



2015-2016 *FIRST*[®] Tech Challenge Game Manual Part 2



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Revision History		
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1.0 The Game

1.1 Introduction

This document describes *FIRST*® RES-QSM, the *FIRST*® Tech Challenge game for the 2015-2016 season. *Teams* must comply with all rules and requirements stated in this document and in Part 1 of the Game Manual. Clarifications to the game rules are issued on the Question & Answer section of the game forum at FTCFORUM.USFIRST.ORG. Forum rulings take precedence over information in the game manuals.

1.2 Game Description

Matches are played on a *Playing Field* initially set up as illustrated in the figure below. Two *Alliances* – one “Red” and one “Blue,” composed of two *Teams* each – compete in each *Match*. The object of the game is to attain a higher *Score* than the opposing *Alliance* by climbing the *Mountains*, rescuing *Climbers*, alerting authorities with *Rescue Beacons*, and clearing *Debris*. The *Scoring Elements* for the game are 80 *Alliance* neutral *Debris* in the shape of cubes and spheres and 14 *Climbers*. The game is played in two distinct periods: *Autonomous* and *Driver-Controlled*.

The game starts with a 30-second *Autonomous Period*. *Teams* are challenged to design *Robots* that: 1) activate *Rescue Beacons*, 2) relocate *Climbers* to *Shelters*, 3) climb *Mountains*, and 4) *Park In a Rescue Beacon Repair Zone or Floor Goal*. *Robots* start the *Match* with up to two pre-loaded *Climbers*.

The two minute *Driver-Controlled Period* follows the *Autonomous Period*. *Teams* earn points for their *Alliance* by: 1) cleaning up the disaster *Area* by placing *Debris* *Inside Alliance-specific Mountain Goals or Floor Goals*, 2) releasing *Climbers* to ride a *Zip Line* to safety, and 3) relocating *Climbers* to *Shelters*.

The final 30 seconds of the *Driver-Controlled Period* is called the *End Game*. In addition to the previously listed *Scoring* activities, *Robots* may scale the challenging vertical section at the top of the *Mountain* and claim the *All Clear Signal* for their *Alliance*. *Robots* also earn points for their *Alliance* based on their height on the *Mountain* at the conclusion of the *Match*.

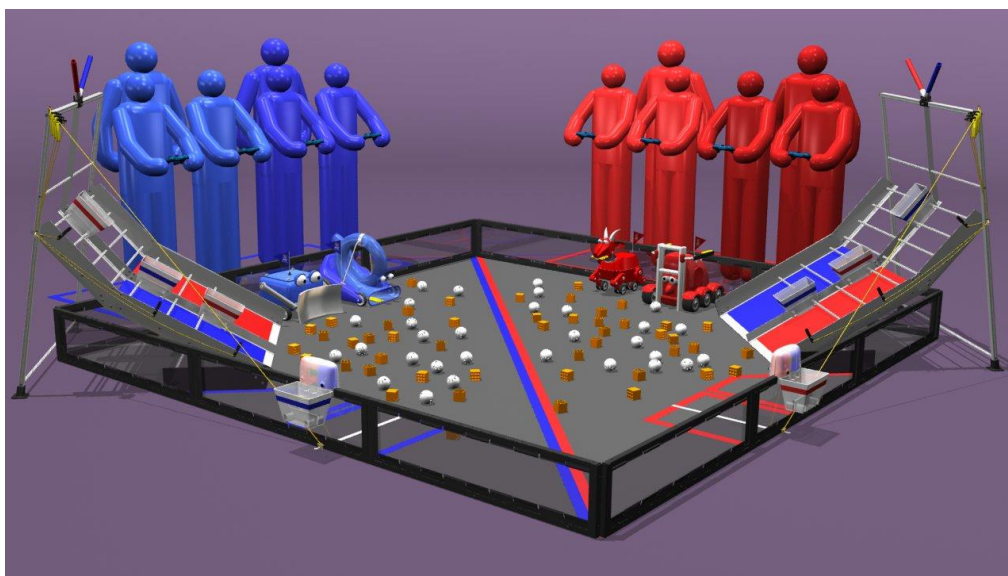


Figure 1.2-1 – *FIRST*® RES-QSM *Playing Field*.

