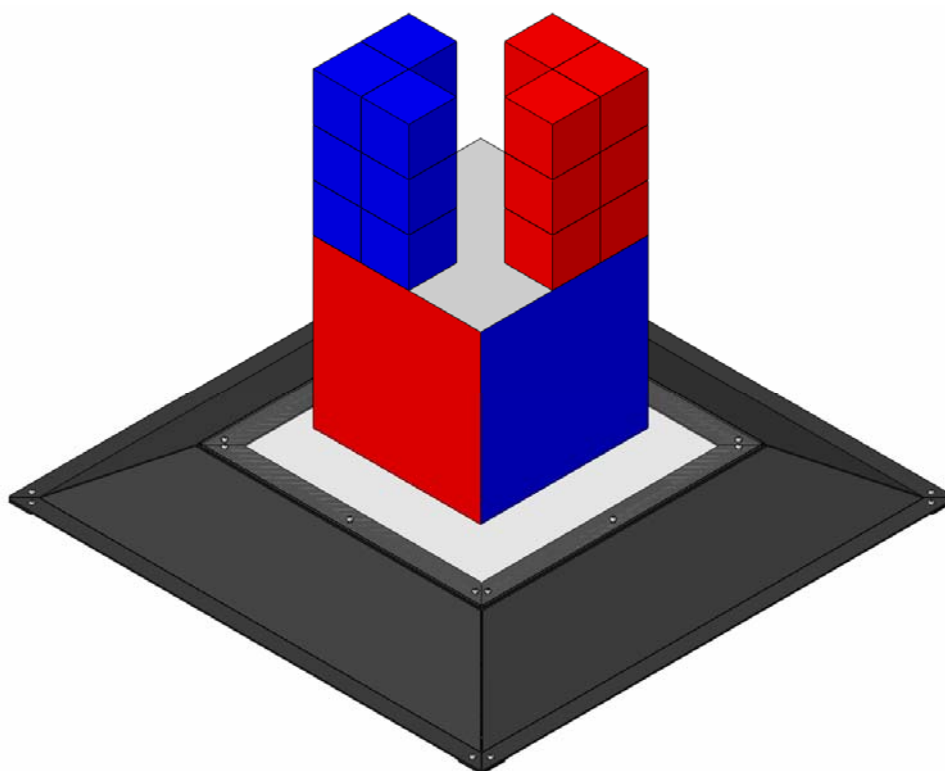


## Field Specs & Assembly Instructions



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APPENDIX

## Game Field

### Introduction

This document will provide detailed specifications, BOM information, and assembly instructions for the “*Elevation*” Official Competition Field.

Teams who do not need an “official” field should refer to the separate low-cost field guide for cost-reduction options.

Please note: this field utilizes the VL-FIELD competition field frame developed by VEX Robotics. Instructions and specifications for this field perimeter are available in a separate document, and are also important for the *Elevation* field assembly.

This document is divided up into four sections:

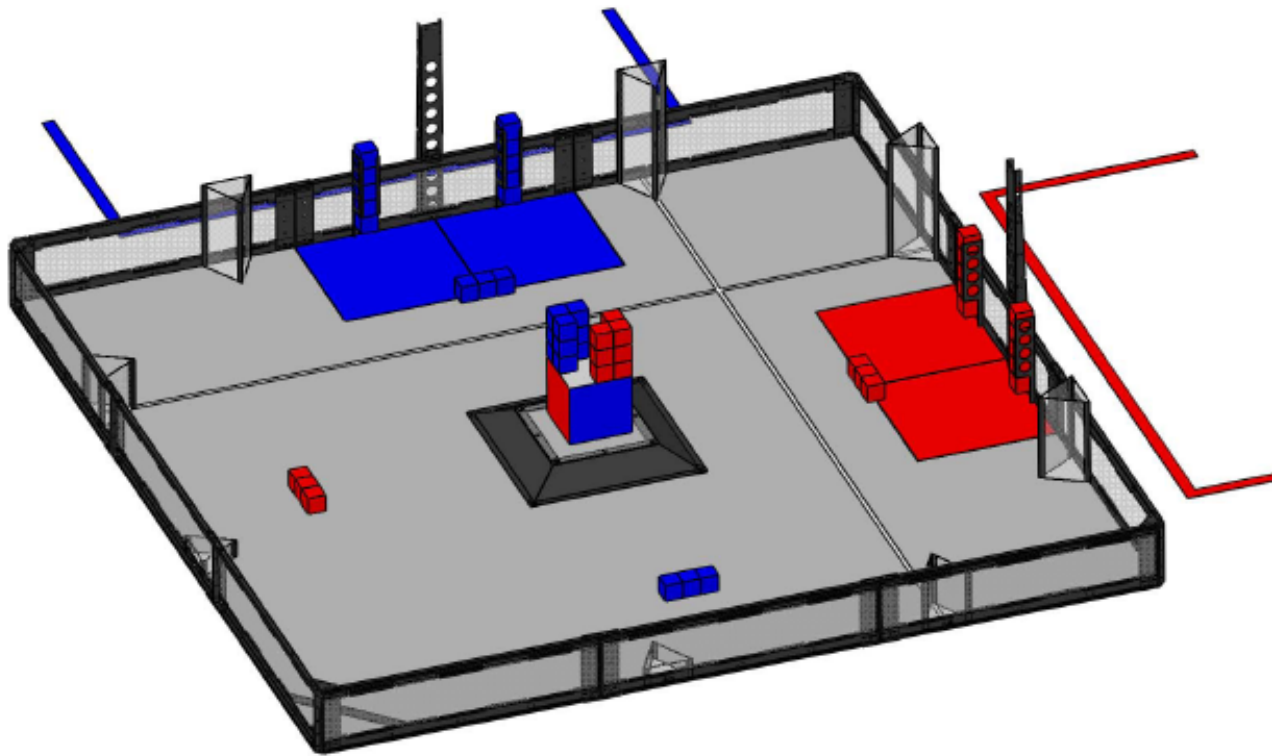
1. Field Overview
2. Field Bill of Materials
3. Field Specifications
4. Field Assembly Instructions

There is also an accompanying SolidWorks eDrawing Viewer file, which shows the field as a 3D solid model. Designers can take dimensions directly off this model if they require an additional level of detail not provided in this document. This eDrawing Viewer file is a self contained executable which will open on most computers without any CAD software.

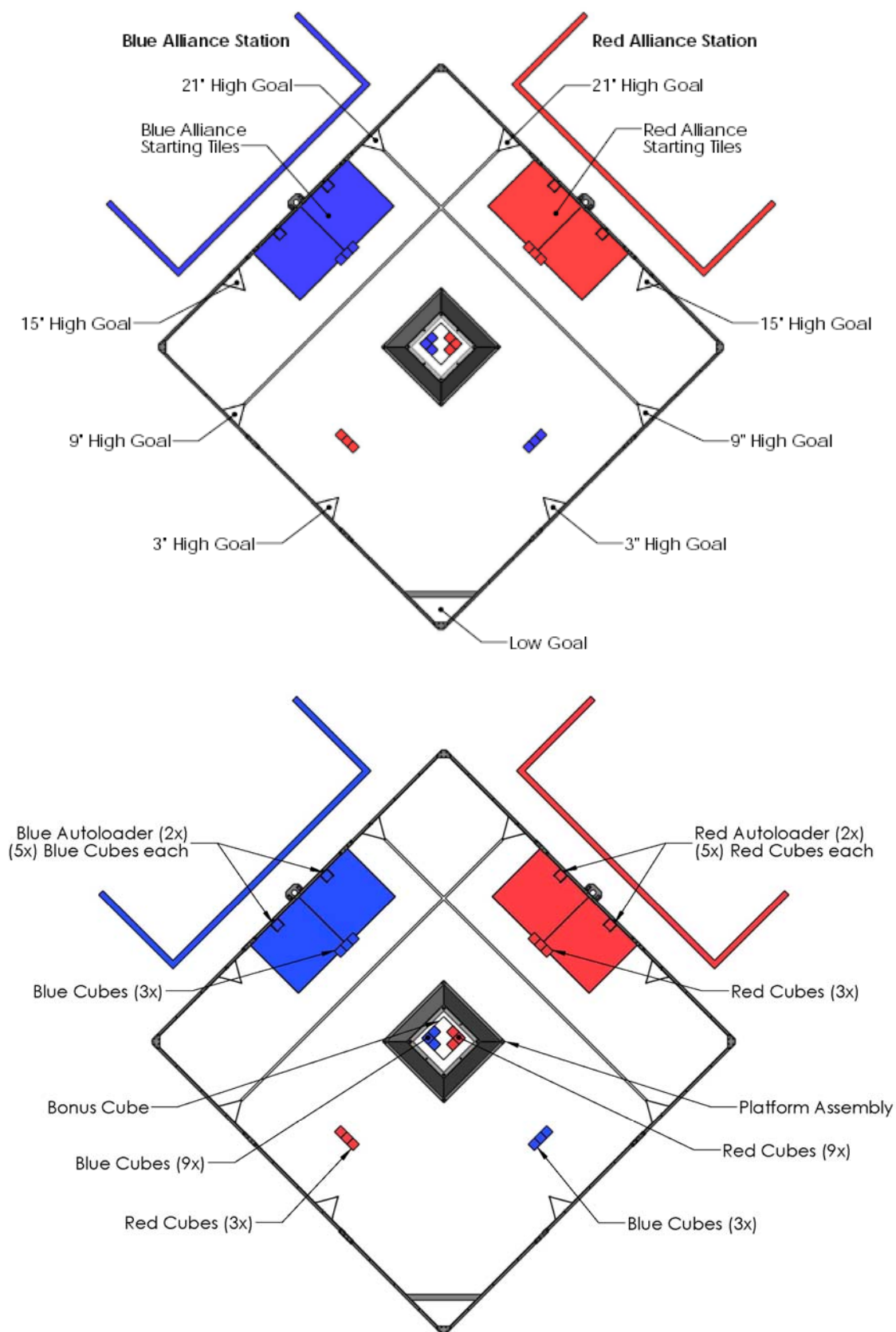
For additional game-play detail, please refer to the “*Elevation*” competition manual.

## Field Overview

The game “Elevation” is played on a 12 ft x 12 ft foam-mat, surrounded by a sheet-metal and lexan perimeter. There are eight triangular goals of four different heights spread around the perimeter of the field. The game is played by scoring foam cubes into these trough sections. There is also a platform at the center of the field which robots can climb onto. For more details and specific game-play rules, please refer to the Elevation Competition manual.



# VEX Robotics Competition - *Elevation*



# Game Objects & Field Bill of Materials

All these items are available for purchase from:

[www.VEXROBOTICS.com](http://www.VEXROBOTICS.com)



## Generic Field Elements - Reuseable Each Year

Part Number	Description	Price
VL-FIELD-FRAME-KIT	VRC Field Perimeter Frame & Hardware	\$ 749.99
FIELD-TILES	VRC Foam Field Surface - (36) Grey, (2) Red, (2) Blue Tiles	\$ 189.99
VL-FIELD-CONTROLLER	VRC Field Controller	\$ 199.99

**Total Price** \$ 1,139.97

## Additional "Large Event" Field Elements

Part Number	Description	Price
VEX-COMPETITION-CRYSTAL-KIT	Full Set of 27 Mhz Competition Radio Crystals	\$ 249.99

*Available by phone only, call (903) 453-0802 for availability.*

**Total Price** \$ 249.99

## Official *Elevation* Specific Elements

Part Number	Description	Price
VRC-ELEVATION-COMP	ALL Official <i>Elevation</i> Field & Game Objects	\$ 399.99

(8) Lexan High Goals  
 (1) Full Platform Assembly  
 (4) Autoloader Assemblies  
 (1) Roll 2" Wide Black Gaffers Tape  
 (1) Roll 3/4" Wide White Electrical Tape  
 (30) Red & (30) Blue Cubes  
 (2) Bonus Cubes - (1 Spare)  
 (40) Red & (40) Blue Robot Identification Flags

**Total Price** \$ 399.99

## Practice Elements

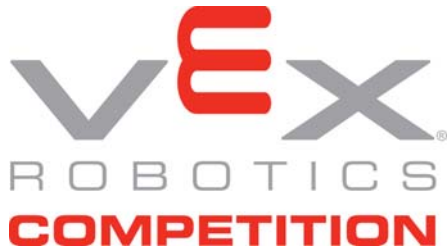
Part Number	Description	Price
VRC-ELEVATION-PRAC	<i>Elevation</i> Practice Kit	\$ 79.99

*This kit includes Low Cost versions of the Field Elements and a sampling of Game Objects. It has everything a team needs to prototype & get started practicing Elevation.*

