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2 The Arena

Section 2

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2.1 Overview

Note: These illustrations are for a general visual understanding of the ULTIMATE ASCENTSM ARENA only. Please refer to the [2013 Official FIRST Field Drawings & Models](#) for exact dimensions and construction details.

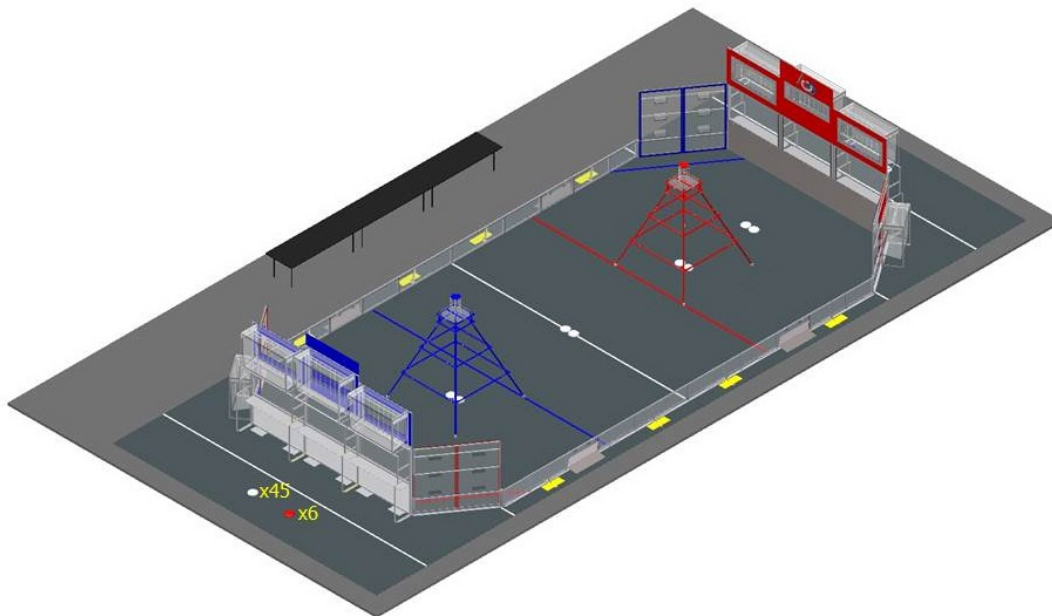


Figure 2-1: ULTIMATE ASCENT ARENA

The ARENA includes all elements of the game infrastructure that are required to play ULTIMATE ASCENT: the FIELD, the ALLIANCE STATIONS, the DISCS, and all supporting communications, ARENA control, and scorekeeping equipment.

ROBOTS play ULTIMATE ASCENT in an octagonal space known as the FIELD. During MATCHES, ROBOTS are controlled from ALLIANCE STATIONS located outside the ends of the FIELD. Each ALLIANCE STATION consists of three PLAYER STATIONS that provide connectivity between the controls used by the DRIVERS and the ROBOTS. There are GOALS mounted along the entire length of the ALLIANCE STATION and on top of the PYRAMID.

The drawings and CAD models, drawings for low-cost versions of the important elements of the ARENA, and links to CAD models hosted by Autodesk and PTC for ULTIMATE ASCENT can be found on the [2013 Official FIRST Field Drawings & Models](#) (dimensions stated in this document are nominal).

The competition ARENA is a modular construction that is assembled, used, disassembled, and shipped many times during the competition season. It may undergo wear and tear. The ARENA is designed to withstand rigorous play and frequent shipping, and every effort is made to ensure that the ARENAS are consistent from event to event. However, as the ARENA is assembled in different venues by different event staff, some small variations do occur. Fit and tolerance on large assemblies (e.g. the LOW GOALS) are ensured only to within ¼ in. Overall gross dimensions of the entire FIELD may vary up to 4 in. Successful teams will design ROBOTS that are insensitive to these variations.

2.2 The ARENA

Note: The official ULTIMATE ASCENT ARENA description, layout, dimensions and parts list are contained in [FE-00036 - 2013 ARENA Layout and Marking](#). Diagrams and dimensions below are for illustrative purposes only.