1.3 Playing Field Illustrations

The following illustrations identify the *Game Elements* and give a general visual understanding of the game. Teams should refer to the official *Playing Field* documents available at www.usfirst.org under “The FTC Game” for the exact *Game Element* layout and dimensions.

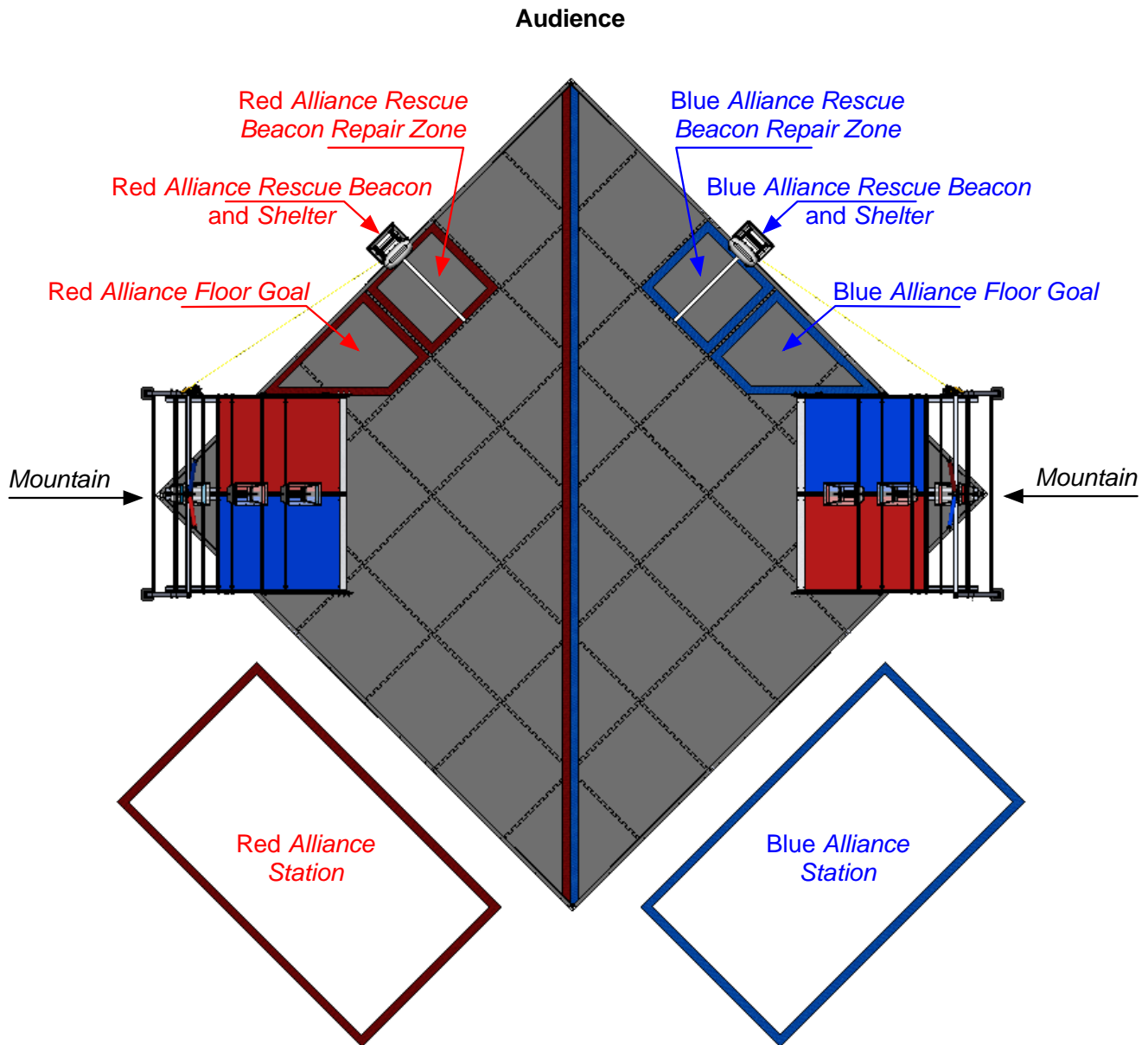


Figure 1.3-1 – Overhead view of the *Playing Field*.