**Official VEX Robotics Competition Event Partners are eligible for a discount on field purchases.**

**Contact [events@vexrobotics.com](mailto:events@vexrobotics.com) for more information!**





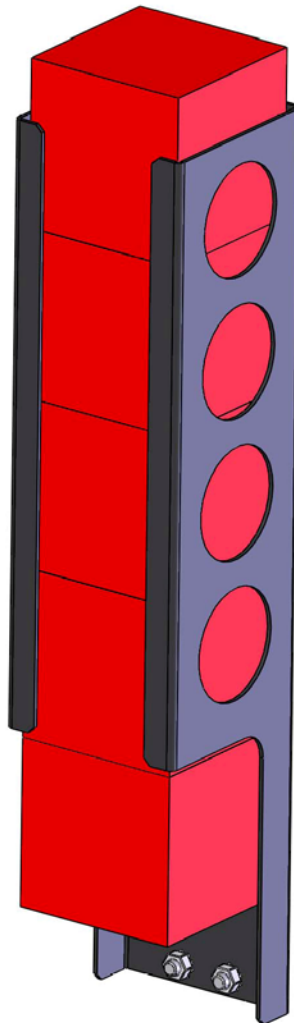
# Field Specifications

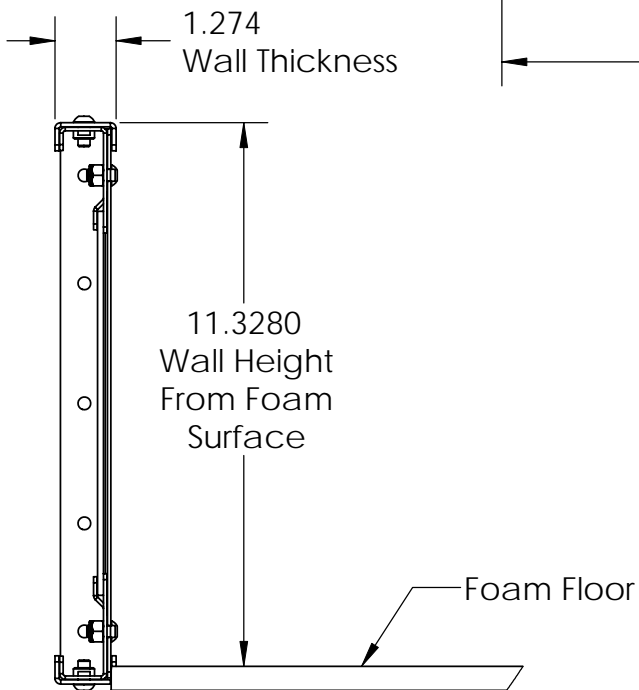
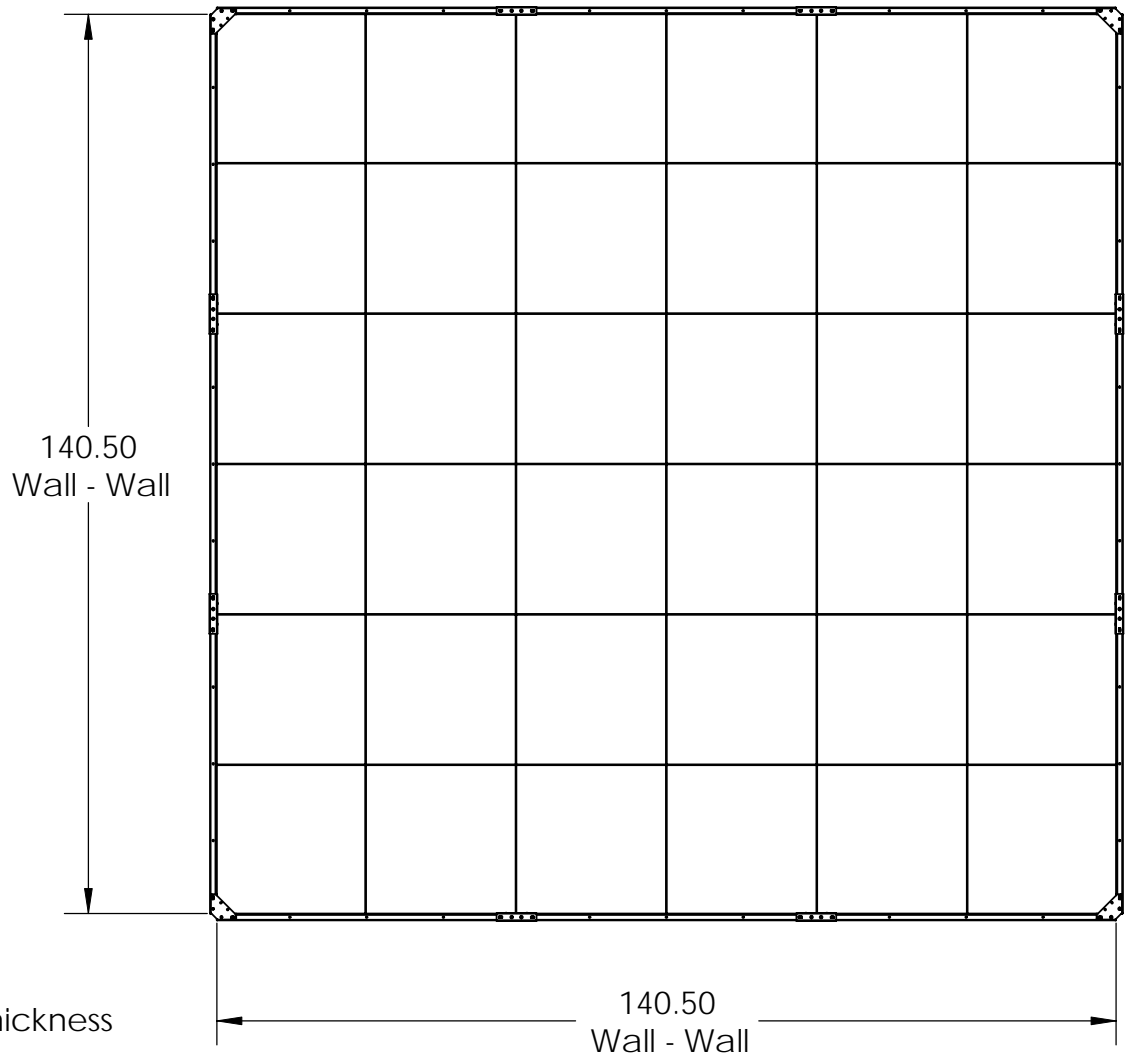
## Introduction



This section will outline the specifications which are most important to teams designing a robot to compete in the VEX Robotics Competition - *Elevation*. Though many of the critical dimensions are included in this section, it may be necessary to consult the separate assembly guide and 3D-CAD models of the field for an additional level of detail.

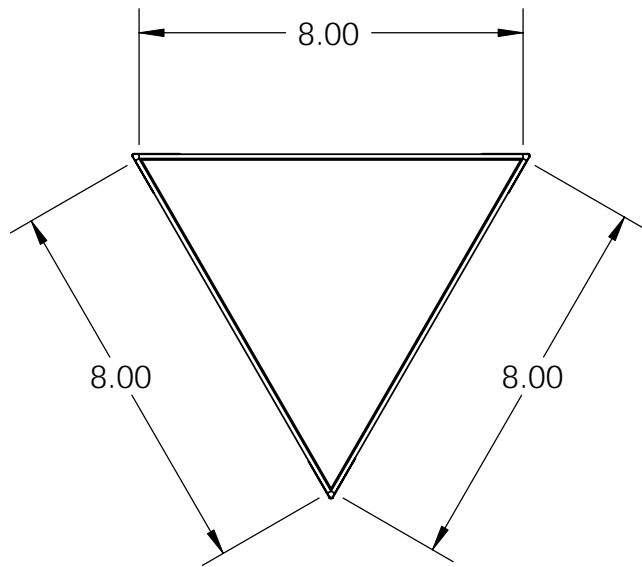
Field components may vary slightly from event to event. This is to be expected; teams will need to adapt accordingly. It is good design practice to create mechanisms capable of accommodating variances in the field and game pieces.



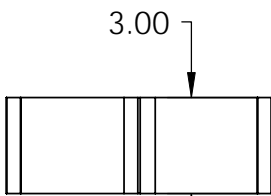


**Field Critical Dimensions:**

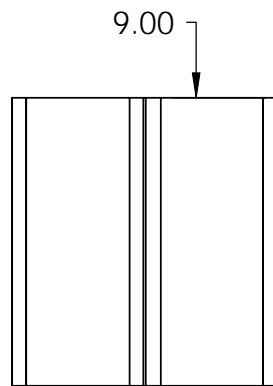
- ~140.5" Square Wall-Wall, Inside
- 11.328" Wall Height
- 1.27" Wall Thickness



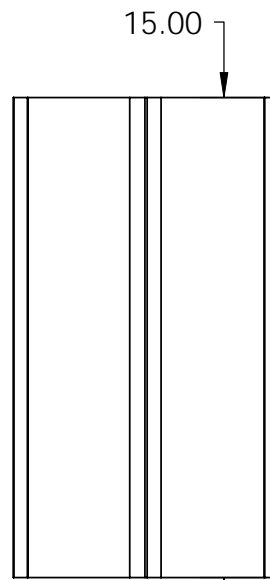
There are (4x) types of High Goals on the field. These goals are similar, except they vary in height as shown.



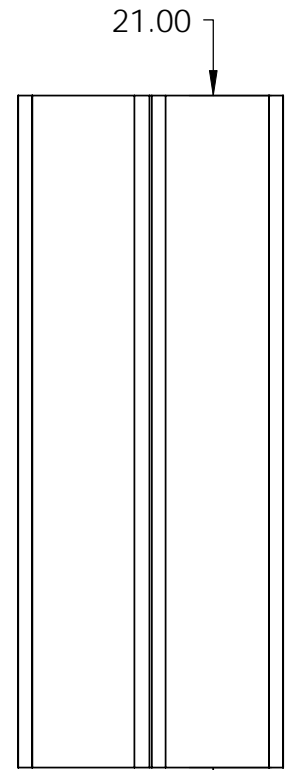
3"High Goal



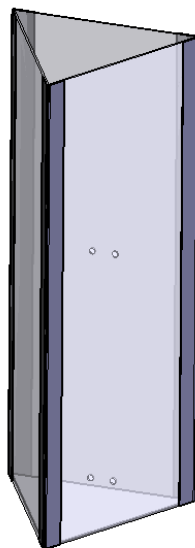
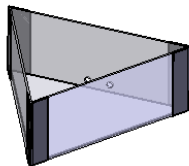
9" High Goal



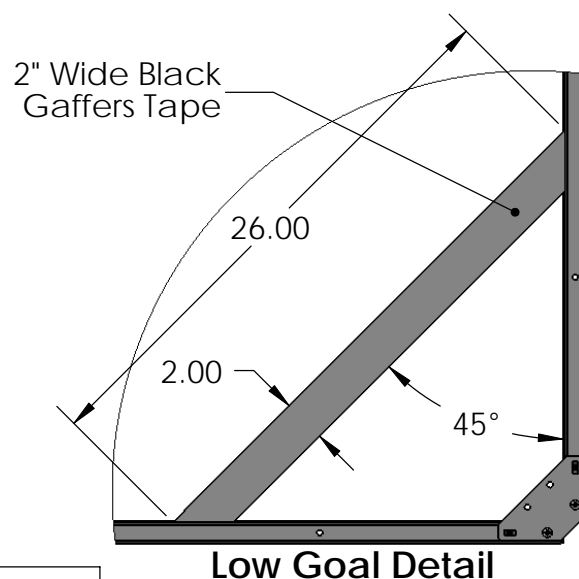
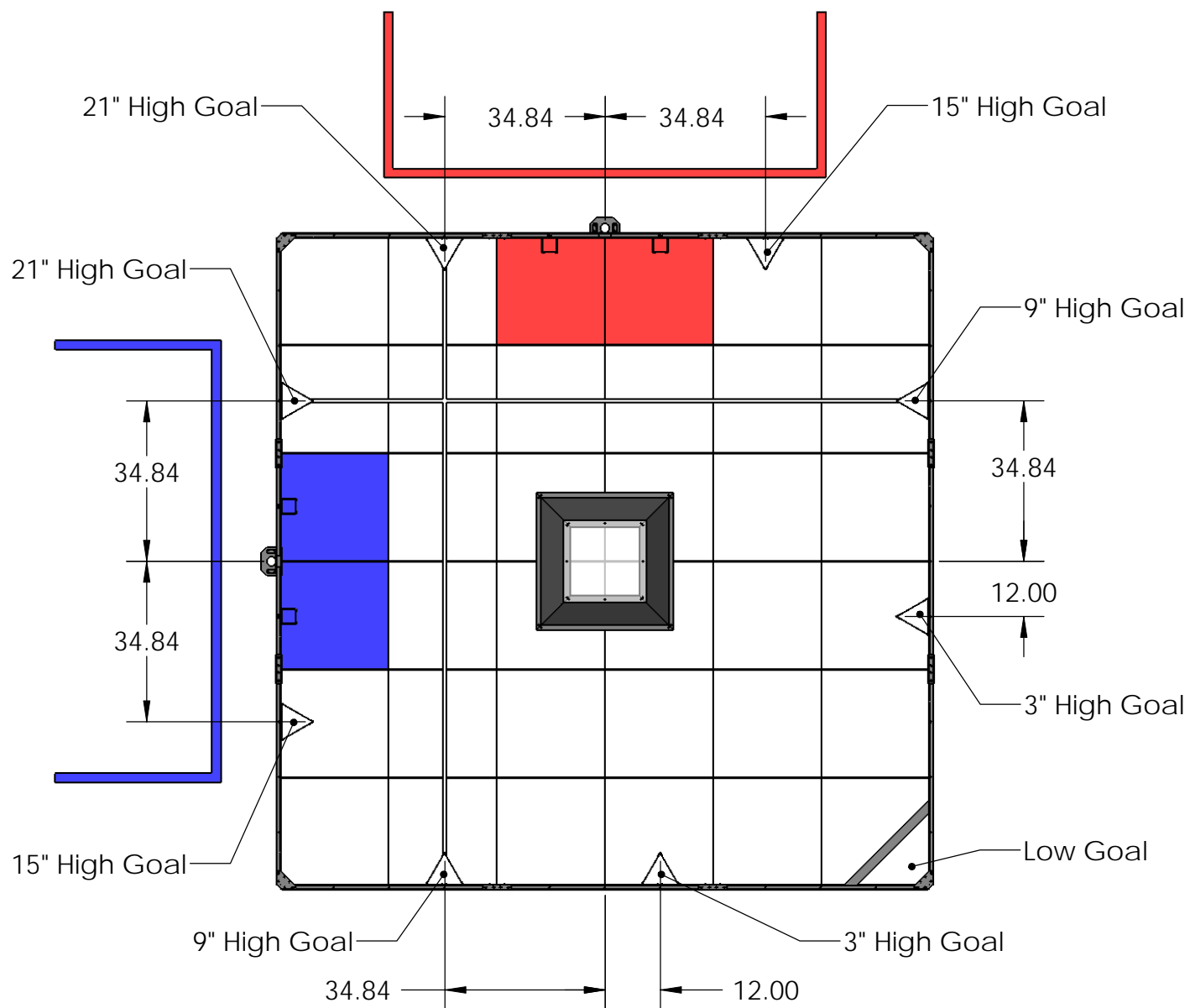
15"High Goal



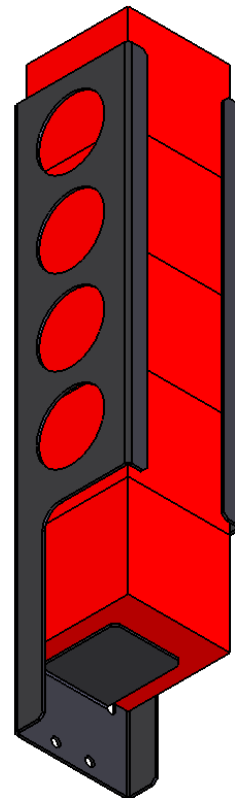
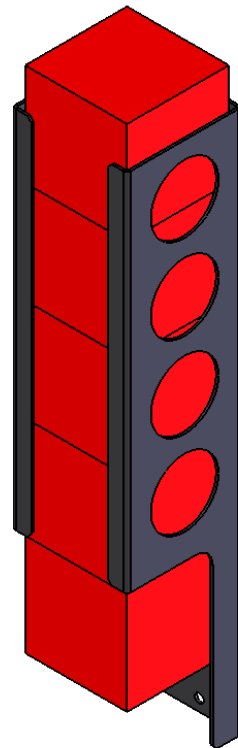
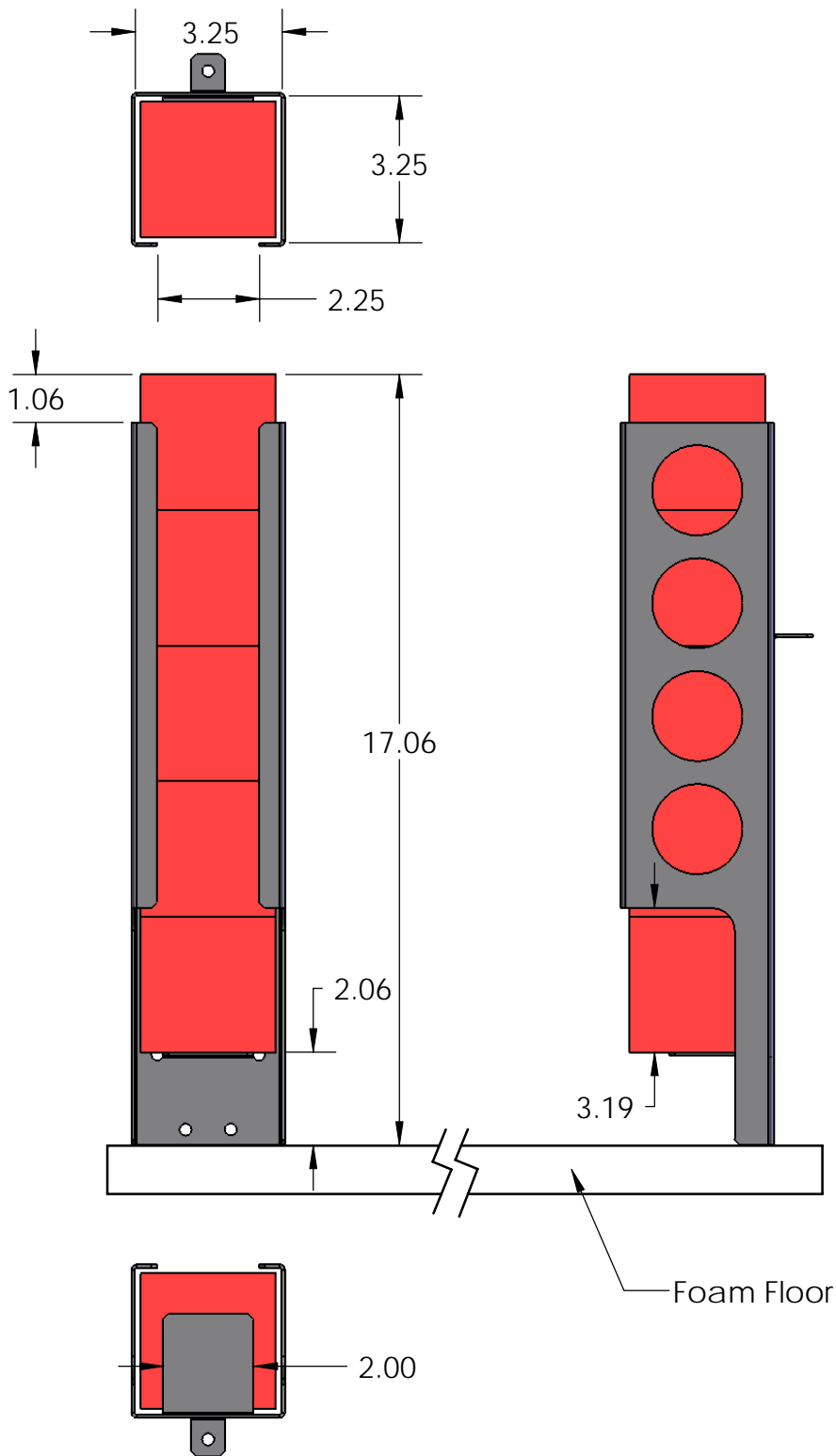
21"High Goal








