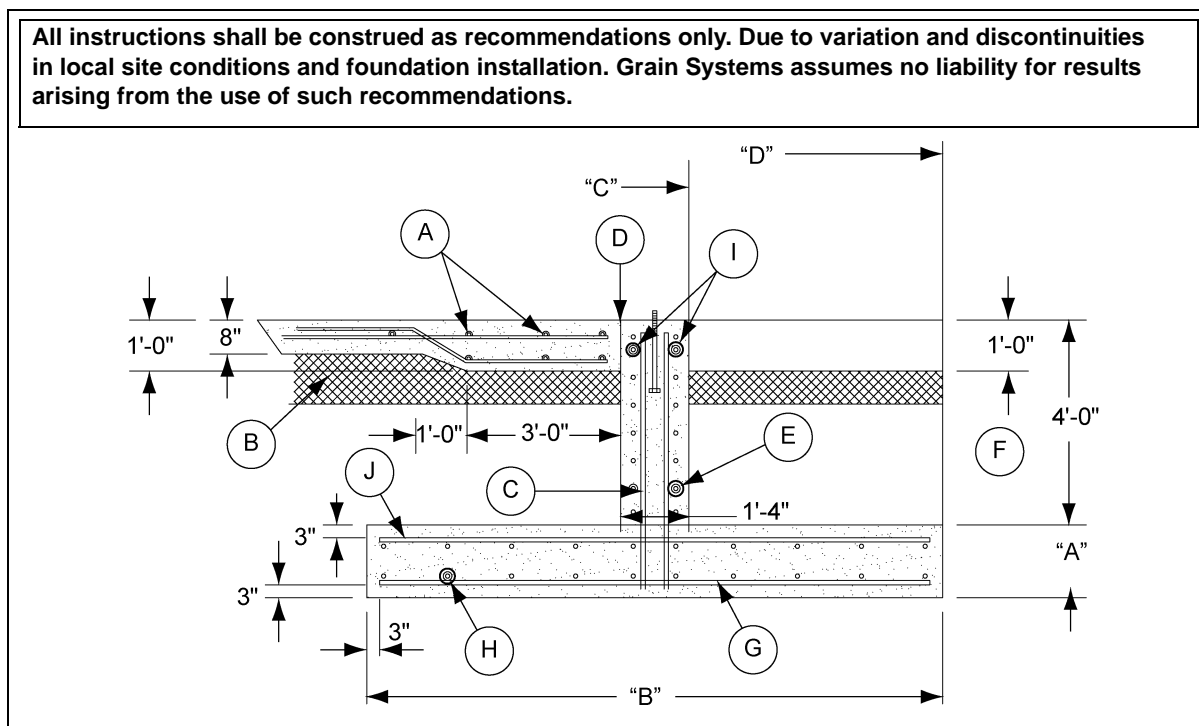


Figure 3B 27'-48' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 27'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30	32
	A	1'-3"	1'-3"
	B	7'-0"	7'-6"
	C	14'-5"	14'-5"
	D	17'-1"	17'-9"
	M	6 #6's	7 #5's
	N	8 #5's	8 #5's
	P	#6 @ 12" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0
	#5 (ft.)	2400	3700
	#6 (ft.)	1700	800
Weight (Lbs.)		5050	5025
Total Cu. Yds. of Concrete	Footing	28	31
	Wall	17	17
	Floor	16	16
	Total	61	64

**Diameter of Bin: 30'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30	32
	A	1'-3"	1'-3"
	B	7'-6"	7'-6"
	C	15'-11"	15'-11"
	D	18'-10"	18'-9"
	M	7 #5's	7 #5's
	N	8 #5's	8 #5's
	P	#6 @ 10" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0
	#5 (ft.)	4100	4100
	#6 (ft.)	800	800
Weight (Lbs.)		5500	5475
Total Cu. Yds. of Concrete	Footing	33	33
	Wall	19	19
	Floor	20	20
	Total	72	72

**Diameter of Bin: 33'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30	32
	A	1'-3"	1'-3"
	B	8'-0"	8'-0"
	C	17'-5"	17'-5"
	D	20'-6"	20'-6"
	M	7 #5's	7 #5's
	N	9 #5's	9 #5's
	P	#6 @ 10" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0
	#5 (ft.)	4900	4900
	#6 (ft.)	1000	1000
Weight (Lbs.)		6525	6525
Total Cu. Yds. of Concrete	Footing	38	38
	Wall	21	21
	Floor	24	24
	Total	83	83

**Diameter of Bin: 36'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30	32
	A	1'-4"	1'-4"
	B	8'-0"	8'-6"
	C	18'-11"	18'-11"
	D	22'-0"	22'-3"
	M	7 #5's	7 #5's
	N	9 #5's	9 #5's
	P	#6 @ 10" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0
	#5 (ft.)	5400	5400
	#6 (ft.)	1100	1100
Weight (Lbs.)		7250	7250
Total Cu. Yds. of Concrete	Footing	45	48
	Wall	23	23
	Floor	28	28
	Total	96	99

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

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

	Ring #	30	32
	A	1'-4"	1'-6"
	B	8'-6"	9'-0"
	C	21'-11"	21'-11"
	D	25'-2"	25'-5"
	M	7 #5's	7 #5's
	N	10 #5's	10 #5's
	P	#6 @ 10" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
	Rerod	#4 (ft.)	0
#5 (ft.)		6800	6800
#6 (ft.)		1300	1400
Weight (Lbs.)		9025	9175
Total Cu. Yds. of Concrete	Footing	56	66
	Wall	27	27
	Floor	37	37
	Total	120	130

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

	Ring #	30	32
	A	1'-6"	1'-8"
	B	9'-6"	10'-0"
	C	24'-11"	24'-11"
	D	28'-8"	28'-11"
	M	7 #5's	7 #5's
	N	10 #5's	11 #5's
	P	#7 @ 12" c/c	#6 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c
	Rerod	#4 (ft.)	0
#5 (ft.)		8100	8400
#6 (ft.)		0	1800
#7 (ft.)		1400	0
Weight (Lbs.)		11175	11425
Total Cu. Yds. of Concrete	Footing	80	93
	Wall	30	30
	Floor	49	49
	Total	159	172



### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

## 54'-78' Diameter, 30 Ring (2.66" Corrugation), 4000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

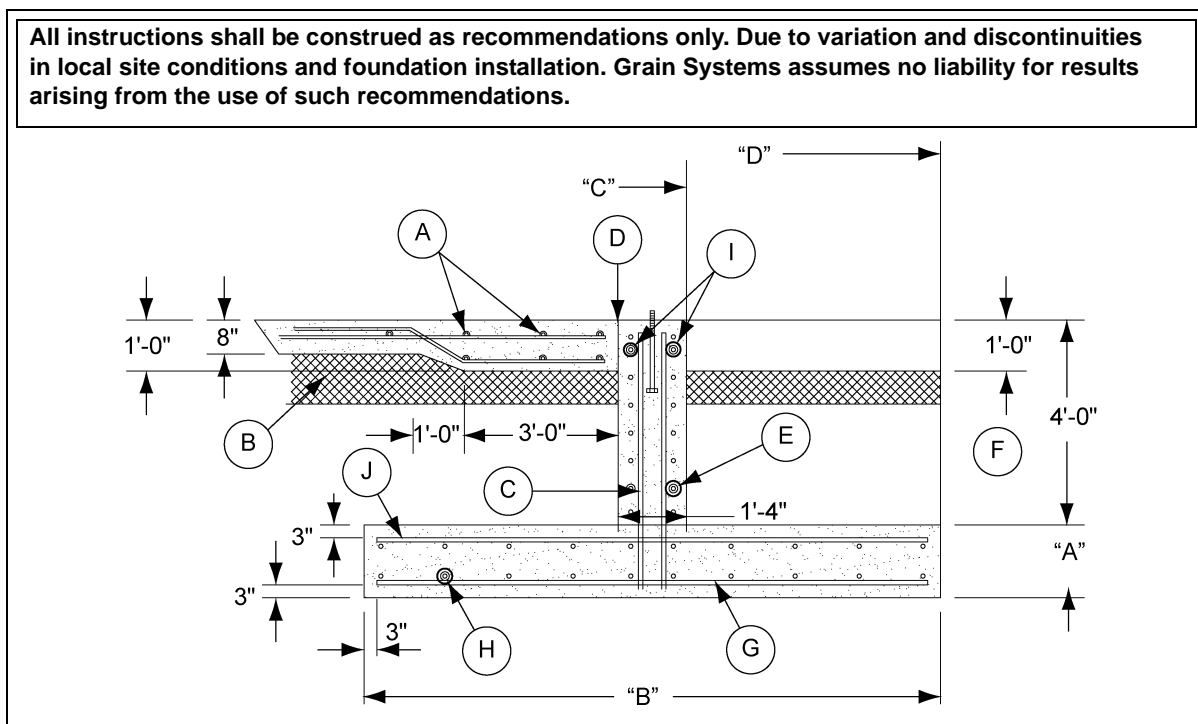


Figure 3C 54'-78' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

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

	Ring #	30
	A	1'-8"
	B	10'-6"
	C	27'-11"
	D	31'-11"
	M	7 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	9700
	#6 (ft.)	0
	#7 (ft.)	2100
Weight (Lbs.)		14250
Total Cu. Yds. of Concrete	Footing	109
	Wall	34
	Floor	61
	Total	204

