PNEG-677

18', 21', 24' HOPPER TANK STRUCTURES FOR OUTSIDE STIFFENED TANKS

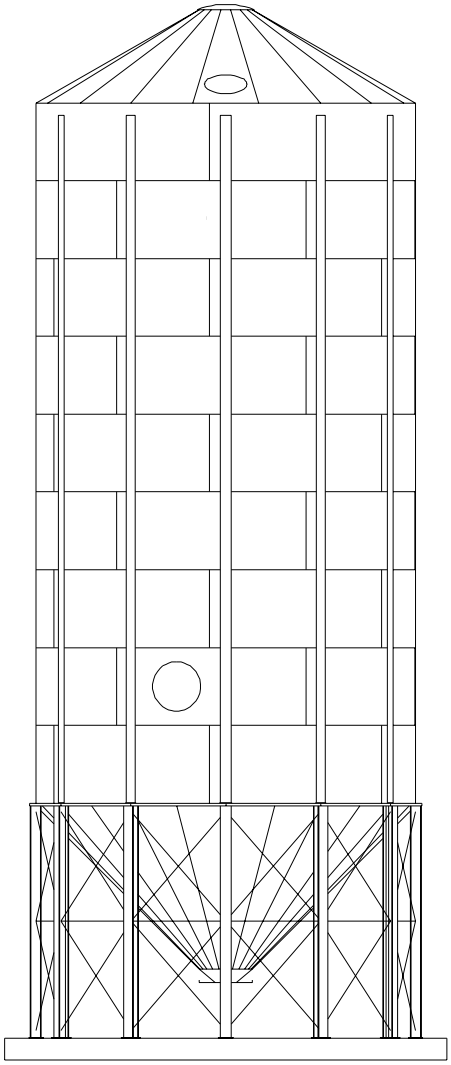

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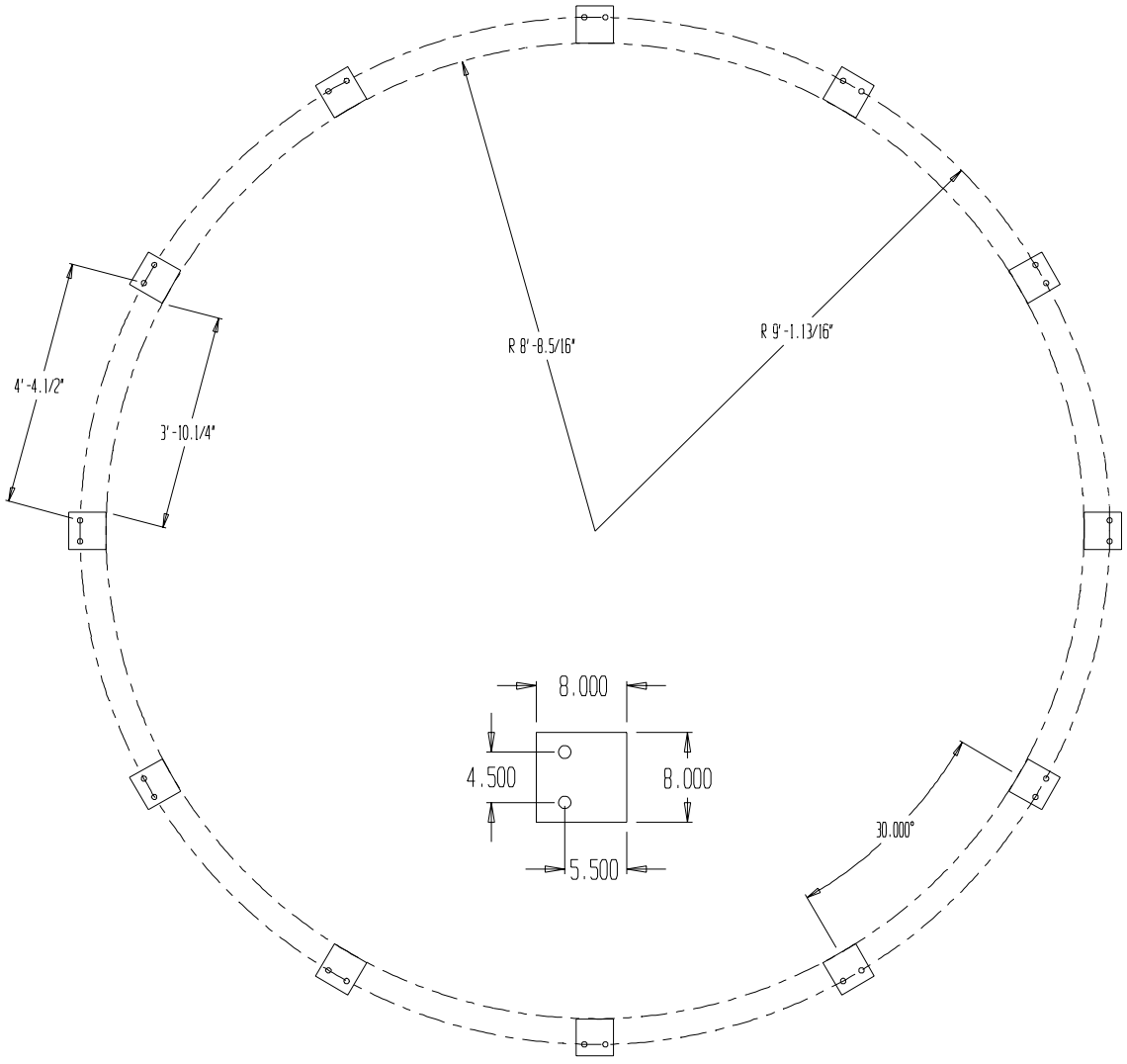
TABLE OF CONTENTS
COMMERCIAL HOPPER TANK

