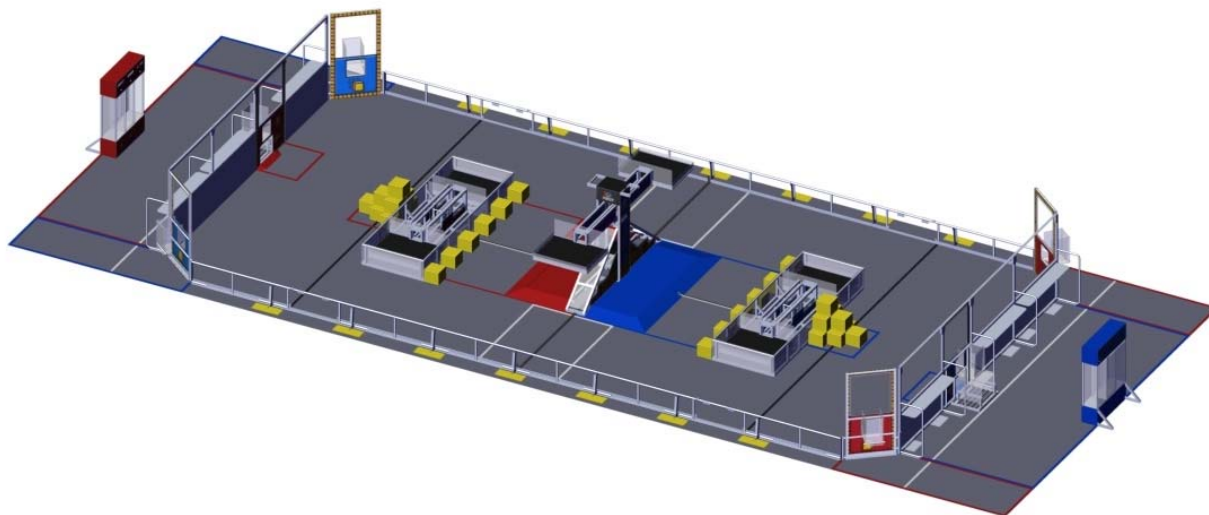


### 3 ARCADE

Figure 3-1: FIRST® POWER UP<sup>SM</sup> playing area



The ARCADE includes all elements of the game infrastructure that are required to play FIRST® POWER UP<sup>SM</sup>: the FIELD, SWITCHES, the SCALE, VAULTS, carpet, the POWER CUBES, and all equipment needed for FIELD control, ROBOT control, and scorekeeping.

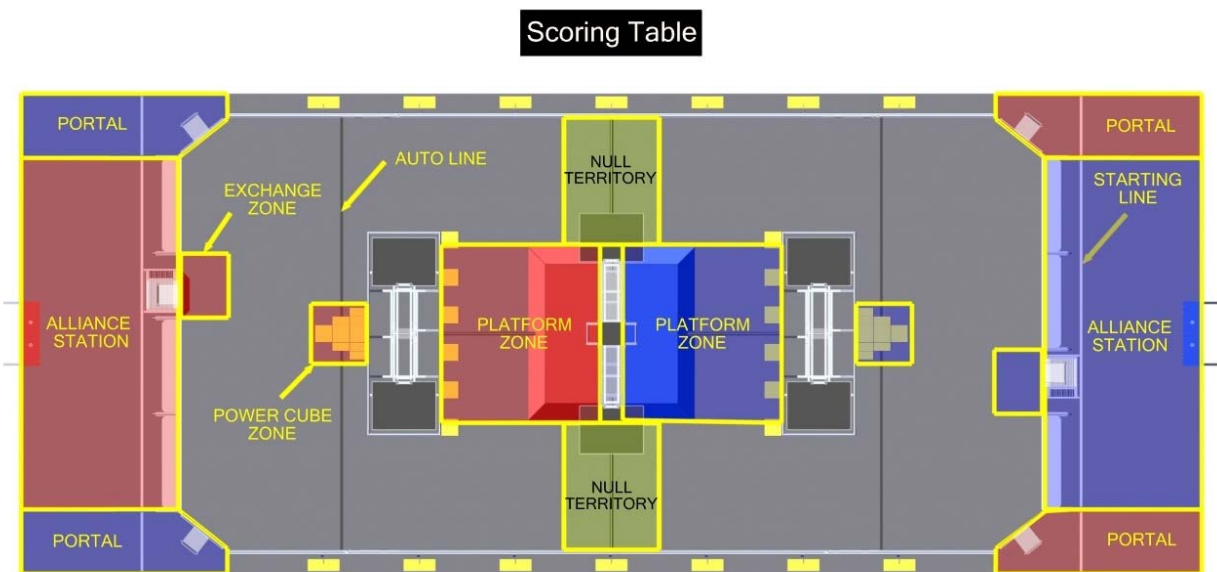
The competition ARCADE is modular and assembled, used, disassembled, and shipped many times during the competition season. It will undergo wear and tear. The ARCADE is designed to withstand rigorous play and frequent shipping. Every effort is made to ensure that ARCADES are consistent from event to event. However, ARCADES are assembled in different venues by different event staff and some small variations occur. For details regarding assembly tolerances, please refer to the [2018 ARCADE Layout and Marking Drawing](#). Successful Teams will design ROBOTS that are insensitive to these variations.

Illustrations included in this section are for a general visual understanding of the FIRST® POWER UP<sup>SM</sup> ARCADE, and dimensions included in the manual are nominal. Please refer to the official drawings for exact dimensions, tolerances, and construction details. The official drawings, CAD models, and drawings for low-cost versions of important elements of the FIRST® POWER UP<sup>SM</sup> FIELD are posted on the [2018 FIRST® POWER UP<sup>SM</sup> Game & Season Materials page](#) on the FIRST® website.

## 3.1 Zones and Markings

- **ALLIANCE STATION:** a 22 ft. (~671 cm) wide by 10 ft. (~305 cm) deep by 10 ft. (~305 cm) tall volume formed by, and including three (3) PLAYER STATIONS, an EXCHANGE wall, and 2 in. ALLIANCE colored gaffers tape.
- **AUTO LINE:** a line of 2 in. (~5 cm), black gaffers tape that is the width of the FIELD and is 10 ft. (~305 cm) from each ALLIANCE WALL to the leading edge of the tape.
- **EXCHANGE ZONE:** A rectangular area 4 ft. (~122 cm) wide by 3 ft. (~91 cm) deep and infinitely tall volume bounded by the EXCHANGE wall and 2 in. (~5 cm) ALLIANCE colored gaffers tape. The EXCHANGE ZONE includes the tape, but excludes the wall.
- **NULL TERRITORY:** one of two, 7 ft. 11 ¼ in. (~242 cm) wide by 6 ft. (~183 cm) deep and infinitely tall volumes formed by 2 in. (~5 cm), white gaffers tape and the GUARDRAILS. The NULL TERRITORY includes the gaffers tape, but excludes the GUARDRAILS. The ALLIANCE'S NULL TERRITORY for a MATCH corresponds to the SCALE PLATE color in that NULL TERRITORY and does not change when the FORCE POWER UP is played.
- **PLATFORM ZONE:** a 11 ft. 1 ½ in. (~339 cm) wide by 9 ft. 11 ¾ in. (~304 cm) deep and infinitely tall volume bounded by 2 in. (~5 cm) ALLIANCE colored gaffers tape, the faces of the OUTRIGGERS, TOWER, and the SWITCH. The PLATFORM ZONE includes the gaffers tape, but excludes the SWITCH and the faces of the OUTRIGGERS AND TOWER.
- **PORTAL:** a 4 ft. (~122 cm) wide by 12 ft. 11 in. (~394 cm) deep infinitely tall volume bounded by, and including, 2 in. (~5 cm). ALLIANCE colored gaffers tape and the PORTAL wall.
- **POWER CUBE ZONE:** A rectangular area 3 ft. 9 in. (~114 cm) wide by 3 ft. 6 in. (~107 cm) deep, bounded by the SWITCH and 2 in. (~5 cm) ALLIANCE colored gaffers tape. The POWER CUBE ZONE includes the gaffers tape, but excludes the SWITCH.
- **STARTING LINE:** a line of 2 in. (~5 cm), white gaffers tape that runs the width of the carpet and is 2 ft. 6 in. (~76 cm) behind the ALLIANCE WALL diamond plate, which includes the tape.

