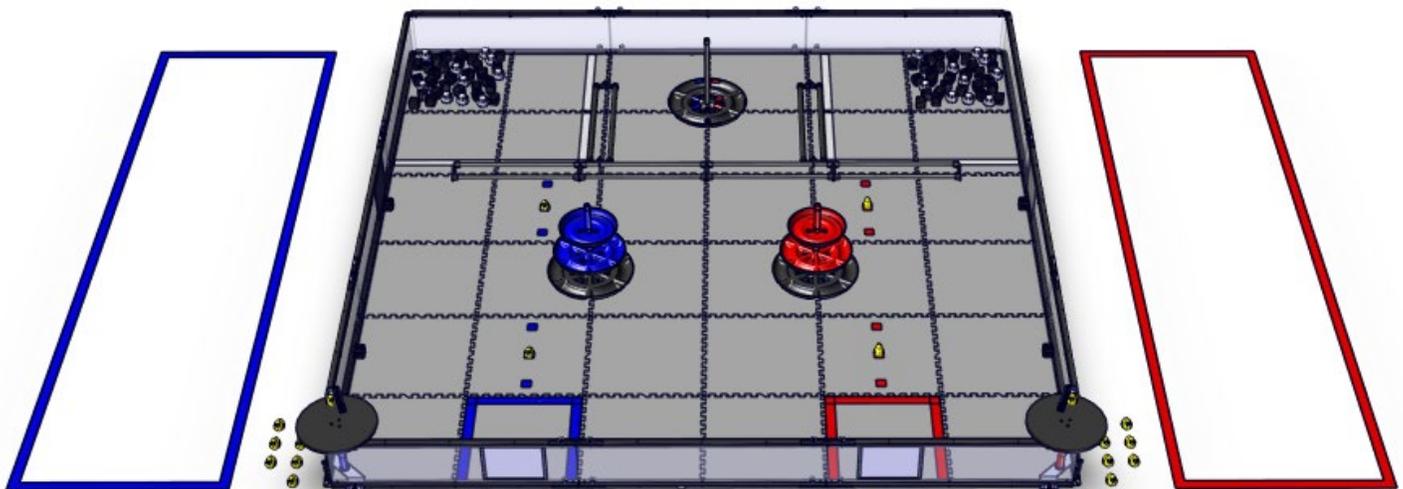




2020-2021 *FIRST*® Tech Challenge Field Setup Guide

Rev 1.1



**This guide contains instructions for setting up the Field Elements for the
2021-2022 FIRST® Tech Challenge Game**

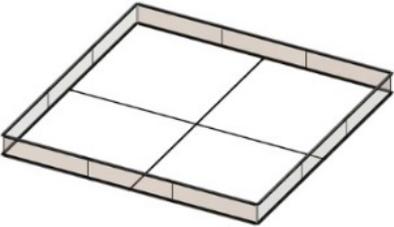
FREIGHT FRENZYSM Presented by Raytheon Technologies

***Read through all the instructions and take a parts inventory before
you begin to assemble and setup the game elements!***

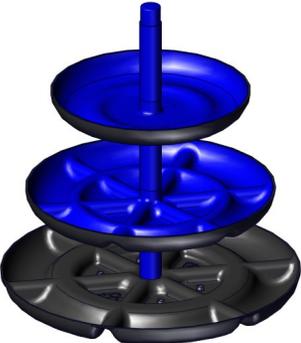
REVISION HISTORY		
Rev.	Date	Description
1.0	9/10/2021	Initial Release
1.1	9/16/2021	Kickoff Release, added Alliance Hub Tape Marker, minor text edits.

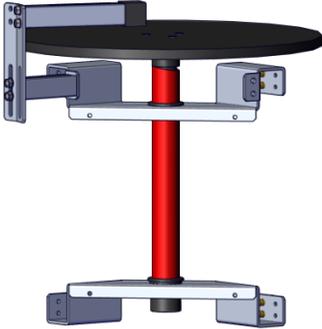
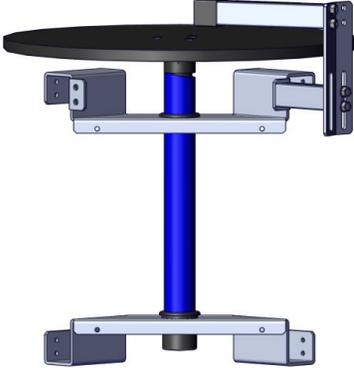
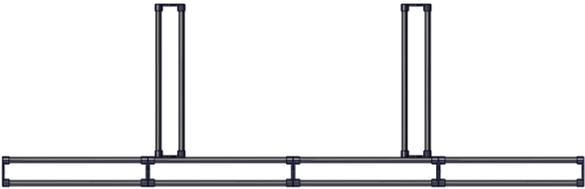
TOOLS NEEDED		
Component	QTY	Part Photo
Safety Equipment	As Needed	
Utility Knife	1	
File	1	
Scissors	1	
Diagonal Cutters	1	
Tape Measure	1	
Color Printer	1	

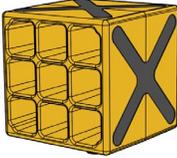
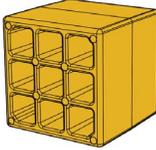
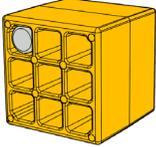
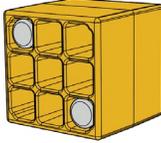
FULL FIELD REQUIREMENTS

Component	Part #	QTY	Part Photo
FIRST Tech Challenge Field Perimeter	am-0481b or similar	1	
5/8" Gray Soft Tiles	am-2499 or similar	36	

Competition Field Components

Component	Part #	QTY	Part Photo
Red Alliance Shipping Hub	See Field Assembly Guide	1	
Blue Alliance Shipping Hub	See Field Assembly Guide	1	

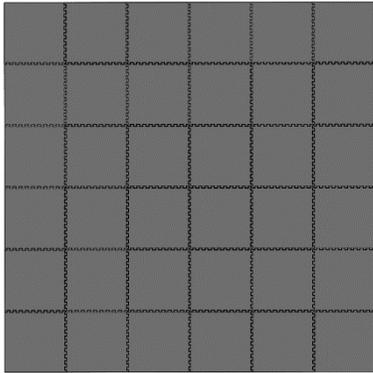
Shared Shipping Hub	See Field Assembly Guide	1	
Red Carousel	See Field Assembly Guide	1	
Blue Carousel	See Field Assembly Guide	1	
Barrier	See Field Assembly Guide	1	
Duck	am-4510	20	

Cargo	am-2850	20	
Pre-load Boxes	See Field Assembly Guide	4	
Light Boxes	See Field Assembly Guide	26	
Medium Boxes	See Field Assembly Guide	20	
Heavy Boxes	See Field Assembly Guide	10	
Permanent Marker	Various	as needed	
2" "Red" Gaffers Tape	am-2946	as needed	
2" "Electric Blue" Gaffers Tape	am-2947	as needed	

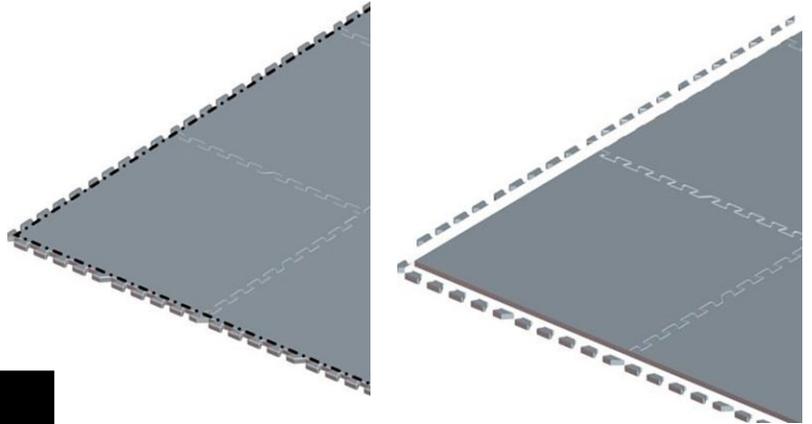
2" "White" Gaffers Tape	am-2945	as needed	
Cardstock for Navigation Image (Printed from FIRST Resource Library)	White 8.5x11" or A4 (international)	8	
Velcro® Dots	Roughly 3/4" diameter or larger	1 pack	
Clear Page Protection Sleeves	Similar to Staples P/N 40713	4	

Part 1: Setting up the Floor and Field Perimeter

Step 1-1: Lay the tiles with the *smooth* surface facing up in a 6x6 grid pattern.



Step 1-2: Critical Mandatory Step: Trim all outer tabs from the 20 Soft Tiles on the outside edges of the field.

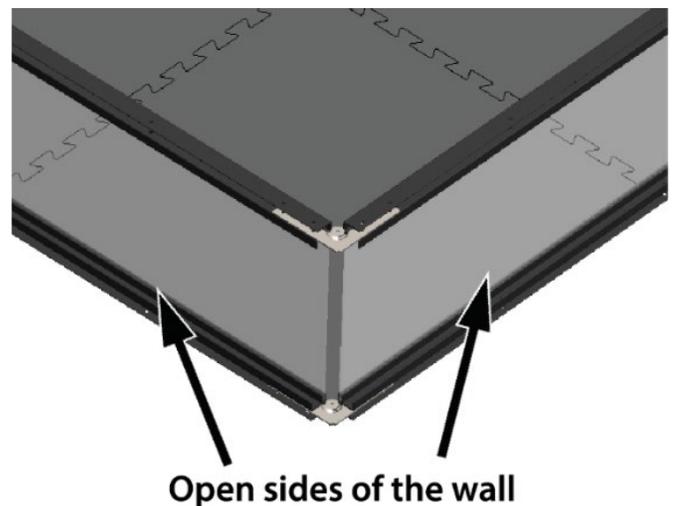
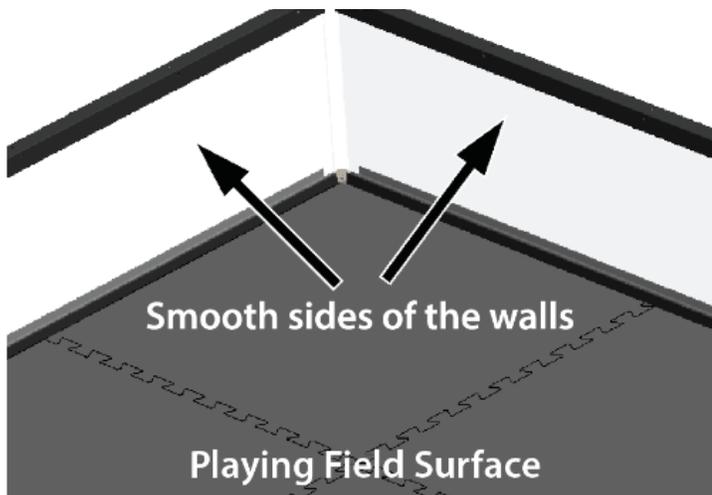


NOTE: Lay the tiles out and mark the outer edge to be cut. Use a sharp utility knife and a straight edge or a band saw (if available) to get a smooth clean edge.