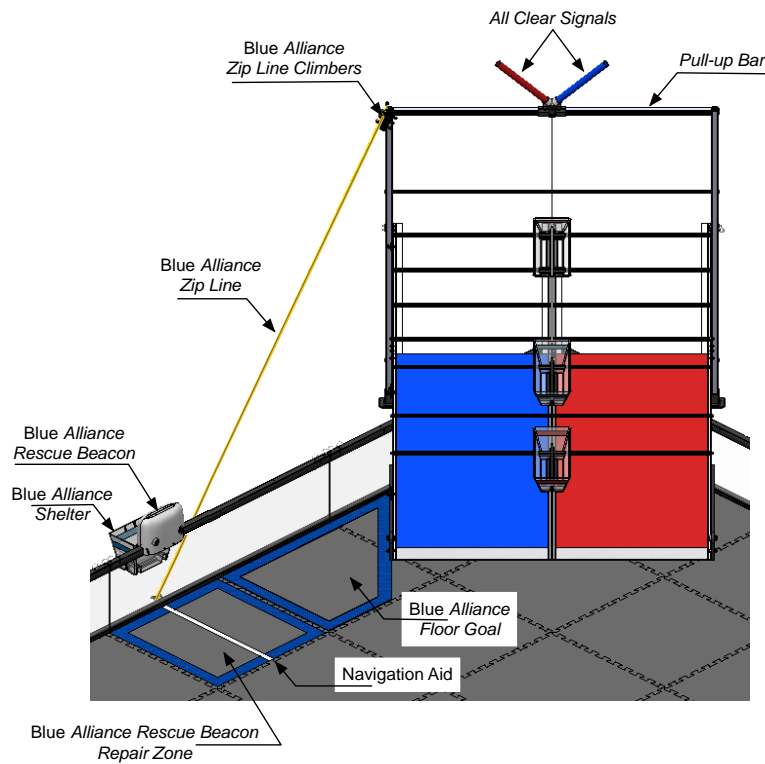


Figure 1.3-2 – Mountain, Zip Line, Rescue Beacon, and Shelter on the Blue Alliance side of the *Playing Field*.

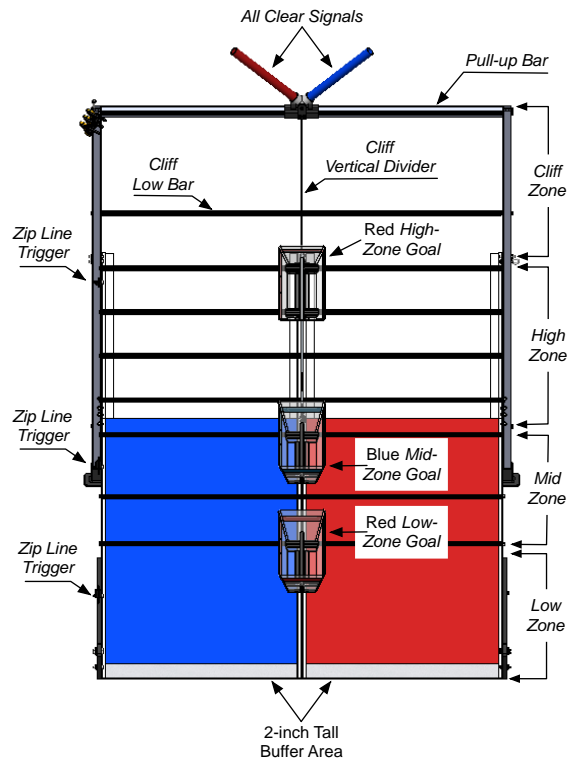


Figure 1.3-3 – Mountain on the Blue Alliance side of the *Playing Field*.