Figure 3-2: Zones and Markings



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## 3.2 FIELD

The FIELD for *FIRST*® POWER UP<sup>SM</sup> is a 27 ft. (~823 cm) by 54 ft. (~1646 cm) carpeted area, bound by and including the inward-facing surfaces of the GUARDRAILS, PORTALS, EXCHANGE walls and ALLIANCE WALLS. The carpet used for the FIELD is gray in color (Shaw Floors, Philadelphia Commercial, Neyland II 20, “Ground Pepper”).

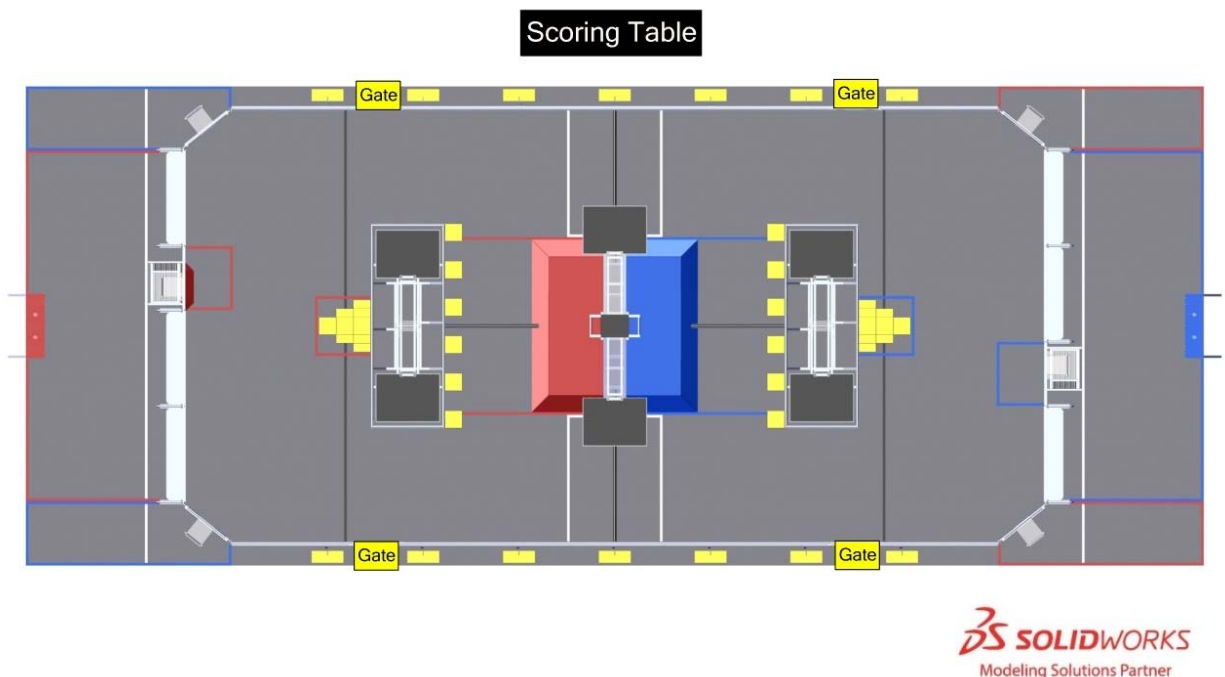
There are two versions of GUARDRAILS and PLAYER STATIONS used for competitions. One design has been used at *FIRST*® Robotics Competitions for several years and matches the 2018 Official *FIRST* Field Drawings & Models. The other is designed and sold by AndyMark. While the designs are slightly different, the critical dimensions, performance, and expected user experience between the two are the same. Detailed drawings for the AndyMark design are posted on the [AndyMark](#) website. All illustrations in the Game Manual show the traditional FIELD design.

### 3.2.1 GUARDRAIL

The GUARDRAIL is a system that consists of transparent polycarbonate supported on the top and bottom by aluminum extrusion. The GUARDRAIL prevents ROBOTS from inadvertently exiting the FIELD during a MATCH.

There are four (4) gates in the GUARDRAIL that allow access to the FIELD for placement and removal of ROBOTS. The gates are 3 ft. 2 in. (~97 cm) wide and closed and shielded during the MATCH.

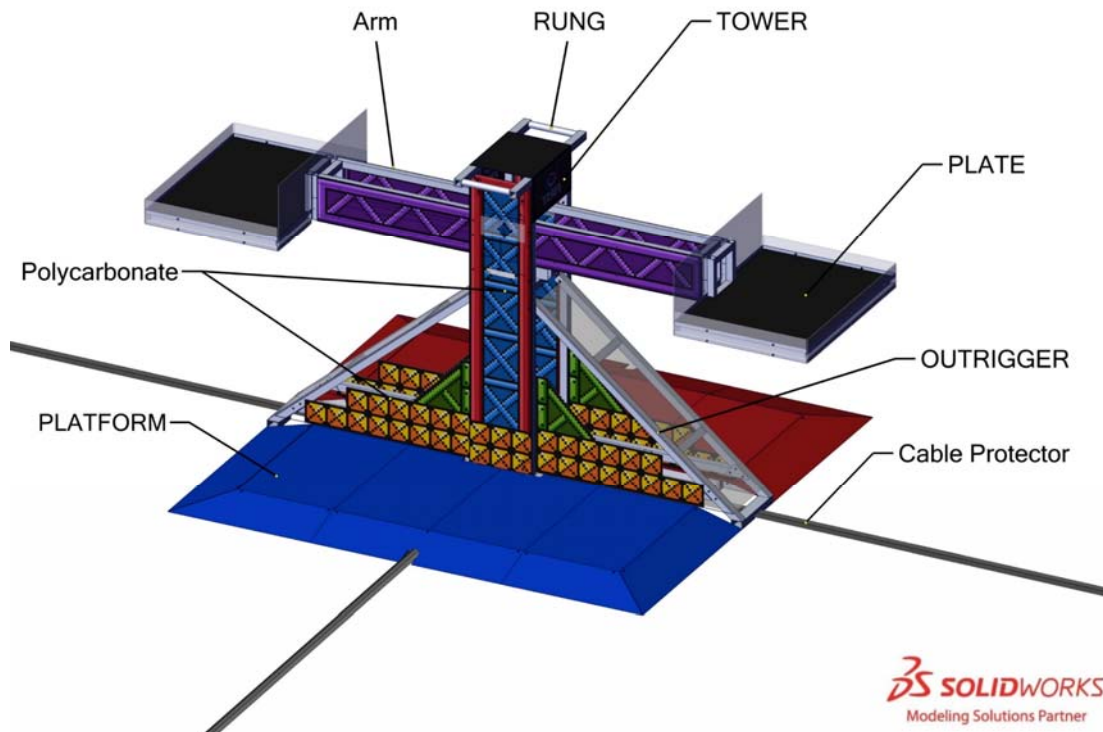
Figure 3-3: Gate locations



### 3.3 SCALE

There is one (1) SCALE centered in the field, and oriented so that the SCALE arm is parallel to the ALLIANCE WALL. The SCALE features an arm, RUNGS, PLATES, OUTRIGGERS, PLATFORMS, and TOWER. All frame surfaces are covered in polycarbonate panels. A cable protector extends from the center of each side of the PLATFORM and is 3 in. (~8 cm) wide and  $\frac{3}{4}$  in. (~2 cm) high (Hubbell Inc. FloorTrak3 Floor Cable Cover FT3BK25, Grainger Item # 5D687, black). The cable protector is attached to the field with hook fastener, increasing the height to approximately  $\frac{7}{8}$  in. (~2 cm). These cable protectors extend to the GUARDRAILS and the SWITCHES.