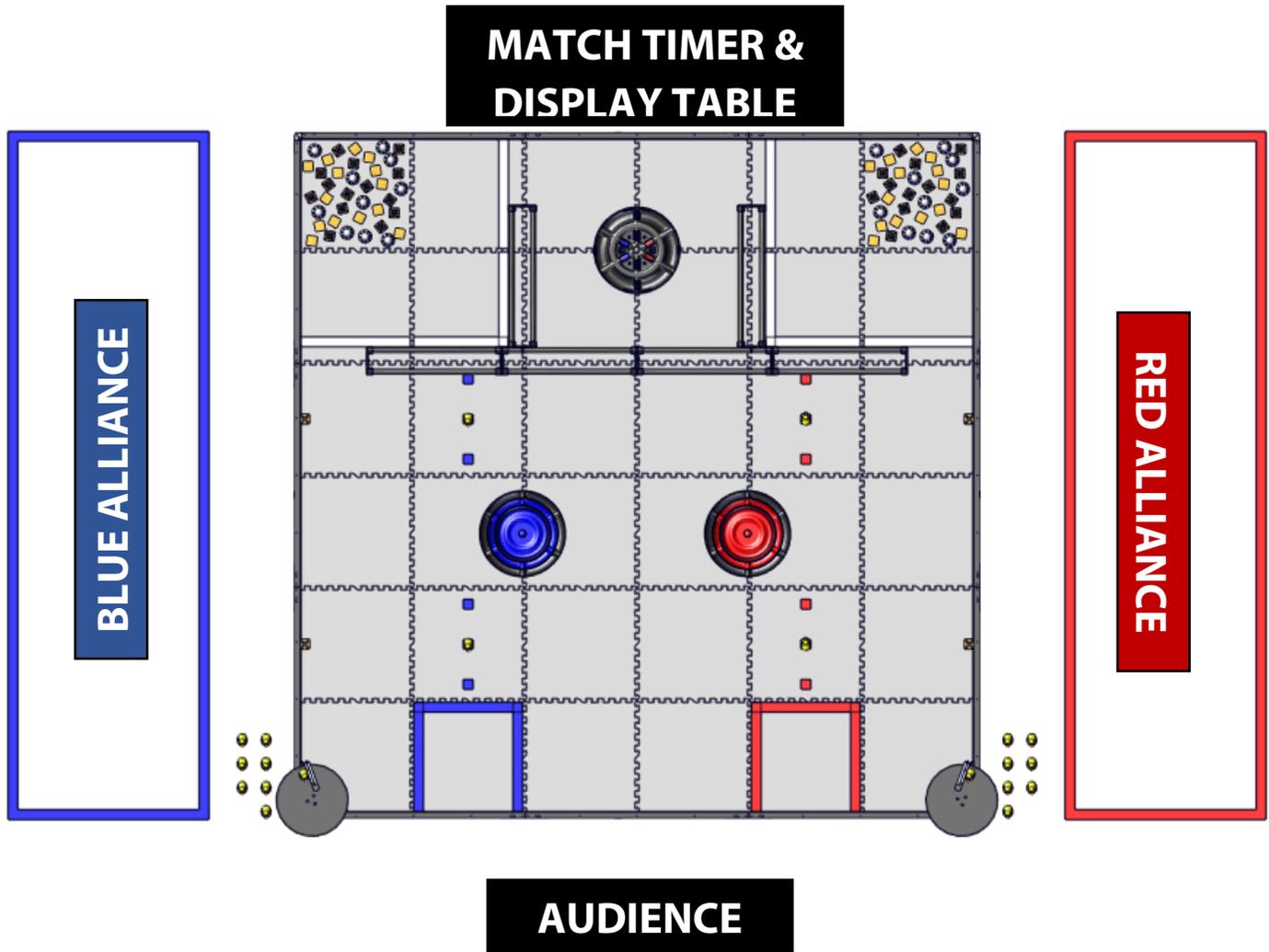
NOTE: If using the AndyMark Field Perimeter, ensure that straps are installed to keep walls in place during game play.

Step 1-3: Note that there are several *FIRST* Tech Challenge Perimeter wall designs. The wall designs fall into two categories. The smooth/non-cavity sides should face towards the inside of the Playing Field as shown in the illustration.

Perimeter	Wall Design Categories	Wall Height
AndyMark (current)	Smooth on one side and an open cavity on the other side	12.125"
IFI Perimeter	Smooth on one side and an open cavity on the other side	11.5"
Logo Loc Perimeter	Symmetrical inside and outside surfaces	12.375"

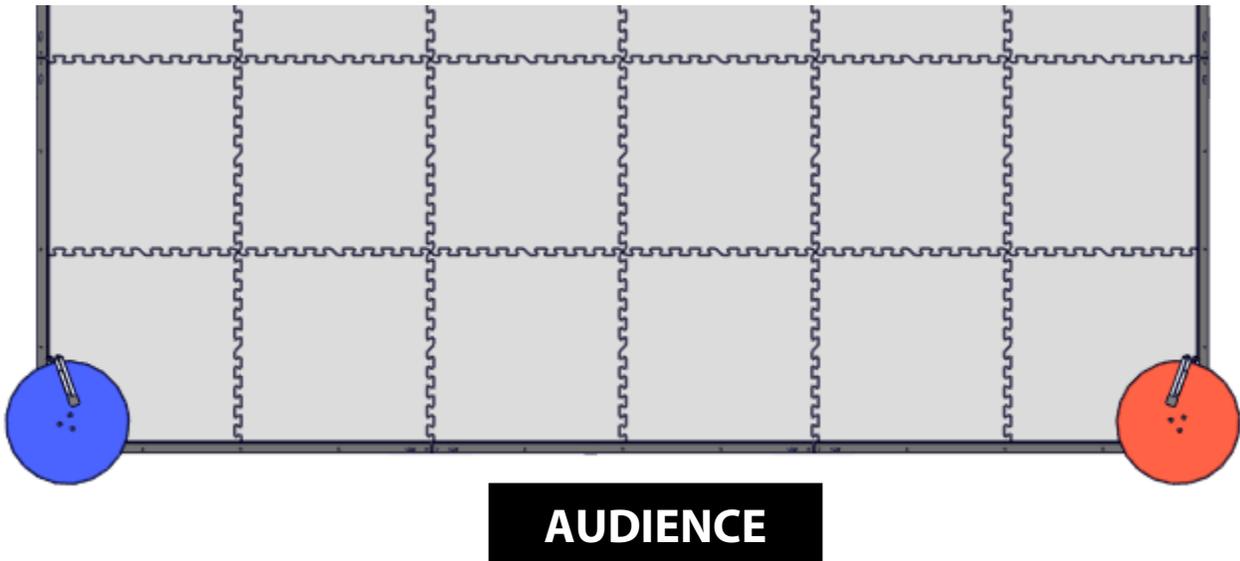


Part 2: General Layout and Orientation



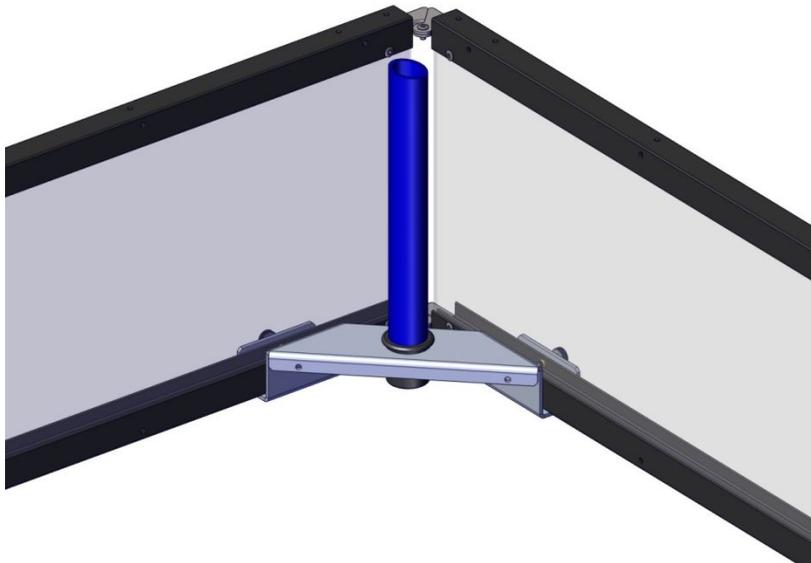
Part 3: Carousel Placement

The Carousels are placed on the field perimeter corners closest to the Audience. The Red Carousel is closest to the Red Alliance Station and the Blue Carousel is closest to the Blue Alliance Station.



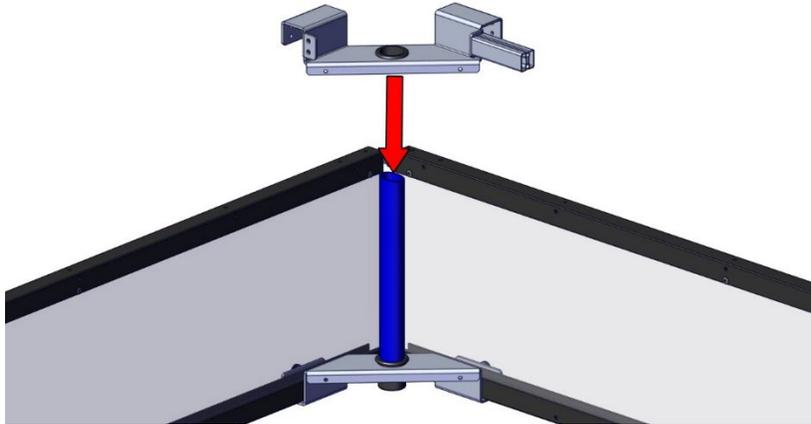
The Carousel needs to be partially disassembled for transport and storage. The full assembly instructions are located in the Field Assembly Guide. Instructions below assume that portions have been pre-assembled:

1. Take the Bottom Bracket Assembly and place it underneath the Field Perimeter. Secure to the field perimeter using the Bracket Hardware (thumb screws).



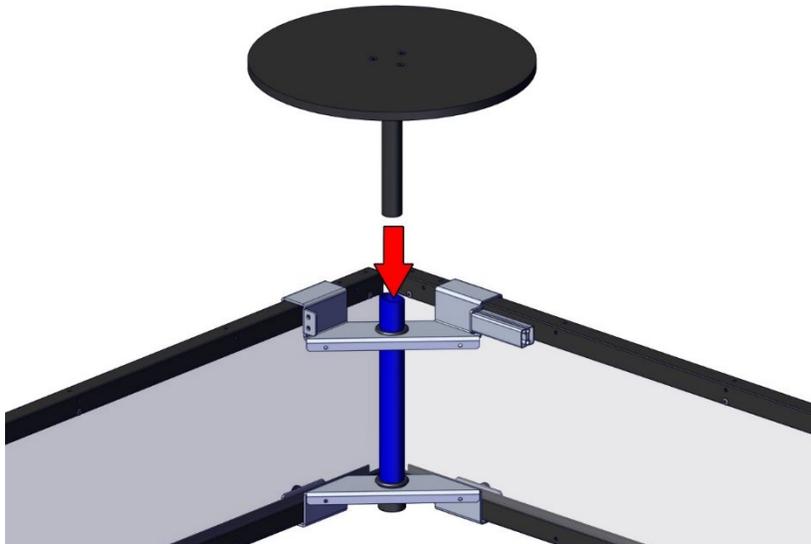
Note: Thumbscrews will need to be in upper hole for AndyMark Perimeters and lower hole for IFI or other perimeter styles.