Low Goal Detail



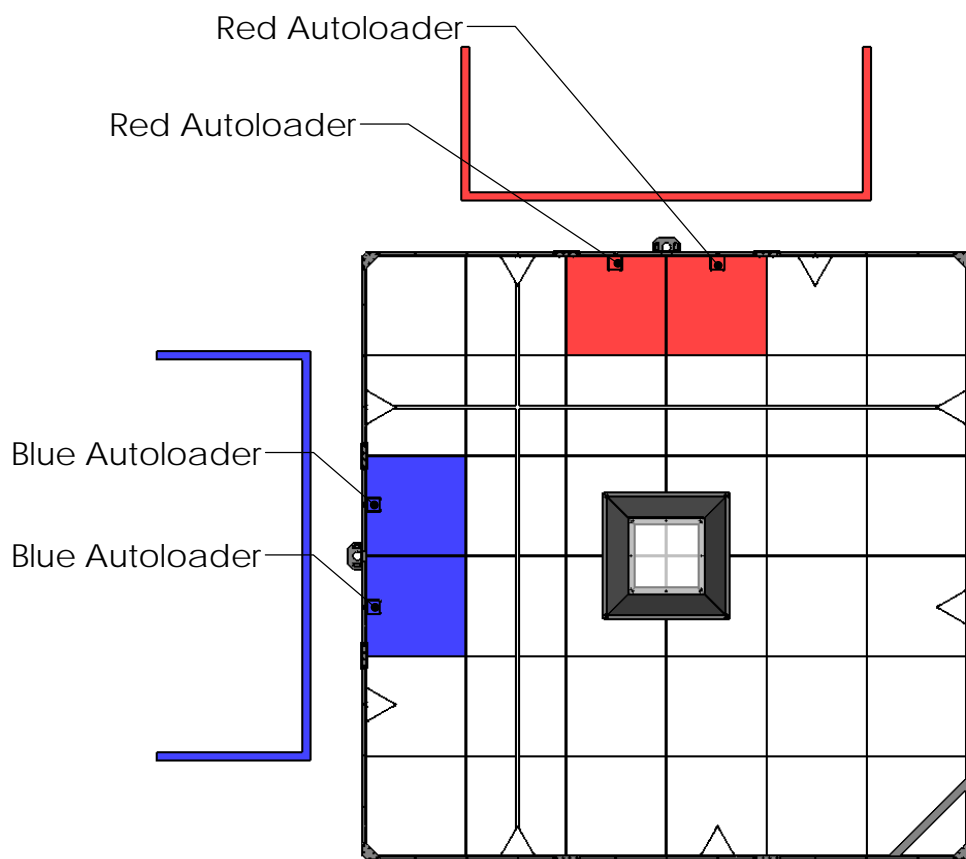
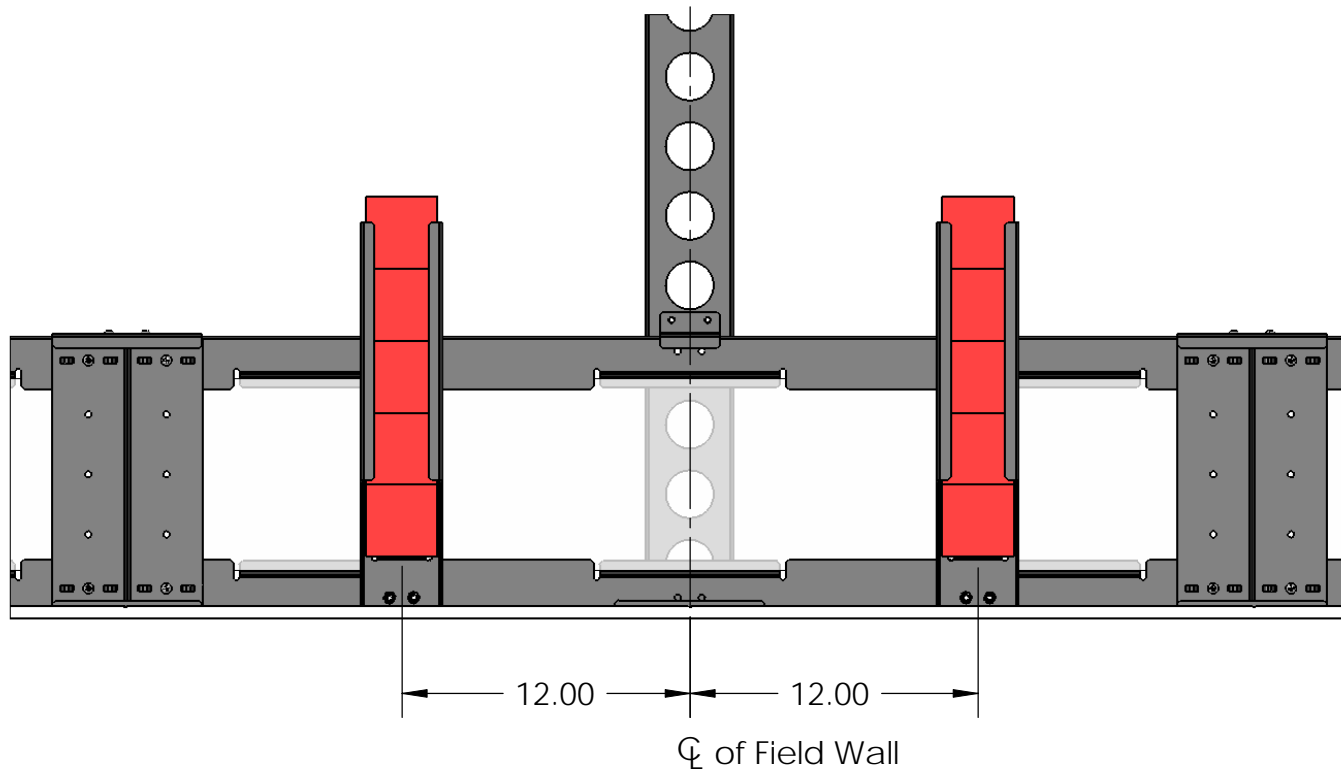
Note: When mounted on the Field Perimeter, the bottom of the Autoloader is flush with the top of the Foam Floor Surface (as seen above).

	Description Autoloader Specs	
	Dwg No VRC09-FIELD-SPECS	
	Competition VRC - Elevation	Sheet 4 of 9
	Release 8/16/2008	ALL DIMENSIONS ARE IN INCHES.

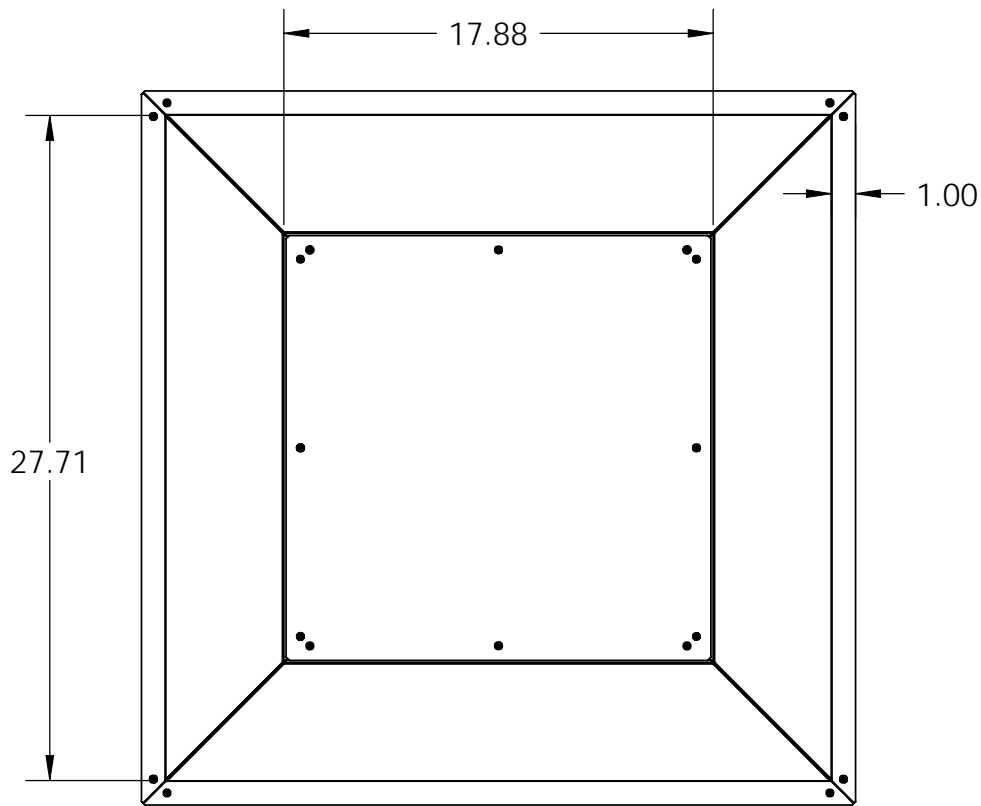
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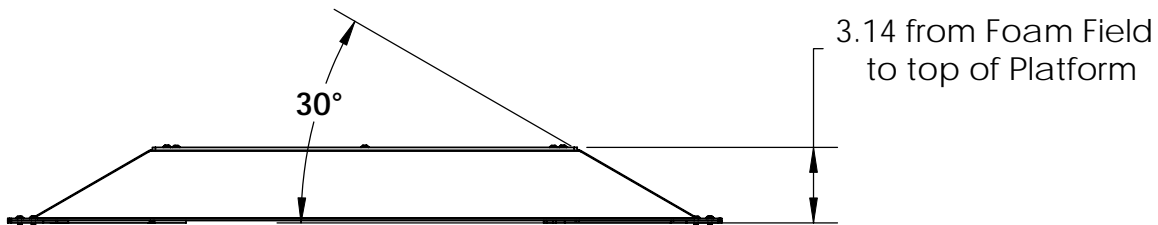
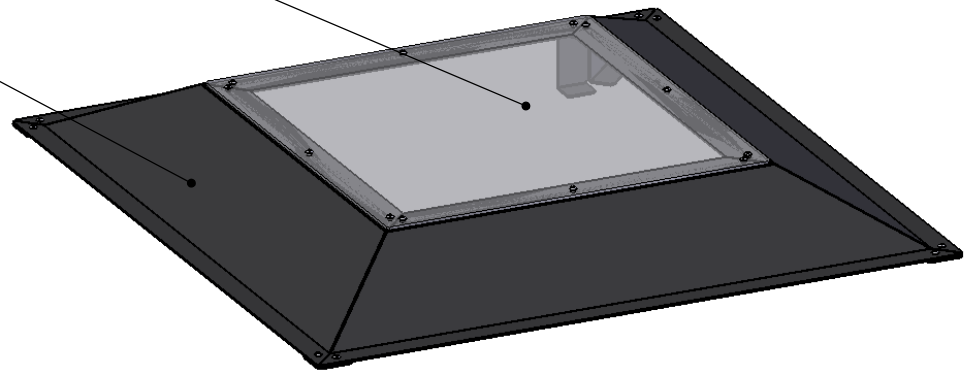


Autoloader with (5x) Blue Cubes loaded



Lexan Platform Surface  
(Plastic)

Powdercoated Steel  
(Textured Paint)



Note: In several locations the screws used to assemble the platform stick up above it's surface. Teams should not assume the platform will be smooth.

