

VEX Robotics Competition Starstruck – Appendix A

Appendix A – Field Specs & Assembly Instructions



Game Field Introduction

This document will provide detailed specifications, BOM information, and assembly instructions for the 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 VEX Competition Field Perimeter (278-1501) developed by VEX Robotics. Instructions and specifications for this field perimeter are available in a separate document, and are important for the 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 STEP file which can be imported into most 3D modeling programs (i.e. Autodesk Inventor). This 3D model not only shows the “official” setup of a *VEX Robotics Competition – Starstruck* Competition field, but it also includes detailed models of all the individual field elements.

For additional game-play detail, please refer to the *VEX Robotics Competition – Starstruck* competition manual.

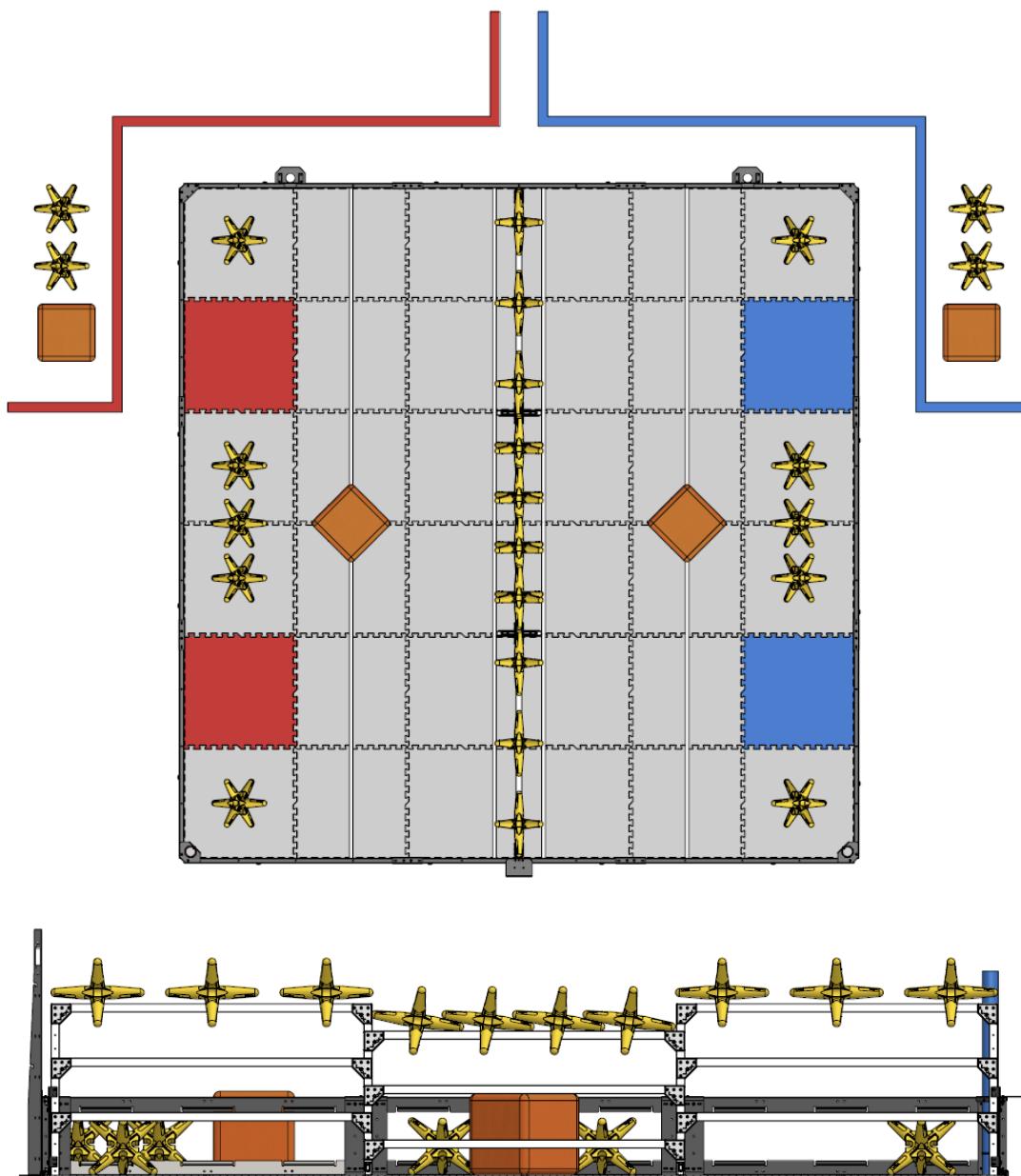
For more information on reducing costs on an unofficial field construction, refer to the accompanying “Low Cost Field” document located online at vexrobotics.com.

VEX Robotics Competition Starstruck – Appendix A

Field Overview

The game *VEX Robotics Competition – Starstruck* is played on a 12ft x 12ft foam-mat, surrounded by a sheet-metal and polycarbonate perimeter. In two corners of this field are colored PVC pipes which denote hanging bars. The field is bisected by a *Fence* made of 1.26in square PVC extrusion and plastic gussets. Foam *Stars* and pillow-like *Cubes* are placed across the field and atop the *Fence* throughout.

For more details and specific game-play rules, please refer to the *VEX Robotics Competition – Starstruck* competition manual.



VEX Robotics Competition Starstruck – Appendix A

Game Objects & Field Bill of Materials

All of these items are available for purchase from: www.vexrobotics.com.

Generic Field Elements – Reusable Each Year

Part Number	Description
278-1501	VRC Field Perimeter Frame & Hardware
278-1502	VRC Foam Field Surface – (36) Grey, (2) Red, (2) Blue Tiles
275-1401	VRC VEXnet Field Controller

Official VEX Robotics Competition – Starstruck Specific Elements

Part Number	Description	Quantity per Full Field
276-4848	VRC Starstruck Game Element Kit	4
276-4897	VRC Starstruck Field Element Kit	1

Practice Elements

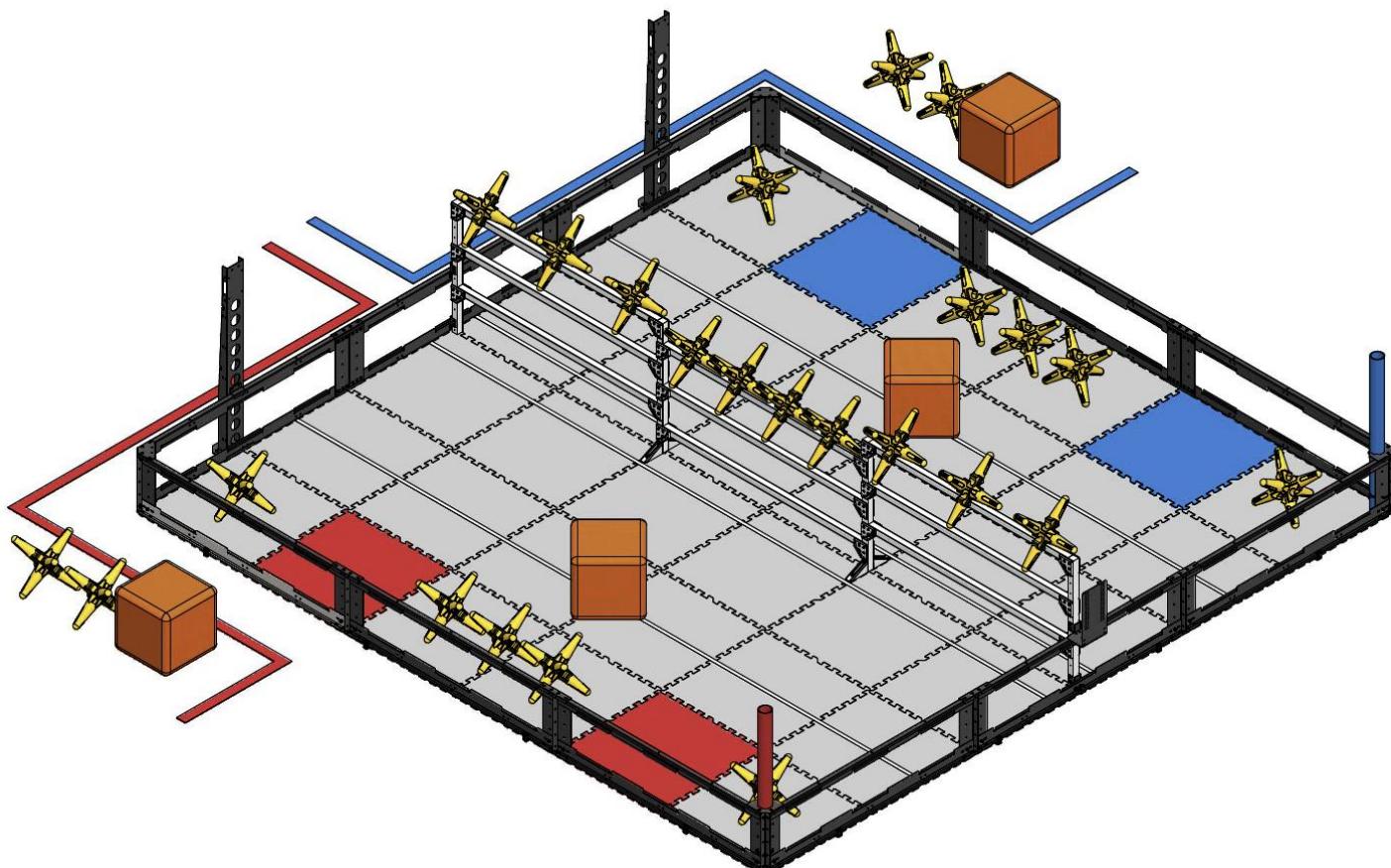
Part Number	Description
276-4848	VRC Starstruck Game Element Kit

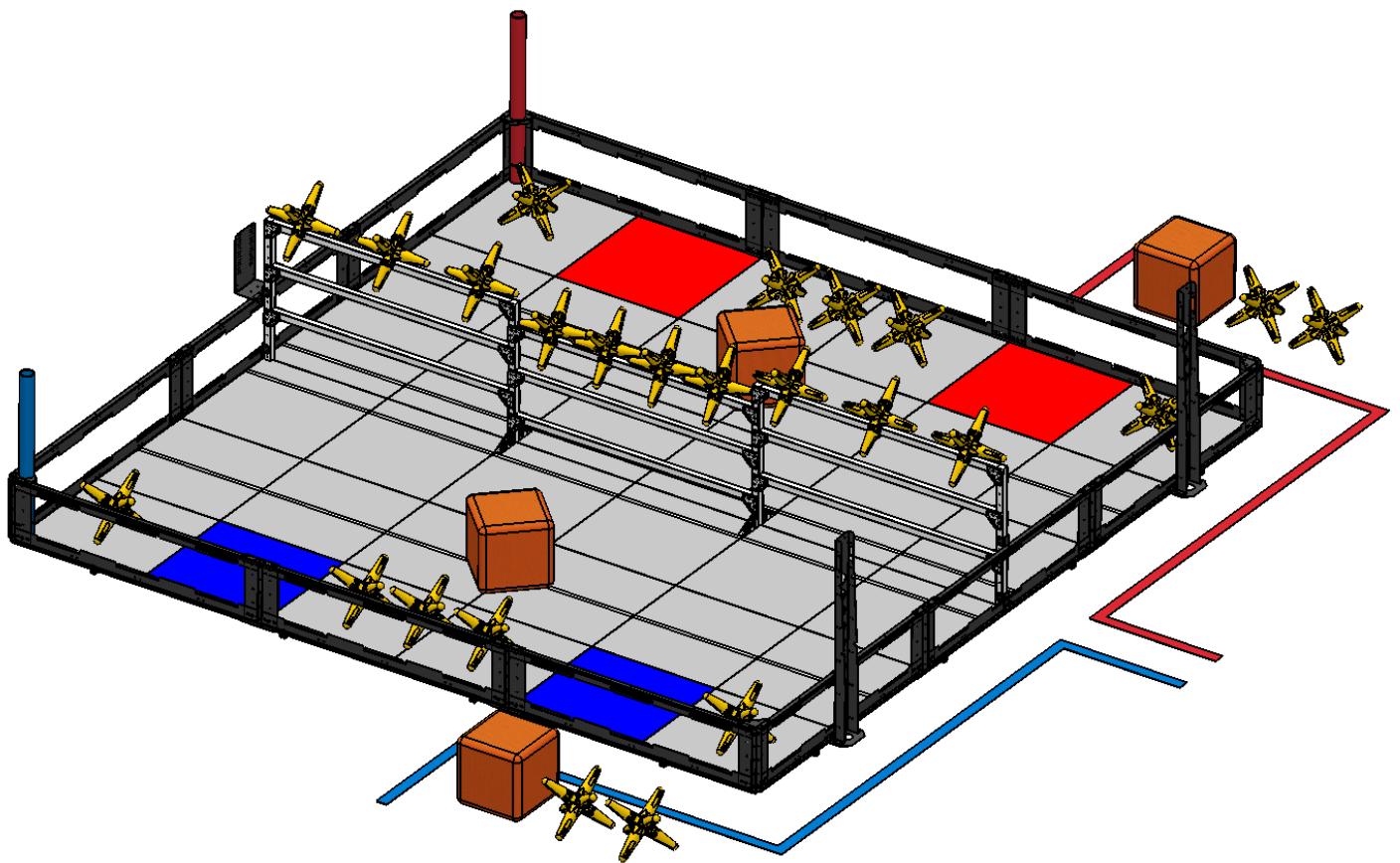
VEX Robotics Competition Starstruck – Appendix A