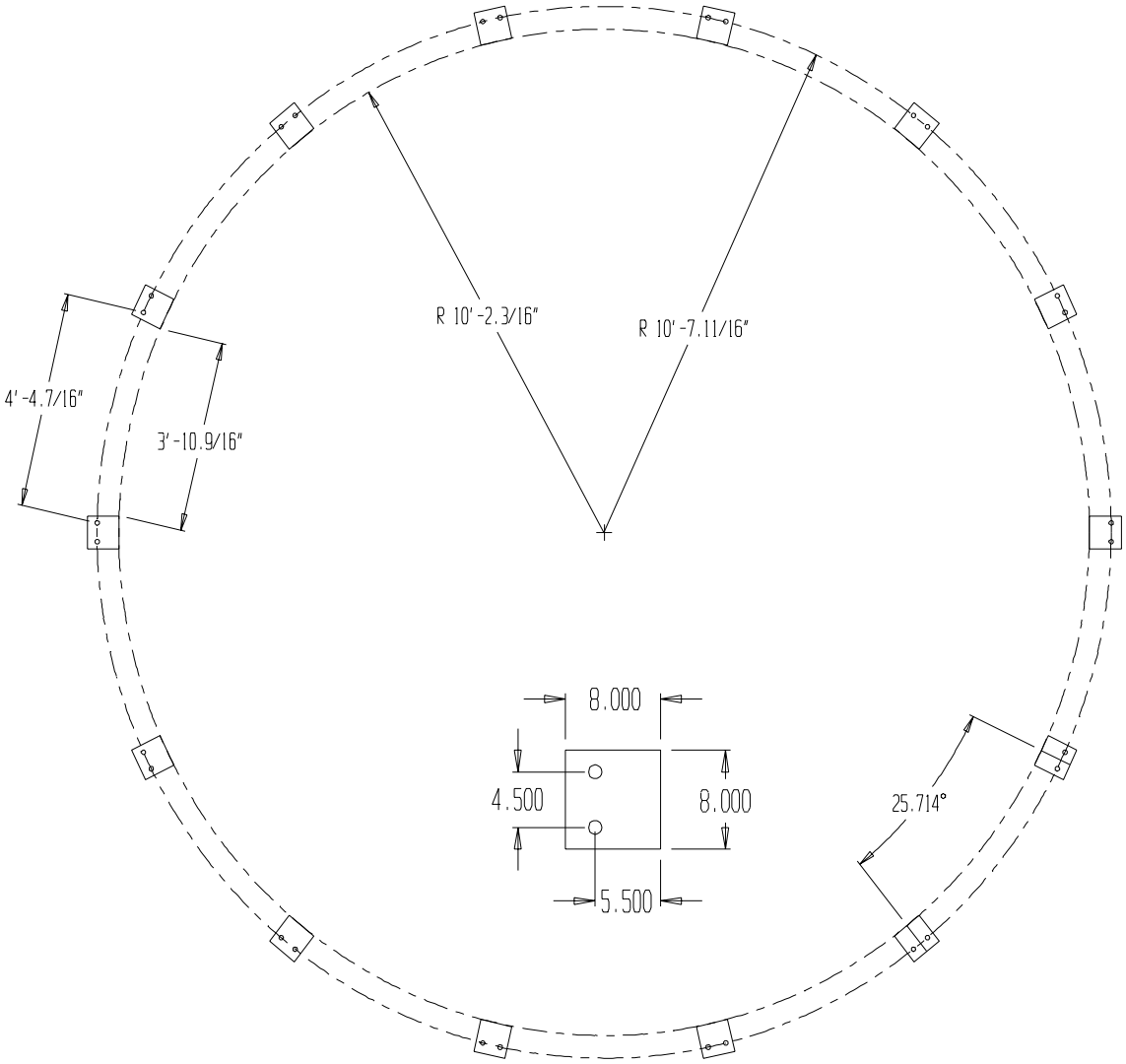
NOTE:

THESE HOPPER STRUCTURES ARE INTENDED TO SUPPORT TANKS WITH OUTSIDE STIFFENERS. TWO STIFFENERS PER SIDEWALL SHEET. PLACING A CONE UNDER A TANK WILL CHANGE THE LEVELS EXERTED ON THE TANK. EXISTING UNSTIFFENED FARM TANKS MAY NOT BE SUITABLE FOR USE OVER A HOPPER, UNLESS STIFFENERS ARE ADDED.