- Using a twisting motion, slide the Top Bracket Assembly over the top of the Field Perimeter and onto the pipe. Secure to the field perimeter using the Bracket Hardware (thumb screws).

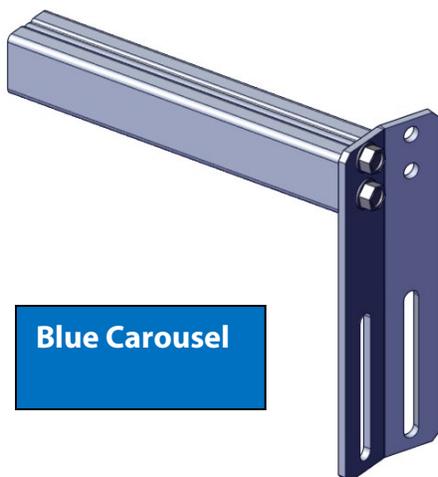


Note: Thumbscrews will need to be in lower hole for AndyMark Perimeters and upper hole for IFI or other perimeter styles.

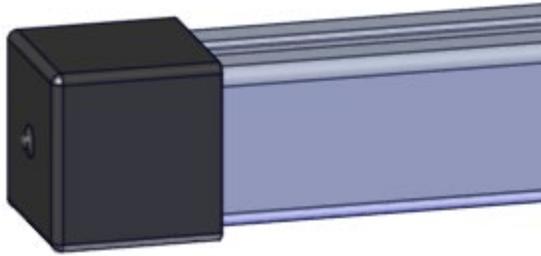
- Insert the Carousel Platform Assembly into the open pipe.



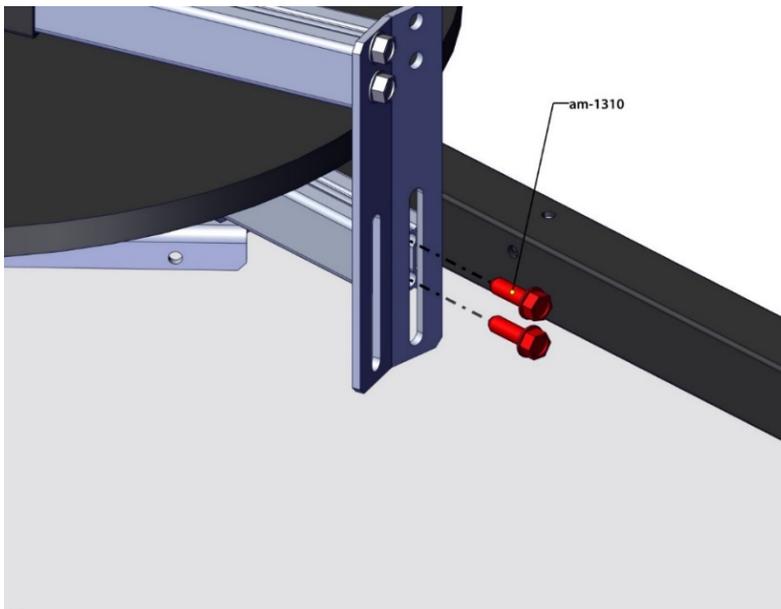
- The Sweeper Bracket and Arm should be pre-assembled. Locate the correct assembly for the carousel or attach the Sweeper Bracket to the Top Sweeper Arm using two Sweeper Screws (am-1310). The Blue Carousel will use the Left set of holes and the Red Carousel will use the Right set of holes as shown.



5. Ensure the Sweeper Arm Cap is on the open end of the Top Sweeper Arm.

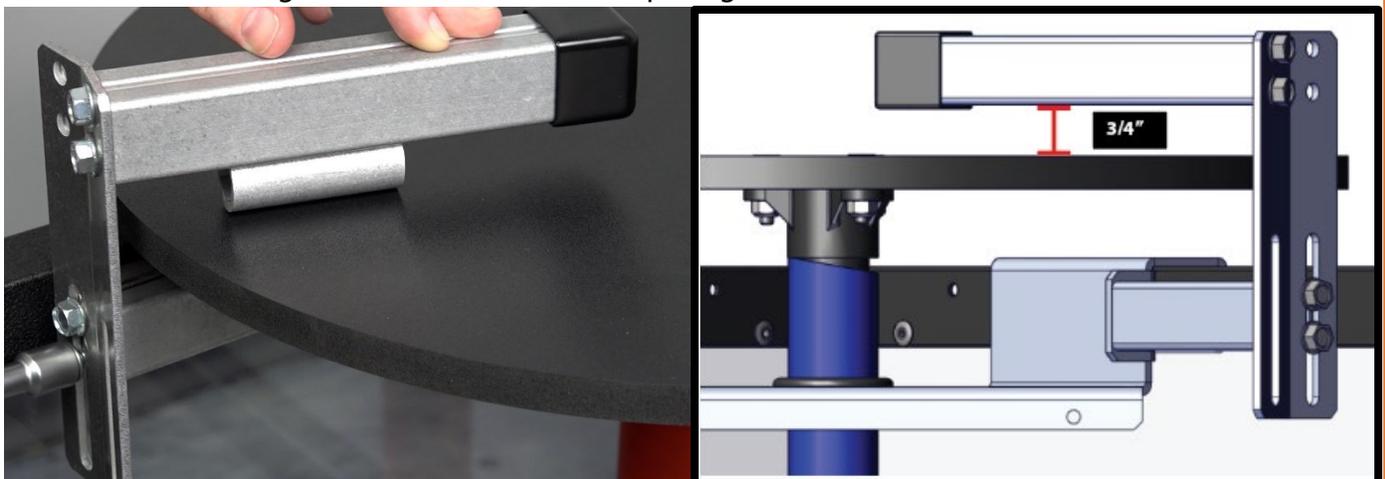


6. Locate the Top Sweeper Bracket Assembly with the Carousel as shown. **Don't tighten the screws yet.** The two Sweeper Screws should be placed through the slot opposite the existing screws (they'll be closest to the wall) so that the Top Sweeper Arm points away from the perimeter wall.



Note: These screws will need to be removed in order to disassemble the Carousel for transport and storage. .

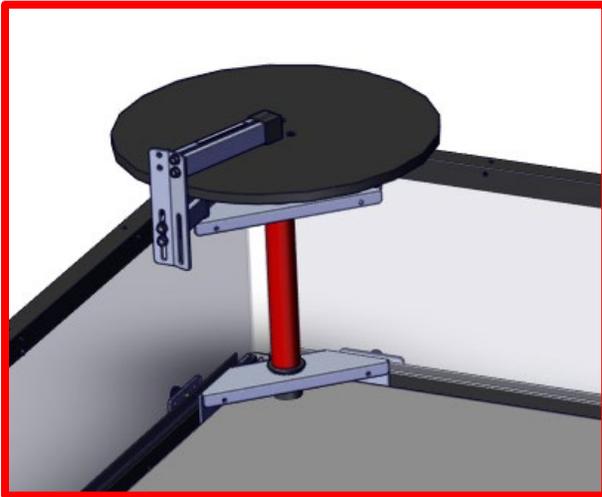
7. Use the Height Spacer to align the Top Sweeper Arm approximately $\frac{3}{4}$ " above the top surface of the Carousel Platform. Tighten the screws once the spacing is confirmed.



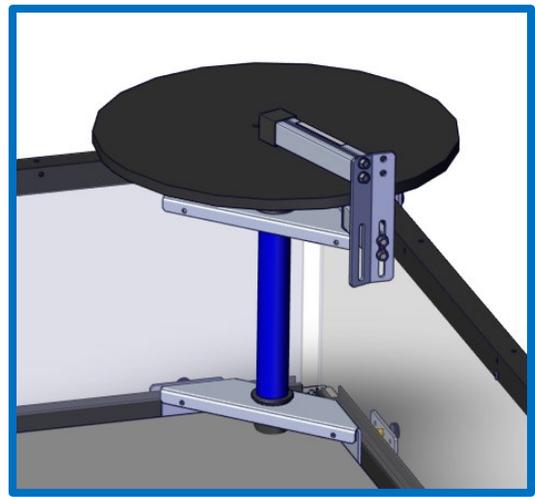
8. Ensure a Pinch Point Sticker is attached to the Top Sweeper Arm or attach by aligning the bottom of the sticker with the bottom of the Arm. Wrap the warning orange box onto the top surface. The text on the sticker should be viewable to the drive team in their respective red or blue alliance stations.



9. Repeat steps for the other carousel. The ends of the Sweeper Arms should point towards the Audience when assembled correctly



