FIRST TECH CHALLENGE

BIOBUZZ
PRESENTED BY RTX

2026-2027 *FIRST*® Tech Challenge

Initial Field Element Assembly Guide

Initial Field Element Assembly Guide

This guide includes instructions to assemble the Field Elements used in the construction of a BIOBUZZ field. Please refer to the companion "Event Field Setup Guide" for instructions on installing the Field Elements on a field and completing the BIOBUZZ field assembly.

> **Reminder:** If at any time during the assembly process you get confused, remember you can reference the full 3D Onshape Field CAD Assembly of the BIOBUZZ field and all its components. This is useful for assistance in identifying parts, checking how things fit together, confirming dimensions, and more.

To ensure correct performance of a BIOBUZZ field, builders should follow the quality checks provided as part of the Field Acceptance Checklist (coming soon) and follow the instructions for fixing field issues found in the Field Mitigation Guide (coming soon).

These and other resources can be found in the Playing Field section of the *FIRST* Tech Challenge 2026-2027 Game & Season Materials.

Contents

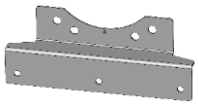
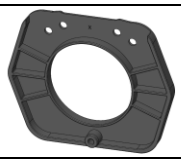
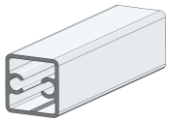
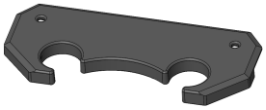
Revision History		
Revision	**Date**	**Description**
1.0	9/12/2026	Kickoff Release

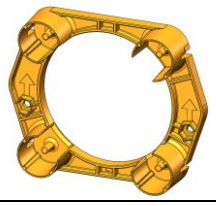
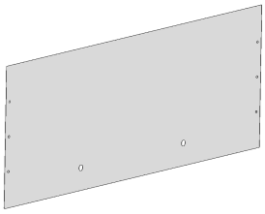
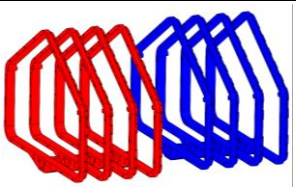
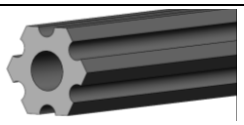
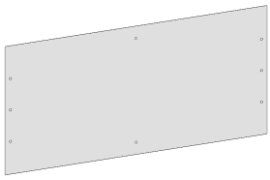
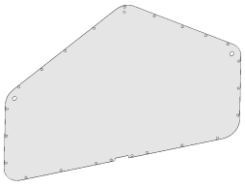
1 Recommended Tools

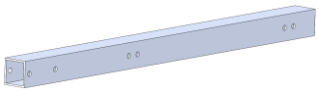
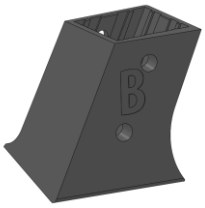
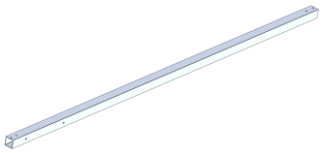
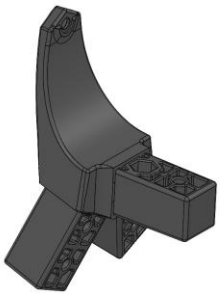
Component	Quantity	Photo
Utility Knife	1	
Tape Measure	1	
5/32 in. Hex Driver or Allen Wrench (ball-end recommended)	1	
3/8 in. Combination Wrench	1	
3/8 in. Nut Driver	1	
3/8 in. Impact Nutsetter / Nut Driver	1	
Phillips #2 (PH2) Screwdriver Bit	1	
Phillips #2 (PH2) Screwdriver	1	
Drill or Power Screwdriver	1	
Safety Gloves	1	
Flush Cutters	1	
Mallet or Screw Clamp (*Optional – See Step 7.1*)	1	
Blocks of Soft Material to Protect Bearings (*Optional – see Step 7.1*)	1	

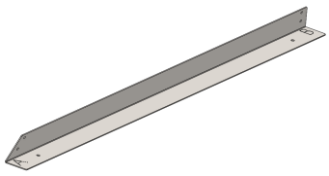
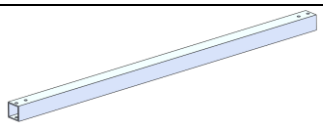
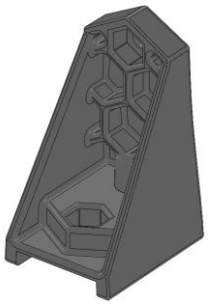
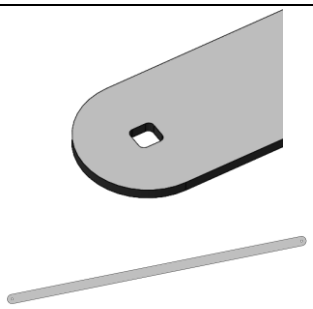
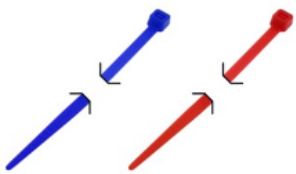
2 Parts List

Note: Components individual Hardware Packs are Shown "by Pack" at the end of this section.

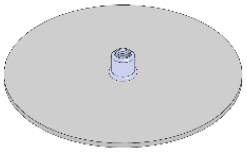
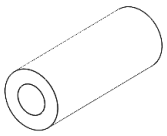
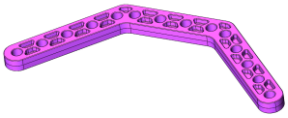
Component	Part #	Full Field Quantity	Partial Field Quantity	Photos
Pollen (Not used until Field Setup)	am-5851_yellow	40	20	
Nectar (Red) (Not used until Field Setup)	am-5852_red	8	8 Red OR 8 Blue	
Nectar (Blue) (Not used until Field Setup)	am-5852_blue	8		
Flower Base Bracket (labeled "A")	am-5861	4	2	
Flower Bottom Ring (labeled "X")	am-5859	4	2	
Flower Middle Ring (labeled "B")	am-5858	4	2	
Peanut Upright	am-5892	8	4	
Flower Pipe	am-5862	16	8	
Field Wall Bracket	am-5860	4	2	

Component	Part #	Full Field Quantity	Partial Field Quantity	Photos
Flower Top Ring (labeled “C”)	am-5857	4	2	
Hive Bottom Skin Approximately 11.625 in. x 34.75 in. (29.55 cm x 88.25 cm) when flat	am-5870	4	2	
AprilTag Sticker [4] Unique Stickers	am-5888	4	2 Red OR 2 Blue	
Goal Rib	am-5866_red am-5866_blue	4 Red 4 Blue	4 Red OR 4 Blue	
Churro Lite Extrusion	am-3666	8	4	
Hive Top Skin Approximately 11.625 in. x 23.4 in. (29.55 cm x 59.45 cm) when flat	am-5869	4	2	
Hive Back Skin	am-5871	4	2	

Component	Part #	Full Field Quantity	Partial Field Quantity	Photos
Cell Base Tube 16.75 in. (42.55 cm) Long	am-5868	4	2	
Pivot Bearing Plate	am-5873	4	2	
BIOBUZZ Sticker	am-5883	2	2	
Frame ACM Panel	am-5877	2	2	
Frame Foot A	am-5879_A	2	2	
Frame Foot B	am-5879_B	2	2	
Frame Leg 45.75 in. (116.20 cm) Long	am-5876	4	4	
Frame Top Corner	am-5874	2	2	

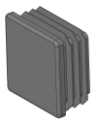
Component	Part #	Full Field Quantity	Partial Field Quantity	Photos
Frame Foot Bar	am-5878	2	2	
Frame Top Bar 24 in. (60.95 cm) Long	am-5875	1	1	
Axle Holder	am-5863	2	2	
Under Tile Strips Approximately 48 in. (121.9 cm) Long	am-5880	2	2	
Scoring Element Tray (Flat)	am-5706	2	1	
4 in. (~10.15 cm) Long Cable Ties (Red or Blue)	am-1589	100 Red 100 Blue	100 Red OR 100 Blue	

Flower Hardware (am-5855h) – (4x) per Full Field, (2x) per Partial Field

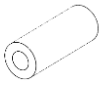
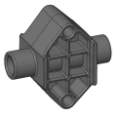
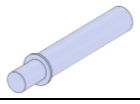
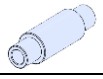
Component	Part #	Pack Quantity	Photos
Under Tile Mount	am-5872	1	
10-32 x 0.75 in. (1.9 cm) Long Screw	am-1047	1	
1/4-20 x 0.75 in. (1.9 cm) Long Thread-Forming Screw	am-1310	6	
Self-Threading 6-18 x 0.50 in. (1.25 cm) Long Screw	am-1775	8	
10-32 x 1.75 in. (4.45 cm) Long Pan Head Screw	am-1776	2	
10-32 x 1.0in. (2.5 cm) Long Plastic Spacer	am-1696	2	
10-32 Nylock Nut	am-1042	2	
Flower Backstop	am-5884	1	

Cell Hardware (P/N: am-5865h) – (4x) per Full Field, (2x) per Partial Field

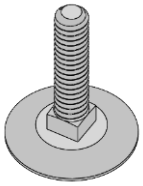
Note: Some fields will include packs labeled "Basket Hardware"

Component	Part #	Pack Quantity	Photos
Tube Plug	am-1767_black	1	
10-32 x 1.0 in. (2.5 cm) Long Screw w/ Locking Patch	am-1763	4	
10-32 x 1.5 in. (3.8 cm) Long Screw	am-1014	3	
10-32 x 2.0 in. (5.1 cm) Long Screw	am-1049	1	
10-32 Nylock Nut	am-1042	4	
Ballast Washer 0.75 in. OD (1.9 cm) OD	am-1523	5	
10-32 Wing Nut	am-1483	1	

Pivot Assembly Hardware (P/N: am-5853h) – (2x) per Full Field, (1x) per Partial Field

Component	Part #	Pack Quantity	Photos
8mm ID Flanged Bearing	am-4457	2	
10-32 x 1.0in. (2.5 cm) Long Plastic Spacer	am-1696	2	
Damper Holder	am-5864	2	
Linear Damper	am-1762	2	
Stepped Axle	am-5881	1	
10-32 x 1.5 in. (3.8 cm) Long Screw	am-1014	10	
10-32 Nylock Nut	am-1042	10	

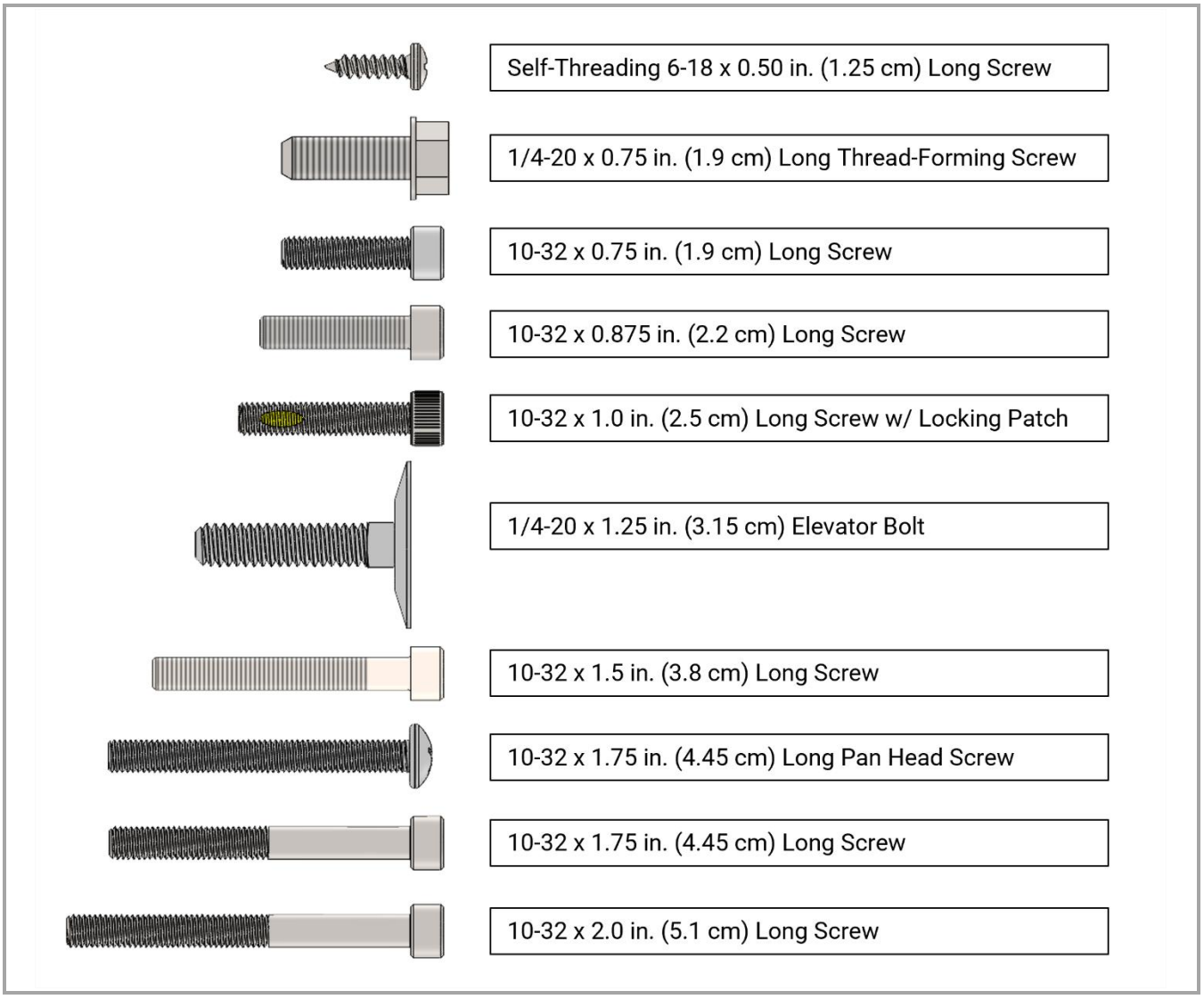
Frame Hardware Pack 1 (P/N: am-5854h1) – (2x) per Full Field, (2x) per Partial Field

Component	Part #	Pack Quantity	Photos
1/4-20 x 1.25 in. (3.15 cm) Elevator Bolt	am-1629	2	
1/4-20 Wing Nut	am-1705	2	
10-32 x 1.75 in. (4.45 cm) Long Screw	am-1048	4	
10-32 Nylock Nut	am-1042	8	
10-32 x 0.875 in. (2.2 cm) Long Screw	am-1753	4	

Frame Hardware Pack 2 (P/N: am-5854h2) – (1x) per Full Field, (1x) per Partial Field

Component	Part #	Pack Quantity	Photos
10-32 x 1.5 in. (3.8 cm) Long Screw	am-1014	10	
#10 Flat Washers (small) 0.5 in. OD (1.25 cm) OD	am-1026	16	
10-32 Nylock Nut	am-1042	14	
10-32 x 2.0 in. (5.1 cm) Long Screw	am-1049	4	
10-32 Wing Nut	am-1483	2	

Hardware Reference Chart – (1:1 Scale)



3 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.

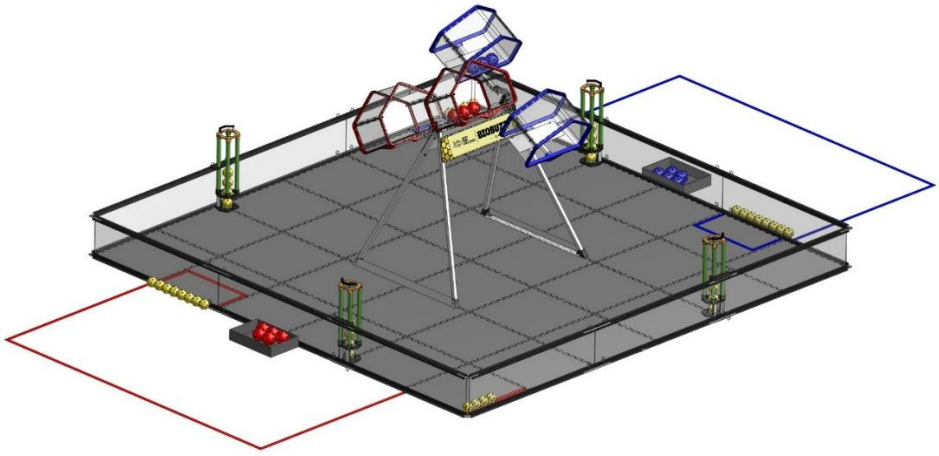
For general reference:

- No fasteners should deform the objects being connected.
- Thread-forming screws should be tightened until no threads are visible and the objects being connected 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.
- Nuts being installed into molded hexagonal pockets should be installed “flat side” first.
- 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.
- After full assembly, **all** Cable Ties should have their tails trimmed using flush cutters such that none of the tail protrudes from the Cable Tie head. It is important to use flush cutters to ensure the tail is fully trimmed.

4 Field & Perimeter Assembly

This guide includes instructions for building the Field Elements used in the construction of a field to play the 2026-2027 *FIRST* Tech Challenge game, BIOBUZZ. It does not include the full details for assembly of a field on-site at an event.

These Field Elements should be pre-assembled to save time during event setup, and the steps outlined in this guide should be done off-site, before the event setup day.