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

	Ring #	30
	A	1'-8"
	B	10'-0"
	C	30'-10"
	D	34'-7"
	M	7 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	11200
	#6 (ft.)	0
	#7 (ft.)	2200
Weight (Lbs.)		15950
Total Cu. Yds. of Concrete	Footing	115
	Wall	38
	Floor	75
	Total	228

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

	Ring #	30
	A	1'-8"
	B	10'-6"
	C	36'-10"
	D	40'-10"
	M	9 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	15200
	#6 (ft.)	0
	#7 (ft.)	2700
Weight (Lbs.)		21325
Total Cu. Yds. of Concrete	Footing	145
	Wall	45
	Floor	106
	Total	296

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30
	A	1'-8"
	B	11'-0"
	C	38'-4"
	D	42'-7"
	M	10 #5's
	N	12 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
	Rerod	#4 (ft.)
#5 (ft.)		17000
#6 (ft.)		0
#7 (ft.)		3000
Weight (Lbs.)		23725
Total Cu. Yds. of Concrete	Footing	158
	Wall	47
	Floor	115
	Total	320

**Diameter of Bin: 78'**  
**Soil Bearing Capacity: 4000 PSF**

	Ring #	30
	A	2'-0"
	B	11'-0"
	C	39'-10"
	D	44'-1"
	M	10 #5's
	N	12 #5's
	P	#6 @ 10" c/c
	Q	#5 @ 12" c/c
	Rerod	#4 (ft.)
#5 (ft.)		18000
#6 (ft.)		3100
Weight (Lbs.)		23350
Total Cu. Yds. of Concrete	Footing	198
	Wall	49
	Floor	124
	Total	371

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

## 90' Diameter, 27-30 Ring (2.66" Corrugation), 4000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

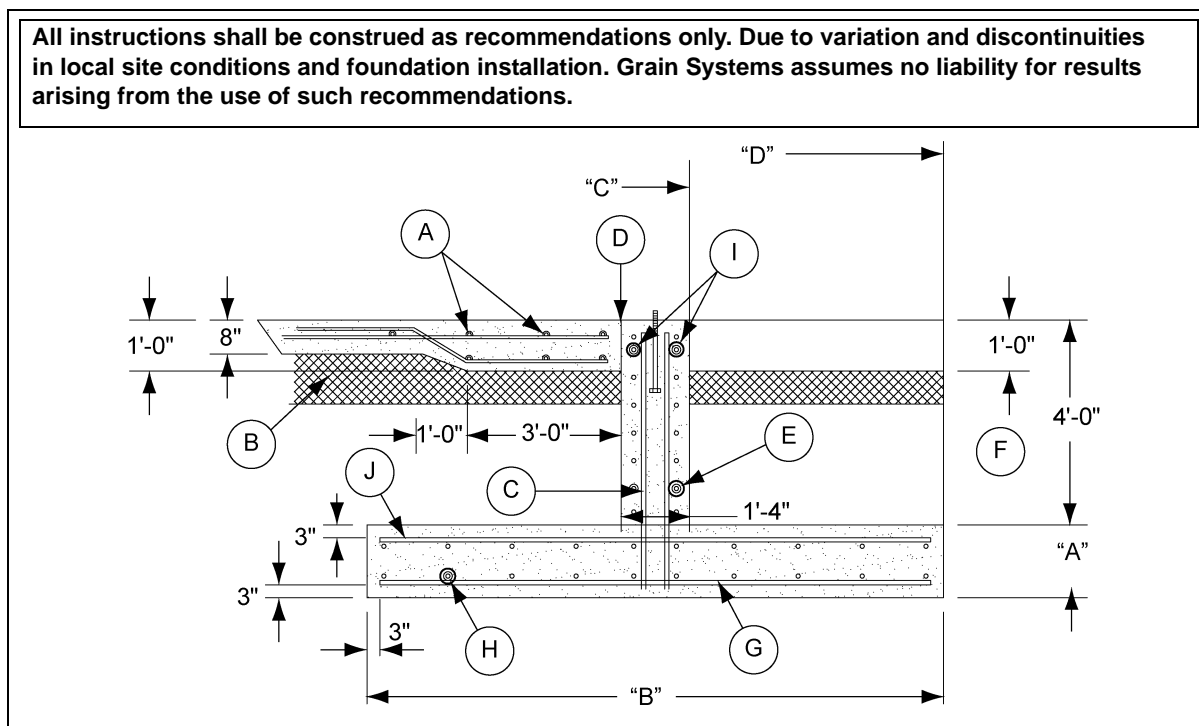


Figure 3D 90' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

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

	Ring #	27	28	30
	A	1'-6"	1'-8"	2'-0"
	B	9'-6"	10'-6"	12'-6"
	C	45'-10"	45'-10"	45'-10"
	D	49'-5"	49'-10"	50'-10"
	M	9 #6's	9 #6's	9 #6's
	N	10 #5's	11 #5's	13 #5's
	P	#6 @ 10" c/c	#7 @ 12" c/c	#7 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0	0
	#5 (ft.)	15000	15600	16700
	#6 (ft.)	8200	5200	5200
	#7 (ft.)	0	2900	3400
Weight (Lbs.)		27950	29775	32100
Total Cu. Yds. of Concrete	Footing	149	182	260
	Wall	56	56	56
	Floor	164	164	164
	Total	369	402	480

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

## 105' Diameter, 27-30 Ring (2.66" Corrugation), 4000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

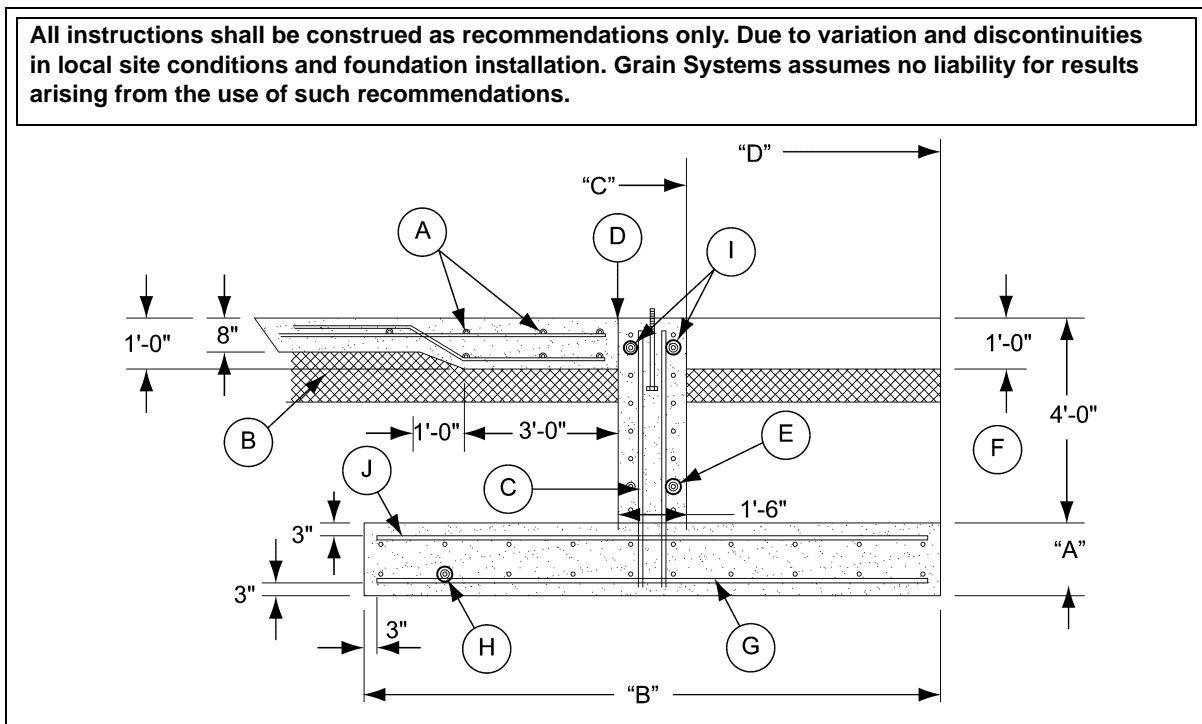


Figure 3E 105' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

### 3. Inverted "T" Foundation for 4000 PSF Allowable Soil Bearing Capacity

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

	Ring #	27	28	30
	A	1'-6"	1'-8"	2'-0"
	B	10'-6"	11'-6"	14'-0"
	C	53'-4"	53'-4"	53'-4"
	D	57'-2"	57'-7"	58'-9"
	M	10 #6's	10 #6's	10 #6's
	N	11 #5's	12 #5's	15 #5's
	P	#7 @ 10" c/c	#7 @ 10" c/c	#8 @ 12" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0	0
	#5 (ft.)	19700	20400	22300
	#6 (ft.)	6700	6700	6700
	#7 (ft.)	4000	4400	0
	#8 (ft.)	0	0	4500
Weight (Lbs.)		38625	40075	45325
Total Cu. Yds. of Concrete	Footing	190	231	337
	Wall	74	74	74
	Floor	221	221	221
	Total	485	526	632