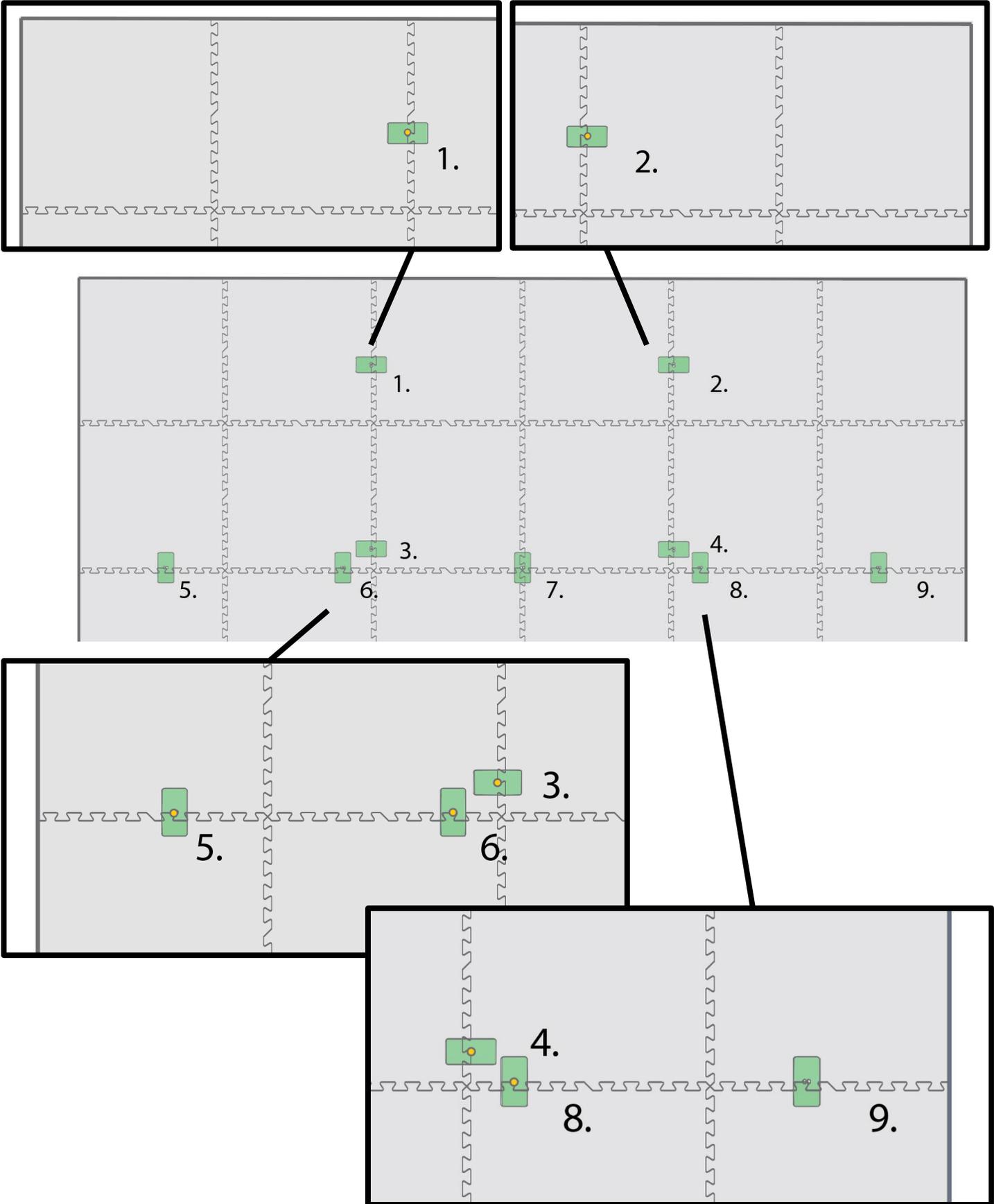
Red Carousel



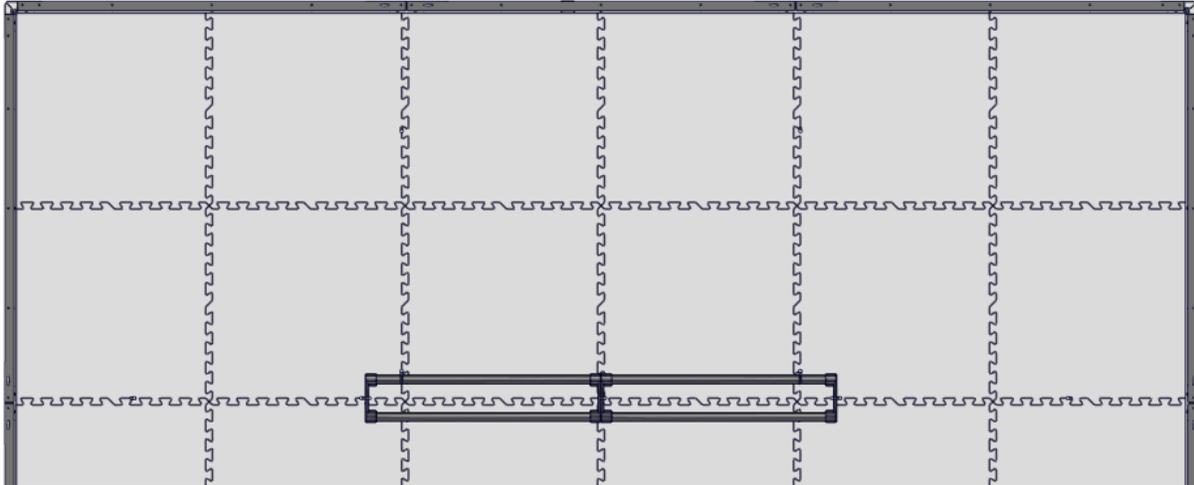
Blue Carousel

Note: The Sweeper Arm and Bracket Assembly will need to be removed in order to disassemble the Carousel for transport and storage. .

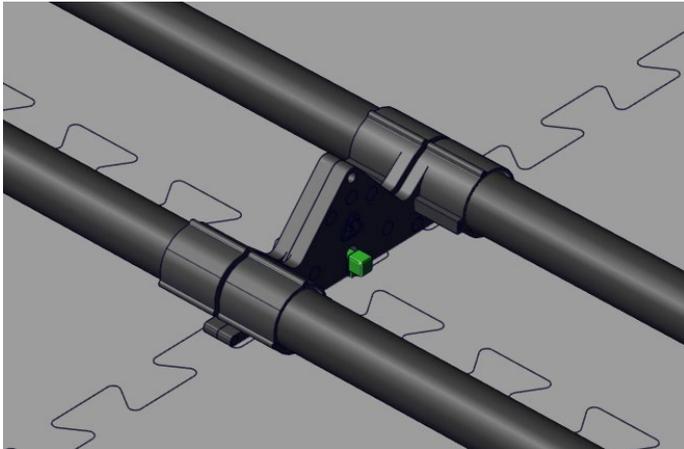
3. Locate the Under Tile Plates between the breaks in the tile with the ends of the cable tie sticking up through the tile. Slide each plate under the tile in the locations as shown.



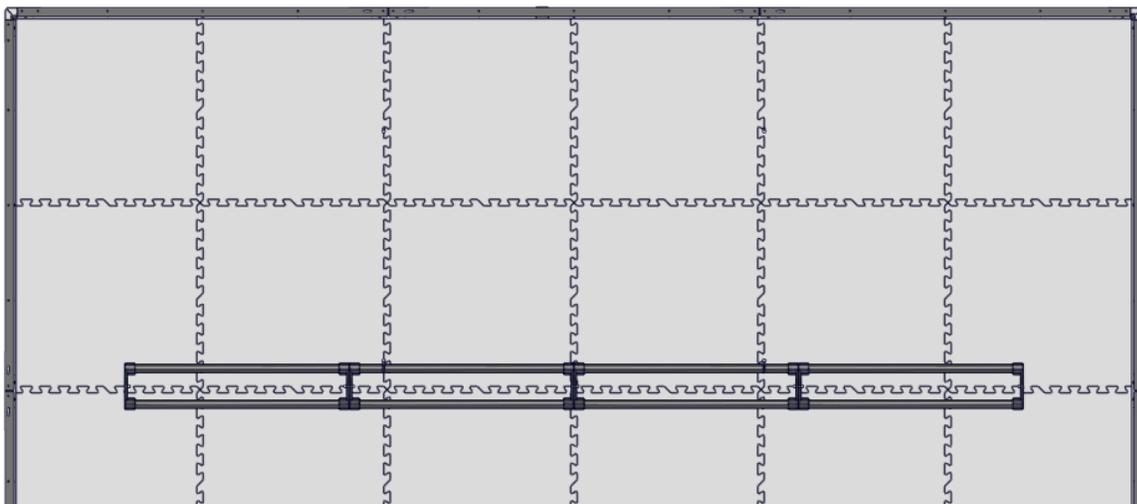
4. Start by laying out two shorter length Horizontal Barrier Assemblies in the locations as shown. Each end should align with an Under Tile Plate.



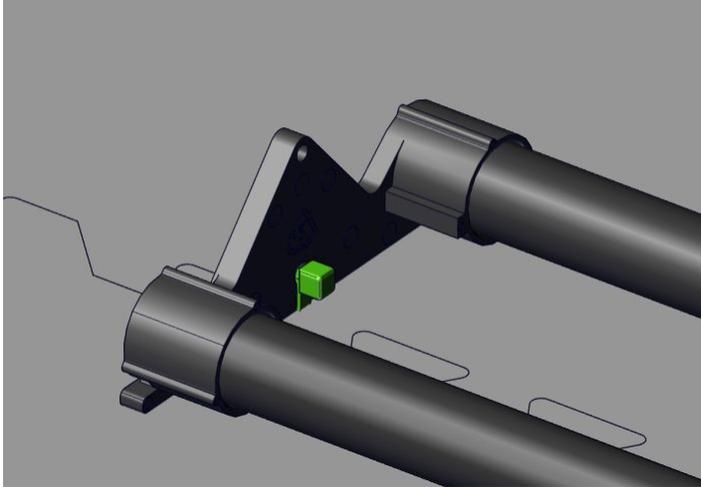
5. **Loosely** route the cable tie from the Under Tile Plate (#7) through the hole in the center Barrier Pipe Anchor.



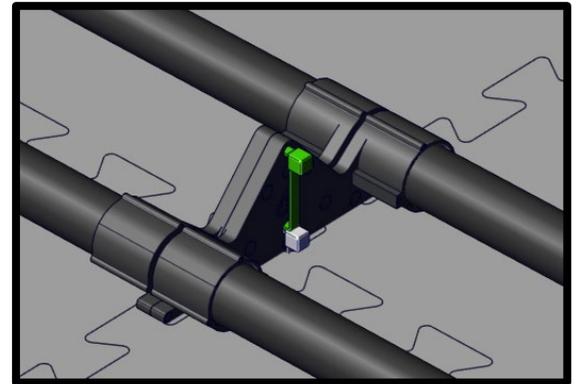
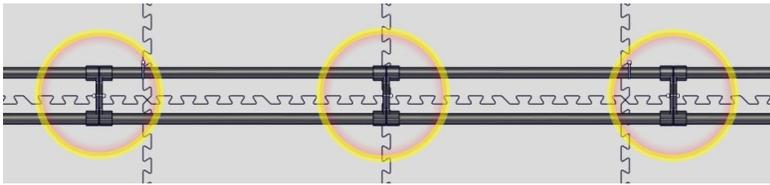
6. Layout a Horizontal Barrier Assembly on each end of the barrier. Each end should align with an Under Tile Plate.



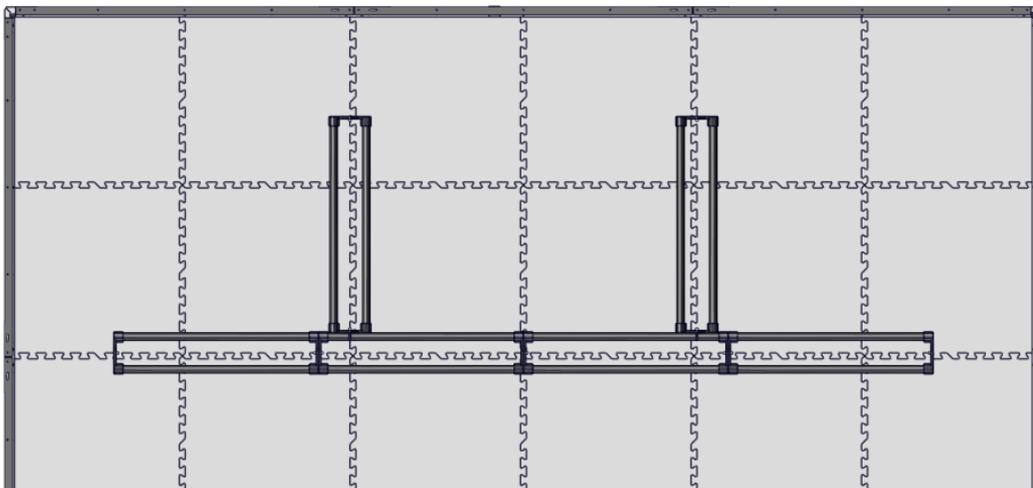
7. Loosely Route the cable ties from the corresponding Under Tile Plates (#5,6,8,9) through the aligned Barrier Pipe Anchors.



