2025-2026 *FIRST*® Tech Challenge

Event FIELD Setup Guide

DECODE™ PRESENTED BY RTX

FIRST® TECH CHALLENGE

Event FIELD Setup Guide

This guide includes instructions to complete the assembly of the DECODE FIELD on-site at an event after previously assembling the FIELD elements (such as the GOALS, RAMPS, and OBELISK). Please refer to the companion “Initial FIELD Element Assembly Guide” for instructions on assembling the FIELD elements.

This guide also provides instructions for re-assembly of a previously built and disassembled FIELD.

Contents

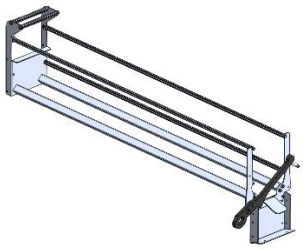
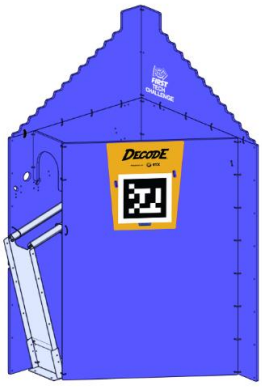
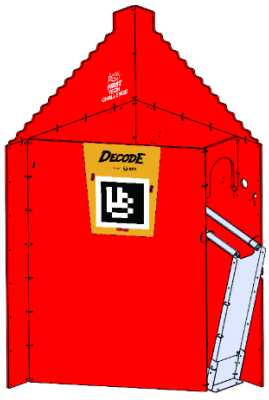
1 Recommended Tools

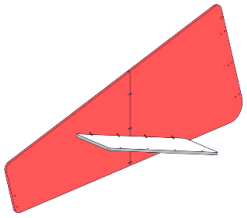
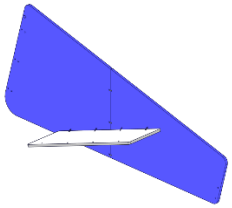
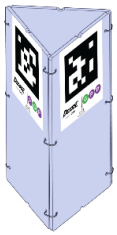
Component	Part #	Quantity	Photo
Utility Knife	N/A	1	
Tape Measure	am-4986	1	
5/32 in. Hex Driver	am-2751	1	
3/8 in. Combination Wrench	am-4961	1	
3/8 in. Nut Driver	am-3877	1	
1/2 in. Combination Wrench	am-2746	1	
3/8 in. Impact Nutsetter	am-2755	1	
Drill	N/A	1	
Safety Gloves	N/A	1	
Flush Cutters	am-3910a	1	
Carpenter Square	N/A	1	

2 Parts List – Individual Components

Component	Part #	Quantity	Photo
Green ARTIFACT	am-3376a_green	12	
Purple ARTIFACT	am-3376a_purple	24	
Red Cable Ties *(consumed with each build)*	am-1552_red (or equivalent)	5	
Blue Cable Ties *(consumed with each build)*	am-1552_blue (or equivalent)	5	
Undertile Disk	am-5422	4	
1/4-20 x 1.25 in. long Hex Head Cap Screw	am-1738	4	
1/4-20 Wing nut	am-1705	4	
10-32 x 0.5 in. long Socket Head Cap Screw	am-1002	8	
#10 Nylock Nut	am-1042	8	
1 in. Wide Gaffers Tape Red, Blue, and White *(consumed with each build)*	am-5700_tape (or equivalent)	1 roll each	

3 Parts List – Pre-Built Assemblies

Component	Part #	Quantity	Photo
Lower RAMP Assembly (Red)	am-5715_red (Partial)	1	
Lower RAMP Assembly (Blue)	am-5715_blue (Partial)	1	
GOAL and Upper RAMP Assembly (Blue)	am-5715_blue (Partial)	1	
GOAL and Upper RAMP Assembly (Red)	am-5715_red (Partial)	1	

Component	Part #	Quantity	Photo
Blocker Panel Assembly (Red)	am-5715_red (Partial)	1	
Blocker Panel Assembly (Blue)	am-5715_blue (Partial)	1	
OBELISK Assembly	am-5705	1	
ARTIFACT Tray	am-5706	2	

4 Fasteners & Tightness

There are no specifications for torquing the various fasteners used on the *FIRST* Tech Challenge FIELD. Unless otherwise noted, all fasteners should be fully tightened as part of the assembly process.

For general reference:

- No fasteners should deform the items being connected.
- Threadforming screws should be tightened until no threads are visible.
  - When threaded into Churro Extrusion, they should be tightened until the Churro Extrusion can no longer rotate when spun by hand.
- Screws threading into nylock nuts should be tightened until no threads are visible between the screw head and nut, and the nut/screw combination can no longer rotate when spun by hand.
- Initial assembly may require loosely attaching Cable Ties to enable correct assembly.
  - Fully secured Cable Ties should be tightened until they can no longer be pulled further by hand, and the objects being connected do not move relative to each other.

5 Initial ARENA Planning

Before beginning FIELD setup, planning for the larger ARENA area should take place. This can mean different things depending on if the FIELD is being set up in a school classroom or as part of a multi-division Regional Championship.

When doing ARENA layout, it is important to consider things beyond the FIELD itself. Event planners should be sure to include team/spectator/volunteer walkways, a scorekeeper's table, timing screens, volunteer snack cart, audience displays, queuing tables & paths, cart parking at the field, and more.

Please refer to the Tournament Guide for more information on event planning, layout, and setup.

5.1 FIELD Surface

While every FIELD uses TILES, ROBOTS will perform differently depending on the surface under the FIELD. We recommend that wherever possible, TILES are placed on top of a hard, level, and uniform surface. This will enable the most consistent ROBOT performance. We also recommend that whatever the surface conditions are for the FIELDS in the ARENA, similar conditions are available at any practice FIELDS which are available. Consistency is most important. (If you must have carpet under practice FIELDS, consider putting carpet under the FIELDS in the ARENA, and vice versa.)

6 TILE Coordinates

TILE coordinates are used to assist with FIELD setup. Figure 5-1 below defines the intersections/seams of each of the TILES on the FIELD where the TILE tabs interlock. Figure 5-2 defines the grid coordinate system for the TILES.

Figure 5-1: TILE tab-line locations

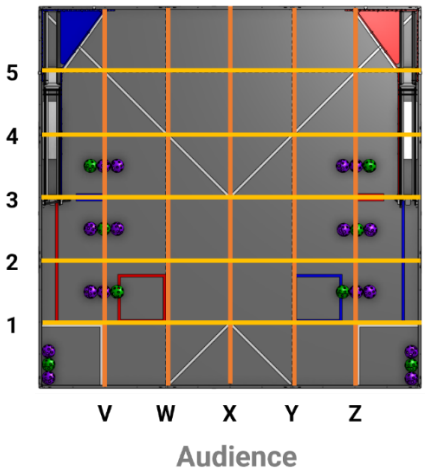
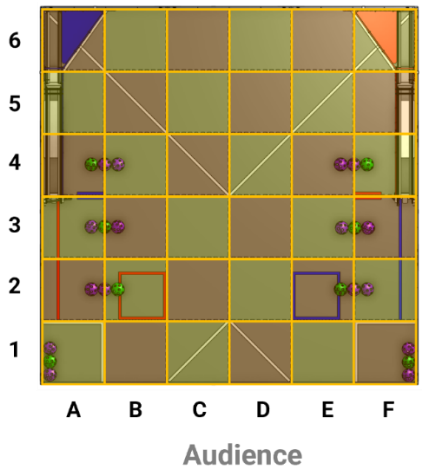
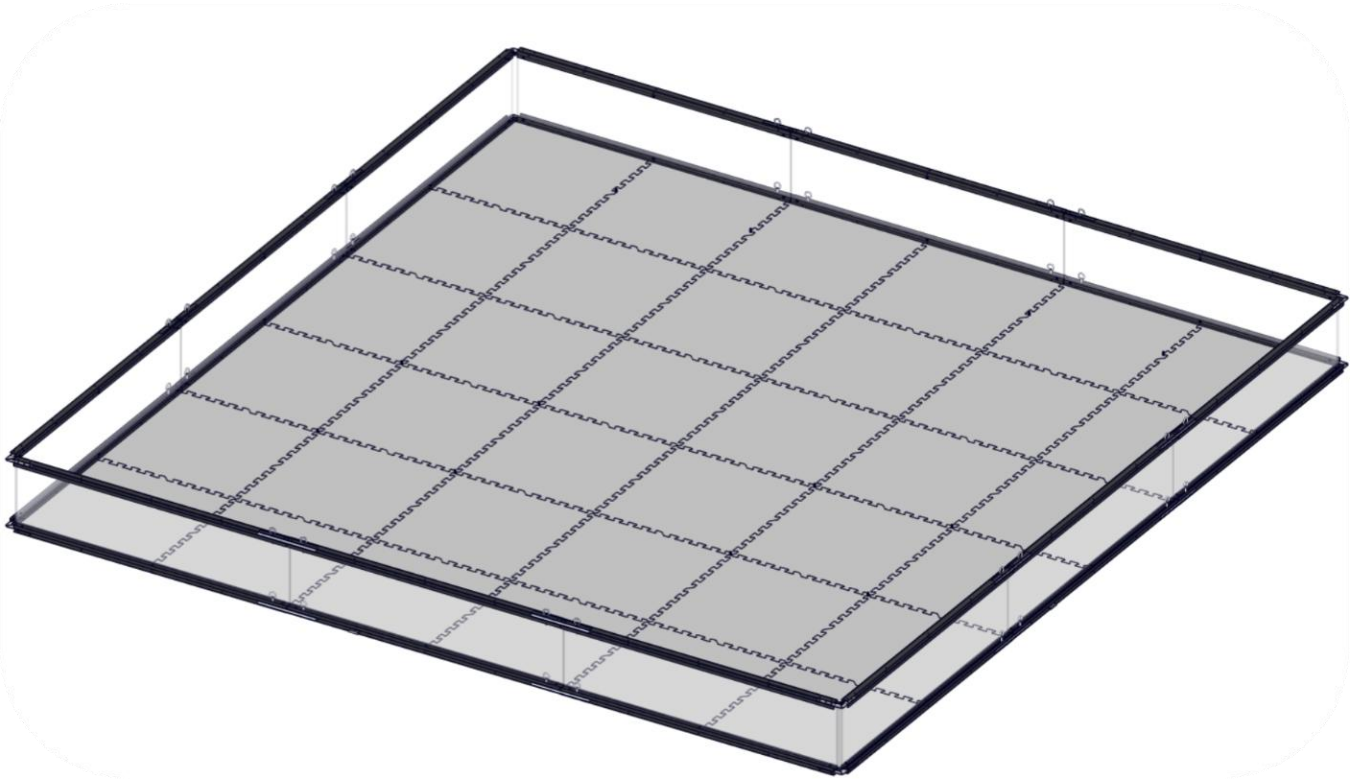


Figure 5-2: TILE locations



FIELD & Perimeter Assembly



7 FIELD & Perimeter Assembly

The primary version of the FIELD perimeter is the AndyMark *FIRST* Tech Challenge Perimeter Kit (am-0481), but other equivalent perimeters may be used. Detailed information about what FIELD components may be used for official *FIRST* Tech Challenge events is found in section 9 ARENA of the DECODE Competition Manual.

Step 1

If using the AndyMark "FTC Field Perimeter", follow the FTC Field Perimeter Setup Guide to construct your FIELD perimeter. Scan or tap this QR code or tap the link above to view.

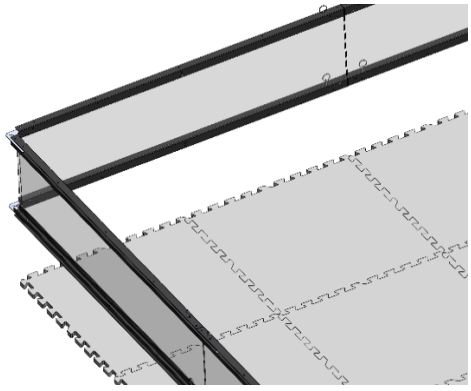
If using a different FIELD perimeter, follow its associated assembly guide. Note that different FIELD perimeters will have varying heights, as listed in the table below.

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"

Step 2

Assemble a [6 by 6] grid of tiles inside (or below) the FIELD perimeter. The tiles will be wider than the inside of the perimeter.

TILE Sizes Vary- In the next step you will need to cut some of each "tab" off some TILES. Measure how much material needs to be removed so your TILES will be centered inside the perimeter.

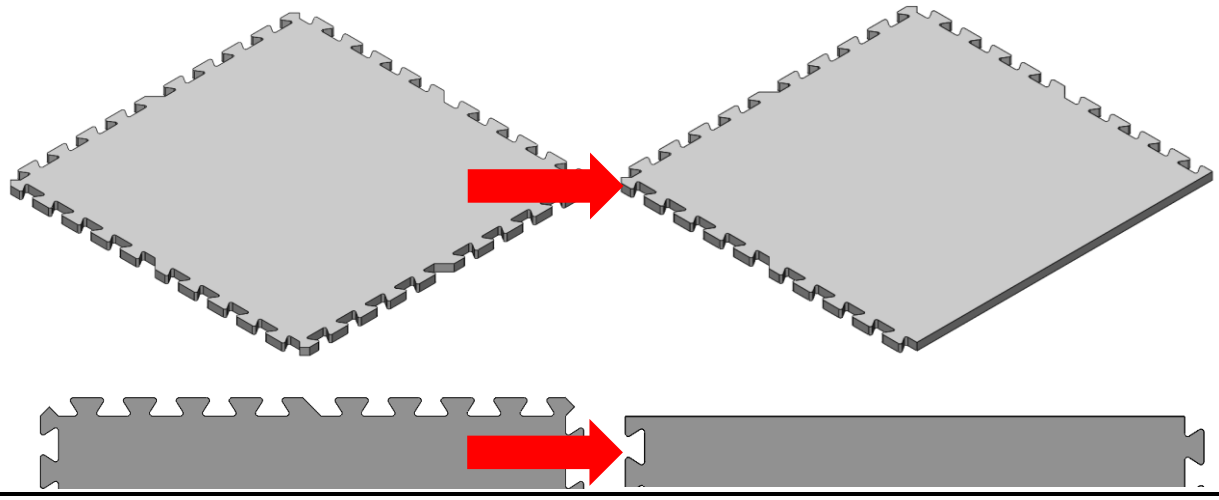


Note: TILES may be different than the ones shown.