1.4 Game Definitions

The following definitions and terms are used in *FIRST*® RES-QSM

All Clear Signal – Red and blue batons located at the top of each *Mountain* that *Robots* claim for their *Alliance* during the *End Game*.

Alliance – A pre-assigned grouping of two *Teams* that work together for a given *Match*. *Alliances* are designated as either “Red” or “Blue.”

Alliance Station – The designated “Red” or “Blue” *Alliance Area* adjacent to the *Playing Field* where the *Drivers* and *Coach* stand or move within during a *Match*.

Area – The space defined by the vertical projection of the outside edge of a region’s boundary (e.g. gaffers tape, *Goal*, *Playing Field Wall*). The boundary element (tape, wall, markings, etc.) is considered to be part of the *Area* for the purposes of determining *Inside* and *Outside*.

Autonomous Period – A thirty second period in which the *Robots* operate and react only to sensor inputs and to commands pre-programmed by the *Team* onto the onboard *Robot* control system. Human control of the *Robot* is not permitted during this time.

Blocking Access – Preventing a *Robot* from accessing a *Game Element* or *Area* by obstructing ALL paths of travel to the object or *Area*.

Cliff / Cliff Zone – The vertical *Climbing Area* above/beyond the *High Zone* on the *Mountain*. A *Pull-up Bar* for *Robots* to hang from and the *All Clear Signal* are located at the top of the *Cliff*.

Cliff Low Bar – The closest horizontal bar below the *Pull-up Bar* in the *Cliff Area*.

Cliff Vertical Divider – The vertical dividing structure in the center of the *Cliff Area* connecting the top bar of the *High Zone* to the *Pull-up Bar*. The *Cliff Vertical Divider* separates the Red and Blue *Alliance Climbing Areas* in the *Cliff*.

Climber – A human-shaped, gold-colored *Scoring Element*. The maximum dimensions for the *Climbers* are 4.62 inches (11.73 cm) tall, 1.17 inches (2.97 cm) wide and 0.5 inches (1.27 cm) thick. *Climbers* weigh approximately 0.8 ounces (22.7 gm).

There are a total of fourteen *Climbers* as described below.

- a. Three *Climbers* for each *Alliance* start the *Match* at the top of the corresponding *Alliance’s Zip Line*. *Robots* earn points by activating *Triggers* at three heights on the *Mountain* to set free their *Alliance’s Climbers*, one *Climber* per *Trigger*, to slide down the *Zip Line* to safety. The *Climbers* attached to a *Zip Line* may not be removed from the *Zip Line*. There are a total of six *Climbers* on the *Zip Lines*.
- b. Each *Robot* may start the *Match* with up to two pre-loaded *Climbers* to place *In* a *Shelter*. There are a total of eight pre-loaded *Climbers*, four per *Alliance*.

Climbing Area – *Mountains* have separate, restricted *Robot Climbing Areas* for the two *Alliances*. The restricted *Areas* are designated by red and blue colored panels forming the underlying climbing surface *In* the *Low* and *Mid Zone Climbing Areas*. The restricted *Climbing Areas* include the corresponding *High Zone* and *Cliff Zone* of the *Mountains*. Three *Alliance* specific *Goals* for *Scoring Debris* are *In* an *Alliance* shared space between the two *Climbing Areas*. The Red *Alliance Climbing Area* is on the right side of the *Mountain* when it is viewed from the *Playing Field* floor entrance to the *Mountain*.

Coach – A student *Team* member or adult mentor designated as the *Team* advisor during the *Match* and identified by wearing a “Coach” badge or identifying marker.

