

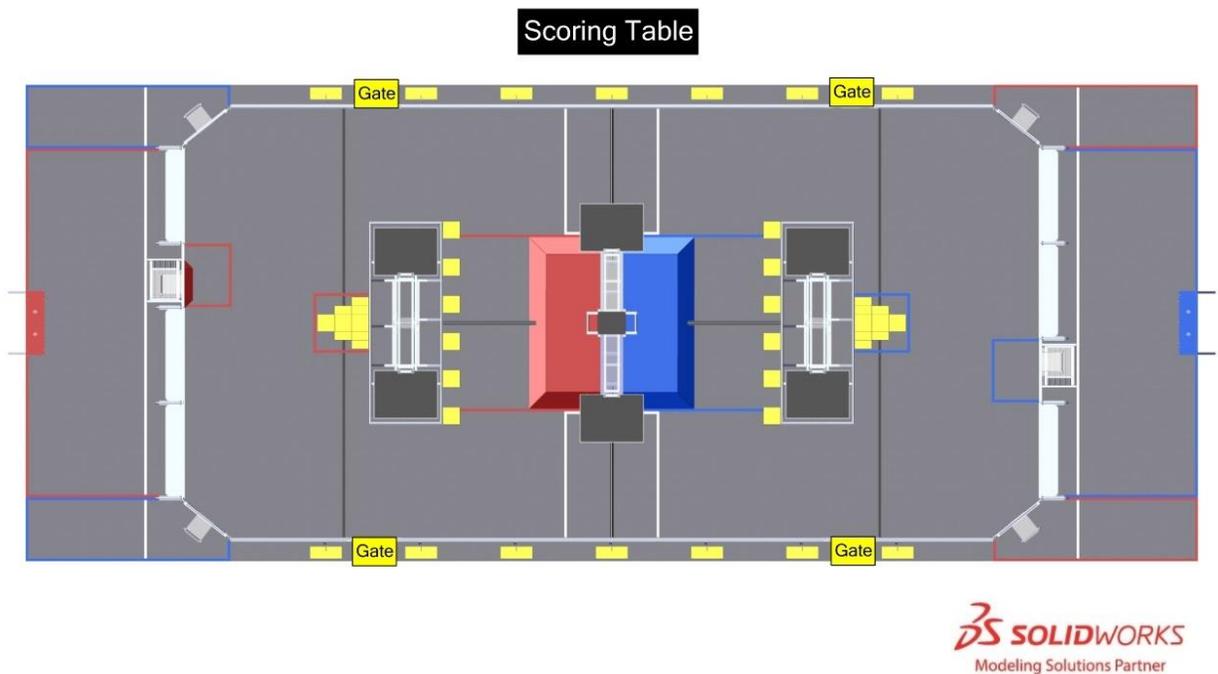
There are two versions of GUARDRAILS and PLAYER STATIONS used for competitions. One design has been used at *FIRST*® Robotics Competitions for several years and matches the 2018 Official *FIRST* Field Drawings & Models. The other is designed and sold by AndyMark. While the designs are slightly different, 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