Figure 3-4: The SCALE (Note, cable protectors are shown, but are not part of the SCALE)



The BRICKS are graphics depicting golden squares surrounded by a black outline that extends 12 in. (~30cm) above the horizontal surface of the PLATFORM. The BRICKS cover the polycarbonate panels at the base of the TOWER and OUTRIGGERS.



Figure 3-5: The BRICKS



### 3.3.1 SCALE PLATES

Each SCALE features two (2) PLATES which are 3 ft. (~91 cm) wide and 4 ft. (~122 cm) deep. The outside edges of the two PLATES are 15 ft. (~457 cm) apart. Each PLATE has four polycarbonate walls which contain Philips Color Kinetics LED lights. The wall closest to the center of the FIELD extends 1 ft. 3 in. (~38 cm) above the PLATE surface. The other walls extend up 3 ½ in (~9 cm) above the PLATE surface.

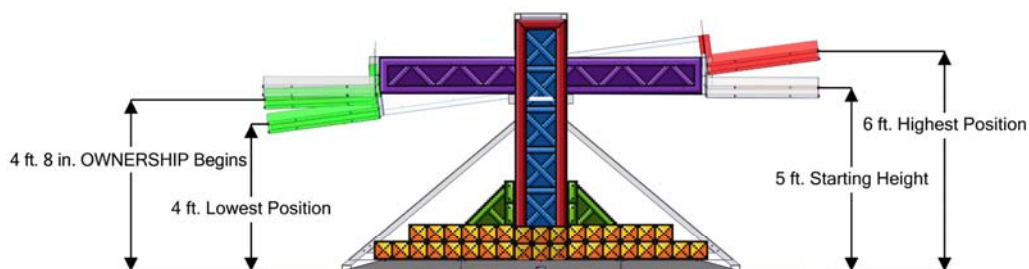
At the start of the MATCH the PLATES are even, such that the outside edges of each PLATE are 5 ft. (~152 cm) +/- 1 in. (~2.5 cm) above the FIELD carpet. The SCALE can tilt and rest in different positions depending on the number and location of the POWER CUBES on the PLATES. During the MATCH, the SCALE is in one of three (3) states based on the magnitude of its tilt:

1. OWNERSHIP by the Red ALLIANCE, or
2. OWNERSHIP by the Blue ALLIANCE, or
3. neither ALLIANCE has OWNERSHIP

If the outside edge of an ALLIANCE colored PLATE is positioned between 4 ft. (~122 cm) and 4 ft. 8 in. (~142 cm) above the FIELD carpet then the ALLIANCE has OWNERSHIP of the SCALE. If the outside edge of an alliance colored PLATE is positioned between 5 ft. 4 in. (~163 cm) and 6 ft. (~182 cm) above the FIELD carpet then the opposing ALLIANCE has OWNERSHIP. When neither ALLIANCE has OWNERSHIP of the SCALE, the outside edges of the PLATES are between 5 ft. 4 in. (~163 cm) and 4 ft. 8 in. (~142 cm) above the FIELD carpet. See Figure 3-6. The time required to move between states is dependent on the weight difference and the distribution of the weight on the SCALE PLATES. Details on OWNERSHIP can be found in [Section 4.2 Scoring](#).



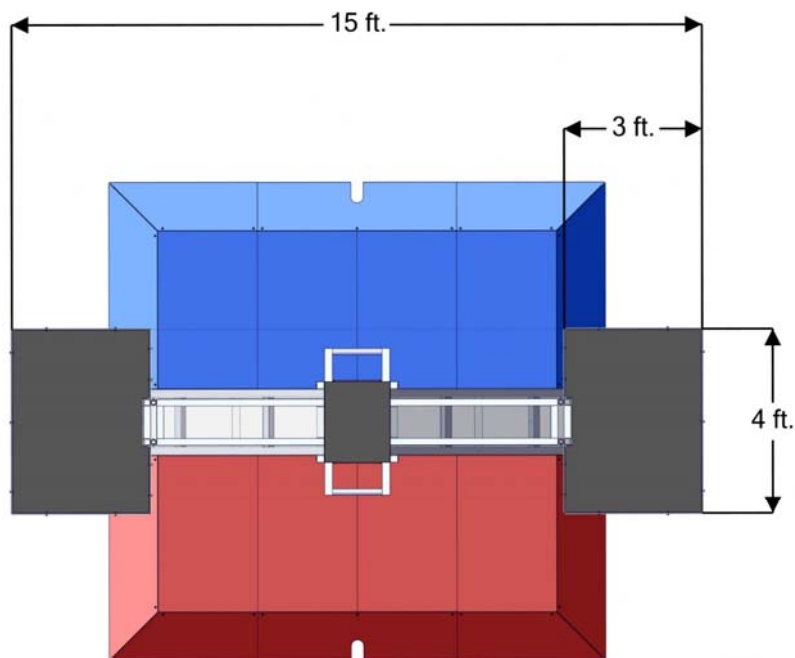
Figure 3-6: SCALE range of motion



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Note: It's possible to have the same quantity of POWER CUBES on the PLATES on each side of the SCALE and have the SCALE not be balanced. The location of the POWER CUBES on the SCALE/SWITCH is a factor in its position.