2.2.1 The FIELD

The FIELD for ULTIMATE ASCENT is a 27 by 54 ft. carpeted area, bounded by ALLIANCE WALLS, FEEDER STATIONS, LOW GOALS, and GUARDRAILS. The FIELD floor is covered with carpet (Shaw Floors, Philadelphia Commercial, Neyland II, 20, 30753, "Ground Pepper"). Three (3) GOALS are located at each end of the FIELD above each ALLIANCE WALL. A fourth GOAL and three (3) FEEDER STATIONS are located in the corners next to each ALLIANCE WALL. A PYRAMID is adjacent to each ALLIANCE'S AUTO LINE. At the top of each PYRAMID sits a PYRAMID GOAL. Each LOADING ZONE is a trapezoidal area bounded by two (2) FEEDER STATIONS, an ALLIANCE WALL, a GUARDRAIL, and Red or Blue tape.

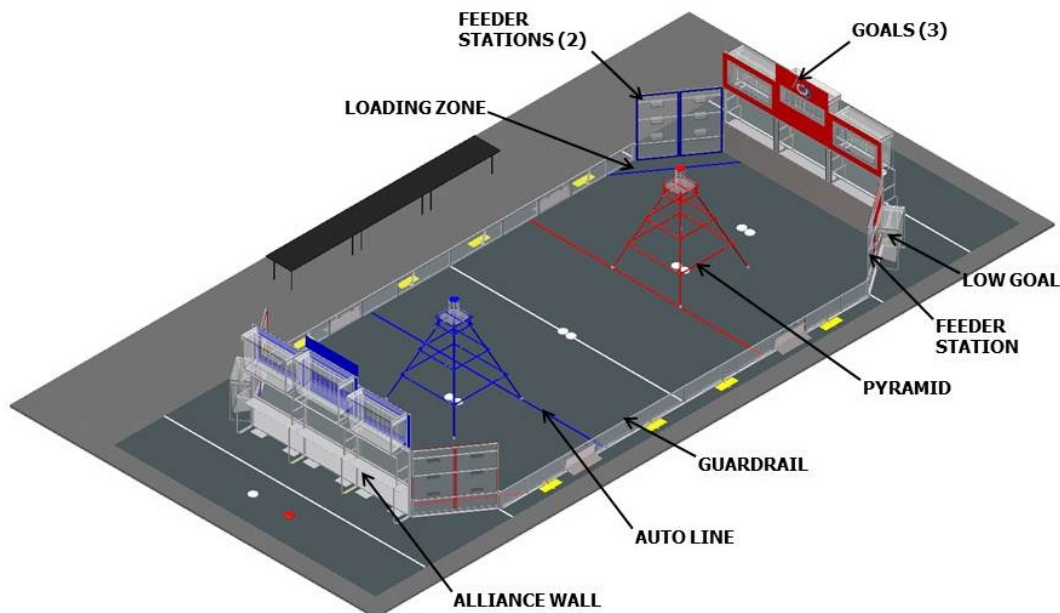


Figure 2-2: Basic FIELD Layout

The ALLIANCE WALLS are 6 ½ ft. high, 18 ft. wide, and define the ends of the FIELD. The ALLIANCE WALL protects the PLAYER STATIONS and is composed of a 3 ft. high base of diamond plate aluminum topped with a 3 ½ ft. high transparent polycarbonate panel.

The GUARDRAIL is a system that consists of horizontal pipes that are 20 in. above the floor and supported by vertical struts mounted on a 3 in. aluminum angle. A transparent polycarbonate shield is attached on the inside of the GUARDRAIL, extending from the floor to the top of the GUARDRAIL, and running the length of the GUARDRAIL. The shield is intended to help prevent ROBOTS, in whole or in part, from inadvertently exiting the FIELD during a MATCH. The GUARDRAIL defines the borders of the FIELD, except where it is bounded by the ALLIANCE WALL, FEEDER STATIONS or LOW GOALS.

Four gates in the GUARDRAIL allow access to the FIELD for placement and removal of ROBOTS. The gates are 38 in. wide, and are closed and shielded during MATCHES.

2.2.2 FIELD Markings

FIELD markings are shown in Figure 2-3 and are for illustrative purposes only. Please refer to drawing [FE-00036](#) for exact dimensions.