5 Flower Assembly

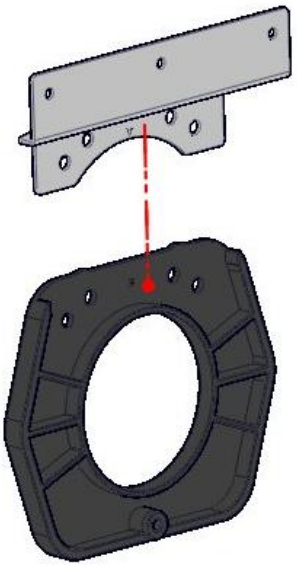
Assemble
[4x]
per Field

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

5.1 Flower Base Assembly

Slide [1] **Flower Base Bracket** (labeled “A”) onto [1] **Flower Bottom Ring** (labeled “X”)

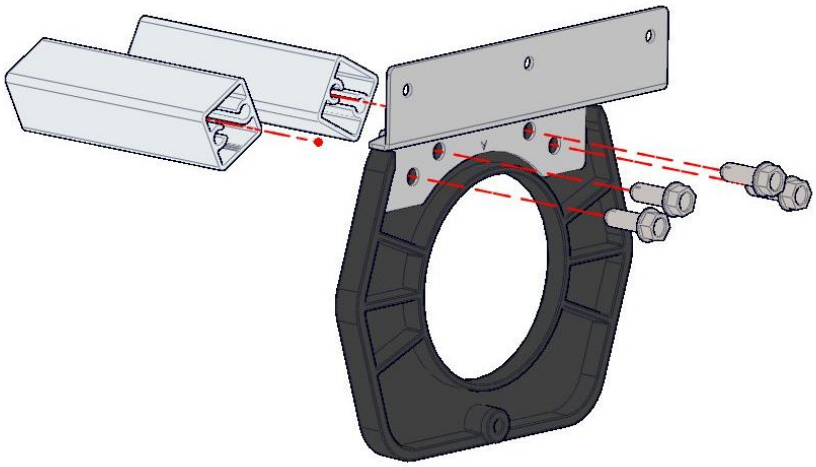
Assemble
[1x]
per Flower



5.2 Flower Peanut Upright Installation

Install [2] **Peanut Uprights** onto the **Assembly from Step 5.1** using [4] **1/4-20 x 0.75 in. (1.9 cm) Long Thread-Forming Screws**.

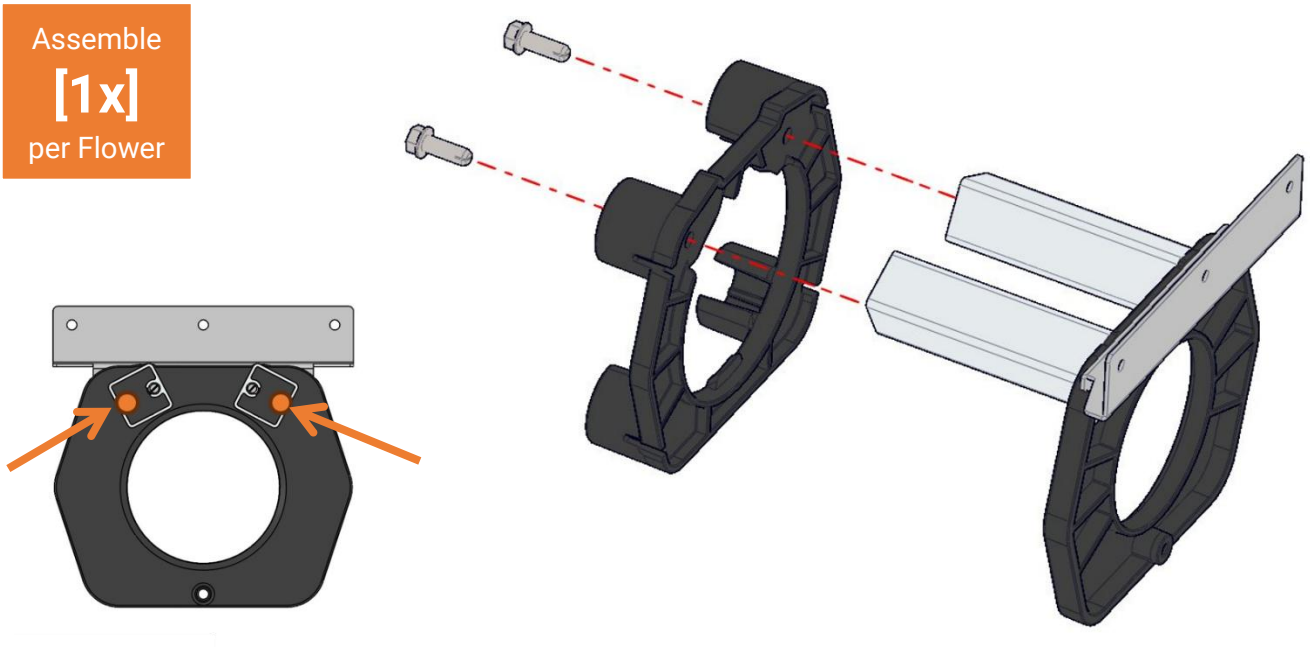
Assemble **[1x]** per Flower



5.3 Flower Middle-Ring Attachment

Install [1] **Flower Middle Ring** (labeled "B") onto the **Assembly from Step 5.2** by threading [2] **1/4-20 x 0.75 in. (1.9 cm) Long Thread-Forming Screws** into the **Peanut Uprights**.
Screws should be installed into the "outside" holes in each **Peanut Upright**, as shown.

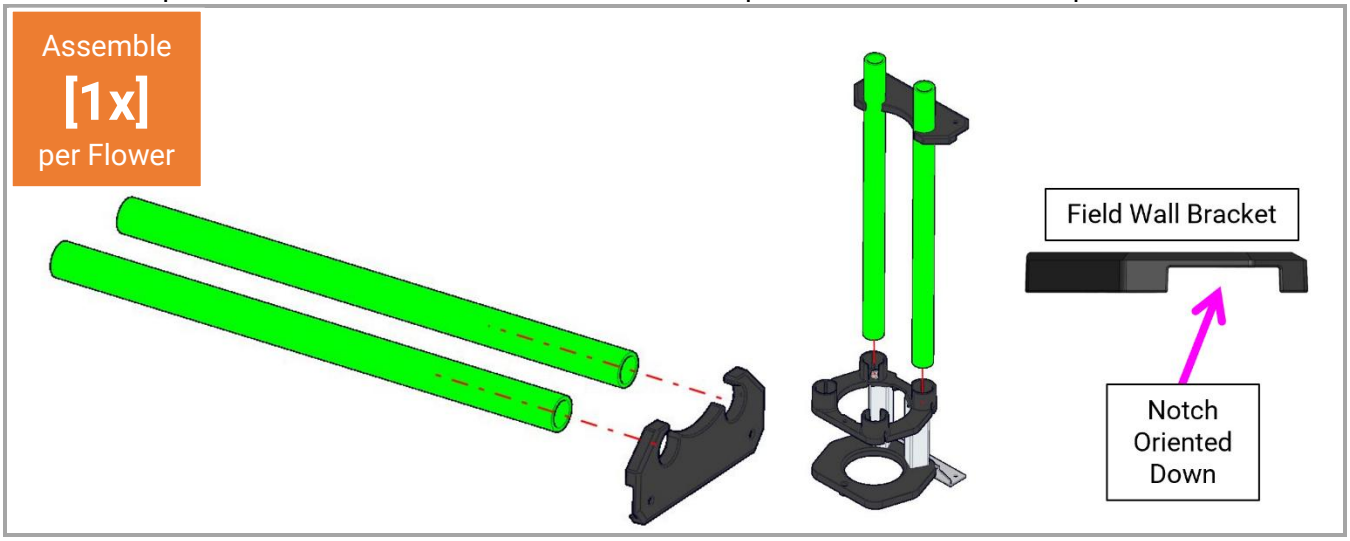
Assemble **[1x]** per Flower



5.4 Flower Back Pipe Installation

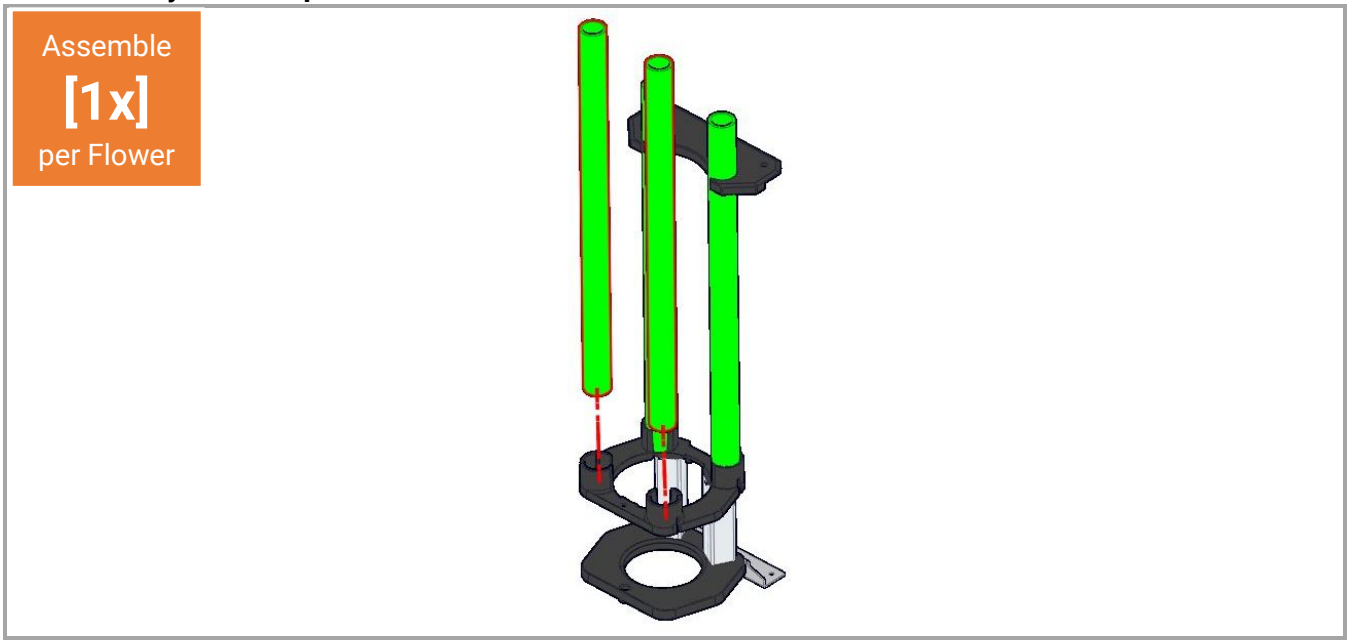
Insert [2] **Flower Pipes** through [1] plastic **Field Wall Bracket** and into the "back" pipe sockets on the **Flower Middle Ring** that is part of the **Assembly from Step 5.3**, as shown.

Note: it is expected that the Field Wall Bracket can slide up and down the Flower Pipes



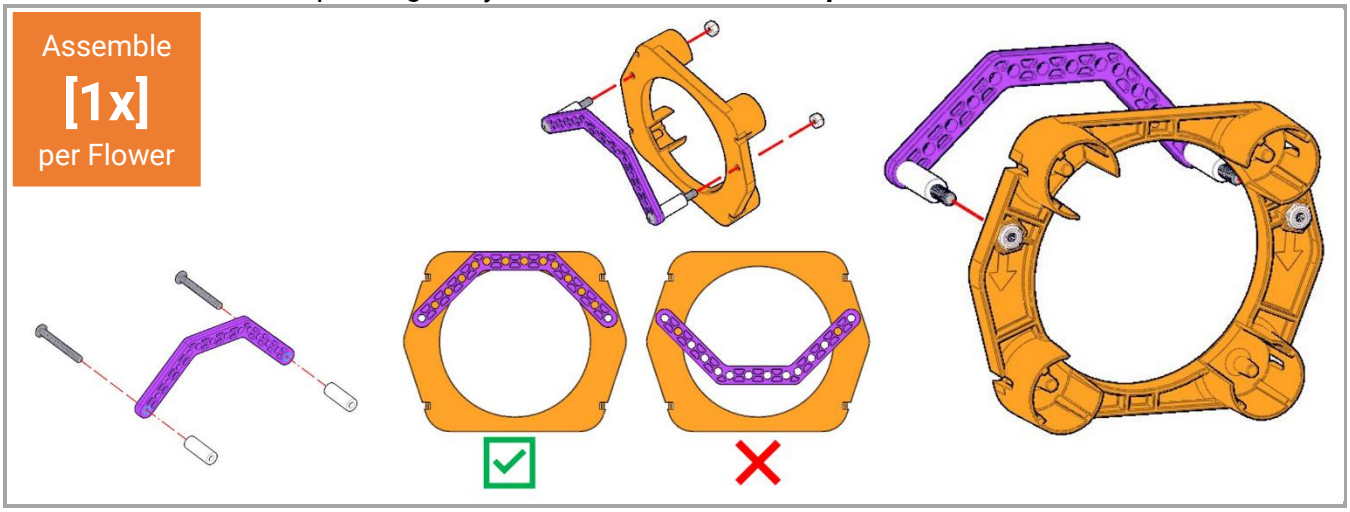
5.5 Flower Front Pipe Installation

Insert [2] additional **Flower Pipes** into the "front" pipe sockets on the **Flower Middle Ring** that is part of the **Assembly from Step 5.4**, as shown.



5.6 Flower Top Assembly

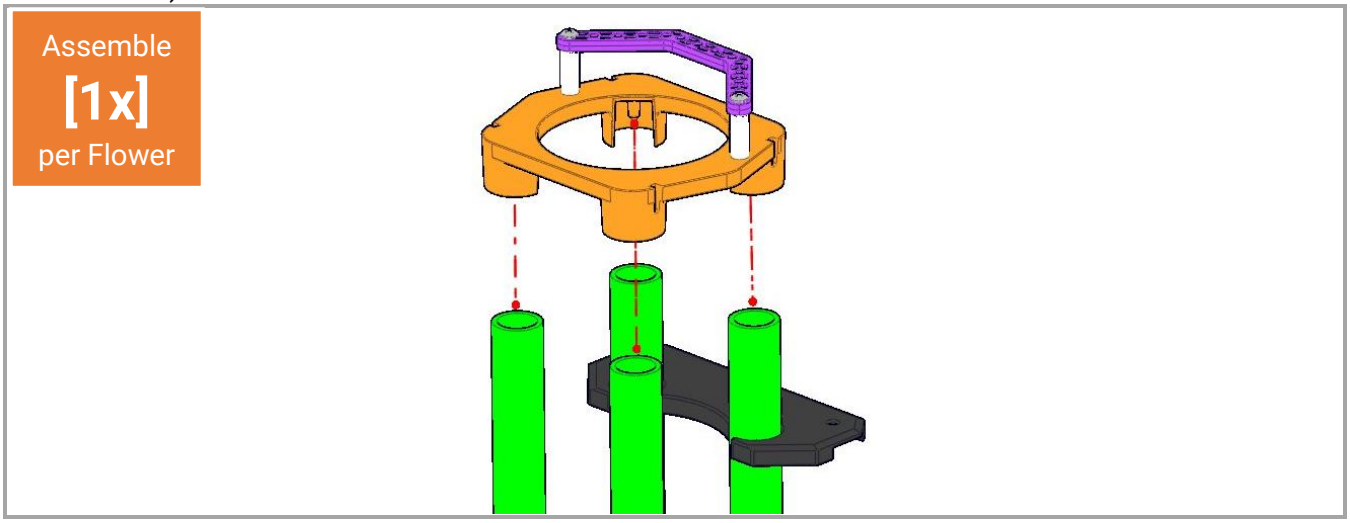
Attach [1] **Flower Backstop** onto [1] **Flower Top Ring** (labeled "C") using [2] **10-32 Nylock Nuts**, [2] **10-32 x 1.0in. (2.5 cm) Long Plastic Spacers**, and [2] **10-32 x 1.75in. (4.45 cm) Long Pan Head Screws**. The nuts are installed into hexagonal nut-pockets molded into the bottom side of the **Flower Top Ring**. The **Flower Backstop** should be positioned and aligned with the two screw holes in the **Flower Top Ring** with the molded arrows pointing away from the **Flower Backstop**, as shown.



5.7 Install Flower Top

Install the **Flower Top Assembly from Step 5.6** onto the **Assembly from Step 5.5** by aligning the [4] **Flower Pipes** with the pipe sockets on the bottom of the **Flower Top Ring** that is part of the **Assembly from Step 5.6**.

Note the orientation of the **Flower Top Assembly** relative to the **Field Wall Bracket** (the purple **Flower Backstop** should be oriented towards the "back" of the Flower which is the same side as the black **Field Wall Bracket**).