Figure 3-7: SCALE PLATE dimensions

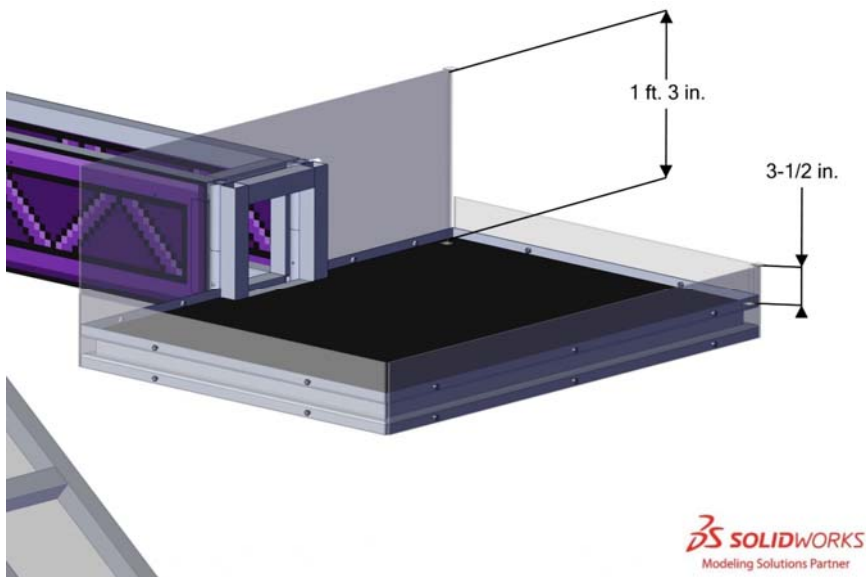


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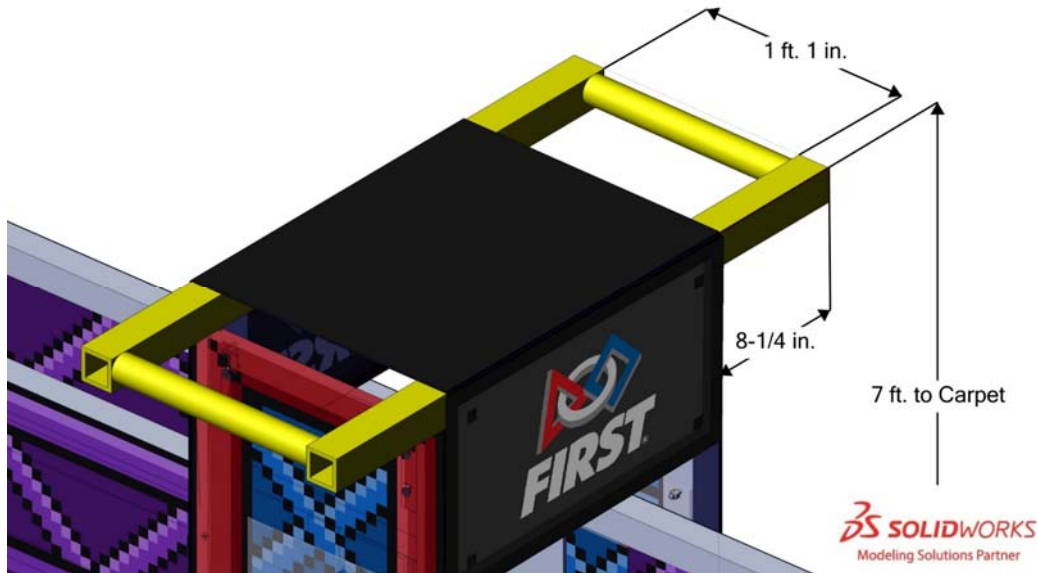
Figure 3-8: SCALE PLATE wall dimensions



### 3.3.2 RUNGS

At the top of each SCALE there are two RUNGS, one per ALLIANCE. An ALLIANCE'S RUNG extends into their PLATFORM ZONE. RUNGS consist of a 1 ft. 1 in. (~33 cm) long 1 ¼ in. Schedule 40 aluminum pipe supported by 2 in. (~5 cm) box tubing. Each RUNG extends 8 ¼ in. (~21 cm) from the vertical face of the SCALE supports and 7 ft. (~213 cm) from the carpet to the top of the RUNG. The RUNG in Figure 3-9 is highlighted for clarity.

Figure 3-9: RUNGS



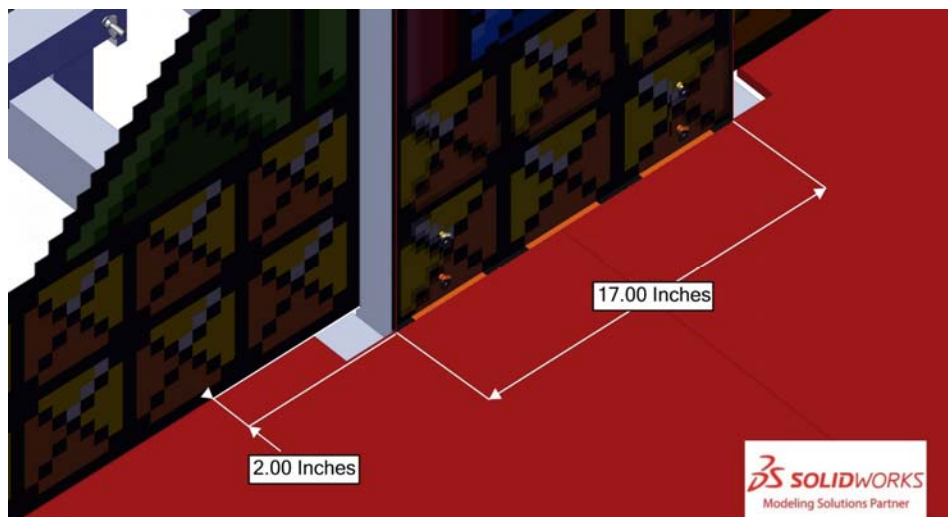
### 3.3.3 OUTRIGGERS

The OUTRIGGERS are supports for the TOWER constructed from aluminum shielded by polycarbonate

### 3.3.4 TOWER

The TOWER is the central structure of the SCALE constructed from aluminum shielded by polycarbonate which supports the RUNGS and SCALE PLATES. The tower is 17 in. (~43 cm) wide and extends 2 in. (~5 cm) from the face of the OUTRIGGERS.

Figure 3-10: Tower dimensions





### 3.3.5 PLATFORM

Located at the base of the SCALE, on each side, is a PLATFORM covered with ALLIANCE colored HDPE. The TOWER and OUTRIGGERS separate one PLATFORM from the other. Each PLATFORM top is 8 ft. 8 in. (~264 cm) wide by 3 ft. 5 ¼ in. (~105 cm) deep and 3 ½ in. (~9 cm) tall. The PLATFORM includes ramps which are 1 ft. 1 in. (~33 cm) long with a 15.35 deg. angle. The ALLIANCE colored tape that abuts the PLATFORM ramps is part of the PLATFORM.

Figure 3-11: PLATFORM top length and width dimensions

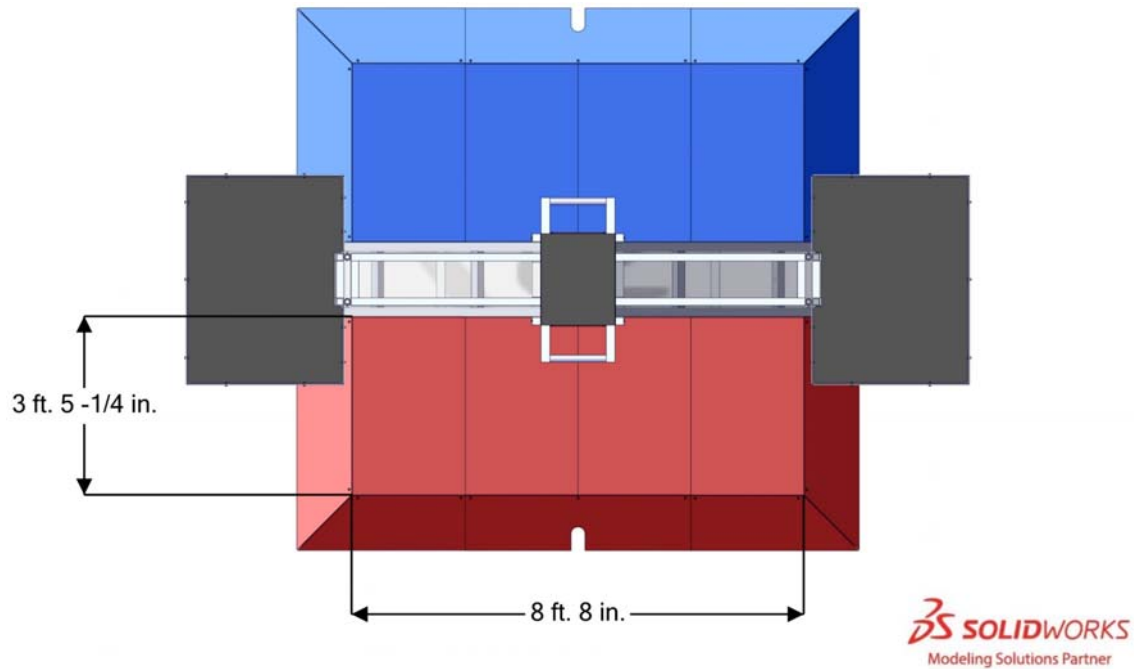
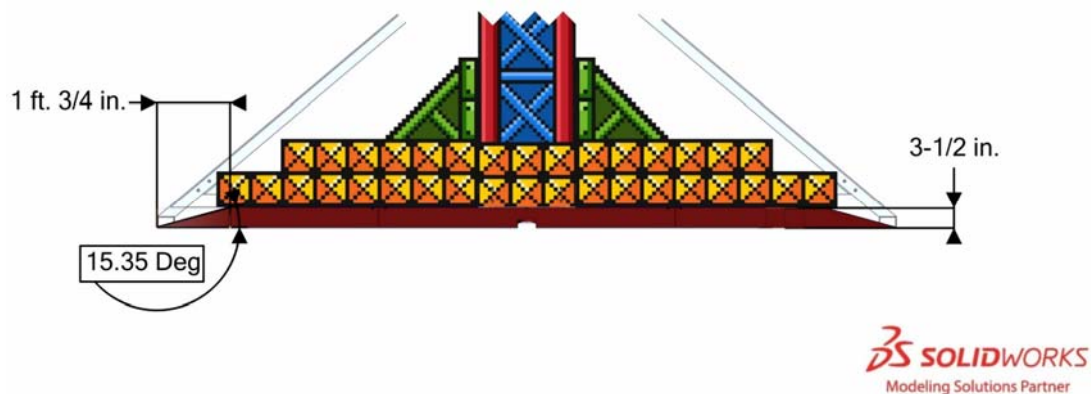