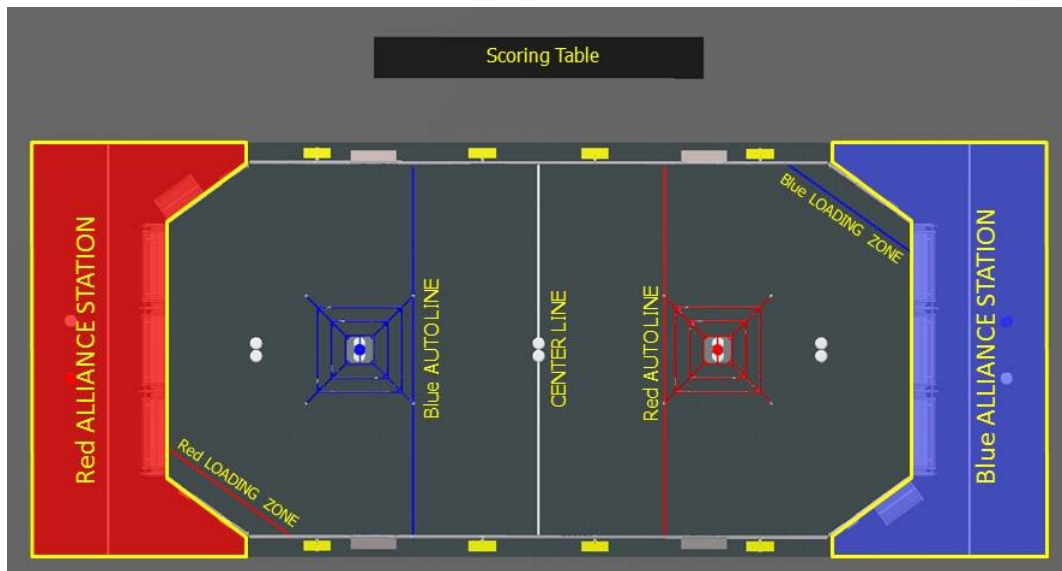


Figure 2-3: FIELD Markings

Three lines (Red, White, and Blue) span the width of the FIELD. The White line is the CENTER LINE, marked with 2 in. White gaffers tape. The Red and Blue lines are AUTO LINES, located 108 in. to either side of the CENTER LINE. These are marked with 2 in. red or blue gaffers tape.

Each ALLIANCE has one LOADING ZONE that is located in front of their double FEEDER STATION. This zone is defined by a 2 in. red or blue gaffers tape line that is offset 20 in. from the FEEDER STATIONS.

2.2.3 The GOALS



Figure 2-4: The GOALS

Each ALLIANCE'S LOW GOAL is located adjacent to the opponent ALLIANCE WALL and to the opponent DRIVERS' left. The opening of the LOW GOAL is 29 in. wide and 24 in. tall. The bottom edge of the LOW GOAL is located 19 in. from the playing surface of the FIELD.

Two MIDDLE GOALS and one HIGH GOAL are located above each ALLIANCE WALL. The two MIDDLE GOALS have openings that are 54 in. wide and 21 in. tall. The bottom edge of the MIDDLE GOAL is located $88 \frac{5}{8}$ in. above the FIELD. The HIGH GOAL is 54 in. wide and 12 in. tall with the bottom edge of the opening located $104 \frac{1}{8}$ in. above the surface of the FIELD. Hanging from the top of the post are chains (Ace Hardware P/N: 5365283) to help dampen the DISCS as they enter the GOAL. These chains are $9 \frac{1}{2}$ in. back from the front of the GOAL and spaced $6 \frac{1}{2}$ in. apart.

Located atop each PYRAMID is a PYRAMID GOAL. The PYRAMID GOAL is a polycarbonate and metal framed "basket" that is a $23 \frac{5}{8}$ in. square that is $2 \frac{3}{4}$ in. deep. Rising out of the center of the PYRAMID GOAL is a 20 in. tall, $1 \frac{1}{2}$ in. diameter post. Hanging from the top of the post are chains (Ace Hardware P/N: 5365283) to help dampen the DISCS as they enter the PYRAMID GOAL.

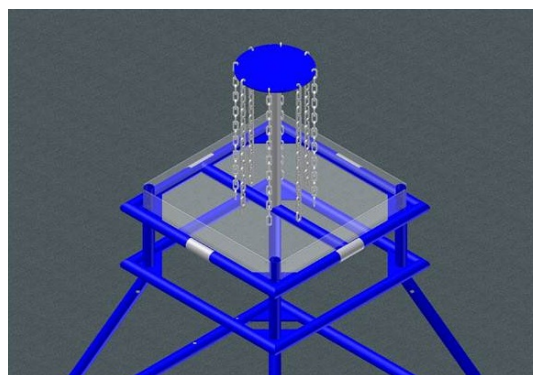


Figure 2-5: PYRAMID GOAL

2.2.4 The VISION TARGETS

Each GOAL has an associated VISION TARGET made of retro-reflective material (3M 8830 Silver Marking Film).