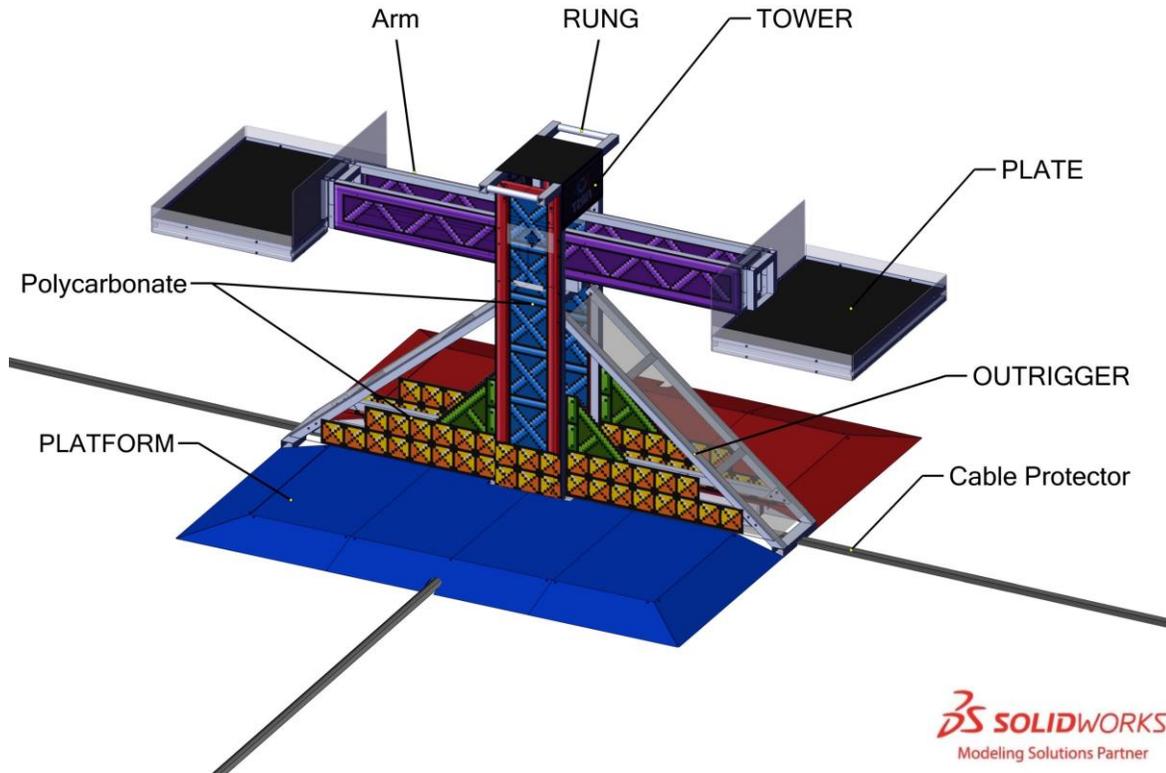


3.3 SCALE

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 2 ½ in. (~6 cm) wide and ¾ in. (~2 cm) high (Electriduct, Inc. CSX-3, black). These cable protectors extend to the GUARDRAILS and the SWITCHES.



Figure 3-4: The SCALE



The BRICKS are graphics depicting golden squares surrounded by a black outline that extends 12 in. (~30cm) above the 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

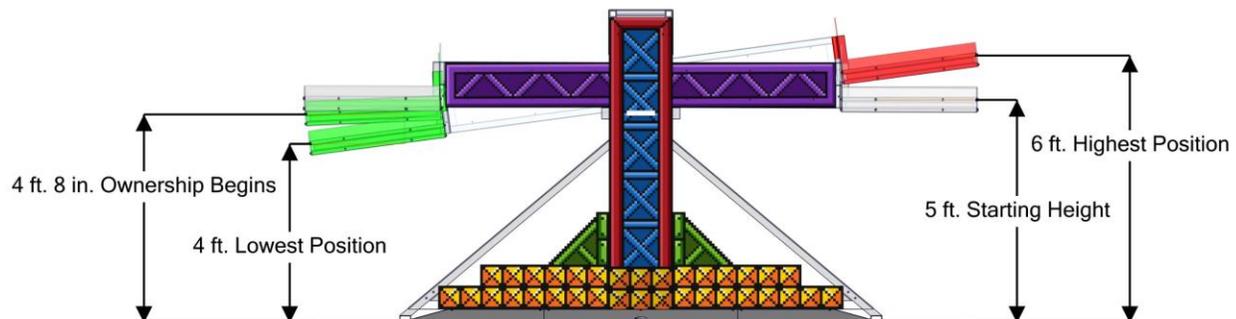
Each SCALE features two (2) PLATES which are 3 ft. (~91 cm) wide and 4 ft. (~122 cm) deep. The outside edges of the two PLATES are 15 ft. (~457 cm) apart. Each PLATE has four polycarbonate walls which contain Philips Color Kinetics LED lights. The wall closest to the center of the FIELD extends 1 ft.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