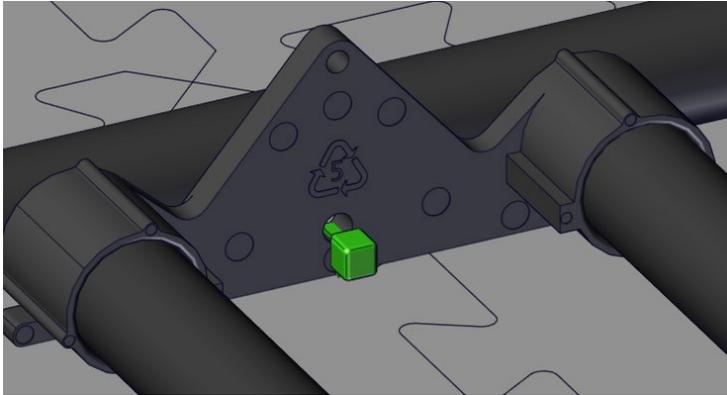
8. Add three additional cable ties to connect adjacent Anchors together.



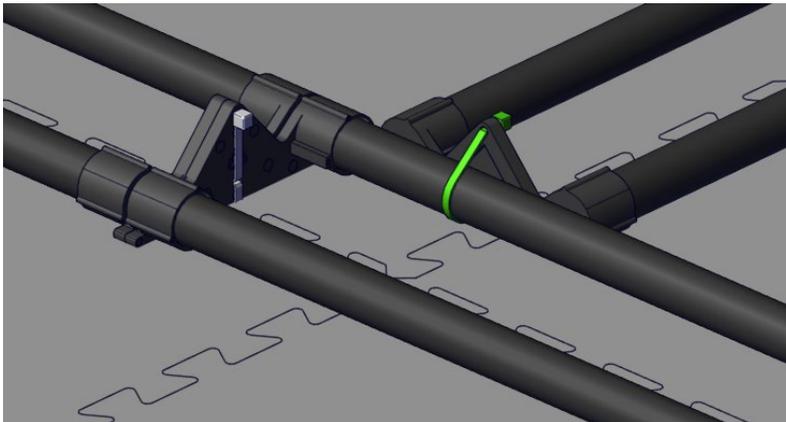
9. Layout the two Vertical Barrier Sections as shown. The anchor should be up against the horizontal pipe.



10. **Loosely** attach the cable ties on the Under Tile Plate (#1,2,3,4) to the adjacent Anchors on the Vertical Barrier Assemblies.

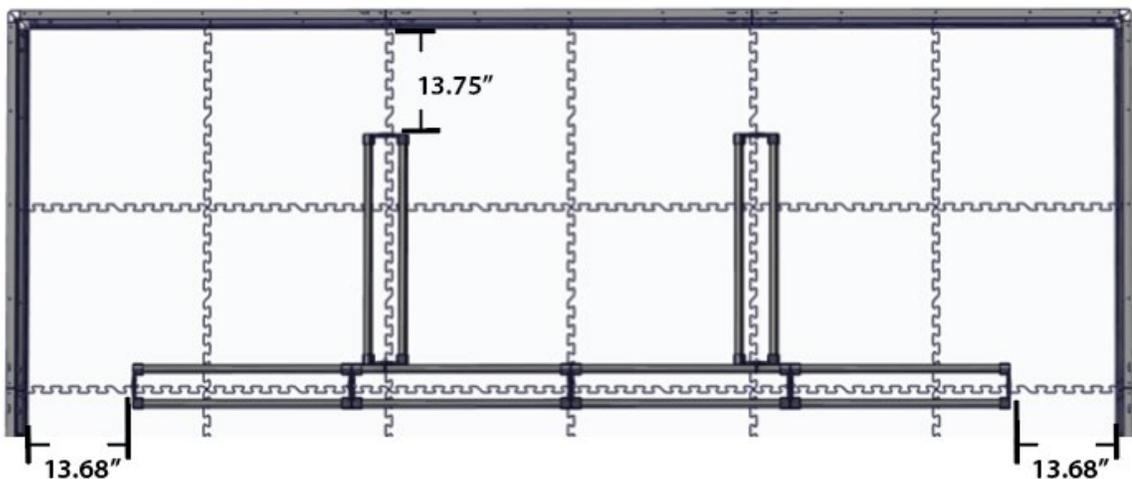


11. **Loosely** add a cable tie from the top hole of the Anchor on the Vertical Barriers (Locations #3,4) and wrap around the adjacent Horizontal Barrier Pipe.



12. **Check the Barrier.** Ensure the Barrier is completely flat on the floor, is aligned straight and parallel to perimeter walls, and evenly spaced between the perimeter walls.

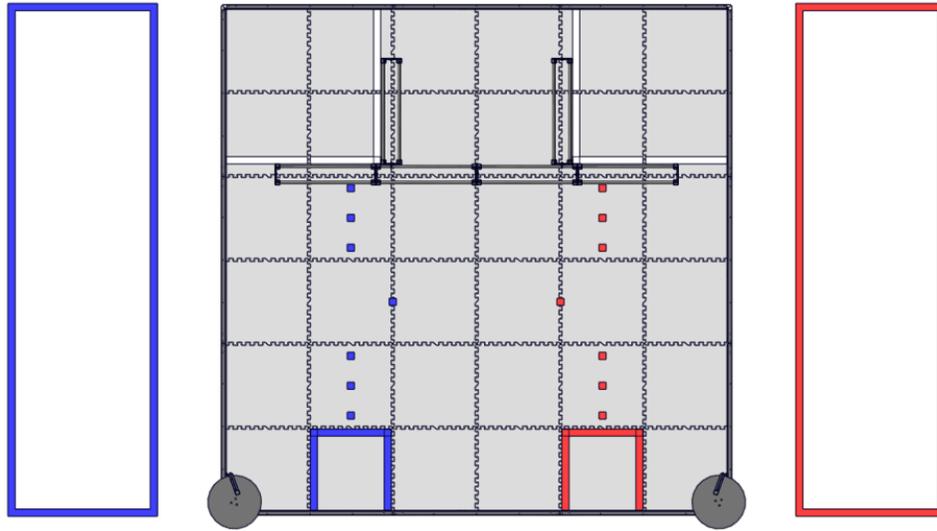
- The distance from the edge of the Vertical Barrier to the edge of the back perimeter wall should measure 13.75" (13 3/4").
- The distance from each end of the Horizontal Barrier to the edge of the tiles should measure 13.68" (~13 11/16")



13. Tighten all the cable ties to secure and trim ends.

Part 5: Tape Lines

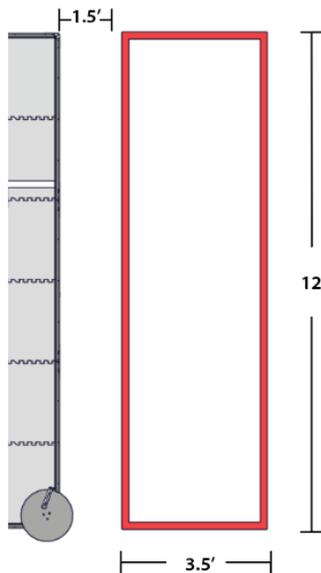
Tape lines for the field are as shown. All lines on and around the field are made with 2" wide white, red or blue Gaffers Tape. There is also a need for a Referee Question Box close to the field area.



AUDIENCE

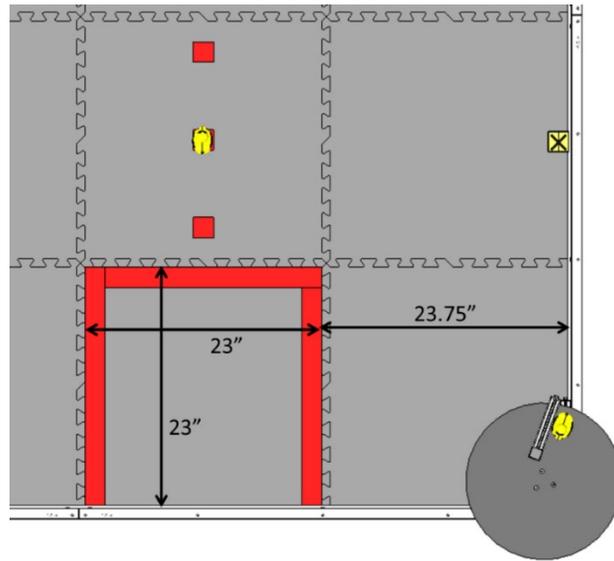
Drivers & Human Player Stations

Drivers Stations are 12ft wide x 3.5ft deep. When viewed from the audience, the Blue Driver Station is on the left side. The Driver Stations are located 1.5ft (18 inches) away from the field perimeter.



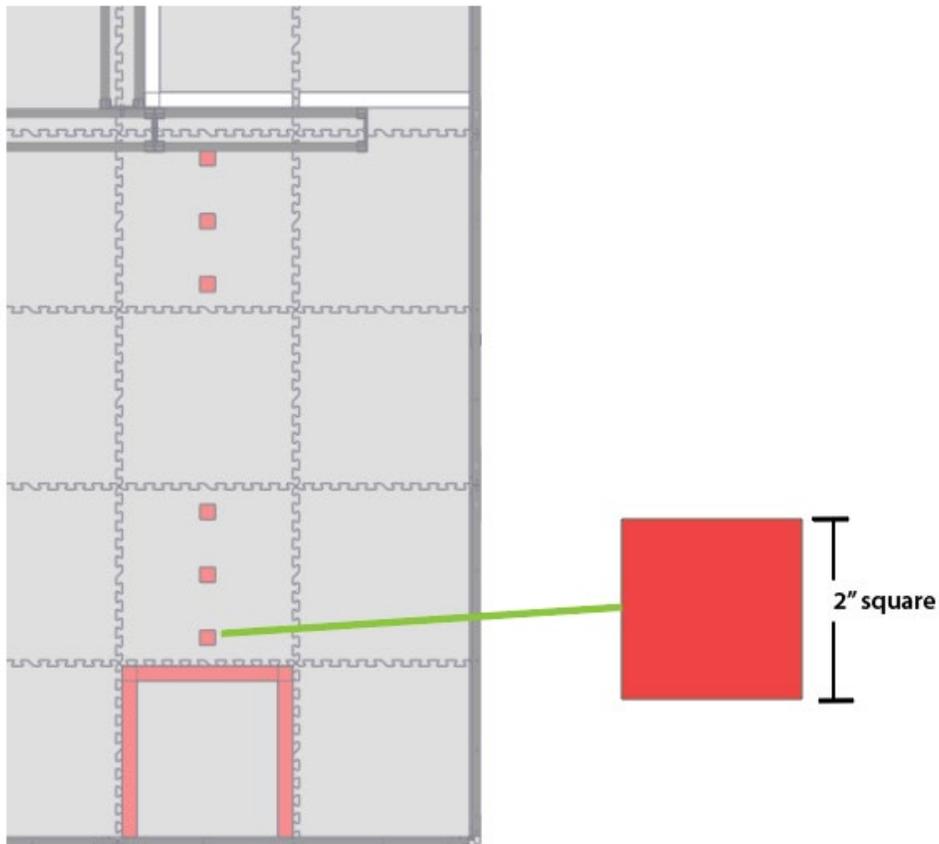
Storage Units

The Storage Units are approximately 22.75" by 22.75" (22 ¾") square areas of the field marked by 2" wide Red or Blue Gaffers tape on the inside edge of the tile square. Red squares are closest to the Red Alliance and Blue squares are closest to the Blue Alliance.