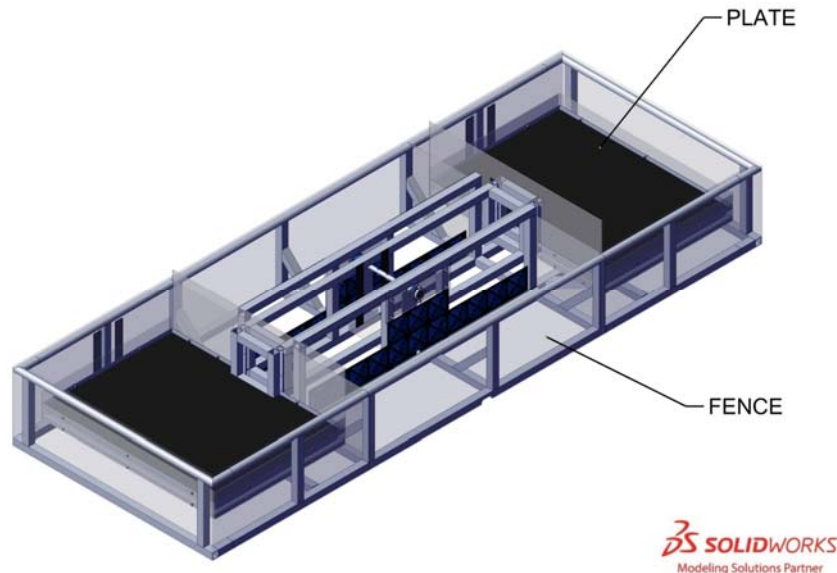
Figure 3-12: PLATFORM height and ramp dimensions



## 3.4 SWITCH

There are two (2) SWITCHES on the FIELD, one per ALLIANCE. Each SWITCH is centered across the width of the FIELD, with the center of the SWITCH located 14 ft. (~427 cm) from the ALLIANCE STATION. Each SWITCH is surrounded by a [FENCE](#). An ALLIANCE'S SWITCH is the one located closest to its ALLIANCE STATION.

Figure 3-13: SWITCH



### 3.4.1 SWITCH PLATES

Each SWITCH features two (2) PLATES which are 3 ft. (~91 cm) wide and 4 ft. (~122 cm) deep. The outside edges of the two PLATES are 12 ft. (~366 cm) apart. Each PLATE has four polycarbonate walls which contain Philips Color Kinetics LED lights. The wall closest to the center of the FIELD extends 1 ft. 3 in. (~38 cm) above the PLATE surface. The other walls extend up 3 ½ in (~9 cm) above the PLATE surface

The PLATES are 9 in. (~23 cm) above the carpet when the SWITCH is level. Like the SCALE, the SWITCH tilts and rests in different positions based on the placement of POWER CUBES. During the MATCH, the SWITCH is in one of two (2) states based on the magnitude of its tilt:

1. OWNERSHIP by its ALLIANCE, or
2. neither ALLIANCE has OWNERSHIP

If the outside edge of an ALLIANCE'S colored PLATE is positioned between 3 in. (~8 cm) and 6 in. (~15 cm) above the FIELD carpet then the ALLIANCE has OWNERSHIP of its SWITCH. If the outside edge of an ALLIANCE colored PLATE is positioned between 6 in (~15 cm) and 15 in. (~38 cm) above the FIELD carpet then neither ALLIANCE has OWNERSHIP of the SWITCH. See Figure 3-15. The time required to move between states is dependent on the weight difference and the distribution of the weight on the SWITCH PLATES. Details on OWNERSHIP can be found in [Section 4.2\\_Scoring](#).



Figure 3-14: SWITCH PLATE dimensions

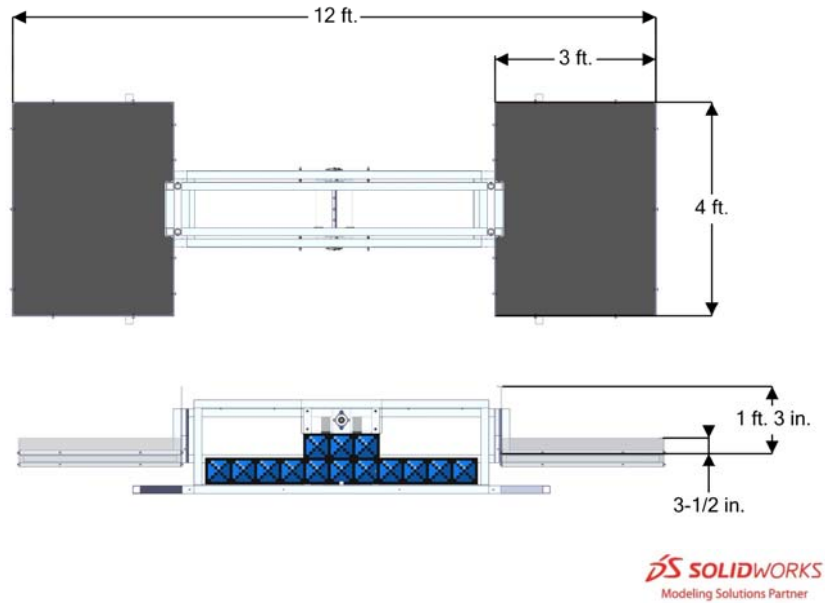
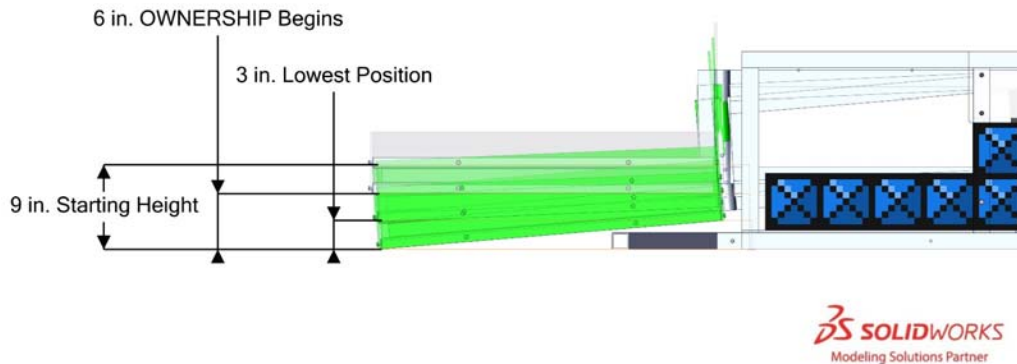