#### 4. Inverted "T" Foundation for 4500 PSF Allowable Soil Bearing Capacity

### 54'-90' Diameter, 32 Ring (2.66" Corrugation), 4500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

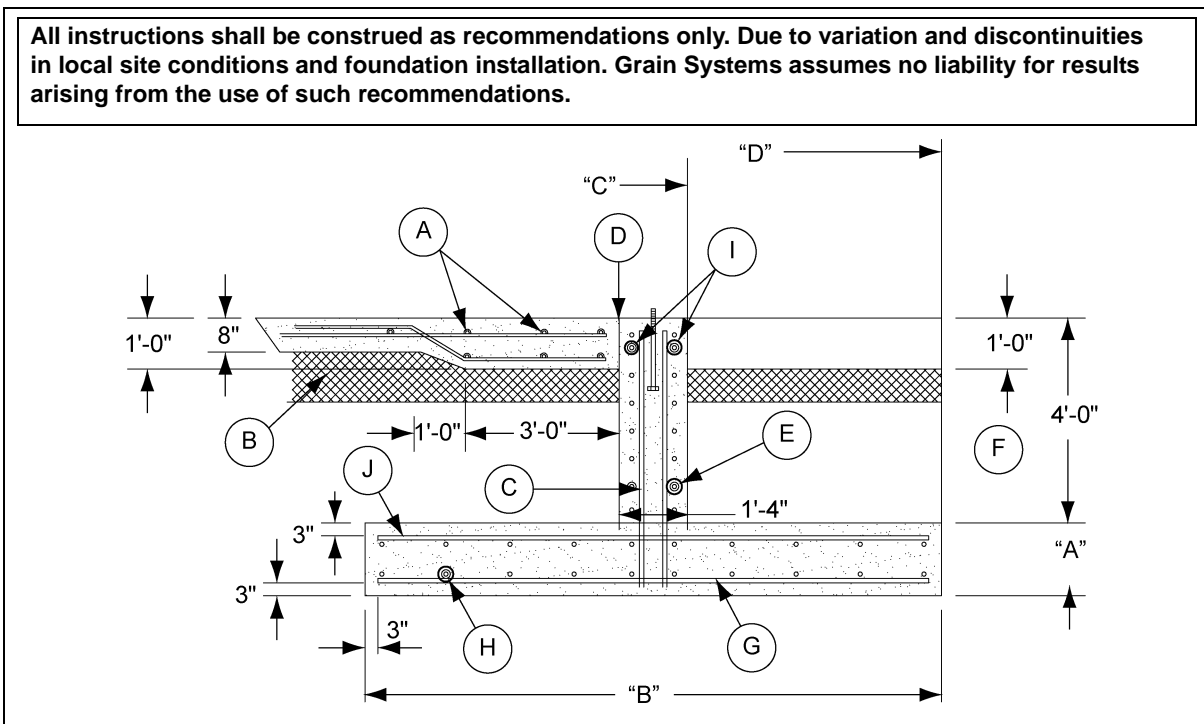


Figure 4A 54'-90' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing



## 4. Inverted "T" Foundation for 4500 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 54'**  
**Soil Bearing Capacity: 4500 PSF**

	Ring #	32
	A	1'-6"
	B	9'-6"
	C	27'-11"
	D	31'-5"
	M	7 #5's
	N	10 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	9400
	#6 (ft.)	0
	#7 (ft.)	1900
Weight (Lbs.)		13500
Total Cu. Yds. of Concrete	Footing	89
	Wall	34
	Floor	61
	Total	184

**Diameter of Bin: 60'**  
**Soil Bearing Capacity: 4500 PSF**

	Ring #	32
	A	1'-8"
	B	10'-0"
	C	30'-10"
	D	34'-7"
	M	7 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	11200
	#6 (ft.)	0
	#7 (ft.)	2200
Weight (Lbs.)		15950
Total Cu. Yds. of Concrete	Footing	115
	Wall	38
	Floor	75
	Total	227

**Diameter of Bin: 72'**  
**Soil Bearing Capacity: 4500 PSF**

	Ring #	32
	A	1'-8"
	B	10'-6"
	C	36'-10"
	D	40'-10"
	M	9 #5's
	N	11 #5's
	P	#7 @ 9" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	15200
	#6 (ft.)	0
	#7 (ft.)	3000
Weight (Lbs.)		21950
Total Cu. Yds. of Concrete	Footing	145
	Wall	45
	Floor	106
	Total	296

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 4500 PSF**

	Ring #	32
	A	1'-10"
	B	12'-0"
	C	38'-4"
	D	44'-0"
	M	10 #5's
	N	13 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	17500
	#6 (ft.)	0
	#7 (ft.)	3300
Weight (Lbs.)		24750
Total Cu. Yds. of Concrete	Footing	190
	Wall	47
	Floor	115
	Total	352

#### 4. Inverted "T" Foundation for 4500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 78'  
Soil Bearing Capacity: 4500 PSF

Diameter of Bin: 90'  
Soil Bearing Capacity: 4500 PSF

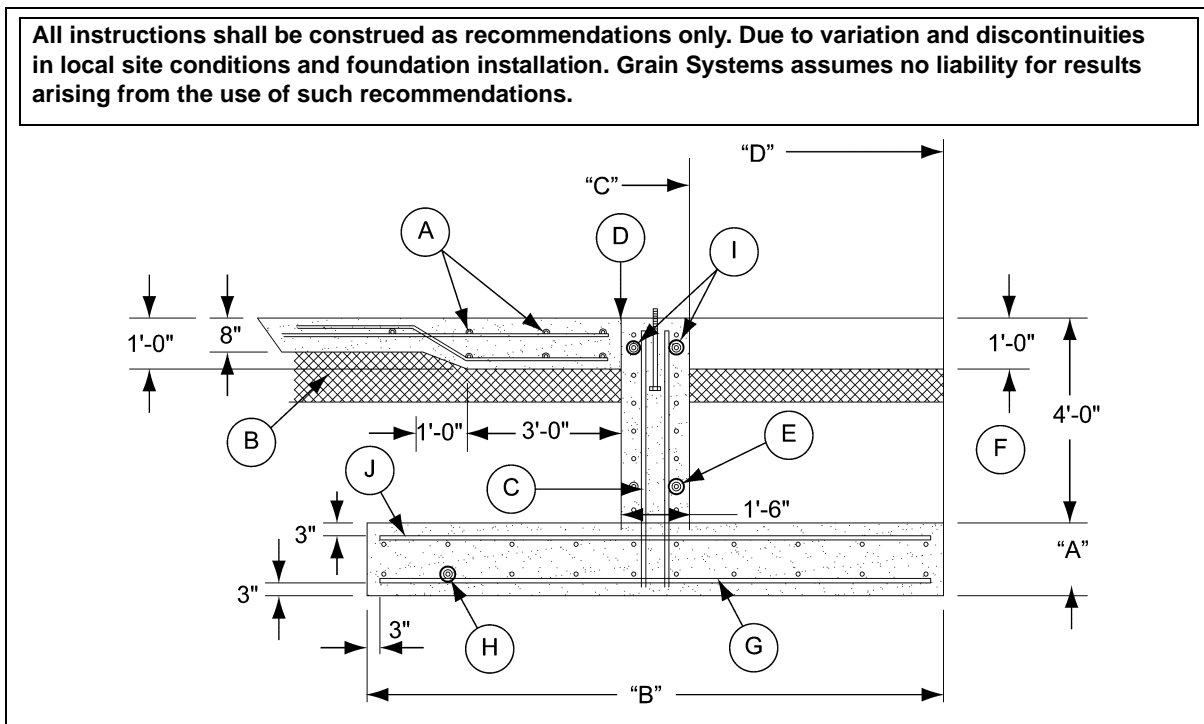
	Ring #	32
	A	1'-10"
	B	12'-0"
	C	39'-10"
	D	44'-6"
	M	10 #5's
	N	13 #5's
	P	#7 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	18400
	#6 (ft.)	0
	#7 (ft.)	2800
Weight (Lbs.)		24875
Total Cu. Yds. of Concrete	Footing	197
	Wall	49
	Floor	124
	Total	370

	Ring #	32
	A	1'-10"
	B	12'-0"
	C	45'-10"
	D	50'-6"
	M	9 #6's
	N	13 #5's
	P	#8 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16700
	#6 (ft.)	5200
	#7 (ft.)	0
	#8 (ft.)	3300
Weight (Lbs.)		34000
Total Cu. Yds. of Concrete	Footing	228
	Wall	56
	Floor	164
	Total	448

## 4. Inverted "T" Foundation for 4500 PSF Allowable Soil Bearing Capacity

### 105' Diameter, 32 Ring (2.66" Corrugation), 4500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 4500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.