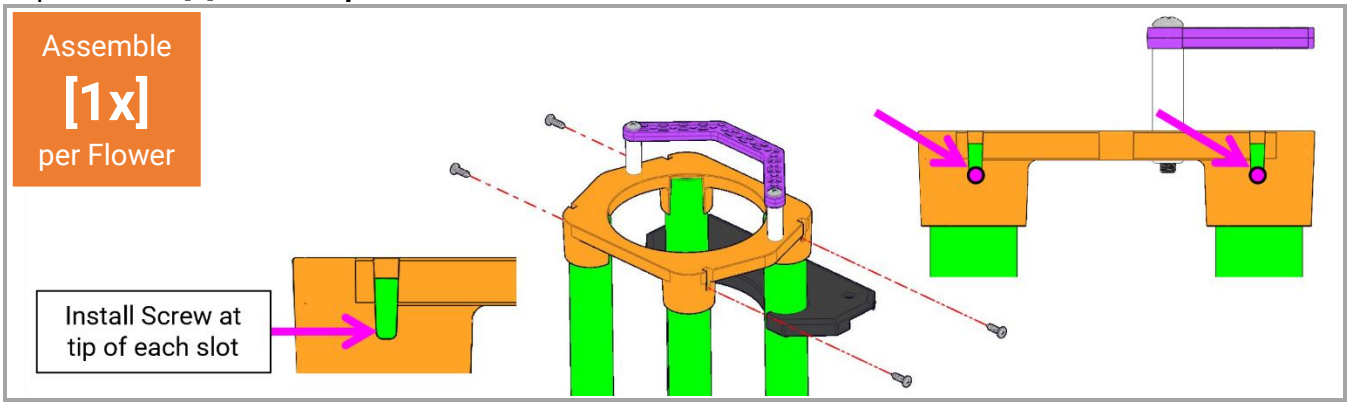


5.8 Install Top Pipe Screws

WARNING! Ensure ALL [4] **Flower Pipes** are fully pressed into the pipe sockets on the **Flower Top Ring**. It is critical that each pipe is fully inserted and force is applied to keep them fully inserted as the screws are used to lock them in place.

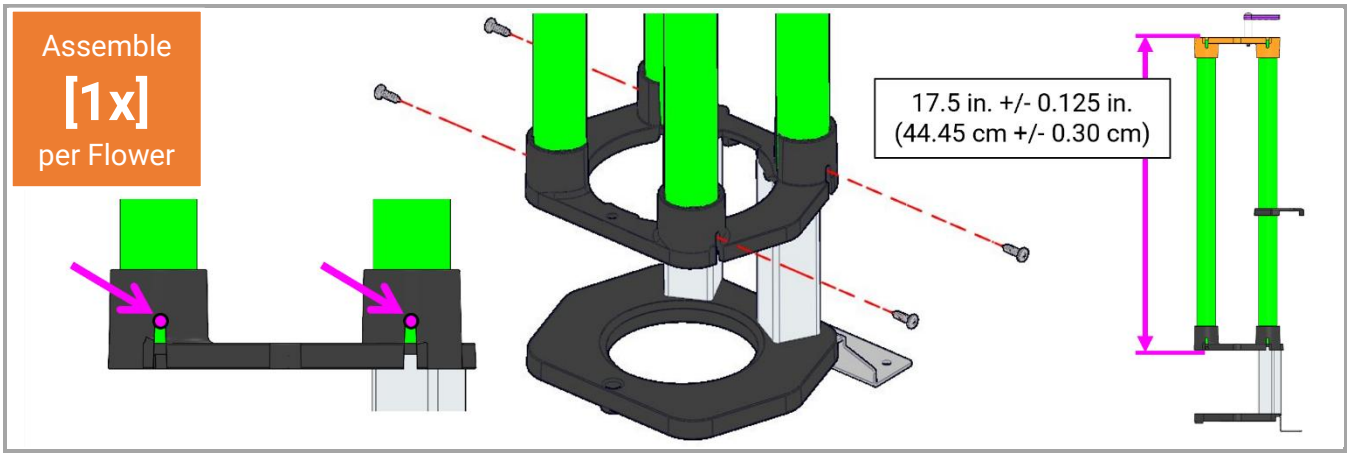
Install [1] **Self-Threading 6-18 x 0.50in. (1.25 cm) Long Screw** through the tip of a side-slot into a **Flower Pipe** (while ensuring the Flower Pipe remains fully inserted into the pipe socket of the **Flower Top Ring**).
Top Tip: The side slots show the insertion depth of the **Flower Pipe** into each Pipe Socket.

Repeat for all [4] **Flower Pipes**.



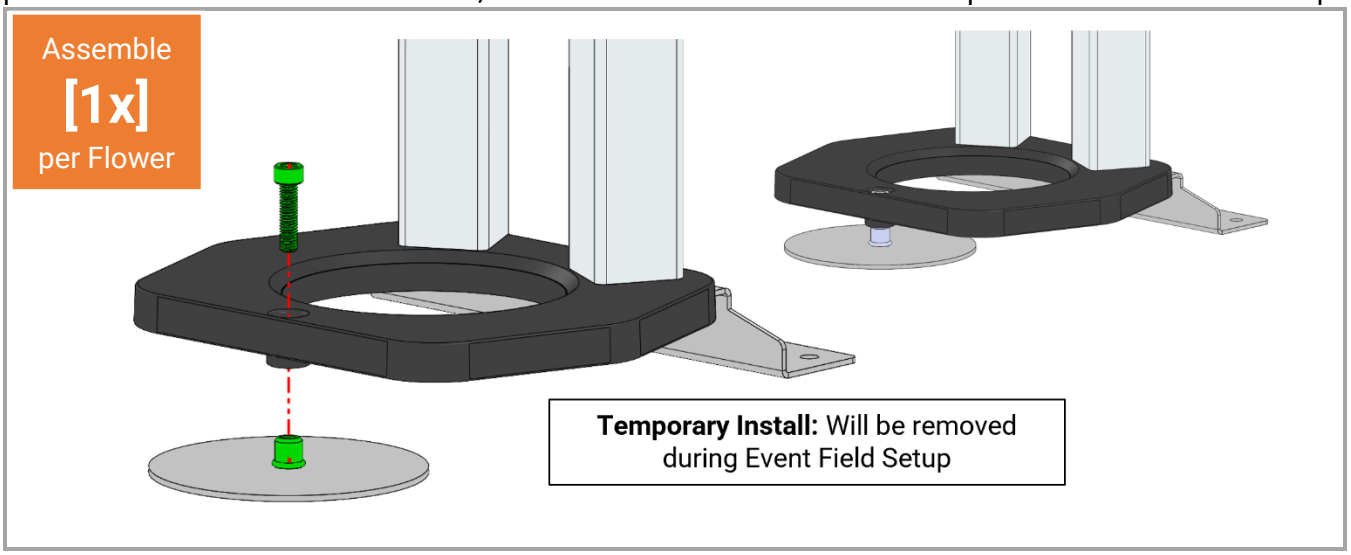
5.9 Install Bottom Pipe Screws

Using [4] **Self-Threading 6-18 x 0.50in. (1.25 cm) Long Screws**, repeat Step 5.8 for all [4] **Flower Pipes** in the pipe sockets of the **Flower Middle Ring** (while ensuring the **Flower Pipe** remains fully inserted). The Top and Middle Rings should be approximately 17.5 in. (44.45 cm) outside-outside, when measured as shown.



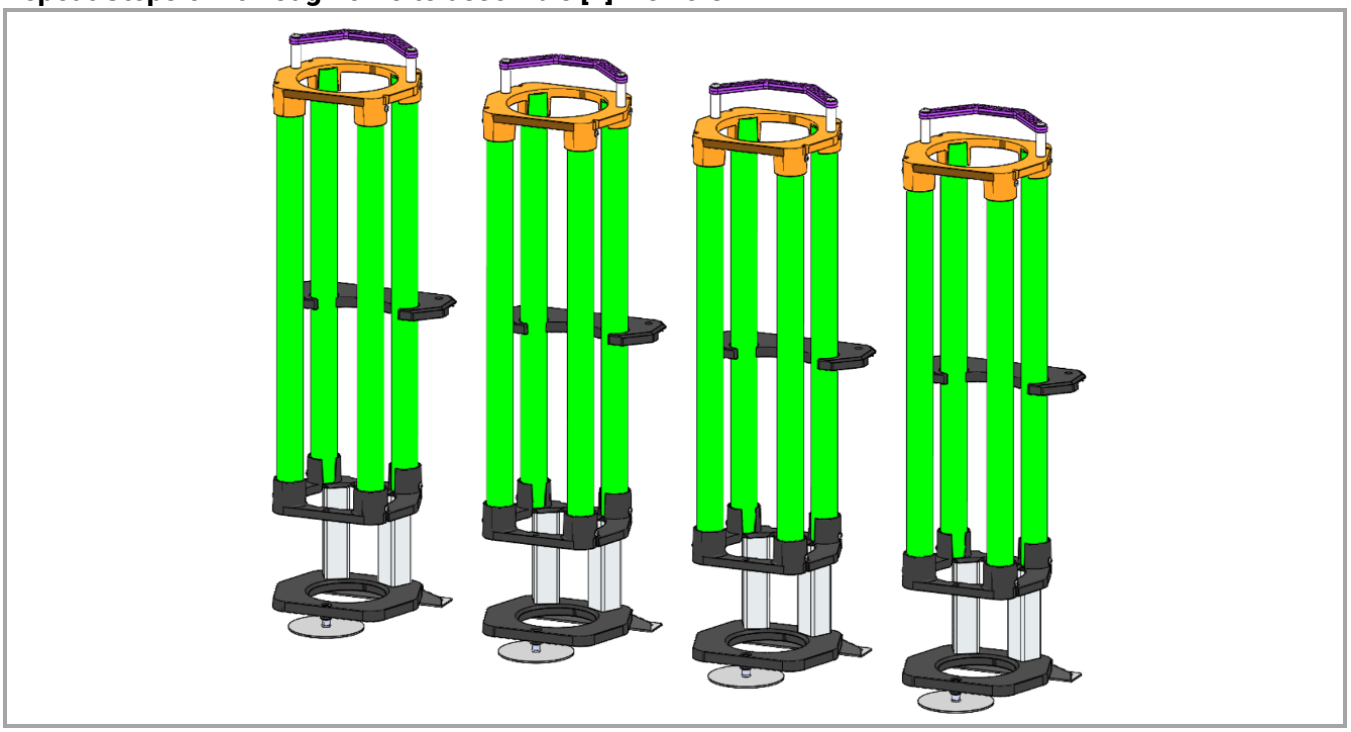
5.10 Install Under Tile Hardware

Attach [1] **Under Tile Mount** to the **Flower Bottom Ring** that is part of the **Assembly from Step 5.9** by inserting [1] **10-32 x 0.75 in. (1.9 cm) Long Screw** into the **10-32 Press-In Threaded Standoff** that is pre-installed in the **Under Tile Mount**, as shown. These will be removed as part of the Event Field Setup.



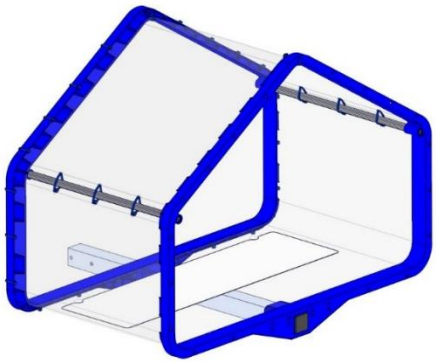
5.11 Repeat for [4] Flowers

Repeat Steps 5.1 through 5.10 to assemble [4] Flowers



6 Cell Assembly

Assemble
[2x] Red
[2x] Blue
per Field



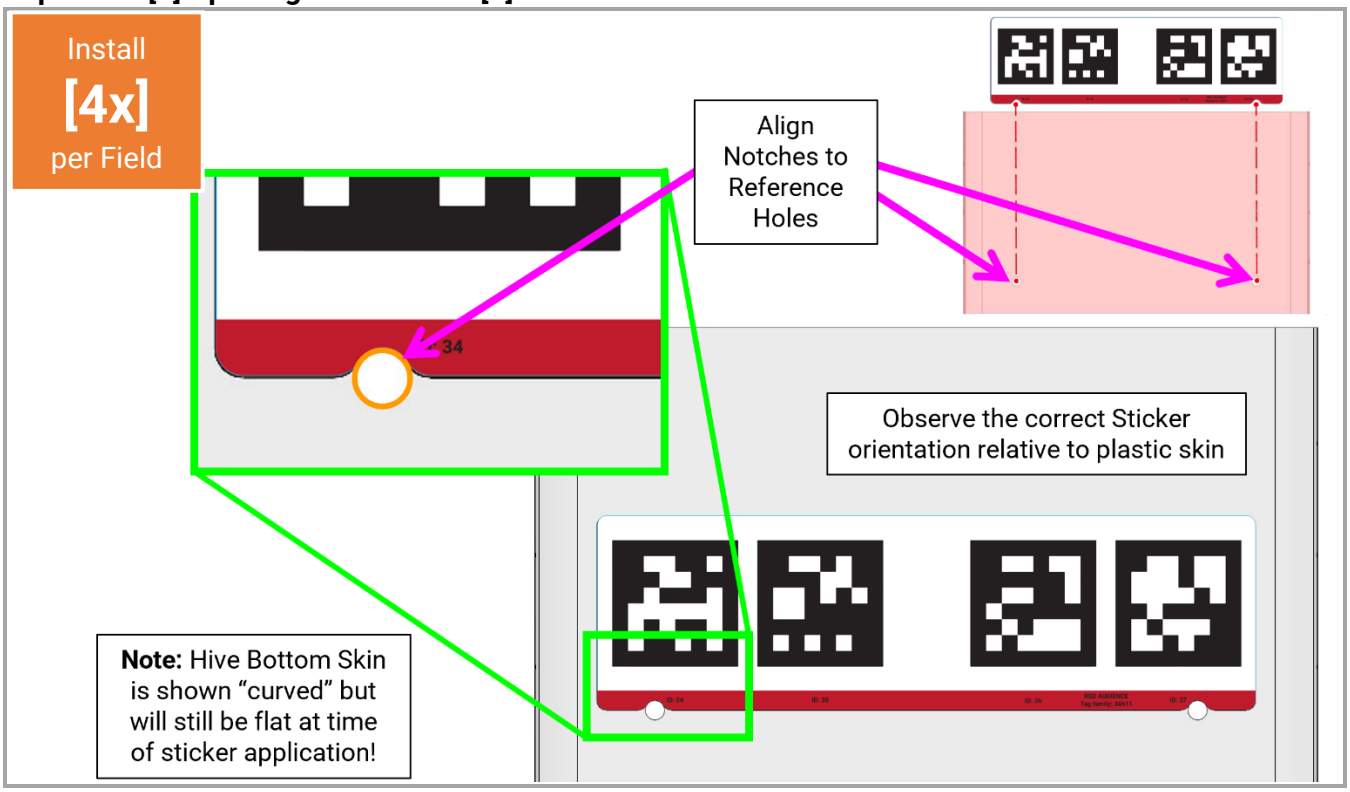
WARNING
Metal parts may have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be removed with a deburring tool or sandpaper.

6.1 Install April Tag Stickers

Peel the protective film off ***both sides*** of [1] clear plastic **Hive Bottom Skin**. Install [1] **AprilTag Sticker**: position the sticker by aligning the two reference holes in the plastic with the corresponding notches in the sticker. Apply the sticker carefully: attach it in one location then smoothly work outwards from that spot smoothing out wrinkles and bubbles as you go.

Repeat for [4] AprilTag Stickers and [4] Hive Bottom Skins.

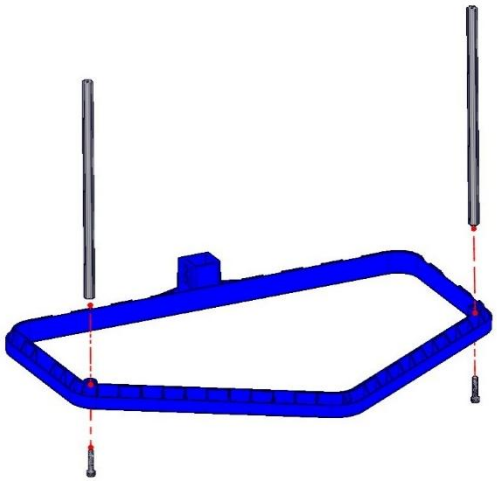
Install
[4x]
per Field



6.2 Churro Installation

On [1] **Goal Rib**, install [2] **Churro Lite Extrusions** into the molded hexagonal pockets, as shown. Affix these in place using [2] **10-32 x 1.0 in. (2.5 cm) Long Screws w/ Locking Patch**. Ensure the Churro is fully installed into the hex pocket.