The VISION TARGETS for the LOW, MIDDLE, and HIGH GOALS consist of a 4 in. wide border of retro-reflective material around the GOAL opening. An additional VISION TARGET is located on either side of the center PLAYER STATION, made up of a 4 in. wide, 32 in. tall stripe of retro-reflective material bordered by 2 in. wide black gaffers tape on the left and right sides. These stripes begin 36 in. above the FIELD carpet and are 72 in. apart, measured center-to-center.

The PYRAMID GOAL VISION TARGET is made up of two components. The first component is a 4in. wide retro-reflective marker located on the center of each horizontal metal pole of the GOAL basket. The second component is retro-reflective material covering the 20 in. tall, 1 ½ in. diameter post in the center of the PYRAMID GOAL.



Figure 2-6: The VISION TARGETS

2.2.5 The PYRAMIDS

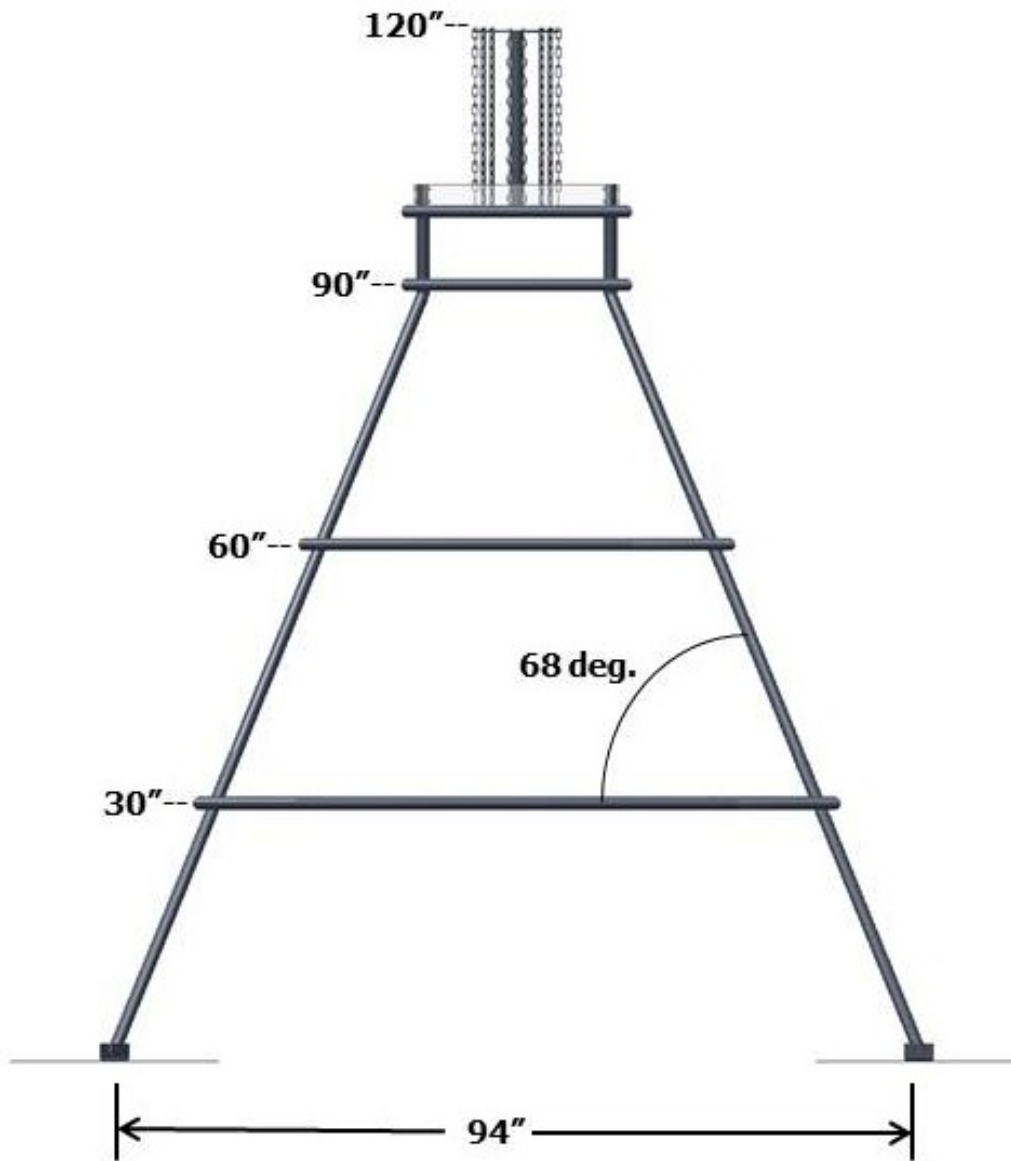


Figure 2-7: The PYRAMIDS

An ALLIANCE specific PYRAMID is located in each half of the FIELD. The PYRAMID is made out of 1 1/2 in. diameter steel tubing and powder coated Red or Blue. It is 94 in. wide at the base and each side slanted at a 68-degree slope. The rungs are located 30 in., 60 in., and 90 in. off of the floor. At the top of the PYRAMID is the PYRAMID GOAL, detailed in Section 2.2.4 The GOALS.