**Figure 4B 105' Bin**

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

#### 4. Inverted "T" Foundation for 4500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 105'  
Soil Bearing Capacity: 4500 PSF

	Ring #	32
	A	2'-0"
	B	12'-0"
	C	53'-4"
	D	57'-10"
	M	8 #7's
	N	13 #5's
	P	#8 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	21000
	#6 (ft.)	0
	#7 (ft.)	5400
	#8 (ft.)	3800
Weight (Lbs.)		42900
Total Cu. Yds. of Concrete	Footing	290
	Wall	74
	Floor	221
	Total	585

## 5. Inverted "T" Foundation for 5000 PSF Allowable Soil Bearing Capacity

### 42'-90' Diameter, 34 Ring (2.66" Corrugation), 5000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

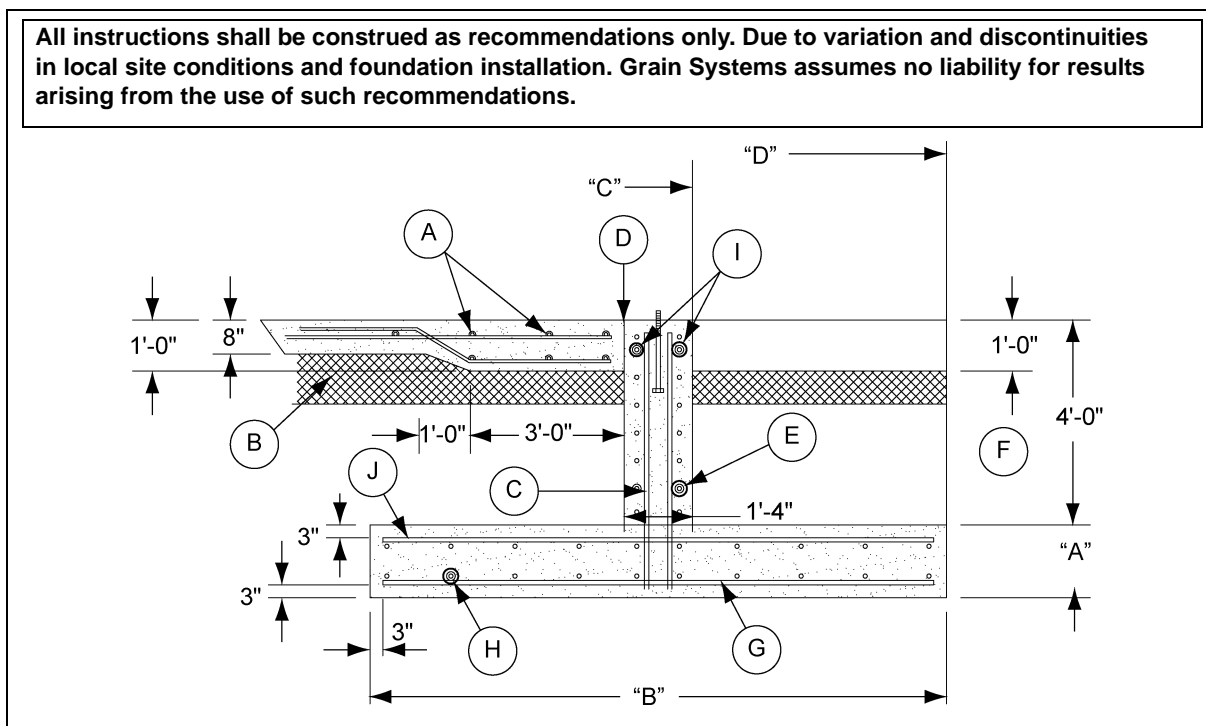


Figure 5A 42'-90' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 5. Inverted "T" Foundation for 5000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 42'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-6"
	B	7'-6"
	C	21'-11"
	D	24'-10"
	M	7 #5's
	N	8 #5's
	P	#6 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	6300
	#6 (ft.)	1000
Weight (Lbs.)		8050
Total Cu. Yds. of Concrete	Footing	55
	Wall	27
	Floor	38
	Total	120

**Diameter of Bin: 48'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-6"
	B	8'-0"
	C	24'-11"
	D	28'-0"
	M	7 #5's
	N	9 #5's
	P	#6 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	7800
	#6 (ft.)	1400
Weight (Lbs.)		10200
Total Cu. Yds. of Concrete	Footing	67
	Wall	30
	Floor	49
	Total	146

**Diameter of Bin: 54'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-8"
	B	9'-0"
	C	27'-11"
	D	31'-4"
	M	7 #5's
	N	10 #5's
	P	#7 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	9400
	#6 (ft.)	0
	#7 (ft.)	1500
Weight (Lbs.)		12725
Total Cu. Yds. of Concrete	Footing	94
	Wall	34
	Floor	61
	Total	189

**Diameter of Bin: 60'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-8"
	B	9'-0"
	C	30'-10"
	D	34'-3"
	M	7 #5's
	N	10 #5's
	P	#7 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	10800
	#6 (ft.)	0
	#7 (ft.)	1600
Weight (Lbs.)		14475
Total Cu. Yds. of Concrete	Footing	104
	Wall	38
	Floor	75
	Total	217

## 5. Inverted "T" Foundation for 5000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 72'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-8"
	B	10'-0"
	C	36'-10"
	D	40'-8"
	M	10 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	15700
	#6 (ft.)	0
	#7 (ft.)	2600
Weight (Lbs.)		21550
Total Cu. Yds. of Concrete	Footing	139
	Wall	45
	Floor	106
	Total	290

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-10"
	B	10'-6"
	C	38'-4"
	D	42'-5"
	M	10 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16600
	#6 (ft.)	0
	#7 (ft.)	2900
Weight (Lbs.)		23000
Total Cu. Yds. of Concrete	Footing	167
	Wall	47
	Floor	115
	Total	329

**Diameter of Bin: 78'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	1'-10"
	B	10'-6"
	C	39'-10"
	D	43'-11"
	M	10 #5's
	N	11 #5's
	P	#7 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	17500
	#6 (ft.)	0
	#7 (ft.)	2500
Weight (Lbs.)		23175
Total Cu. Yds. of Concrete	Footing	173
	Wall	49
	Floor	124
	Total	346

**Diameter of Bin: 90'**  
**Soil Bearing Capacity: 5000 PSF**

	Ring #	34
	A	2'-0"
	B	11'-0"
	C	45'-10"
	D	50'-2"
	M	9 #6's
	N	12 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16200
	#6 (ft.)	5200
	#7 (ft.)	3600
Weight (Lbs.)		31850
Total Cu. Yds. of Concrete	Footing	229
	Wall	56
	Floor	164
	Total	449