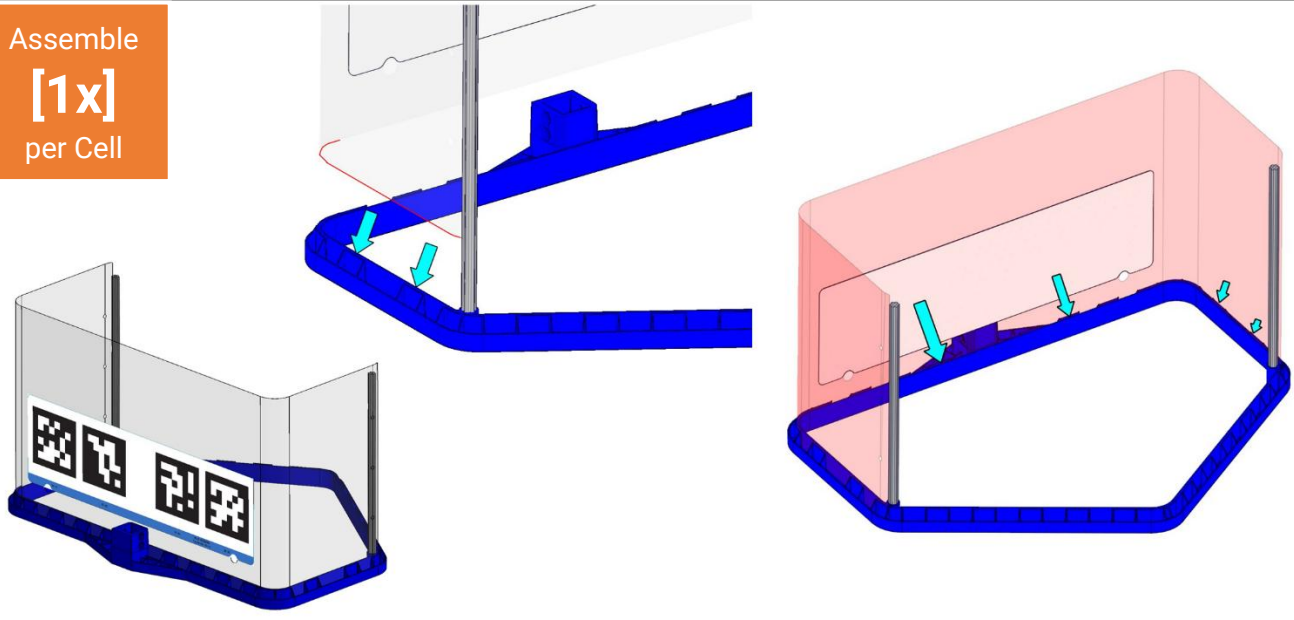
Assemble
[1x]
per Cell



6.3 Bottom Skin Installation

Install [1] **Hive Bottom Skin** into the groove of the **Goal Rib** that is part of the **Assembly from Step 6.2**. The Bottom Skin should be installed as shown. Be sure to use a **Hive Bottom Skin** with an **AprilTag Sticker** that matches the color of the **Goal Rib** (e.g., Blue Sticker on Blue Rib) and that the AprilTag is oriented correctly (as shown).

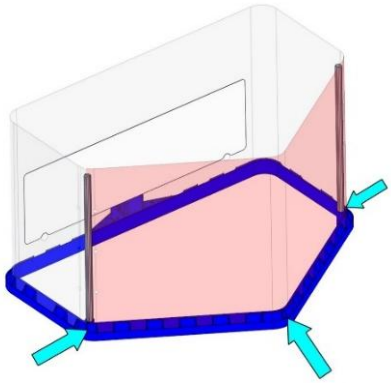
Assemble
[1x]
per Cell



6.4 Top Skin Installation

Peel the protective film off ***both sides*** of [1] clear plastic **Hive Top Skin**. Install [1] **Hive Top Skin** into the groove of the **Goal Rib** that is part of the **Assembly from Step 6.3**. The **Hive Top Skin** should be installed as shown.

Assemble
[1x]
per Cell



6.5 Second Rib Installation

OK, real talk: You're probably going to dislike this part of the build. We're sorry in advance. We promise it gets easier.

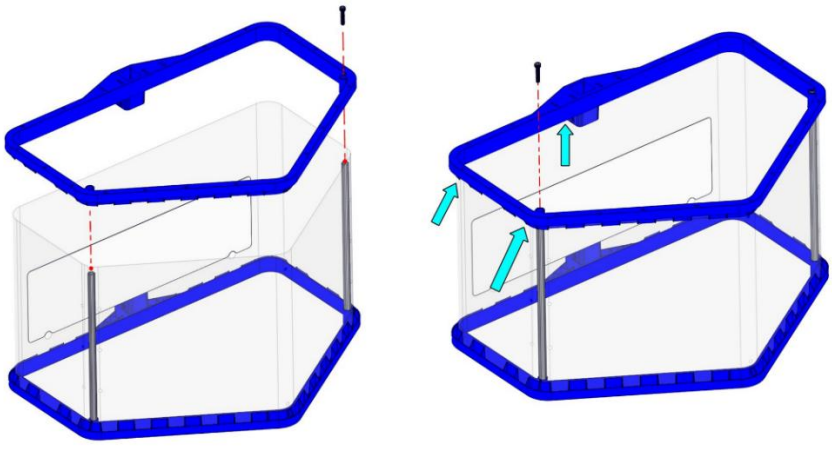
Install [1] **Goal Rib** (of the same color as the one used in Step 6.2) onto the **Assembly from Step 6.4**. You need to sandwich the **Hive Top Skin** and **Hive Bottom Skin** between the two ribs by aligning them with the grooves.

It is easiest to start by attaching the **Goal Rib** onto the [2] **Churro Lite Extrusions** on the **Assembly from Step 6.4** with [2] **10-32 x 1.0 in. (2.5 cm) Long Screws w/ Locking Patch**.

Do not fully tighten the screws.

After both screws are partially installed, align the Hive Bottom Skin with the groove in the new Goal Rib. Once the **Hive Bottom Skin** is fully inserted into the groove, then do the same for the **Hive Top Skin**. To successfully achieve this, it may be easiest to start at one end and slowly "bend" portions of the **Hive Top Skin** such that it "snaps" into position in the groove. Doing this, work your way around the **Goal Rib** until the Skin is fully in position (as opposed to trying to align the entire skin with the groove at the same time). Once the **Goal Rib** is correctly installed, fully tighten the [2] screws.

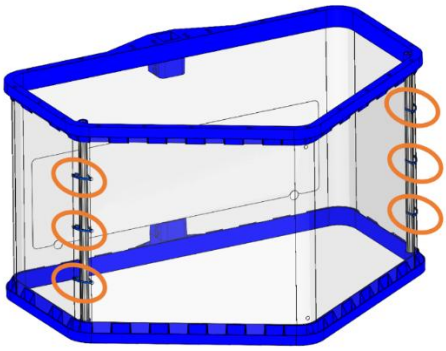
Assemble
[1x]
per Cell



6.6 Attach Skins to Churros

Using [6] of the appropriately colored (Red or Blue) **4 in. (~10.15 cm) Long Cable Ties**, attach both the **Hive Top Skin** and **Hive Bottom Skin** to both **Churro Lite Extrusions**, as shown. The Cable Ties should be attached such that their heads are inside the Cell and tightened until there is no rotational movement of the Cable Tie.

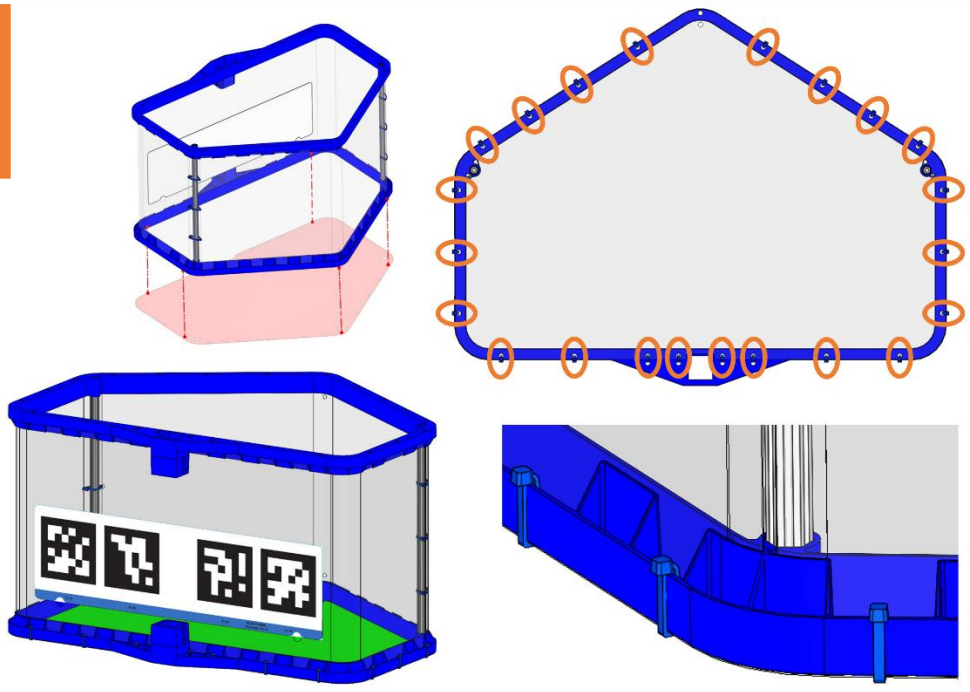
Assemble
[1x]
per Cell



6.7 Attach Back Skin

Peel the protective film off ***both sides*** of [1] **Hive Back Skin**. Using [22] of the appropriately colored (Red or Blue) **4 in. (~10.15 cm) long Cable Ties**, attach [1] **Hive Back Skin** to the **Goal Rib** which is part of the **Assembly from Step 6.6**. The **Hive Back Skin** should attach on the **Goal Rib** which is closest to the **AprilTag Sticker**, as shown. The Cable Ties should be attached such that their heads are on the outside of the **Cell** and positioned as shown and tightened until there is no rotational movement of the Cable Tie.

Assemble
[1x]
per Cell

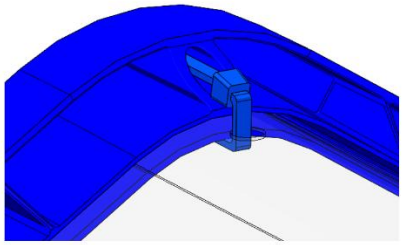


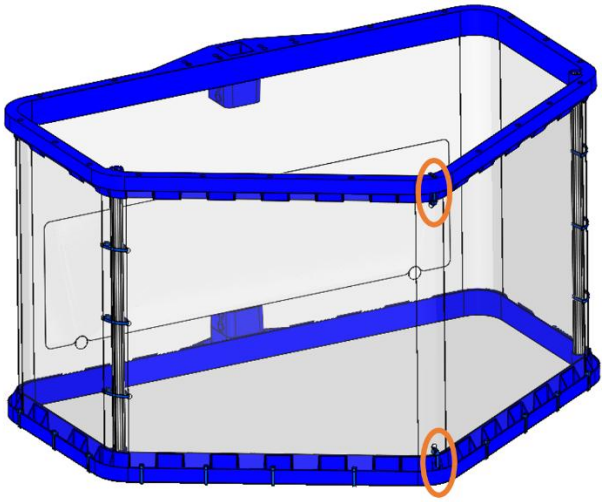
6.8 Install Top Skin Cable Ties

Using [2] of the appropriate colored **4 in. (~10.15 cm) long Cable Ties**, attach the **Hive Top Skin** to both **Goal Ribs**, as shown. The Cable Ties should be attached such that their heads are on the outside of the **Cell** and positioned as shown and tightened until there is no rotational movement of the Cable Tie.

Ensure ALL Cable Ties are tightened, trim ALL Cable Tie tails using flush cutters such that none of the tails protrudes from the Cable Tie head. It is important to use flush cutters to ensure the tail is fully trimmed

Assemble
[1x]
per Cell

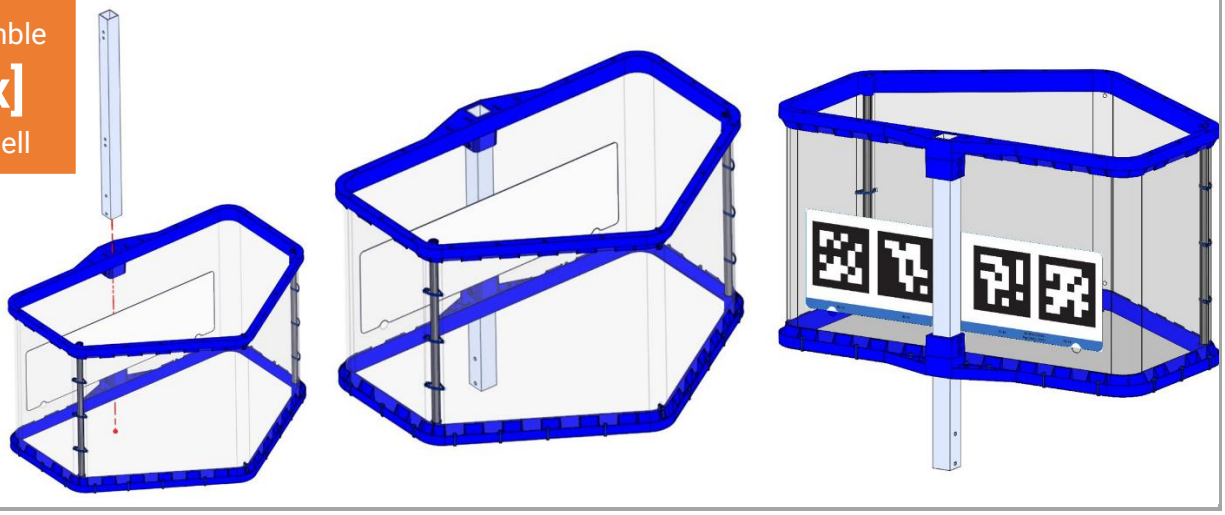




6.9 Insert Cell Base Tube

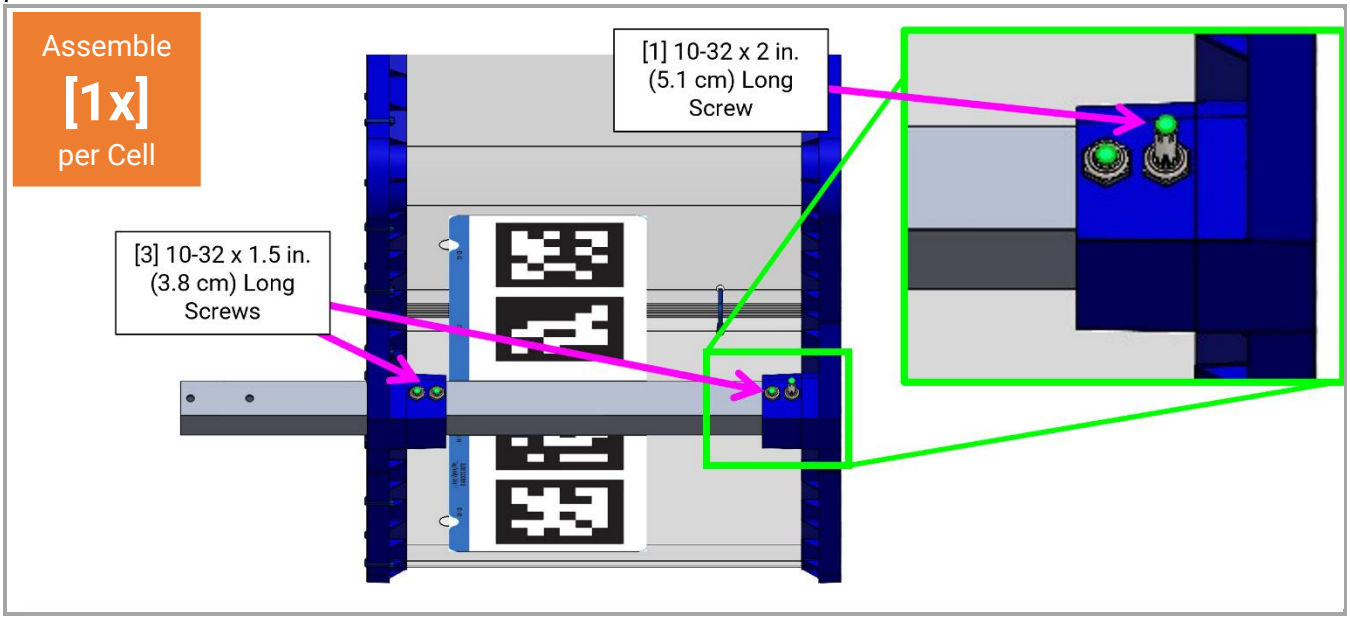
Insert [1] **Cell Base Tube** into the **Assembly from Step 6.8** as shown. The **Cell Base Tube** is installed into the square holes in the [2] **Goal Ribs**. [4] of the screw holes in the "side" of the **Cell Base Tube** need to align with the holes in each of the **Goal Ribs**. The **Cell Base Tube** should protrude from the side of the assembly with the **Hive Back Skin**; note its orientation relative to the **AprilTag Sticker**.

Assemble
[1x]
per Cell



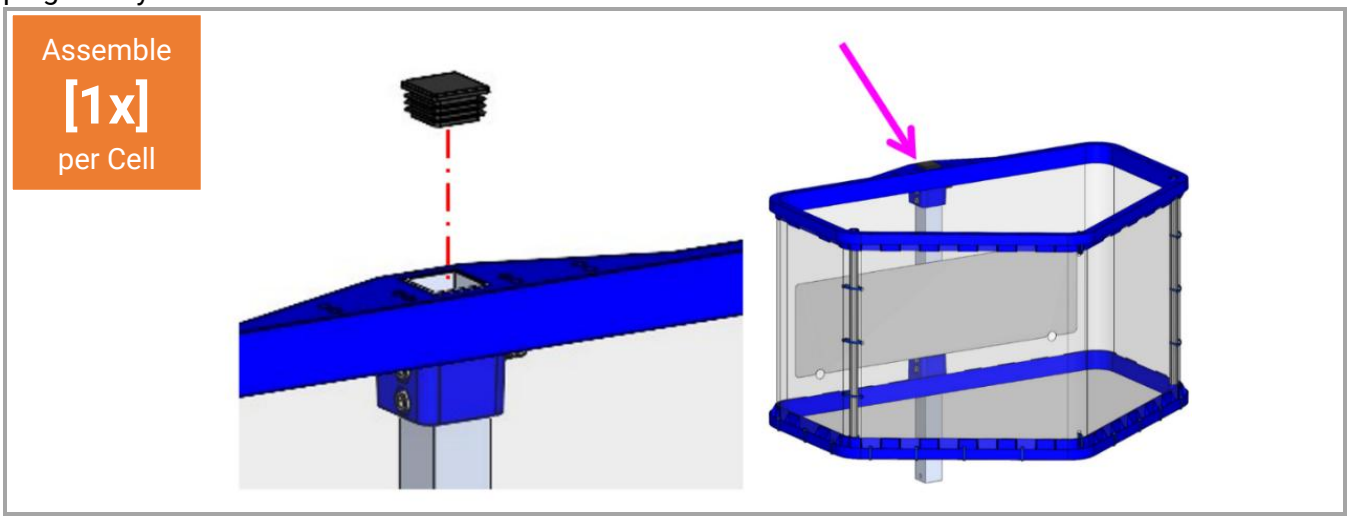
6.10 Install Base Tube Hardware

Attach both **Goal Ribs** to the **Cell Base Tube** using [3] **10-32 x 1.5 in. (3.8 cm) Long Screws** and [1] **10-32 x 2.0 in. (5.1 cm) Long Screw**. (The longer screw will be used to balance/calibrate the Hive and must be installed in the hole furthest from the **Hive Back Skin**, closest to the opening of the Hive). These should each be inserted into **10-32 Nylock Nuts** installed "flat side" first into hexagonal nut pockets molded into the **Goal Ribs**.