Step 3

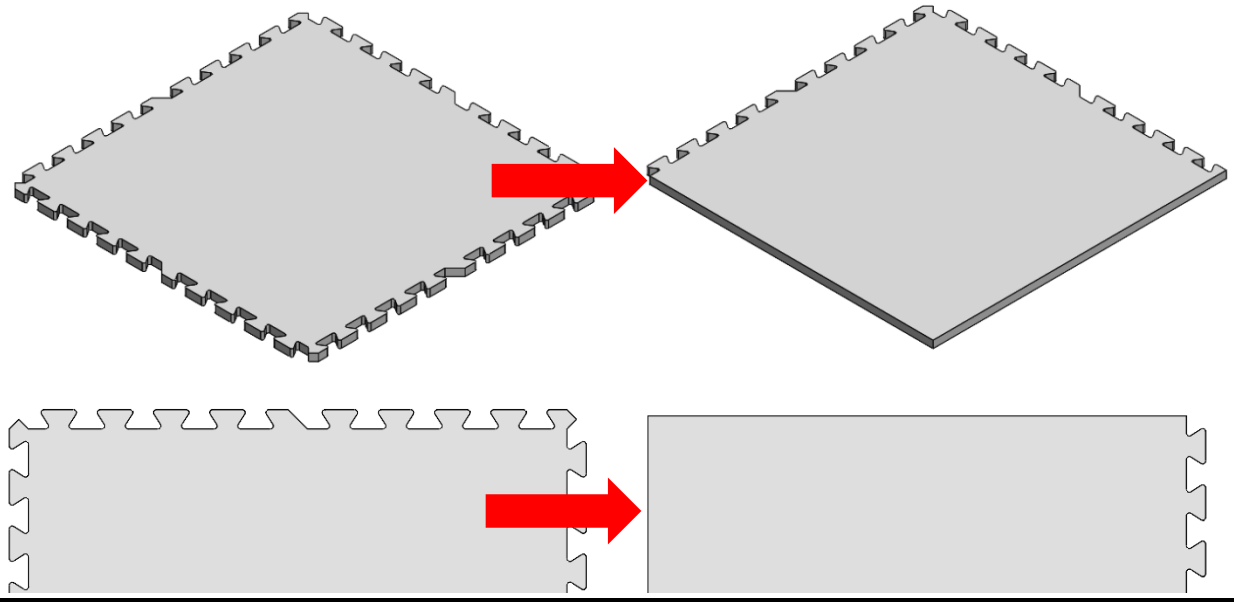
Make [16] Edge TILES: From [16] TILES, remove material from [1] edge. These will be used on the edges of the FIELD.

Keep TILES Centered: Make sure to cut an equal amount from both sides of the field to ensure your TILES remain approximately centered in the perimeter.



Step 4

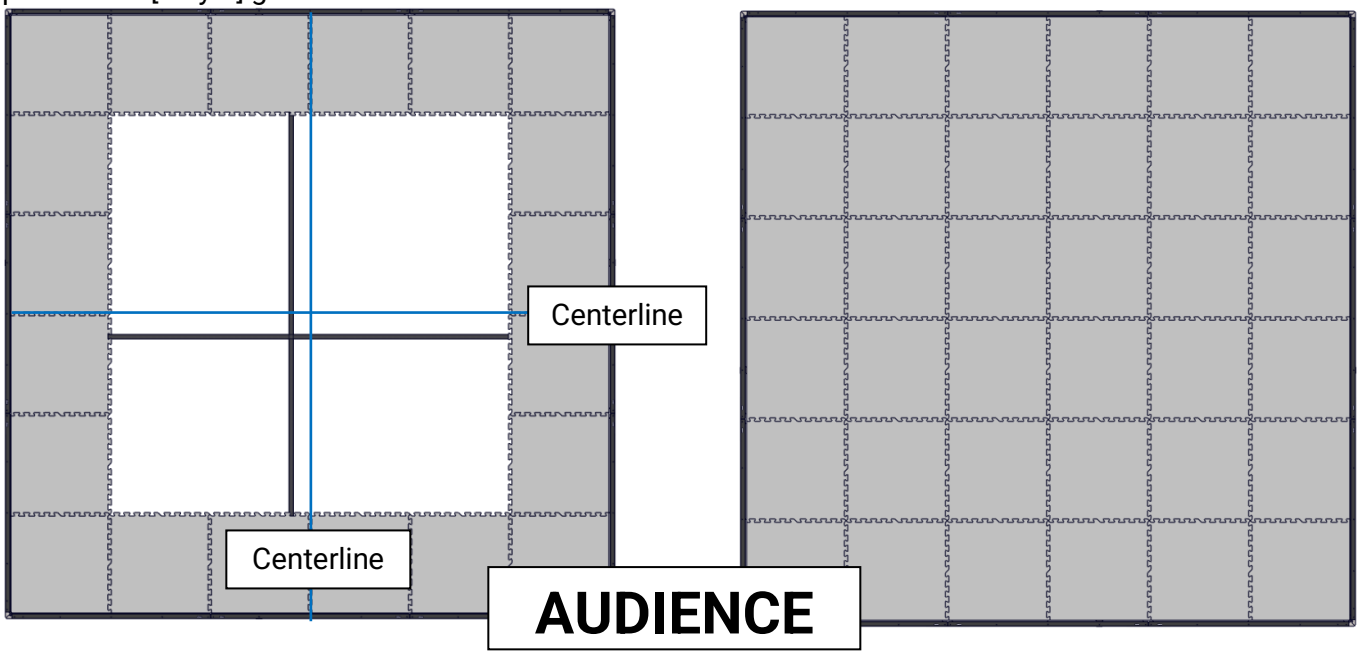
Make [4] Corner TILES: From [4] TILES, remove material from [2] adjacent edges. These will be used in the corners of the FIELD.



Step 5

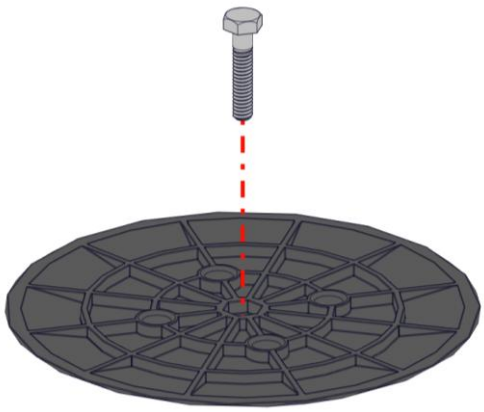
Install the FIELD perimeter straps 6 in. away from the FIELD centerline on the perimeter walls as shown.

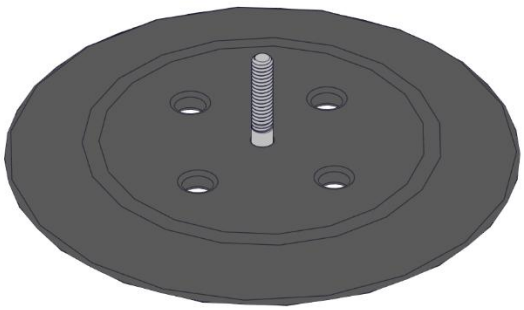
Use the cut TILES ([16] edge TILES, [4] corner TILES) to form the outer border of the FIELD floor inside the FIELD perimeter. Fill in the rest of the floor with uncut TILES. In total there should be [36] TILES placed in a [6 by 6] grid.



Step 6

Prepare the Undertile Disk Assemblies by inserting [1] Hex Head Bolt (am-1738) through the hole in [1] Undertile Disk (am-5422). Ensure the head of the screw completely recesses into the disk. Prepare [4] of these Undertile Disk Assemblies for a full FIELD.

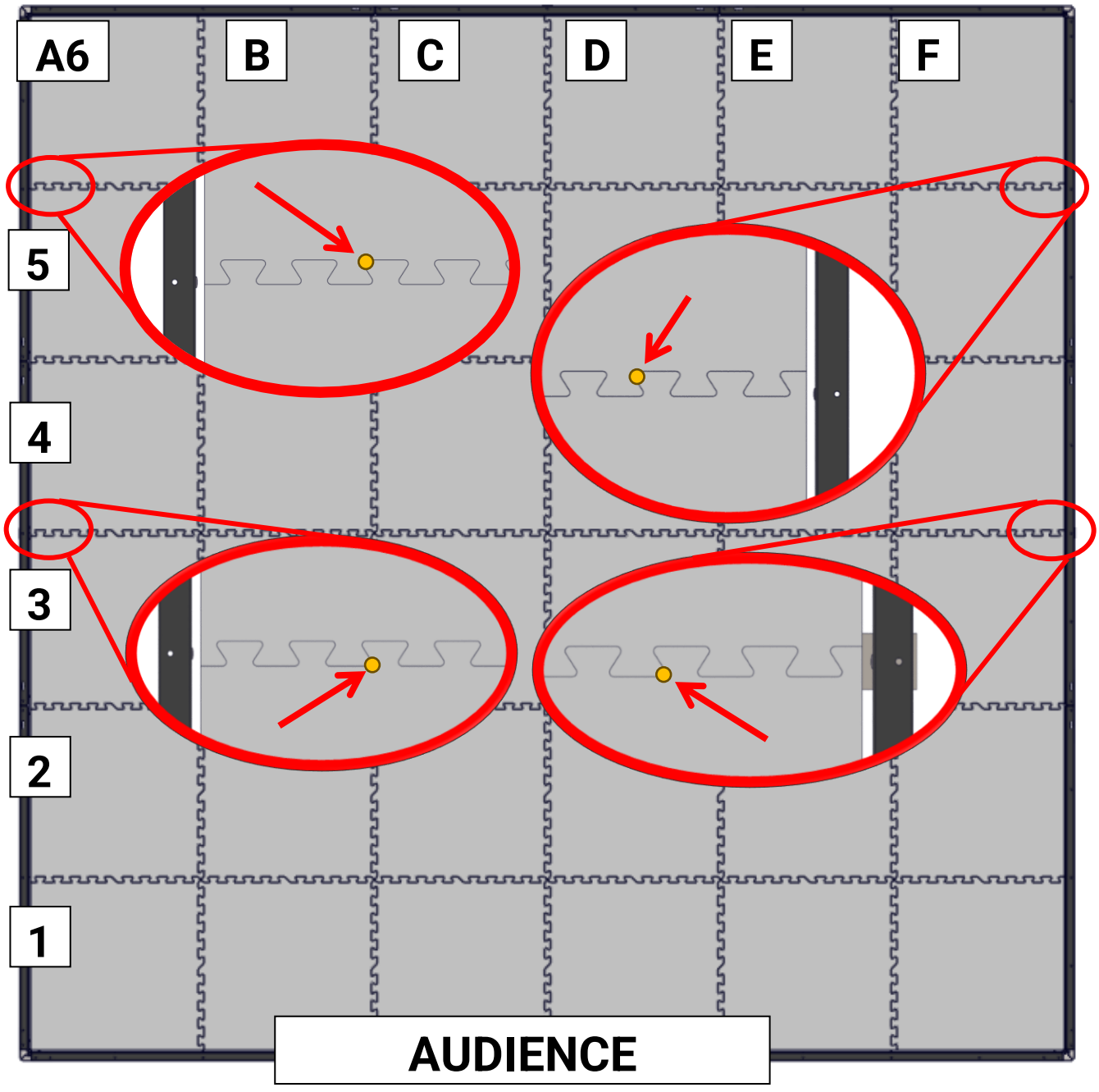




4X

Step 7

Insert [4] Undertile Disk assemblies underneath the TILES at each location shown. The magnified images identify the location where the bolt should stick through the TILES.



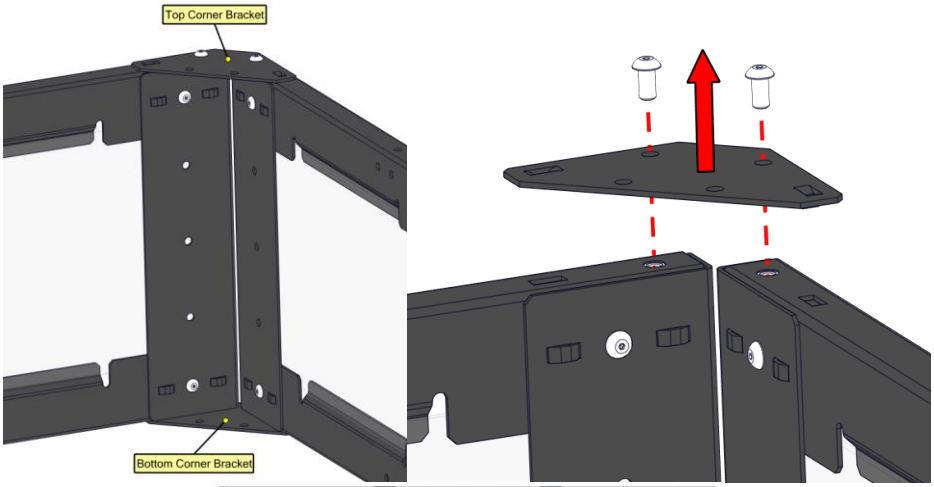
OPTIONAL Step 8

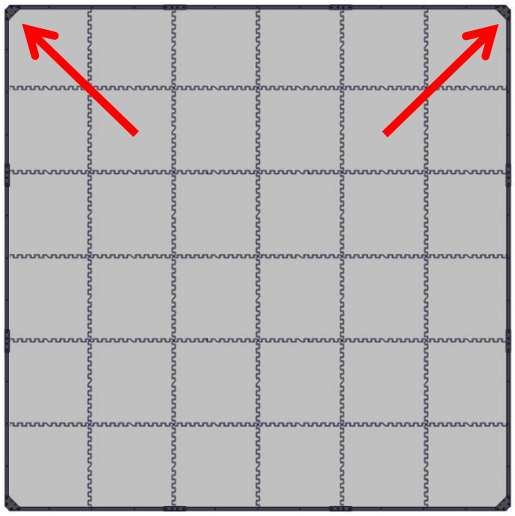
Once the FIELD is in the correct location, some events will attach the FIELD perimeter to the surface on which it rests. In this setup, teams will need to be aware that the FIELD perimeter will be more rigid and behave differently than unattached FIELDS.

Typically, this is only done if the FIELD perimeter is sitting on a platform or stage using some form of clamps or screws spaced evenly around the perimeter.
This should not be done when the FIELD is placed directly on a surface where damage is a concern. (Don't drive screws into the gymnasium floor.)