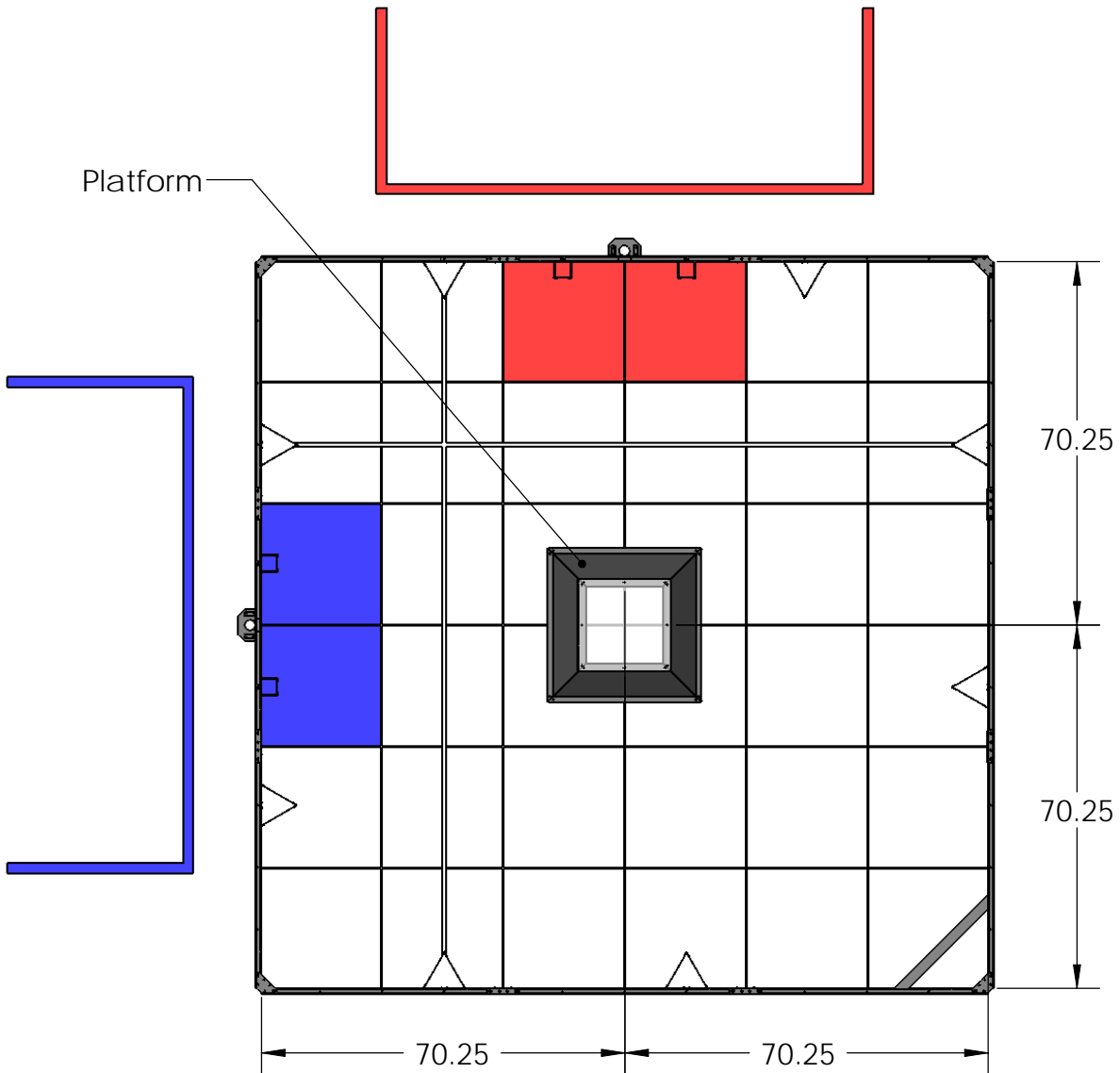


Description	Platform Specs		
Dwg No	VRC09-FIELD-SPECS		
Competition	VRC - Elevation	Sheet 6 of 9	
Release	8/16/2008	ALL DIMENSIONS ARE IN INCHES.	

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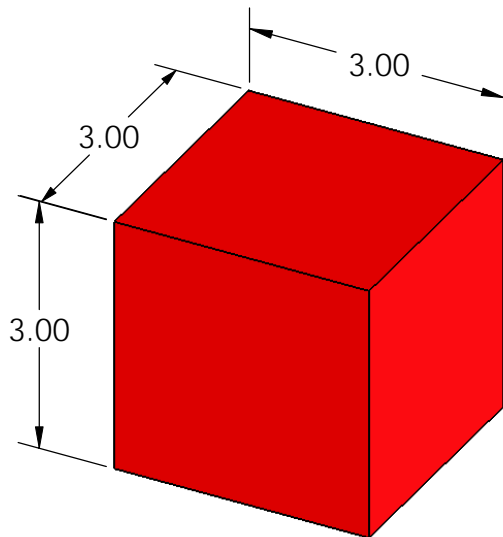
**Innovation First**



Platform Assembly is centered on the field, and placed in the orientation shown.

It is not anchored in place and may slide a small amount during normal gameplay.

Platform Assembly weighs approximately 30 lbs.



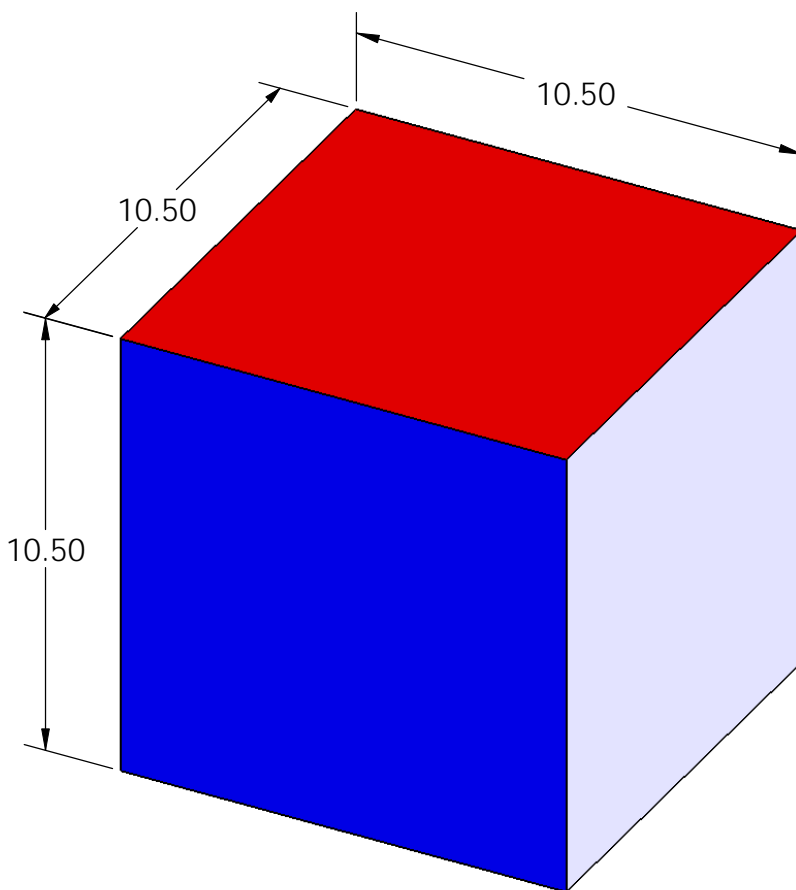
Cubes are constructed of foam.  
Foam is a 2 lb/ft dense crosslinked foam sheet, cut to custom size.

Foam is similar in composition to that of the VEX Foam Field Tiles.

When pressure is applied they will deform, then spring back to their original shape when pressure is removed.

Each cube weighs ~ 0.03 lbs.

Cubes are available in Blue & Red.

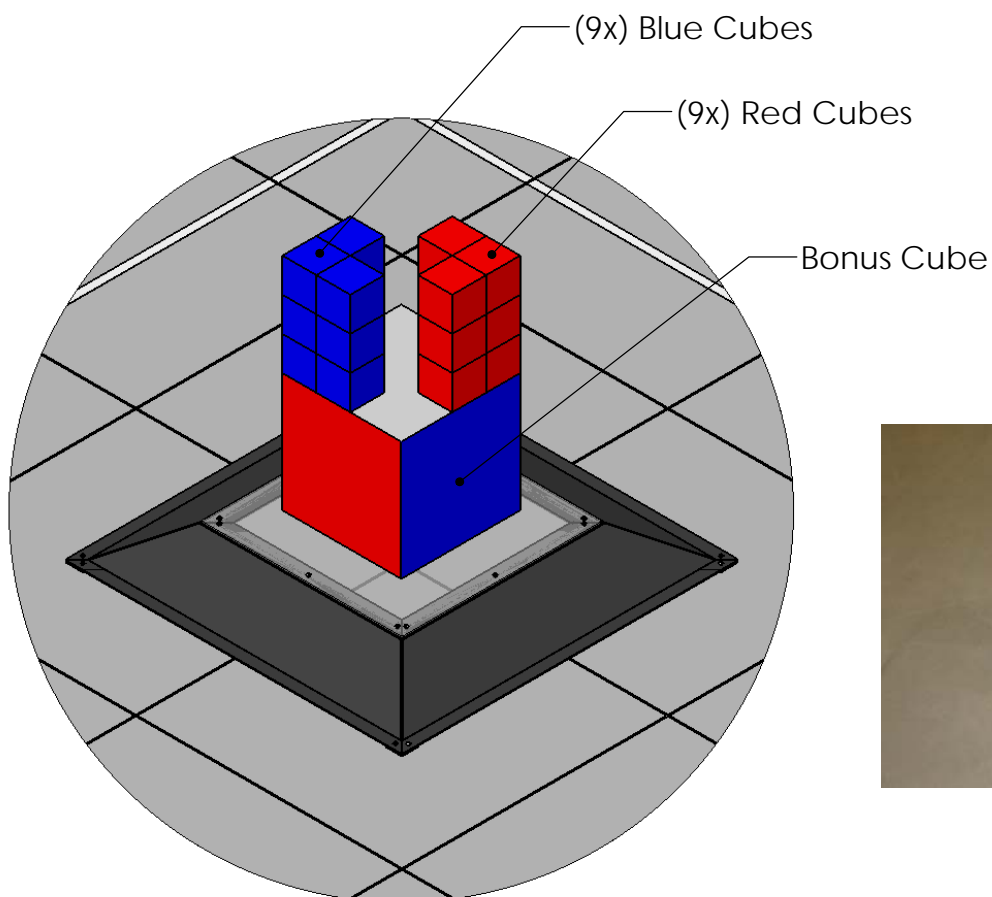
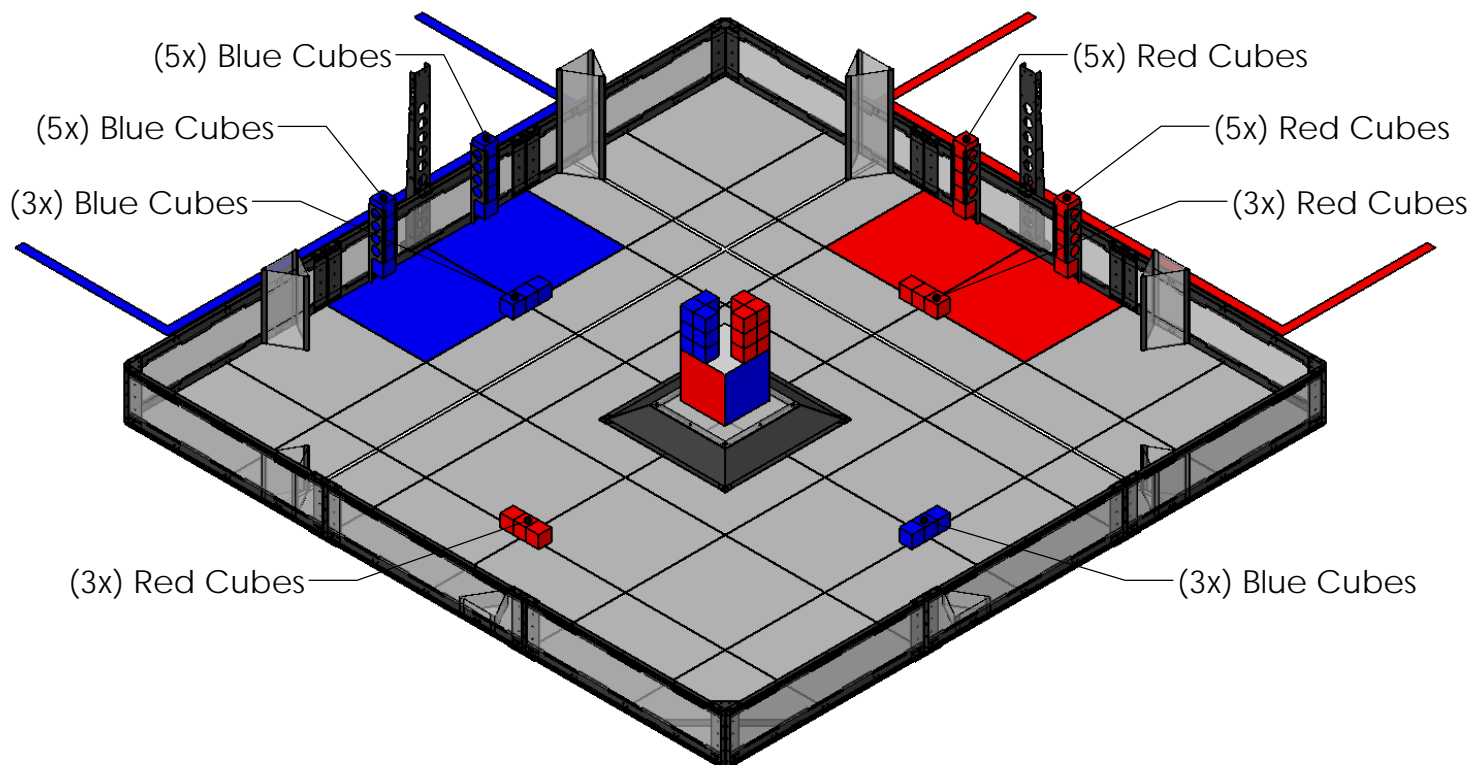


Bonus Cubes are constructed from 200 lb c-flute cardboard.

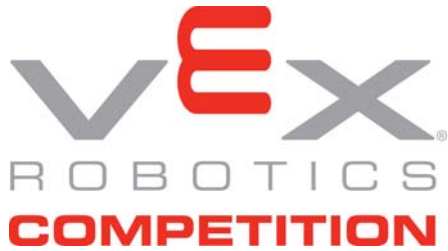
Each cube weighs ~0.94 lbs.

Each Bonus Cube has (6) Sides -  
(2) Red, (2) Blue, (2) White.  
Opposing sides are the same color.

**Note:** Cube dimensions may vary by as much as  $\pm 1/8"$ .  
Teams need to design accordingly.  
It is always a good idea to create mechanisms that can accomodate variation in game objects.



(3x) Blue Cubes on the Foam Field Surface in Starting Position

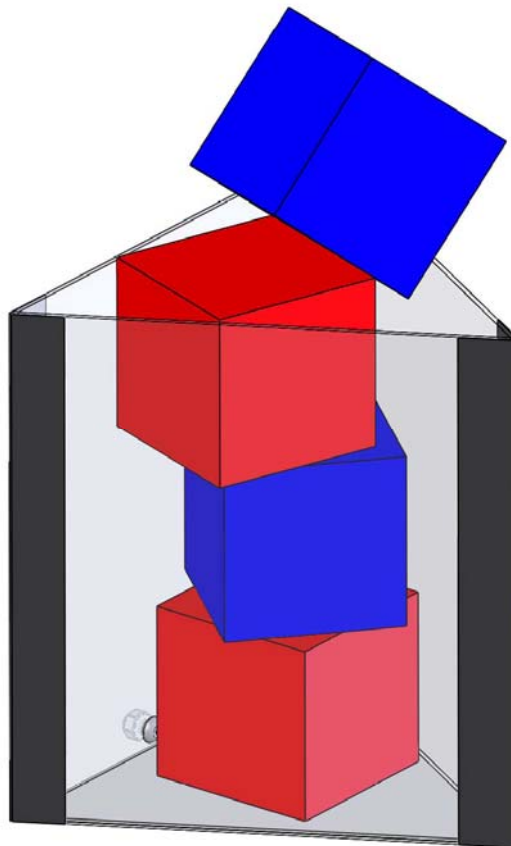


## Field Assembly

### Introduction

This section will detail the steps required to construct the competition field for the VEX Robotics Competition game *Elevation*. The *Elevation* field utilizes the VEX VL-FIELD generic field perimeter frame. For specifications and instructions for assembling this frame, please refer to the separate VL-FIELD manual.

Also refer to the separate low-cost field document, which provides lower cost options to teams not needing a full "official" competition field.