The PYRAMID has four (4), 24 in. square, 11 GA. (.120 in.) steel bases with hook and loop tape ("hook" side) on the bottom. These bases secure the PYRAMIDS to the carpet. To prevent damage to venue floors, these metal bases are surrounded by floor protectors. These floor protectors are made from 1/8 in. thick hardboard. The floor protectors begin 12 in. outside of all the PYRAMID bases and continue to cover the floor underneath the PYRAMID (not including the bases themselves). Additional carpet covers both bases and floor protectors and is held to the carpet using 2 in. wide, Black gaffers tape. The protectors and carpet create a 1/4 - 3/8 in. lip around the PYRAMID.

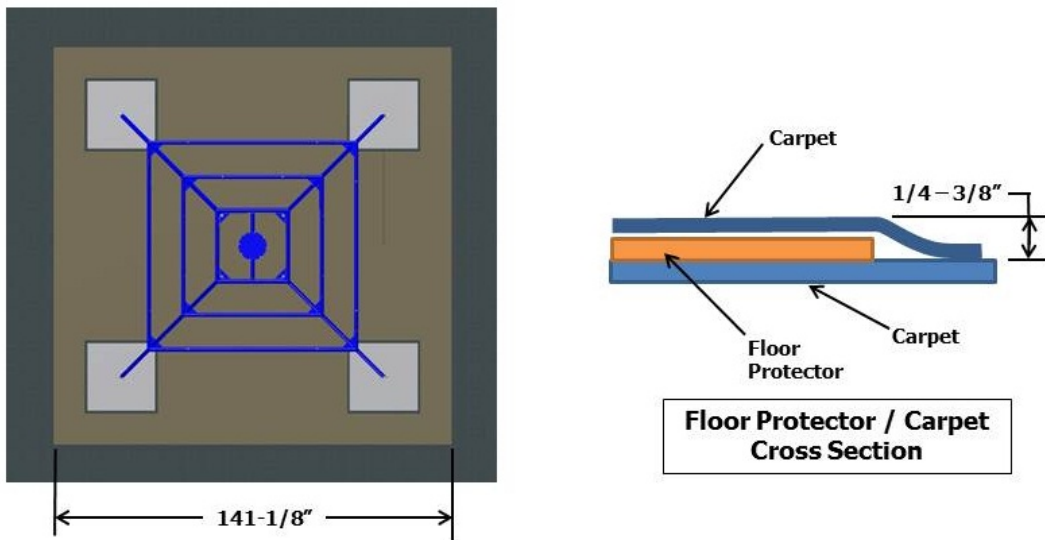


Figure 2-8: PYRAMID Floor Protectors

Teams may have to remove their ROBOT from the PYRAMID after the MATCH is over with the aid of a *FIRST* supplied belay system, per [G04](#). The belaying device acts as a brake to prevent accidentally dropped ROBOTS from causing injuries to teams. The device attaches to the ROBOTS with two carabiners or loops of rope. Teams must supply two attachment points for the belaying device to mount to their ROBOTS, per R10.

Only trained event staff are allowed to use the belaying device.