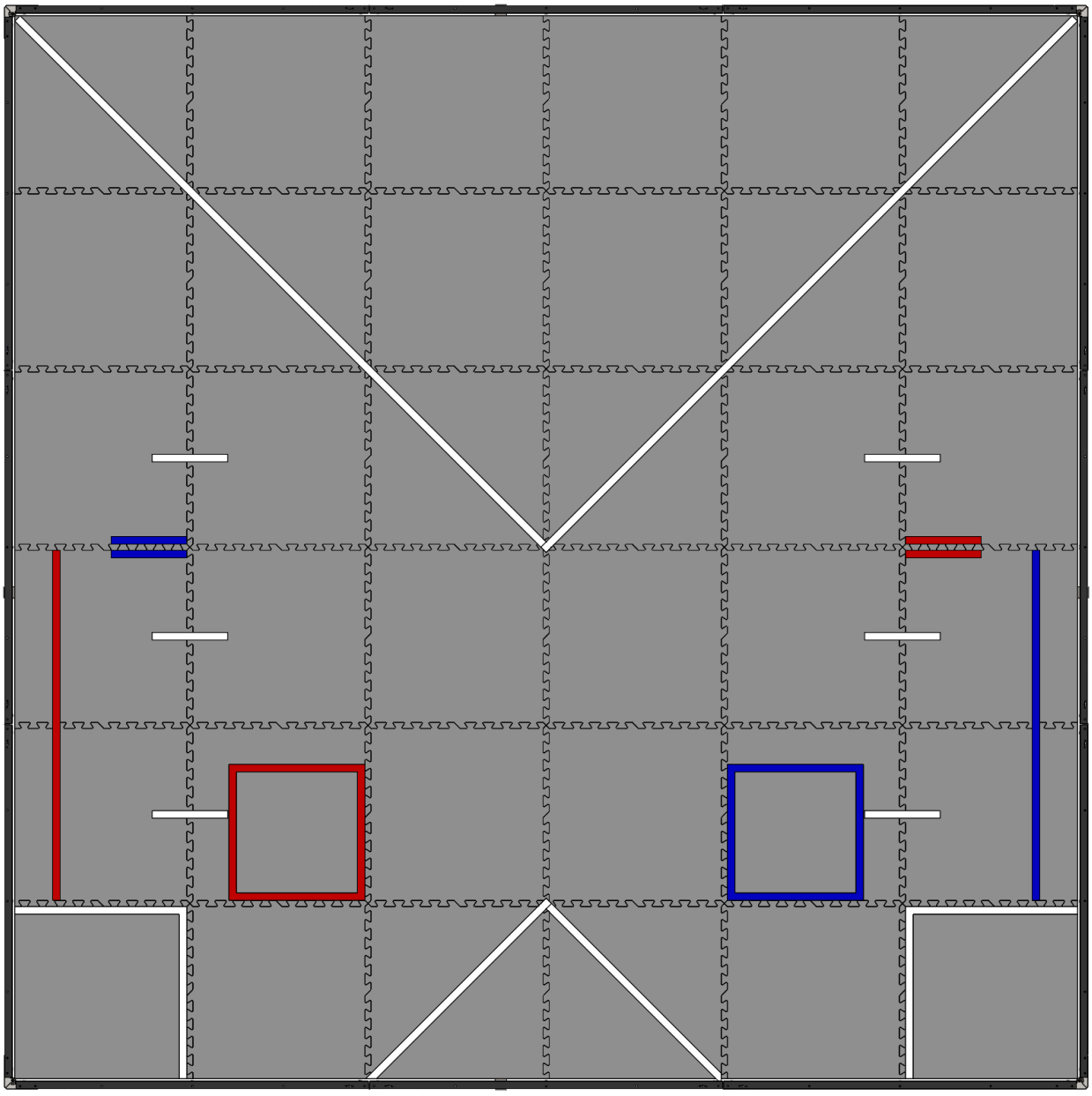
OPTIONAL Step 9 (IFI Perimeter Users Only)

In the corners above TILES A6 and F6, remove the top corner brackets. This may make these [2] FIELD corners temporarily unstable until the GOAL is installed during a later step.





Initial Tape Installation



8 Initial Tape Installation

8.1 Recommended Tape

The tape used to mark lines and zones throughout the FIELD is 1 in. (2.50 cm) wide 3M™ Premium Matte Cloth (Gaffers) Tape (GT1), or ProGaff® Premium Professional Grade Gaffer Tape, or comparable gaffers tape in red, electric blue, and white.

8.2 Line Variance

The tape lines are shown as continuous, but this is not required at official events:

- After applying the tape, event staff may cut the tape at the TILE seams so the TILES may be removed without replacing the tape.
- Events may also apply the tape in multiple segments with gaps less than 1.25 in. +/- 0.25 in. (3.15 cm +/- 0.65 cm) between segments spanning the TILE seams or at the end of tape segments which end at a TILE seam.

REFEREES are instructed to treat these line segments as a continuous line segment, ignoring gaps, when applying game rules.

8.3 Anti-Static Spray & Applying Tape

Before applying tape to the foam TILES, ensure the TILES are dry and clean of any debris, dust, or contaminants.

Tape will more effectively stick to the foam TILES if it is applied **before** any anti-static compound is sprayed on the TILES. *FIRST* recommends that tape is installed before anti-static spray is applied. If anti-static compound has already been sprayed on a TILE, it is important to ensure it is fully dry before applying any tape. Vacuuming the field may negate the effects of anti-static spray.

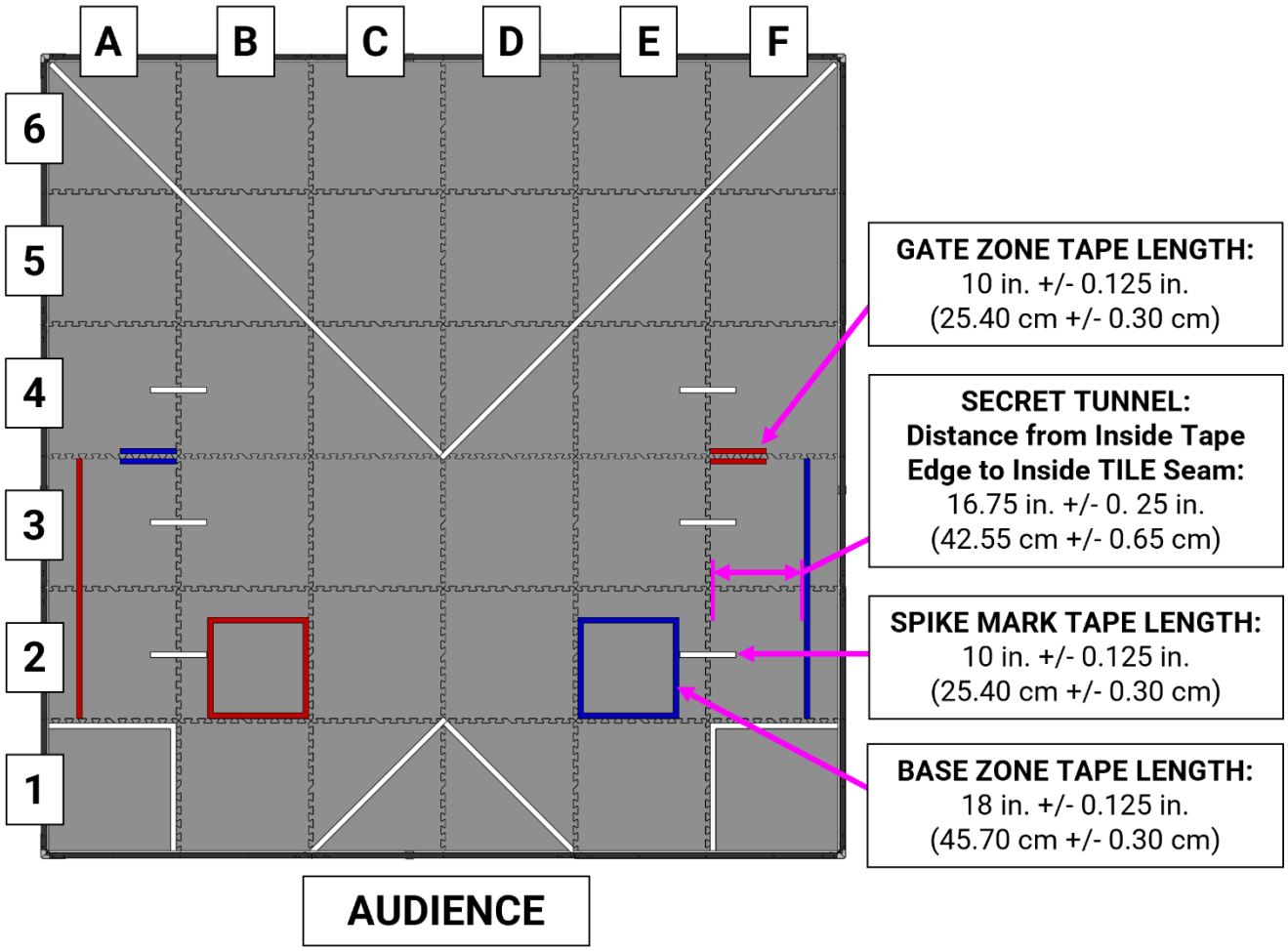
Many types of tape use pressure-activated adhesive. To ensure the best performance, press firmly along as much of the surface area of the tape as possible during installation.

Note: Almost all tape lines can be installed before the FIELD is assembled. Only the DEPOT tape lines at the base of each GOAL need to be placed after the FIELD elements are installed on the FIELD.

Initial Tape Install – Quick Reference:

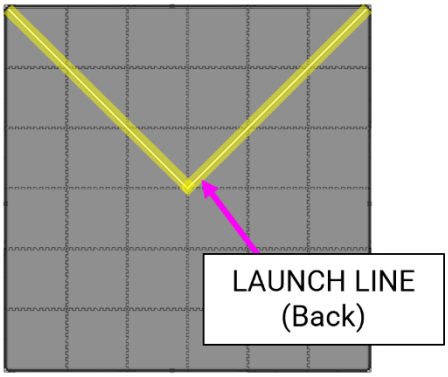
For veteran DECODE FIELD builders who only need a quick reminder on tape locations and key dimensions, this quick reference sheet provides all the basics for tape installation.

Where they are given, dimensions should be measured precisely according to FIELD specifications; however, most of the tape lines are designed to be placed without needing a measuring device. These lines start and end at fixed locations on the FIELD, and/or run adjacent to the seams of the TILE grid. Refer to the Initial Tape Installation guide for more details.



<u>Step 1</u> - Install LAUNCH LINE (Back)

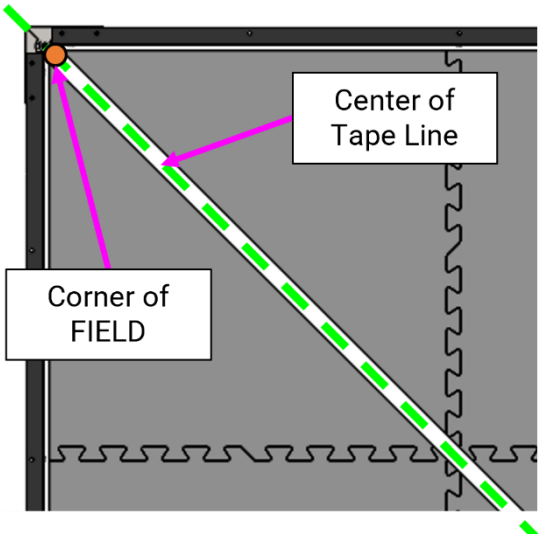
There are [2] sets of white LAUNCH LINES on the FIELD.
The back LAUNCH LINE is in the shape of a "V" which runs from the back corners of the FIELD to the center point of the FIELD on TILES A6, B5, C4, D4, E5, and F6.

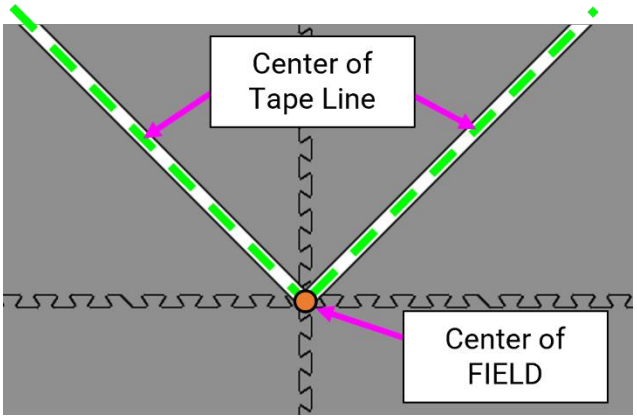


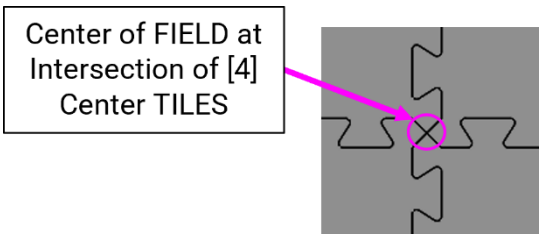
During installation, ensure the centerline of the tape is directly aligned with the corners of the FIELD and the center point of the FIELD, as defined by the [4] center TILES, at the TILE intersection X3.

Care should be taken that the center of the tape line passes through each of the TILE junctions between the FIELD corner and FIELD center to ensure the line is correctly placed. Tape lines that lead up to the edge of the FIELD can be wrapped around the edge for a cleaner placement.

It may be easiest to install these [2] tape lines in an overlapping "X" over the TILE intersection and then using a sharp knife to trim the tape into the shape shown.

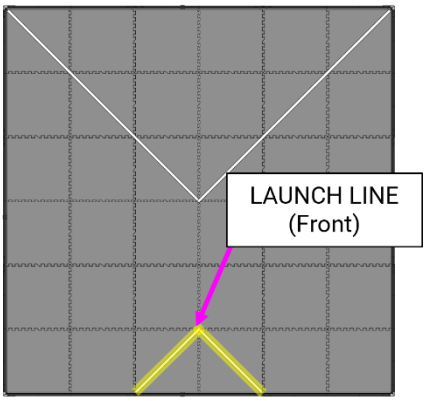




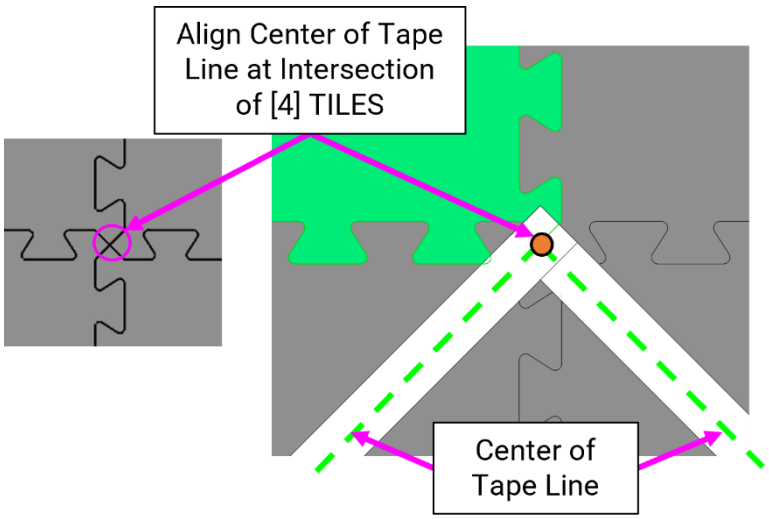


<u>Step 2</u> - Install LAUNCH LINE (Front)

The front LAUNCH LINE is made from [2] tape segments in the shape of an inverted "V" which spans the [2] edge TILES C1 and D1 centered on the audience side of the FIELD (as shown).



During installation, ensure the centerline of the tape is directly over these key locations:



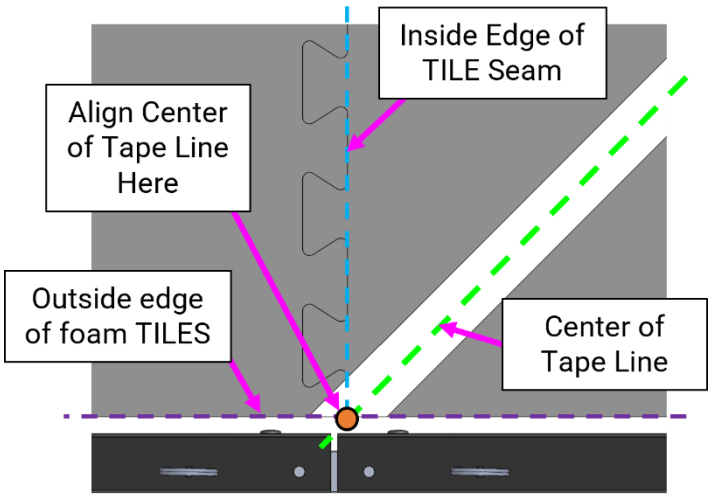
First, each tape line should be centered over the point at the TILE intersection X1 where the [4] TILES meet as shown.

It may be easiest to install these [2] tape lines in an overlapping "X" over the TILE intersection and then using a sharp knife to trim the tape into the corner shown.

Second, each tape line should also be centered over the point at the outside "perimeter facing" edge of the foam TILES and the inside edge of the TILE seam.