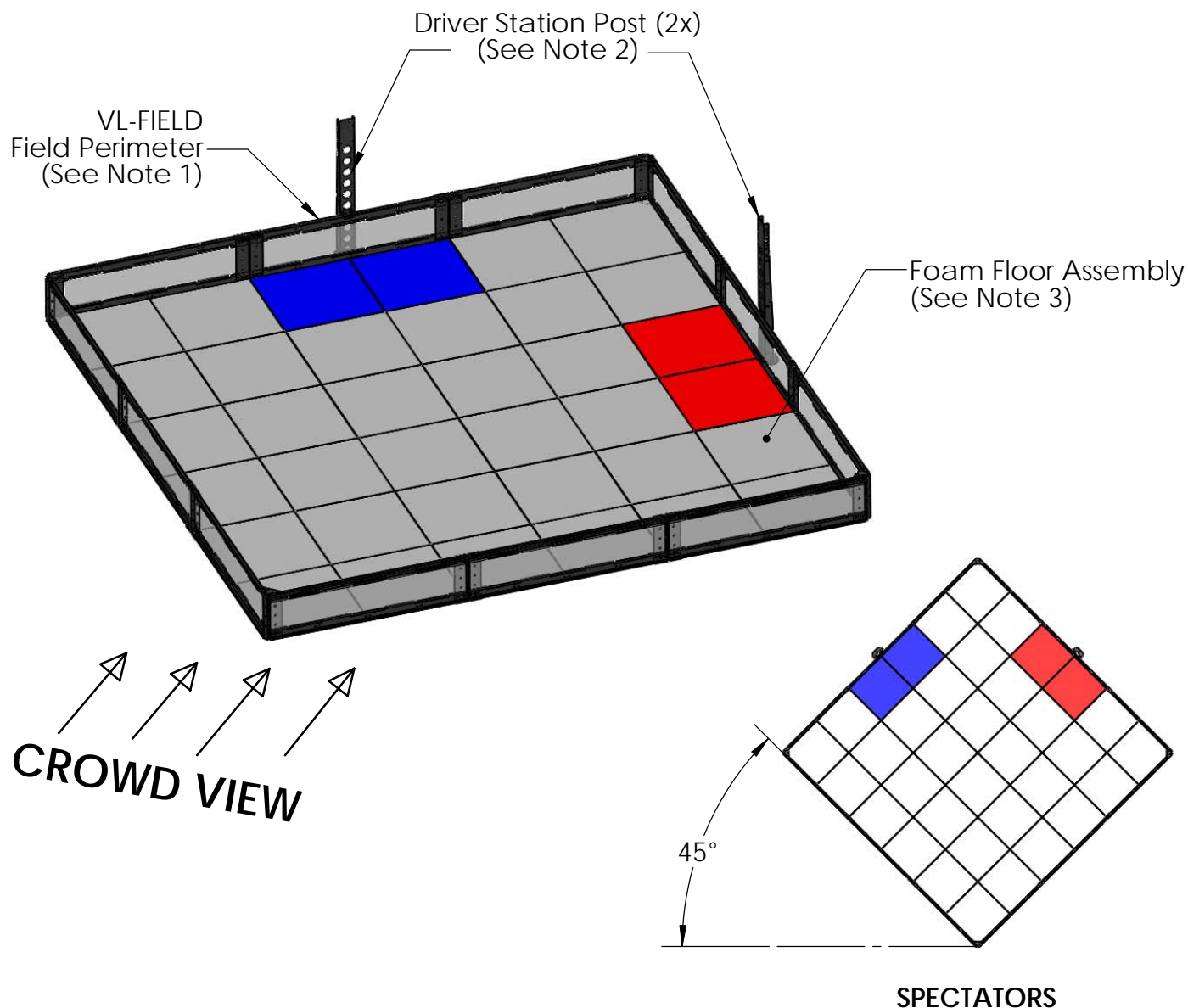


### Tools Required

The following tools are required for assembly of the official *Elevation* field:

- 5/32" Allen Wrench
- 7/16" Open Ended Wrench
- 3/32" Allen Wrench (standard VEX Allen Wrench)
- 11/32" Open Ended Wrench (standard VEX Open Ended Wrench)





#### Notes:

1. Assemble the VL-FIELD Perimeter (see separate VL-FIELD assembly instructions.) Position the Perimeter such that one corner is "pointed" at the crowd. The field should be tilted at 45 degrees, such that it is visible as a diamond.
2. Attach the Driver Station Posts as shown (centered on adjoining walls, opposite the crowd). Instructions for assembly are included with the VL-FIELD instructions.
3. Assemble the Foam Floor inside the perimeter. Refer to Sheets 2 & 3 of this document for instructions.

#### IMPORTANT!:

It is important to assemble the field on a flat, level surface. Some venues may wish to install floor protection underneath the field.

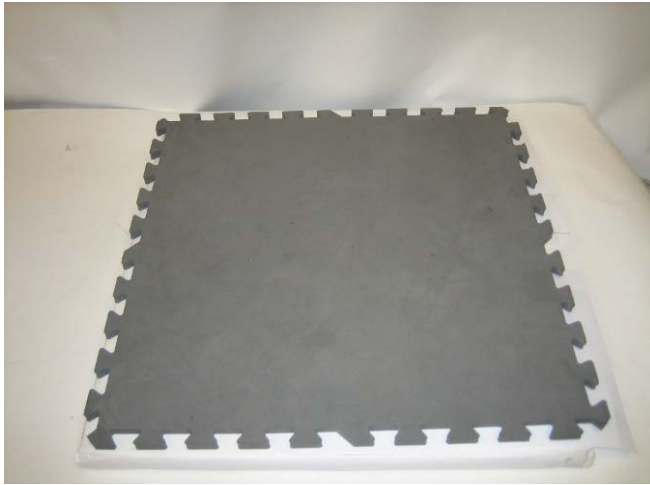


Description	Perimeter Placement	
Dwg No	VRC09-FIELD-ASSY	
Competition	VRC - Elevation	Sheet 1 of 15
Release	8/16/2008	ALL DIMENSIONS ARE IN INCHES.

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## (16x) Normal Tiles

Before assembling the foam tile floor some tiles will need to be modified.

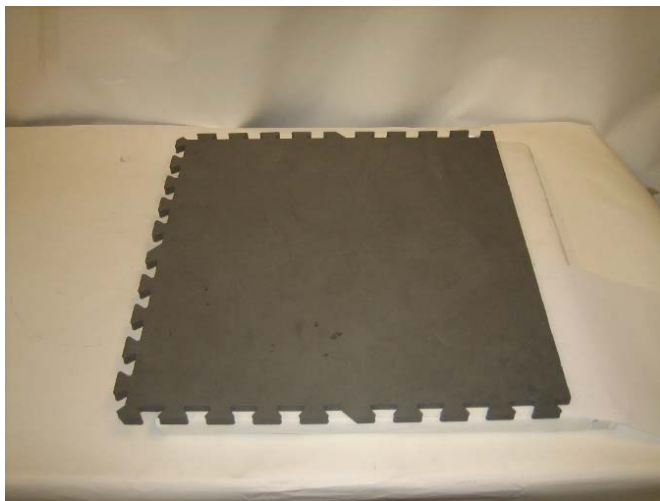
There are 3 main types of tiles.

Normal tiles, are unmodified. These will be used on the "inside" of the field. There should be (16) of these per field.



## (4x) Corner Tiles

Corner tiles have their interlocking tabs cut away on TWO adjacent edges. These will be used in the (4) corners of the field.



## (16x) Edge Tiles

### (2x) Red Edge Tiles

### (2x) Blue Edge Tiles

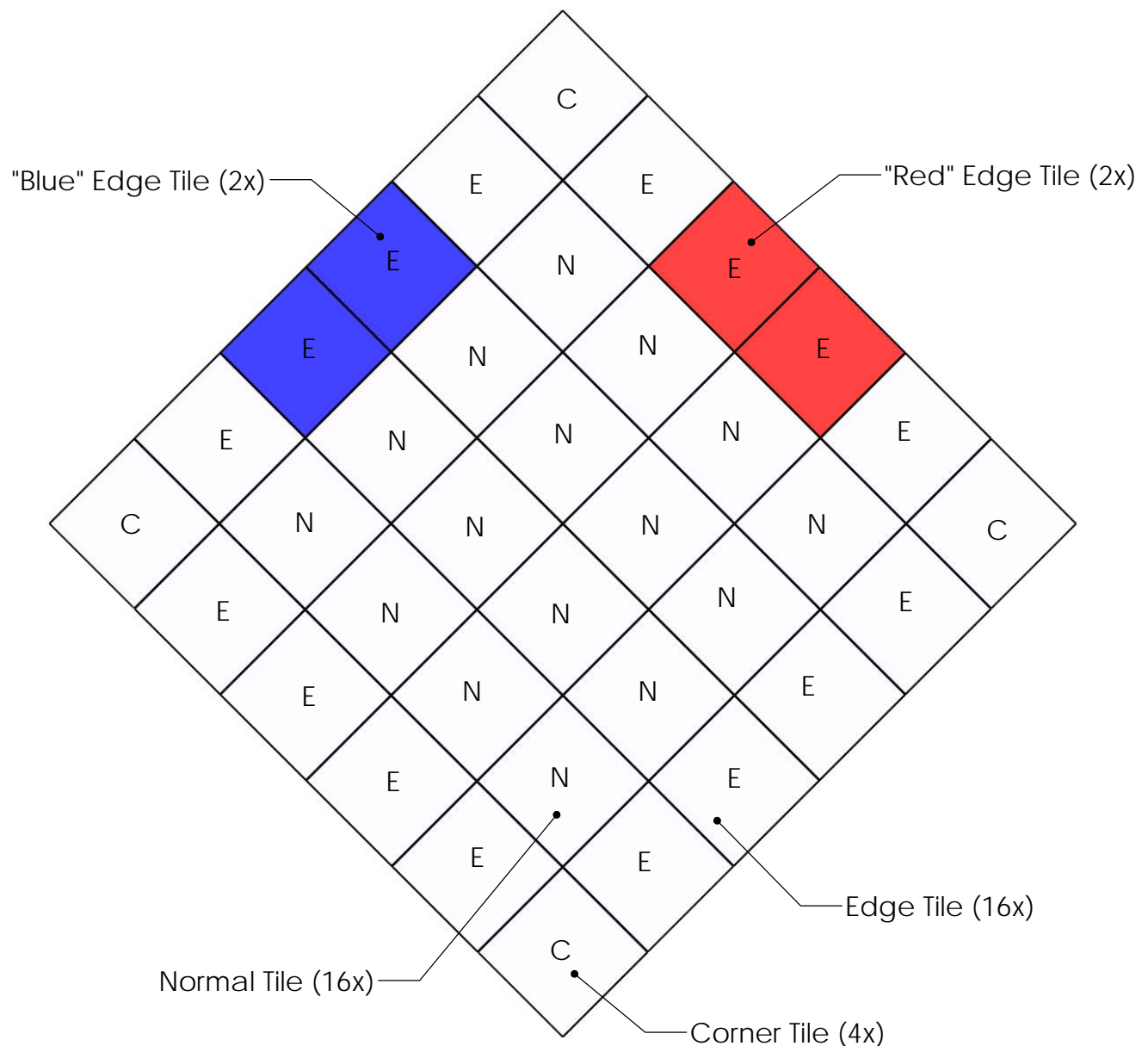
Edge tiles have their interlocking tabs cut away on ONE edge. These will be used along the edges of the field. There are (16) per field.

Note, the (2) Red Tiles and the (2) Blue Tiles are edge tiles.

Tabs should be easily removed with a sharp knife or razor blade. When the tiles are assembled, there should be a smooth edge around the entire perimeter.

### Important:

Before modifying ANY tiles, check to ensure your set of tiles NEEDS modification.

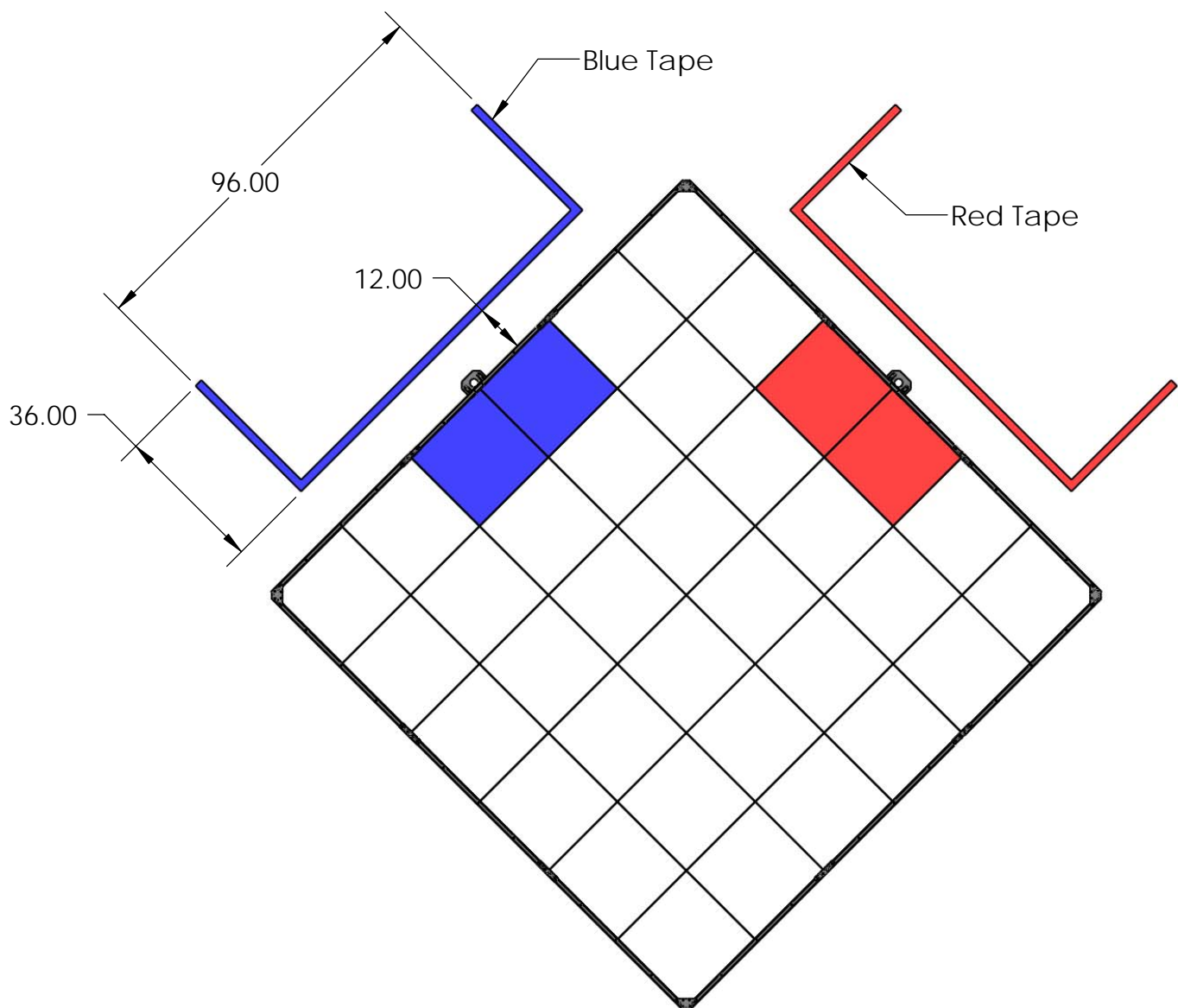


### Assemble Foam Tiles as shown above.

The "smooth" side of the tiles should be up, and the textured side down. the tiles should be assembled "in-place", within the field perimeter.