Competition Area – The *Area* where all the *Playing Fields*, *Alliance Stations*, *Scoring* tables, on-deck queuing tables, event officials, and other tournament items relating to *Match* play are located. The *Team Pit Area* and practice *Playing Fields* are not part of the *Competition Area*.

Control / Controlling – An object is considered to be *Controlled* by a *Robot* if the object is following the movement of the *Robot*. Examples are: pushing an object on the *Playing Field* floor, or holding or carrying an object. Objects that are *Controlled* by a *Robot* are considered to be part of the *Robot*. See *Possess / Possessing* to learn about a related term.

Debris – An *Alliance*-neutral *Scoring Element* for the game. The game is played with two types of *Debris*: fifty 2-inch (5.1 cm) gold-colored plastic cubes and thirty 2.8-inch (7.1 cm) diameter white plastic spheres. The cubes weigh approximately 1.9 ounces (54.4 gm) and the spheres weigh approximately 0.96 ounces (27.2 gm).

Disable / Disabled – A *Robot* that is no longer active for the remainder of the *Match* due to a *Robot* failure or by the request of a referee. If a referee *Disables* a *Robot* during a *Match*, he/she will ask the *Team* to drive their *Robot* to a neutral position on the *Playing Field* and to place their *Driver Station* in a hands-off location on a tournament-provided structure or the *Alliance Station* floor.

Disqualified / Disqualification / Disqualify – A *Team* that is *Disqualified* from a *Match* has their *Robot Disabled* and will not receive credit for the *Match* (i.e., no Qualifying or Ranking points).

Drive Team – Up to three representatives (two *Drivers* and one *Coach*) from the same *Team*.

Driver – A pre-college student *Team* member responsible for operating and controlling the *Robot* and identified by wearing a “Driver” badge or identifying marker.

Driver-Controlled Period – The two minute time period in which the *Drivers* operate the *Robots*.

Driver Station – Hardware and software used by *Drive Teams* to control their *Robot* during a *Match*. The *Driver Station* consists of an Android device, FTC-supplied Android App, adapter cable, optional unpowered USB Hub, and up to two Logitech F310 Gamepad Controllers.

End Game – The last thirty seconds of the *Driver-Controlled Period*.

Floor Goal – An approximately 3.9 square-foot (0.36 square-meter) *Alliance*-colored taped *Area* on the *Playing Field* floor along the *Playing Field Wall*, between the *Rescue Beacon Repair Zone* and the *Mountain*. There are two *Floor Goals* on the *Playing Field* floor, one per *Alliance*.

Game Element – Any item *Robots* interact with to play the game. *Game Elements* for this year’s game include: *Mountains*, *Pull-up Bars*, *Triggers*, *Zip Lines*, *Rescue Beacons*, *Goals*, *Shelters*, *Debris*, *Climbers*, and *All Clear Signals*.

Goal – An *Area* where *Robots* place *Debris* to earn points for their *Alliance*.

In(side) / Completely In(side) – An object that has crossed into the vertical (i.e. at a right angle to the *Playing Field* tile floor) extension of a defined *Area*’s boundary is *Inside* the *Area*. An object that is entirely within the vertical

Inadvertent – An outcome that is not a planned strategy and not the predictable result of persistent or repeated actions.

Inconsequential – An outcome that does not have an effect on *Scoring* or gameplay.

Match – A head-to-head competition between two *Alliances*. A *Match* consists of a thirty second *Autonomous Period* followed by a two minute *Driver-Controlled Period* for a total time of two minutes and thirty seconds.

Mountain – An Area where *Robots* climb, *Score Debris* into *Goals*, release *Climbers* and claim the *All Clear Signal*. A *Mountain* consists of: 1) separate Red and Blue *Alliance Climbing Areas* with four levels of climbing difficulty, 2) three *Alliance-specific Goals*, 3) an *Alliance-specific Zip Line* with three *Climbers*, 4) three *Alliance-specific Zip Line Climber-release Triggers*, and 5) an *All Clear Signal*.