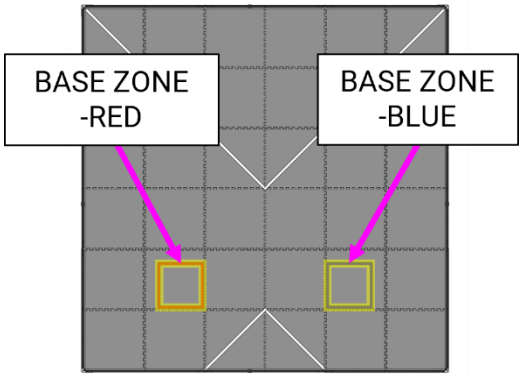
Tape lines that lead up to the edge of the FIELD can be wrapped around the edge for a cleaner placement.

Per section 8.2 Line Variance, in this guide: Builders cutting the tapelines at TILE seams may have small "extra" segments of tape. These can be cut or omitted, such as the small triangle at the corner of the LAUNCH LINE triangle.



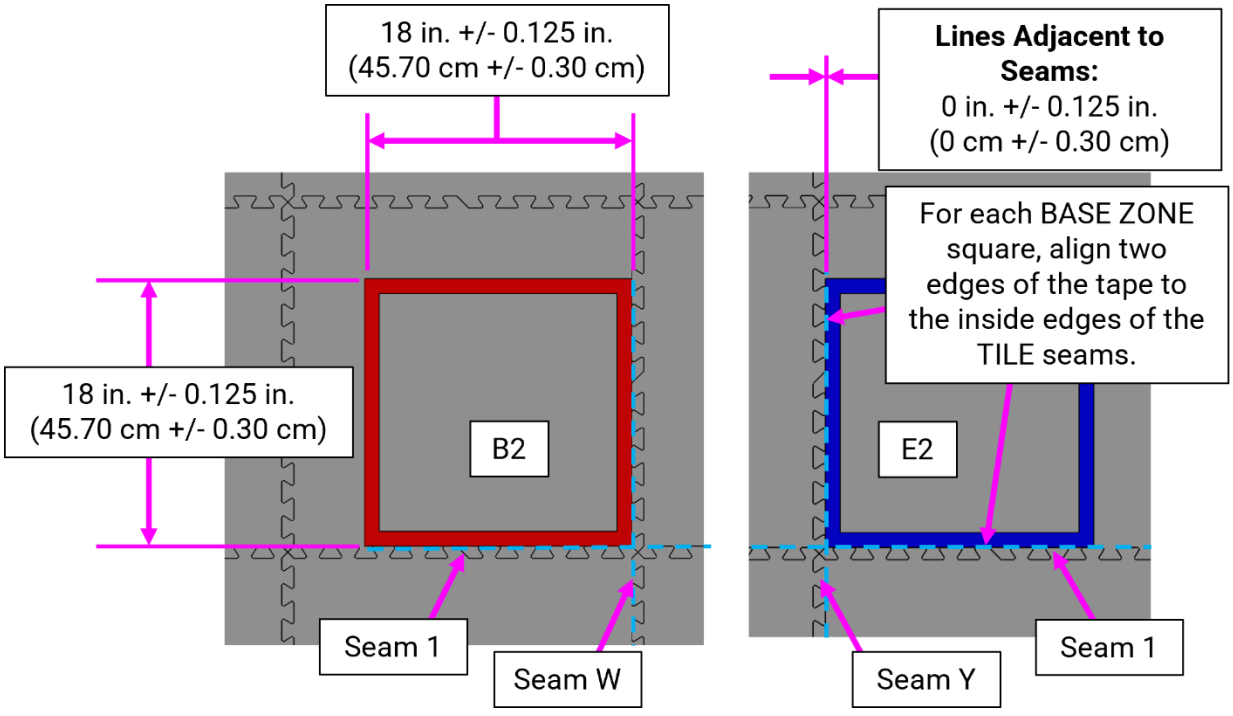
<u>Step 3</u> - Install [2] BASE ZONES

There are [2] BASE ZONES on the FIELD, [1] constructed from red tape and [1] from blue tape. They are located on the FIELD relative to the foam TILE grid, as shown. The red BASE ZONE is on TILE B2 and the blue is on TILE E2.



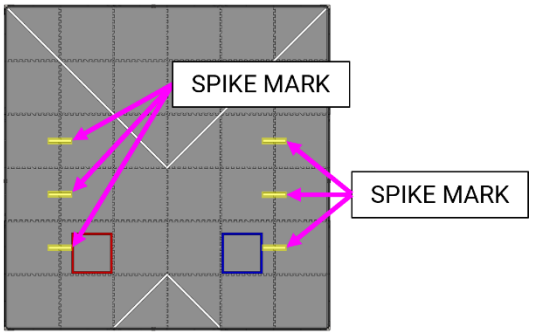
Each BASE ZONE is made from [4] segments of tape measuring 18 in. (45.70 cm) long, forming a square.

The BASE ZONES are located such that they are lined up against the inside edges of the TILE seams. Place each square so [2] tape edges are adjacent to the TILE seams in the locations shown. The red BASE ZONE is lined up with tape adjacent to the TILE seams W and 1, and the blue BASE ZONE is lined up with tape adjacent to TILE seams Y and 1.

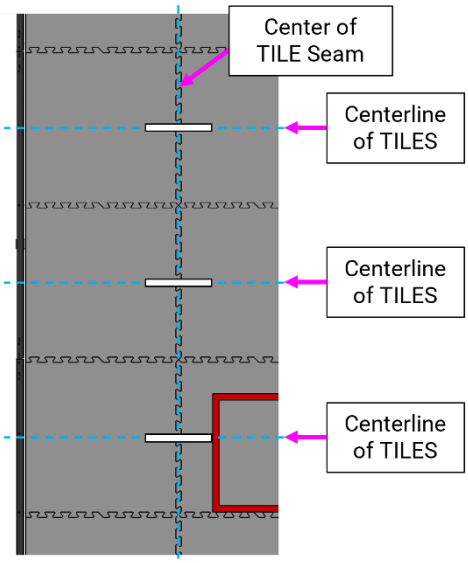


Step 4 - Install [6] SPIKE MARKS

There are [6] white tape SPIKE MARKS on the FIELD used for FIELD reset of SCORING ELEMENTS located relative to the foam TILE grid, as shown. SPIKE MARKS are placed on TILE pairs A4/B4, A3/B3, and A2/B2, each spanning TILE seam V, and on TILE pairs E4/F4, E3/F3, and E2/F2, each spanning TILE seam Z.



Each SPIKE MARK is placed along the centerline of a TILE and evenly spans the TILE seam.
SPIKE MARKS are orthogonal to the TILE grid.

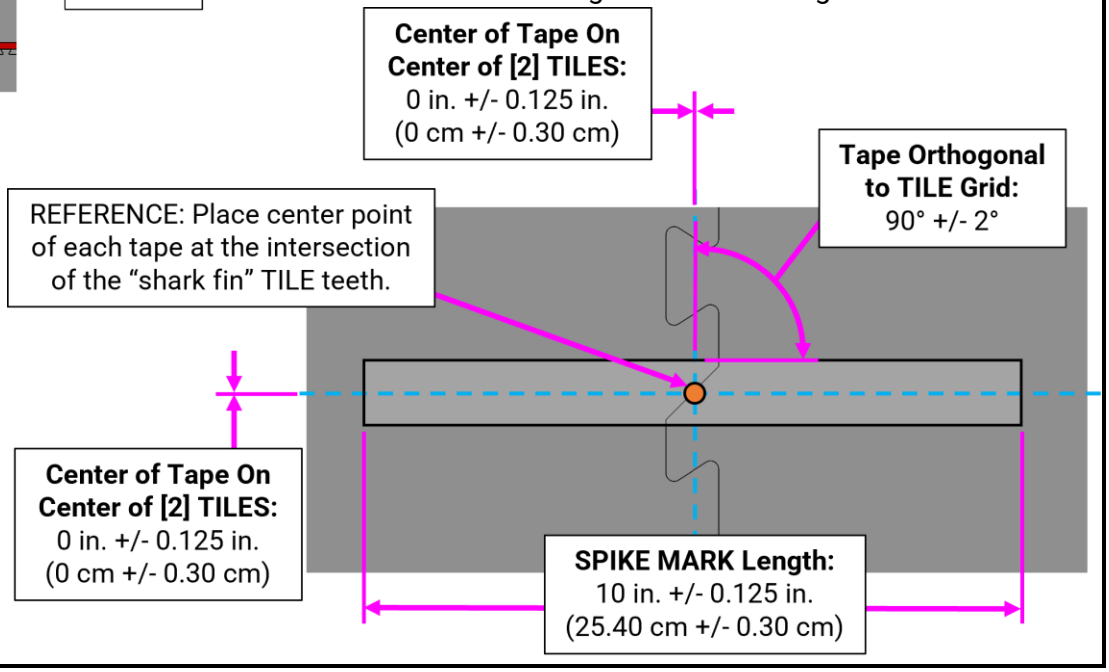


Cut [6] pieces of tape which are 10 in. (25.40 cm) long and place a mark at the center point of each piece for reference.

Place each SPIKE MARK using the marked center points as a reference for installation – the tape center point should be placed at the middle of the TILE, evenly spread across the TILE seams, as shown.

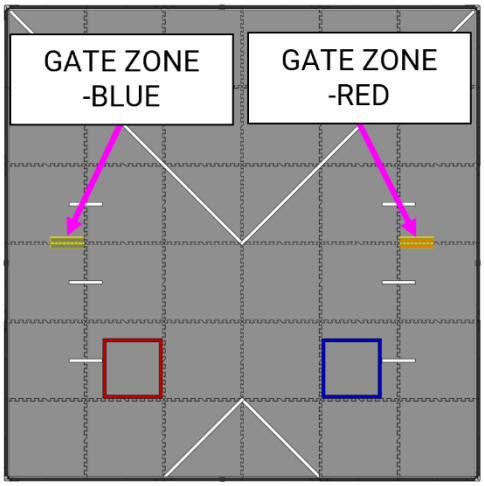
For most types of TILES, the “shark fin” tooth at the middle of the TILE can be used as a reference for the center, as shown.

It is recommended builders use a “Square” of some kind to ensure the SPIKE MARKS are orthogonal to the TILE grid.



Step 5 - Install [2] GATE ZONES

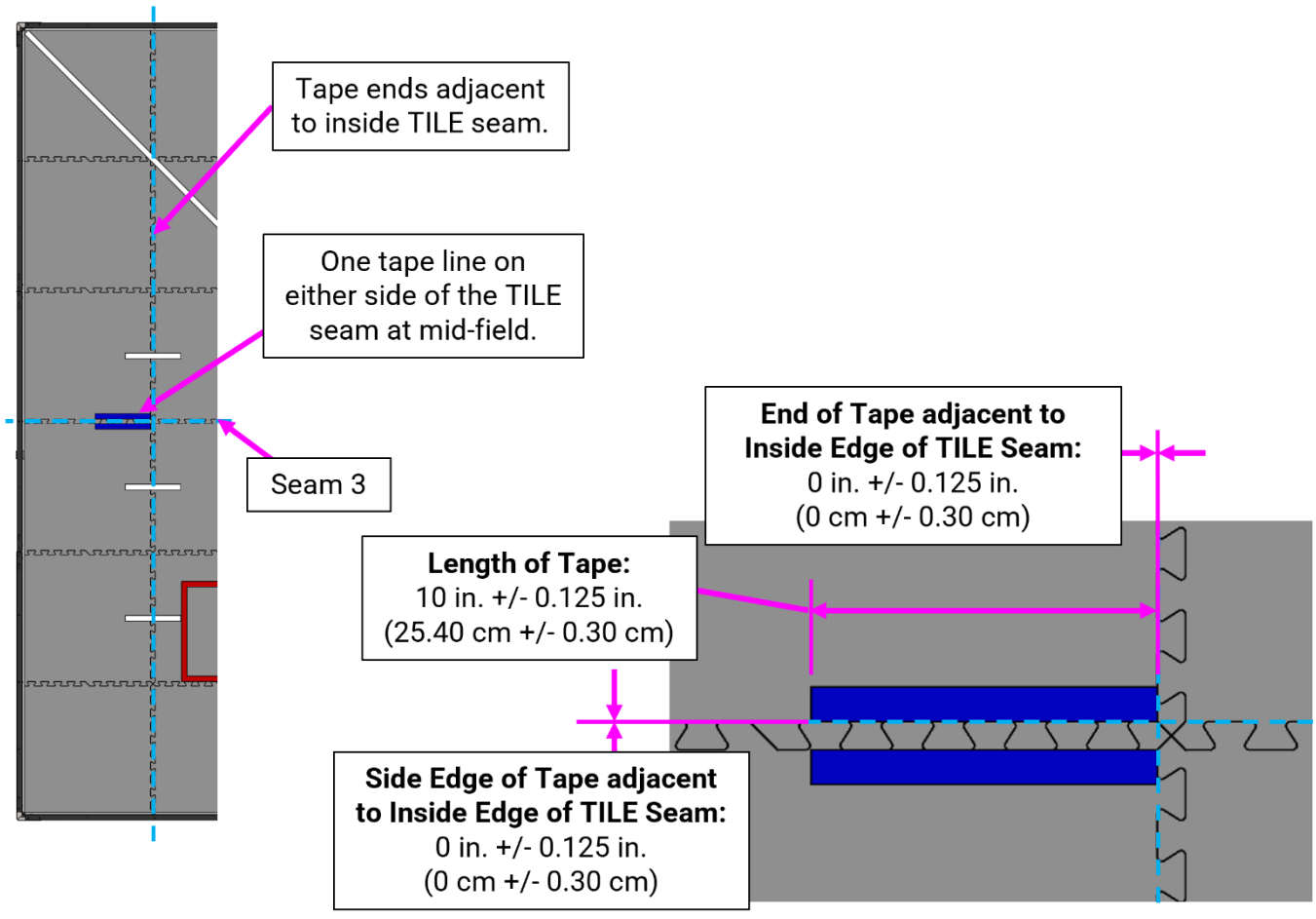
There are [2] GATE ZONES on the FIELD, [1] for each ALLIANCE. Each GATE ZONE is made from [2] pieces of red or blue tape.



The GATE ZONES are located on the FIELD relative to the foam TILE grid, as shown.
The blue GATE ZONE is taped on TILES A3 and A4.
The red GATE ZONE is taped on TILES F3 and F4.

Cut [2] pieces of red tape and [2] pieces of blue tape each 10 in. (25.40 cm) long.

The tape lines are placed such that their ends start at TILE seams V and Z and run toward the nearest perimeter wall and parallel and adjacent to nearby TILE seam 3, as shown.