6.11 Install Tube Plug

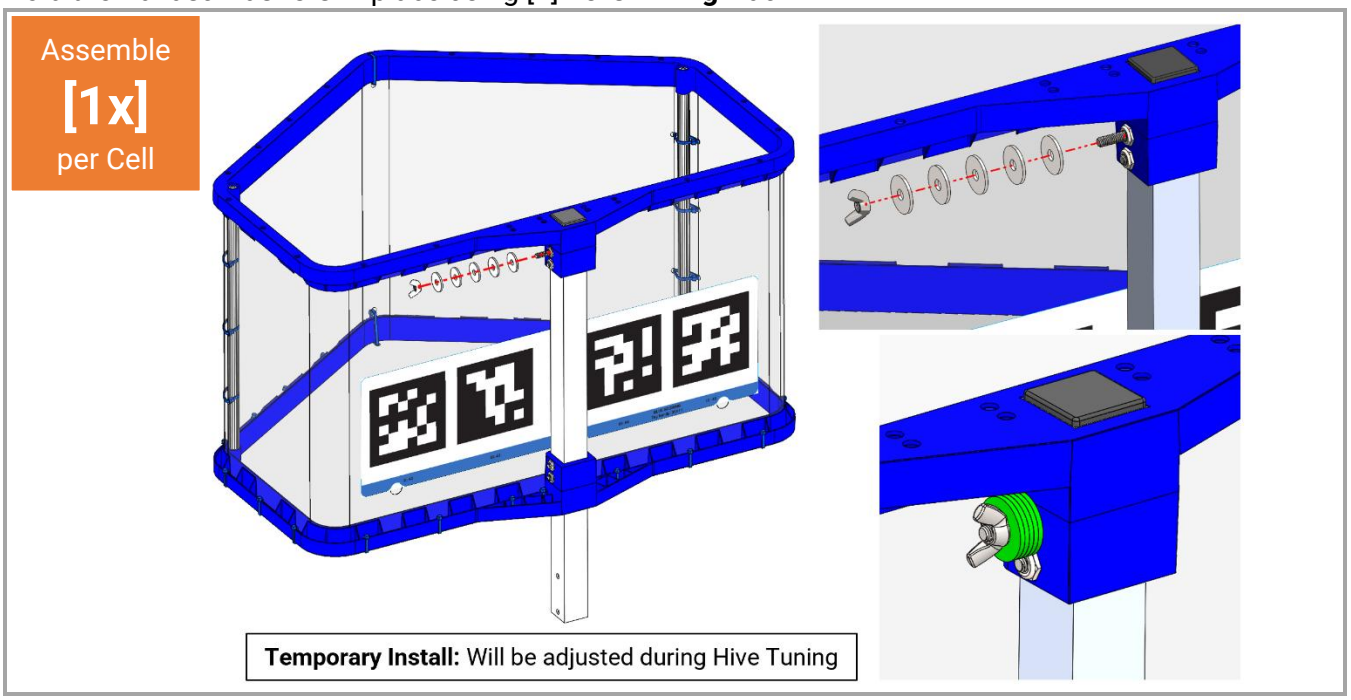
Insert [1] **Tube Plug** into the **Cell Base Tube** that is part of the Assembly from Step 6.10. The Tube Plug is installed in the end of the **Cell Base Tube** that is flush with the **Goal Rib**, as shown. Make sure the plug is fully inserted.



6.12 Install Tuning Hardware

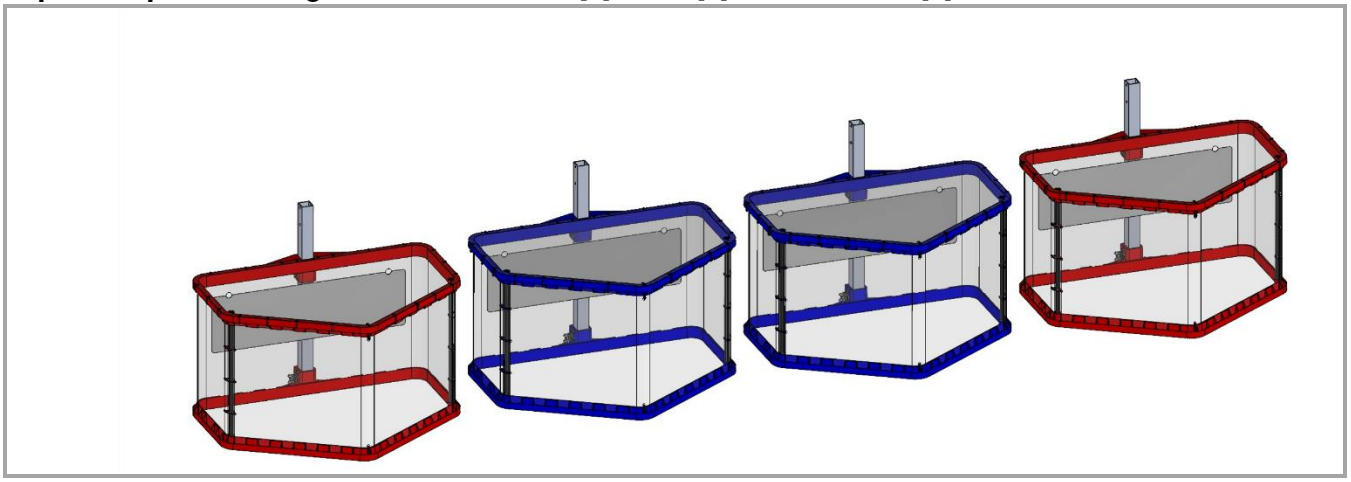
Attach spare **#10 Ballast Washers** (used to balance each Hive) on the [1]**10-32 x 2.0 in. (5.1 cm) Long Screw** that is protruding from the front **Goal Rib**. Additional Ballast Washers will be stored on the Frame in Step 8.11. The quantity of **Ballast Washers** will be adjusted during Hive Tuning. (*Note*: Do NOT discard extra washers.)

Hold the **Ballast Washers** in place using [1] **10-32 Wing Nut**.



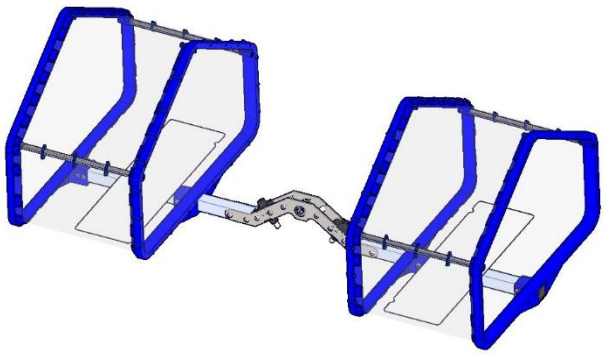
6.13 Repeat for [4] Cells

Repeat Steps 6.2 through 6.12 to assemble [4] Cells: [2] Red Cells and [2] Blue Cells.



7 Pivot & Hive Assembly

Assemble
[1x] Red
[1x] Blue
per Field



WARNING
Metal parts may have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be removed with a deburring tool or

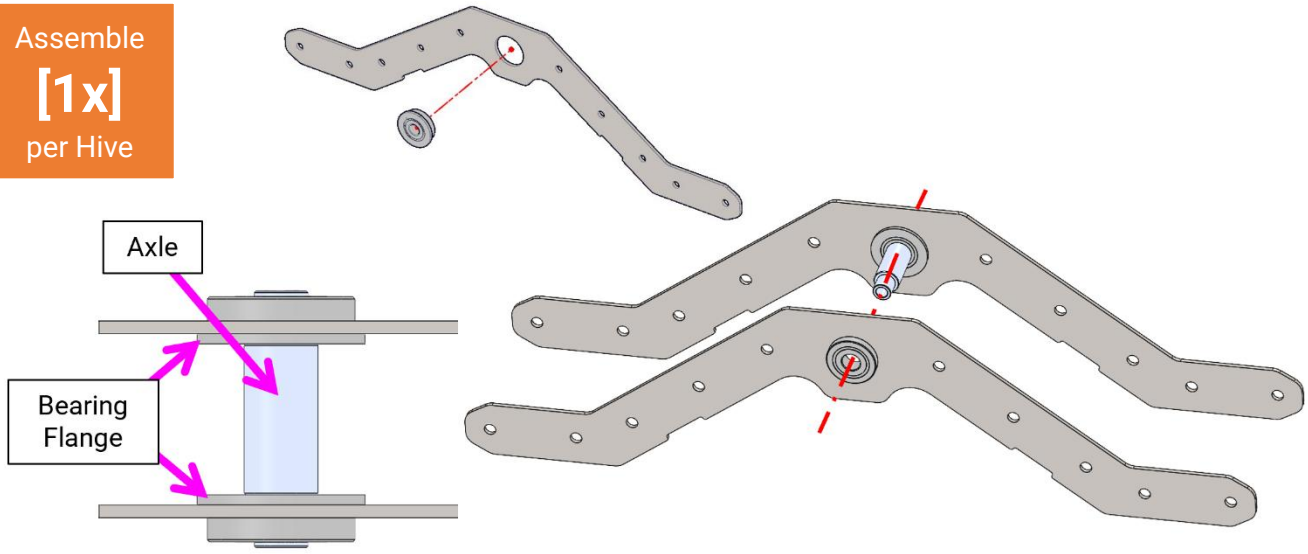
7.1 Install Bearings & Axle

Install [2] **8mm ID Flanged Bearings** into [2] **Pivot Bearing Plates**, [1] bearing is installed in each plate, and should be pressed in until the Bearing Flanges are flush against the plate.

Note: The bearing holes are very tightly sized relative to the bearings, and it may be necessary to press the bearings in using a vice/clamp or gently tap the bearing into place using a mallet. Be careful not to damage the bearings during installation, if clamping or hammering is required, use a material such as wood or soft plastic to protect the bearing itself as this installation may require significant force.

Install [1] **Stepped Axle** into the [2] **8mm ID Flanged Bearings**. Note that the Bearing Flanges should be positioned between the two plates, as shown.

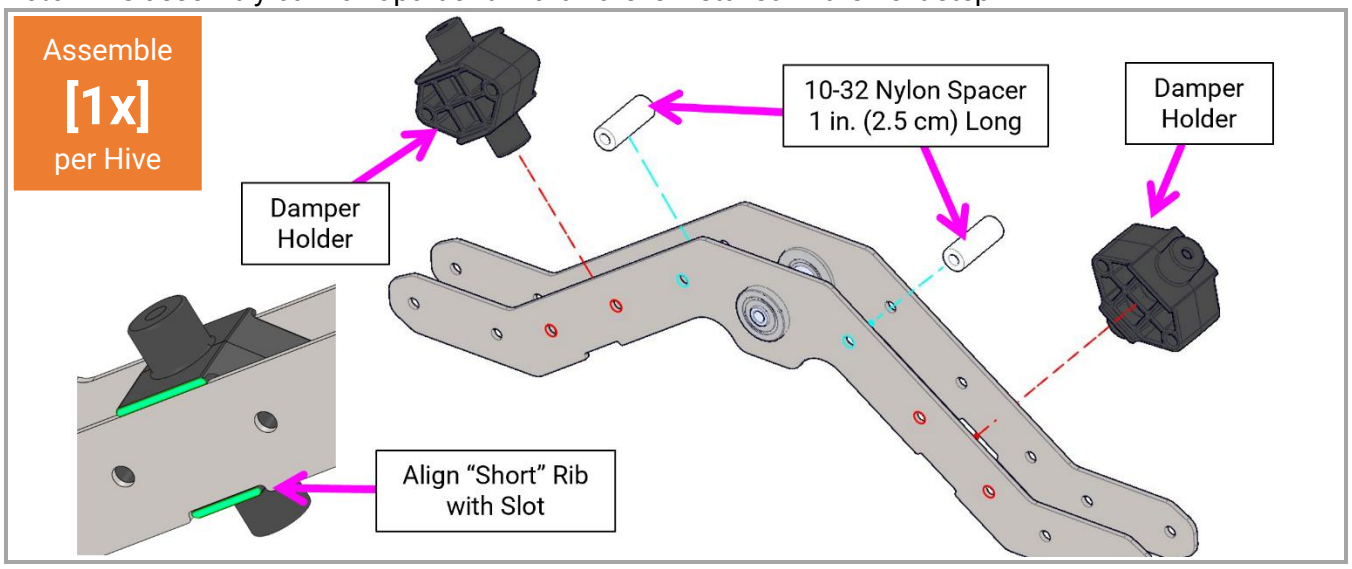
Assemble
[1x]
per Hive



7.2 Install Pivot Spacers

Insert [2] **10-32 x 1 in. (2.5 cm) Long Plastic Spacers** and [2] **Damper Holders** between the [2] **Pivot Bearing Plates** that are part of the **Assembly from Step 7.1**. The **Damper Holders** have injection molded "ribs" which ensure they can only be installed in one orientation. The shorter rib must align with a slot cut into the bearing plates, as shown.

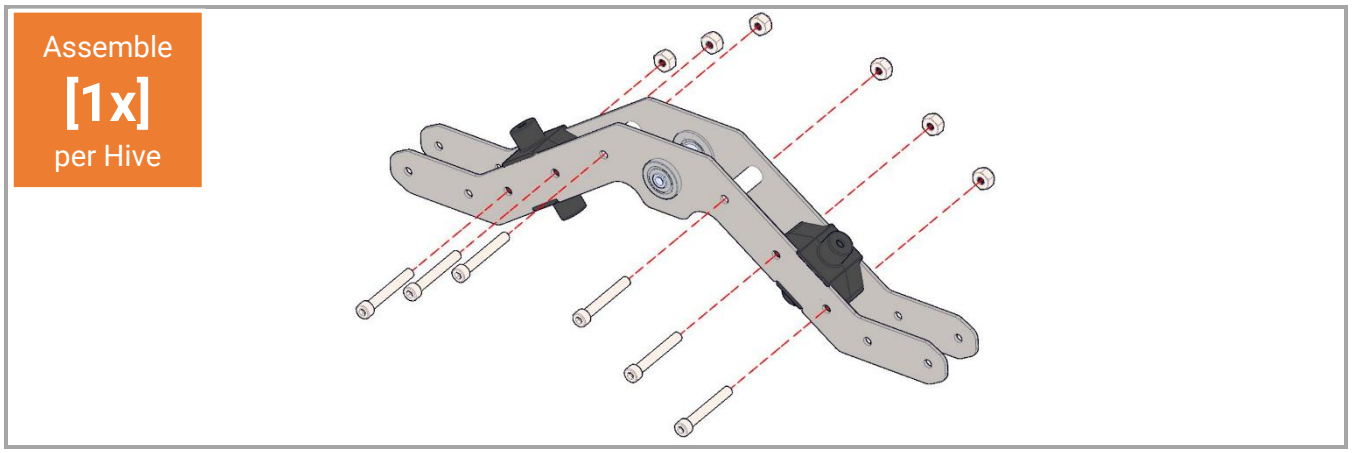
Note: This assembly can fall apart until hardware is installed in the next step.



7.3 Install Pivot Hardware

Attach the [2] **Pivot Bearing Plates** together, using [6] **10-32 x1.5 in. (3.8 cm) Long Screws** and [6] **10-32 Nylock Nuts**. These screws need to go through holes in the **Damper Holders**, and the **10-32 x 1 in. (2.5 cm) Long Plastic Spacers** from Step 7.2, all while keeping the **Stepped Axle** from Step 7.1 in place.