There are two *Mountains* with *Alliance-specific* differences on the *Playing Field*. The *Mountain* adjacent to the Red *Alliance Station* contains one *Debris Goal* for the Red *Alliance*, two *Debris Goals* for the Blue *Alliance*, and a *Zip Line* for the Red *Alliance*. The *Mountain* adjacent to the Blue *Alliance Station* contains one *Debris Goal* for the Blue *Alliance*, two *Debris Goals* for the Red *Alliance*, and a *Zip Line* for the Blue *Alliance*. Figures 1.3-2 and 1.3-3 identify the *Game Elements* for a *Mountain* located on the Blue *Alliance* side of the *Playing Field*.

Mountain Goals – *Debris Scoring Areas* located at different heights on the *Mountain*, in an *Alliance-shared* space between the two *Climbing Areas*. Each *Mountain* contains three *Alliance-specific Goals*, as specified in the table below.

Goal	Mountain Adjacent to the Red Alliance Station	Mountain Adjacent to the Blue Alliance Station
<i>High Zone</i>	Blue Alliance Goal	Red Alliance Goal
<i>Mid Zone</i>	Red Alliance Goal	Blue Alliance Goal
<i>Low Zone</i>	Blue Alliance Goal	Red Alliance Goal

Mountain Zones – A *Mountain* consists of four height zones: *Low*, *Mid*, *High*, and *Cliff*. The *Mountain Zone* locations are shown in Figure 1.3-3.

Off / Completely Off – Not physically in contact with or *Supported* by an object, surface, etc.

On / Completely On – Physically in contact with and *Supported* by an object, surface, etc. An object that is entirely *Supported* by another object, surface, etc. is defined as *Completely On* the object, surface, etc.

Out / Outside – An object that has NOT crossed into any part of a defined *Area* is *Outside* the *Area*.

Park / Parked – A *Robot* that is motionless.

Penalty – The consequence imposed for a rule or procedure violation that is identified by a referee. When a *Penalty* occurs, points will be awarded to the *Alliance* that did not incur the *Penalty*. *Penalties* are further defined into *Minor Penalties* (ten points) and *Major Penalties* (forty points).

Pin / Pinning – Preventing the movement in ALL directions of an opposing *Alliance Robot* while it is in contact with the *Playing Field Wall*, one or more *Game Elements*, or another *Robot*.

Playing Field – The part of the *Competition Area* that includes the 12 ft. x 12 ft. (3.66 m x 3.66 m) field and all of the *Game Elements* described in the official field documents. The *Playing Field* is divided into two equal-sized *Alliance Areas* (Red and Blue) separated by red and blue gaffers tape as shown in the illustration of the *Playing Field* in section 1.3. From the audience viewpoint, the Red *Alliance Area* is on the right side of the *Playing Field*.

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Playing Field Perimeter – The outermost boundary of the *Playing Field* defined by the *Outside* face of the *Playing Field*, *Mountains*, *Rescue Beacons* and *Shelters*. The *Mountains*, *Rescue Beacons* and *Shelters* extend the outermost boundary beyond the *Outside* face of the *Playing Field Wall* at their respective locations on the *Playing Field*.

Playing Field Wall – An approximate 1 ft. (0.3m) tall, 12 ft. (3.66 m) long by 12 ft. wide (3.66 m) wall surrounding the soft foam tile floor of the *Playing Field*.

Possess / Possessing – An object is considered to be in *Possession* by a *Robot* if, as the *Robot* moves or changes orientation (e.g. moves forward, turns, backs up, spins in place), the object remains in approximately the same position relative to the *Robot*. Objects in *Possession* of a *Robot* are considered to be *Controlled*, and they are part of the *Robot*. See also *Control / Controlling*.

Pull-up Bar – The top-most horizontal bar located *In* the *Cliff Zone* of the *Mountain*.