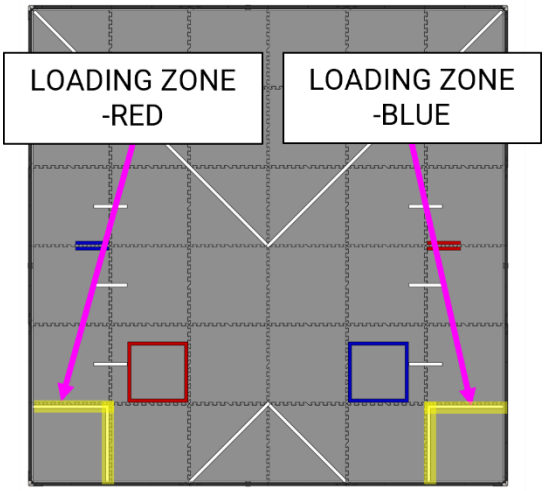


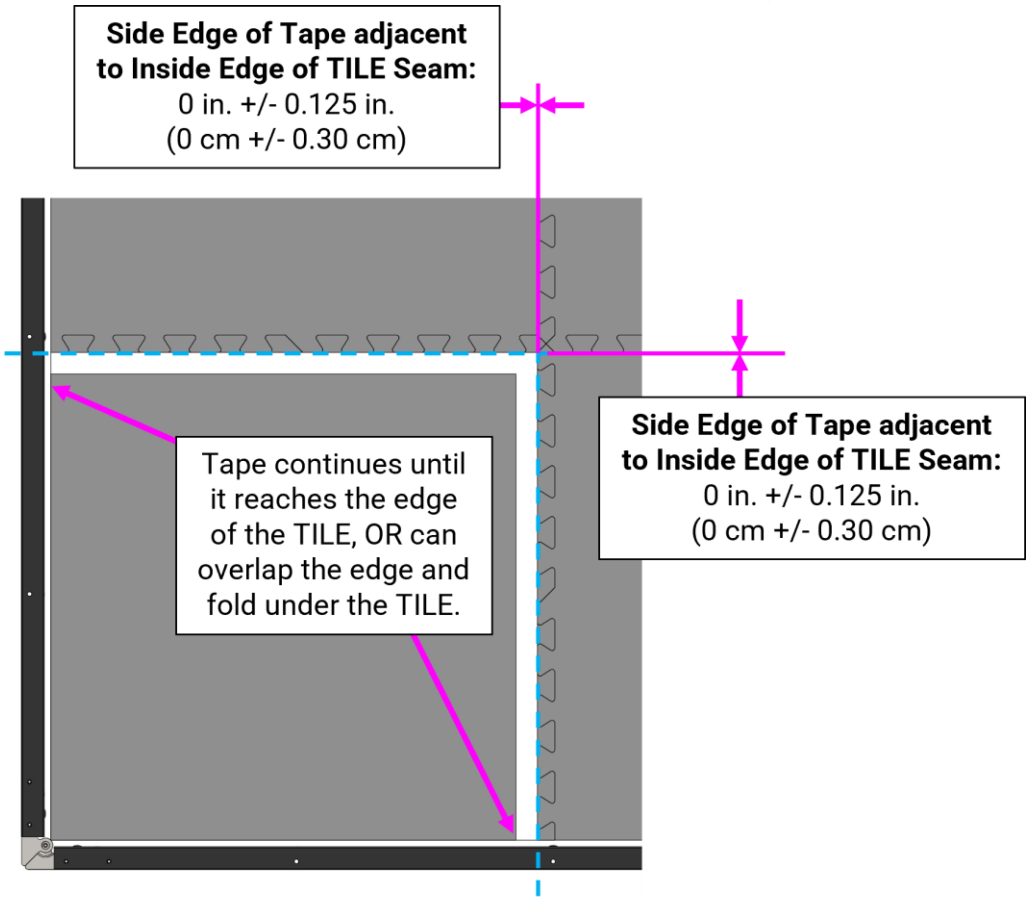
<u>Step 6</u> - Install [2] LOADING ZONES

There are [2] LOADING ZONES on the FIELD, [1] for each ALLIANCE. Each LOADING ZONE is made from [2] pieces of white tape.

The LOADING ZONES are located on the FIELD relative to the foam TILE grid, as shown. LOADING ZONES are in TILES A1 and F1, in the corners on the audience side of the FIELD with [2] tape lines bounding its inner edges.

The tape lines are placed such that their ends and side edges are adjacent to nearby TILE seams 1, V, and Z, as shown.



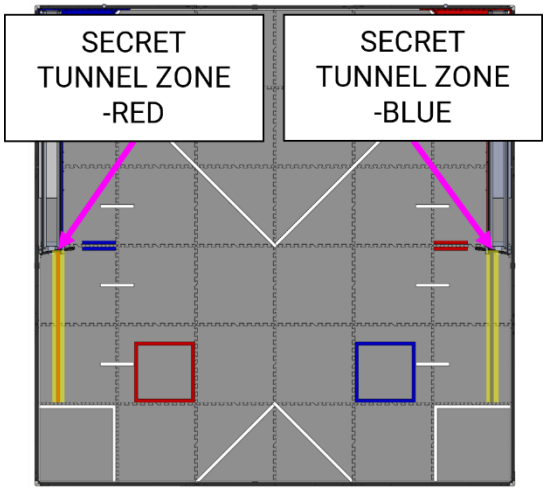


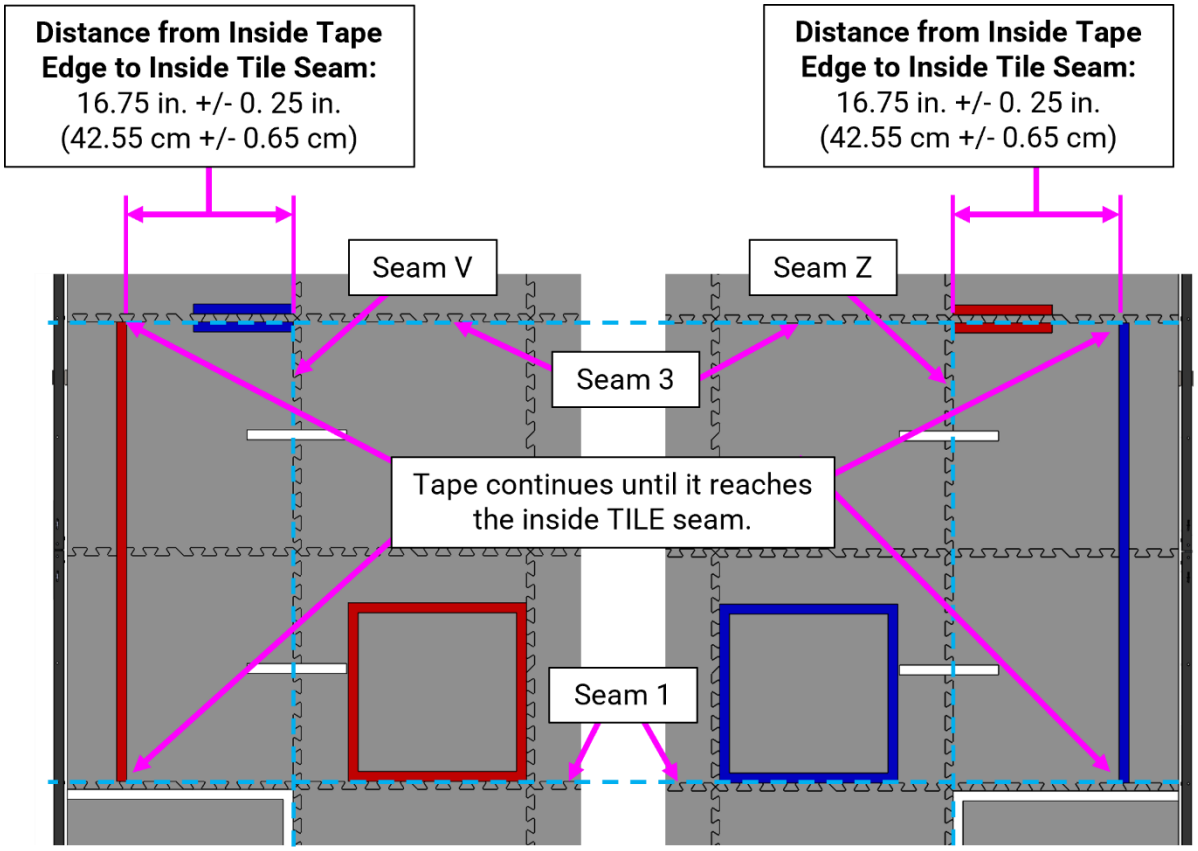
Step 7 - Install [2] SECRET TUNNEL ZONES

There are [2] SECRET TUNNEL ZONES on the FIELD, [1] for each ALLIANCE. Each SECRET TUNNEL ZONE is made from [1] piece of red or blue tape.

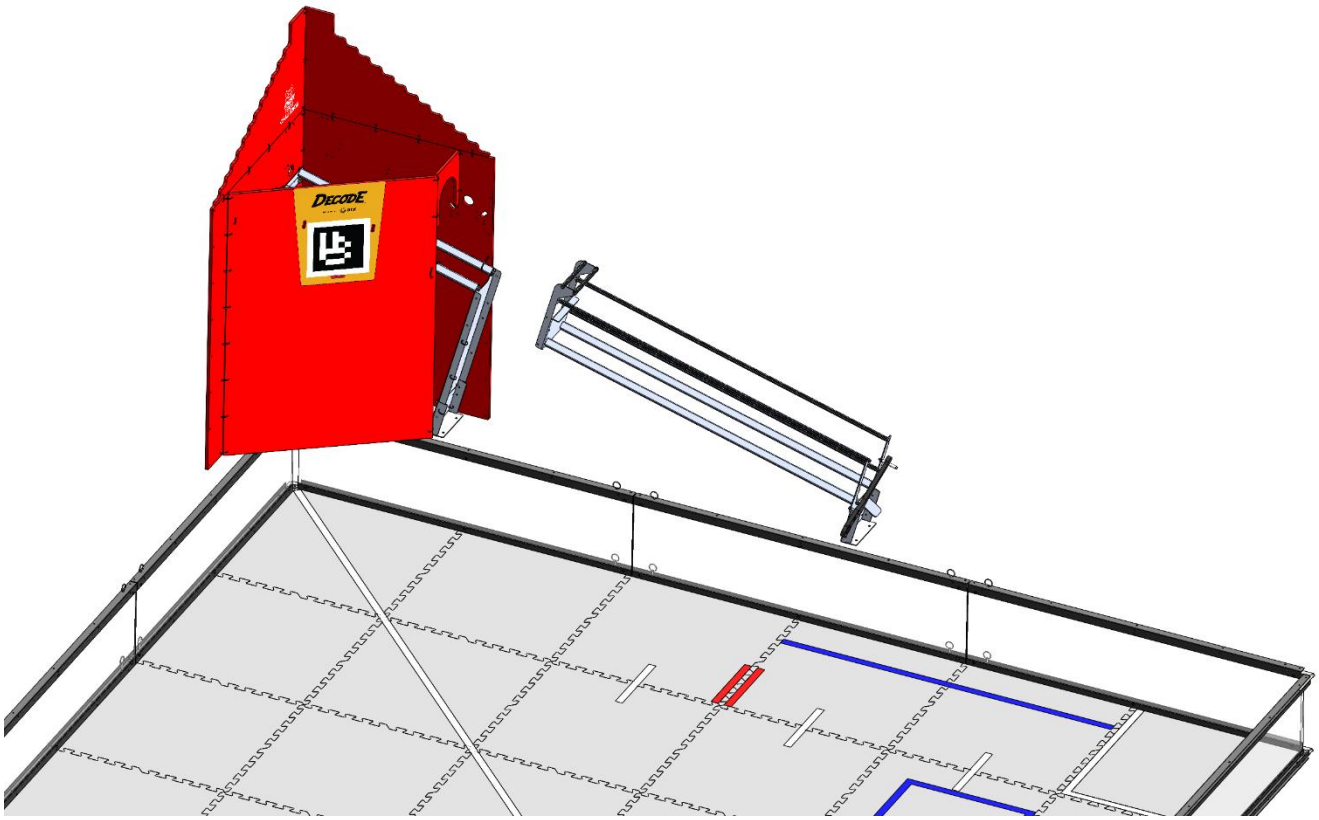
The SECRET TUNNEL ZONES are located on the FIELD relative to the foam TILE grid, as shown. The red SECRET TUNNEL ZONE is on TILES A2 and A3 spanning from TILE seam 1 to 3. The blue SECRET TUNNEL ZONE is on TILES F2 and F3 from TILE seam 1 to 3.

The tape lines are placed such that they are 16.75 in. (42.55 cm) away from the inside of TILE seam V or Z, respectively, as shown.





ARENA Setup



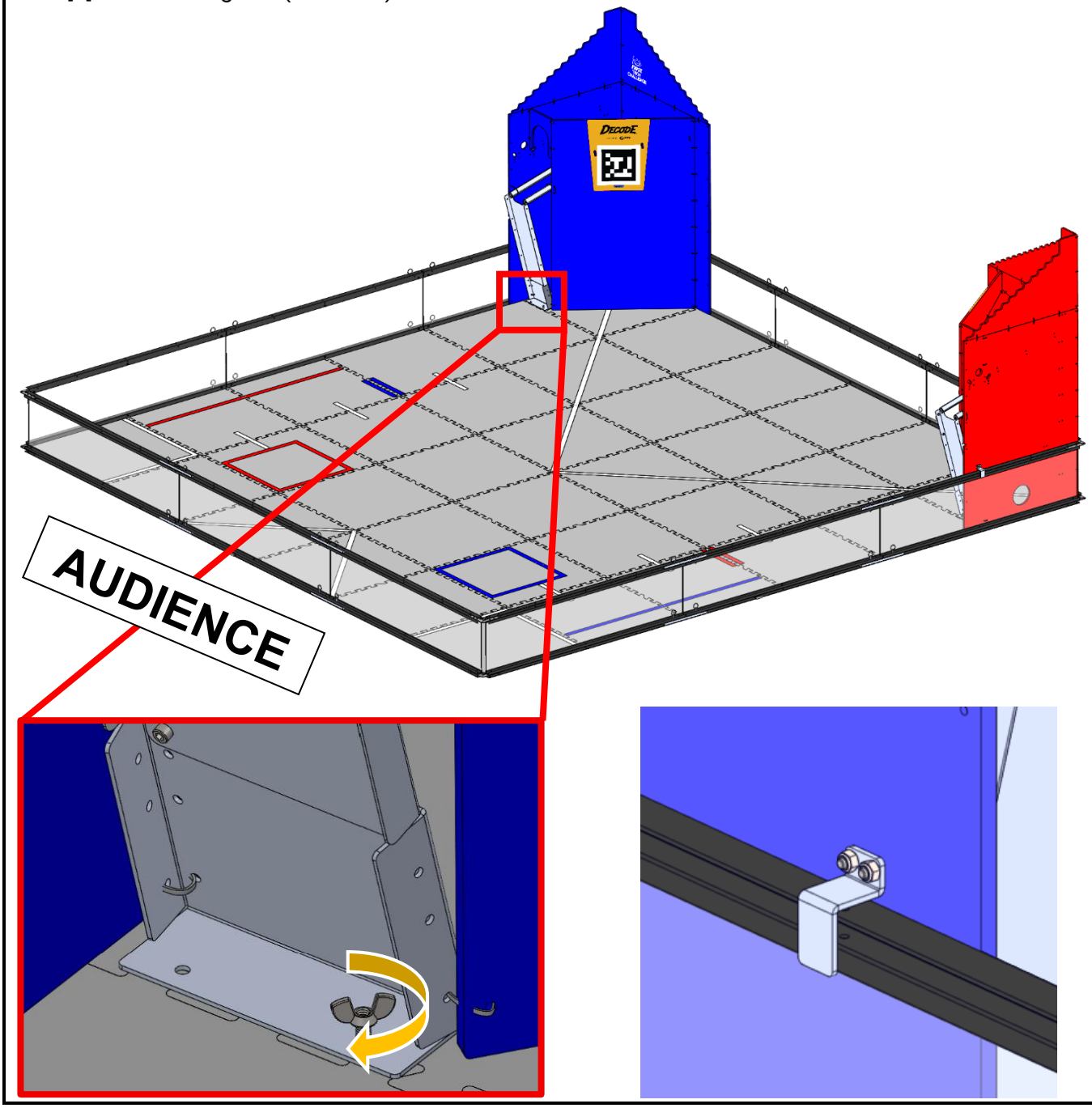
WARNING

Metal parts MAY have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be deburred with a deburring tool or sandpaper.