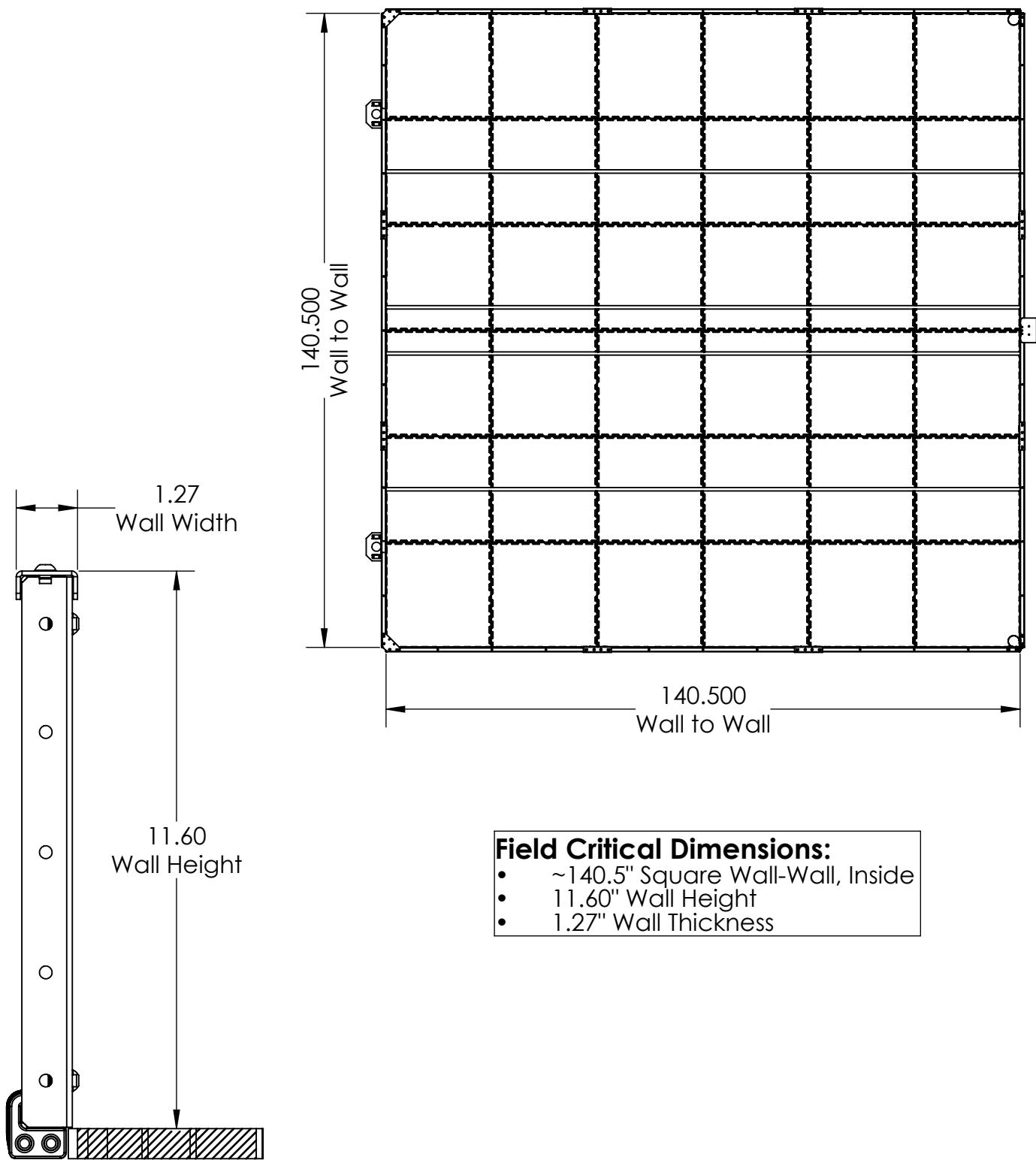
Field Specifications Introduction

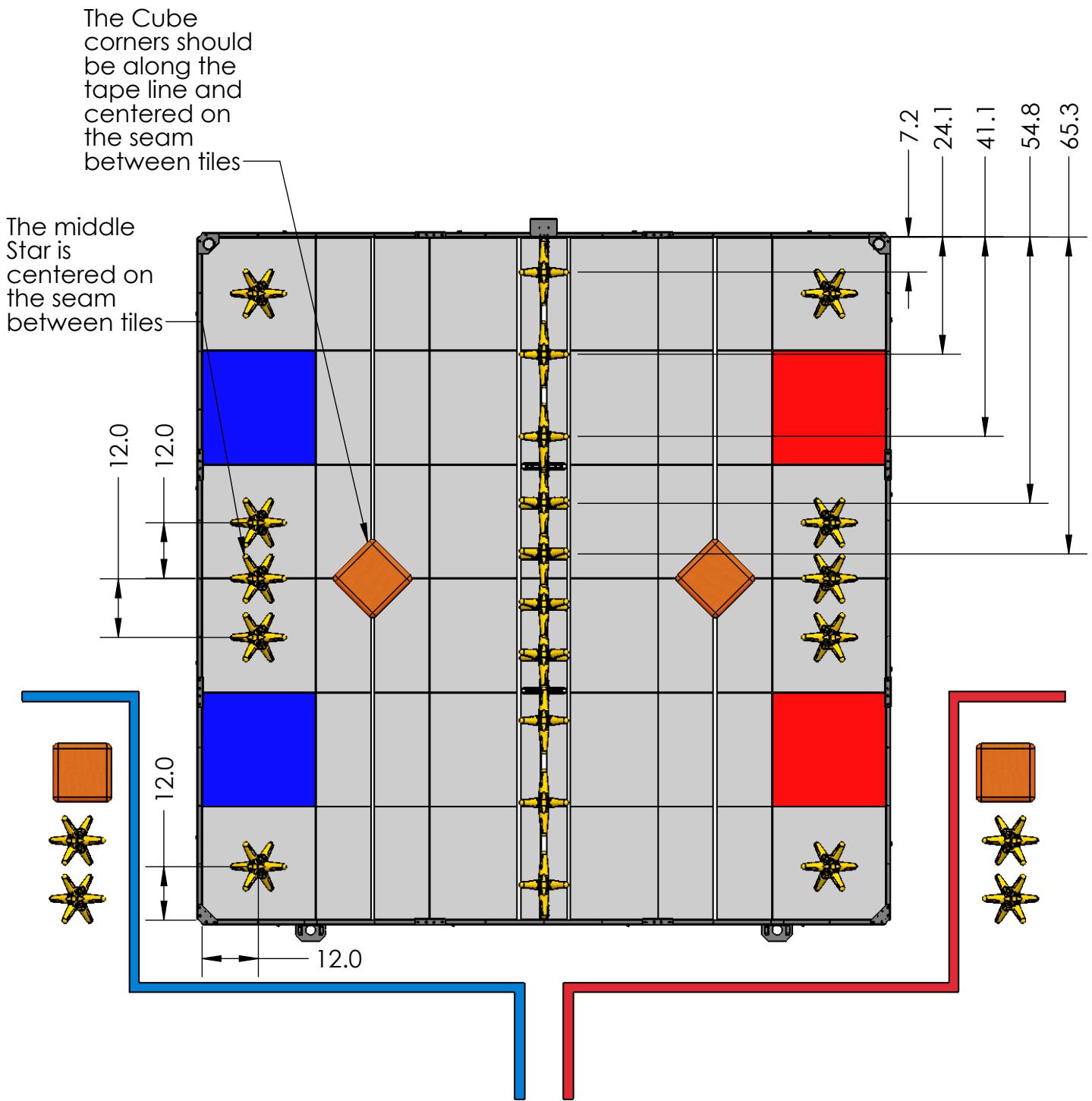
This section will outline the specifications that are most important to teams designing a robot to compete in the *VEX Robotics Competition – Starstruck*. Though many of the critical dimensions are included in this section, it may be necessary to consult the separate assembly guide and 3D CAD models of the field for an additional level of detail. If you can't find a dimension in the specifications, we include a FULL model of the field to "virtually" measure whatever dimension is necessary.

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.



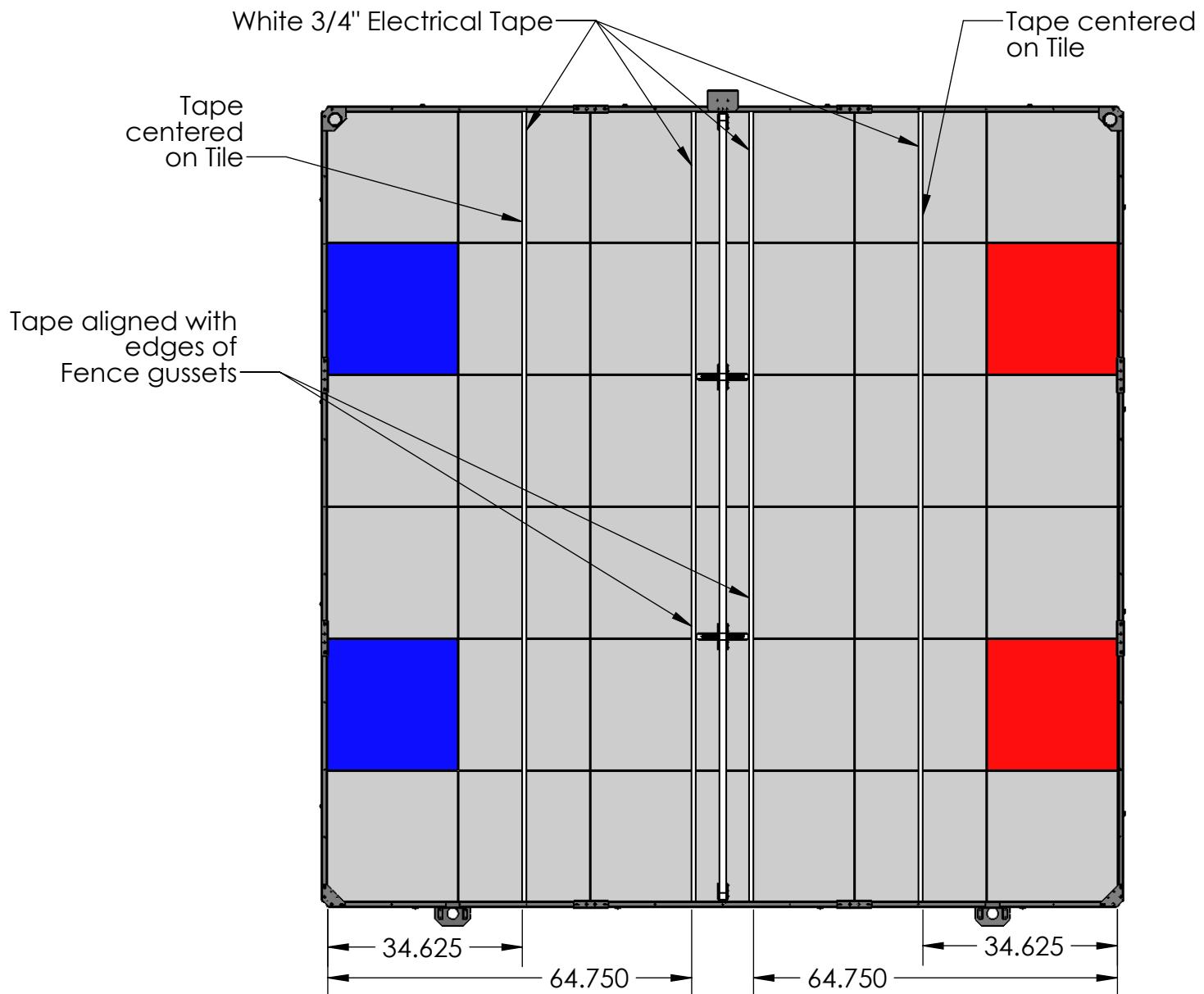






There are (4X) strips of White Electrical Tape running across the Field, as shown below.

Dimensions are for reference only.



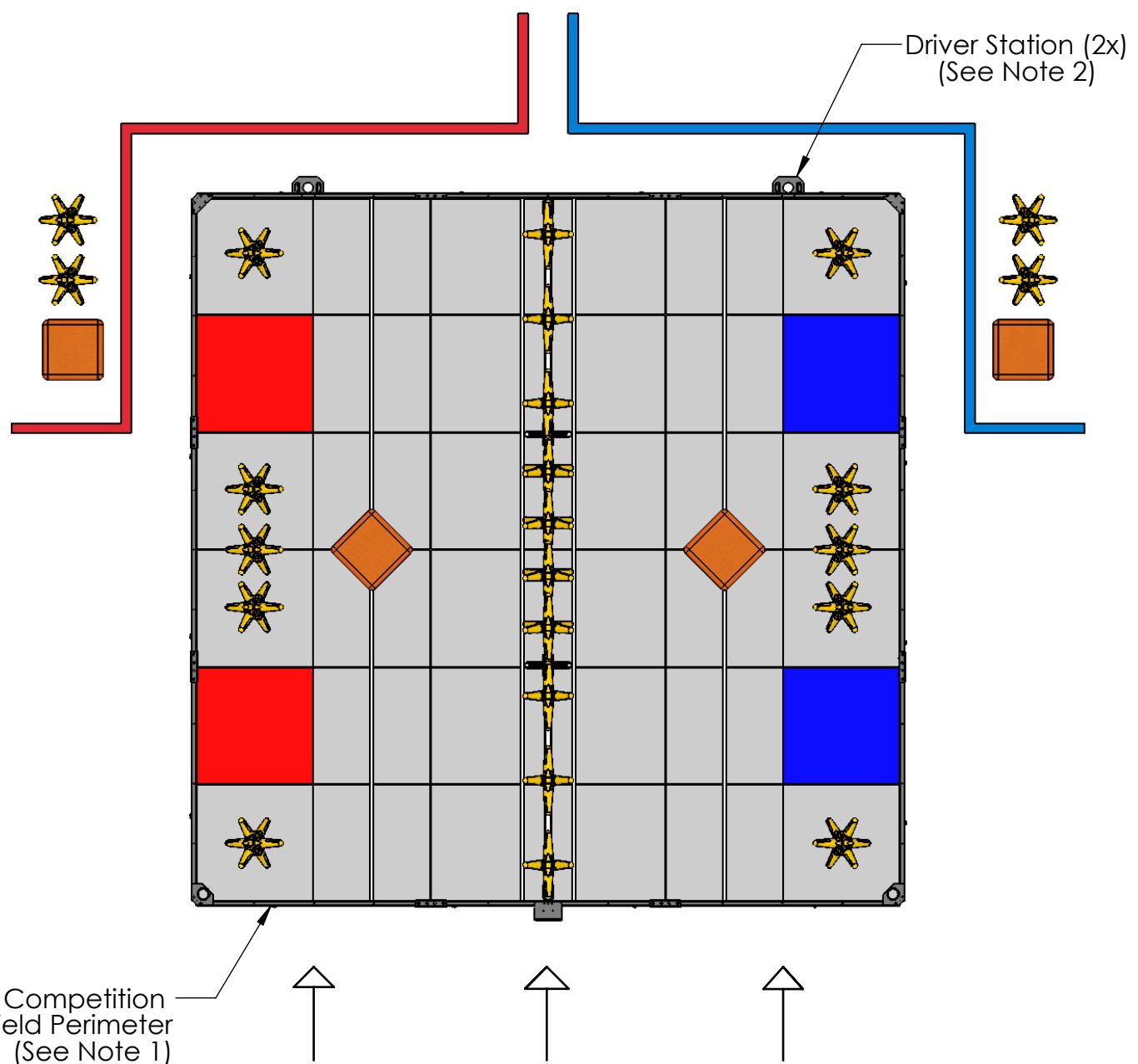
IMPORTANT NOTE:

DO NOT stretch Tape when applying to the Foam Tile Floor. For best results, smooth out any bubbles that form during application.

To prevent tape lines from being pulled up during competition, it is recommended that the ends of the tape are tucked into Tile seams.

Pro-Tip:

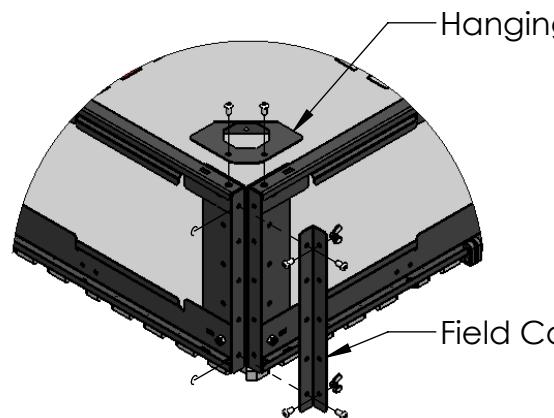
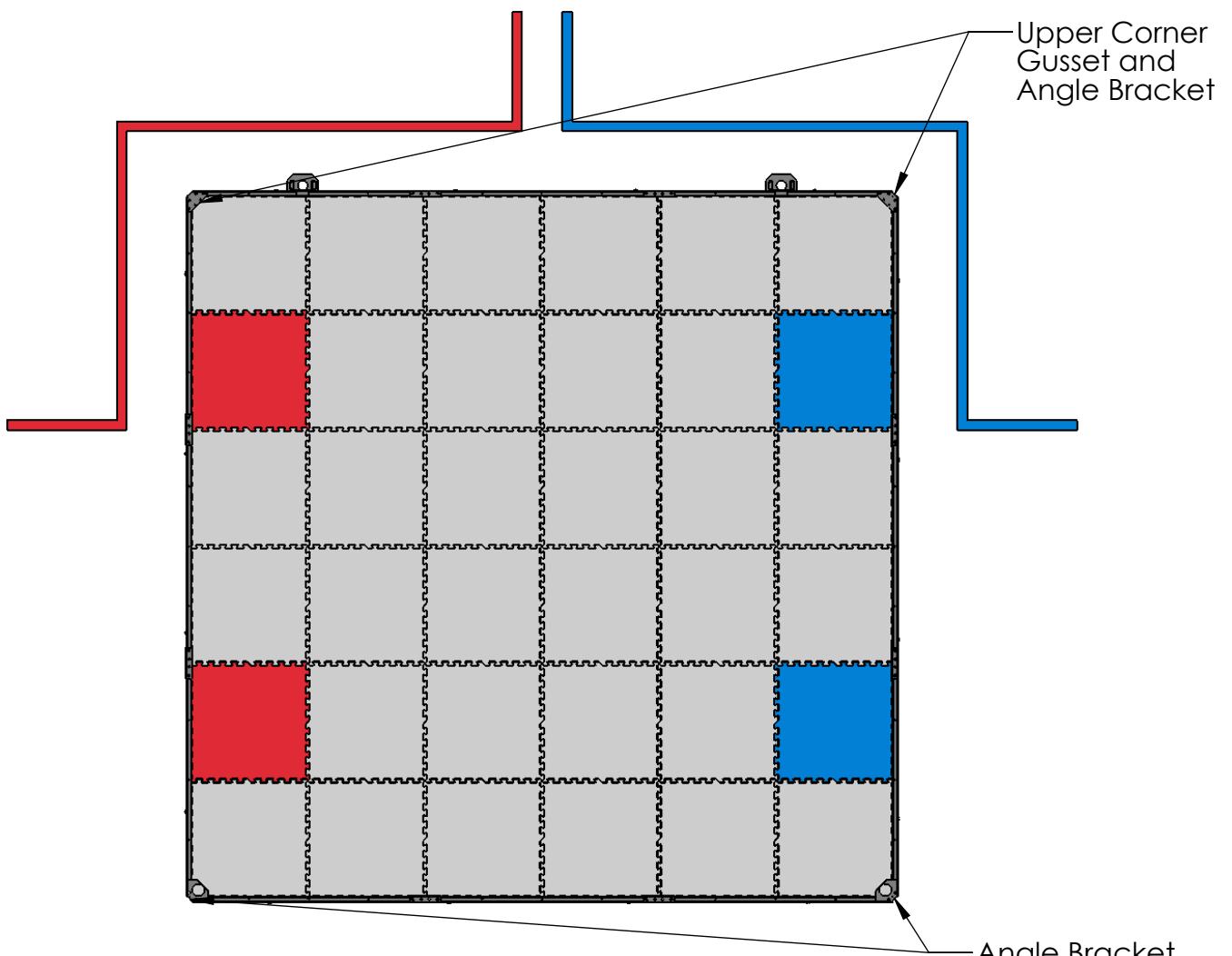
If the Tiles are to be used at multiple events, it is not necessary to remove the Tape. Simply cut the Tape at the Tile seams and note the order of the Tiles when they are stored.



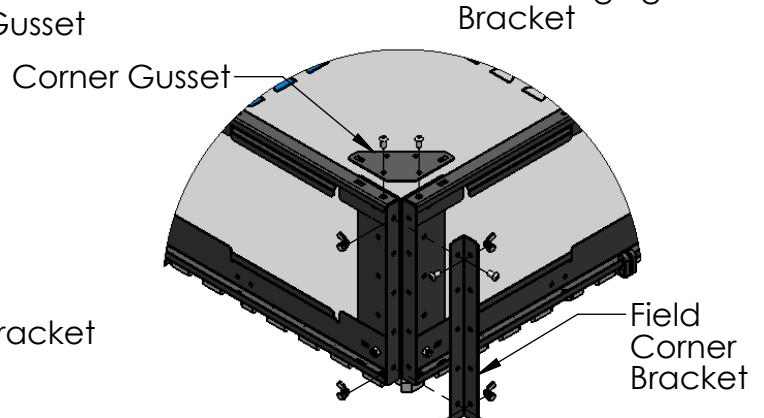
CROWD VIEW

Notes:

1. Assemble the VEX Competition Field Perimeter (see separate VEX Competition Field Perimeter assembly instructions.) Position the perimeter so that noted side is "facing" the crowd.
2. Attach driver station as shown. (~1ft off Field Perimeter edge opposite of crowd.) Instructions for assembly are included with the VEX Competition Field Perimeter Instructions.
3. Assemble the Foam Tiles inside the Perimeter. Refer to sheet 12 of this document for instructions.