The "Blue" and "Red" Edge tiles should be placed adjacent to the driver station posts of the field perimeter.

The grid-lines shown are for reference only.



## CROWD

Once the Field Perimeter is in its final position, mark off the Driver Stations using red and blue tape. One station should be blue, and one should be red.

Apply the tape as shown above, do not close the back of the driver-boxes.

The Driver Stations should be centered on each field wall.

**Important Note:**  
**Apply tape carefully and slowly for best result.**  
**Smooth out all bubbles.**



**Step 1**



**Step 2 & 3**

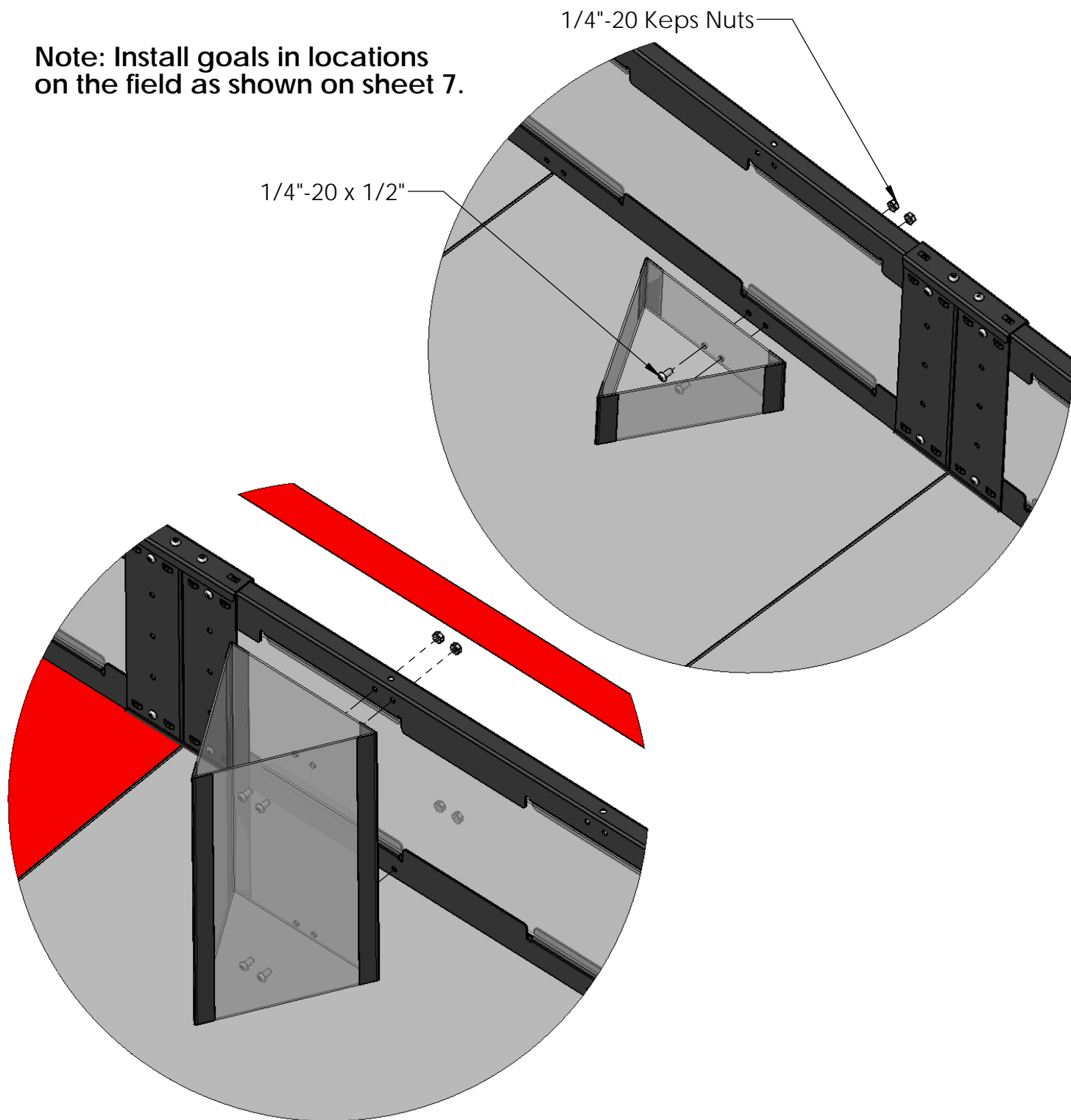


**Step 4 & 5**

1. Remove paper cover from Lexan Panels.
2. Lay out (3) of the same size High-Goal Lexan Panels on a flat surface as shown above.  
 Ensure that ONE panel has mounting holes in it.  
 Leave a 1/4" gap between the panels (about the width of a pencil).
3. Place a strip black gaffers tape between each panel. Place the tape directly centered over the gap.
4. Flip the panel over, and repeat step 2 on the back side.
5. Bend the assembly along the seams such that it forms an equilateral triangle. Apply tape along the outside edge to complete the triangle.
6. Apply a strip of tape to the inside seam to reinforce the assembly.
7. One field consists of :
  - (2x) 3" High Goals      - (2x) 15" High Goals
  - (2x) 9" High Goals      - (2x) 21" High Goals



Note: Install goals in locations on the field as shown on sheet 7.



Bolt the Goals to the field perimeter.  
 - 3" High Goals & 9" High Goals use (2) pairs of hardware  
 - 15" High Goals & 21" High Goals use (4) pairs of hardware.

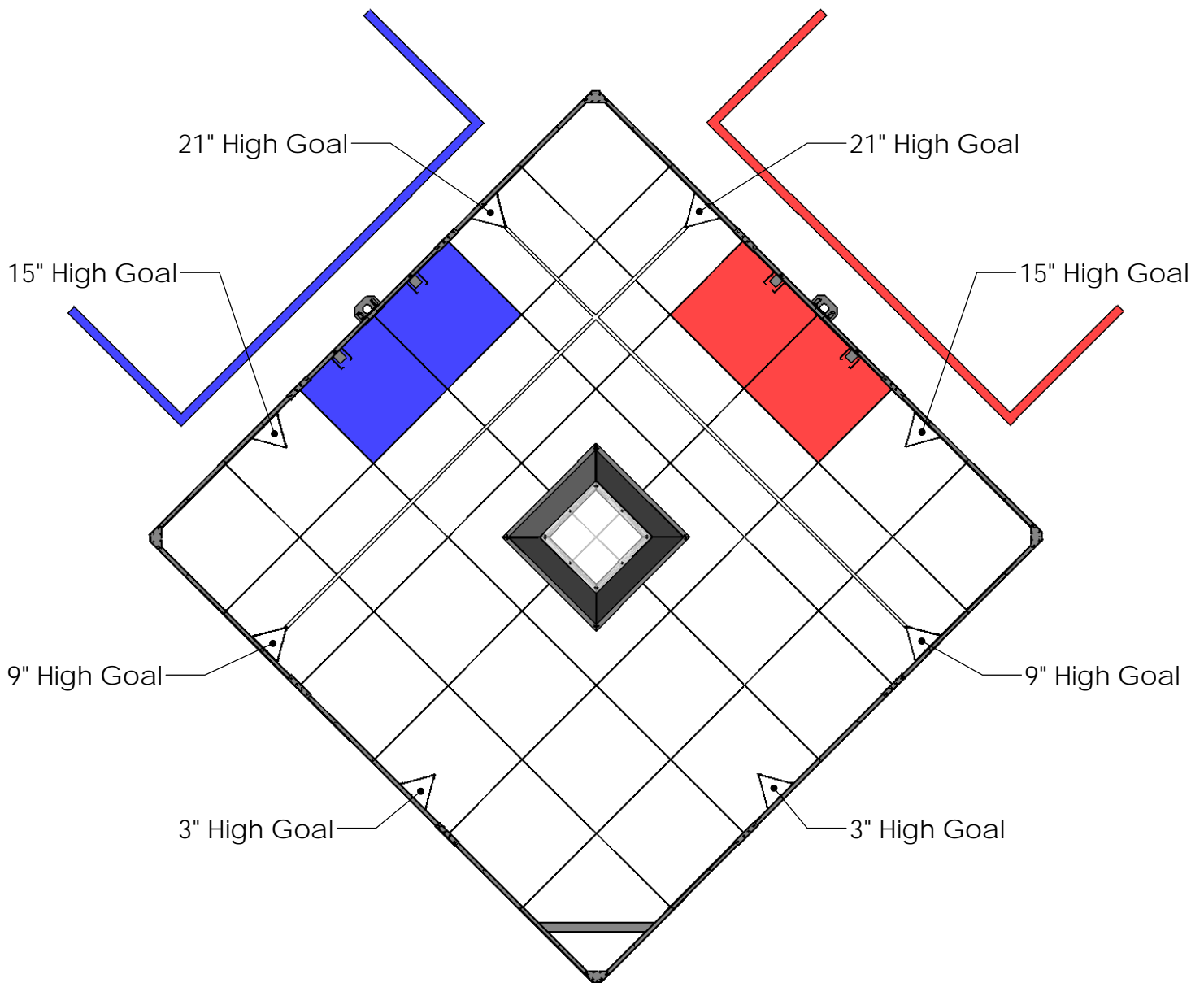


Description	Goal Assembly	
Dwg No	VRC09-FIELD-ASSY	
Competition	VRC - Elevation	Sheet 6 of 15
Release	8/16/2008	ALL DIMENSIONS ARE IN INCHES.

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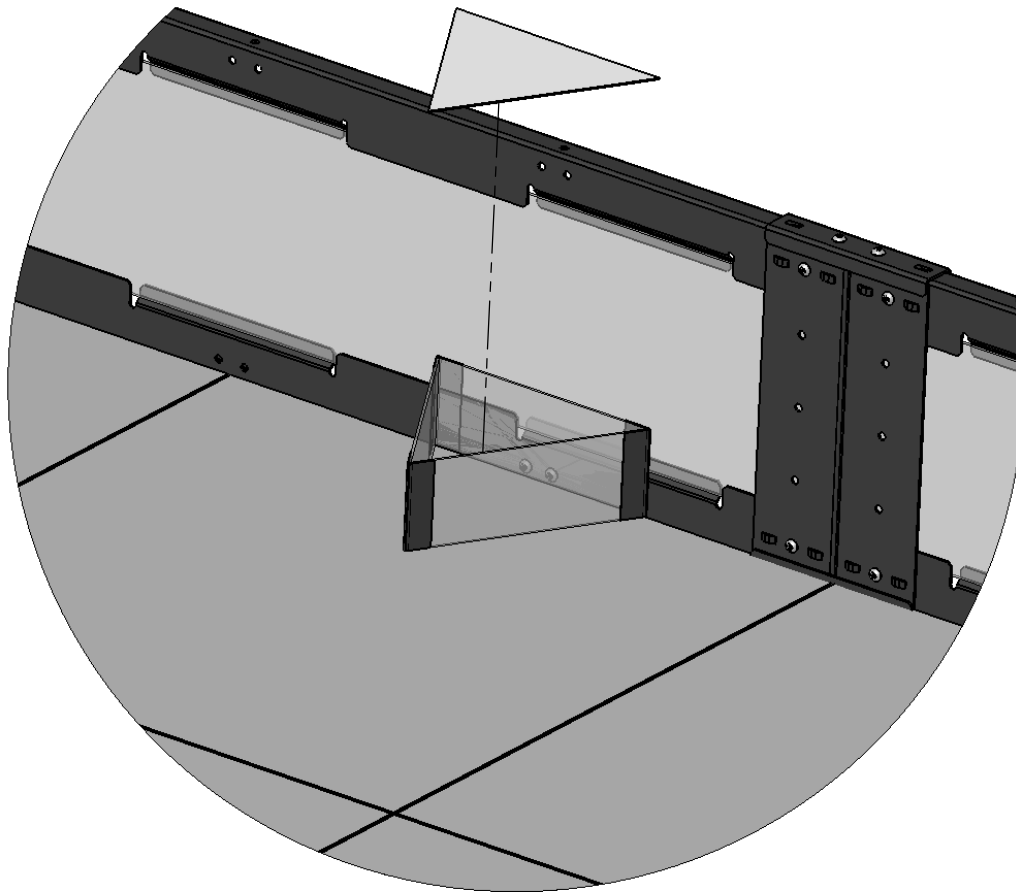
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Attach goals to the field perimeter in the locations shown using the included mounting holes as shown on sheet 6.

**Note: the goals do not always line up directly across from each other. Pay special attention to the locations shown.**

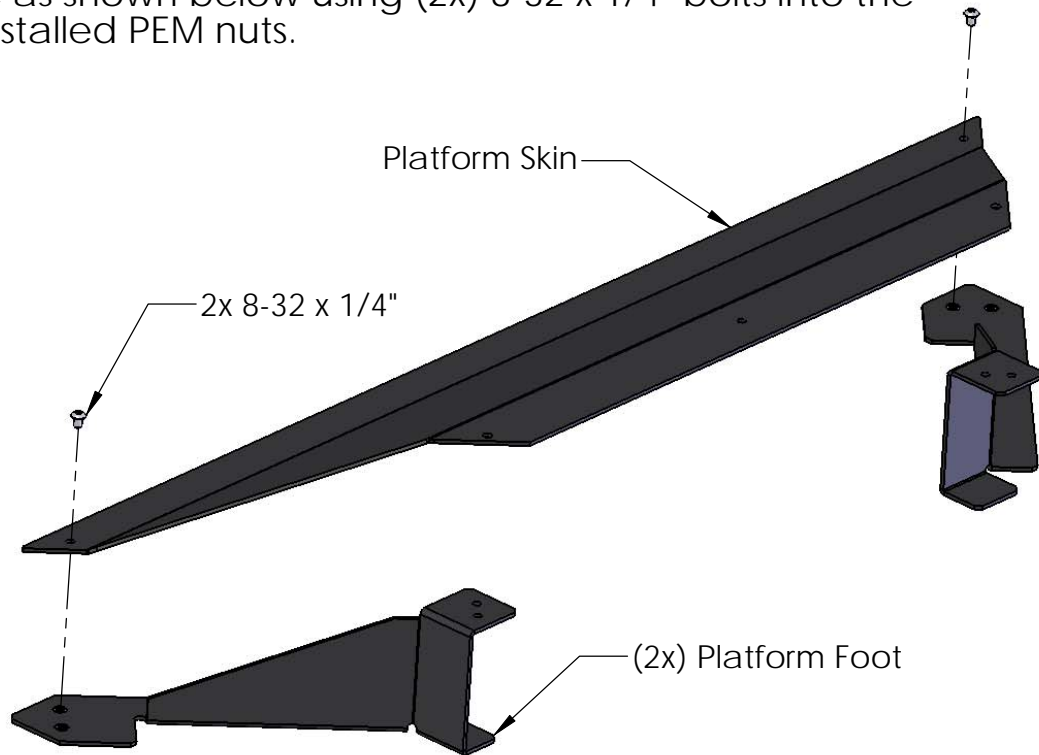
	Description		Goal Assembly		
	Dwg No		VRC09-FIELD-ASSY		
	Competition		VRC - <i>Elevation</i>	Sheet 7 of 15	 <b>Innovation First</b>
	Release		8/16/2008	ALL DIMENSIONS ARE IN INCHES.	