## 5. Inverted "T" Foundation for 5000 PSF Allowable Soil Bearing Capacity

### 105' Diameter, 34 Ring (2.66" Corrugation), 5000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

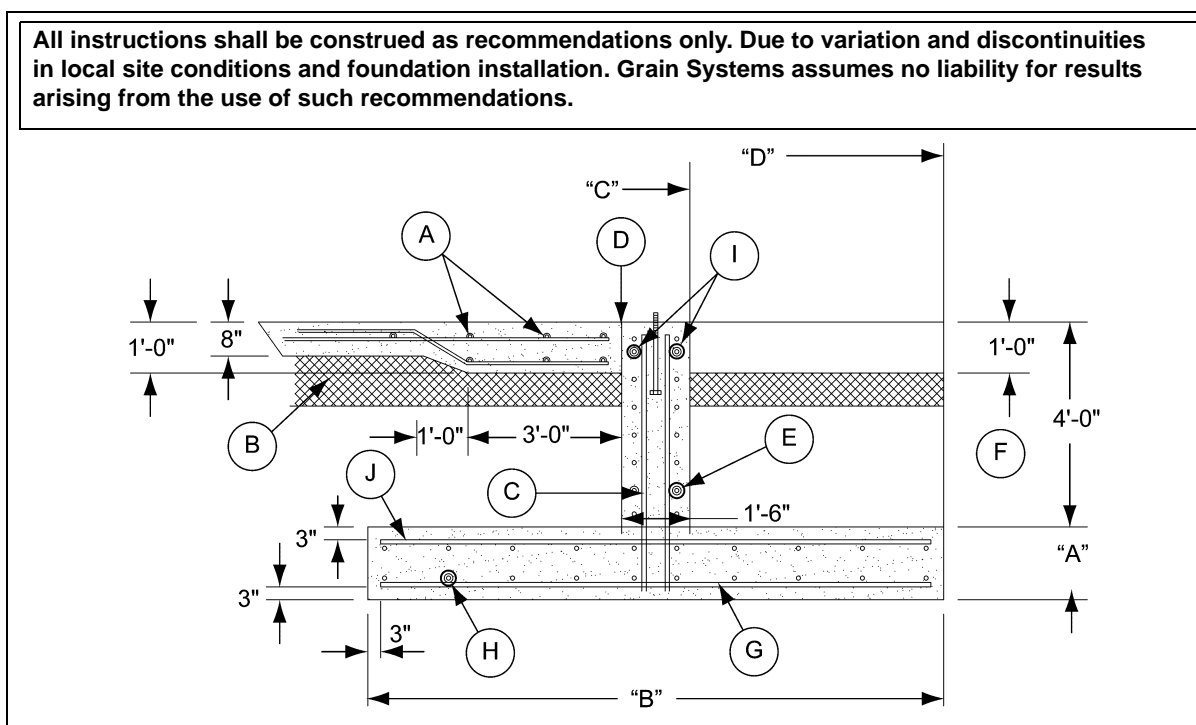


Figure 5B 105' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing



## 5. Inverted "T" Foundation for 5000 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 105'  
Soil Bearing Capacity: 5000 PSF

	Ring #	34
	A	2'-0"
	B	12'-0"
	C	53'-4"
	D	57'-11"
	M	9 #7's
	N	13 #5's
	P	#8 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	21100
	#6 (ft.)	0
	#7 (ft.)	6000
	#8 (ft.)	4600
Weight (Lbs.)		46400
Total Cu. Yds. of Concrete	Footing	290
	Wall	74
	Floor	221
	Total	585

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

### 42' Diameter, 36 Ring (2.66" Corrugation), 5500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

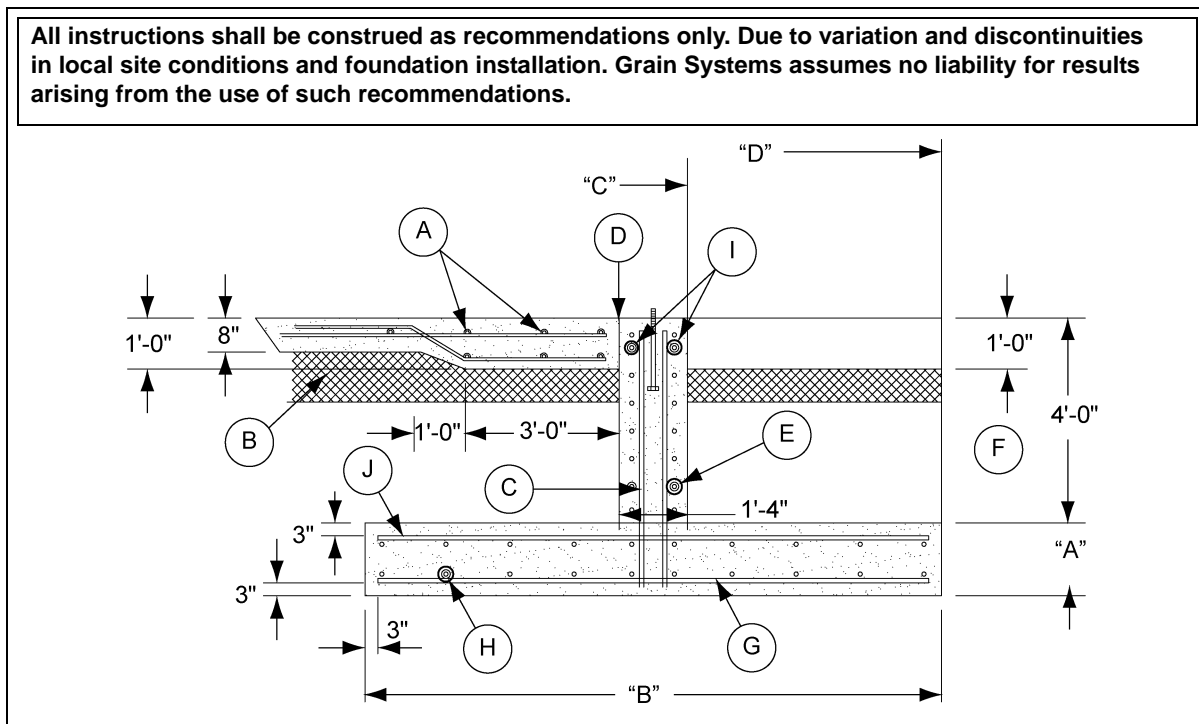


Figure 6A 42' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 42'  
Soil Bearing Capacity: 5500 PSF

	Ring #	36
	A	1'-6"
	B	7'-0"
	C	21'-11"
	D	24'-7"
	M	7 #5's
	N	8 #5's
	P	#6 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	6300
	#6 (ft.)	900
Weight (Lbs.)		7900
Total Cu. Yds. of Concrete	Footing	51
	Wall	27
	Floor	38
	Total	116

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

### 48' Diameter, 36 Ring (2.66" Corrugation), 5500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

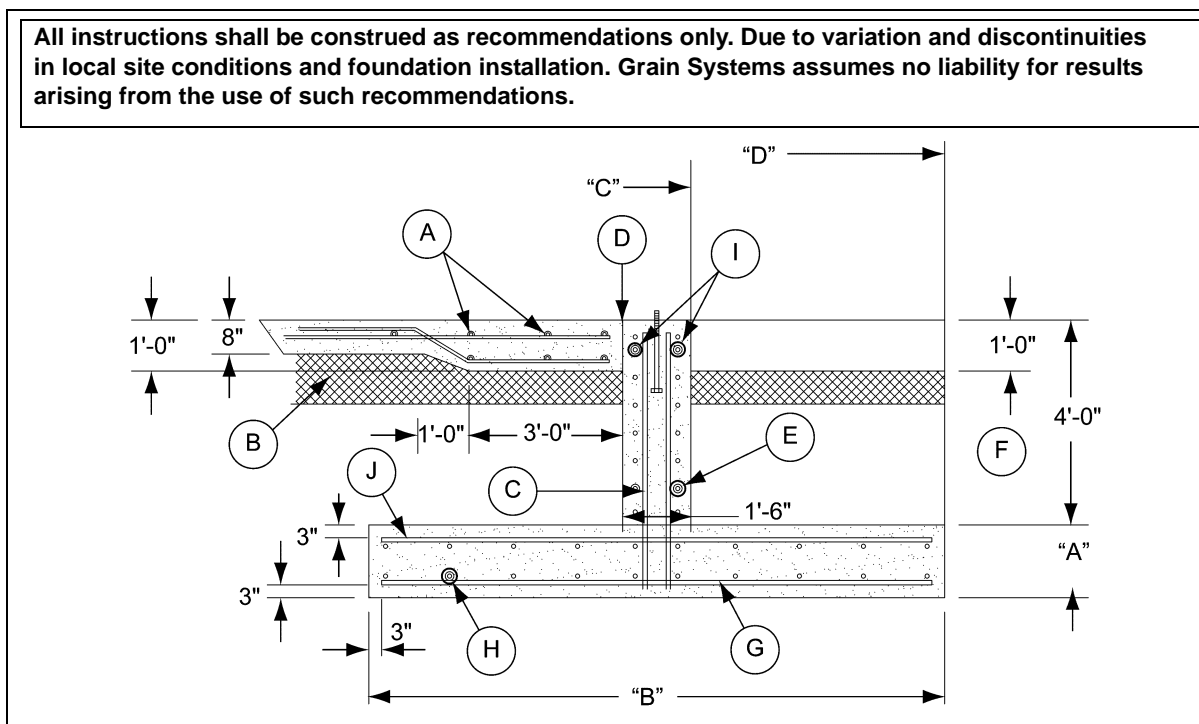


Figure 6B 48' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 48'

Soil Bearing Capacity: 5500 PSF

	Ring #	36
	A	1'-6"
	B	8'-0"
	C	25'-0"
	D	27'-11"
	M	7 #5's
	N	9 #5's
	P	#7 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	7800
	#6 (ft.)	0
	#7 (ft.)	1200
Weight (Lbs.)		10375
Total Cu. Yds. of Concrete	Footing	67
	Wall	34
	Floor	48
	Total	149