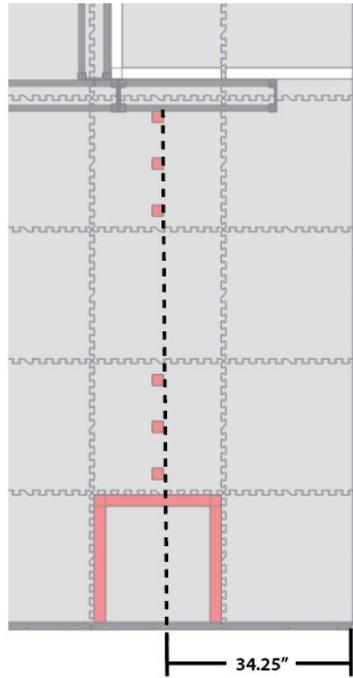
Barcode

The Barcodes are to be marked with an approximately 2x2" square piece of Red or Blue Gaffers Tape.

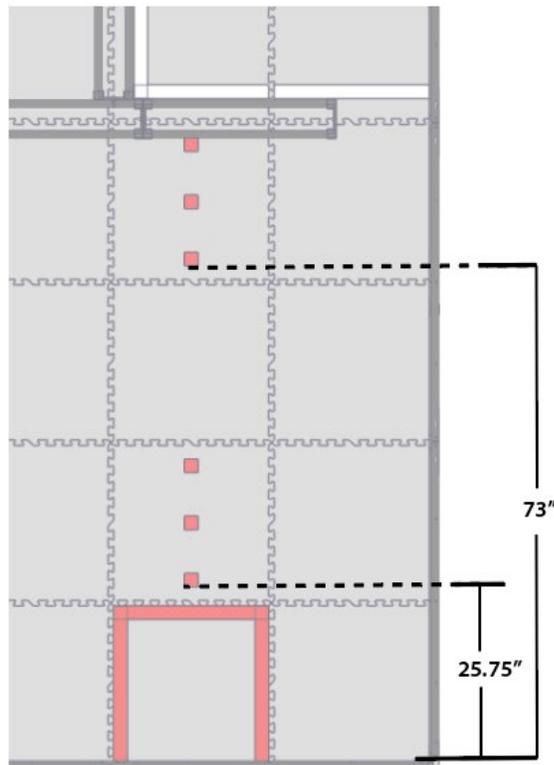


The barcodes are in two groups of 3 squares centered on the second and fourth tile above the Storage Units. The Red Barcodes will be located on the side closest to the Red Alliance Station and the Blue Barcodes will be located closest to the Blue Alliance Station.

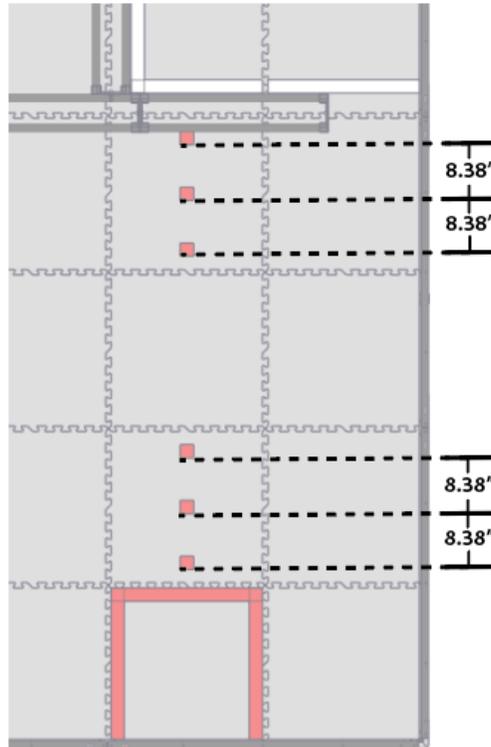
The closest edge of the barcode measures 34.25" (34 1/4") to the edge of the tiles along each Alliance Wall.



The bottom edge of the first set of squares is placed 25.75" (25 1/4") away from the edge of the tiles along the near wall. The bottom edge of the second set of squares is placed 73" away from the edge of the tiles along the near wall.

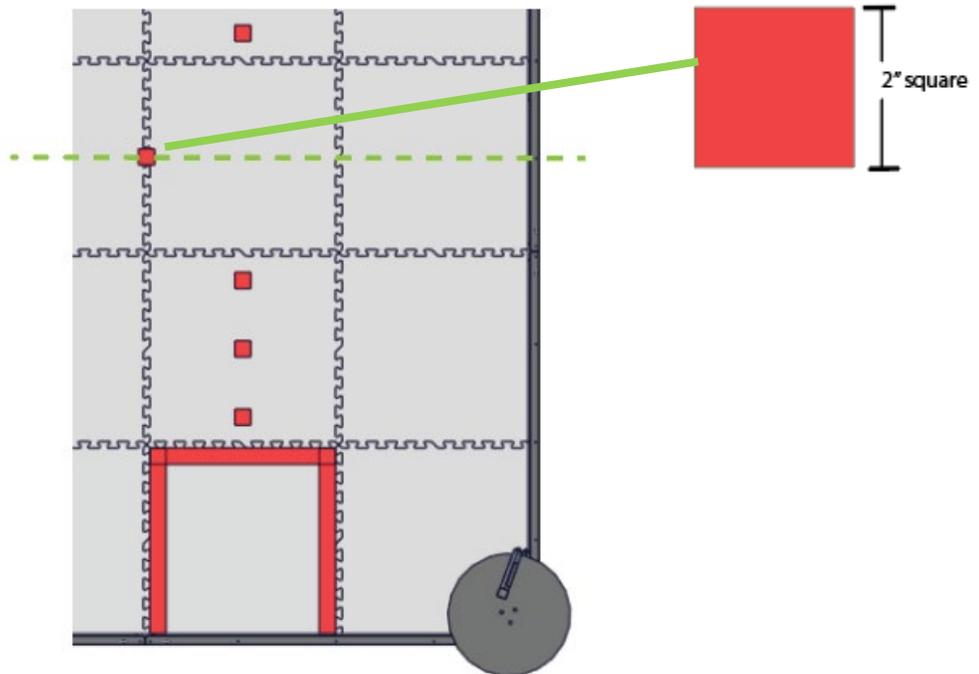


The remaining two squares in each set are 8.38" (8 3/8") apart measured from bottom to bottom.



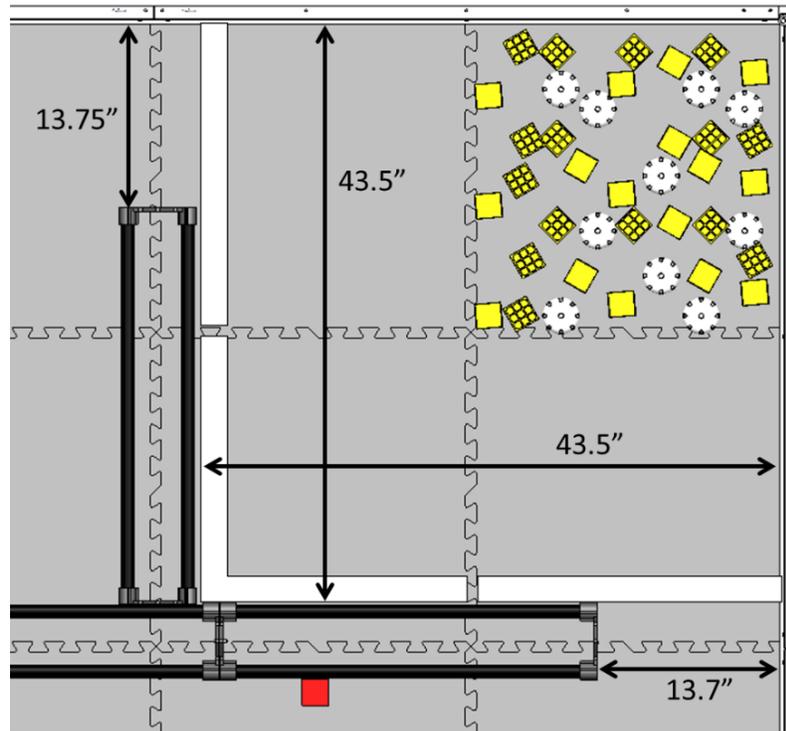
Alliance Hub Marker

An additional 2"x2" tape square is placed over the second tile seam from the side wall. The tape should be centered on the third tile from the front wall.



Warehouse

The warehouse is approximately 43.5" x 43.5" marked by 2" wide White Gaffers tape on the inside edge of the Vertical and Horizontal Barriers. Leave a gap in the tape where it meets each tile seam.



Referee Question Box

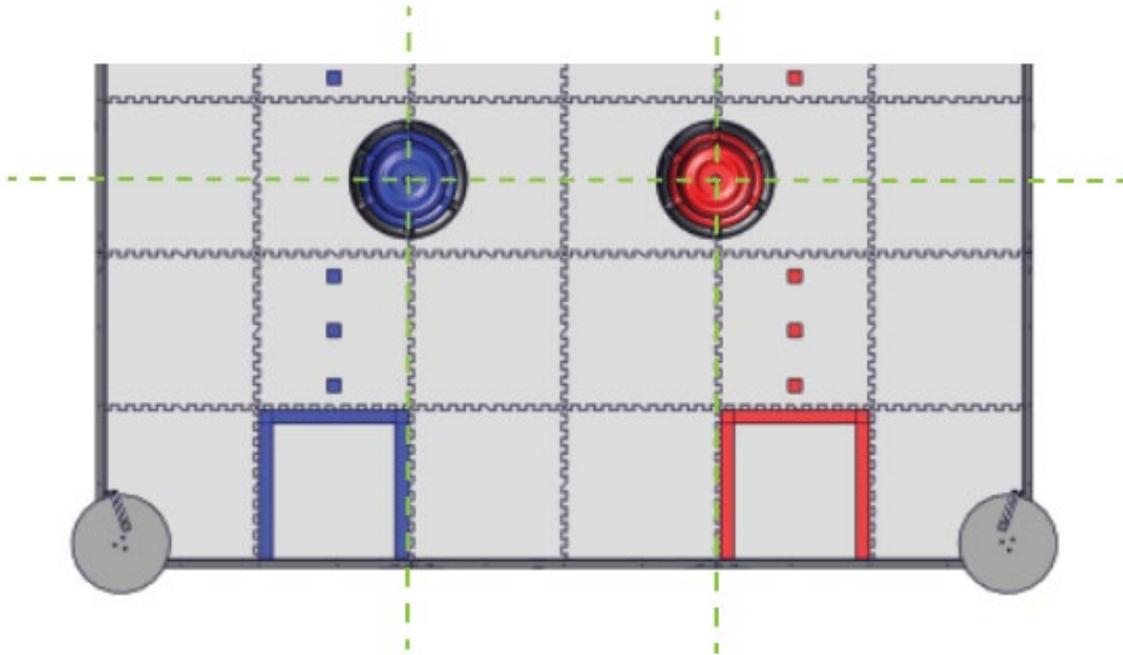


The Referee Question Box is a place where Teams can ask questions of the Referees after a Match.