Hanging Bar Corners



Non-Hanging Bar Corners

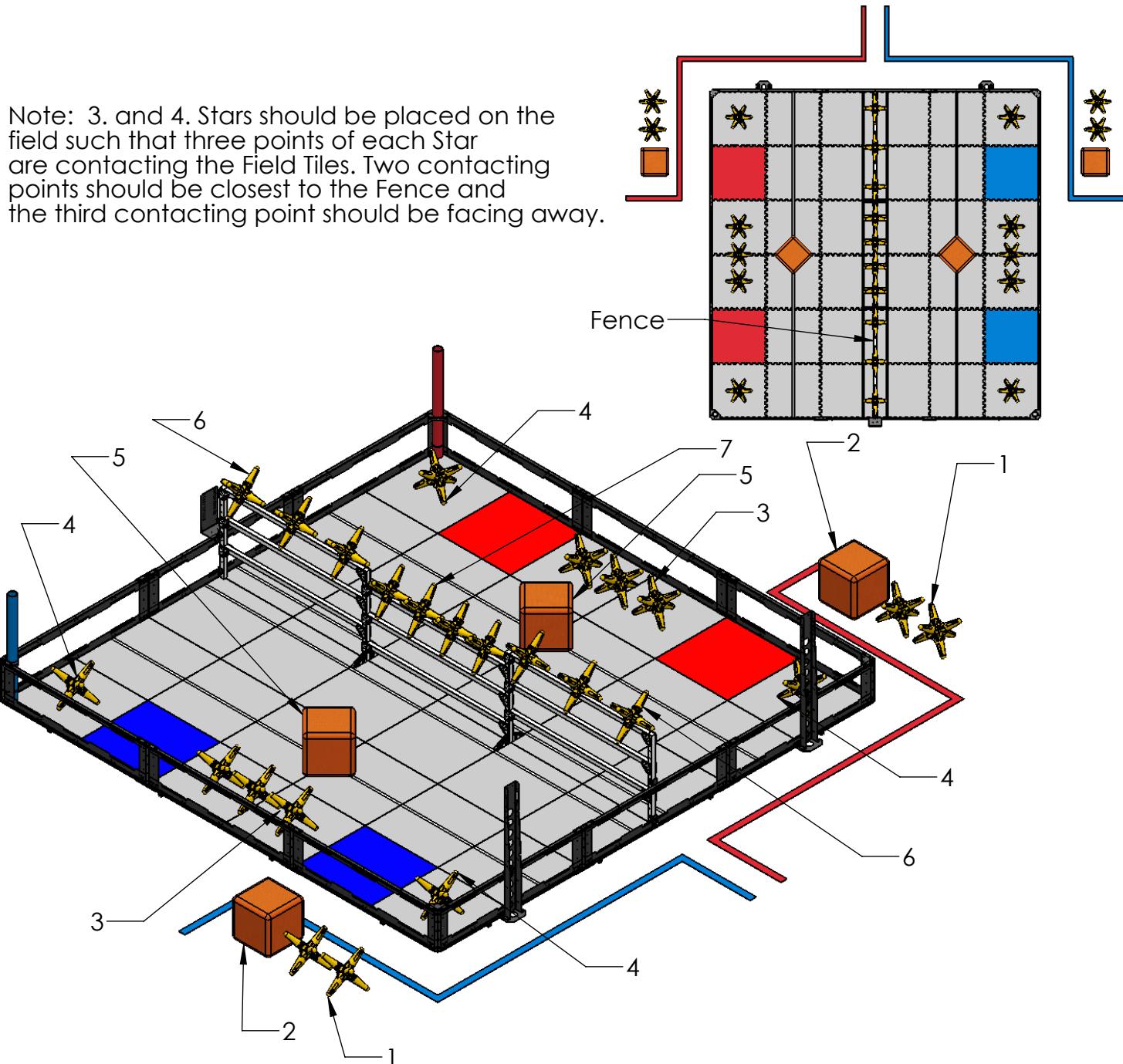
Corners for the Competition Field Perimeter are configured as shown above.

VEX ROBOTICS COMPETITION	Description	2016-2017 Field Corner Configuration	
	Dwg No	276-4847-000 Rev4	
	Project	VRC 2016-2017	Sheet 6 of 28
	Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

The Stars and Cubes are placed as follows before the start of each match.

1. There are (2X) Stars for Preload in each Alliance Station
2. There is (1X) Cube as a Driver Control Load in each Alliance Station
3. There are (3X) Stars centered on each half of the field between Alliance Starting Tiles.
4. There is (1X) Star centered on each corner Field Tile.
5. There is (1X) Cube on each half of the field diagonally centered on the Far Zone tape line.
6. There are (3X) Stars equally spaced on both outside sections of the Fence.
7. There are (4X) Stars equally spaced on the middle section of the Fence.

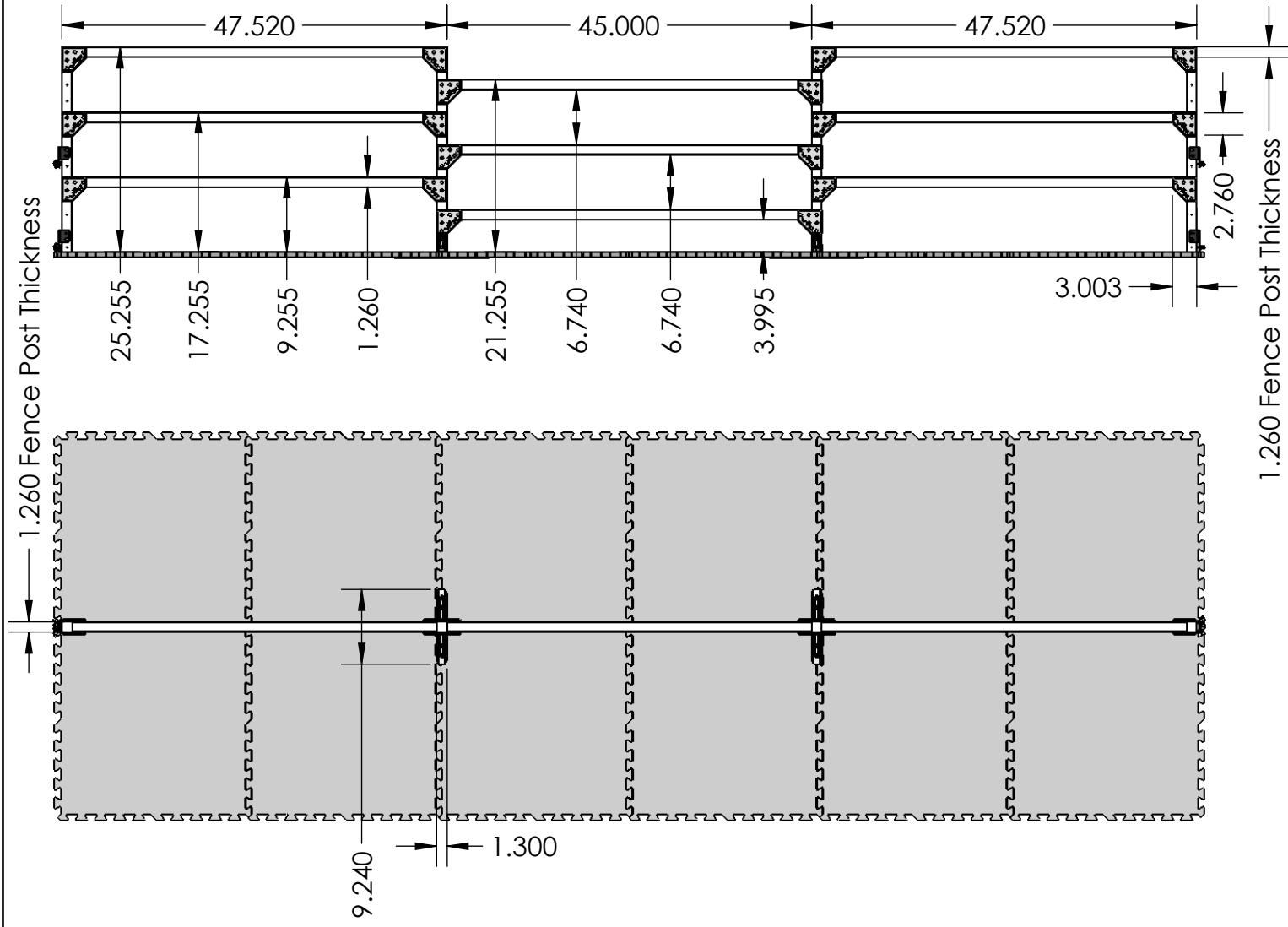
Note: 3. and 4. Stars should be placed on the field such that three points of each Star are contacting the Field Tiles. Two contacting points should be closest to the Fence and the third contacting point should be facing away.



VEX ROBOTICS COMPETITION	Description	Game Object Placement
	Dwg No	276-4847-000 Rev4
	Project	VRC 2016-2017
	Release	2016-05-26

www.VEXROBOTICS.com

Fence Specs:

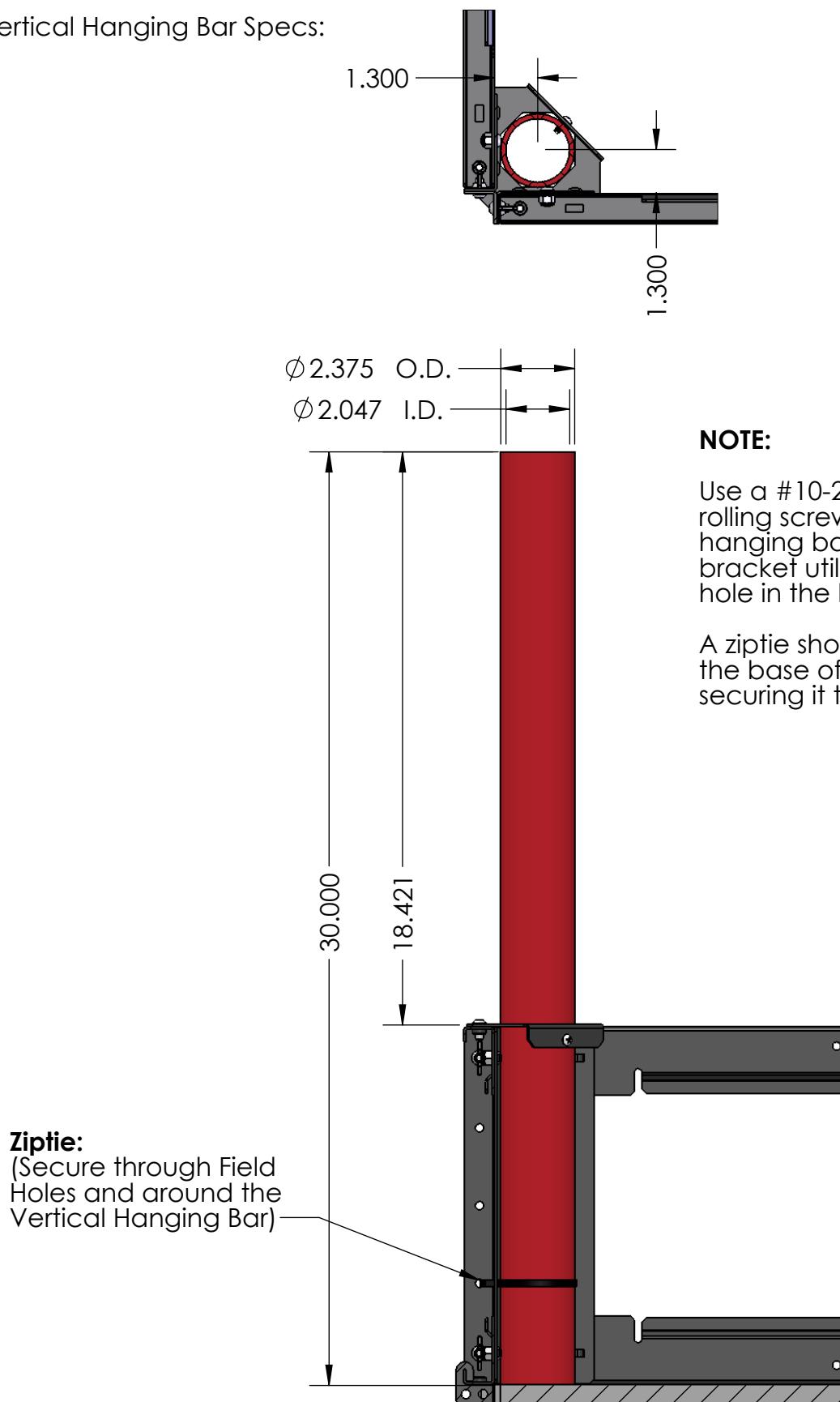


Fence is made of 32mm Square PVC Extrusion and Plastic Triangular Gussets.



Description	Fence Specifications	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 8 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

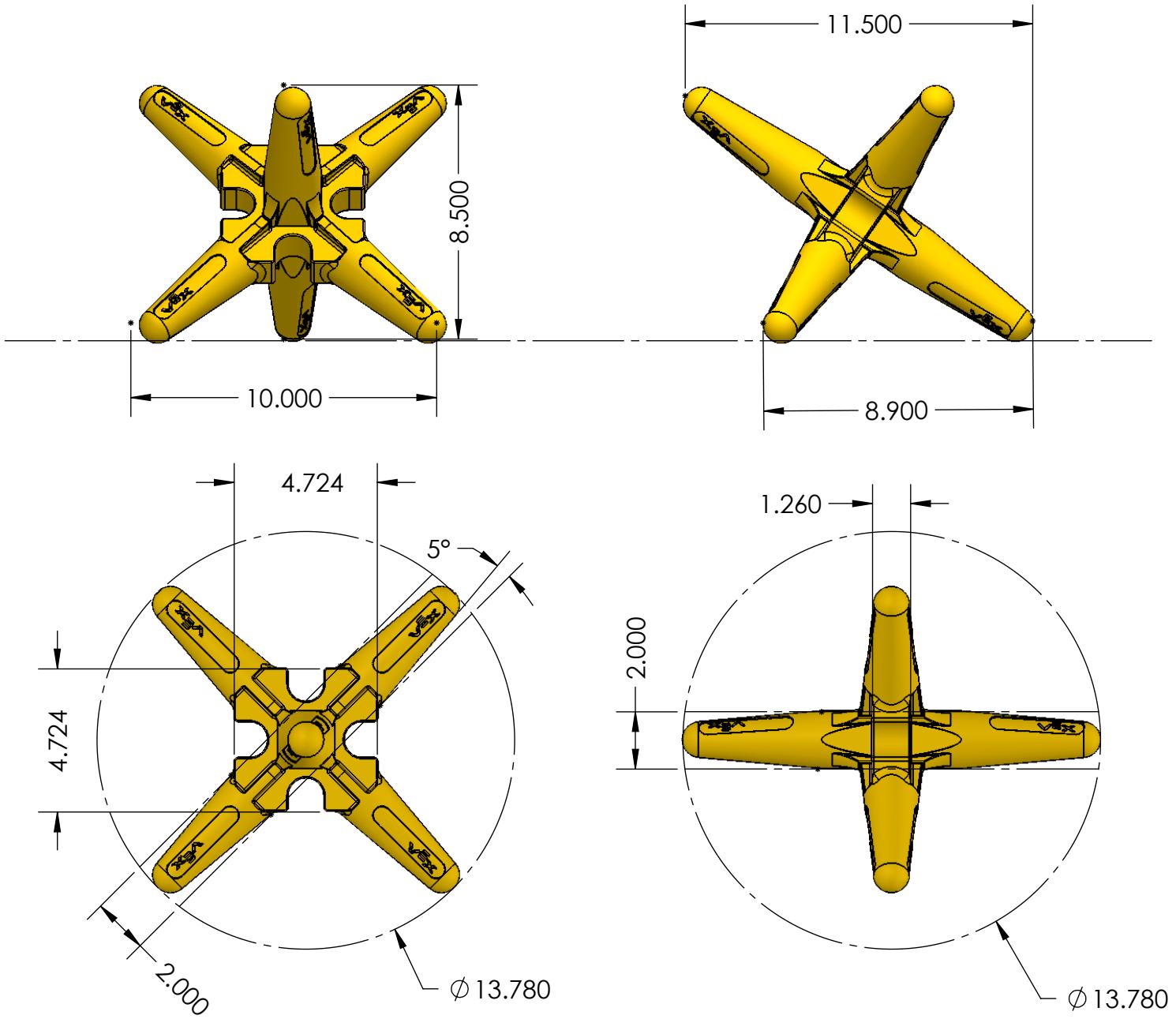
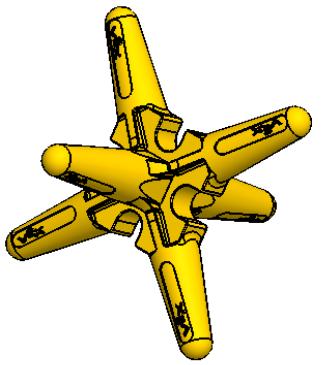
Vertical Hanging Bar Specs:



Description	Hanging Bar Specifications	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 9 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

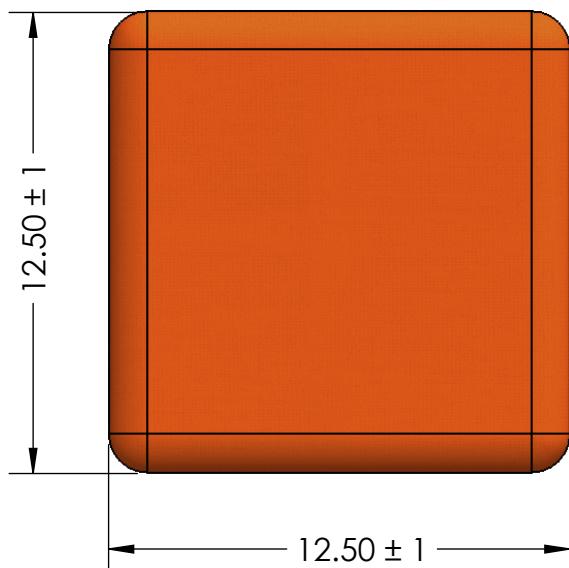
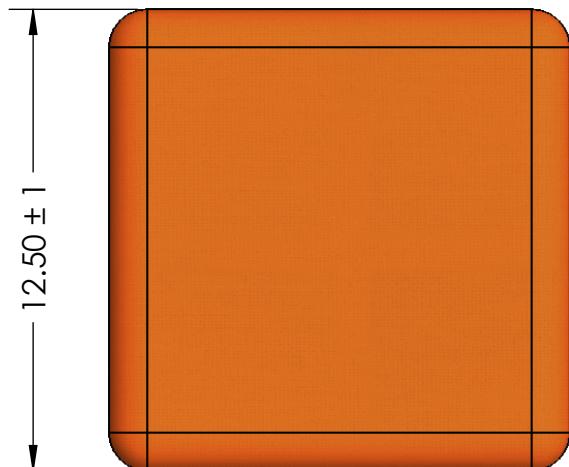
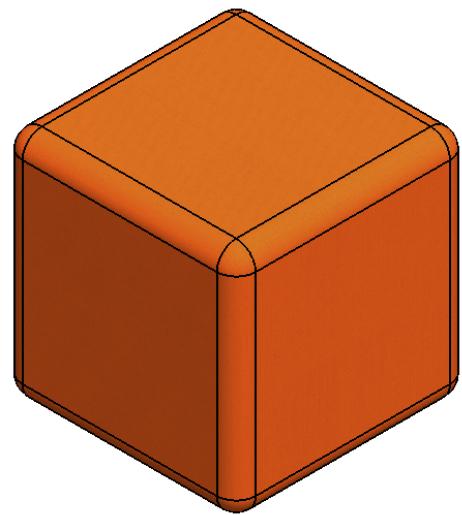
Star Specs:

Weight: 270g ± 15%



Cube Specs:

The Cube is fabric filled with polyester fiber.
Cube is pillow like and easy to deform.