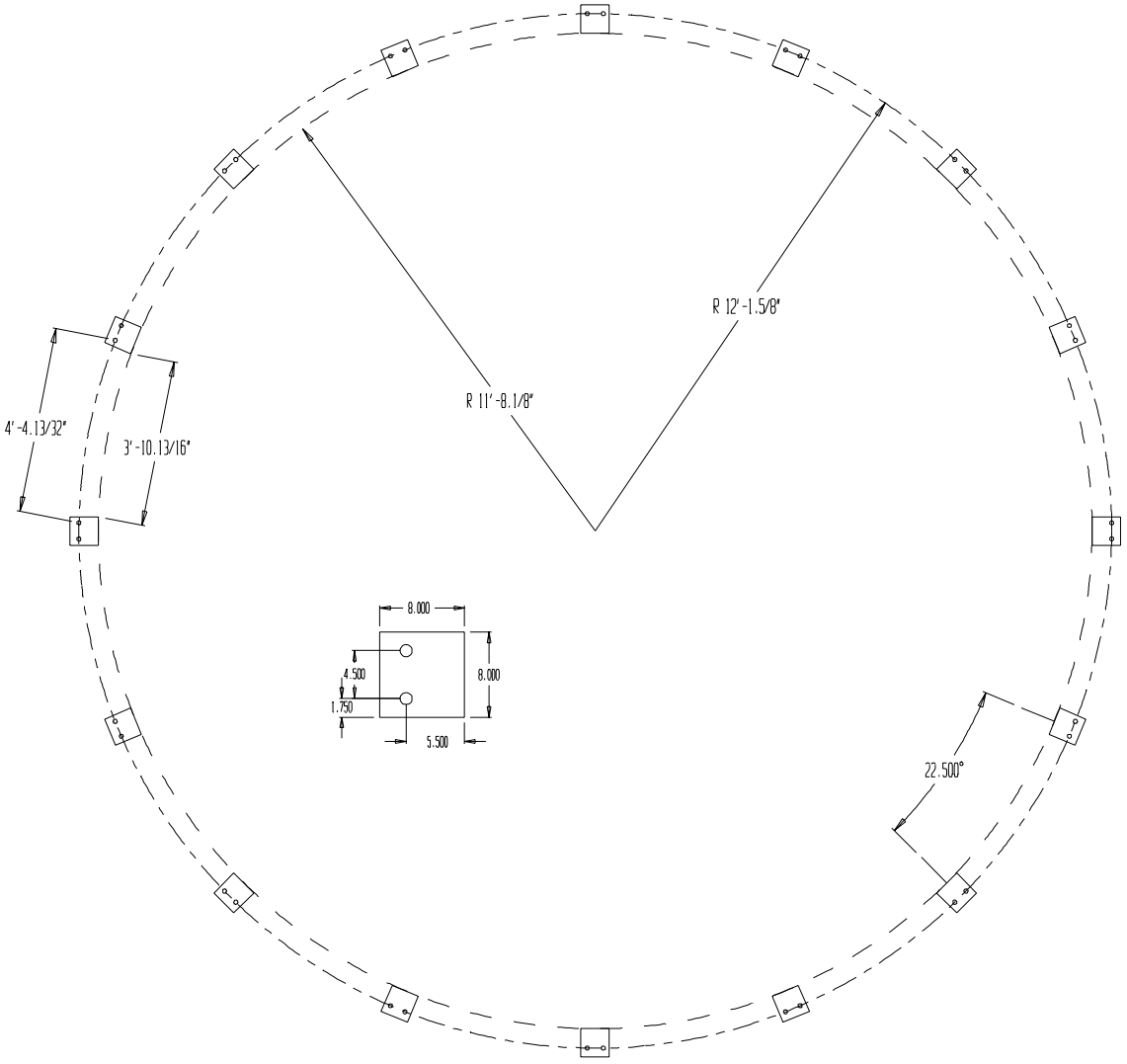
18' DIA FCHT BASE PLATE LAYOUT



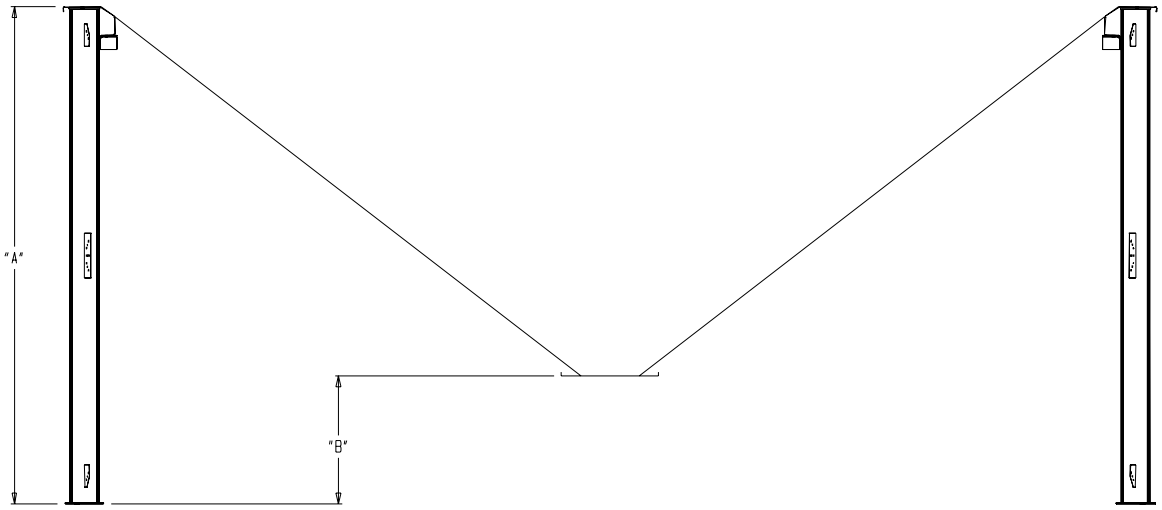
21' DIA. FCHT BASE PLATE LAYOUT



24' DIA. FCHT BASE PLATE LAYOUT



FCHT SUBSTRUCTURE PART LISTS			
TANK SIZE	18'-45DEGREE	21'-45DEGREE	24'-45DEGREE
COLOR CODE	GOLD & WHITE	GOLD & BROWN	GOLD & LIGHT BLUE
COLUMN WELDMENT	LCHT-0030 (12)	LCHT-0043 (14)	LCHT-0006 (16)
COMPRESSION ELEMENT	LCHT-0031 (12)	LCHT-0044 (14)	LCHT-0007 (16)
COMPRESSION SPLICE**	LCHT-0032 (12)	LCHT-0045 (14)	LCHT-0008 (16)
HOPPER COLLAR	LCHT-0037 (1)	LCHT-0050 (1)	LCHT-0026 (1)
HORIZONTAL BRACE	LCHT-0011 (24)	LCHT-0011 (28)	LCHT-0011 (32)
DIAGONAL BRACE	LCHT-0033 (48)	LCHT-0046 (56)	LCHT-0010 (64)
RIGHT HOPPER PANEL	LCHT-0034 (12)	LCHT-0047 (14)	LCHT-0012 (16)
LEFT HOPPER PANEL	LCHT-0035 (12)	LCHT-0048 (14)	LCHT-0013 (16)
SUPPORT HARDWARE	LCHT-0018 (1)	LCHT-0020 (1)	LCHT-0022 (1)
BASE ANGLE SHIM**	LCHT-0014(12)	LCHT-0014(14)	LCHT-0014(16)
COLUMN SHIM PLATE**	LCHT-0015(60)	LCHT-0015(70)	LCHT-0015(80)
** INDICATES COMPONENTS THAT WILL BE FOUND IN THE SUPPORT HARDWARE			



TANK SIZE	HOPPER	"A" DIMENSION		"B" DIMENSION	
DIAMETER	SLOPE	FEET	METERS	INCHES	MILLIMETERS
18'	45	11'-1.3/16"	3.383	34"	864
21'	45	12'-5.3/16	3.789	32"	813
24'	45'	13'-4.15/16	4.088	31"	787

HOPPER SECTION ASSEMBLY
18'-24' (5.49 M-7.32 M) DIAMETER HOPPER TANKS

Before placing the support columns on the anchor bolts, use a transit and surveyors rod to locate high and low areas in the concrete. To assure level alignment for the support columns, use the proper supplied shim or shims between the concrete and base plate. After leveling is completed, place the support columns over the anchor bolts, on the shims, and loosely fasten with nuts and washers (not furnished). Refer to Figure #1.

NOTE:

18' (5.49 M) diameter hopper tanks have 12 columns.
21' (6.40 M) diameter hopper tanks have 14 columns.
24' (7.32 M) diameter hopper tanks have 16 columns.