The Referee Question Box must be placed in the Competition Area in a location where it will not interfere with the current running Matches, but close enough that the Referees will be able to see a student waiting at the Question Box. The Question Box can be as simple as a 3' x 3' Gaffers Tape square on the floor.

Part 6: Alliance Hub Placement

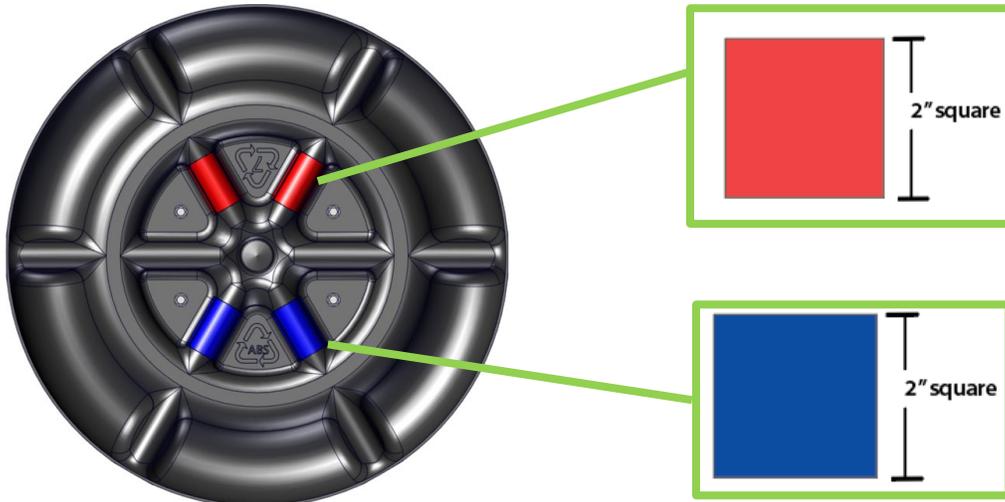
Alliance Hubs are placed on the Alliance Hub Marker on the center of the 3rd row of tiles away from the audience and on the second tile seam closest to their respective colored alliances.



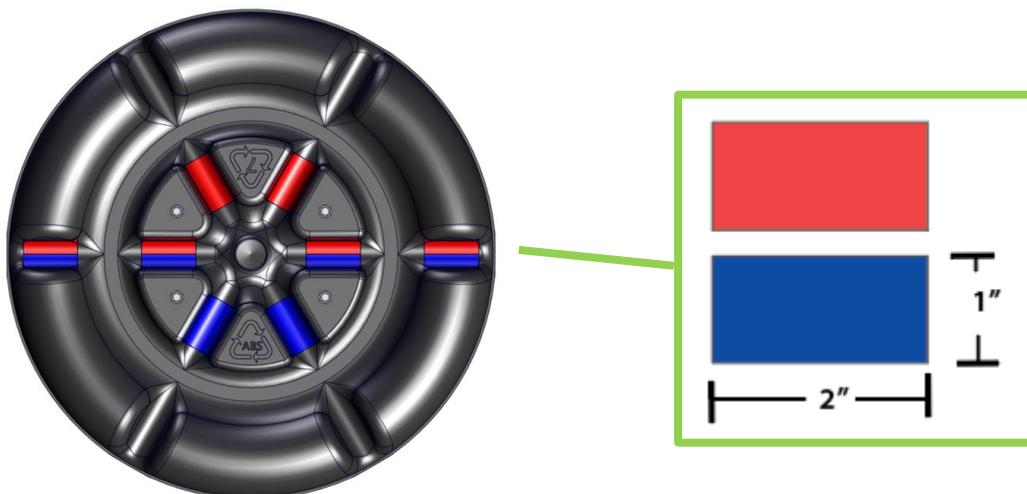
Part 7: Shared Shipping Hub Tape and Placement

1. For gameplay, the shared hub is split into a red and blue half delineated by gaffers tape markings. To help with tape alignment, a Shared Hub Tape Tool STL is available for download at <https://www.firstinspires.org/resource-library/ftc/game-and-season-info>.

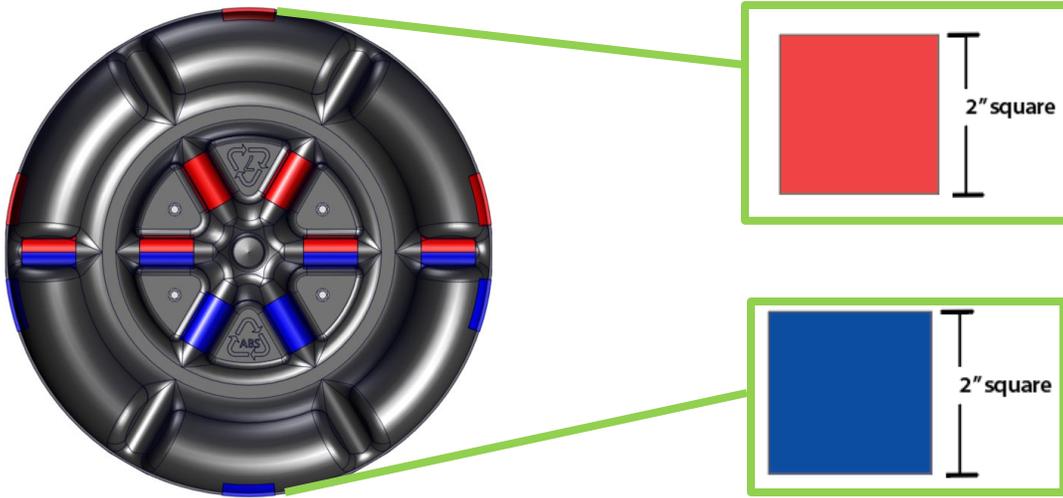
- a. Add 2x2" square red and blue tape to the inner ring spokes as shown.



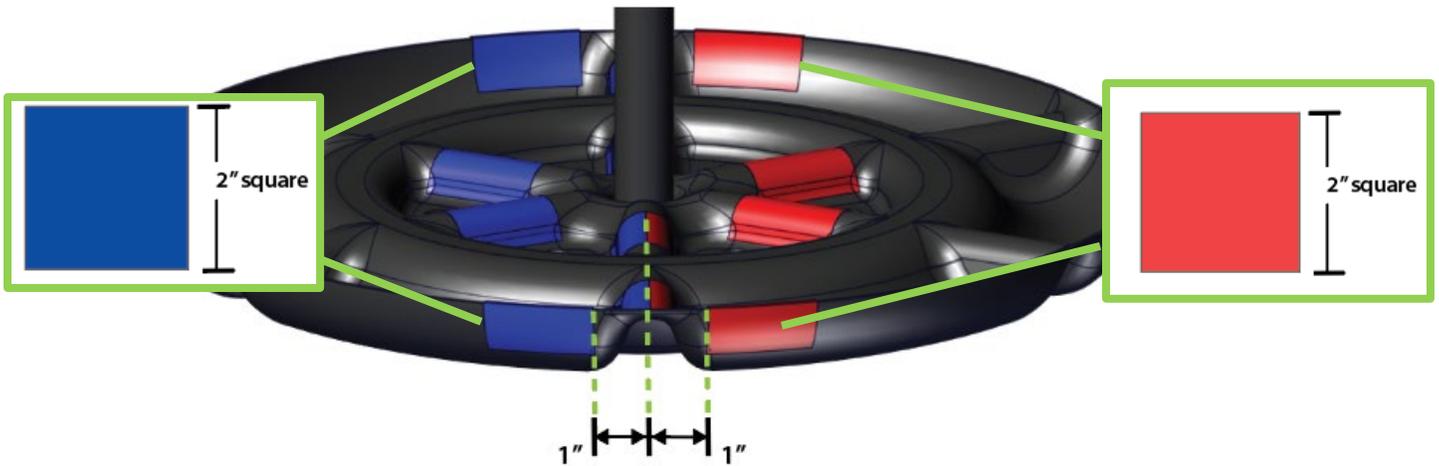
- b. Divide the remaining inner ring spokes and the corresponding outer ring spokes with 1"x2" strips of red and blue tape.



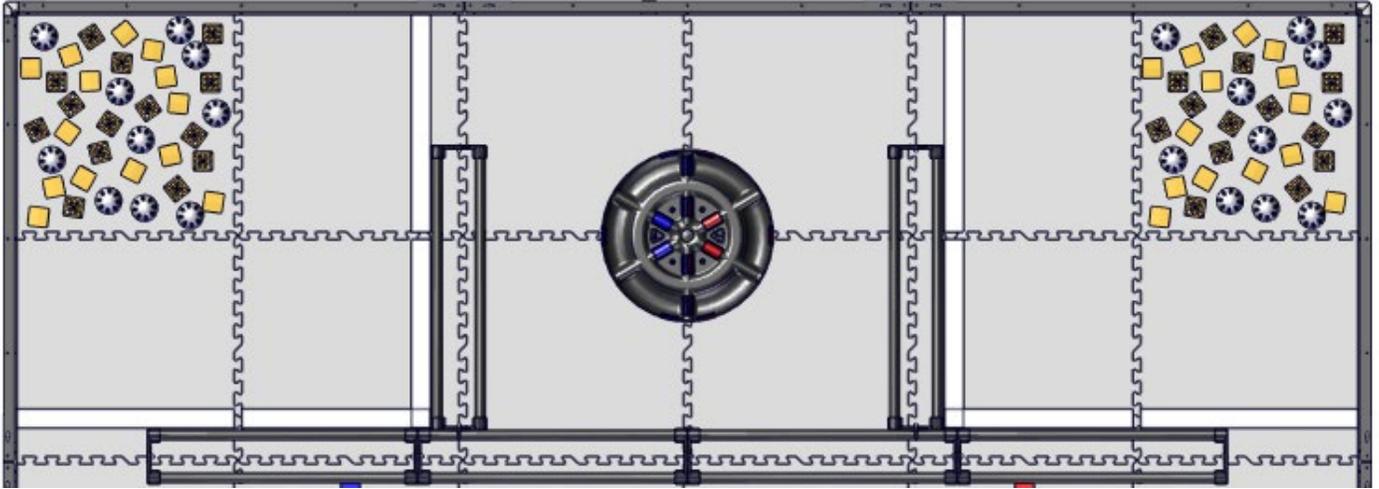
c. Fold 2x2" tape over the outer edge in each center red and blue section. .



d. On adjacent red and blue sections, fold 2x2" square tape over the outer edge spaced 1" away from the center dividing line as shown.