NOTE:

Cubes will come vacuum packed and will need to be fluffed before use.

All dimensions are nominal and will vary due to deformation.

Weight: $760g \pm 15\%$

VEX Robotics Competition Starstruck – Appendix A

Field Assembly Introduction

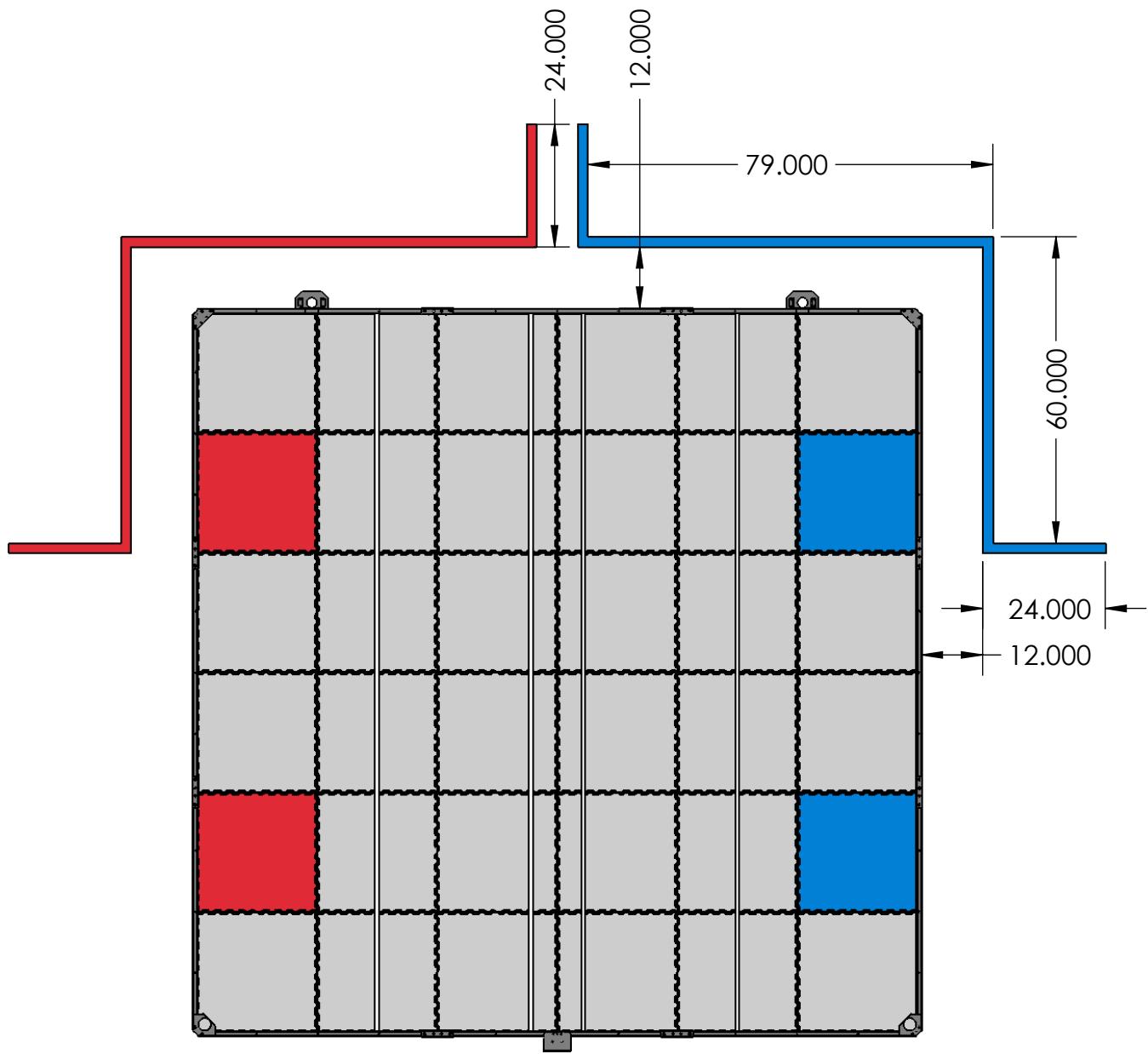
This section will detail the steps required to construct the competition field for the *VEX Robotics Competition – Starstruck*. The field utilizes the “VEX Competition Field Perimeter” (278-1501). For specifications and instructions for assembling this frame, please refer to the separate “VEX Competition Field Perimeter” 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 VEX Robotics Competition – Starstruck field:

- 3/32" Allen Wrench
- 11/32" Wrench
- 1/4" Wrench
- Phillips Head Screw Driver
- Side Cutters or Scissors (for cutting zip ties)

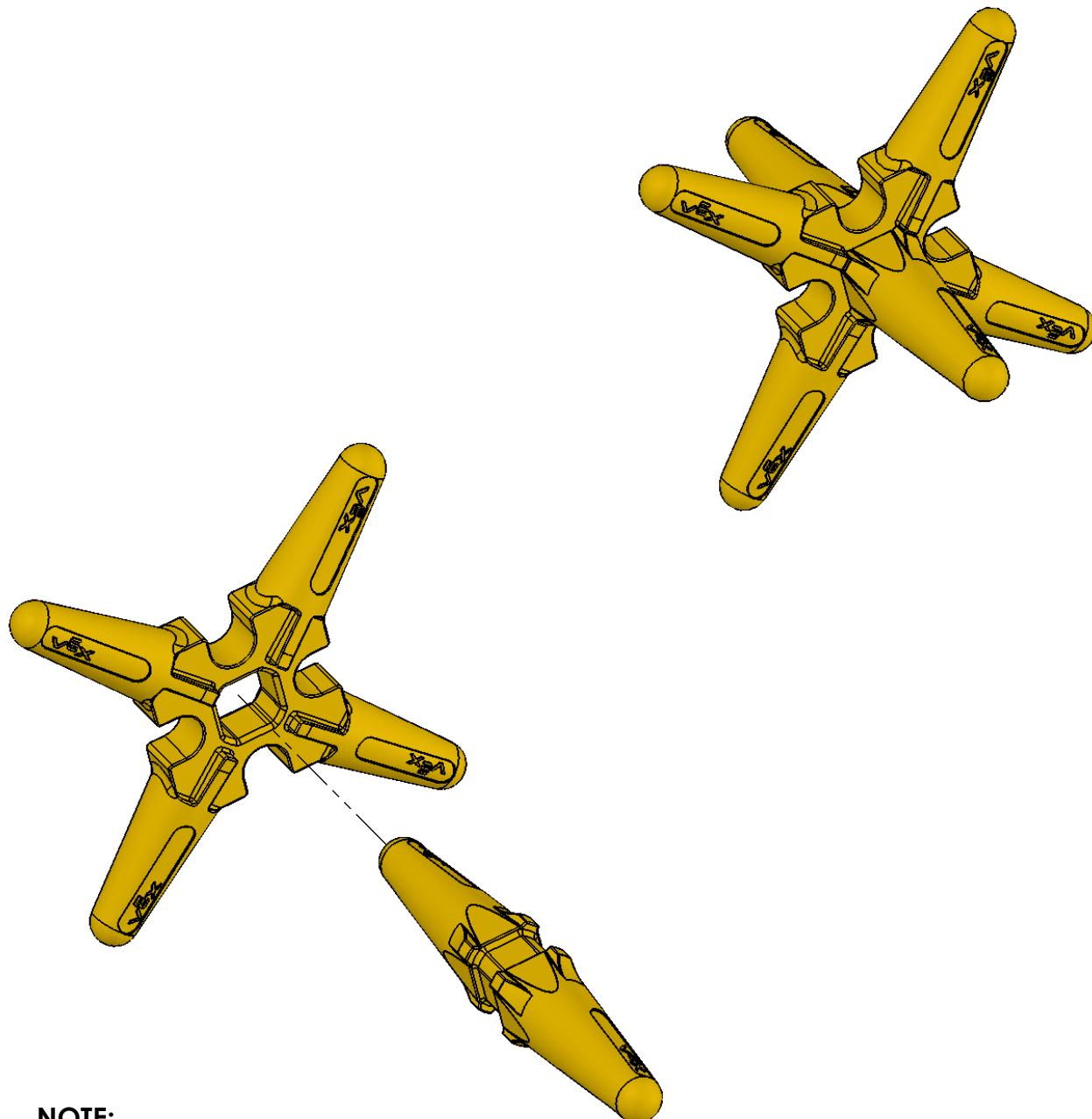


CROWD

Once the Field Perimeter is in place, mark off the Alliance Station using Red or Blue Tape as shown above.

The edges of the Alliance Stations should be in line with the edges of the corresponding foam tiles.

Star Assembly:



NOTE:

The Star should be assembled as shown above.

Push the insert **evenly** until the tabs are seated on both sides of the Star body.

Uneven pressure can cause permanent damage to the Star.

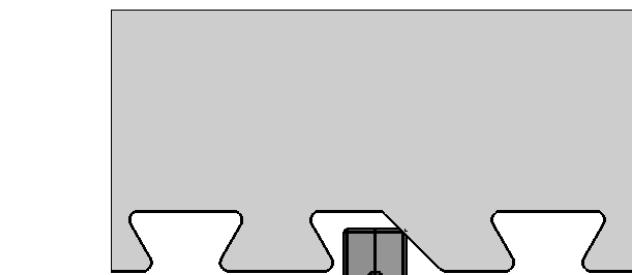
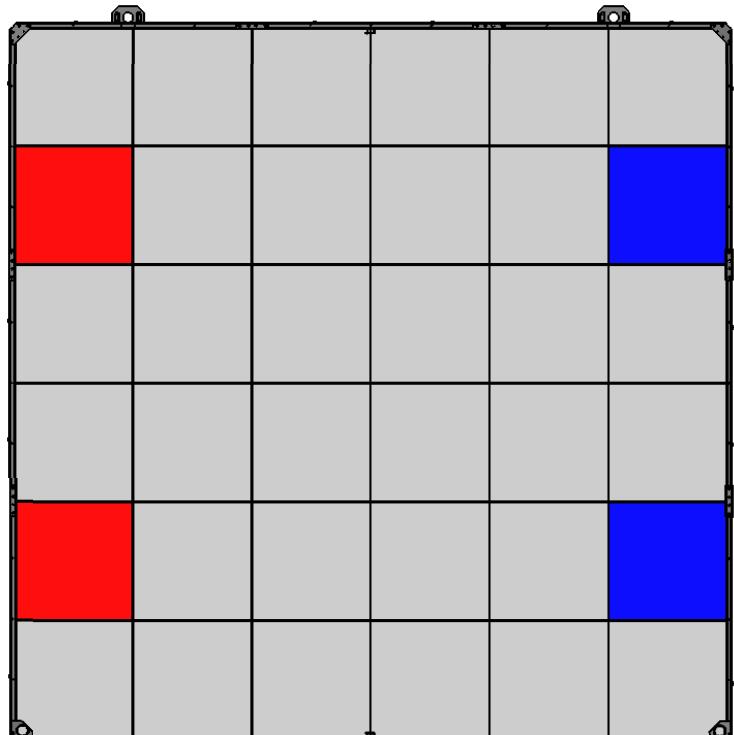
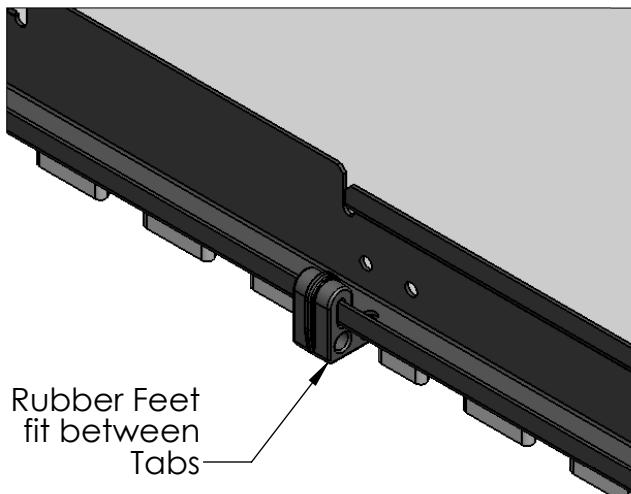
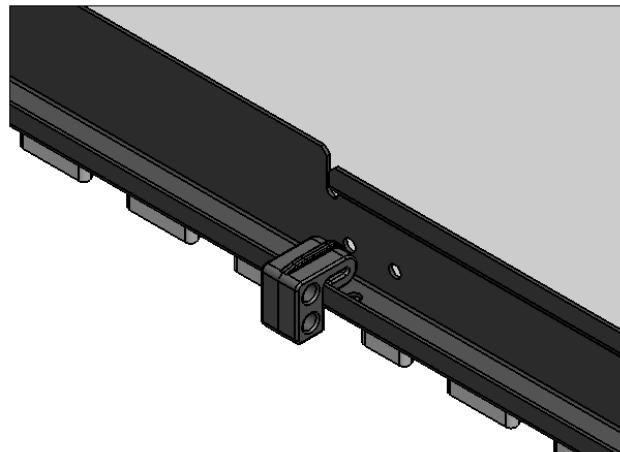
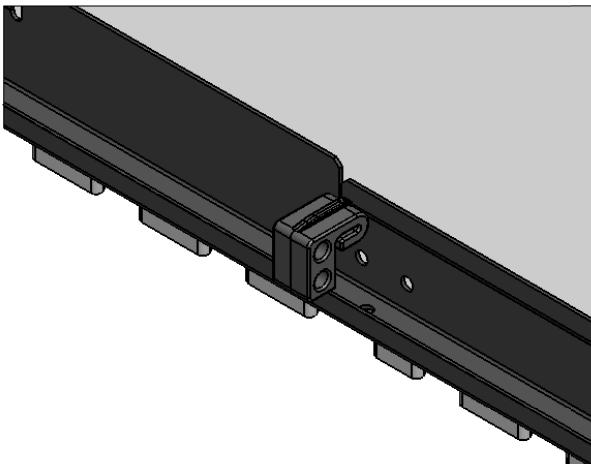
Once the Star has been assembled, **DO NOT** disassemble. Disassembly can cause permanent damage to the game piece.

Description	Star Assembly	
Dwg No	276-4847-000 Rev4	
Competition	VRC 2016-2017	Sheet 13 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

Field Perimeter Rubber Feet are attached to the Field Perimeter as shown.

(4X) Rubber Feet are used on each Field Perimeter side.