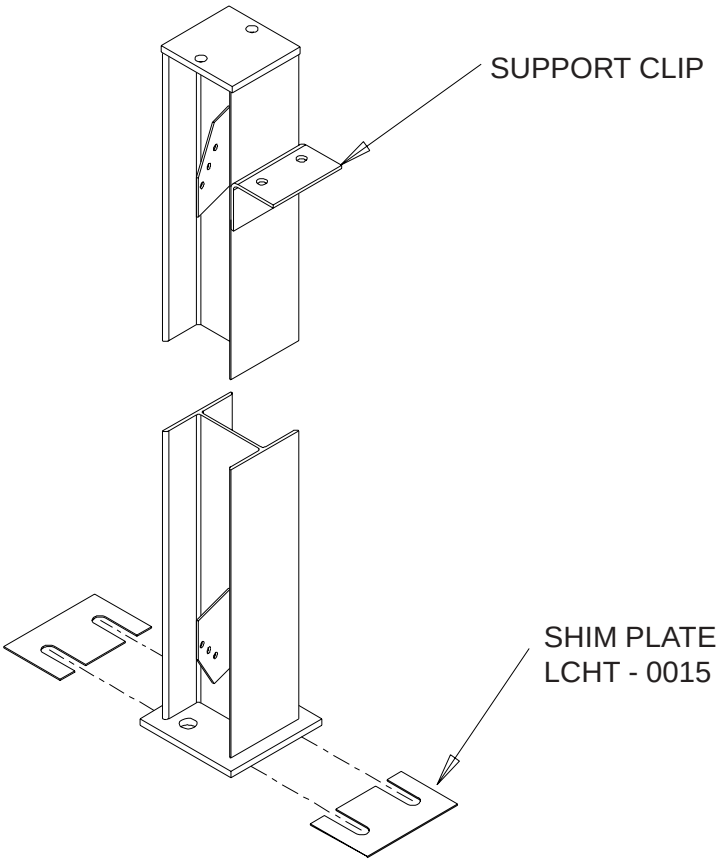


FIGURE #1

HOPPER SUPPORT SYSTEM LAYOUT

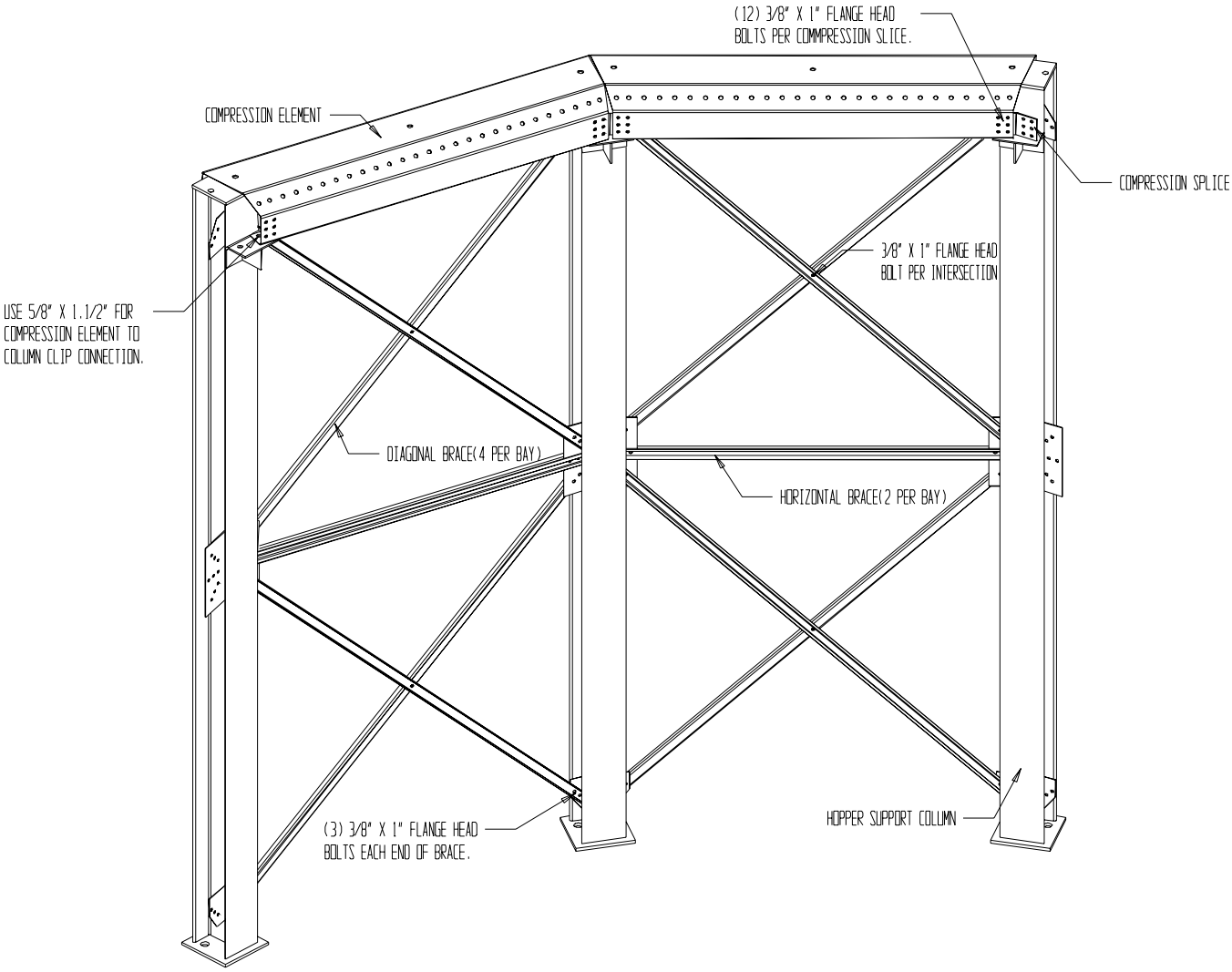


FIGURE #2

Connect hopper support column bracing as depicted in figure 2. Use 3/8" x1" hex flange head bolts for all bracing connections. The horizontal brace consist of 2 formed channels placed back to back. Connect diagonal braces at their intersection with one 3/8" x 1" hex flange head bolt. The compression elements can be placed on the top of the column while the bracing is being installed. To ease construction pre-install a compression splice on the end of each compression element (3/8" x 1" hex flange head bolts). Compression elements are connected to column supports clips with a 5/8" x 1.1/2" hex bolt at each end. The compression element can be connected to column top plate at this time for alignment, however this bolt will have to be removed before the tank is set on the hopper support structure. Connect adjacent compression elements with compression splices.

Begin assembling the hopper bottom by attaching a right and left pair or pairs of hopper panels to the compression angle ring (5/8" x 1 1/2" Hex head bolts) and discharge collar (3/8" x 1" hex flange head bolts) at four opposing points (Refer to figure #3). The left and right hopper panels can be assembled (3/8" x 1" hex flange head bolts) prior to attachment to the compression ring. Caulking is required on the vertical seams of the lapped hopper panels (Refer to detail A). Complete assembly by positioning pairs of right and left hopper panels while moving around in one direction and lapping all sheets in the same way (Refer to detail B). Do not tighen bolts until all hopper panels are attached to each other, the compression ring , and discharge collar. When ready to tighten, start at the bottom of the hopper and tighten all bolts. This will include hopper panels bolts, hopper collar bolts, compression ring bolts, compression splice bolts, column bracing bolts, and anchor bolts.