9 FIELD Element Installation

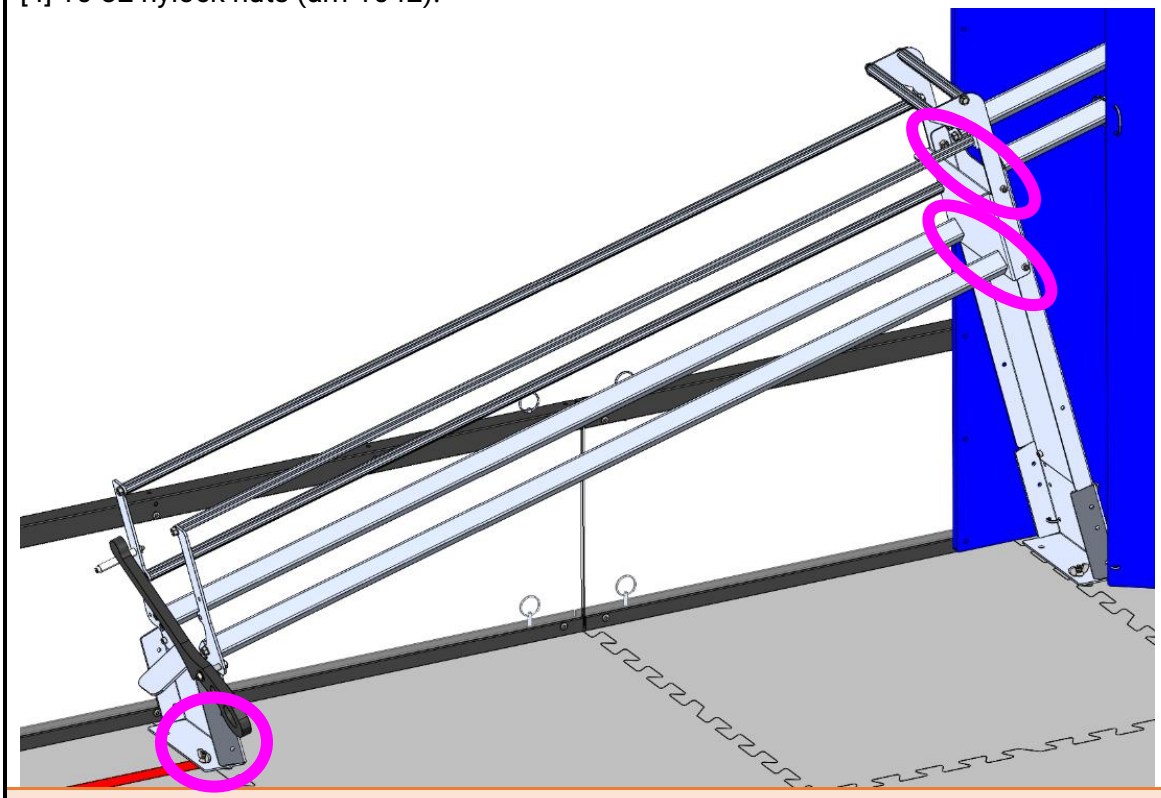
Step 1

Place each GOAL Assembly onto the FIELD, making sure the GOAL Border Brackets slip over the FIELD perimeter, and the RAMP Support Bracket engages with the Undertile Disk assembly as shown. Secure with [1] 1/4 -20 Wing Nut (am-1705) each.



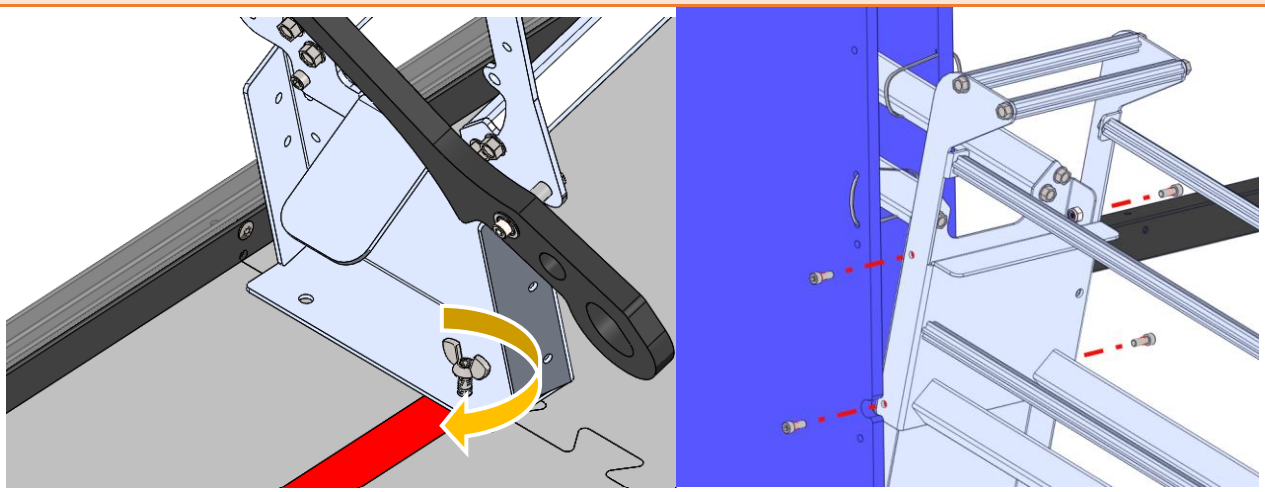
Step 2

Place the Lower RAMP Assembly on the FIELD, as shown. Secure to the TILES with [1] 1/4-20 Wing Nut (am-1705). Secure to the Upper RAMP Assembly using [4] 10-32 x 0.5 in. long screws (am-1002) and [4] 10-32 nylock nuts (am-1042).



Warning: Ensure Lower RAMP is Properly Aligned

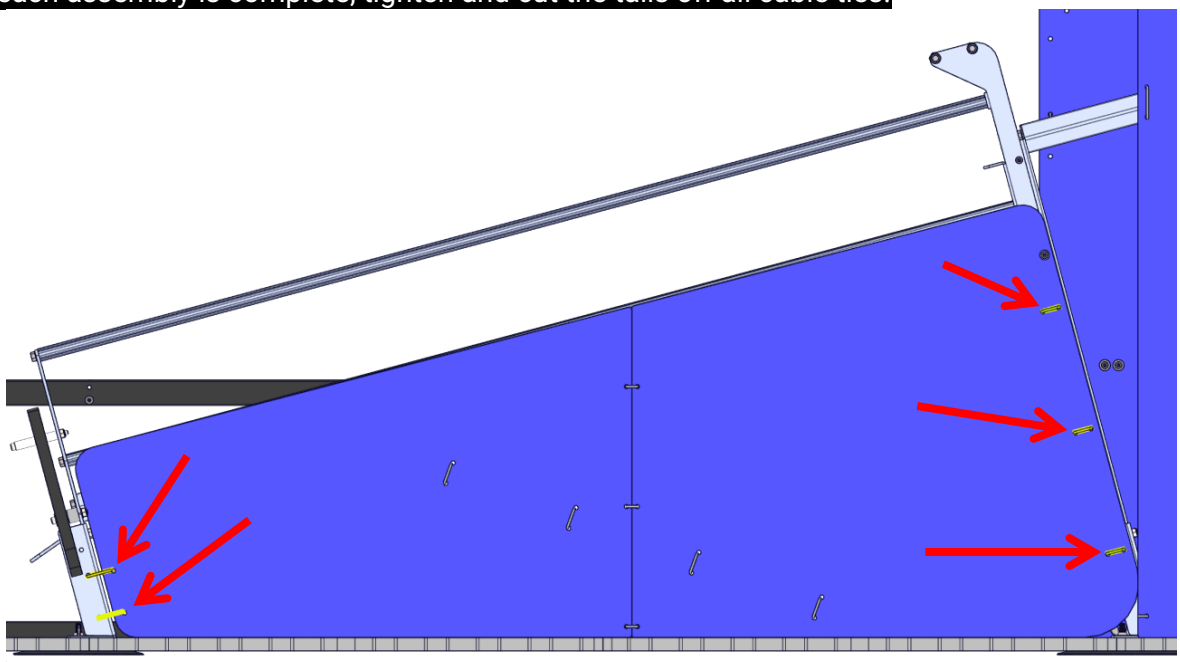
During assembly the RAMPS may be built with a slight "twist." To ensure proper RAMP function, make sure both RAMPS sit flat when placed on a flat level surface, with no twist down their length.

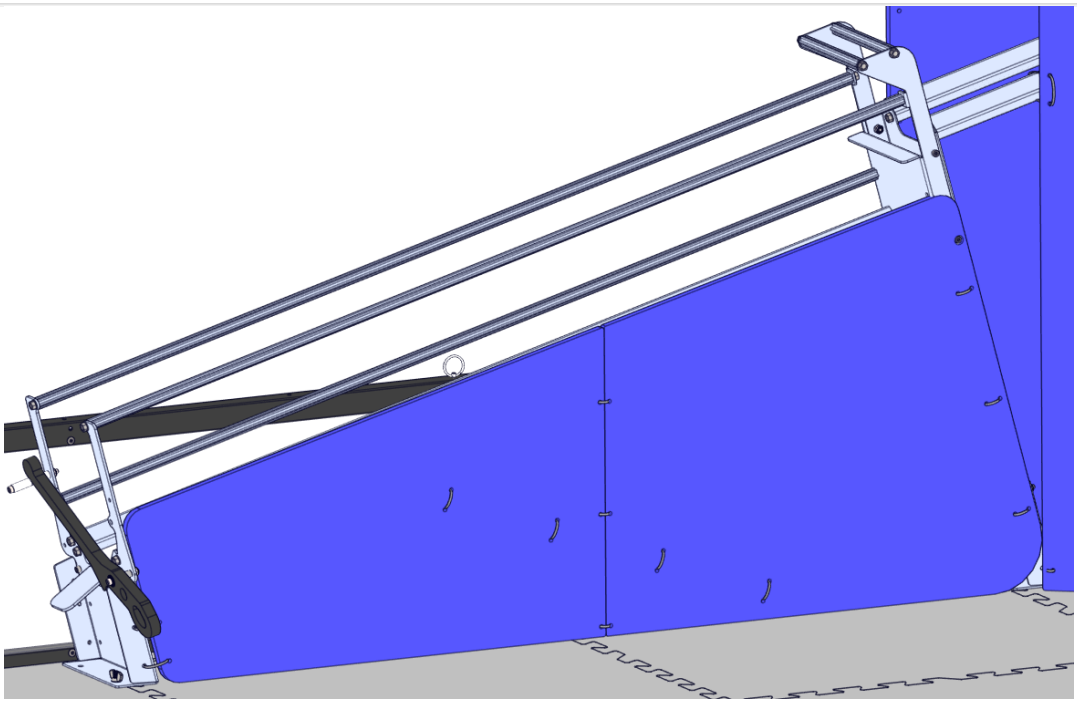


Step 3

Attach the Blocker Panel Assembly using [5] same ALLIANCE colored cable ties (am-1552) as shown. Cable tie heads should be INSIDE the assembly. To make assembly easier do not tighten cable ties until after the assembly is complete.

Once each assembly is complete, tighten and cut the tails off all cable ties.





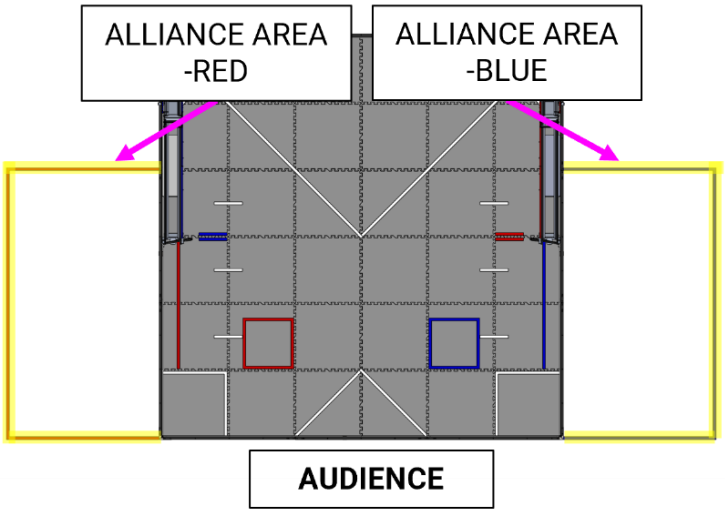
10 Final ARENA Details

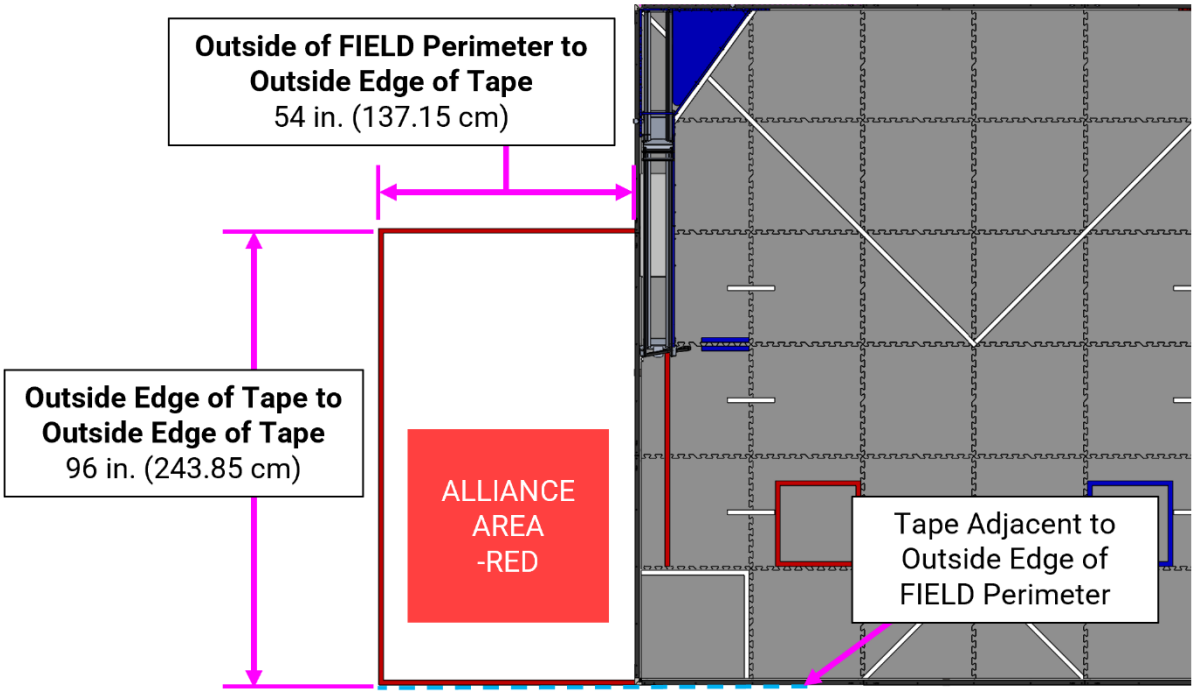
<u>Step 1</u> – Place [2] ALLIANCE AREAS

There are [2] ALLIANCE AREAS in the ARENA, adjacent to the FIELD, [1] constructed from red tape and [1] from blue tape. The red ALLIANCE AREA is on the left of the FIELD, and the blue is on the right of the FIELD, from the audience's perspective.