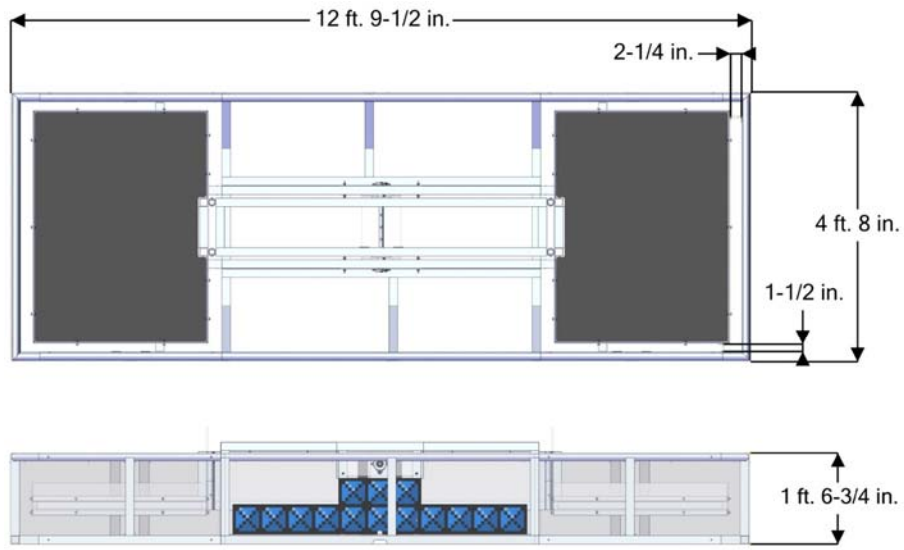
Figure 3-15: SWITCH range of motion



### 3.4.2 FENCE

Each SWITCH is surrounded by a FENCE constructed from aluminum shielded by polycarbonate. The FENCE is 12 ft. 9 1/2 in. (~390 cm) wide by 4 ft. 8 in. (~142 cm) deep by 1 ft. 6 3/4 in. (~48 cm) tall. The gap between the FENCE and the sides of the PLATES is approximately 1 1/2 in. (~4 cm). When the SWITCH is level, the gap between the FENCE and the outer edges of the PLATES is approximately 2 1/4 in (~8 cm).

Figure 3-16: FENCE



### 3.5 PLATE Lighting

Each PLATE is highlighted by Philips Color Kinetics Flex LED light strings.

Until further notice, events are instructed to install the SCALE light strings in the cavity below the outriggers instead of around the PLATES, approximately as shown below.

Figure 3-17 Temporary SCALE lighting.



These lights indicate ALLIANCE color and OWNERSHIP. The lights have the following states:



Table 3-1: PLATE Lighting

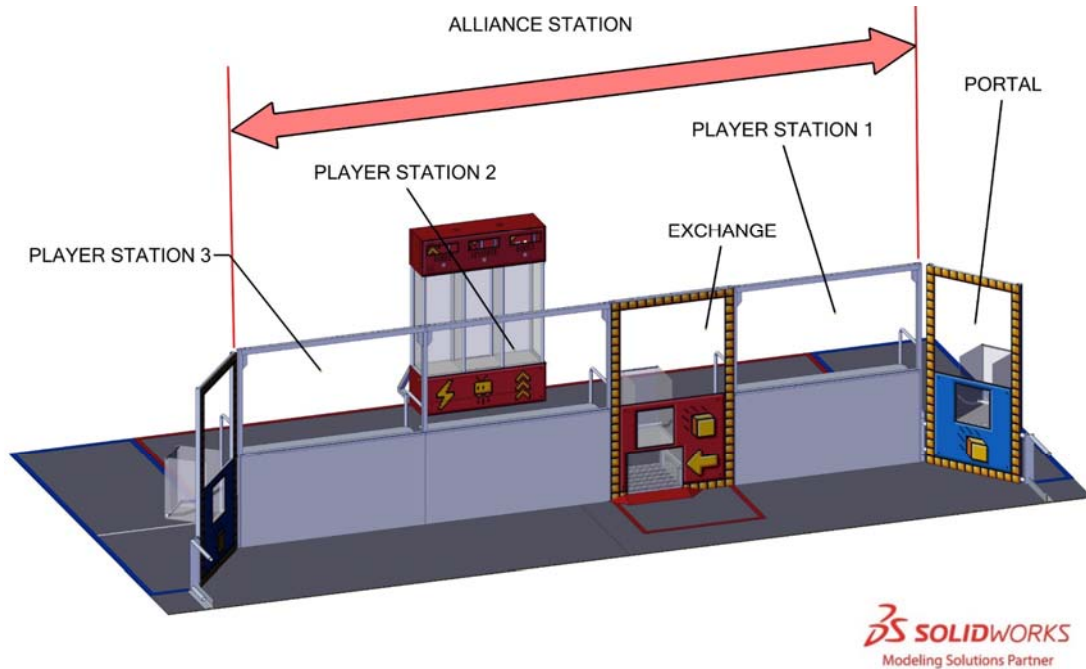
Color	Pre-MATCH	AUTO	TELEOP	Post-MATCH
Blue at 100% brightness	N/A		ALLIANCE color	N/A
Blue (pulsing)			Blue OWNERSHIP	
Blue (pulsing) with solid red corners		N/A	Blue FORCE POWER UP is active	
Blue at 25% brightness			Red OWNERSHIP	
Blue (chase pattern)		N/A	Blue BOOST POWER UP is active	
Red at 100% brightness			ALLIANCE color	
Red (pulsing)			Red OWNERSHIP	
Red (pulsing) with solid blue corners		N/A	Red FORCE POWER UP is active	
Red at 25% brightness			Blue OWNERSHIP	
Red (chase pattern)		N/A	Red BOOST POWER UP is active	
Purple (pulsing)				FIELD is safe for FIELD STAFF
Green			N/A	FIELD is safe for all
OFF	MATCH ready to start			N/A

ALLIANCE color of the PLATES is provided to the Driver Station software by the Field Management System. More details are in [Section 3.10 The Field Management System](#)

## 3.6 ALLIANCE WALL

The ALLIANCE WALL is the structure that separates ROBOTS from DRIVE TEAMS (except the TECHNICIAN) and consists of three (3) PLAYER STATIONS, and an EXCHANGE wall.