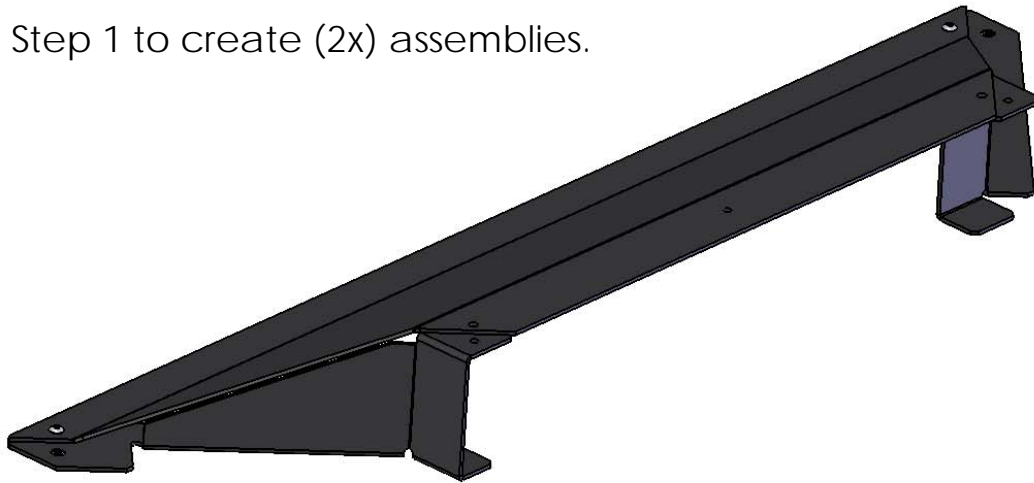
Insert Triangular Cardboard Goal Bases into all (8x) High Goals.  
Place them with the white finished surface facing upwards.

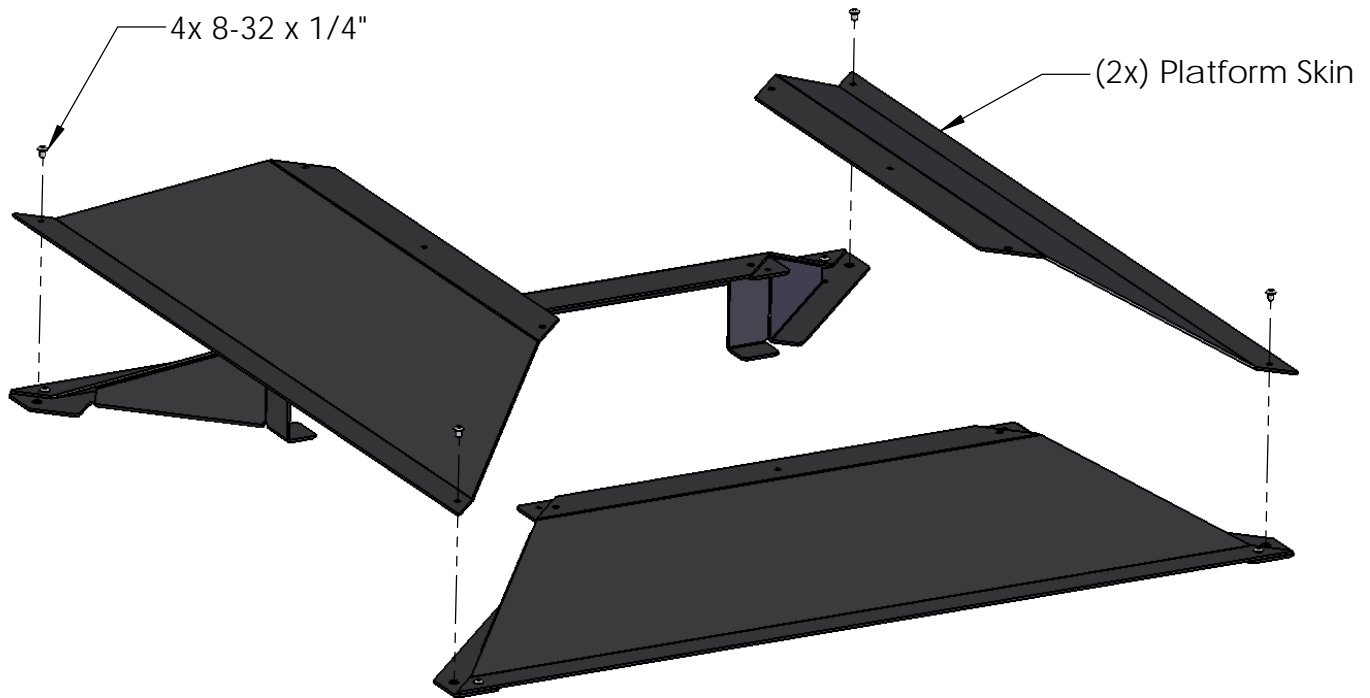


1. Attach (2x) Platform Foot pieces to (1x) Platform Skin piece as shown below using (2x) 8-32 x 1/4" bolts into the pre-installed PEM nuts.



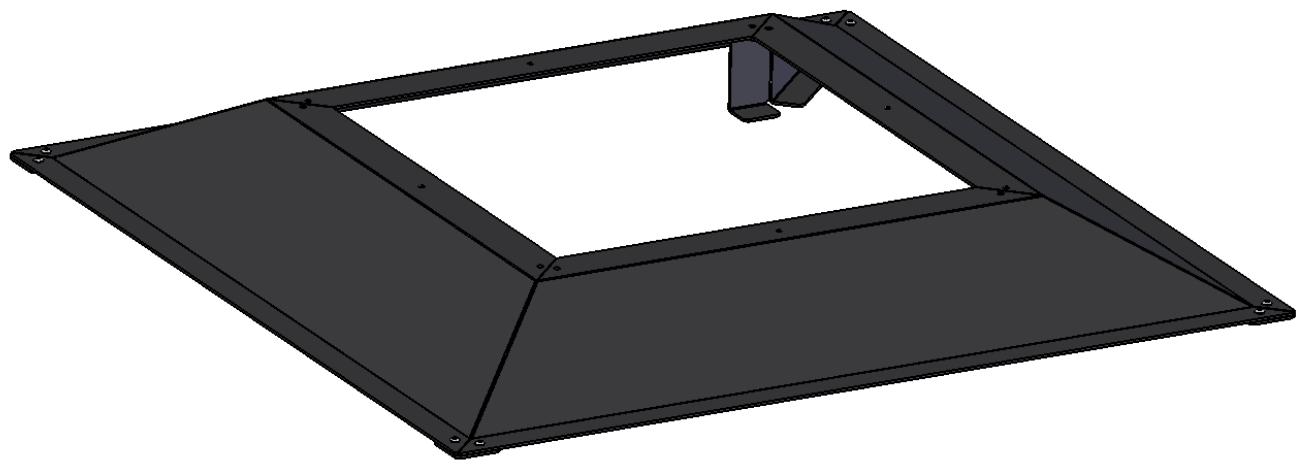
2. Repeat Step 1 to create (2x) assemblies.

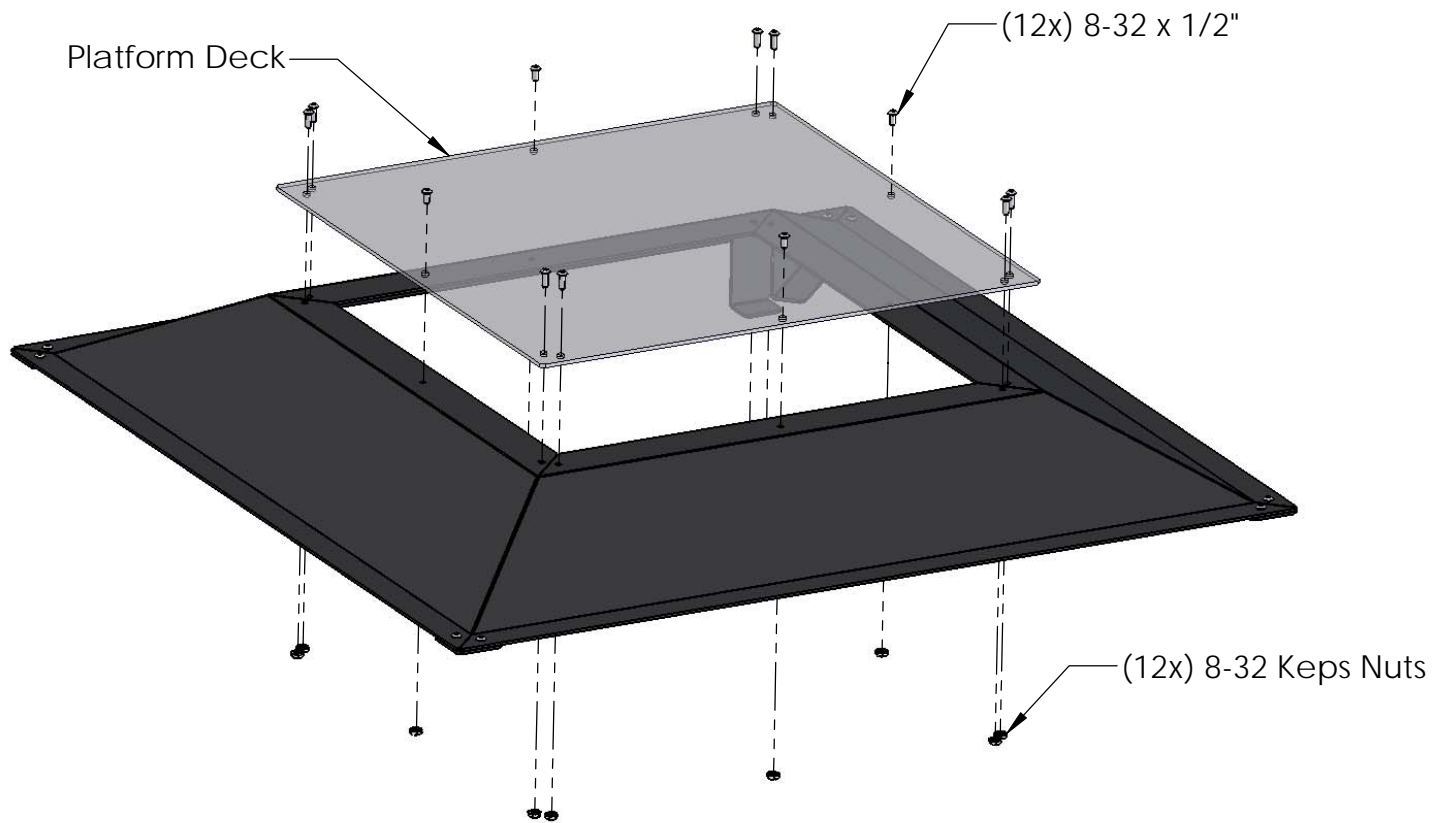




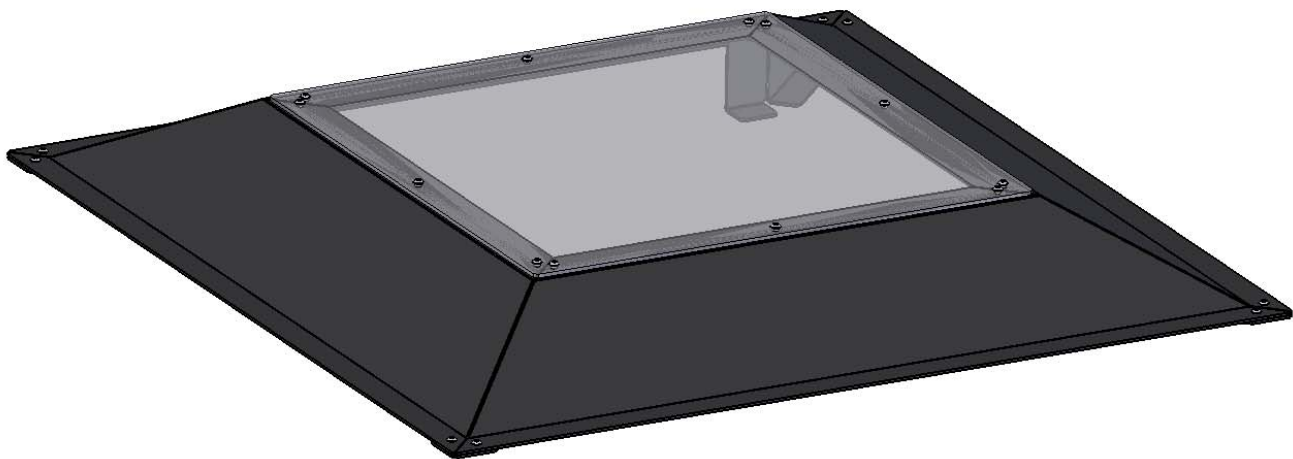
3. Attach the two assemblies from the previous step (on sheet 9) together using (2x) Ramp Skin pieces.

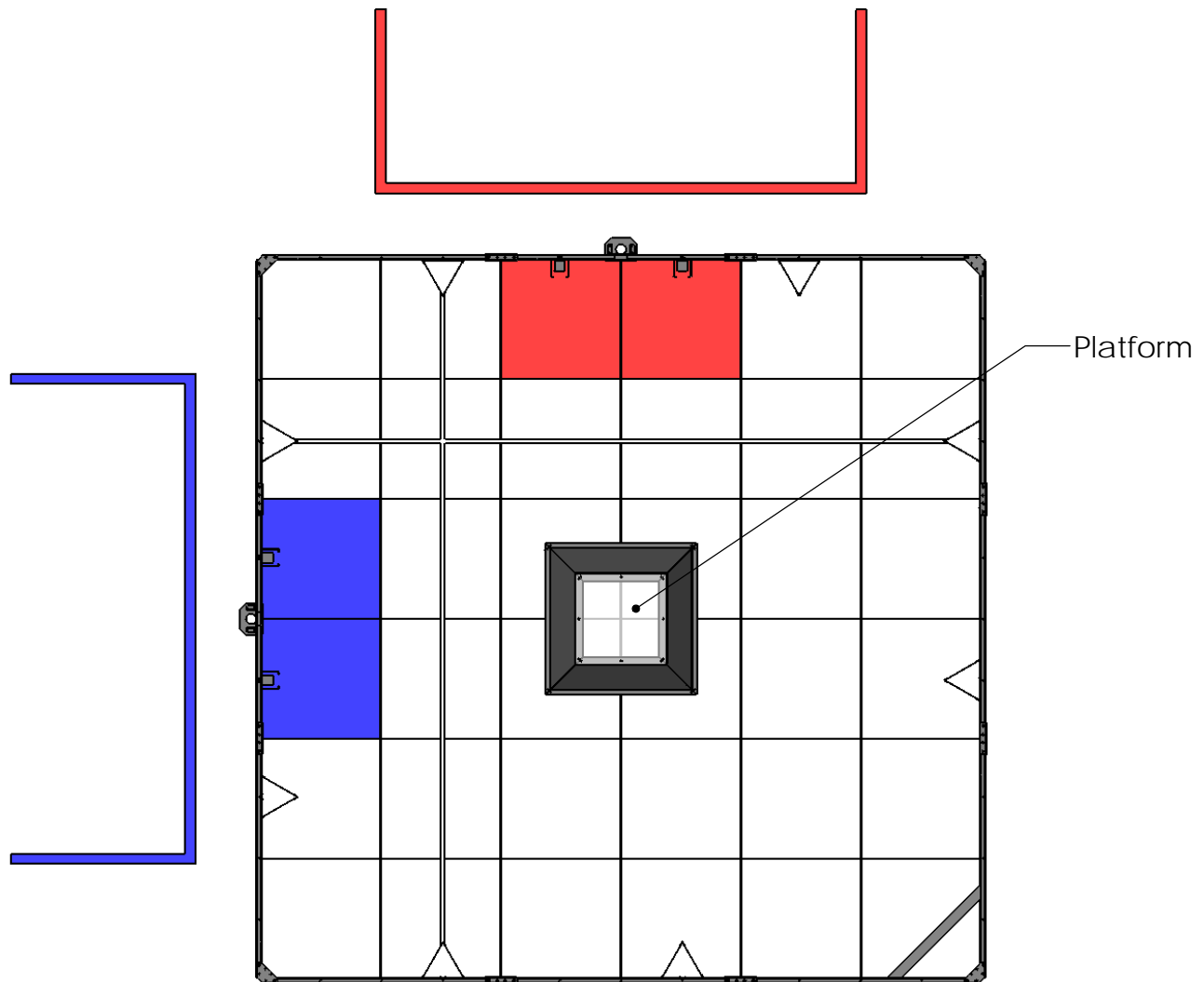
Screw (4x) 8-32 x 1/4" screws into the pre-installed PEM Nuts as shown.