Each ALLIANCE AREA is defined by [3] segments of tape. The ALLIANCE AREAS are 54 in. (137.15 cm) wide and run along the sides of the FIELD for 96 in. (243.85 cm) starting from the corners at the audience end of the FIELD.

The tape line at the end of each ALLIANCE AREA is placed colinear with the side of the FIELD perimeter closest to the audience.





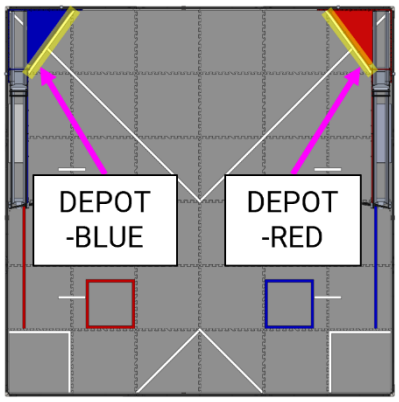
Step 2 – Install [2] DEPOTS

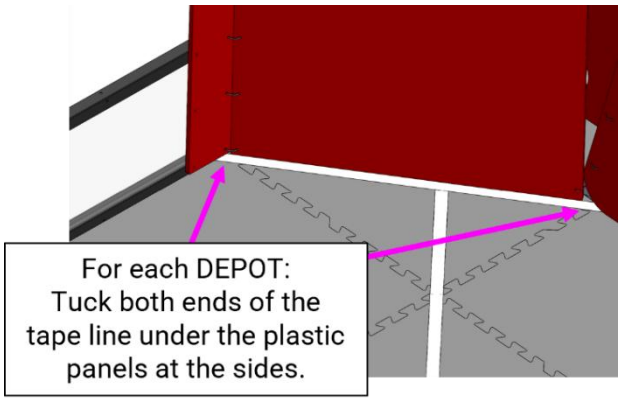
There are [2] DEPOTS on the FIELD, [1] for each ALLIANCE. Each DEPOT is made from [1] piece of white tape.

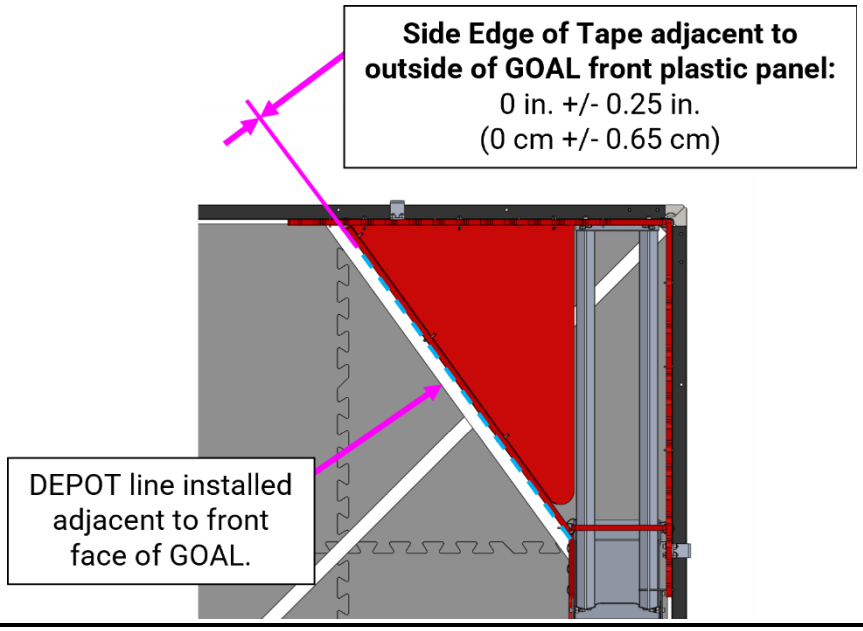
The DEPOT tape lines should be placed after the GOALS have been installed on the FIELD.

Each DEPOT tape line runs along the bottom of the GOAL and is adjacent to the bottom edge of the front plastic GOAL panel, as shown.

The ends of each DEPOT tape line can be cut with a sharp knife to end cleanly at the side plastic panels or they may be "tucked" under the side plastic panels.





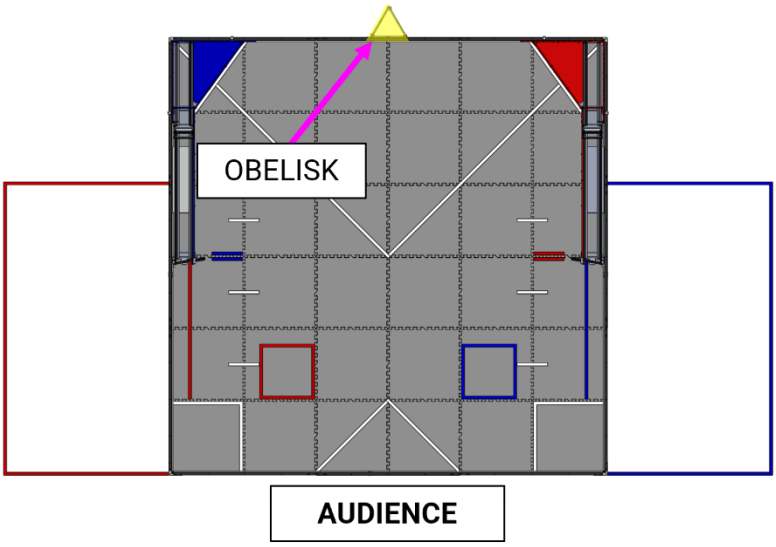


Step 3 – Place OBELISK

The OBELISK is placed in the ARENA on the side of the FIELD opposite the audience.

The OBELISK is placed approximately at the center of the FIELD and TILE seam X, adjacent to the FIELD perimeter, contacting the perimeter wall. Since the OBELISK is rotated each MATCH, its position is approximate.

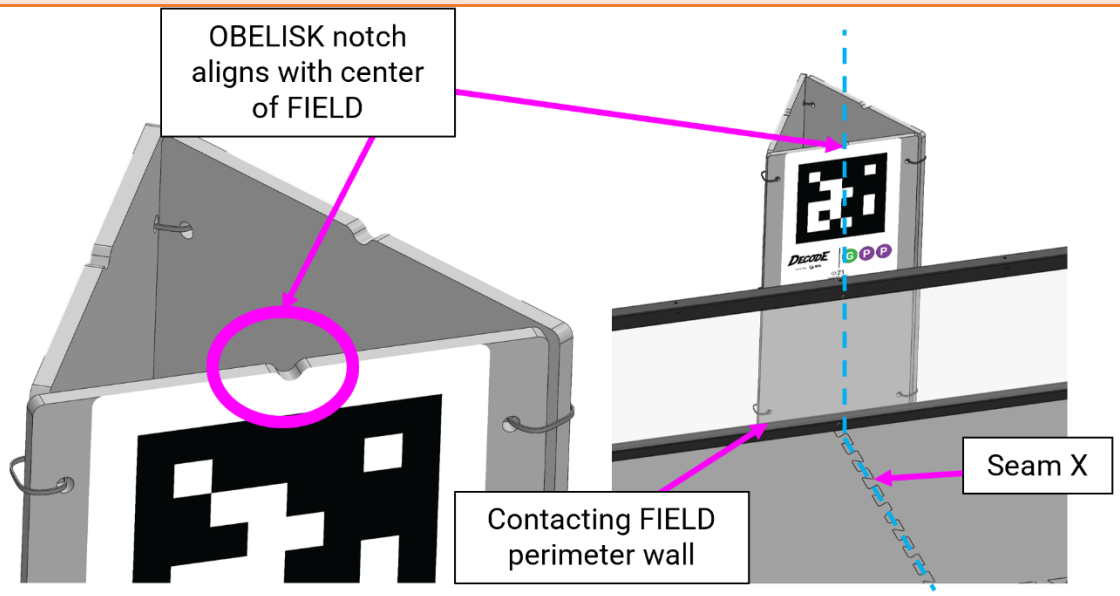
The OBELISK has a notch centered at the top and bottom of each face which can be used by FIELD STAFF as a reference for placement and adjustment of the OBELISK.



Note: The OBELISK is not intended to be deterministic relative to the FIELD coordinate system and should not be used for ROBOT navigation.

TOP TIP for Happy Refs: Label the OBELISK. To assist in rotating the OBELISK to the correct side during FIELD randomization, it is recommended that the back of each panel on the inside of the OBELISK is labeled with the MOTIF code shown on the front face (i.e., 21 - GPP, 22 - PGP, 23 - PPG). This can be done using a marker or label maker.

If there are already MOTIF codes labeled on the inside of the OBELISK, ensure that the labeled MOTIF codes match the AprilTag on the corresponding face outside of the OBELISK.

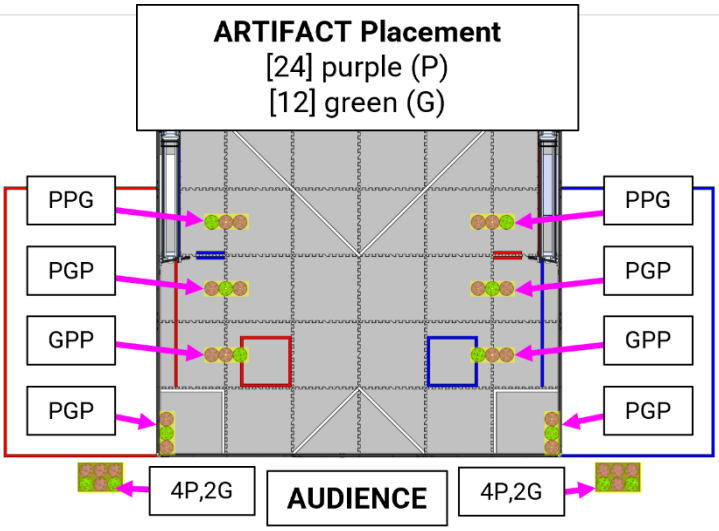


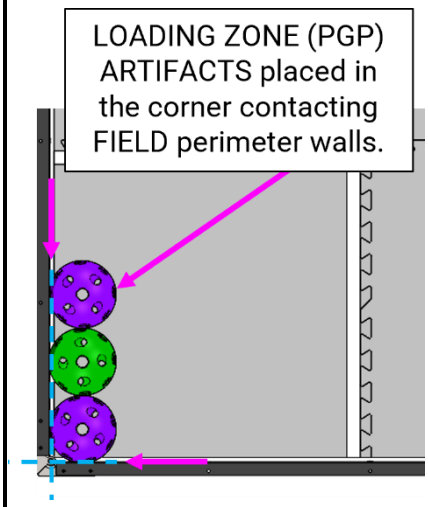
Step 4 – Place SCORING ELEMENTS

There are [24] purple (P) and [12] green (G) ARTIFACTS used in DECODE. The FIELD is symmetrical from right to left, from the audience perspective.

To prevent them rolling around, the on-FIELD ARTIFACTS should all be placed with [1] of the holes in contact with the foam TILES.

Each ALLIANCE AREA includes [6] ARTIFACTS (4P,2G) which start in the ARTIFACT tray. These are not in any specific order and can be pre-loaded into ROBOTS before the start of each MATCH.



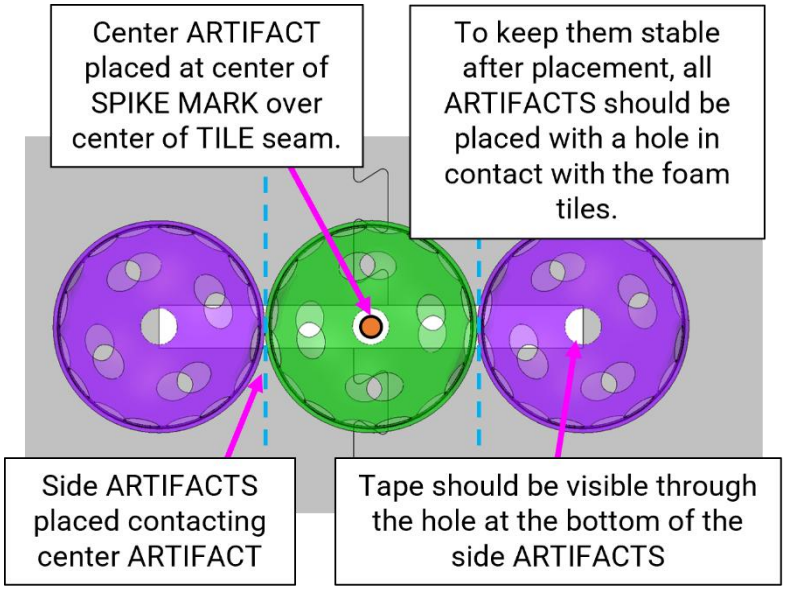


There are [3] ARTIFACTS in each LOADING ZONE, placed contacting the FIELD perimeter wall adjacent to each ALLIANCE AREA and directly or transitively contacting the front FIELD perimeter wall. These are both arranged in the PGP configuration, as shown.

There are [6] sets of [3] ARTIFACTS pre-staged on the SPIKE MARKS with specific color configurations, as shown.
Note, the MOTIF for these ARTIFACTS is read (e.g., GPP) starting from the middle of the FIELD and continuing toward the FIELD perimeter.

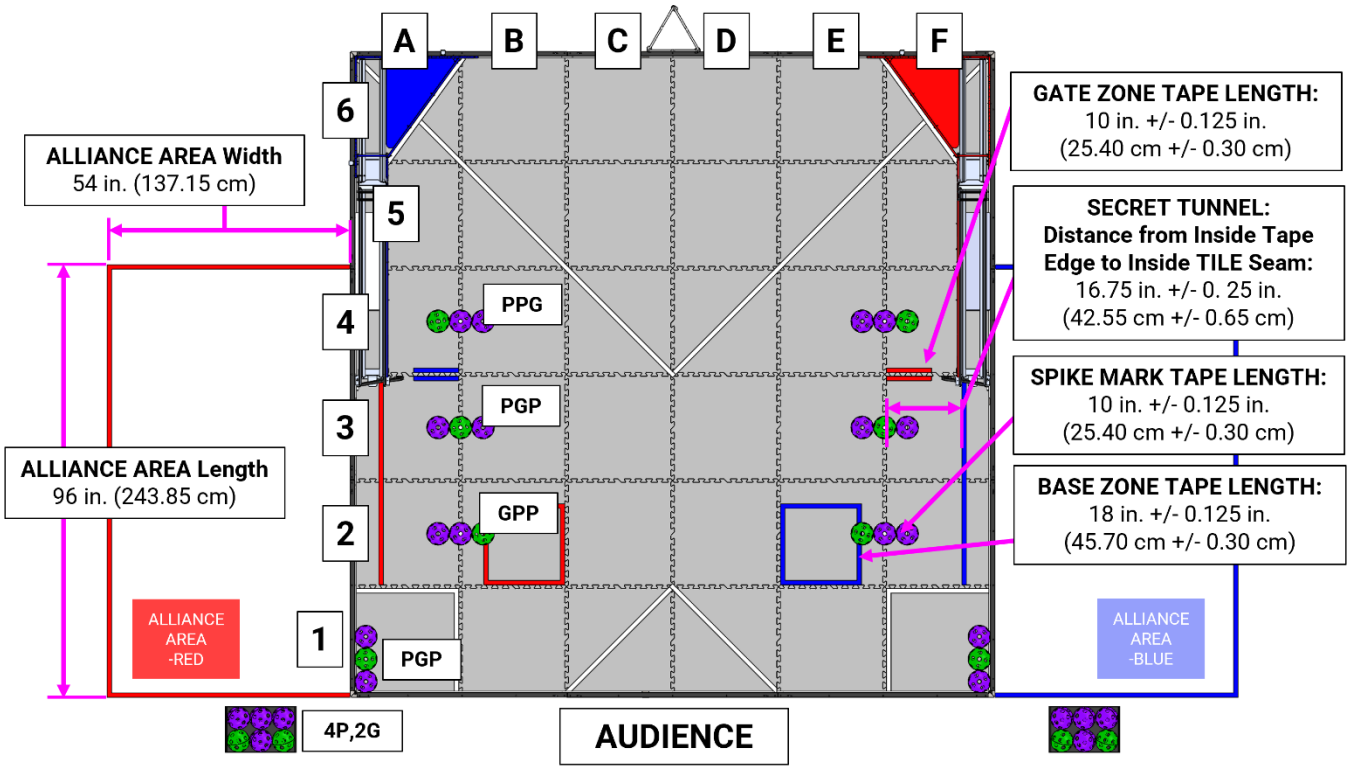
For each of these sets, the middle ARTIFACT is placed such that it is directly on top of the center of the SPIKE MARK over the center of the TILE seam, with the outside ARTIFACTS placed in contact with the middle ARTIFACT and overhanging the SPIKE MARK.