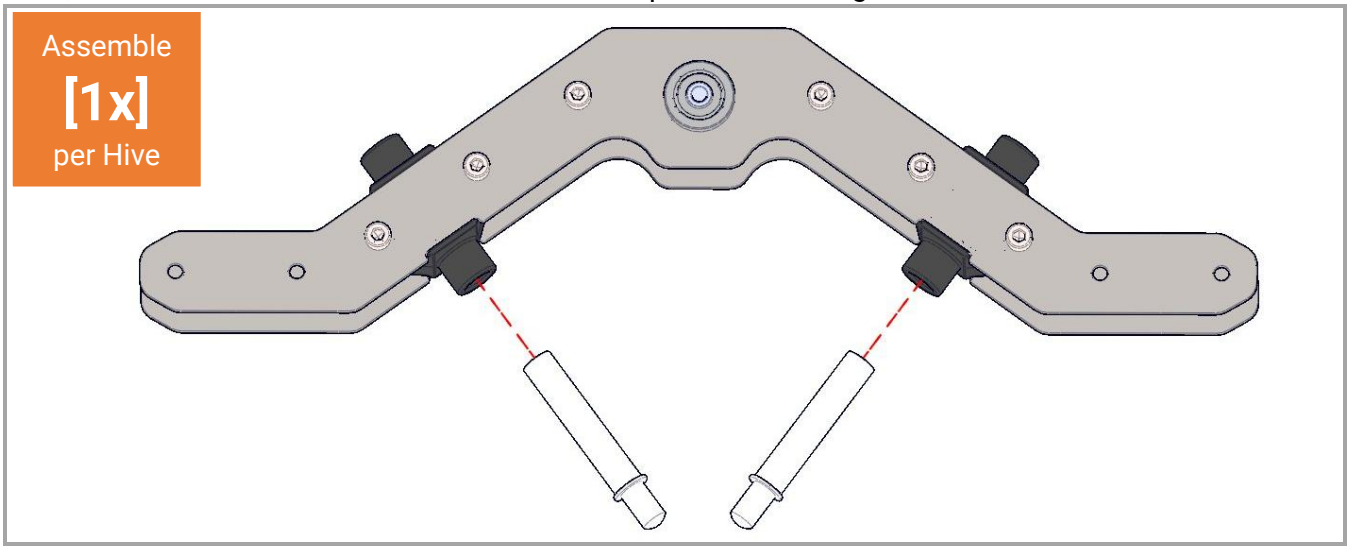
Note: **Do not fully tighten the screws**, leave them loose until Step 7.6.



7.4 Insert Dampers

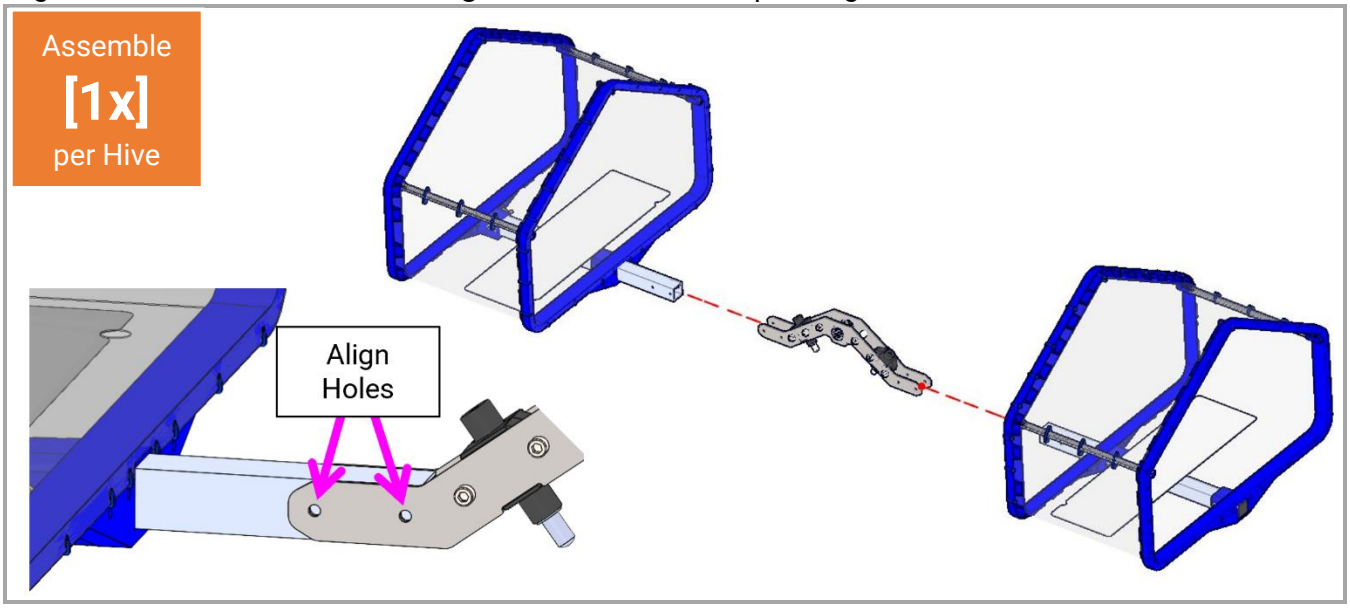
Insert [1] **Linear Damper** into the sockets on each of the [2] **Damper Holders** that are part of the **Assembly from Step 7.3**.

Note: Ensure the **Linear Dampers** are fully installed until their flanges contact the **Damper Holders**. This is a "press fit" and it is normal if they are difficult to install, but a tool such a hammer should not be used, and care should be taken to ensure the damper is not damaged.



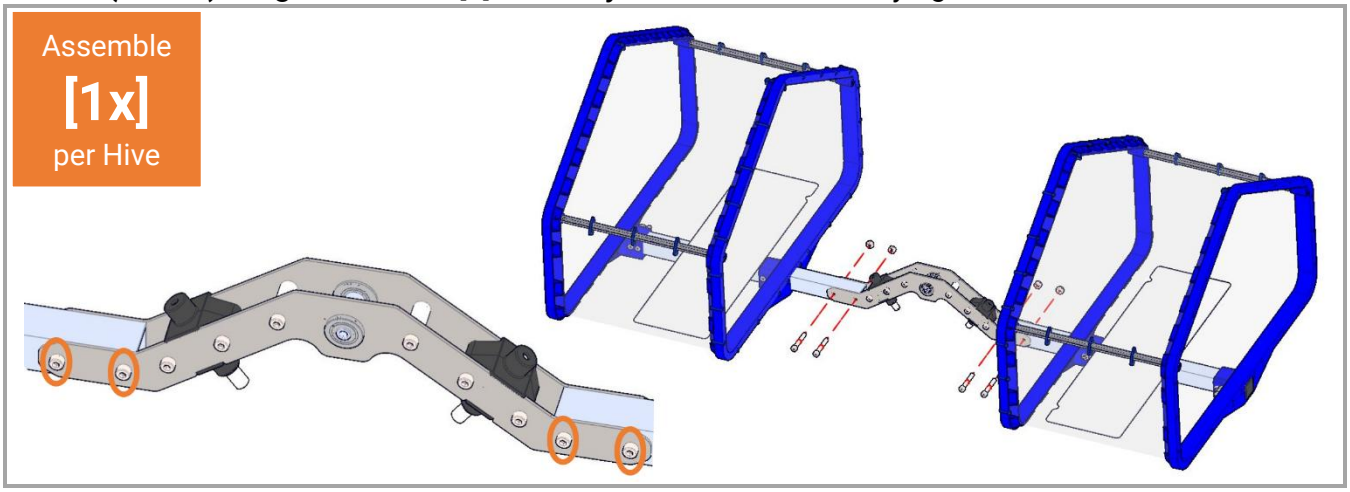
7.5 Link Cells

Slide [2] Cell Assemblies of the same color from Section 6 between the [2] **Pivot Bearing Plates** and align the holes in each **Pivot Bearing Plate** with the corresponding holes on the **Cell Base Tube**.



7.6 Install Cell Attachment Hardware

Attach the [2] **Cell Assemblies from Step 6.12** to the **Pivot Assembly from Step 7.4** using [4] **10-32 x1.5 in. (3.8 cm) Long Screws** and [4] **10-32 Nylock Nuts**. Do not fully tighten the screws.

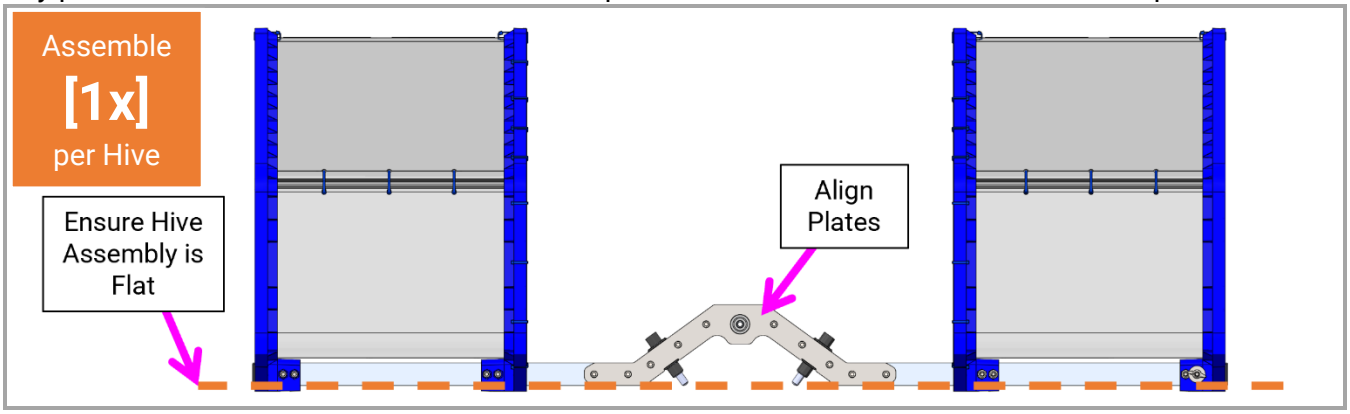


7.7 Ensure Hive Alignment & Tighten Hardware

Before tightening the Hive Assembly Screws, it's important to confirm the Hive is not twisted. Check that the [2] **Pivot Bearing Plates** are aligned together, then tighten the [6] **Screws from Step 7.3**.

Next confirm that the Hive Assembly is completely flat, before tightening the [4] **Screws from Step 7.6**.

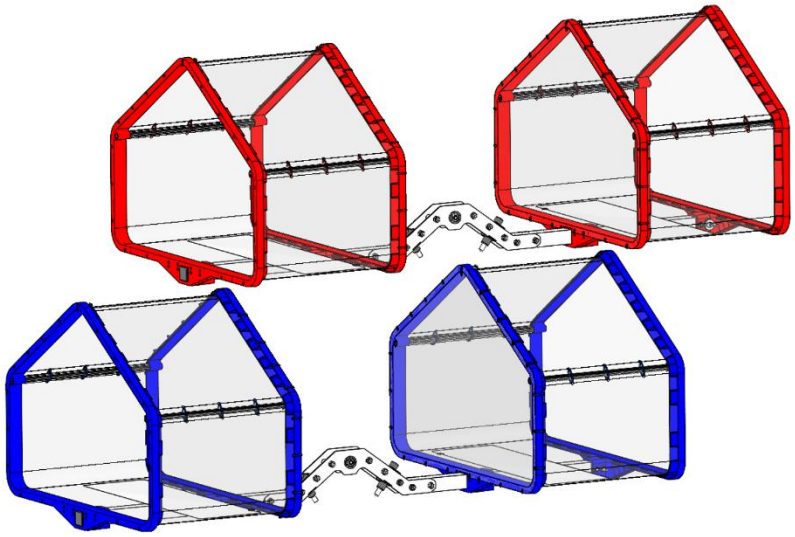
Ensure the screws are all tightened correctly such that they do not deform any other Hive components. Pay particular attention to ensure the Plastic Spacers are not "crushed" between the two plates.



7.8 Repeat for [2] Hives

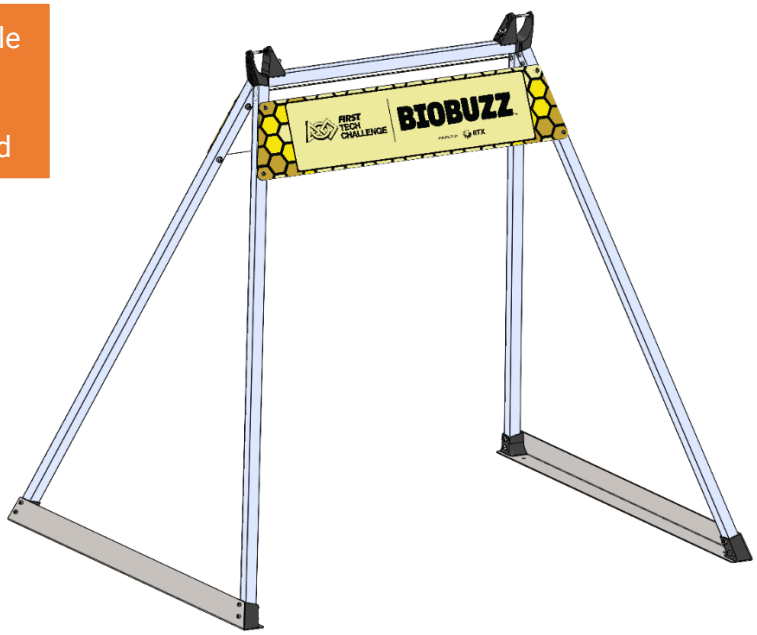
Repeat Steps 7.1 through 7.7 to assemble [2] Hives: [1] Red Hive and [1] Blue Hive.

Assemble
[1x] Red
[1x] Blue
per Field



8 Frame Assembly

Assemble
[1x]
per Field



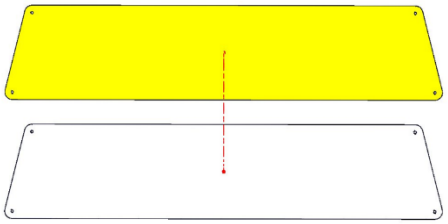
WARNING
Metal parts may have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be deburred with a deburring tool or sandpaper.

8.1 Apply BIOBUZZ Stickers

Peel the protective film off ***both sides*** of [1] **Frame ACM Panel**. Install [1] **BIOBUZZ Sticker**: position the sticker by aligning the edges of the sticker with the edges of the panel.
Apply the sticker carefully: attach it in one location then smoothly work outwards from that spot smoothing out wrinkles and bubbles as you go.

Repeat for [2] BIOBUZZ Stickers and [2] Frame ACM Panels.

Assemble
[2x]
per Field

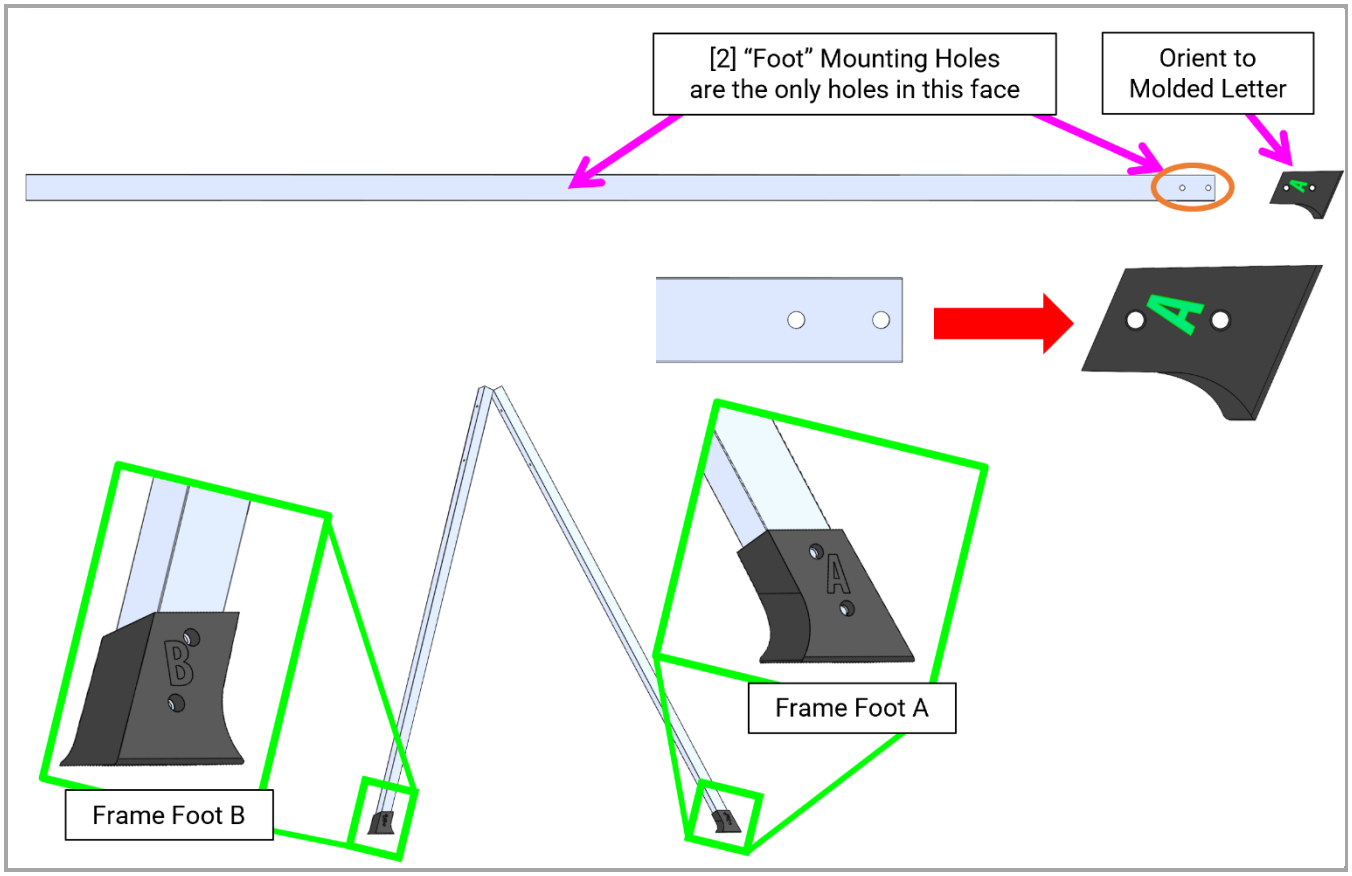


8.2 Install Frame Feet

Slide [1] **Frame Foot A** onto the end of [1] **Frame Leg**. Orient the **Frame Foot** so the [2] attachment holes align with [2] similar holes on **the Frame Leg**. Each Frame Foot includes an injection molded label "A" or "B." The face of the **Frame Foot** with this label must align with the face on the **Frame Leg** that does not have any other holes on its face, besides the ones used for **Frame Foot** attachment, as shown. Do not install any hardware.