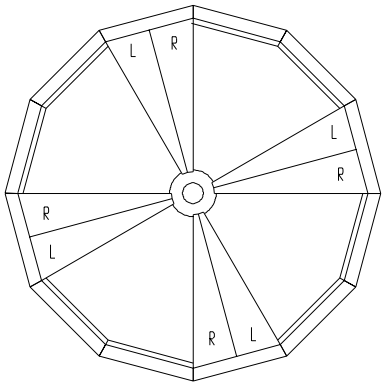


FIGURE #3
HOPPER PANEL AND DISCHARGE COLLAR ASSEMBLY

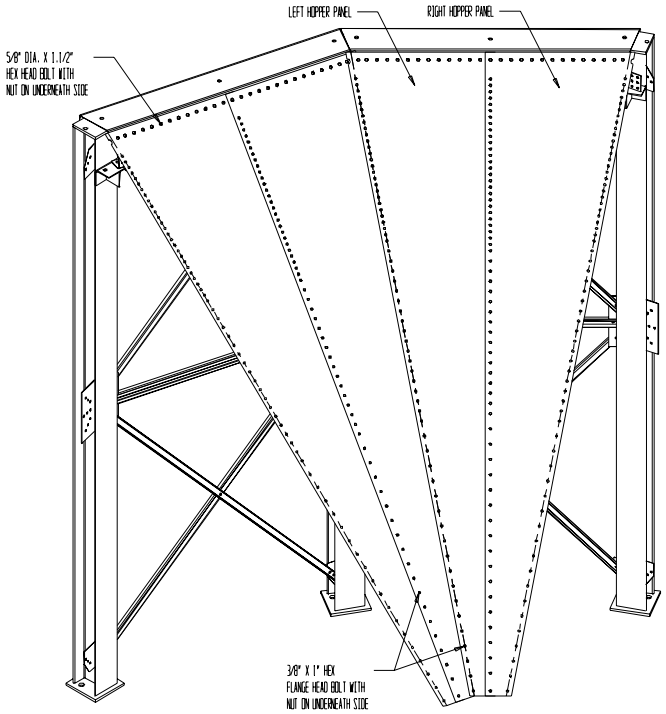
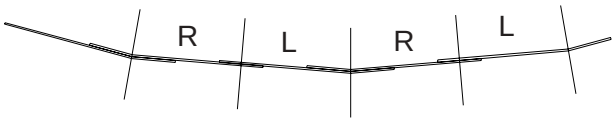
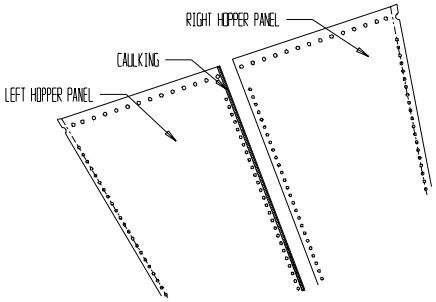


FIGURE #4
HOPPER PANEL DETAIL

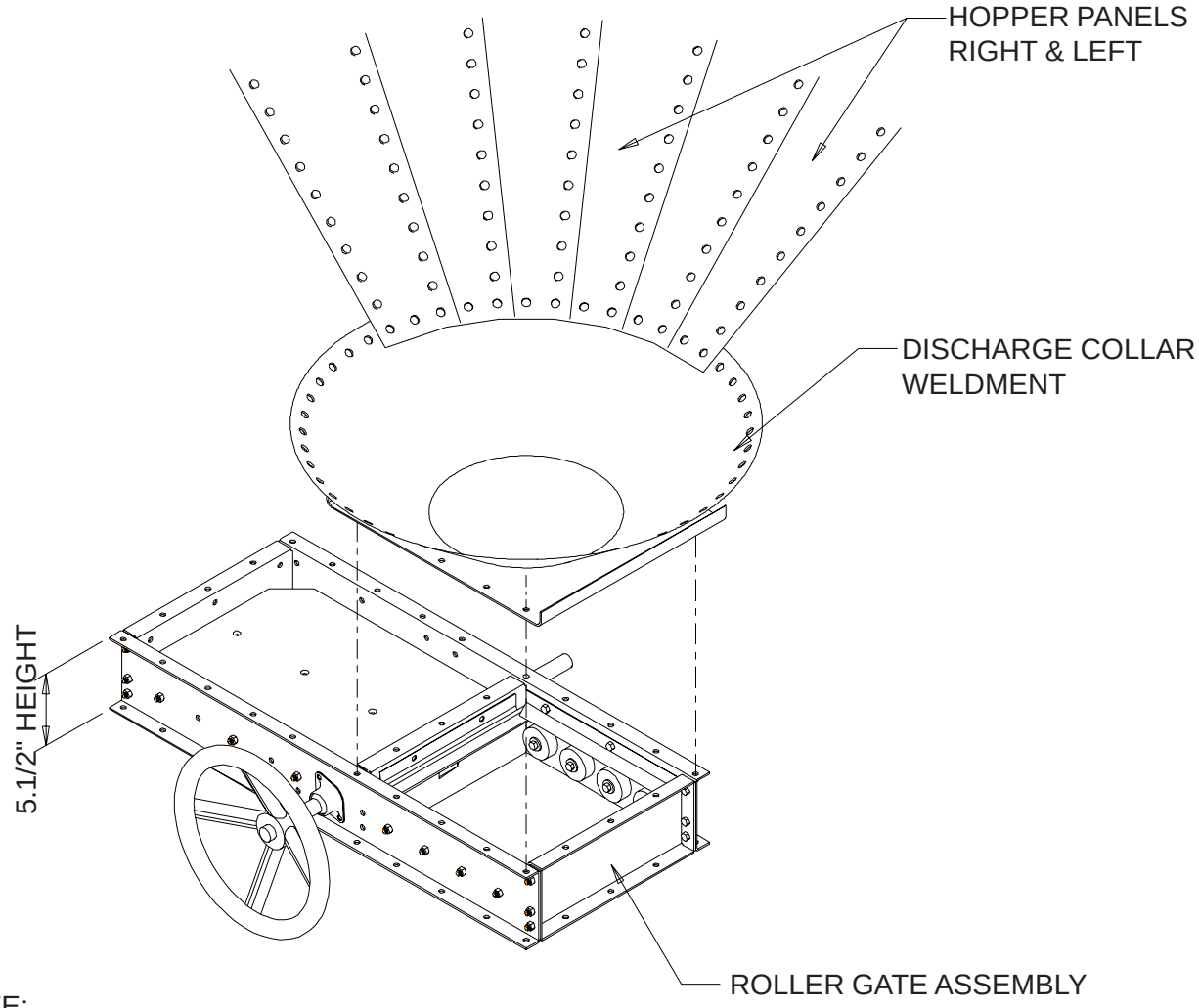


DETAIL B
LAP DETAIL
(VIEWED FROM INSIDE OF BIN)



DETAIL A
CAULKING DETAIL

If a rack and pinion gate is purchased, install as shown in Figure #5 using 5/16" x 3/4" hardware.

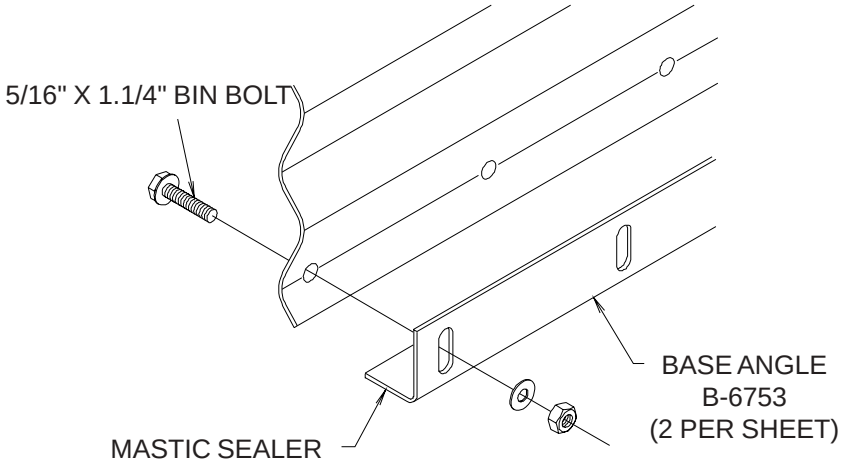


NOTE:
TOP EXTENSION PLATE MAY HAVE TO BE LOOSENED PRIOR TO DISCHARGE COLLAR CONNECTION.