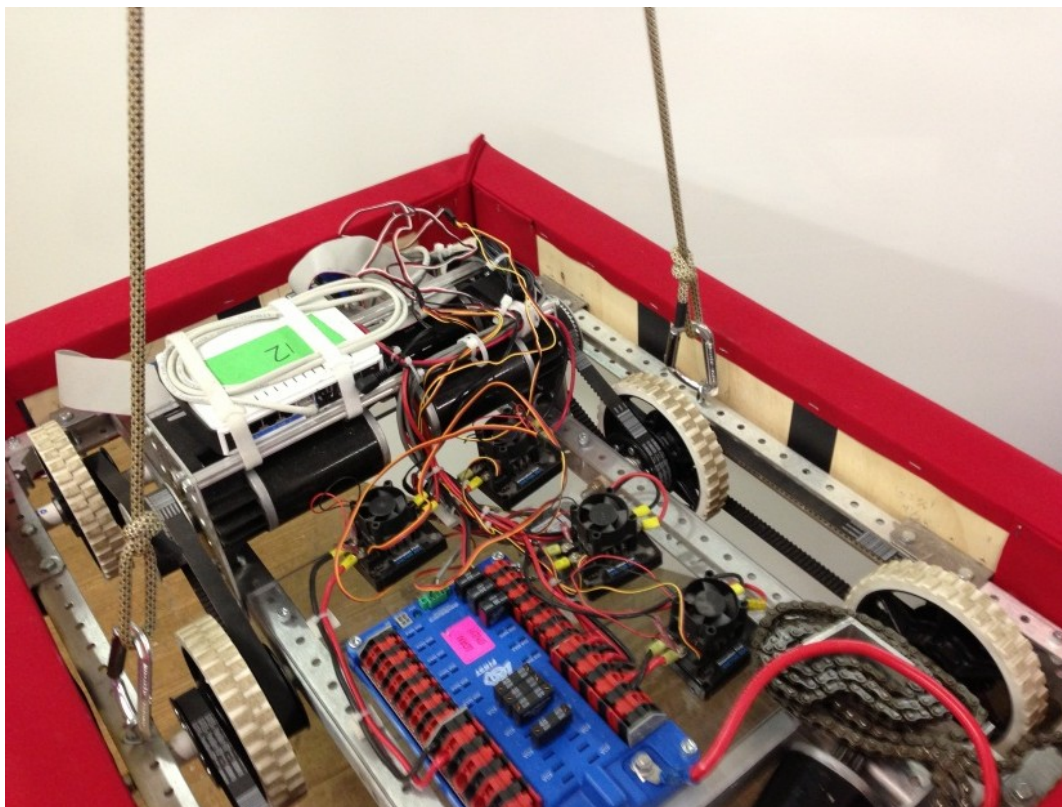


Figure 2-9: ROBOT Using Belay Device

2.2.6 The ALLIANCE STATIONS

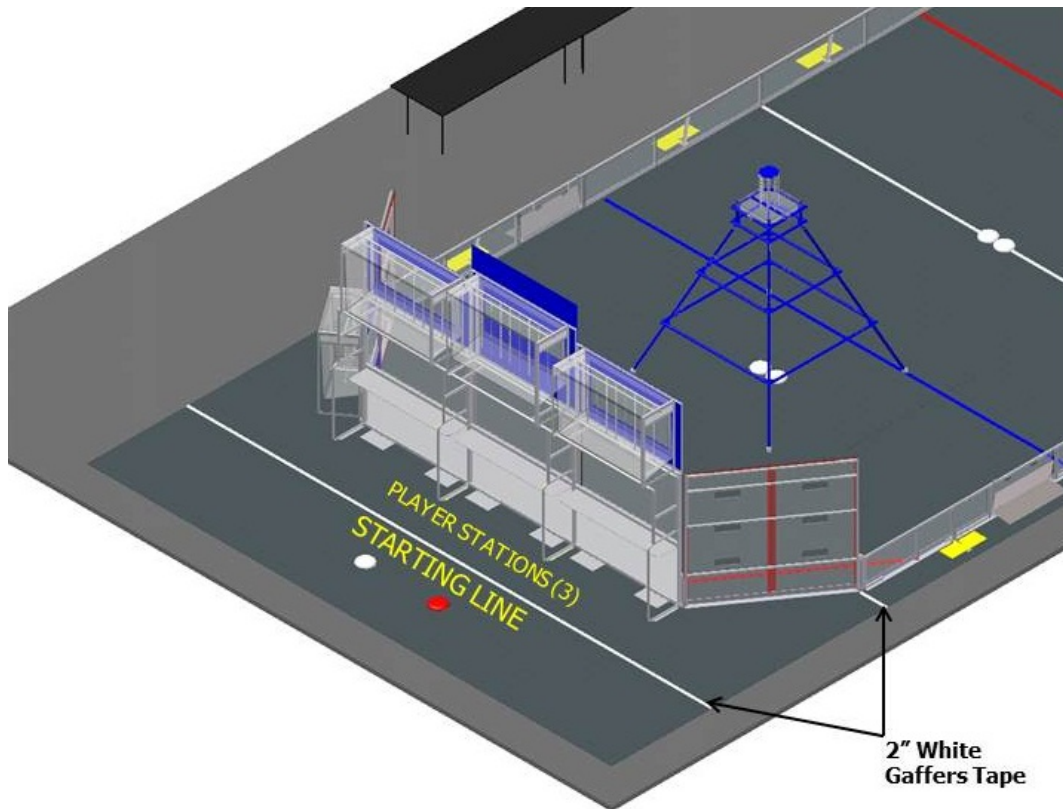


Figure 2-10: The ALLIANCE STATIONS

The ALLIANCE STATIONS are located at either end of the FIELD, behind the ALLIANCE WALLS. The ALLIANCE STATION extends 10 ft. back from the ALLIANCE WALL, and spans the entire width of the wall. The ALLIANCE STATION includes the three (3) PLAYER STATIONS, one (1) FEEDER/GOAL STATION and one (1) double FEEDER STATION. The STARTING LINE is marked with White 2 in. wide gaffers tape 4 ft. behind the ALLIANCE WALL. The ALLIANCE STATION includes the area behind the corners of the FIELD, with the end of the ALLIANCE STATION marked out in 2 in. white gaffers tape. The tape boundaries are not considered part of the bounded areas.

2.2.7 The FEEDER STATIONS

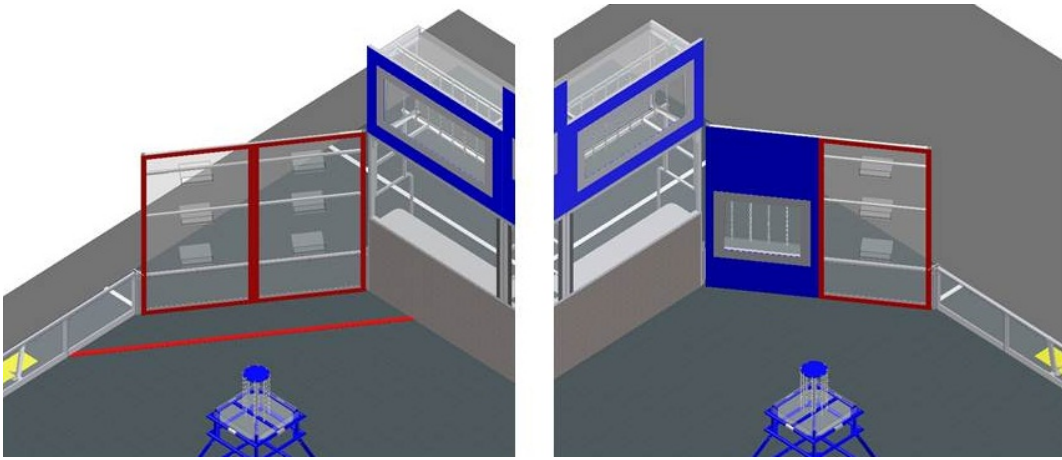


Figure 2-11: The FEEDER STATIONS

There are three (3) FEEDER STATIONS per ALLIANCE. Two (2) FEEDER STATIONS are located side by side in one corner of the FIELD to the right of the ALLIANCE'S DRIVERS. The third FEEDER STATION is located next to the opponent's LOW GOAL on the opposite side of the ALLIANCE STATION.