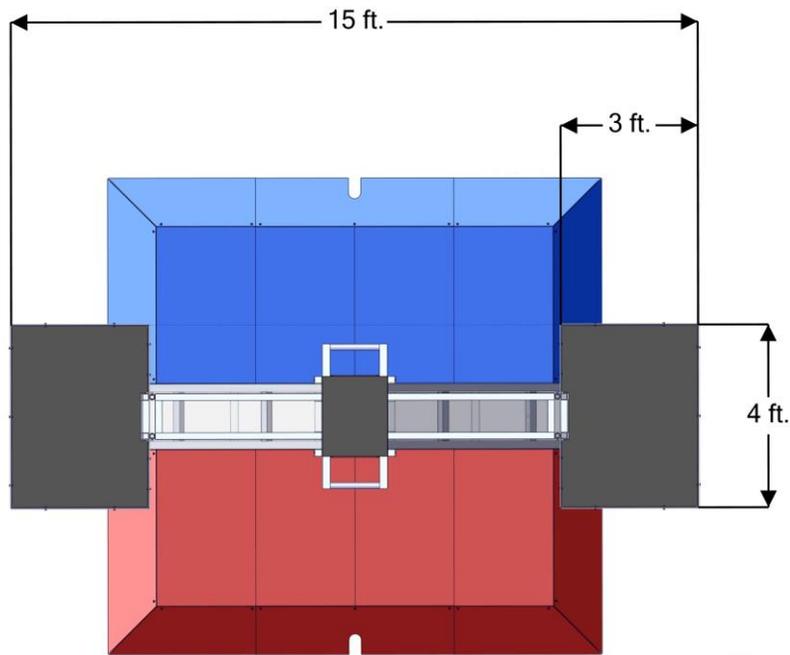
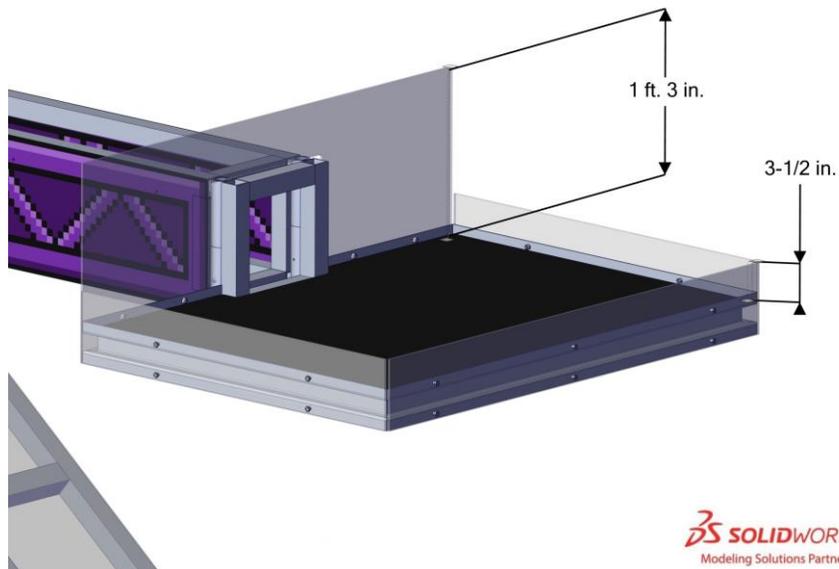