FIGURE #5
HOPPER DISCHARGE COLLAR TO ROLLER GATE

BASE ANGLE INSTALLATION

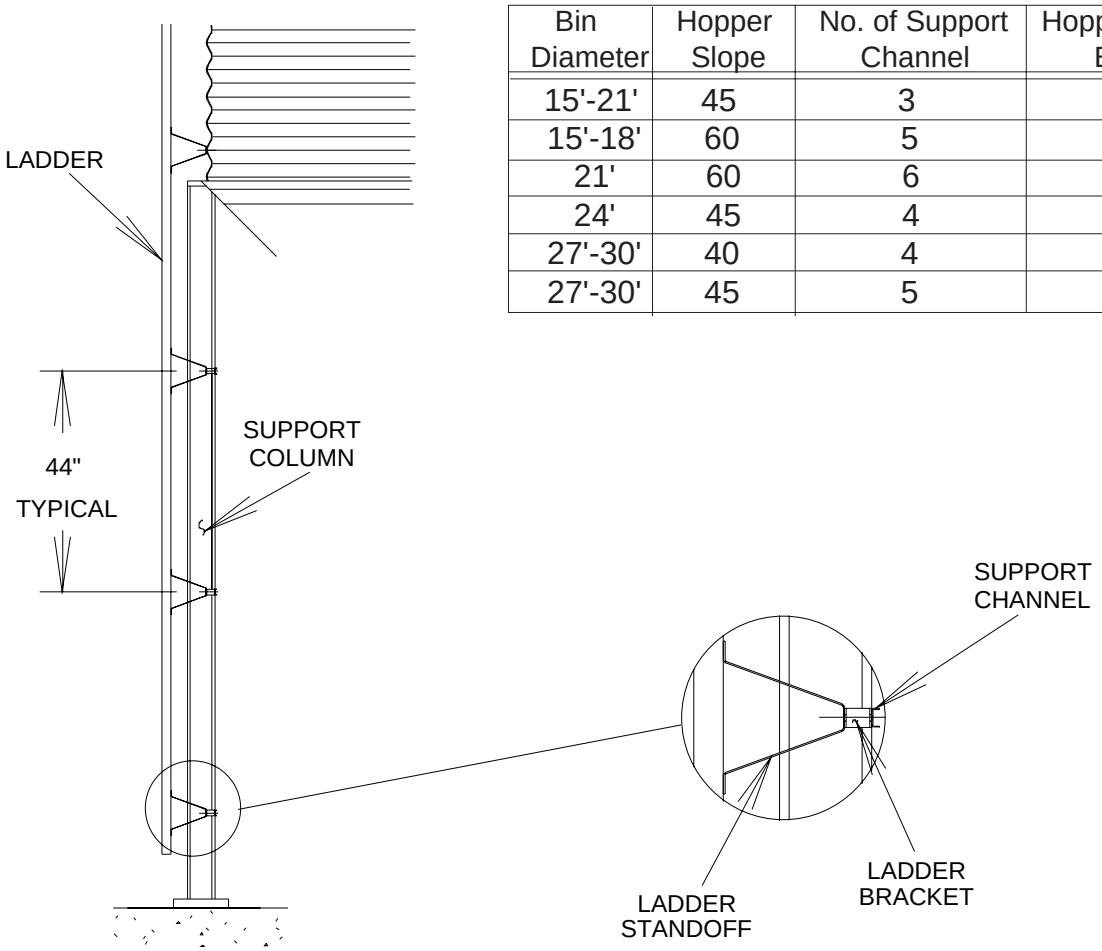
It is recommended that tanks without a rolled lip on the base ring, use a base angle.

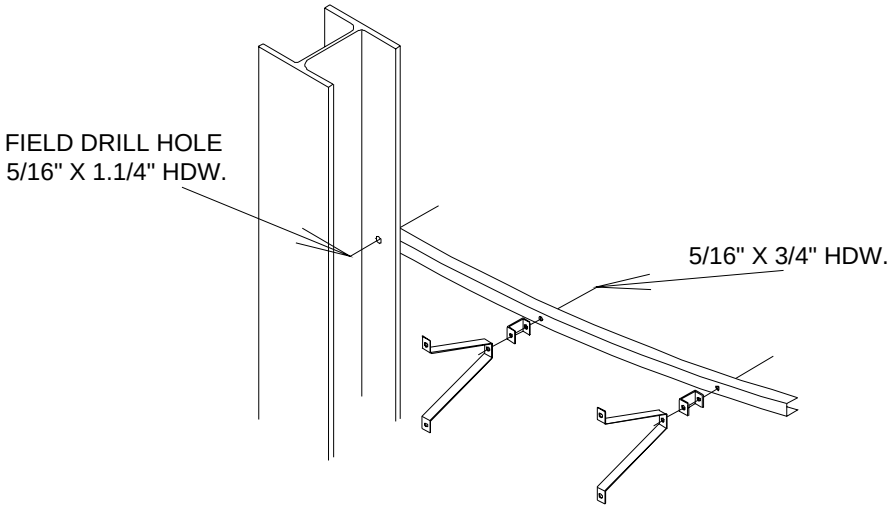


NOTE: THE BASE ANGLE WILL OBSTRUCT THE TWO SMALLER HOLES IN THE BASE PLATE OF THE BOTTOM STIFFENER. THE BASE ANGLE MUST BE NOTCHED IN THESE LOCATIONS TO ALLOW THE TANK TO BE BOLTED TO THE HOPPER STRUCTURE.

HOPPER LADDER SUPPORTS

Bin Diameter	Hopper Slope	No. of Support Channel	Hopper Ladder Brackets
15'-21'	45	3	6
15'-18'	60	5	10
21'	60	6	12
24'	45	4	8
27'-30'	40	4	8
27'-30'	45	5	10





LADDER SUPPORT DETAIL

HOIST INSTRUCTIONS

RECOMMENDATIONS FOR HOISTING COMPLETED
TANK ONTO HOPPER BOTTOM STRUCTURE.

(ALL PARTS MENTIONED IN THIS SECTION ARE **NOT** FURNISHED)

A crane is normally used to lift the tank and place it on top of the substructure. Technique of Hoisting of the complete tank on the hopper structure is in large part based on personal experience, equipment and manpower. The following recommendations are intended as a guideline only.