Repeat with [1] **Frame Foot B** with another [1] **Frame Leg** so you have two Frame Leg Assemblies, one "A" and one "B."

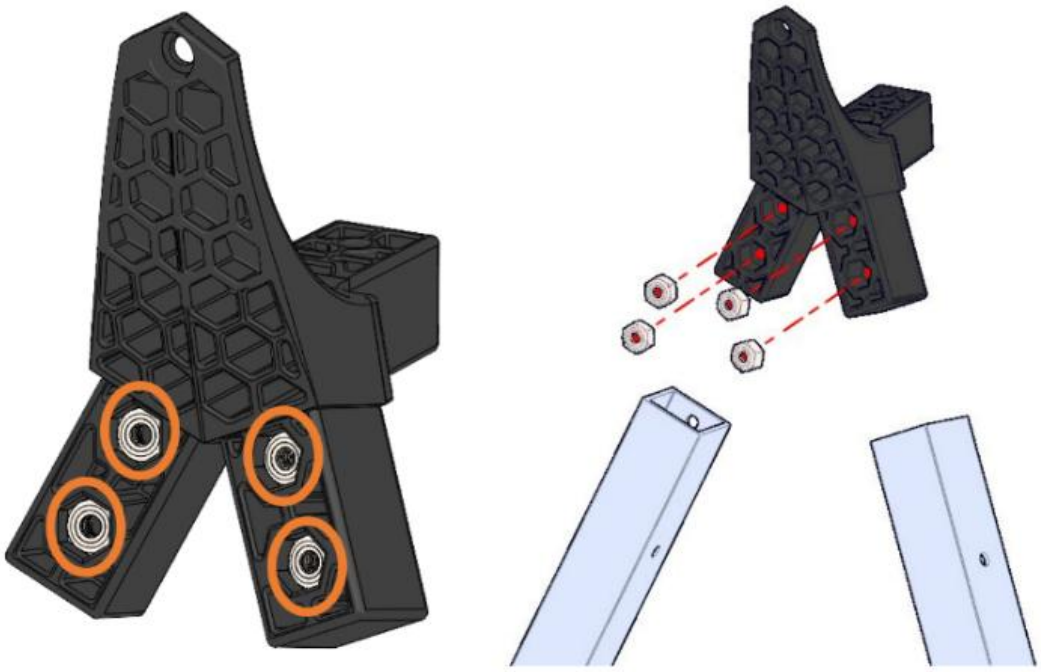
> *Note:* If visualizing the correct orientation of these components is confusing, we recommend consulting the CAD assembly posted at ftc.game/field.



8.3 Install Leg Attachment Nuts

Insert [4] **10-32 Nylock Nuts** into [1] **Frame Top Corner** using the molded hexagonal pockets “flat side” first, in the locations shown below.

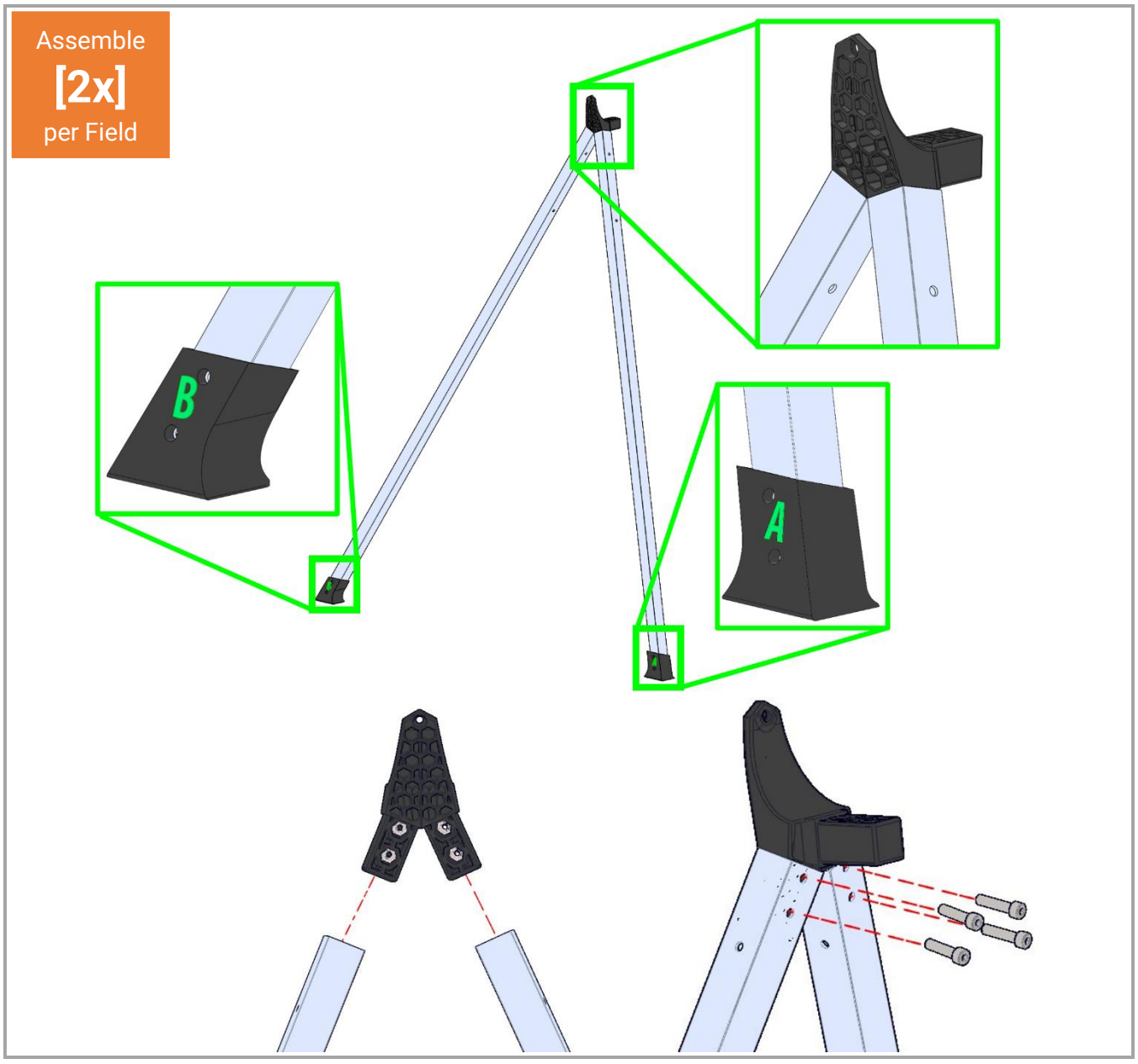
Assemble
[2x]
per Field



8.4 Install Top Corner

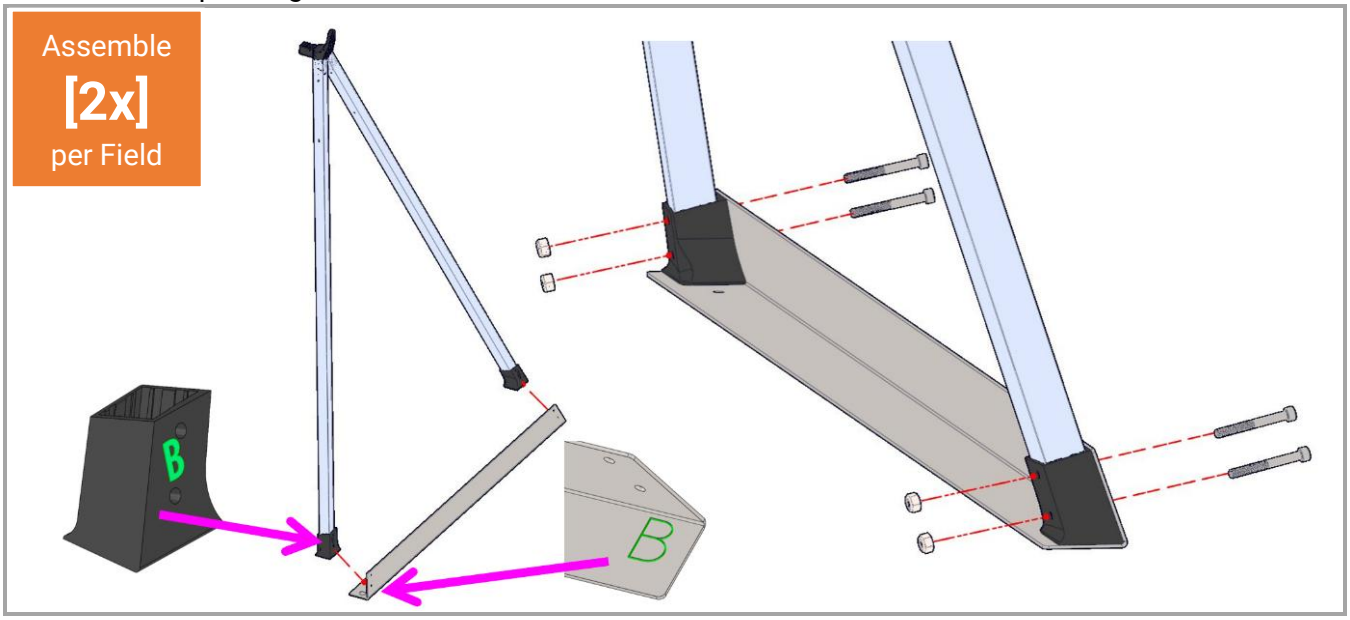
Slide the **Frame Top Corner Assembly from Step 8.3** into the [2] **Frame Leg Assemblies from Step 8.2** as shown. Orient the components such that the molded letter “A” on **Frame Foot A** and “B” on **Frame Foot B** are oriented as shown relative to the **Frame Top Corner**.

Attach both Frame Legs to the Frame Top Corner by threading [4] **10-32 x 0.875 in. (2.2 cm) Long Screws** into the **10-32 Nylock Nuts** that were installed in the **Frame Top Corner** in Step 8.3.



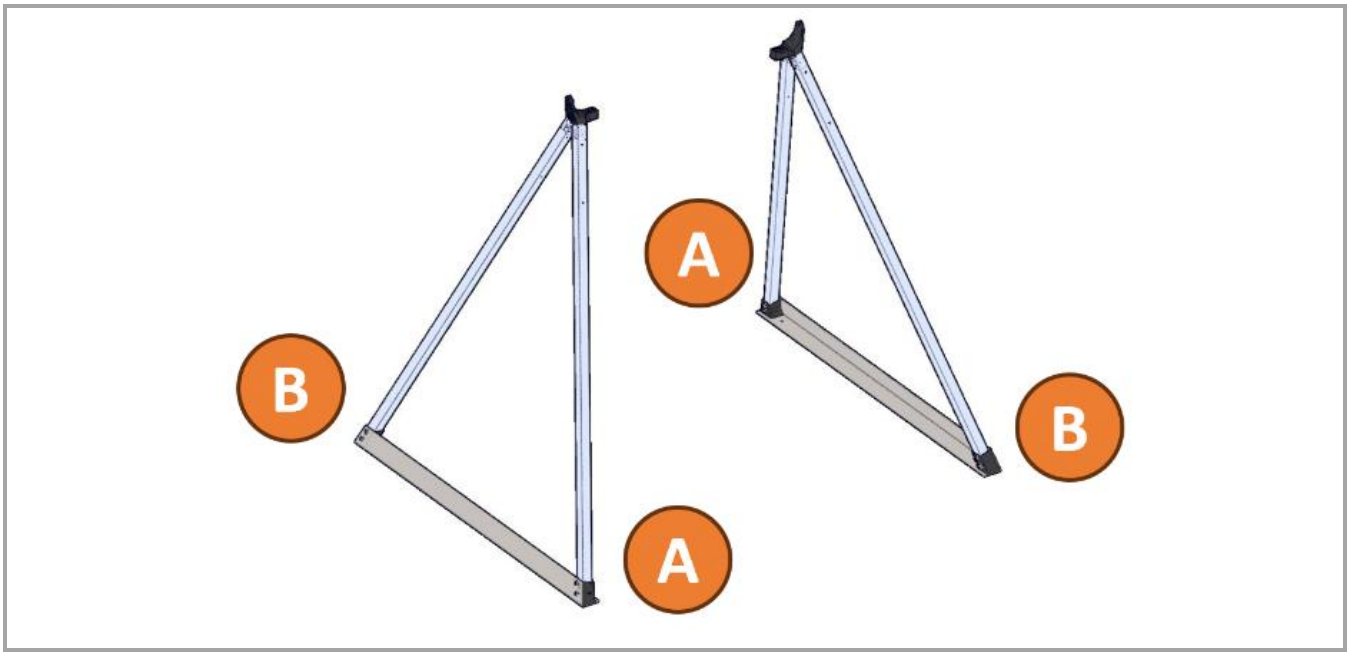
8.5 Install Foot Bar

Attach [1] **Frame Foot Bar** onto the **Assembly from Step 8.4** using [4] **10-32 x 1.75 in. (4.45 cm) Long Screws** and [4] **10-32 Nylock Nuts**. The feet each have a letter "A" or "B" molded into them which will match a corresponding "A" or "B" etched into the **Frame Foot Bar**.



8.6 Build Another Leg Assembly

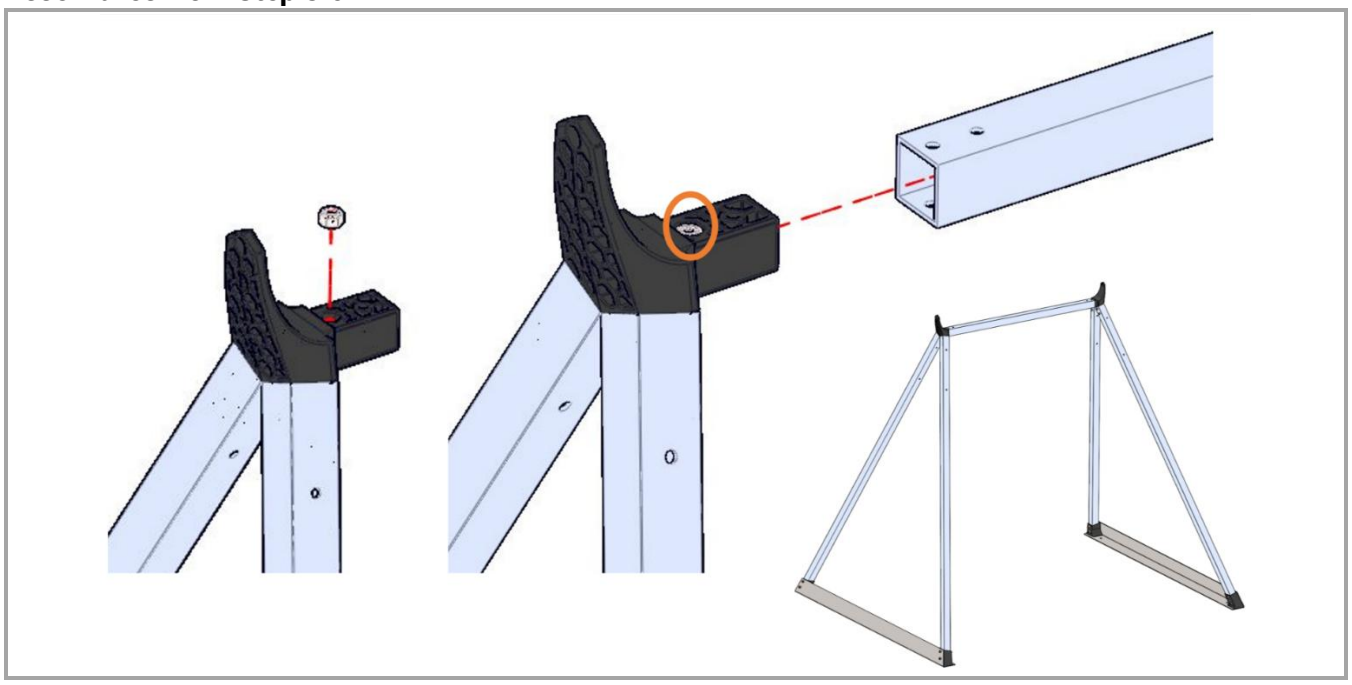
Repeat Steps 8.2 through 8.5 to create an additional Leg Assembly. These two assemblies are identical, each with a **Frame Foot A** and a **Frame Foot B** as noted.