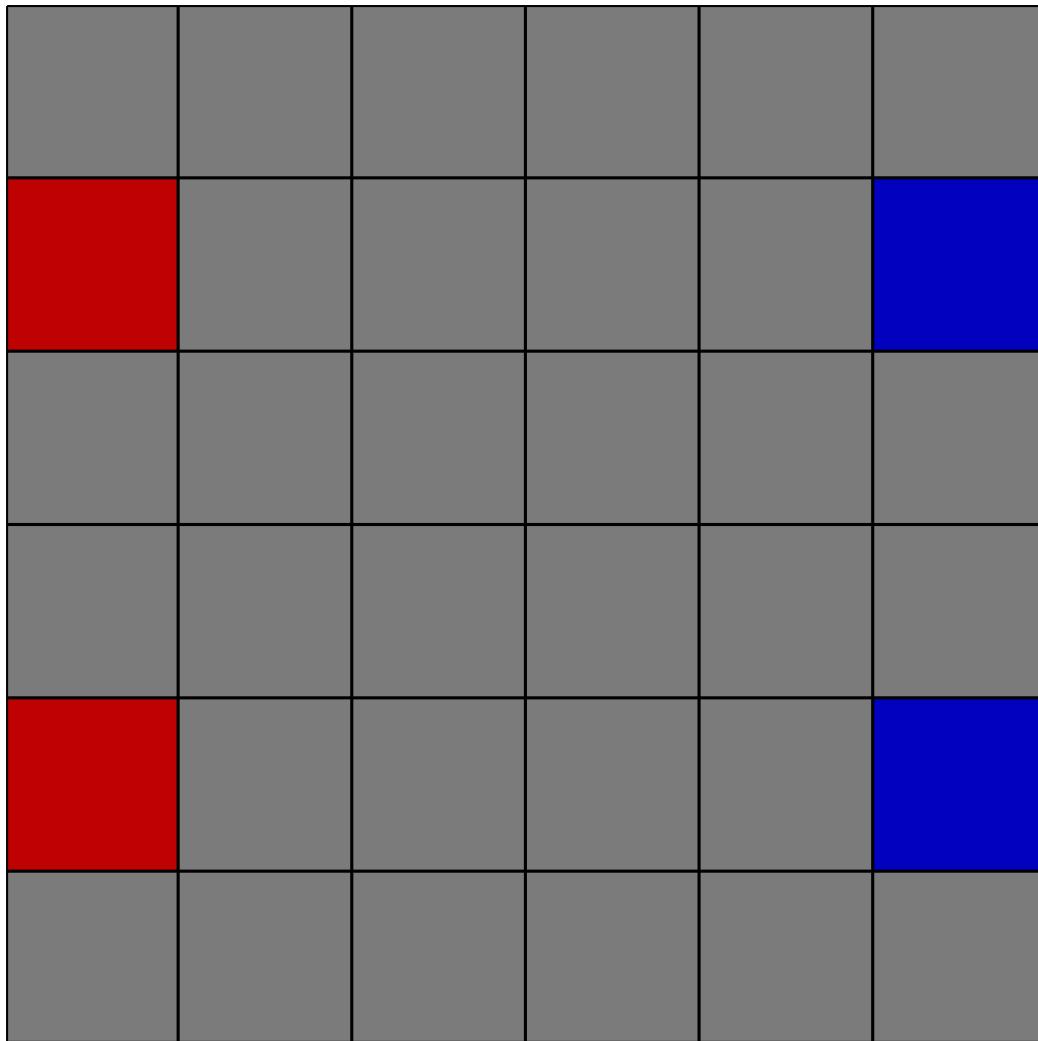
Note: Field Perimeter Rubber Feet fit between Foam Tile tabs. Tabs do NOT need to be removed.



4 Field Perimeter Rubber Feet per side (typical)

	Description	Field Perimeter Rubber Feet Assembly	
	Dwg No	276-4847-000 Rev4	
	Competition	VRC 2016-2017	
	Release	2016-05-27	ALL DIMENSIONS ARE IN INCHES.

Do NOT remove Foam Tile tabs!



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", with the Field Perimeter.

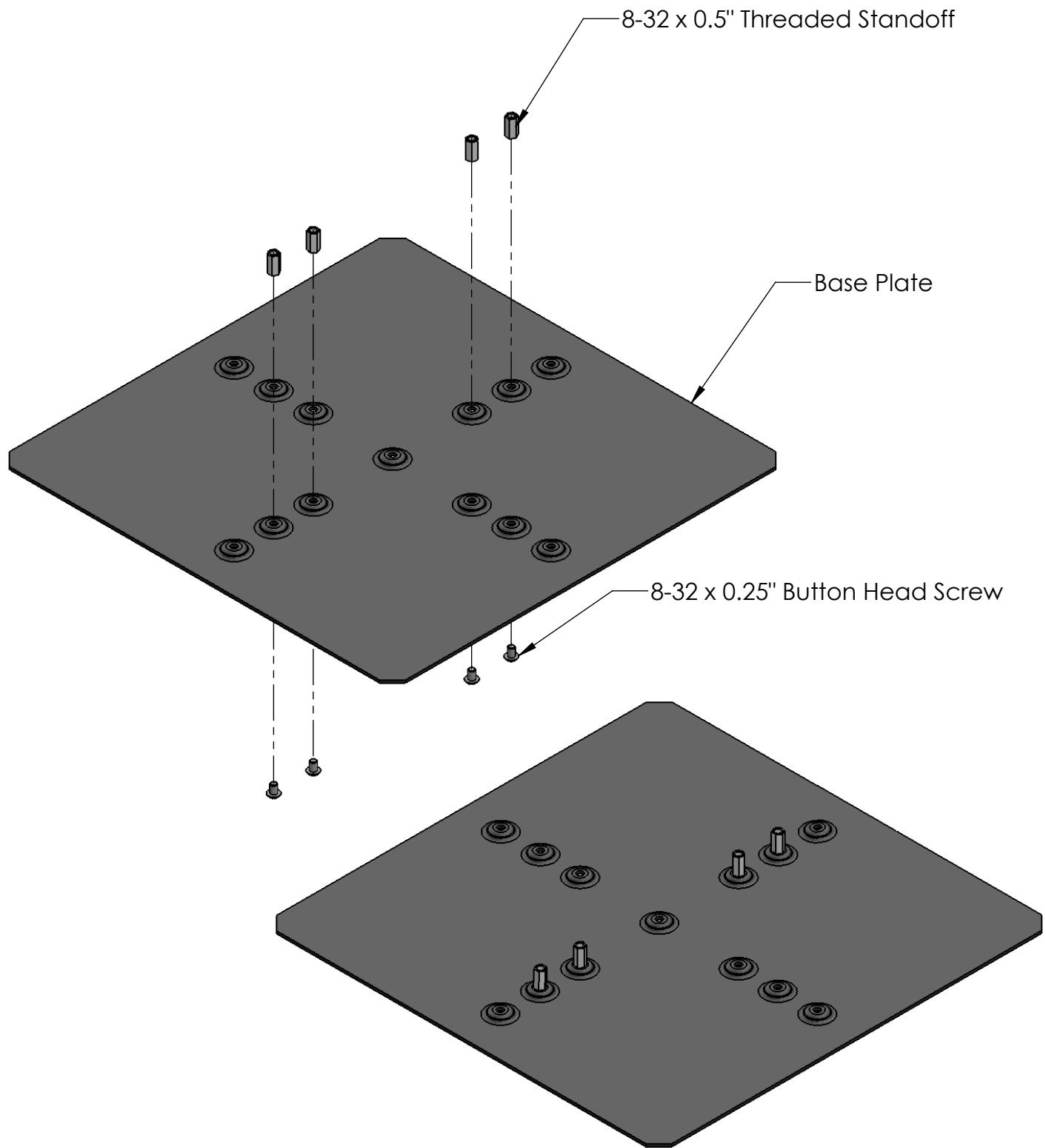
The "Blue" and "Red" Tiles should be placed as shown above.

The grid-lines are for reference only.

Note: Tabs DO NOT need to be removed from Foam Tiles.

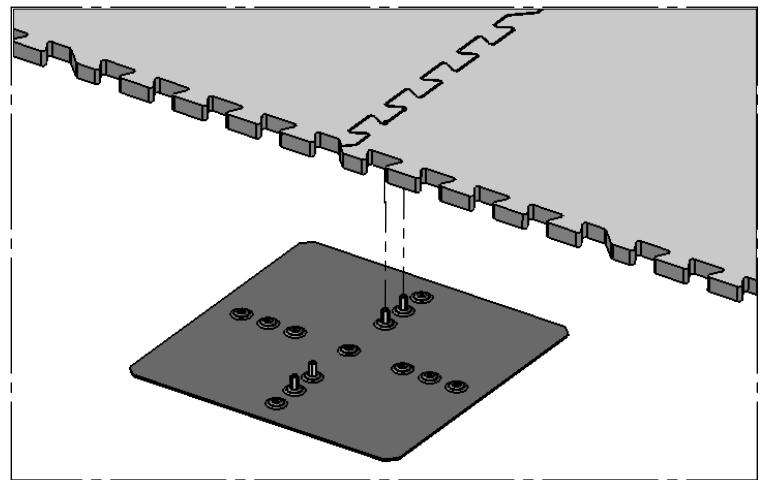
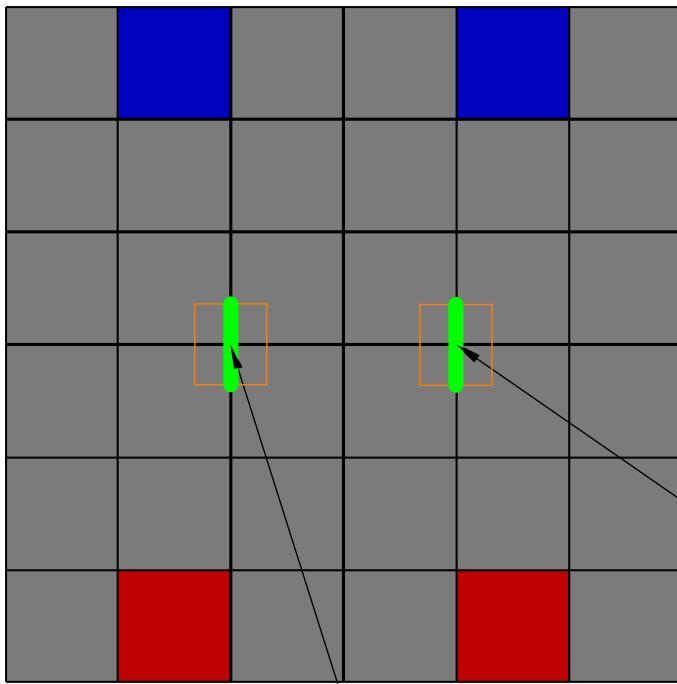
Step 1:

Attach (4X) 8-32 x 0.5" Threaded Standoffs to the Base Plate using (4X) 8-32 x 0.25" Button Head Screws. Repeat this (2X).



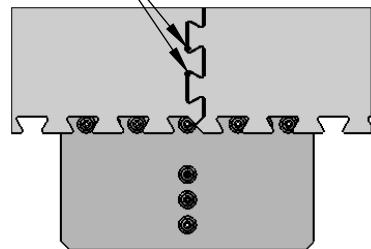
Step 2:

Place the Base Plate Stand-off Assembly under the Field Tiles as specified below.

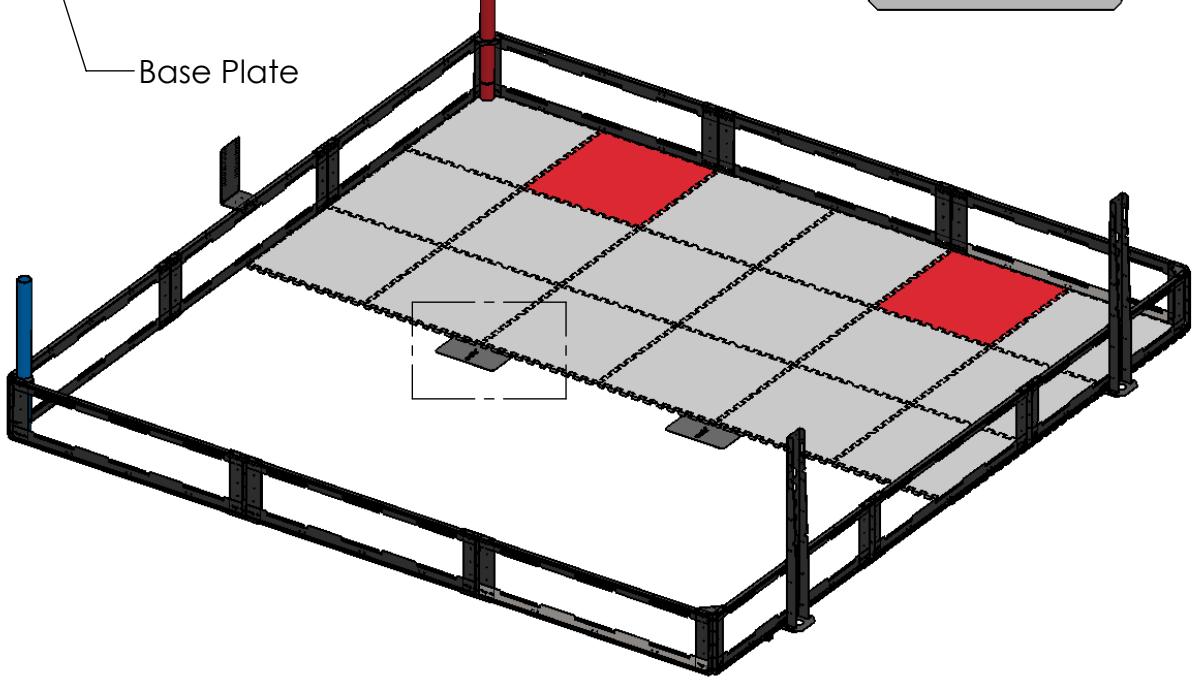


Stand-offs go between
Foam Tile tabs

Base Plate



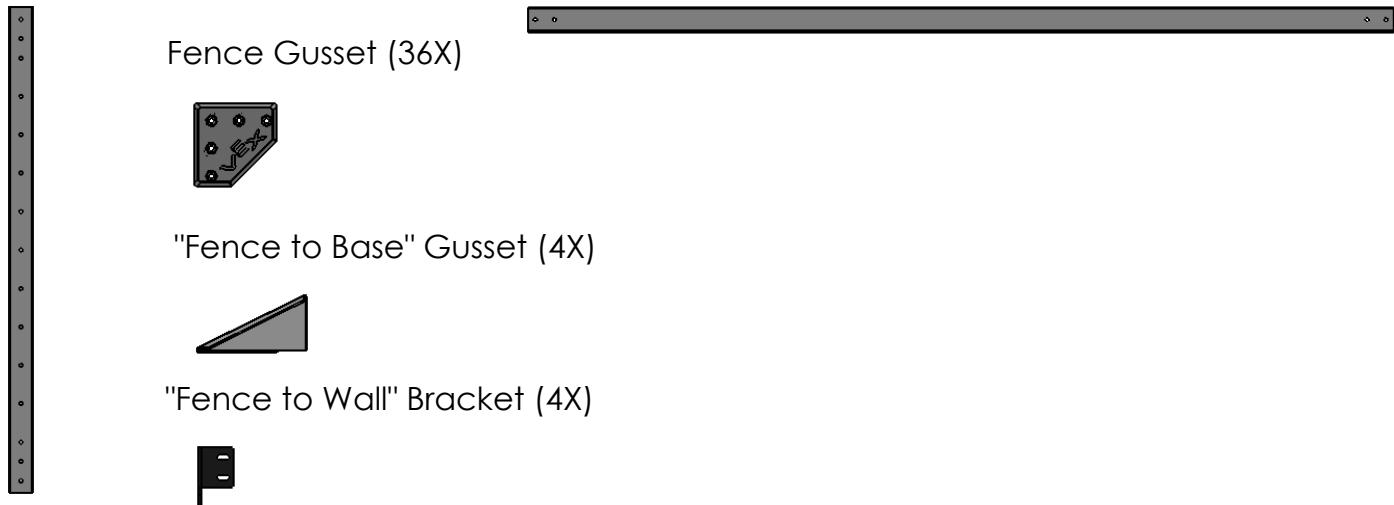
Base Plate



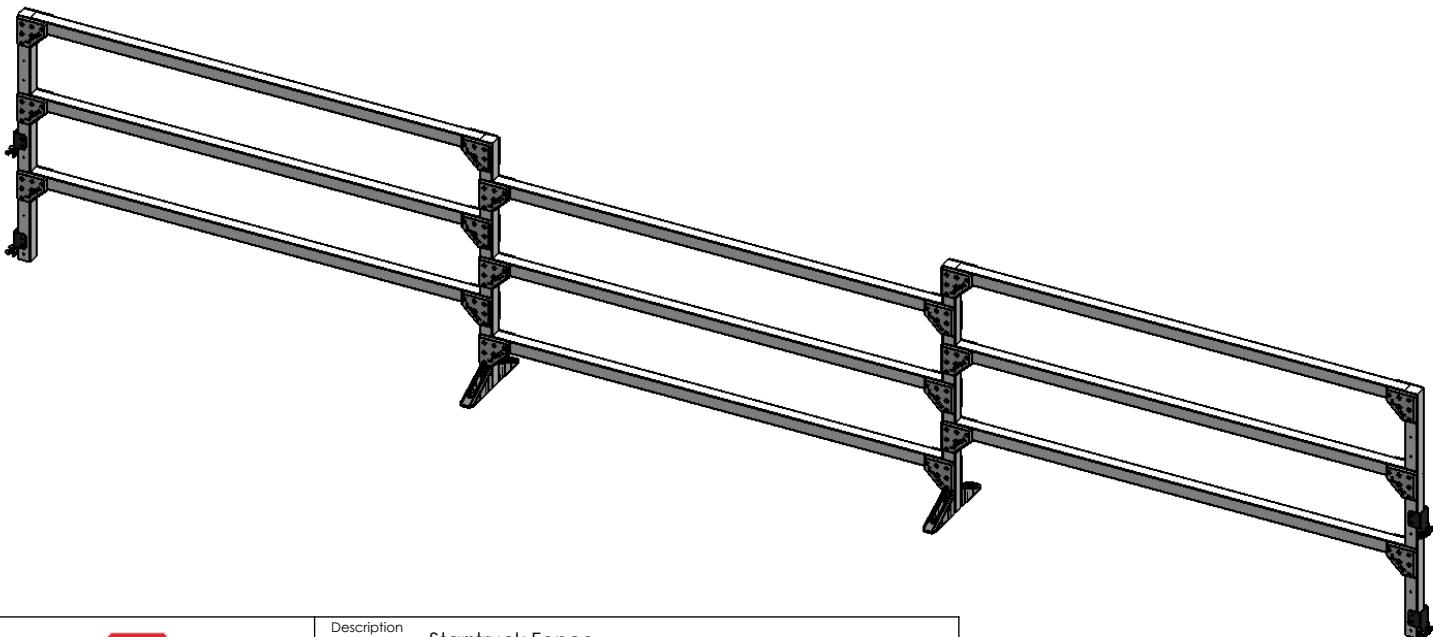
The Fence in VEX Robotics Competition Starstruck is made up of:

1. (4X) Vertical Fence Post
2. (9X) Horizontal Fence Bar
3. (36X) Fence Gusset
4. (4X) "Fence To Base" Gusset
5. (2X) Base Plate
6. (4X) "Fence To Wall" Bracket
7. (80X) 8-32 x 1.75" Screw
8. (80X) 8-32 Nylock Nut
9. (16X) 8-32 x 0.25" Screw
10. (8X) 0.5" Threaded Standoff
11. (8X) 1/4-20 x 0.5" Screw
12. (8X) 1/4-20 Wingnut

Vertical Fence Post (4X)

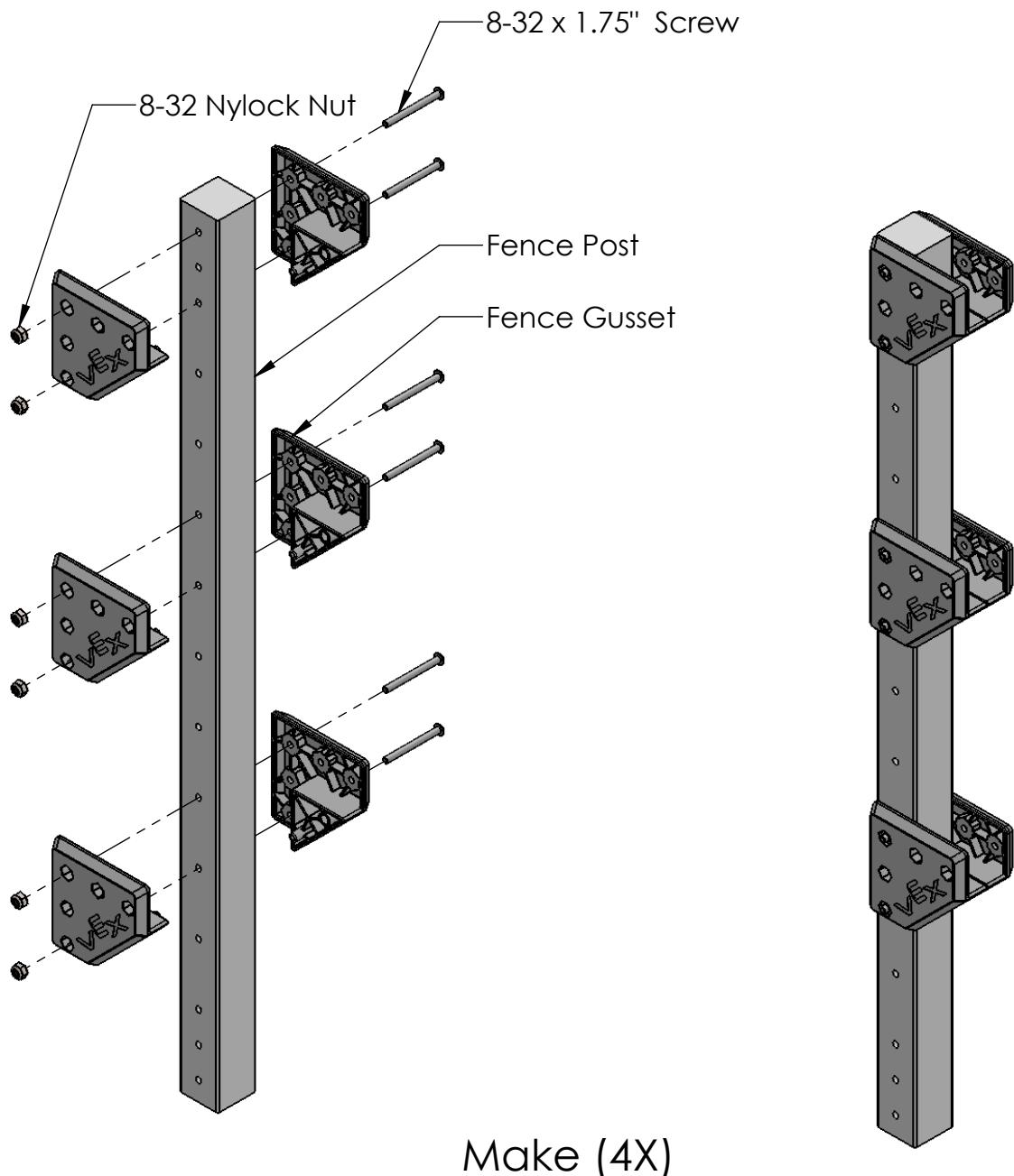


Fence Bar (9X)



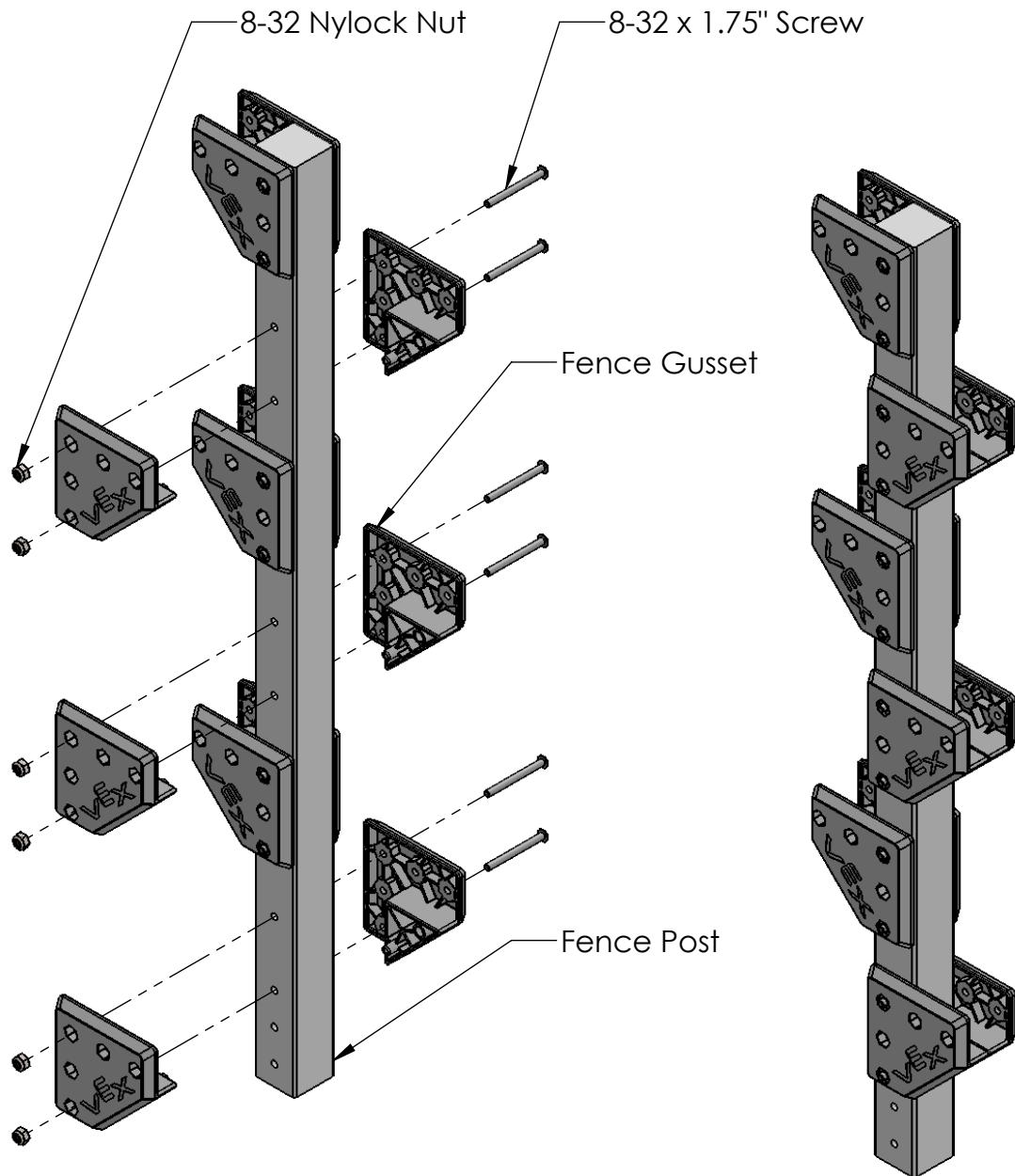
Step 1:

Attach (3X) pairs of Fence Gussets to the Vertical Fence Post using (6X) 8-32 x 1.75" Screws and (6X) Nylock Nuts. Repeat this (4X).



Step 2:

Attach (3X) pairs of Fence Gussets to the Vertical Fence Post using (6X) 8-32 x 1.75" Screws and (6X) Nylock Nuts. Repeat this (2X).

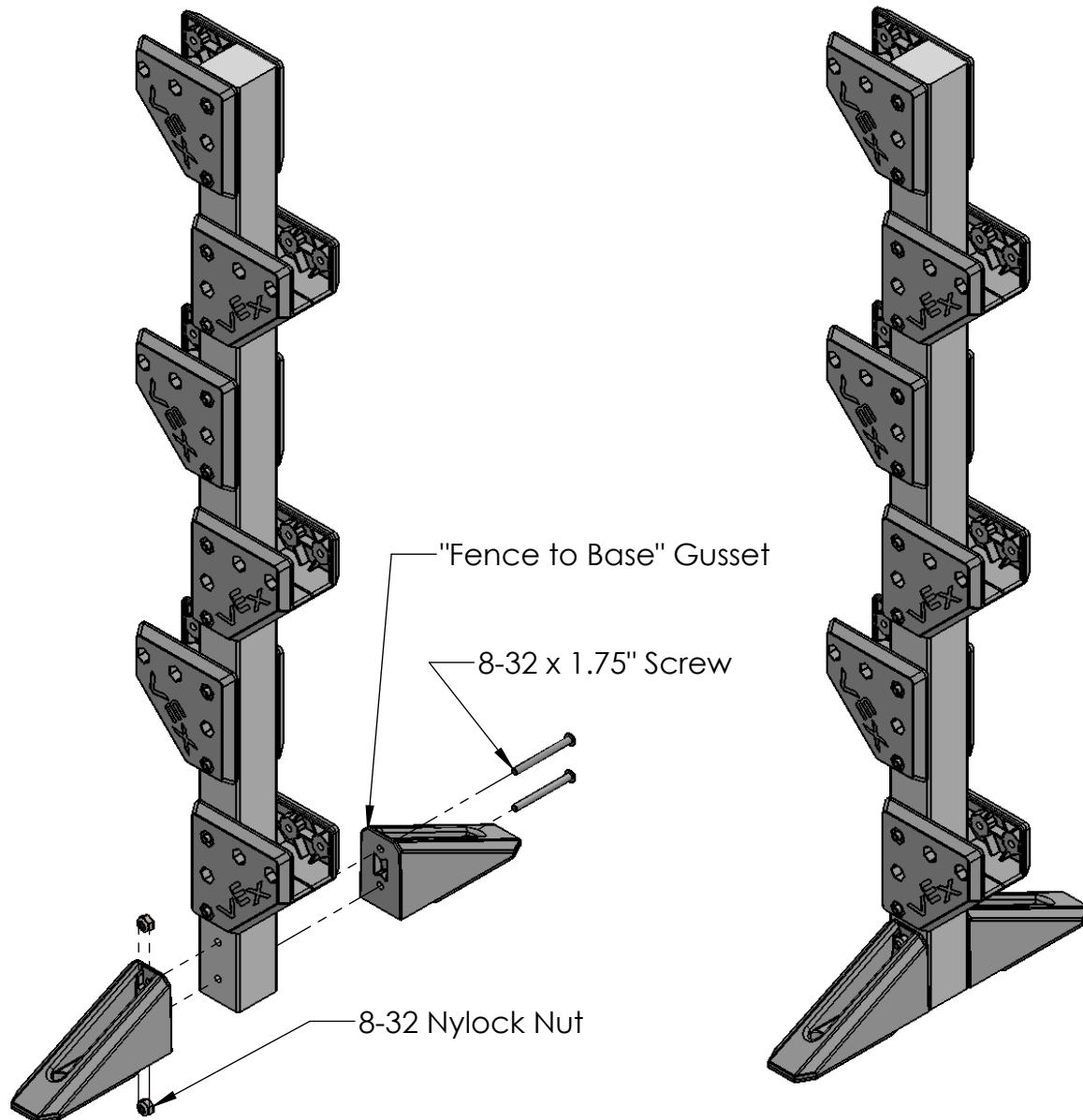


Make (2X)

Description	Fence Gusset Assembly	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 20 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

Step 3:

Attach (1X) pair of "Fence to Base" Gussets to the Vertical Fence Post using (2X) 8-32 x 1.75" Screws and (2X) Nylock Nuts. Repeat this (2X).

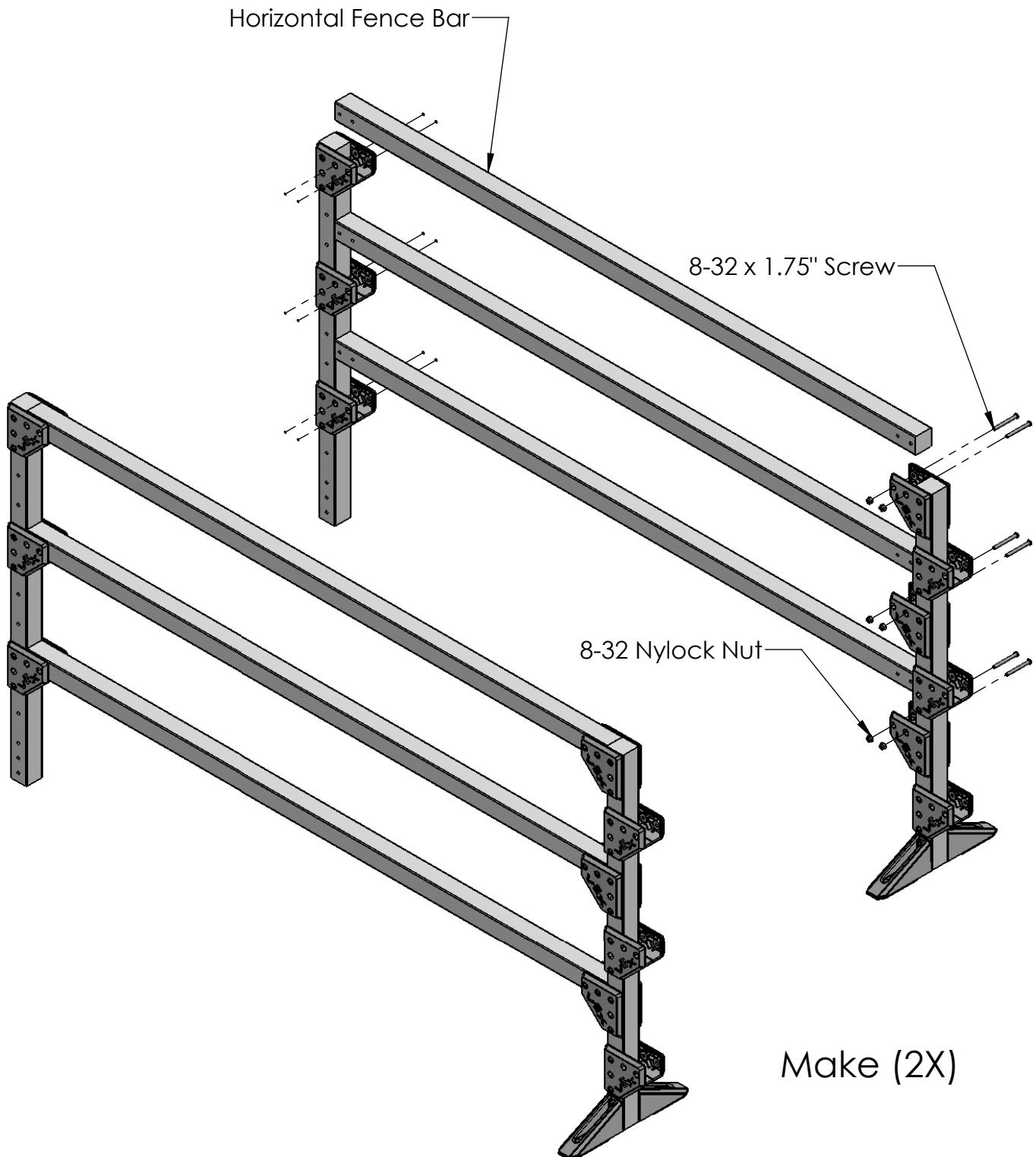


Make (2X)

Description	Base Gusset Assembly	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 21 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

Step 4:

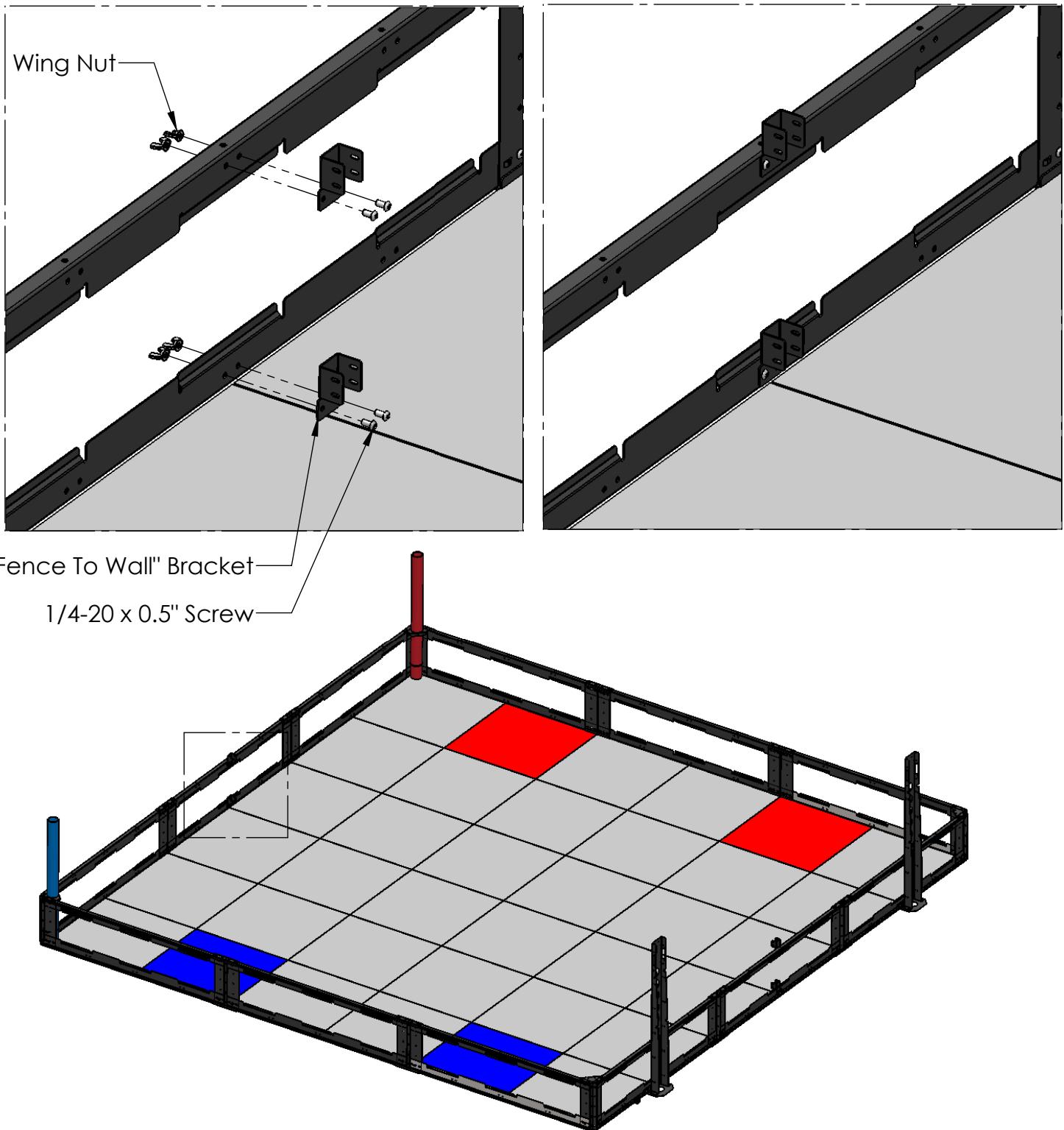
Attach (3X) Horizontal Fence Bars to the Vertical Fence Assembly using (12X) 8-32 x 1.75" screws and (12X) 8-32 Nylock Nuts. Repeat this (2X).



Description	Vertical Fence Post Assembly	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 22 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

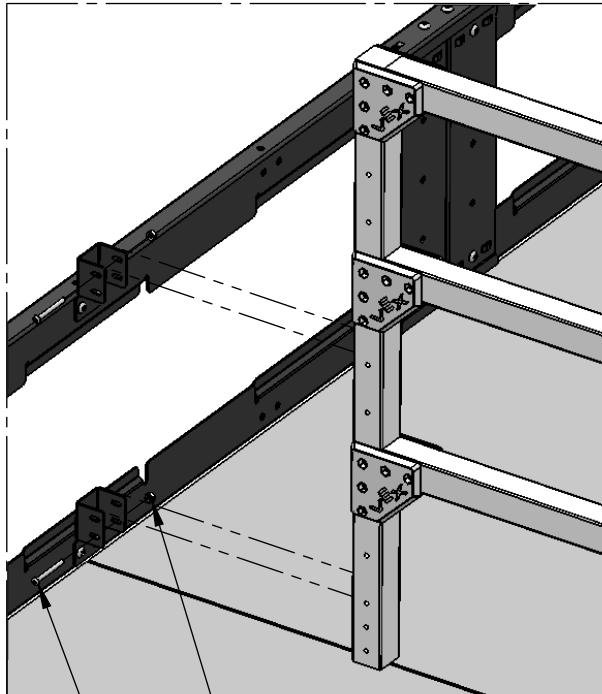
Step 5:

Attach (2X) "Fence to Wall" Brackets to the center holes in the Field Perimeter using (4X) 1/4-20 x 0.5" Screws and (4X) 1/4-20 Wingnuts. Repeat this (2X) for other side of the Field.

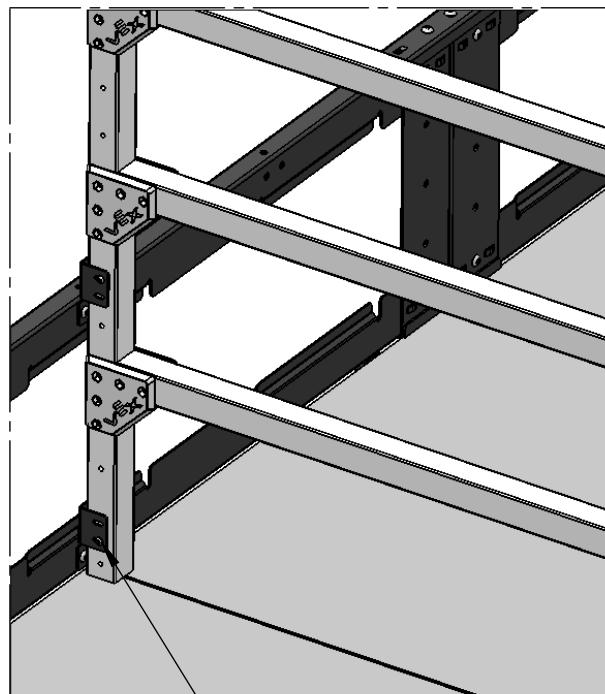


Step 6:

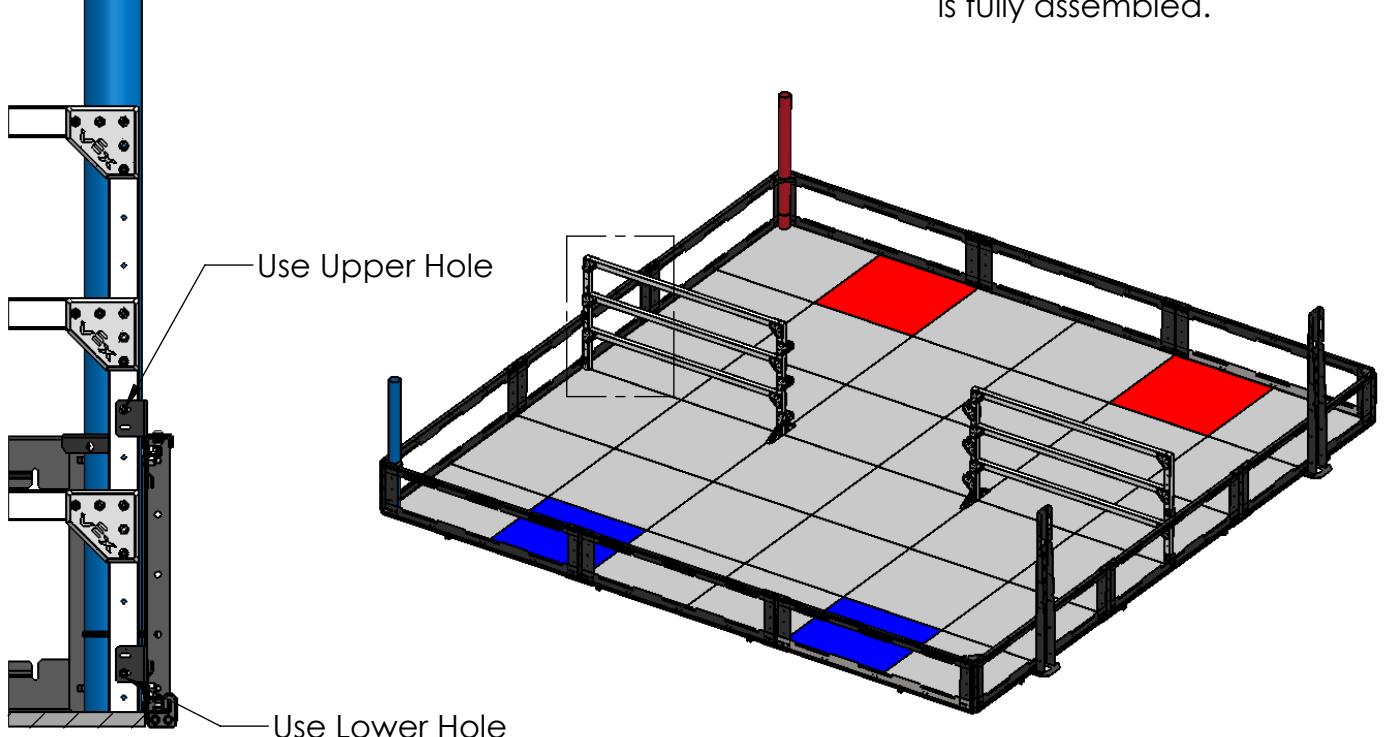
Attach the Fence segment to the Fence to Wall Bracket using (2X) 8-32 x 1.75" Screws and (2X) 8-32 Nylock Nuts. Repeat this (2X) for other side of the Field.



8-32 Nylock Nut
8-32 x 1.75" Screw



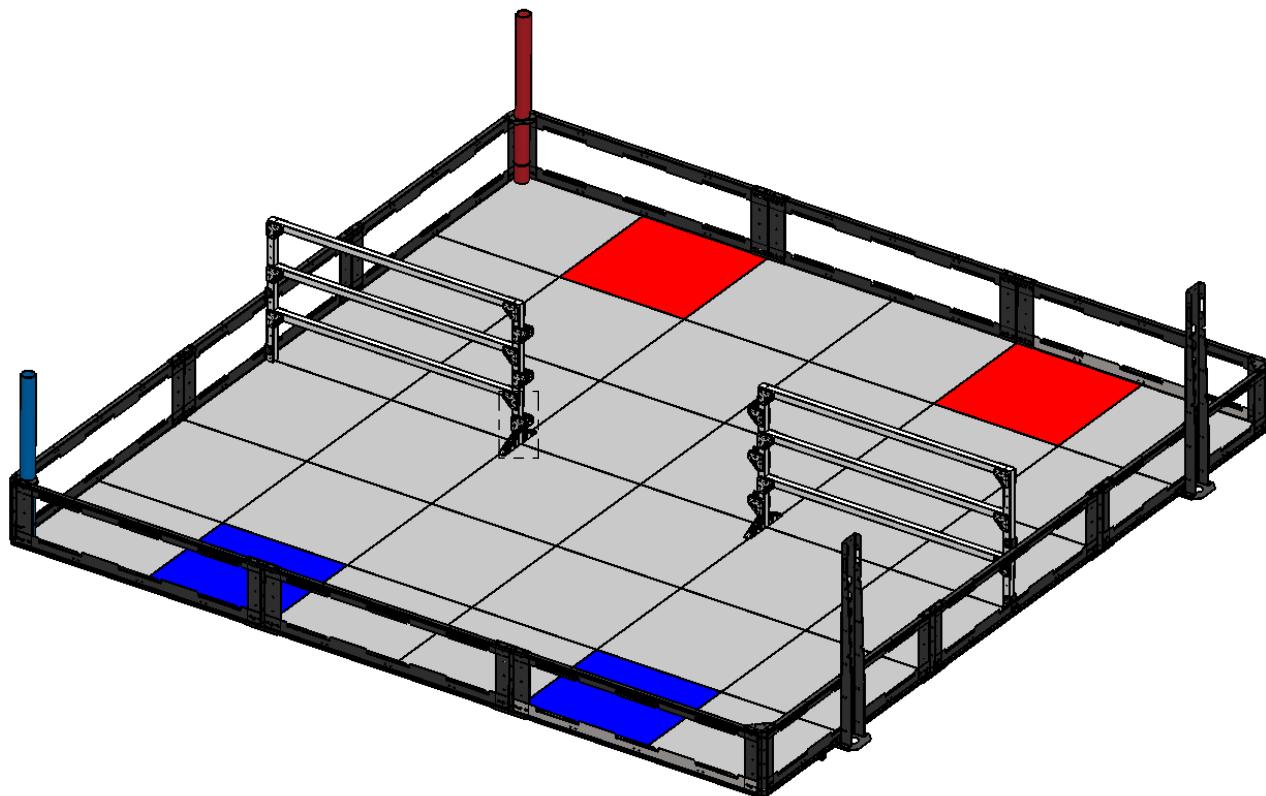
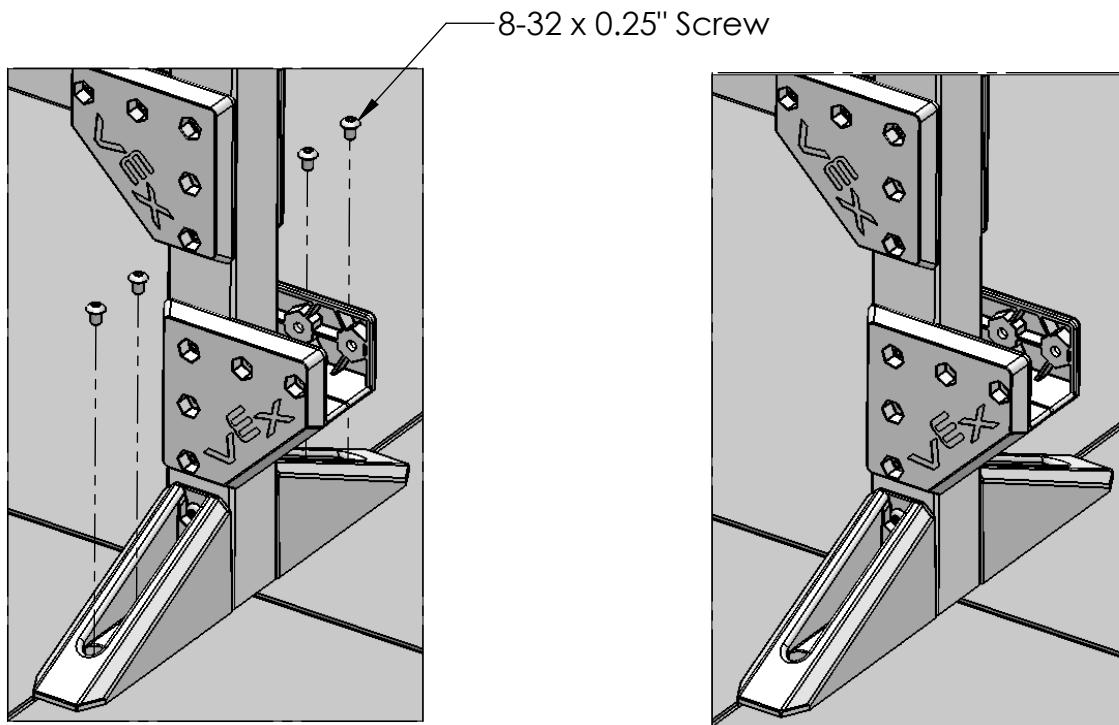
DO NOT tighten the bolts until the Fence is fully assembled.



Description		Fence Attachment
Dwg No		276-4847-000 Rev4
Project	VRC 2016-2017	Sheet 24 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

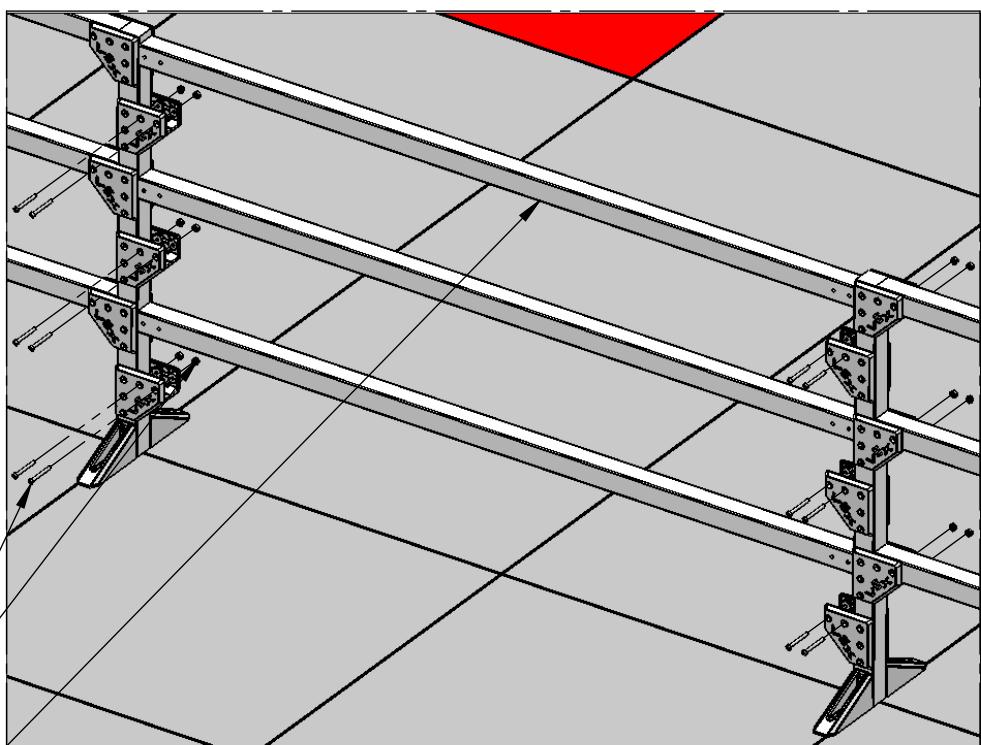
Step 7:

Attach the Half Fence to the Base Plate Assembly under the Field Tiles using (4X) 8-32 x 0.25" Screws. Repeat this (2X) for both sides of the Field.