1. Before lifting the tank the following should be checked:
   a. The columns and substructure should be checked for levelness and verified plumb and leveled if necessary.

   b. Final ladder and safety cage and door locations should be determined and clearance at these locations verified.

   c. Proper provisions should be made for safe working platforms around the top of the substructure.

2. Lifting technique are largely influenced by personal experience and equipment capacity however general recommendations as follow:

   a. Lifting brackets should be attached to the stiffeners. At least one bracket per sidewall sheet should be used. These would typically be attached in the third ring from the bottom of the tank. Brackets should attach to a minimum of four (4) bolts through the stiffener. Attach cables to the lift brackets and to the crane hook, which has been lowered through the center ring opening. Cables should be sized to handle the entire weight of the bin. Make all lift cables of equal length before the bin is lifted. Reference Figure #7 & #8.

   b. To prevent distortion of the assembled tank a "spider" or horizontal bracing is recommended. A suggested method of this is illustrated in the following details. This may be done by using a center "hub" and pipe. The center hub would typically be made of 6" schedule 40 pipe with 3" x 3" x 3/8" angle welded to it and the pipe bolting to the hub. The second smaller pipe would bolt to the lifting brackets attached to the stiffeners (Reference Figure #9). Typical number of horizontal member that would be used are:

Recommended minimum number of lift brackets

Diameter	No. of Brackets
12'	4
15'	5
18'	6
21'	7
24'	8
27'	9
30'	10

Recommended number of horizontal braces

Diameter	No. of Braces
21'	3
27'	3
12'	4
24'	4
15'	5
30'	5

   c. Use of temporary bracing across the peak collar may be needed to guide the cable. This should be made easily removable.

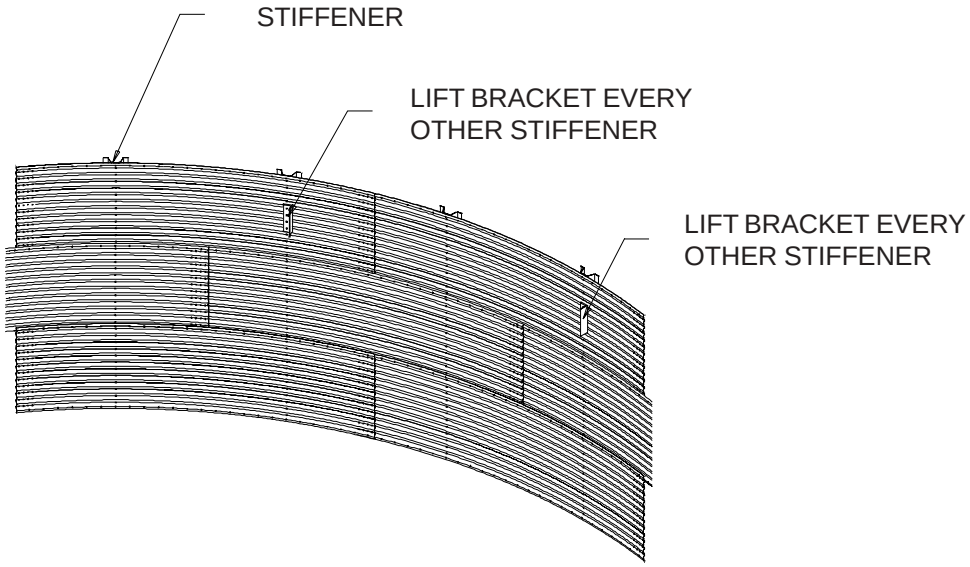


FIGURE #7

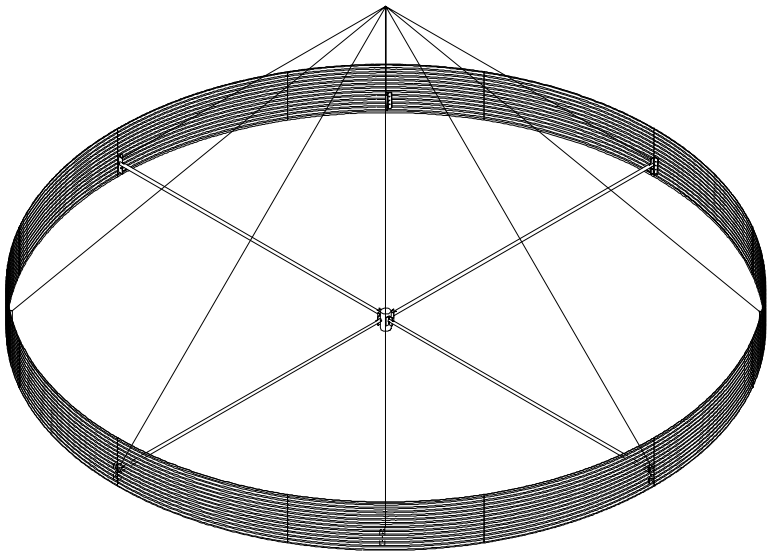


FIGURE #8

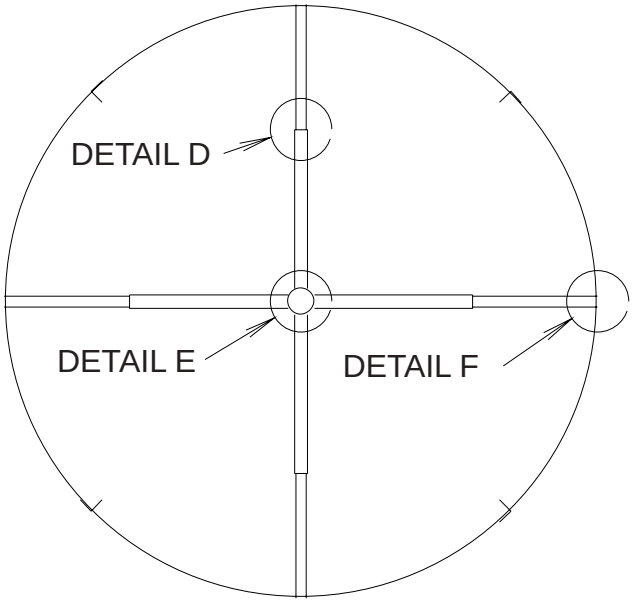
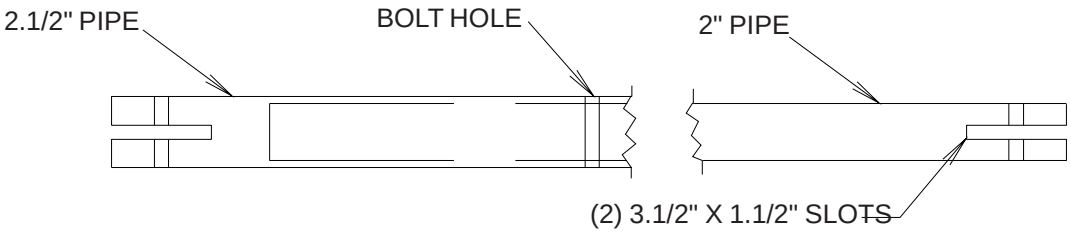
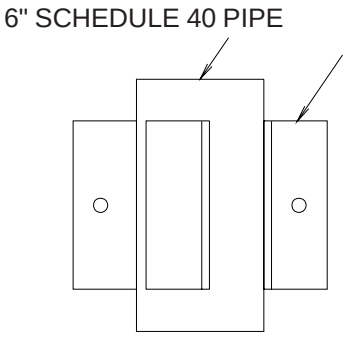