All of the FEEDER STATIONS consist of a 44 in. wide shield of clear polycarbonate. In the center of the shield are three horizontal FEEDER SLOTS, 12 in. wide by 3 in. high. These slots are located 22 in., 42 in. and 62 in. from the FIELD carpet to the bottom of the slot. Each slot has a slide attached to it on the FEEDER side of the plastic. These slides are 8 in. long and are at a 30-degree incline.

2.2.8 The PLAYER STATIONS

Attached to the ALLIANCE WALL in each PLAYER STATION is an aluminum shelf to support the OPERATOR CONSOLE for the FRC Team in that PLAYER STATION. The support shelf measures 69 in. wide by 12 in. deep. There is a 54 in. long by 2 in. wide strip of hook-and-loop tape ("loop" side) along the center of the support shelf that may be used to secure the OPERATOR CONSOLE to the shelf. Each setup location includes a competition cable (to provide Ethernet connectivity) that attaches to the Ethernet Port of the OPERATOR CONSOLE. The cable provides communications with the ROBOT via the ARENA network.

Each PLAYER STATION also includes a power adapter cable that may be used to power the Classmate laptops that were provided to teams in the Kit of Parts starting in 2010. Emergency Stop (E-Stop) buttons for each ROBOT are located on the left side of each PLAYER STATION shelf. ARENA components (including team number displays, competition ARENA hardware, ALLIANCE lights, control hardware cabinets and clock displays) are also located above the PLAYER STATIONS and below the shelf.