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

### 54'-78' Diameter, 37 Ring (2.66" Corrugation), 5500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

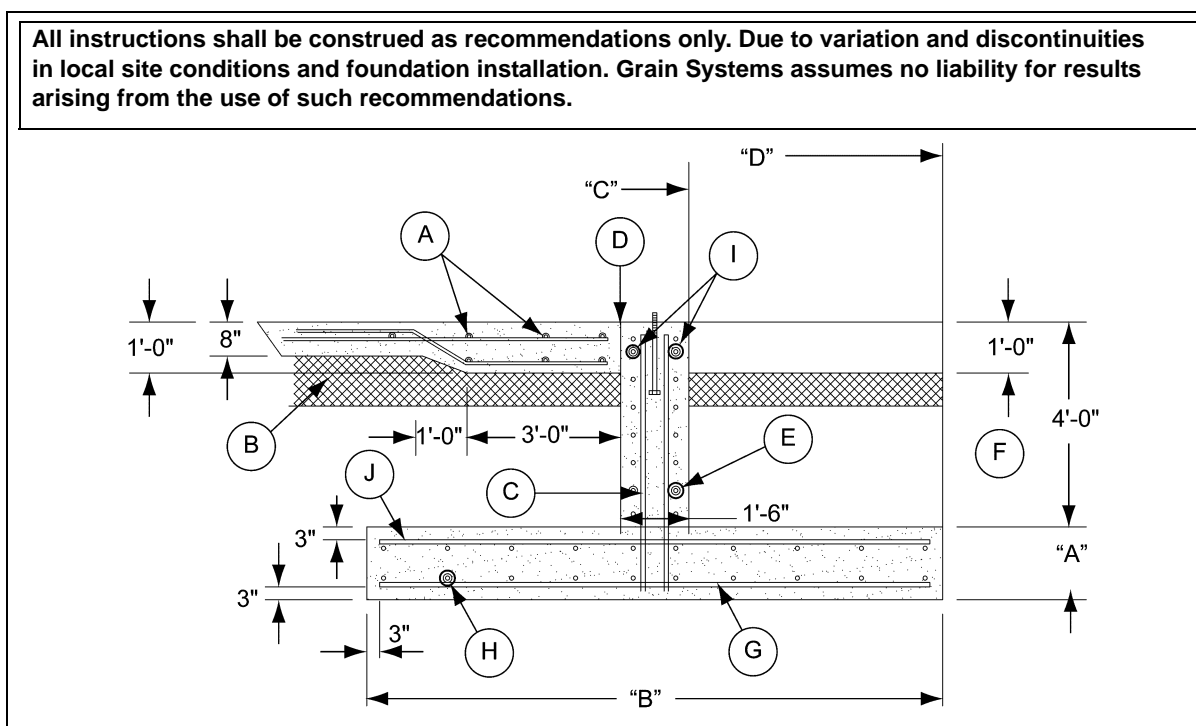


Figure 6C 54'-78' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 54'**  
**Soil Bearing Capacity: 5500 PSF**

	Ring #	37
	A	1'-10"
	B	8'-6"
	C	28'-0"
	D	31'-3"
	M	7 #5's
	N	9 #5's
	P	#6 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	9100
	#6 (ft.)	1700
Weight (Lbs.)		12000
Total Cu. Yds. of Concrete	Footing	98
	Wall	38
	Floor	61
	Total	197

**Diameter of Bin: 60'**  
**Soil Bearing Capacity: 5500 PSF**

	Ring #	37
	A	1'-8"
	B	9'-6"
	C	30'-11"
	D	34'-6"
	M	7 #5's
	N	10 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	10800
	#6 (ft.)	0
	#7 (ft.)	2100
Weight (Lbs.)		15350
Total Cu. Yds. of Concrete	Footing	110
	Wall	42
	Floor	74
	Total	226

**Diameter of Bin: 72'**  
**Soil Bearing Capacity: 5500 PSF**

	Ring #	37
	A	2'-0"
	B	10'-0"
	C	36'-11"
	D	40'-8"
	M	10 #5's
	N	11 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	15700
	#6 (ft.)	0
	#7 (ft.)	2600
Weight (Lbs.)		21525
Total Cu. Yds. of Concrete	Footing	166
	Wall	51
	Floor	106
	Total	323

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 75'  
Soil Bearing Capacity: 5500 PSF

	Ring #	37
	A	1'-10"
	B	10'-0"
	C	38'-5"
	D	42'-3"
	M	10 #5's
	N	11 #5's
	P	#7 @ 9" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16600
	#6 (ft.)	0
	#7 (ft.)	3000
Weight (Lbs.)		23300
Total Cu. Yds. of Concrete	Footing	159
	Wall	53
	Floor	115
	Total	327

Diameter of Bin: 78'  
Soil Bearing Capacity: 5500 PSF

	Ring #	37
	A	1'-10"
	B	10'-0"
	C	39'-11"
	D	43'-9"
	M	9 #6's
	N	11 #5's
	P	#7 @ 9" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	12500
	#6 (ft.)	4500
	#7 (ft.)	3100
Weight (Lbs.)		26075
Total Cu. Yds. of Concrete	Footing	166
	Wall	55
	Floor	124
	Total	345



## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

### 90'-105' Diameter, 37 Ring (2.66" Corrugation), 5500 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 5500 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

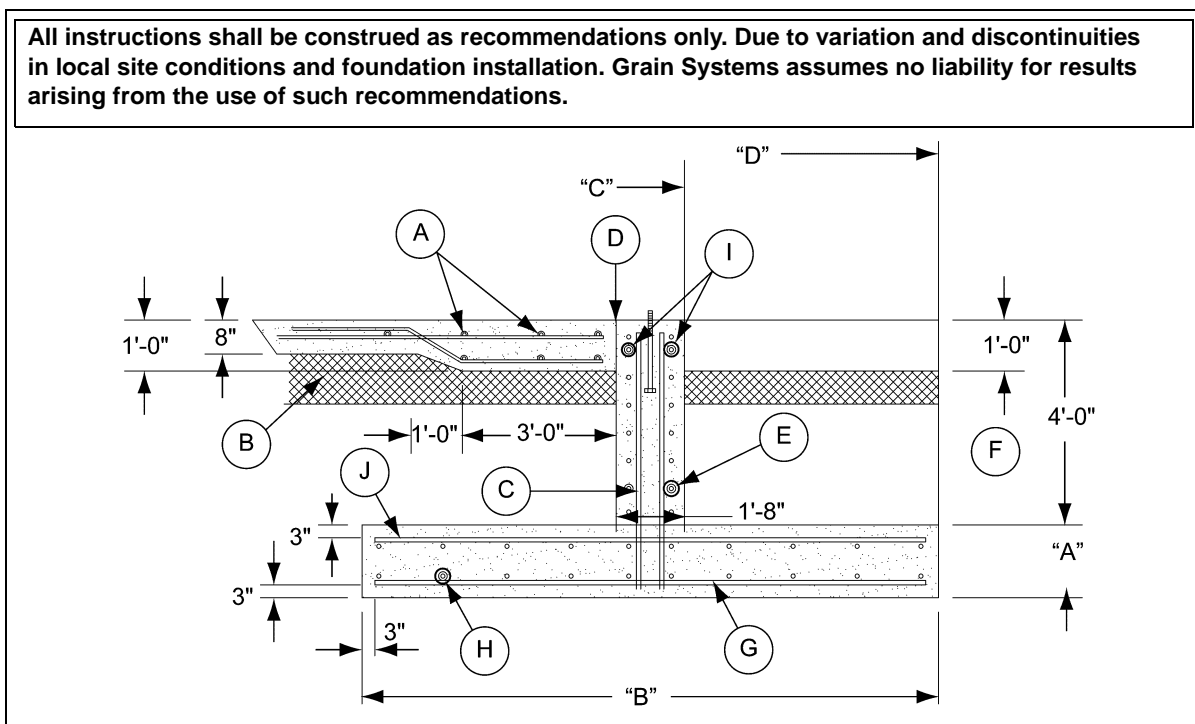


Figure 6D 90' and 105' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 6. Inverted "T" Foundation for 5500 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 90'  
Soil Bearing Capacity: 5500 PSF

	Ring #	37
	A	2'-0"
	B	11'-0"
	C	46'-0"
	D	50'-2"
	M	10 #6's
	N	12 #5's
	P	#8 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16100
	#6 (ft.)	5800
	#7 (ft.)	0
	#8 (ft.)	3600
Weight (Lbs.)		35100
Total Cu. Yds. of Concrete	Footing	230
	Wall	70
	Floor	163
	Total	463

Diameter of Bin: 105'  
Soil Bearing Capacity: 5500 PSF

	Ring #	37
	A	2'-2"
	B	12'-0"
	C	53'-5"
	D	57'-11"
	M	9 #7's
	N	13 #5's
	P	#8 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	21000
	#6 (ft.)	0
	#7 (ft.)	6000
	#8 (ft.)	4600
Weight (Lbs.)		46375
Total Cu. Yds. of Concrete	Footing	315
	Wall	82
	Floor	220
	Total	617

## 7. Inverted "T" Foundation for 6000 PSF Allowable Soil Bearing Capacity

### 54'-78' Diameter, 38 Ring (2.66" Corrugation), 6000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 6000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