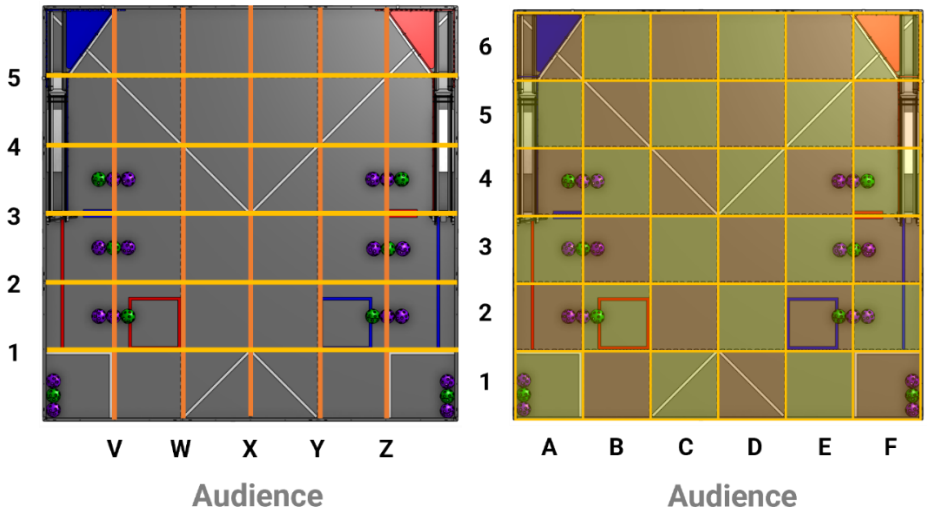
Note: to aid in FIELD reset, it may help to place a small colored mark on each SPIKE MARK corresponding to the correct colored ARTIFACT in each location.



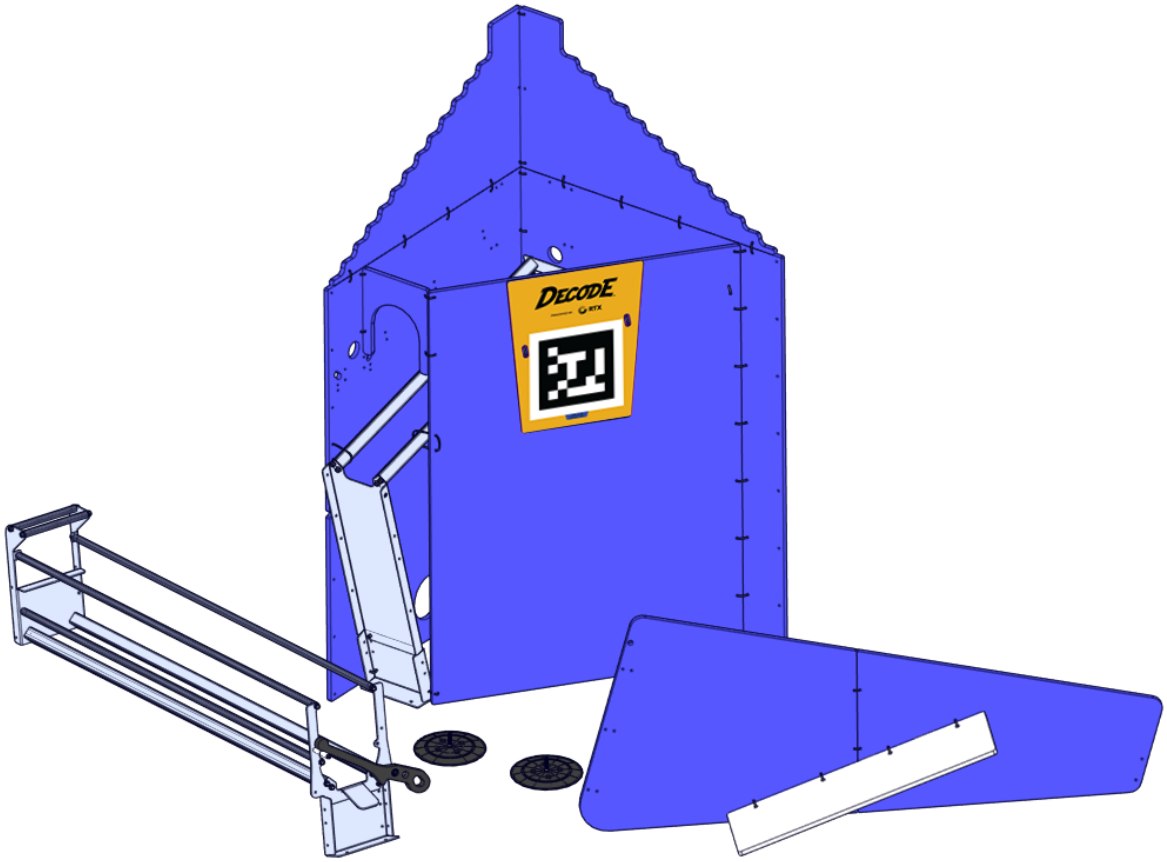
11 FIELD & ARENA Quick Reference

For veteran DECODE FIELD builders who only need a reminder on specific locations and dimensions:





DECODE Element Disassembly for Storage & Transportation

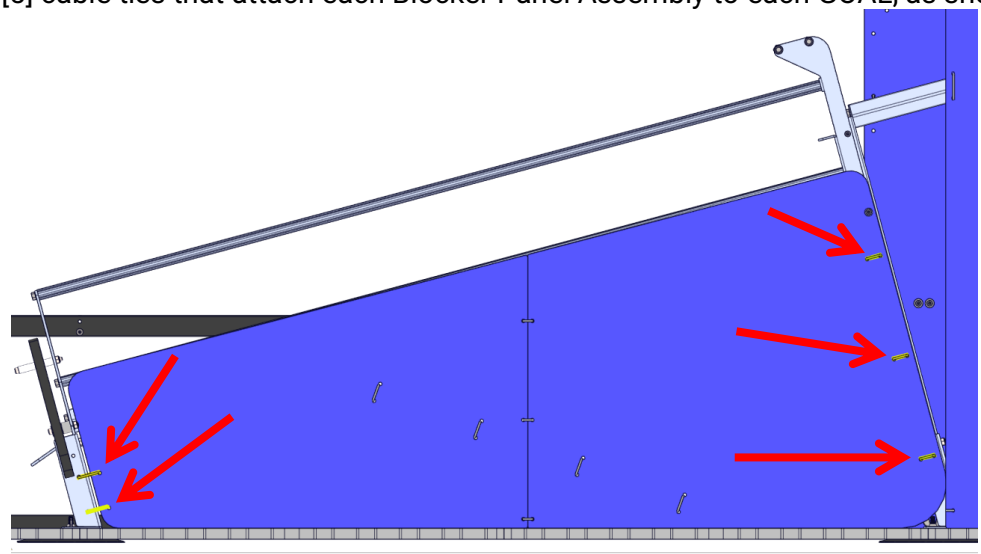


12 Element Disassembly for Storage & Transport

During the season, a *FIRST* Tech Challenge FIELD will be set up, taken down, moved, and re-assembled multiple times. These FIELDS are designed to be partially disassembled for transport without needing to fully disassemble every component. Below are the steps to prep the FIELD for movement:

Step 1

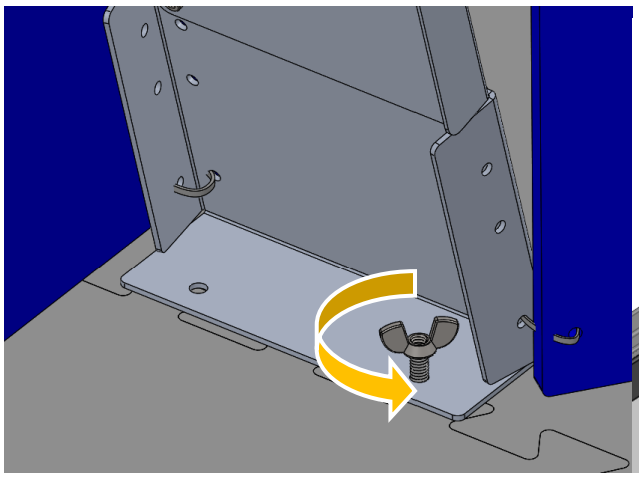
Cut **ONLY** the [5] cable ties that attach each Blocker Panel Assembly to each GOAL, as shown.

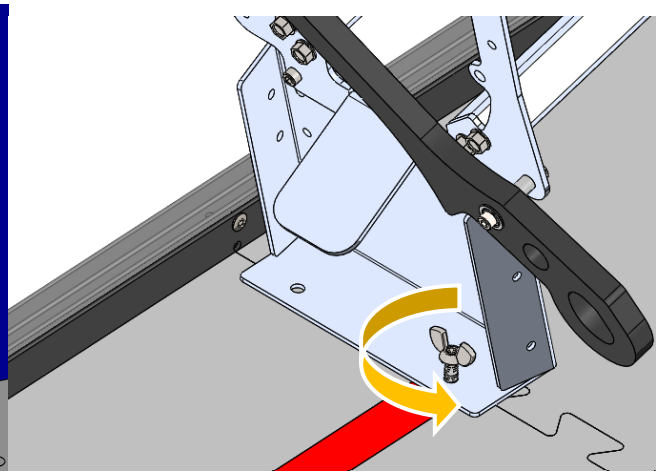


Warning: Do not cut additional cable ties. This will result in unnecessary disassembly. If needed, refer to the "Initial FIELD Element Assembly Guide" for help rebuilding the Blocker Panel Assembly.

Step 2

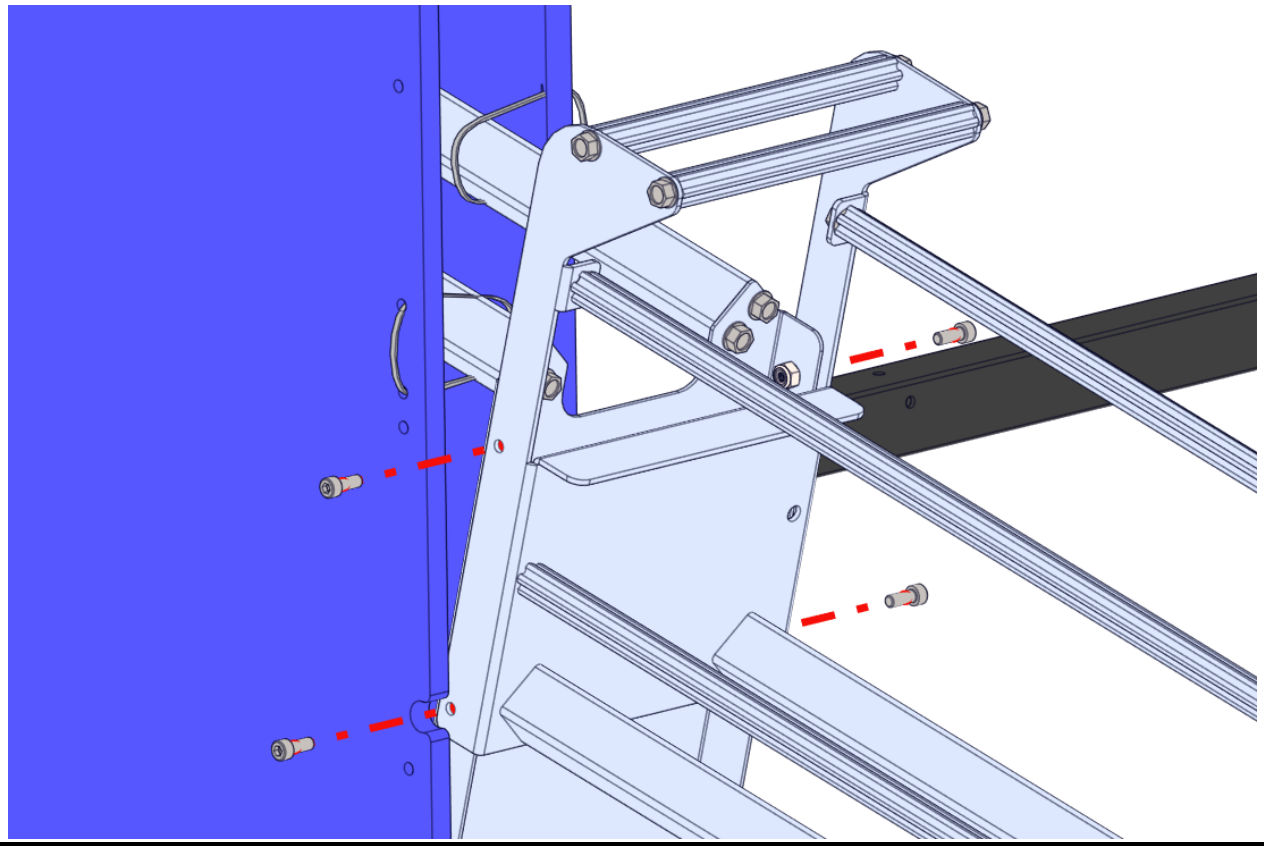
Unscrew the [2] 1/4-20 Wing Nuts (am-1705) that attach each GOAL to the Undertile Disks.





Step 3

Undo the [4] 10-32 x 0.5 in. long screws (am-1002) and [4] 10-32 nylock nuts (am-1042) connecting the Lower RAMP Assembly to the Upper RAMP Assembly and disconnect the [2] assemblies.
Repeat for both Lower RAMP Assemblies.



Step 4 – Ship it!

Pack the FIELD. No additional disassembly is required or recommended. The GOAL, lower RAMP, and Blocker Panel Assemblies can be packed and transported with the rest of the FIELD.

Revision History		
Revision	Date	Description
V1	9/5/2025	Initial Release