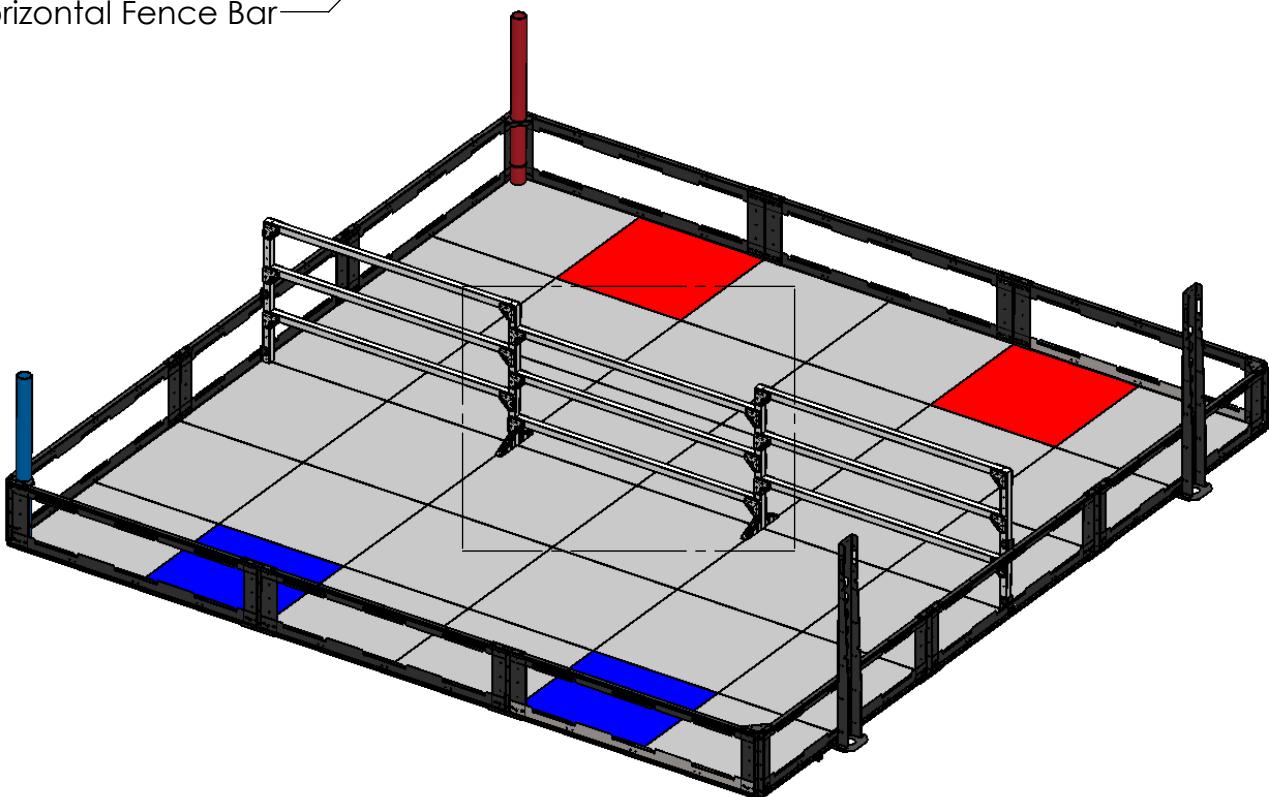


Step 8:

Attach the Fence segment Assemblies together using (3X) Horizontal Fence Posts (12X) 8-32 x 1.75" Screws and (12X) 8-32 Nylock Nuts. Tighten all remaining screws.

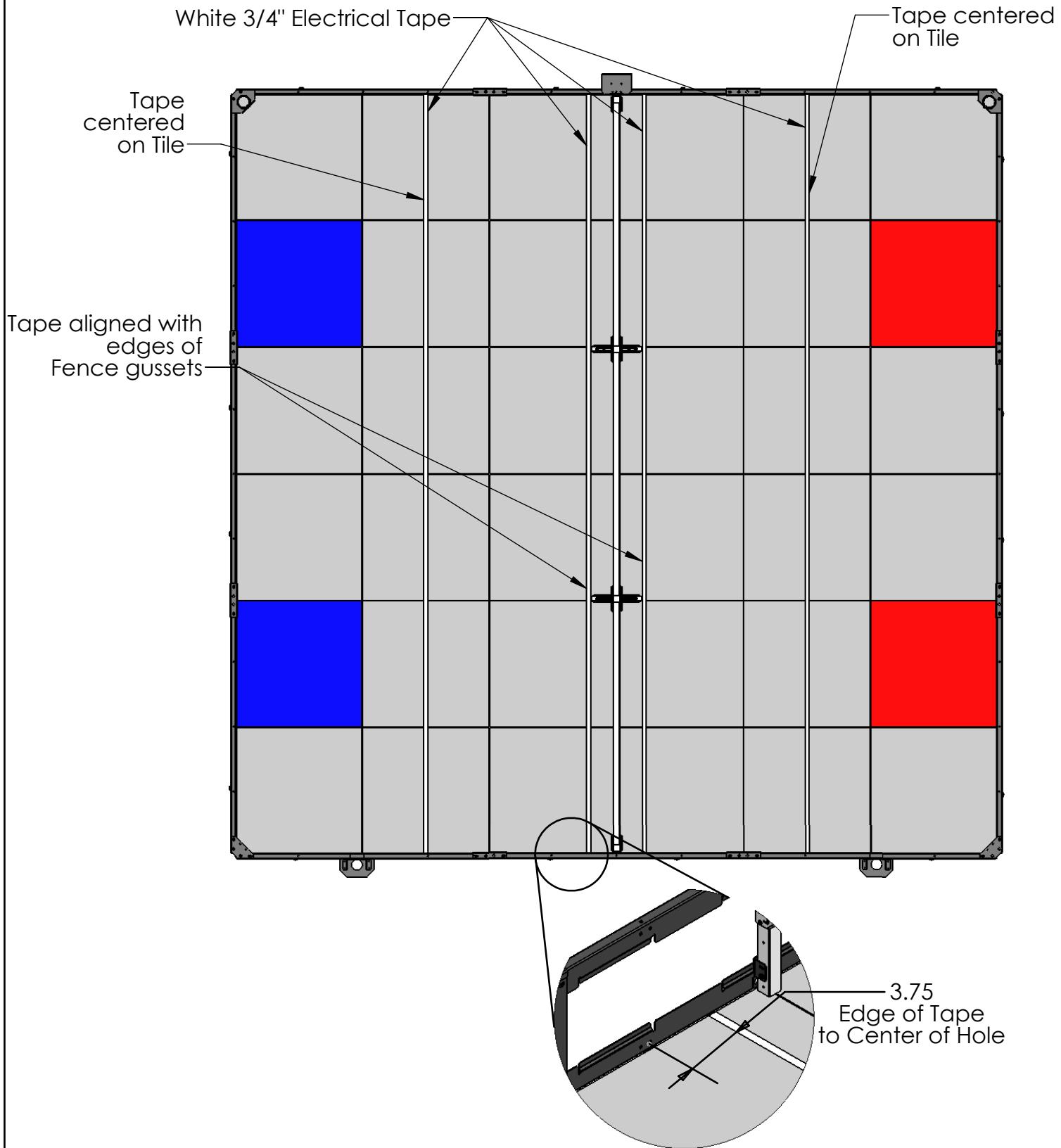


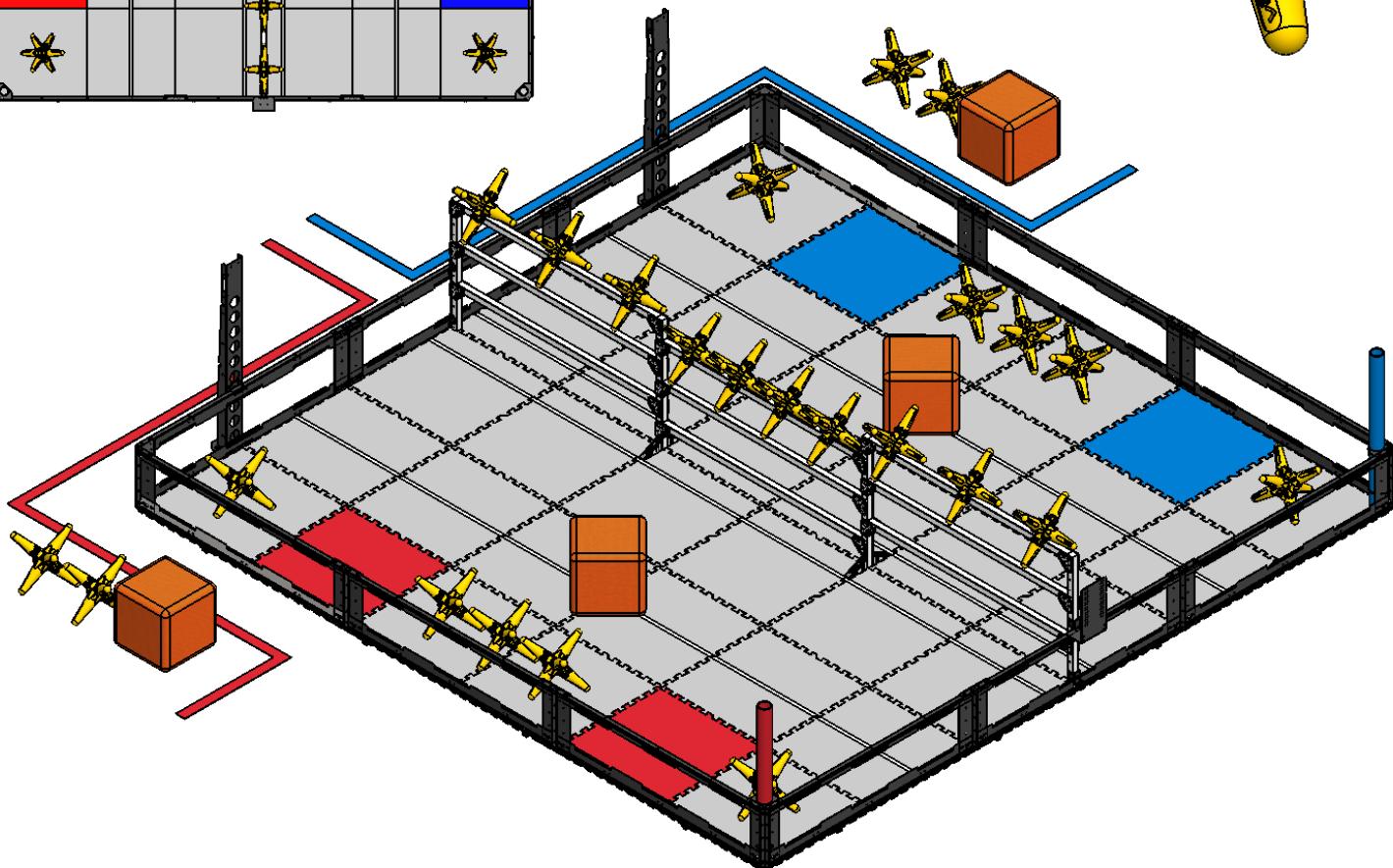
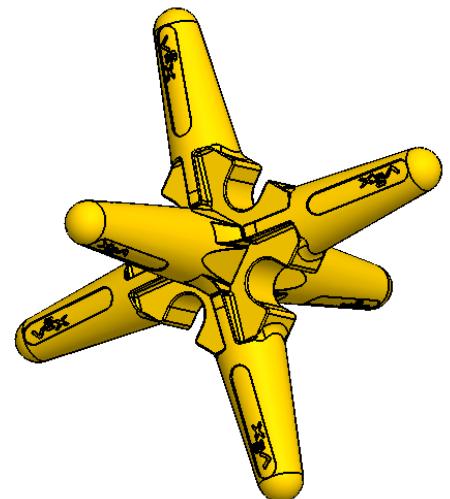
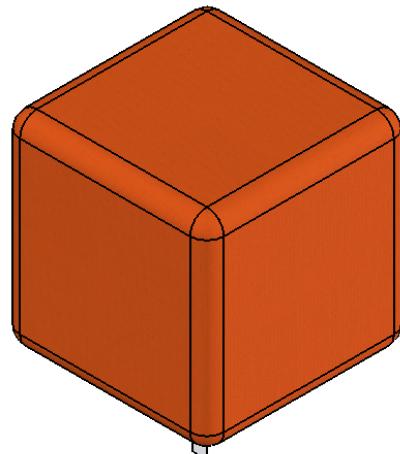
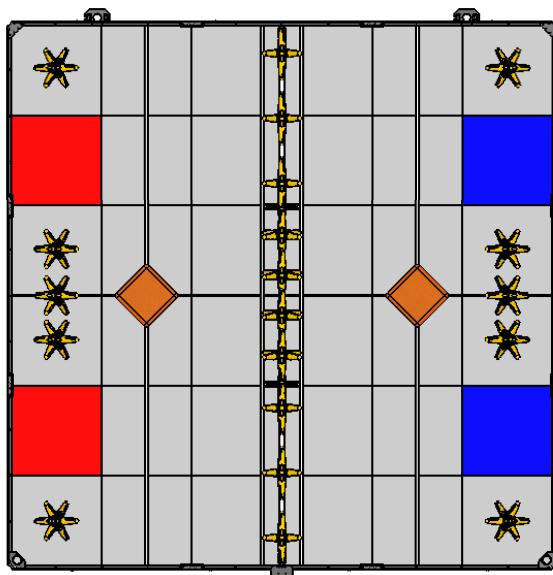
Horizontal Fence Bar



Description	Fence Segment Assembly	
Dwg No	276-4847-000 Rev4	
Project	VRC 2016-2017	Sheet 26 of 28
Release	2016-05-26	ALL DIMENSIONS ARE IN INCHES.

After the Fence has been assembled, apply (4X) strips of White Electrical Tape to the grey Foam Tiles as shown on Sheet 4 and below.





Use (10x) Stars to prepare the Fence for competition. Make sure the Stars are oriented as shown on Sheet 6 and in accordance to the VRC Starstruck Game Manual before beginning.

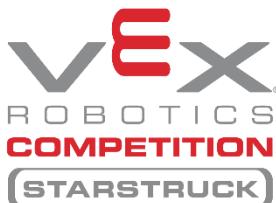
DO NOT take apart the Stars after initial assembly, damage to the Star may occur.

Refer to the VRC Starstruck Game Manual for more details, including all official rules and regulations.

Use the 3D CAD model of the VRC Starstruck Field for additional details not shown in the Field Drawings.

VEX Robotics Competition Starstruck – Appendix A

Low Cost Field Options



Introduction

The field components and game objects used in *VEX Robotics Competition - Starstruck* are all available for purchase from www.vexrobotics.com (P/N 276-4848 and P/N 276-4897), however not every team needs the exact objects which will be used at official VEX Robotics Competition Tournaments. This section will outline some options for teams wishing to use lower-cost substitutes for field objects.

Field Perimeter Cost Reduction

VEX Robotics Competition – Starstruck utilizes the VEX Competition Field Perimeter (278-1501) as the outer edge of the playing area. This custom sheet-metal and lexan frame is robust and designed to be a high-end solution for anyone holding a VEX Robotics Competition. In some cases, however, having a high-end rigid perimeter wall is not important. Some teams may wish to practice with something as simple as a perimeter of tape laid out on the floor. For information on cost reducing the field perimeter and for detailed plans to construct one example of a low-cost perimeter consult the Low-Cost Field Perimeter Guide.

Field Object Cost Reduction

The field objects specific to playing *VEX Robotics Competition - Starstruck* are available from www.vexrobotics.com. These objects include the Fence, Hanging Bars, as well as the Stars, Cubes, and Hardware.

The key things to think about when cost reducing these field objects are the following two questions:

1. What field functionality do I actually need?
2. How can I achieve this functionality with the minimum effort and cost?

The simplest way to cost reduce is to use less. Does every team need a full set of Stars? Maybe a handful is enough for prototyping and practicing. Does the team need four Cubes?

There are a variety of reasons to build or purchase field objects, in many of these cases the official "spec" field components are unnecessary. By analyzing the functionality needed for an application, one can build a "stand-in" object which will interact with robots in the same manner as an 'official' component. These "stand-in" objects can be extremely useful during the prototyping phase of the design process.

VEX Robotics Competition Starstruck – Appendix A

Example Prototyping Ideas

As discussed above, when considering building unofficial field objects, consider the functionality required. A mock-up Fence could be as simple as some cardboard stock cut to size. It may be possible to build the entire field out of wood and successfully simulate robot functions – it just depends what is being tested.

Detailed specifications for the “official” pieces are included in Appendix A – a team must determine which dimensions are important for their mockups and build them accordingly.

Every school will receive a sample game object in their welcome kit. These samples should help teams to learn about the nature of the objects, but also to find things they can use to simulate objects. The samples will provide a good benchmark as teams look for “placebo” objects.

VEX Starstruck Practice Kit

VEX Robotics is happy to offer lower-cost kits to VEX Robotics Competition participants who do not wish to purchase a full field. The Game Element Kit includes a number of Stars as well as a Cube. With this kit (and some cardboard sheet for a fence) teams can build enough for their robot to test its scoring abilities.

More information on these kits is available in the *VEX Robotics Competition - Starstruck* section of www.vexrobotics.com.

Further Questions

Any further questions should be directed to the VEX Technical Support & Community Forum at www.vexforum.com. There is a section specifically for the VEX Robotics Competition including a Q&A section where teams can ask for official rulings from the VEX Robotics Competition Game Design Committee, and will receive answers from the GDC Chairman – Karthik Kanagasabapathy. Look for “Official Starstruck Q&A.”