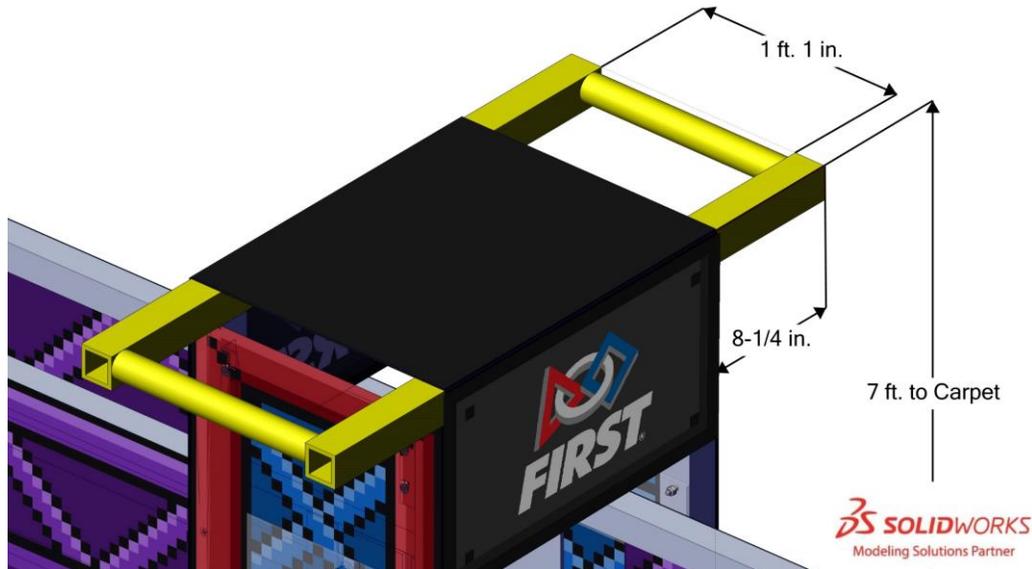
Figure 3-8: SCALE PLATE wall dimensions



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

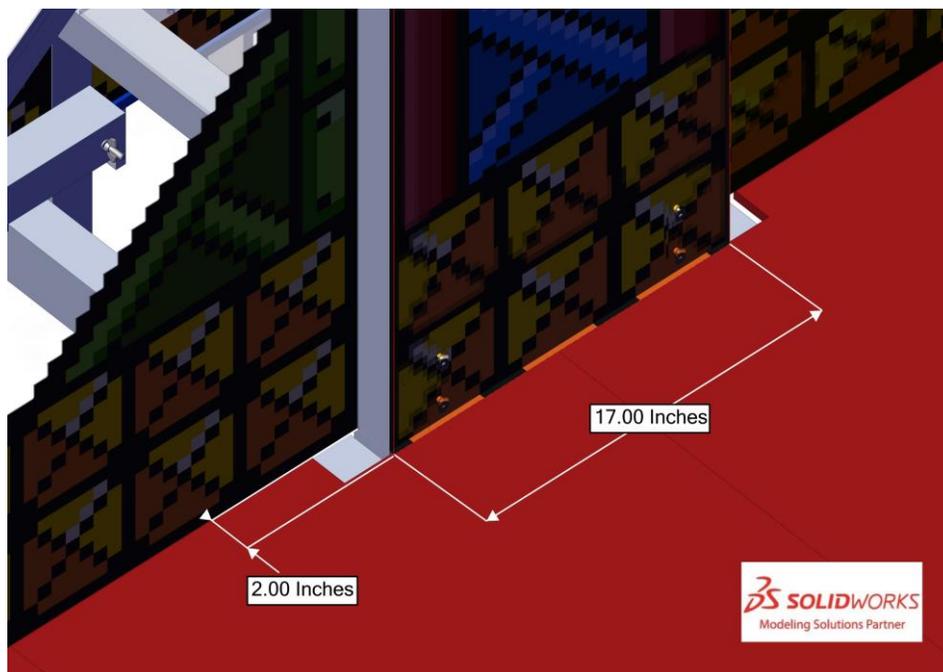
The OUTRIGGERS are supports for the TOWER constructed from aluminum shielded by polycarbonate

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 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 ramps leading to the PLATFORM are 1 ft. 1 in. (~33 cm) long with a 15.35 deg. angle.

Figure 3-11: PLATFORM length and width dimensions

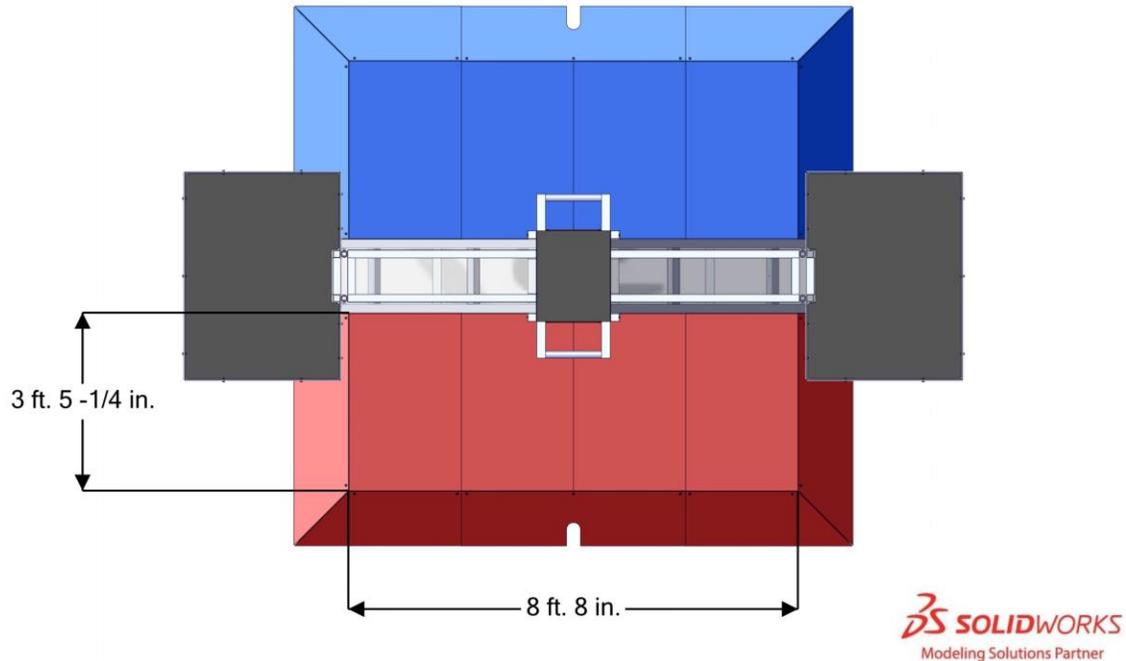


Figure 3-12: PLATFORM height and ramp dimensions