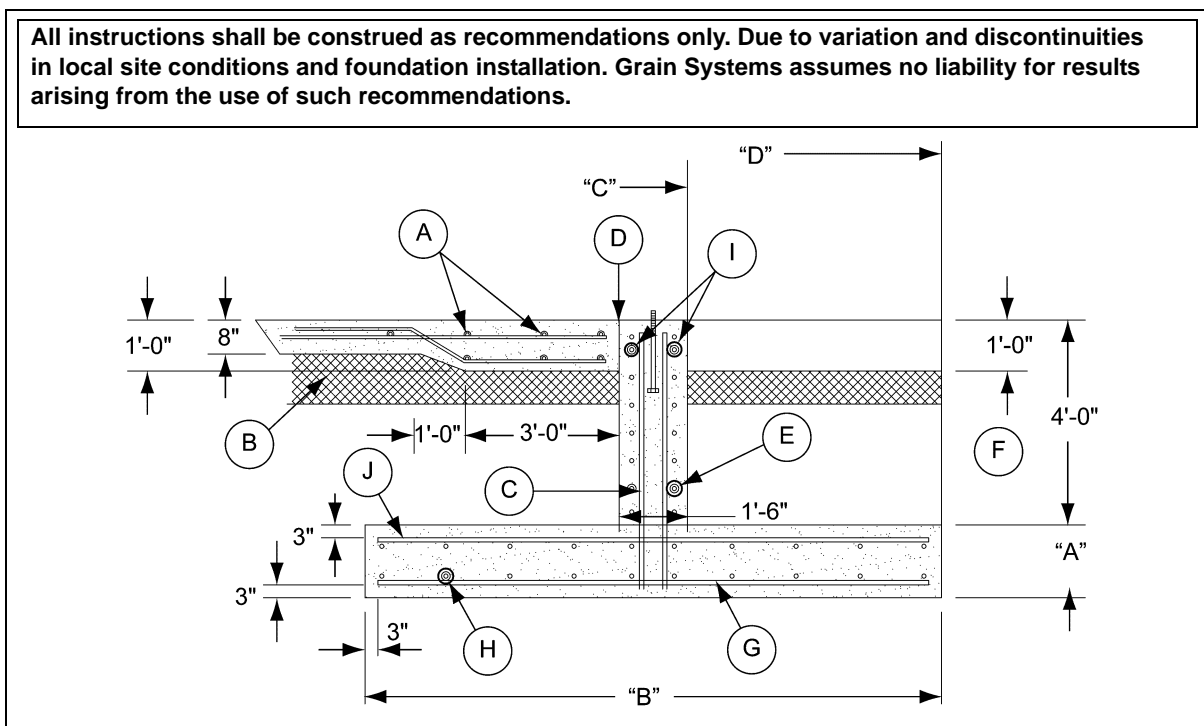


Figure 7A 54'-78' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 7. Inverted "T" Foundation for 6000 PSF Allowable Soil Bearing Capacity

Diameter of Bin: 54'  
Soil Bearing Capacity: 6000 PSF

	Ring #	38
	A	1'-10"
	B	8'-0"
	C	28'-0"
	D	31'-0"
	M	7 #5's
	N	9 #5's
	P	#6 @ 10" c/c
	Q	#5 @ 12" c/c
	Rerod	#4 (ft.)
#5 (ft.)		9100
#6 (ft.)		1600
#7 (ft.)		0
Weight (Lbs.)		11850
Total Cu. Yds. of Concrete	Footing	92
	Wall	38
	Floor	61
	Total	191

Diameter of Bin: 60'  
Soil Bearing Capacity: 6000 PSF

	Ring #	38
	A	1'-10"
	B	9'-6"
	C	30'-11"
	D	34'-7"
	M	7 #5's
	N	10 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
	Rerod	#4 (ft.)
#5 (ft.)		10800
#6 (ft.)		0
#7 (ft.)		2100
#8 (ft.)		0
Weight (Lbs.)	15375	
Total Cu. Yds. of Concrete	Footing	121
	Wall	42
	Floor	74
	Total	237

Diameter of Bin: 72'  
Soil Bearing Capacity: 6000 PSF

	Ring #	38
	A	1'-10"
	B	9'-6"
	C	36'-11"
	D	40'-6"
	M	10 #5's
	N	10 #5's
	P	#7 @ 10" c/c
	Q	#5 @ 12" c/c
	Rerod	#4 (ft.)
#5 (ft.)		15200
#6 (ft.)		0
#7 (ft.)		2500
Weight (Lbs.)	20800	
Total Cu. Yds. of Concrete	Footing	145
	Wall	51
	Floor	106
	Total	302

## 7. Inverted "T" Foundation for 6000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 75'**  
**Soil Bearing Capacity: 6000 PSF**

	Ring #	38
	A	1'-10"
	B	9'-6"
	C	38'-5"
	D	42'-0"
	M	10 #5's
	N	10 #5's
	P	#7 @ 9" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	16100
	#6 (ft.)	0
	#7 (ft.)	2900
Weight (Lbs.)		22500
Total Cu. Yds. of Concrete	Footing	151
	Wall	53
	Floor	115
	Total	319

**Diameter of Bin: 78'**  
**Soil Bearing Capacity: 6000 PSF**

	Ring #	38
	A	2'-0"
	B	10'-0"
	C	39'-11"
	D	43'-9"
	M	9 #6's
	N	11 #5's
	P	#7 @ 9" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	12500
	#6 (ft.)	4500
	#7 (ft.)	3100
Weight (Lbs.)		26075
Total Cu. Yds. of Concrete	Footing	181
	Wall	55
	Floor	124
	Total	360

## 7. Inverted "T" Foundation for 6000 PSF Allowable Soil Bearing Capacity

### 90'-105' Diameter, 38 Ring (2.66" Corrugation), 6000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity of 6000 lbs./ft<sup>2</sup>. 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

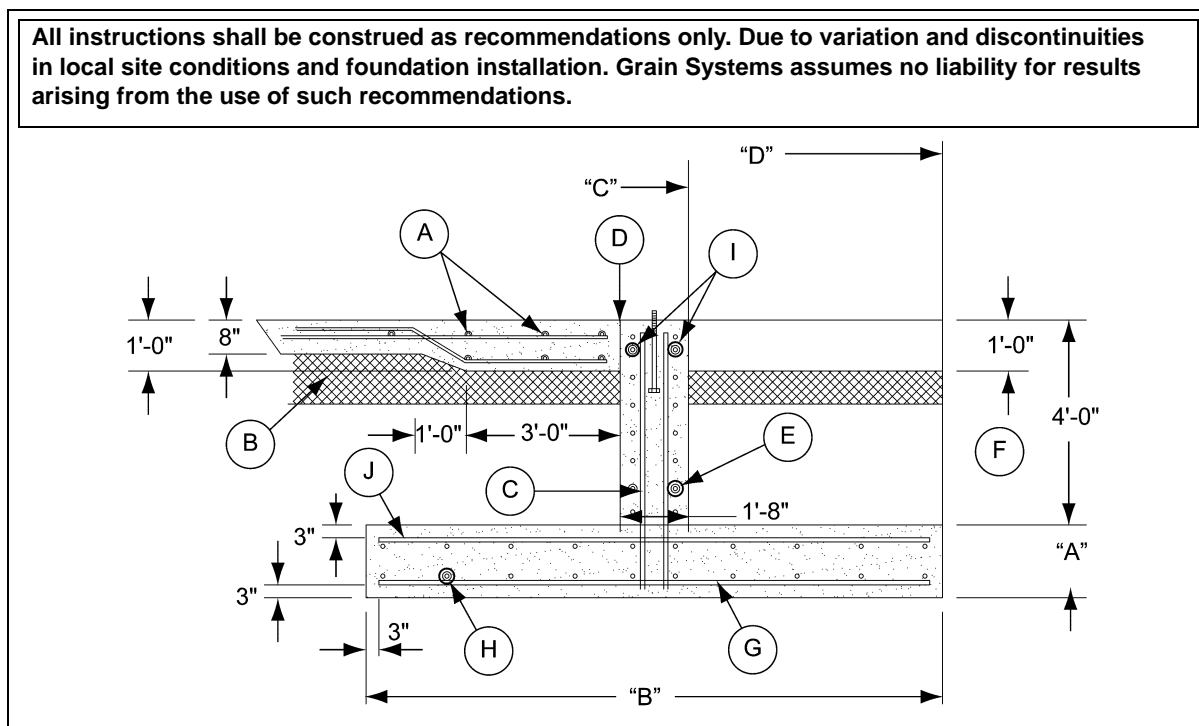


Figure 7B 90' and 105' Bins

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing

## 7. Inverted "T" Foundation for 6000 PSF Allowable Soil Bearing Capacity

**Diameter of Bin: 90'**  
**Soil Bearing Capacity: 6000 PSF**

	Ring #	38
	A	2'-0"
	B	10'-6"
	C	46'-0"
	D	50'-0"
	M	10 #6's
	N	11 #5's
	P	#8 @ 12" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	15600
	#6 (ft.)	5800
	#7 (ft.)	0
	#8 (ft.)	2900
Weight (Lbs.)		32650
Total Cu. Yds. of Concrete	Footing	220
	Wall	70
	Floor	163
	Total	453