For pre-match setup, the Shared Shipping Hub is placed centered between the Vertical and Horizontal Barriers and the back perimeter wall.



Part 8: Navigation Image Placement

Step 8-1: Download the Navigation Image file, along with FREIGHT FRENZY logo template, found on the FIRST Tech Challenge Game and Season Info Page:

<https://www.firstinspires.org/resource-library/ftc/game-and-season-info>



Step 8-2: Print the downloaded images in color, not greyscale, on 8.5x11" or A4 White Cardstock. The Print resolution must be at least 300DPI.



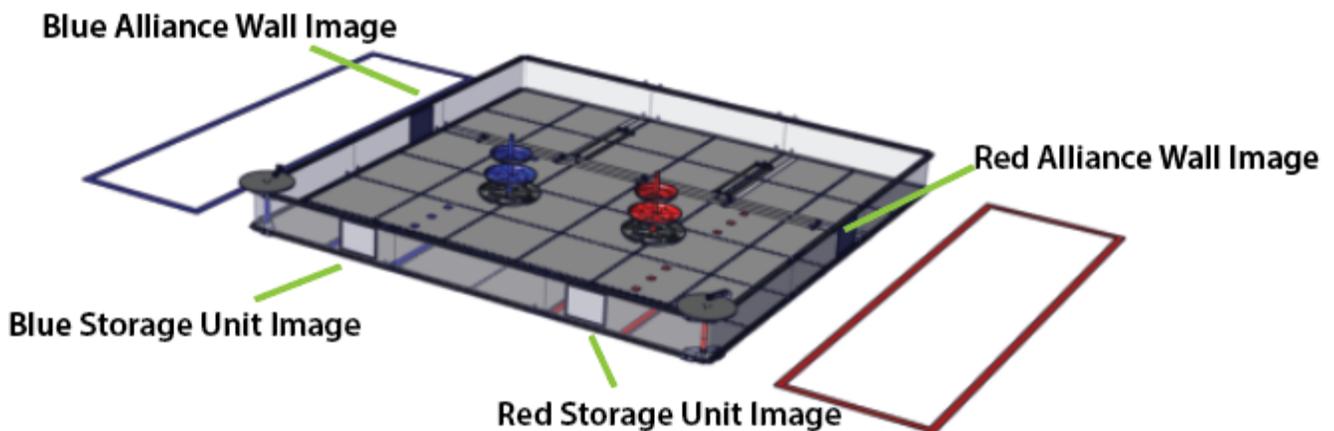
Step 8-3: Place the navigation images and logos in the plastic sleeves. A logo and navigation target image will be placed back to back so that each is visible on one side and upright when the sleeve is in landscape orientation.



Step 8-4: Use Velcro dots in the top corners of the navigation target to secure to the outside of the field perimeter. Refer to the next step for specific image placements.



Step 8-5: There are 4 Navigation Images placed around the field as shown. Each image has lines around the edge indicating vertical and horizontal center. Each image also has text with its placement location. The navigation images will face into the playing field and the logos will face away from the playing field. Navigation Images should always be placed as follows:



The Navigation Image horizontal center line should measure 6.375 inches to the floor (5.75 inches from the top of the tile).



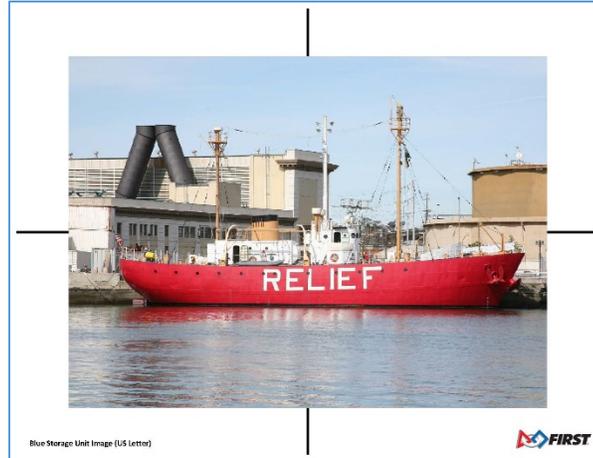
Blue Alliance Wall Image - The Blue Alliance Wall Image is centered on the fourth tile from the audience wall on the Blue Alliance Side.



Red Alliance Wall Image- The Red Alliance Wall Image is centered on the fourth tile from the audience wall on the Red Alliance Side.



Blue Storage Unit Image – The Blue Storage Unit Image is centered on the second tile from the Blue Alliance Station on the audience wall. This image is in the Blue Storage Unit.



Red Storage Unit Image – The Red Storage Unit Image is centered on the second tile from the Red Alliance Station on the audience wall. This image is in the Red Storage Unit.

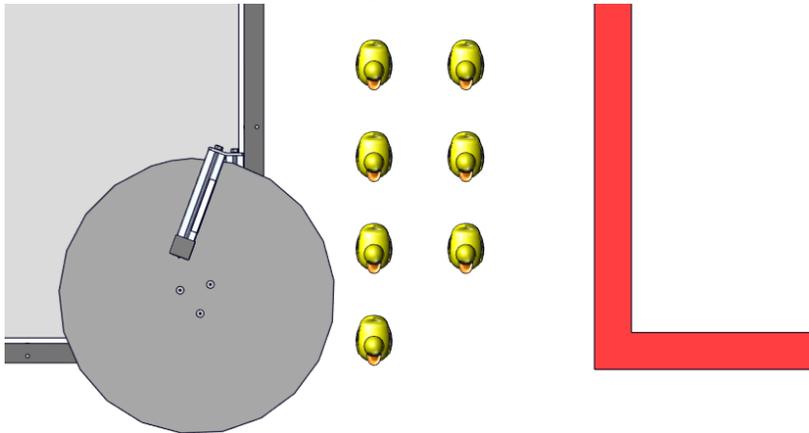


Part 9: Game Piece Placement

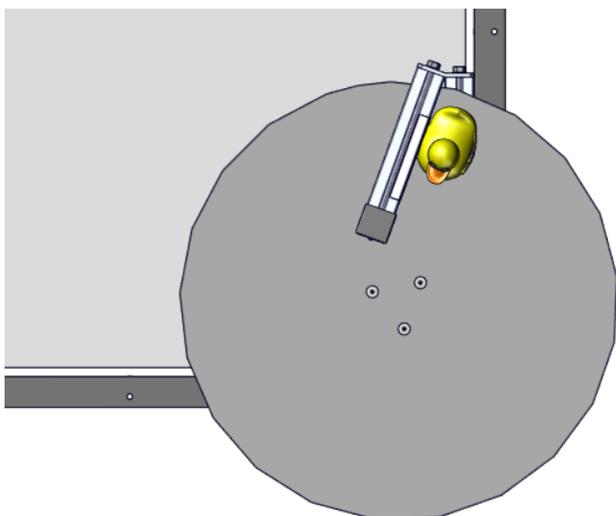
There are 6 different types of game pieces on the playing field. Prior to the match, the game pieces should be placed in the following locations.

Ducks: There are 20 Ducks on each field, 10 per alliance.

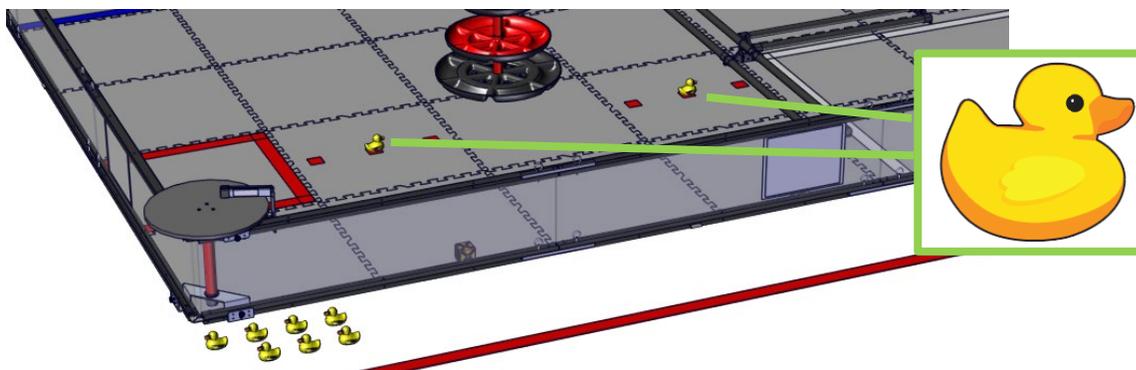
- 7 Ducks are located in each Loading Dock between the field and Alliance Station



- 1 Duck is placed on each Carousel as shown.

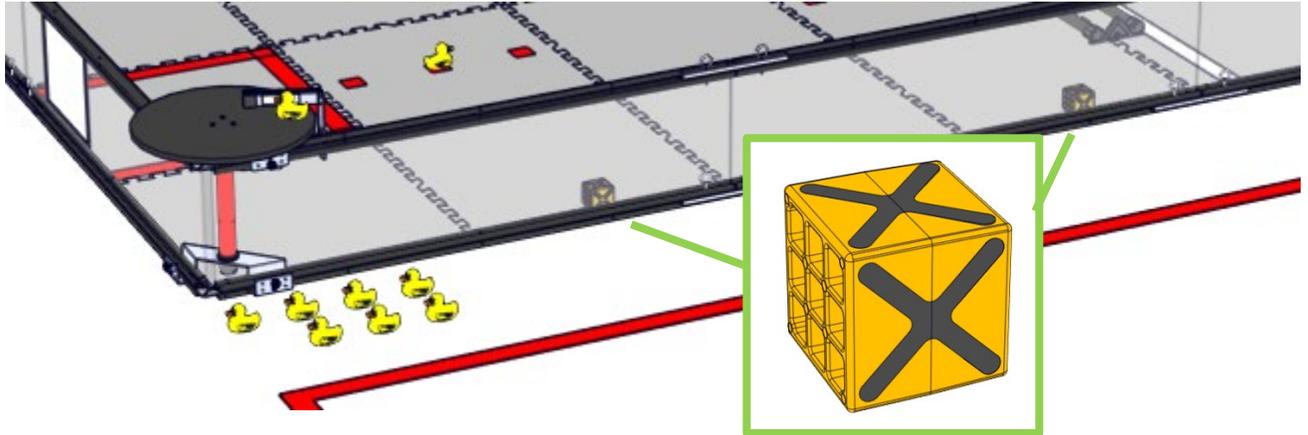


- 1 Duck is placed on each center barcode mark facing to the right when viewed from their respective alliance stations.



Pre-Load Boxes: There are 4 Pre-load Boxes on each field

- 1 Pre-load Box starts centered on both the 2nd and 4th tile away from the audience along each alliance wall. The open (waffle) ends of the box should be facing towards the front and back of the field.



Boxes and Cargo: There are 20 Cargo pieces, 26 Light Boxes, 20 Medium Boxes, and 10 Heavy Boxes on each field.

- Game pieces are mixed and approximately evenly distributed in each corner tile square next to the back and side walls in each warehouse.