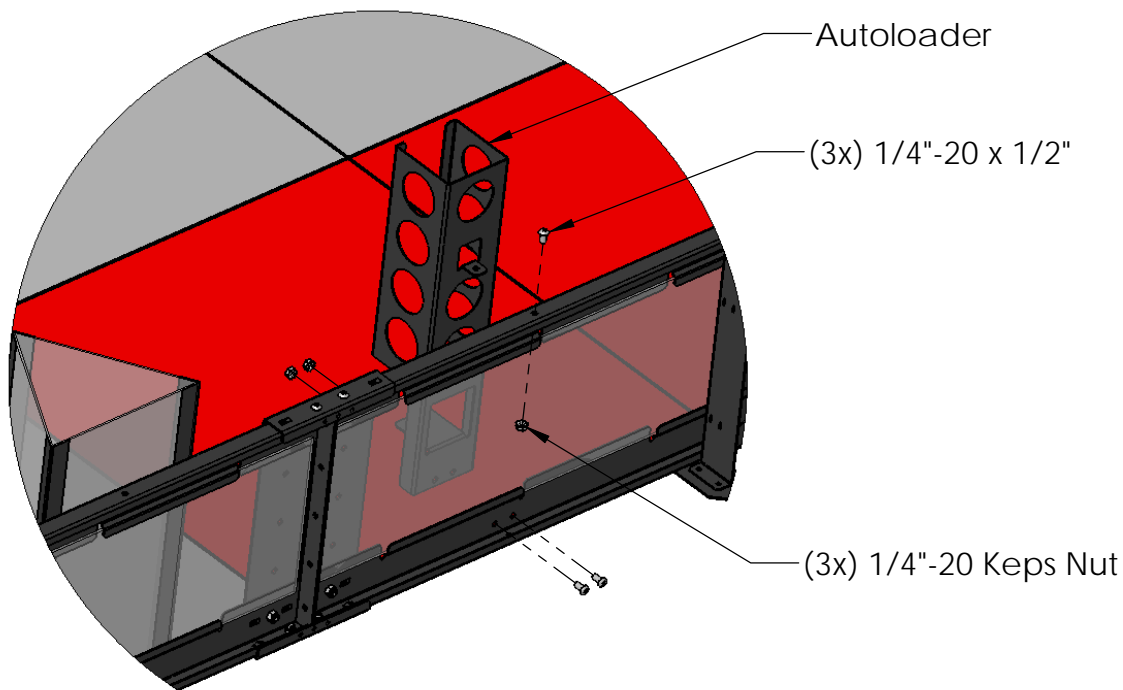
4. Attach the Lexan Platform Deck to the assembly from the previous step (on sheet 10) using (12x) 8-32 x 1/2" bolts and (12x) 8-32 Keps nuts as shown.





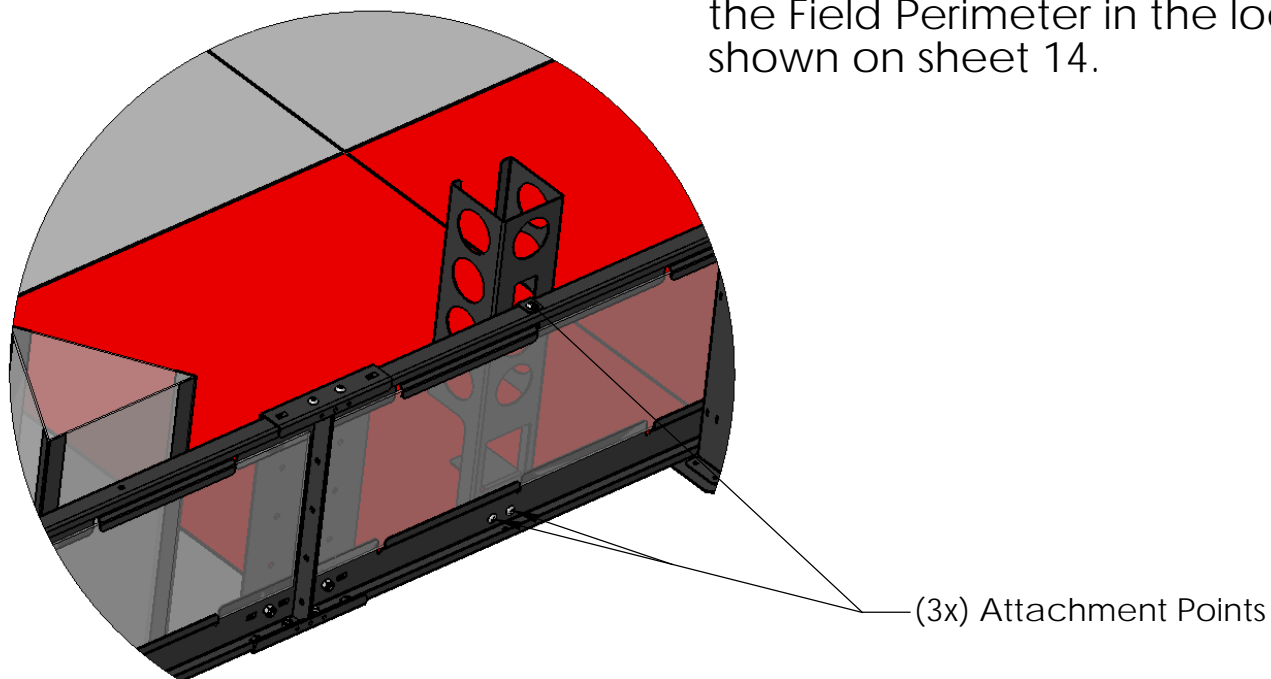
Platform Assembly should be placed in the center of the field as shown. The Platform is NOT anchored to the field.

Re-Center the platform in between matches (if necessary).

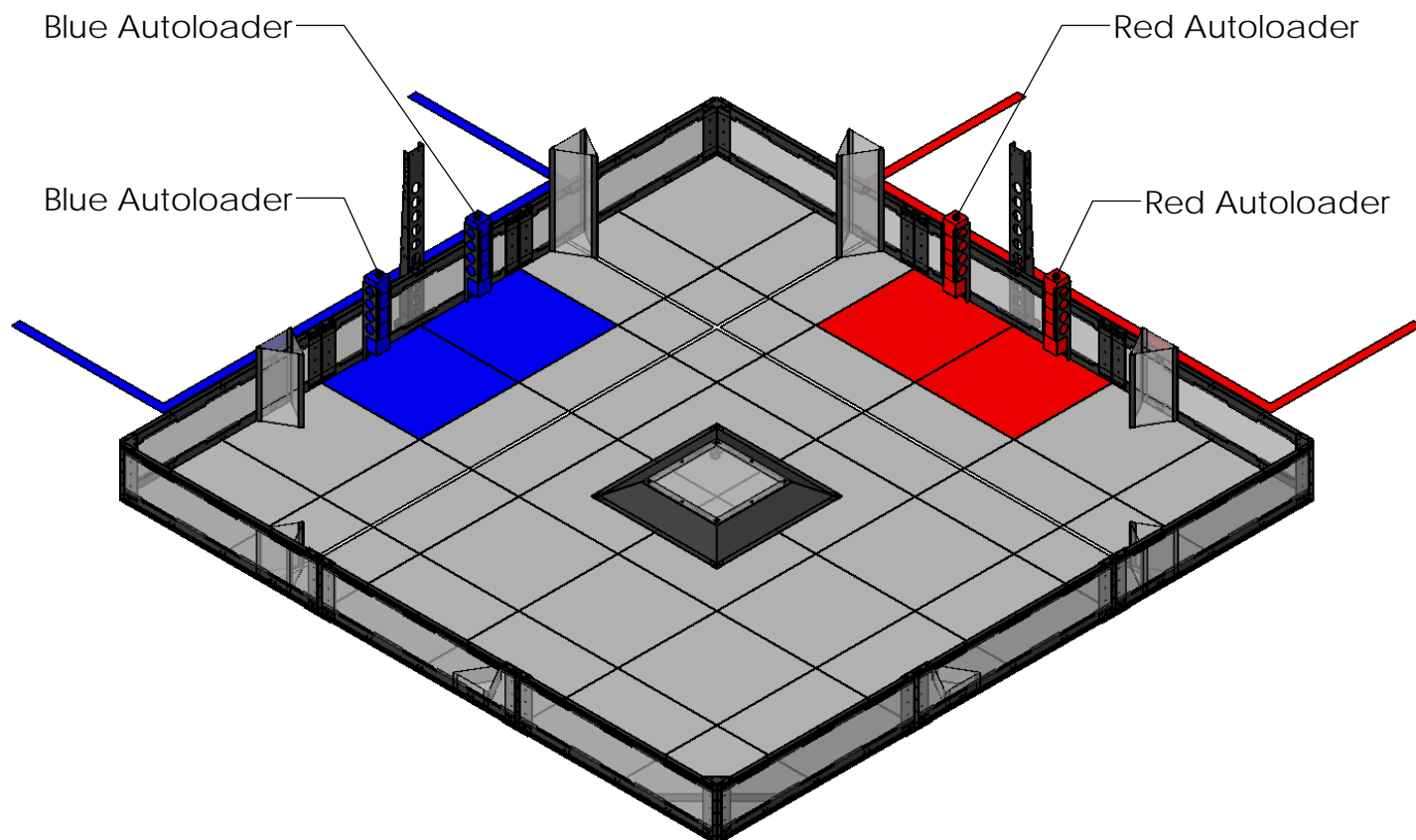


Install (4x) Autoloaders on the field using (3x) 1/4"-20 x 1/2" bolts and (3x) 1/4-20 Keps Nuts per Autoloader.

Bolt through the mounting holes in the Field Perimeter in the locations shown on sheet 14.



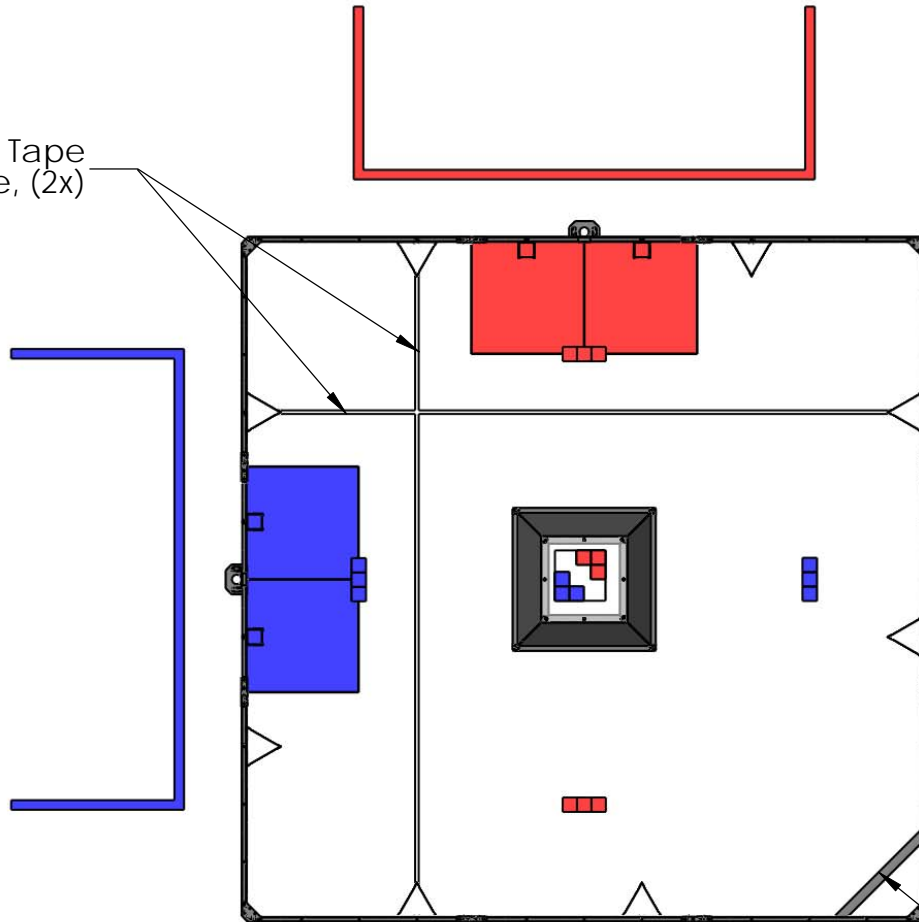
(3x) Attachment Points



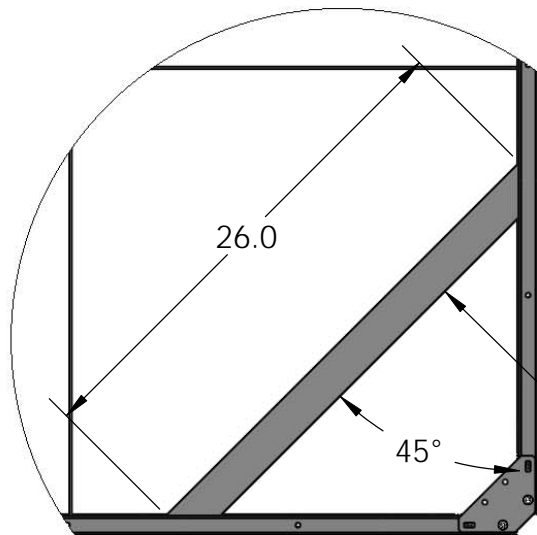
Attach Autoloaders to the field perimeter in the locations shown using the mounting holes in the field perimeter as shown in the previous step (on sheet 13).

**Important Note:**  
 Apply tape carefully and slowly for best result.  
 Smooth out all bubbles.

White Electrical Tape  
 3/4" Wide, (2x)



Black Gaffers  
 Tape 2" Wide



1. Cut a piece of 2" Wide Black Gaffers tape 26" long.
2. Cut 45 degree angles on each end.
3. Lay tape down firmly and smooth out bubbles.
4. Lay down two strips of 3/4" Wide White Electrical Tape as shown above.

Black Gaffers Tape  
 2" Wide