**Diameter of Bin: 105'**  
**Soil Bearing Capacity: 6000 PSF**

	Ring #	38
	A	2'-2"
	B	11'-6"
	C	53'-5"
	D	57'-9"
	M	9 #7's
	N	12 #5's
	P	#8 @ 10" c/c
	Q	#5 @ 12" c/c
Rerod	#4 (ft.)	0
	#5 (ft.)	20400
	#6 (ft.)	0
	#7 (ft.)	6000
	#8 (ft.)	4400
Weight (Lbs.)		45175
Total Cu. Yds. of Concrete	Footing	302
	Wall	82
	Floor	220
	Total	604

## 8. Inverted "T" Foundation for 4000-6000 Allowable Soil Bearing Capacity

### 135' Diameter, 20-36 Ring (2.66" Corrugation), 4000-6000 PSF Allowable Soil Bearing Capacity

1. The foundation design is based on a minimum allowable soil bearing capacity listed on the 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 constructed 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 40 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 4500 PSI at 28 days.
8. Foundation recommendation charts are provided as an aid in material estimation purposes for standard commercial bin design conditions. Seismic conditions are not considered.

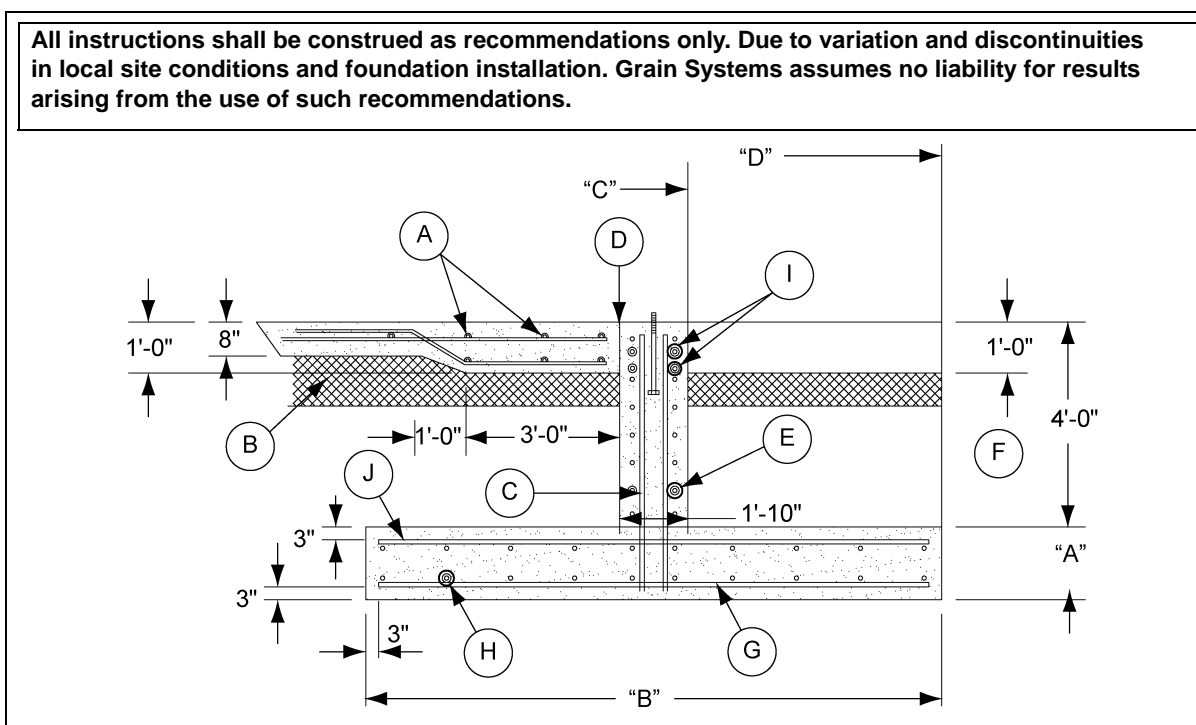


Figure 8A 135' Bin

Ref #	Description
A	# 5 Bars @ 18" C/C Each Way
B	Well Compacted Fill
C	# 5 Bars @ 18" C/C Each Face (W STD 90° Hook)
D	1/2" Expansion Joint
E	"M" Bars Evenly Spaced Each Face

Ref #	Description
F	Grade
G	"P" Bars Spacing at Center of Footing
H	"N" Bars Evenly Spaced
I	Two (2) Additional Hoop Bars Each Face, 3" from Top Hoop Bars
J	"Q" Bars Spacing at Center of Footing



## 8. Inverted "T" Foundation for 4000-6000 Allowable Soil Bearing Capacity

Diameter of Bin: 135'

Soil Bearing Capacity: 4000-6000 PSF

	PSF	4000	4500	4500	5000	5000
	Ring #	20	22	24	26	28
	A	1'-3"	1'-3"	1'-6"	1'-6"	1'-8"
	B	7'-6"	7'-6"	8'-6"	8'-6"	9'-6"
	C	68'-5"	68'-5"	68'-5"	68'-5"	68'-5"
	D	70'-11"	70'-11"	71'-5"	71'-5"	72'-2"
	M	12 #6's	12 #6's	12 #6's	11 #7's	11 #7's
	N	8 #5's	8 #5's	9 #5's	9 #5's	10 #5's
	P	#5 @ 10" c/c	#6 @ 12" c/c	#6 @ 12" c/c	#6 @ 10" c/c	#6 @ 9" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0	0	0	0
	#5 (ft.)	30600	27000	27900	27900	28700
	#6 (ft.)	10300	13200	13700	4100	5100
	#7 (ft.)	0	0	0	9400	9400
	#8 (ft.)	0	0	0	0	0
Weight (Lbs.)		47300	47950	49575	54300	56725
Total Cu. Yds. of Concrete	Footing	147	147	200	200	248
	Wall	115	115	115	115	115
	Floor	360	360	360	360	360
	Total	622	622	675	675	723

	PSF	5500	5500	6000	6000
	Ring #	30	32	34	36
	A	1'-8"	2'-0"	2'-0"	2'-4"
	B	9'-6"	10'-6"	10'-9"	12'-0"
	C	68'-5"	68'-5"	68'-5"	68'-5"
	D	71'-10"	72'-3"	72'-5"	73'-1"
	M	11 #7's	10 #8's	10 #8's	11 #8's
	N	10 #5's	11 #5's	12 #5's	13 #5's
	P	#7 @ 10" c/c	#8 @ 12" c/c	#8 @ 12" c/c	#8 @ 10" c/c
	Q	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c	#5 @ 12" c/c
Rerod	#4 (ft.)	0	0	0	0
	#5 (ft.)	28700	29500	30400	31200
	#6 (ft.)	0	0	0	0
	#7 (ft.)	14000	0	0	0
	#8 (ft.)	0	12800	12900	15200
Weight (Lbs.)		58325	64925	66075	73100
Total Cu. Yds. of Concrete	Footing	248	328	336	438
	Wall	115	115	115	115
	Floor	360	360	360	360
	Total	723	803	811	913

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# NOTES

## GSI Group, LLC Limited Warranty

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user's sole remedy (and GSI's only obligation) is to repair or replace, at GSI's option and expense, products that in GSI's judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

### Warranty Extensions:

The Limited Warranty period is extended for the following products:

	Product	Warranty Period	
<b>AP Fans and Flooring</b>	Performer Series Direct Drive Fan Motor	3 Years	* Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 25% 5 to 7 years - end-user pays 50% 7 to 10 years - end-user pays 75%
	All Fiberglass Housings	Lifetime	
	All Fiberglass Propellers	Lifetime	
<b>AP and Cumberland</b>	Flex-Flo/Pan Feeding System Motors	2 Years	
<b>Cumberland Feeding/Watering Systems</b>	Feeder System Pan Assemblies	5 Years **	** Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 50%
	Feed Tubes (1-3/4" and 2.00")	10 Years *	
	Centerless Augers	10 Years *	
	Watering Nipples	10 Years *	
<b>Grain Systems</b>	Grain Bin Structural Design	5 Years	
<b>Grain Systems Farm Fans Zimmerman</b>	Portable and Tower Dryers	2 Years	† Motors, burner components and moving parts not included. Portable dryer screens included. Tower dryer screens not included.
	Portable and Tower Dryer Frames and Internal Infrastructure †	5 Years	

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12<sup>th</sup>) month from the date of purchase and continuing until the sixtieth (60<sup>th</sup>) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation and/or shipping costs incurred in the performance of this extended warranty.

### Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.



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