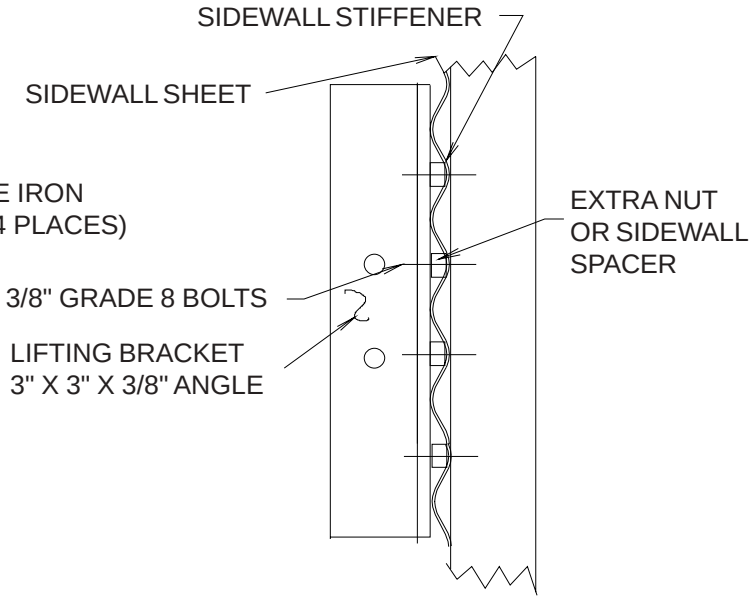
FIGURE #9



DETAIL D



DETAIL E
HUB ASSEMBLY



DETAIL F
SIDEWALL SUPPORT ANGLE

3. Before setting tank on hopper structure, make sure poly base sealer has been applied to bottom lip of tank base angle. Set tank on hopper compression ring and align the holes in stiffener base plates with the holes in the compression ring. Bolt stiffener base plate, compression ring, and support column top plate with two 5/8" x 2.3/4" hex head bolt per stiffener. Shim all stiffener base plates with a base angle shim plate. Column / stiffener shims can be used to shim stiffener base plates when needed. Align 4" bin hold down with hole in center of compression element and attach with 5/8" x 1.1/2" hex head bolt. Field drill six 3/8" dia. holes in tank sidewall to match pattern in bin hold down. Bolt sidewall to hold with 5/16" dia. bin bolt. (Reference figure #10).
4. After tank is secured remove the spider or horizontal bracing.

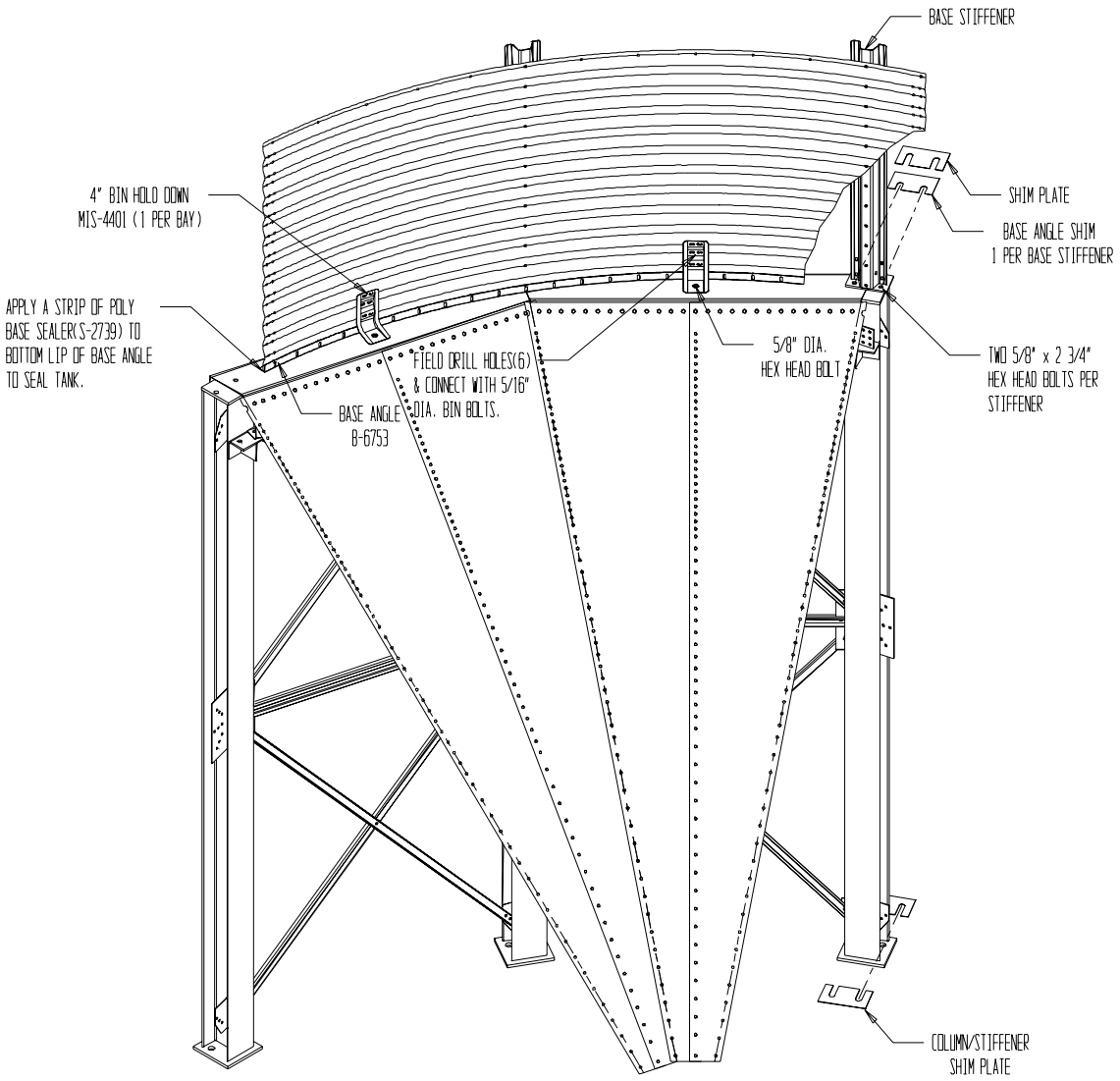


FIGURE #10

Major Changes from the last printing Are Listed Below:

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