Once plugged in to the Field Management System (FMS) via the Ethernet cable provided, the only open ports in the ARENA network are as follows:

- A. TCP 1180: This port is typically used for camera data from the cRIO to the Driver Station (DS) when the camera is connected to port 2 on the 8-slot cRIO (P/N: cRIO-FRC). This port is bidirectional.
- B. TCP 1735: SmartDashboard, bidirectional
- C. UDP 1130: Dashboard-to-ROBOT control data, directional
- D. UDP 1140: ROBOT-to-Dashboard status data, directional
- E. HTTP 80: Camera connected via switch on the ROBOT, bidirectional
- F. HTTP 443: Camera connected via switch on the ROBOT, bidirectional

Teams may use these ports as they wish if they do not employ them as outlined above (i.e. TCP 1180 can be used to pass data back and forth between the ROBOT and the DS if the team chooses not to use the camera on port 2).

2.2.9 The Netting

In order to protect event attendees, a tall net runs parallel to both sides of the GUARDRAIL. The net is made up of three panels that are 10 ft. tall and 14 ft. long. The net is made from black nylon rope woven into a 5 in. mesh, with vinyl trim on all four sides. The panels hang on poles that are connected to steel, free standing bases (not attached to the GUARDRAILS). The net will be set up 12 to 36 in. away from the GUARDRAILS depending on venue space. The panels will be able to be folded back to allow access to the FIELD between MATCHES.

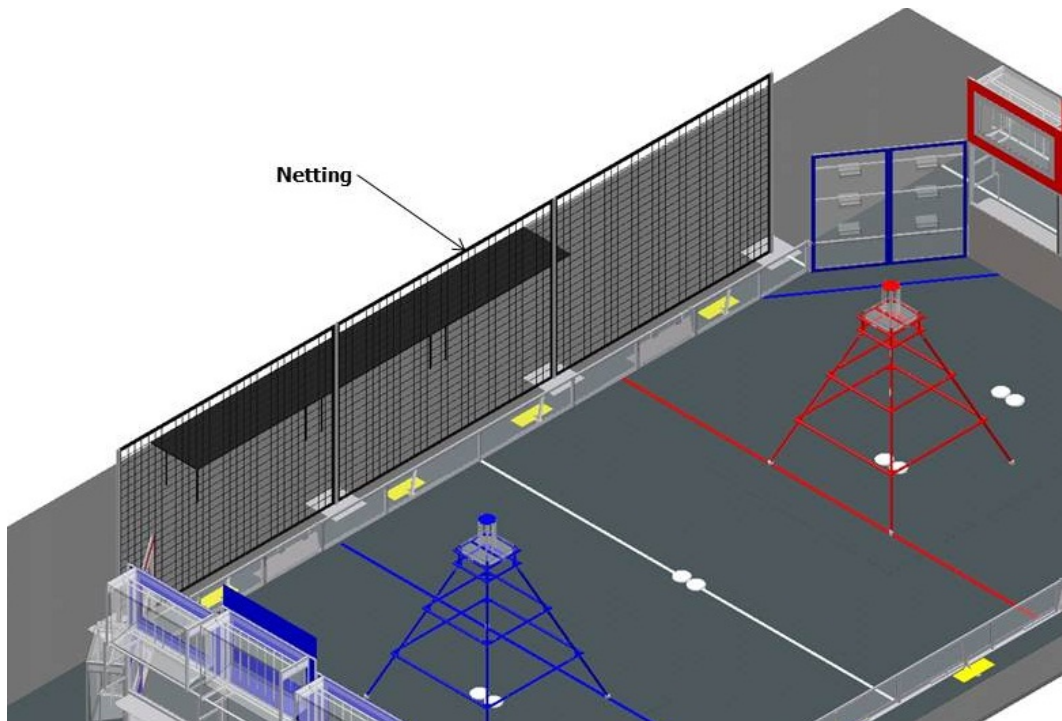


Figure 2-12: The Netting

2.2.10 The DISCS

The DISCS are Wham-O part number 53214 (custom colored Red, White, or Blue) and have a nominal diameter of 11 in., a nominal height of 1.4 in., and a weight of 180 ± 5 grams.



Figure 2-13: Red, White, and Blue DISCS

2.3 Revision History

Date	Section	Change
1/8/13	2.2.10	Updated sizes of DISCS