Figure 3-18: ALLIANCE STATION



### 3.6.1 PLAYER STATION

A PLAYER STATION is one (1) of three (3) assigned positions in an ALLIANCE WALL from where a DRIVE TEAM operates their ROBOT. Each PLAYER STATION is made from a 3 ft. (~91 cm) tall diamond plate panel base topped with a 3 ft. 6 in. (~107 cm) tall transparent plastic panel. An aluminum shelf is attached to each PLAYER STATION to support the DRIVE TEAM'S OPERATOR CONSOLE. The shelf is 5 ft. 9 in. (~175 cm) wide and 1 ft. (~30 cm) deep. There is a 4 ft. 6 in. (~137 cm) long by 2 in. (nominal) 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 PLAYER STATION contains the following components for Teams:

- One Ethernet Cable: attaches to the Ethernet port of the OPERATOR CONSOLE and provides connectivity to the FIELD Management System.
- One 120VAC NEMA 5-15R power outlet: located on each PLAYER STATION shelf and protected by its own 2-Amp circuit breaker. It can be used to power the OPERATOR CONSOLE. DRIVE TEAMS are responsible for monitoring their power consumption as a tripped breaker in the outlet does not constitute an ARCADE fault.
- One Emergency Stop (E-Stop) button: located on the left side of the PLAYER STATION shelf and should be used to deactivate a ROBOT in an emergency.
- One Team sign: displays the Team number and located at the top of each PLAYER STATION.
- One Team LED: indicates ALLIANCE color, ROBOT status, and E-Stop status and centered at the top of each PLAYER STATION. Team LED states include:
  - Solid: indicates that the ROBOT is connected and enabled. This will only happen during a MATCH.



- Blinking: indicates that either the Field Management System is preset for the MATCH or it's during a MATCH and the corresponding ROBOT has lost connectivity.
- Off: indicates that the MATCH has not started yet, but the ROBOT is linked and disabled. – If the amber LED is on, the E-stop button has been pressed.
- One Timer (in the PORTAL adjacent to PLAYER STATION 1): displays the official time remaining in AUTO, TELEOP, and TIMEOUTS and marked with white tape along the bottom edge.
- Field Management System hardware and wiring: mostly located below the center PLAYER STATION shelf.

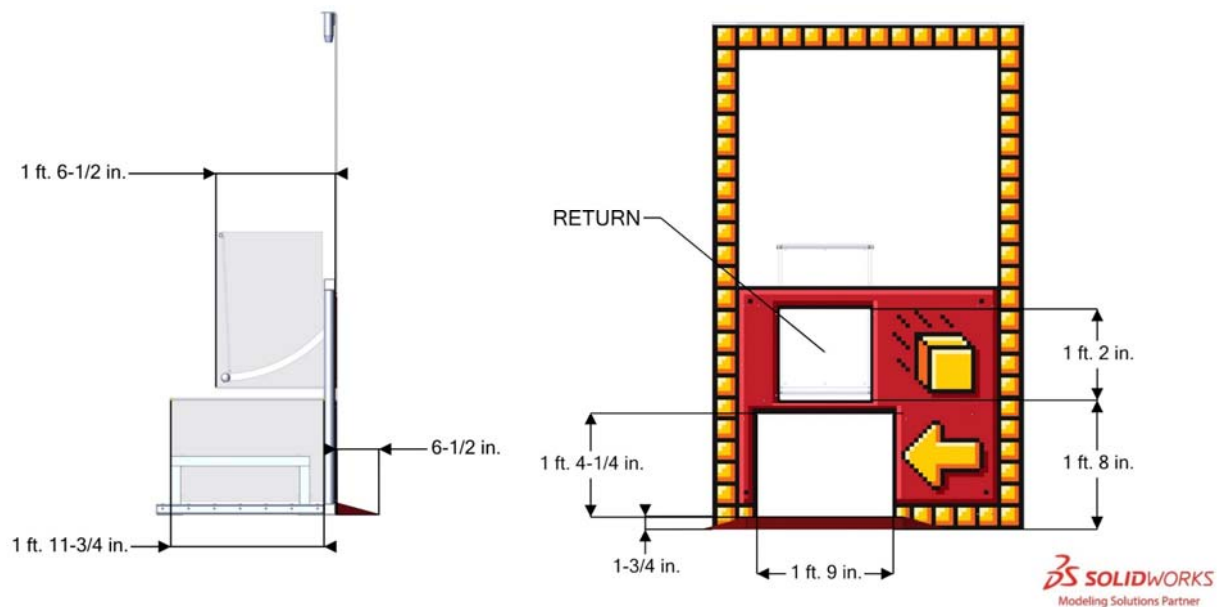
### 3.6.2 EXCHANGE

An EXCHANGE is a polycarbonate wall 6 ft. 5  $\frac{3}{4}$  in. (~197 cm) tall by 4 ft. (~122 cm) wide located between PLAYER STATION 1 and PLAYER STATION 2 and used by ROBOTS to deliver POWER CUBES to HUMAN PLAYERS. HUMAN PLAYERS can then either place POWER CUBES in the VAULT or feed them back to the ROBOT through the RETURN.

Each EXCHANGE has a lower opening 1 ft. 4  $\frac{1}{4}$  in. (~41 cm) tall and is 1 ft. 9 in. (~53 cm) wide used to deliver POWER CUBES to the HUMAN PLAYER. A small ramp, 1  $\frac{3}{4}$  in. (~4 cm) tall by 6  $\frac{1}{2}$  in. (~17 cm) deep, leads to a series of conveyor rollers. The conveyor rollers are spun by the HUMAN PLAYER to move the POWER CUBE through a polycarbonate tunnel that is 1 ft. 11  $\frac{3}{4}$  in. (~60 cm) deep.

Each EXCHANGE also features a RETURN used to deliver POWER CUBES to ROBOTS. The RETURN opening is a 1 ft. 2 in. (~36 cm) square, centered above the lower opening and is located 1 ft. 8 in. (~51 cm) above the carpet. Behind the RETURN opening is a 1 ft. 6  $\frac{1}{2}$  in. (~47 cm) deep polycarbonate chute. The chute features a swinging wall designed to push the POWER CUBE onto the FIELD.

Figure 3-19: EXCHANGE



### 3.6.3 VAULT

The VAULT is an aluminum and plastic structure used by HUMAN PLAYERS to turn POWER CUBES in to POWER UPS. There are three (3) columns within the VAULT. Each column is 1 ft. 1-1/2 in. (~34 cm) wide by 3 ft. 3-1/4 in. (~100 cm) tall with the bottom located 1 ft. 3-1/2 in. (~39 cm) above the carpet. Each of the three (3) columns in the VAULT correspond to a POWER UP. When standing in the

ALLIANCE STATION and facing the open columns of the VAULT the column to the left is the FORCE POWER UP, the center column is the LEVITATE POWER UP and the column on the right is the BOOST POWER UP.

POWER CUBES placed logo-side-up may result in POWER CUBES not being sensed consistently by the FIELD.

Figure 3-20: Blue ALLIANCE VAULT











Caution, there may be orientations where all three (3) POWER CUBES will not fit in a VAULT column, but if HUMAN PLAYERS place POWER CUBES logo side down they'll fit with room to spare.



### 3.6.3.1 VAULT lighting

Lights at the top of each VAULT column display the POWER CUBE count for that column. The lights have the following states:

Table 3-2: VAULT Lighting

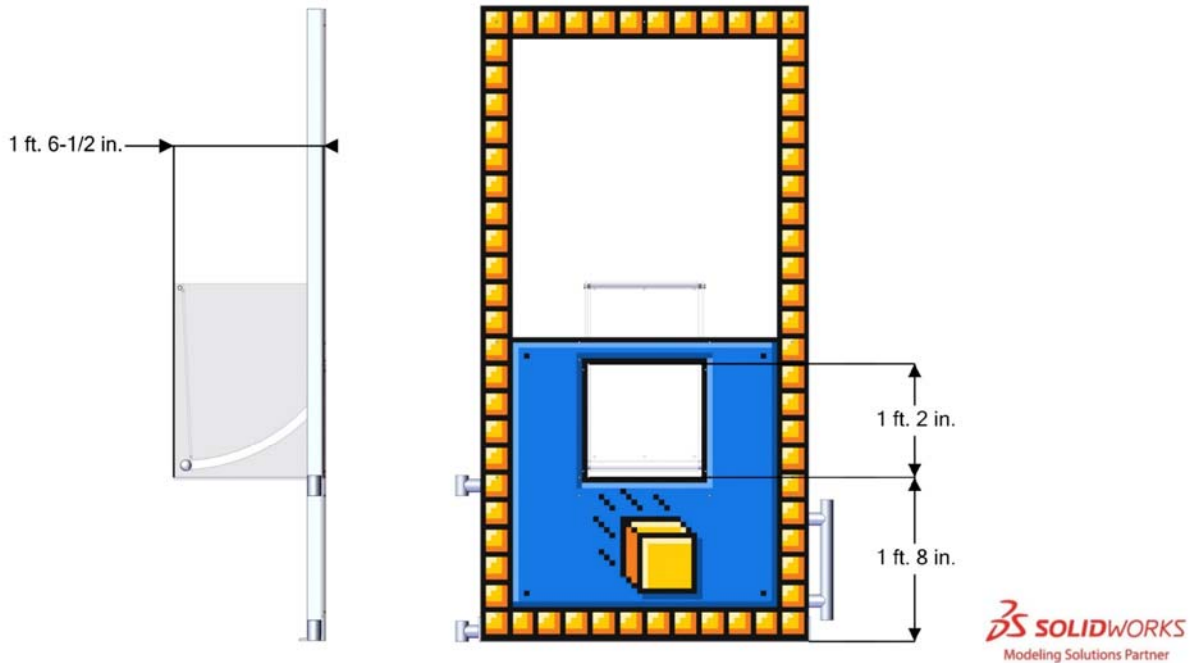
Color	Meaning
	No POWER CUBES in column
	One (1) POWER CUBE in column
	Two (2) POWER CUBES in column
	Three (3) POWER CUBES in column
	Blue POWER UP in queue
	Blue POWER UP played
	Red POWER UP in queue
	Red POWER UP played

The lights illuminate one bulb per POWER CUBE and show one (1), two (2), three (3) or none (0) by lighting up from left to right. To play a POWER UP, the button corresponding to the column and associated POWER UP is pressed by the HUMAN PLAYER. Once played, all five (5) lights in the corresponding column are illuminated in the ALLIANCE color. If an ALLIANCE plays a POWER UP during the time when an opposing ALLIANCE's POWER UP is active, the POWER UP is queued, indicated by five (5) pulsing lights. See [Section 4.3 POWER UPS](#) for more details.

### 3.7 PORTAL

HUMAN PLAYERS may deliver POWER CUBES to ROBOTS through either of the PORTAL walls. Each PORTAL wall features a 1 ft. 2 in. (~36 cm) square opening, centered across the width of the panel and located 1 ft. 8 in. (~51 cm) from the carpet. Behind the opening is a 1 ft. 6 ½ in. (~47 cm) polycarbonate chute. The chute features a swinging wall that the HUMAN PLAYER uses to push the POWER CUBE onto the FIELD.

Figure 3-21: PORTAL



### 3.8 POWER CUBE

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POWER CUBES are used to affect the position of the SCALE and SWITCH PLATES, and can be traded in for POWER UPS. A POWER CUBE is a 1 ft. 1 in. (~33 cm) wide by 1 ft. 1 in. (~33 cm) deep by 11 in. (~27 cm) tall HDPE milk crate covered in a yellow nylon (600 Denier) cover. The *FIRST*® logo covers the open face of the milk crate. Each POWER CUBE weighs approximately 3 ¼ lbs (~1.5 kg). POWER CUBES may be purchased from AndyMark (am-3818 and am-3741), Innovation First (217-6188 and 217-6193), and Rev Robotics (REV-21-1217 and REV-21-1218). Please note that due to the use of recycled material in the manufacturing process, the batches of crates will vary slightly in color, but not such that it's perceptible with the cover in place.

Figure 3-22: POWER CUBE



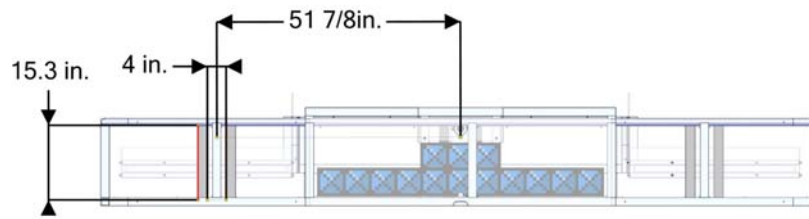
### 3.9 Vision Targets

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Vision targets are located on the SWITCH FENCE facing the ALLIANCE WALL using 2 in. (~5 cm) strips of [3M 8830 Scotchlite Reflective Material](#) and are used to highlight the locations of the PLATES on the SWITCH.

Each vision target consists of two vertical, 16 in. (~41 cm) tall strips of reflective material, with a 4 in. (~10 cm) gap between them. Elements of the SWITCH obscure the top and bottom of the target, resulting in approximately 15.3 in. (~39 cm) of viewable height when viewed straight on. The center of each target is located 51 7/8" in. (~132 cm) from the center of the SWITCH.

Figure 3-23: Vision Target Locations



## 3.10 The FIELD Management System

The FIELD Management System (FMS) is the electronics core responsible for controlling the *FIRST* Robotics Competition playing field. The FMS encompasses all field electronics, including the computers, REFEREE touchscreens, wireless access point, sensors, stack lights, E-Stops, etc.

When a DRIVE TEAM connects the Ethernet cable from their assigned PLAYER STATION to their OPERATOR CONSOLE, the Driver Station software on the OPERATOR CONSOLE computer will begin to communicate with the Field Management System (FMS). Once connected to FMS, the only open ports available are described in Table 3-3.

Table 3-3: Open FMS Ports

Port	Designation	Bi-directional?
UDP/TCP 1180-1190	Camera data from the roboRIO to the Driver Station (DS) when the camera is connected the roboRIO via USB	Yes
TCP 1735	SmartDashboard	Yes
UDP 1130	Dashboard-to-ROBOT control data	Yes
UDP 1140	ROBOT-to-Dashboard status data	Yes
HTTP 80	Camera connected via switch on the ROBOT	Yes
HTTP 443	Camera connected via switch on the ROBOT	Yes
UDP/TCP 554	Real-Time Streaming Protocol for h.264 camera streaming	Yes
UDP/TCP 5800-5810	Team Use	Yes

Teams may use these ports as they wish if they do not employ them as outlined above (e.g. TCP 1180 can be used to pass data back and forth between the ROBOT and the Driver Station software if the Team chooses not to use the camera on USB). Note that ROBOT code cannot be deployed while connected to the FMS. Additional information about the FMS may be found in the [FMS Whitepaper](#).

The FMS provides the ALLIANCE color assigned to each PLATE to the Driver Station software. Immediately following the assignment of PLATE color prior to the start of AUTO. Specific details on the format of the data can be found on the [2018 FRC Control System website](#).

While FMS does provide the ALLIANCE PLATE color to each team's Driver Station, teams must write the necessary ROBOT code to make use of the information during a MATCH.





FMS alerts participants to milestones in the MATCH using audio cues. Please note that audio cues are intended to be a courtesy to participants and not intended as official MATCH markers. If there is a discrepancy between an audio cue and the FIELD timers, the FIELD timers are the authority.

- MATCH Start & PLATES randomized: "Startup Sound"
- AUTO Start: "Cavalry Charge"
- T=0 for AUTO: Buzzer
- Start of TELEOP: Three (3) Bells
- T-30 seconds in TELEOP: Train Whistle
- T=0 for TELEOP/MATCH end: Buzzer
- MATCH stopped: Foghorn
- POWER UP activated: "Linear Popping"