8.7 Install Frame Top Bar

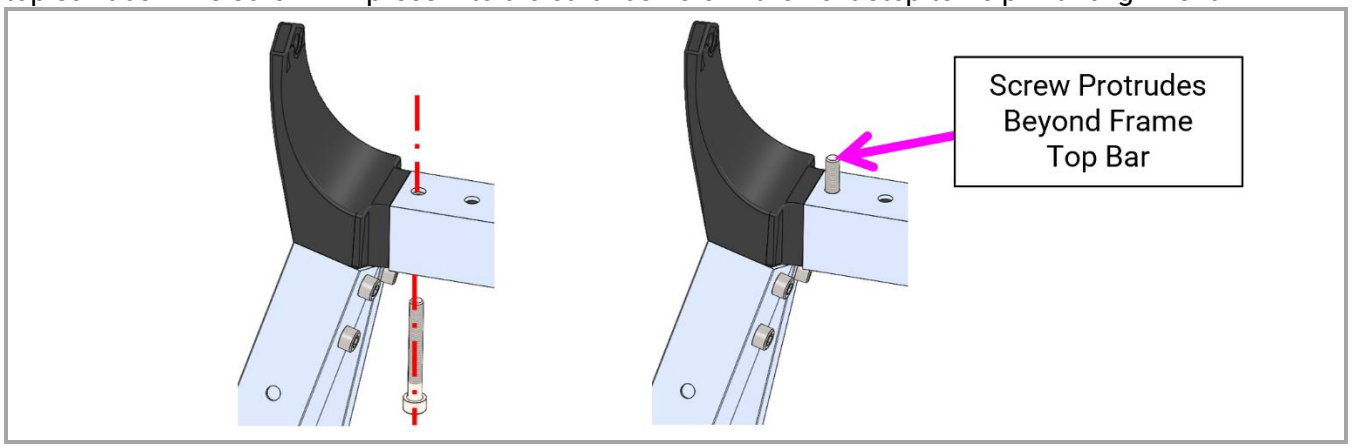
Insert [2] **10-32 Nylock Nuts** into the [2] **Assemblies from Step 8.6**. These nuts are installed "flat side" first into the hexagonal molded pockets of the **Frame Top Corners**, as shown.

Install [1] **Frame Top Bar** by sliding it onto the [2] **Frame Top Corners** as shown. This will connect the [2] **Assemblies from Step 8.6**.



8.8 Attach Top Bar

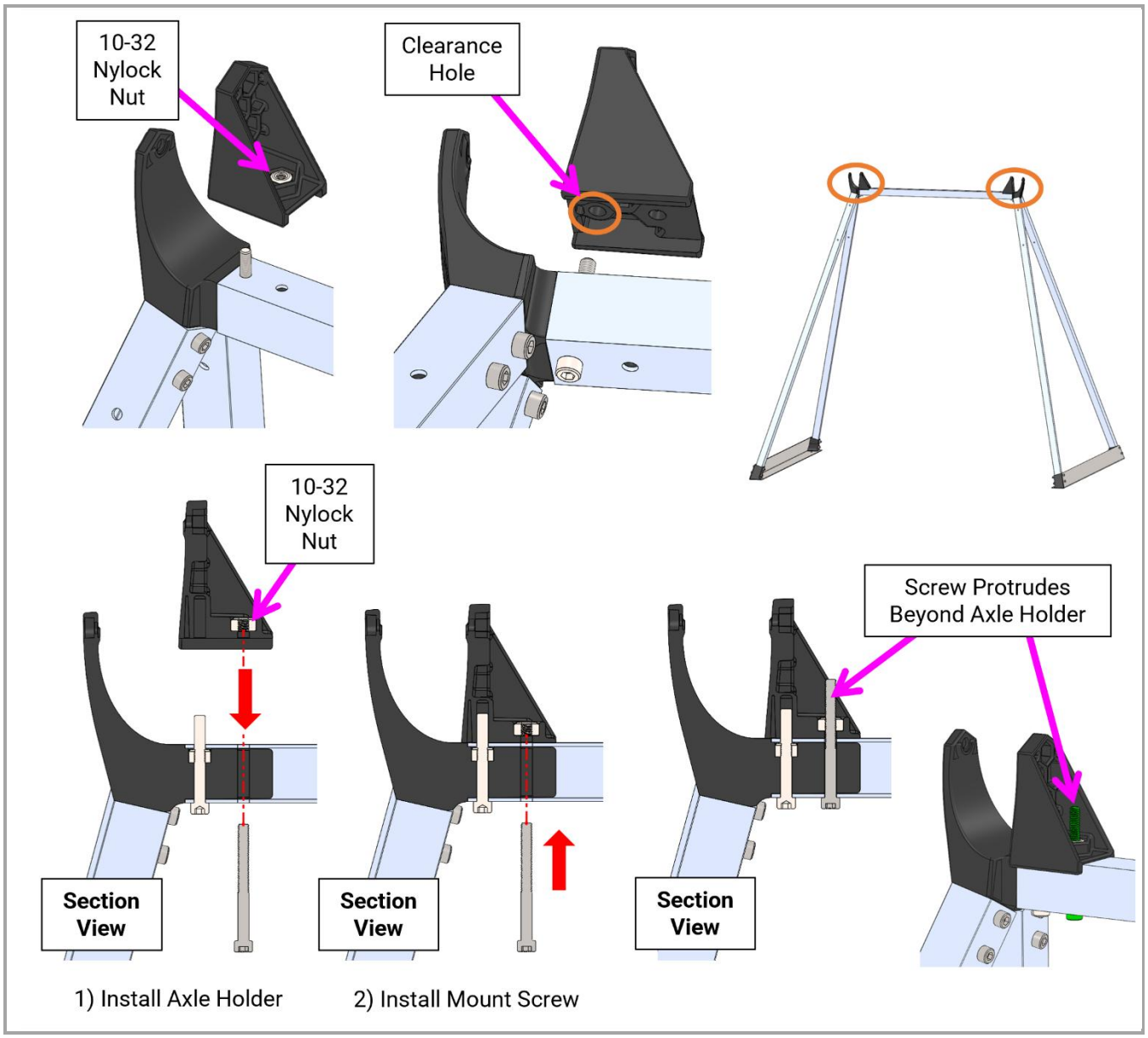
Insert [2] **10-32 x 1.5 in. (3.8 cm) Long Screws** up through the **Frame Top Bar** into the [2] **10-32 Nylock Nuts from Step 8.7**. The screws will attach to the nuts inside the tube and will then protrude beyond the top surface. This screw will press into a clearance hole in the next step to help with alignment.



8.9 Attach Axle Holder

Insert [2] **10-32 Nylock Nuts** into the hexagonal pockets molded into [2] **Axle Holders**. Nuts should be installed with their "flat side" first. Slide the Axle Holders onto the Frame Top Bar such that the Clearance Hole in each Axle Holder pressed down around the [2] **Screws from Step 8.8**.

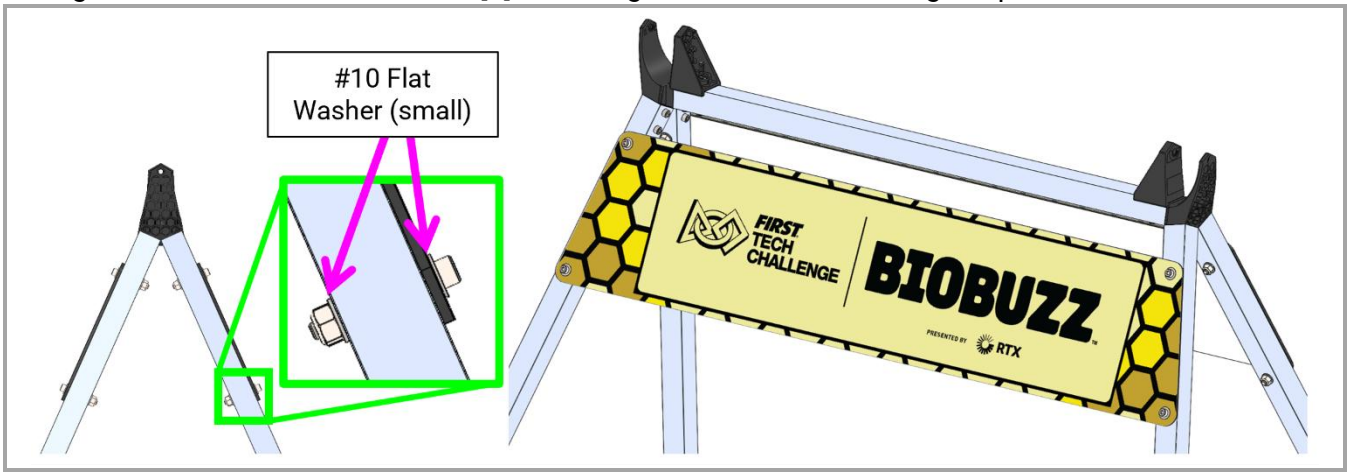
Attach the [2] **Axle Holders** to the **Frame Top Bar** using [2] **10-32 x 2.0 in. (5.1 cm) Long Screws**. These screws protrude beyond the **Axle Holders**. They will be used to store **Ballast Washers** in a later step.



8.10 Attach Frame ACM Panels

Attach [2] **Frame ACM Panels** (with BIOBUZZ Stickers installed) onto the **Assembly from Step 8.9**. Each Panel attaches using [4] **10-32 x 1.5 in. (3.8 cm) Long Screws**, [4] **10-32 Nylock Nuts**, and [8] **#10 Flat Washers (small)**. Washers should be installed on both sides of the attachment, as shown.

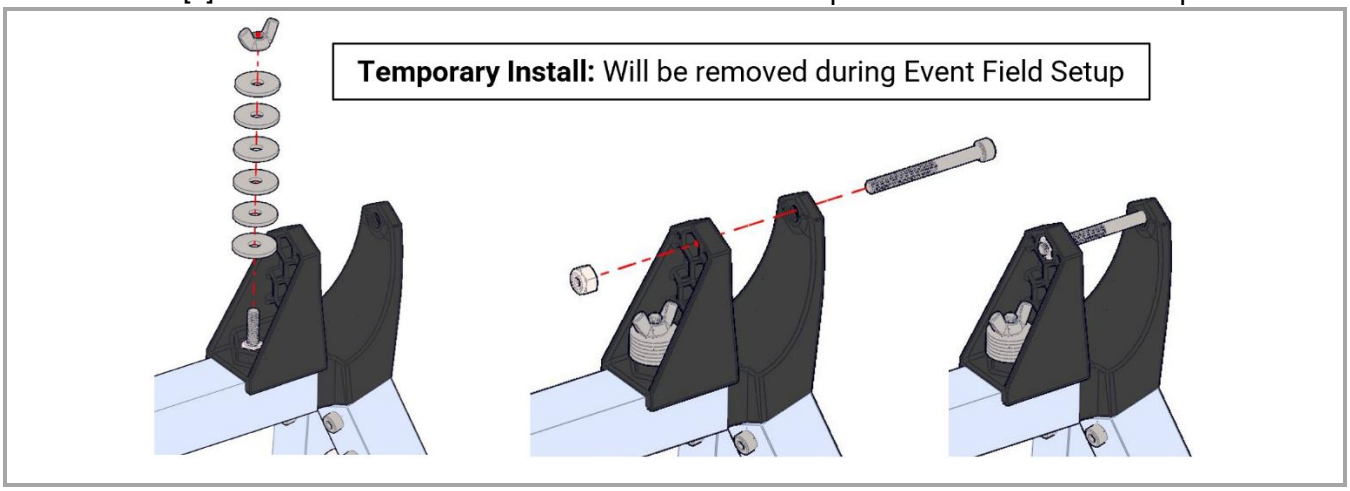
Note: The BIOBUZZ stickers do not have holes pre-cut for their attachment screws. Poke a 10-32 screw through the stickers into each of the [4] mounting holes before attaching the panel.



8.11 Install Field Hardware

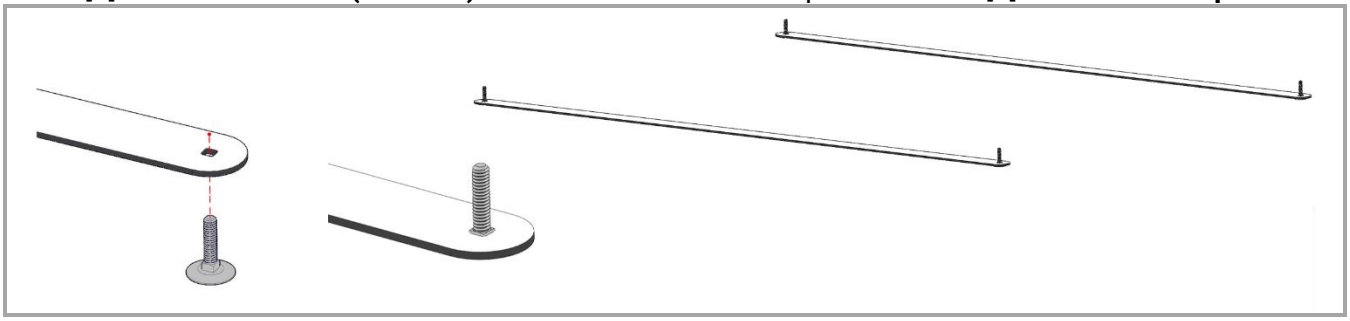
Attach the remaining **#10 Washers (large)** / **Ballast Washers** that were not used in Step 6.12 on the **10-32 x 2.0 in. (5.1 cm) Long Screws** that are protruding from the **Axle Holders**. Hold the **Ballast Washers** in place using [2] **10-32 Wing Nuts**, [1] per **Axle Holder**.

Press [1] **10-32 Nylock Nut** into each **Axle Holder** and then install [2] **10-32 x 2.0 in. (5.1 cm) Long Screws** through the [2] **Frame Top Corners** and into these **10-32 Nylock Nuts**. These will be the pivot bolts that the [2] Hives rotate around. These will be removed as part of the Event Field Setup.



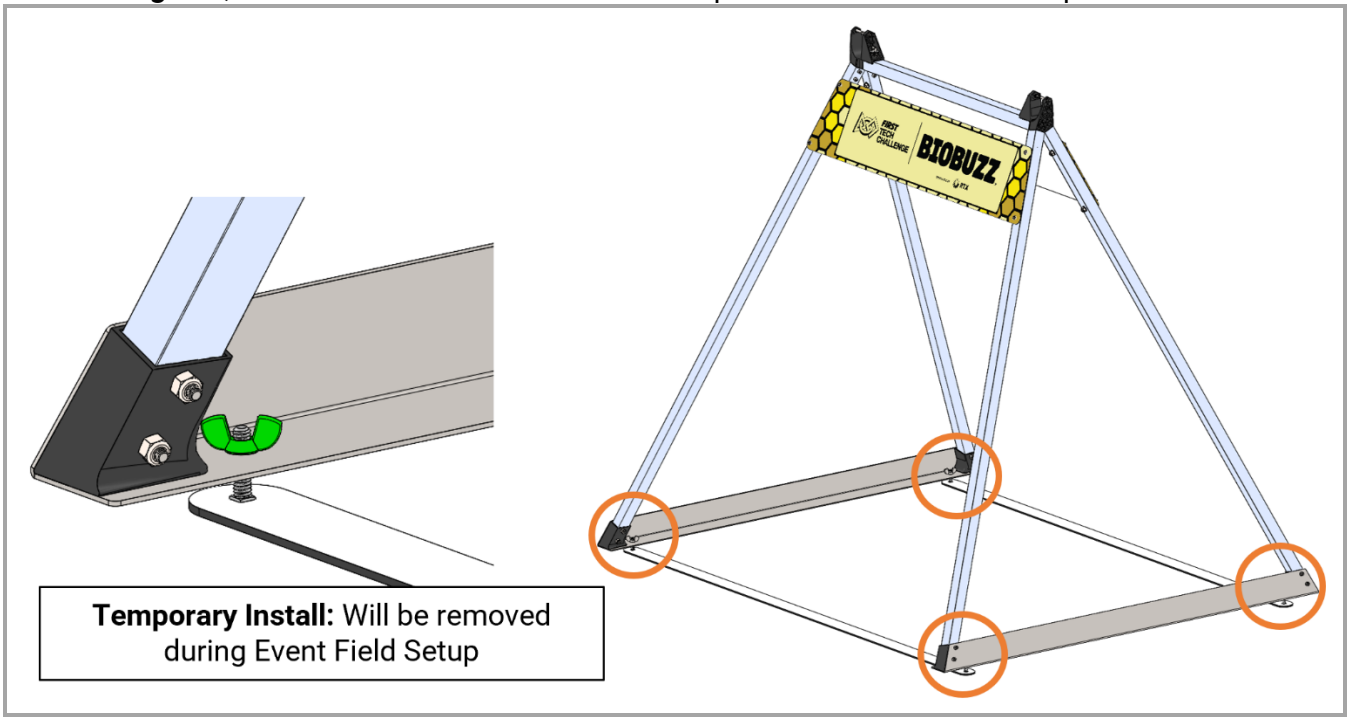
8.12 Assemble Under Tile Strips

Press [4] **1/4-20 x 1.25 in. (3.15 cm) Elevator Bolts** into the square holes in [2] **Under Tile Strips**.



8.13 Install Under Tile Strips

Attach [2] **Under Tile Strip Assemblies from Step 8.12** to the **Frame Assembly from Step 8.11** using [4] **1/4-20 Wingnuts**, as shown. These will be removed as part of the Event Field Setup.



9 Scoring Element Tray

9.1 Fold Scoring Element Trays

Fold the flat cardboard Scoring Element Trays, as shown.

Assemble
[2x]
per Field

10 Prep for Transport

This concludes the Initial Field Element Assembly process.

This is the recommended level of assembly for field storage and transport that minimizes the effort required for field setup at an event and field teardown after the event is completed. Additional disassembly may be required to enable transportation in smaller vehicles, depending on your specific requirements.

Warning: Protect the Hives!
It is important to be careful of the Hive Assemblies during transportation and storage. They are intentionally designed to be lightweight, to enable the Hive's tipping dynamics. Do not stack items on the Hive Assemblies or place them where something could poke through the plastic skins.