Rescue Beacon – An object that *Robots* “reset/repair” during the *Autonomous Period* to earn points for their *Alliance*. FIRST® RES-QSM is played with two *Alliance* specific *Rescue Beacons* which are mounted on top of *Playing Field Walls* in the locations shown in Figure 1.3-1. Each *Rescue Beacon* has two buttons on its front face. Each of those buttons has LEDs above it that will be illuminated as either red or blue. Each *Rescue Beacon* also has a randomization button; when it is pressed, the *Rescue Beacon* will randomly choose to illuminate red LEDs above one button and blue LEDs above the other.

Rescue Beacon Repair Zone – An approximate 2 ft. by 2 ft. (0.6 m x 0.6 m) *Alliance*-specific *Area* on the *Playing Field* floor adjacent to a *Rescue Beacon*. *Rescue Beacon Repair Zones* are identified with red or blue gaffers tape on the *Playing Field* floor tiles.

Robot – Any mechanism that has passed inspection and a *Team* places on the *Playing Field* prior to the start of a *Match*. A detailed definition of *Robot* is in the *Robot* rules section in Part 1 of the Game Manual.

Scoring / Score – *Teams* earn points for their *Alliance* by interacting with *All Clear Signals*, *Climbers*, *Debris*, *Floor Goals*, *Mountains*, *Mountain Goals*, *Pull-up Bars*, *Rescue Beacons*, *Rescue Beacon Repair Zones*, *Shelters*, and *Zip Line Triggers*. *Scoring Elements* are considered to be *Scored* when they are placed *In* the appropriate *Area* and are no longer in contact with a *Robot* from the corresponding *Alliance*. The *Scoring* achievements and their point values are described in section 1.5.

Scoring Elements – Objects that *Robots* place *In* specific *Areas* to earn points for their *Alliance*. The *Scoring Elements* for FIRST® RES-QSM are *Debris* and *Climbers*.

Shelter – An *Alliance*-specific basket attached to the corresponding *Alliance*’s *Rescue Beacon* where *Climbers* are placed by *Robots*. The *Shelters* are *Outside* the *Playing Field Wall*, but *Inside* the *Playing Field Perimeter*.

Support / Supported / Completely Supported – A *Robot* is *Supported* by an object if that object is bearing at least some of the weight of the *Robot*. If the object is bearing all of the *Robot*’s weight, the *Robot* is *Fully Supported* by the object.

Team – Mentors, supporters, and pre-college-aged students affiliated with an entity registered with FIRST and for the competition.

Trap / Trapping – Preventing an opposing *Alliance Robot* from accessing or escaping from a *Game Element* or constrained *Area* of the *Playing Field* for an extended period of time.

Trigger – A lever on a *Mountain* that is used by *Robots* to release *Climbers* to slide down a *Zip Line* to safety. There are three *Alliance*-specific *Triggers* on each *Mountain*. Each *Trigger* releases one *Climber*. The *Trigger* located in the *Low Zone* releases the first/lowest *Climber* on the *Zip Line*. The *Trigger* locations are shown in Figure 1.3-3.

Zip Line – An inclined rope extending from the top of the *Mountain* to the floor beneath the closest *Rescue Beacon*. Each *Mountain* has one *Alliance*-specific *Zip Line*, for a total of two *Zip Lines* on the *Playing Field*. The *Zip Line* reserved for the Red *Alliance* is attached to the *Mountain* adjacent to the Red *Alliance Station*. The *Zip Line* reserved for the Blue *Alliance* is attached to the *Mountain* adjacent to the Blue *Alliance Station*. Three *Climbers* start the *Match* at the top of each *Zip Line*. *Triggers* for releasing the *Climbers* are located at three heights on the *Mountain*.

1.5 Game Play

Prior to the start of the *Match*, *Drive Teams* perform some basic *Robot* setup steps that are described in section 1.5.1. *Matches* are made up of several periods totaling two minutes and thirty seconds. There is a thirty second *Autonomous Period*, followed by a two minute *Driver-Controlled Period*. The last thirty seconds of the *Driver-Controlled Period* is called the *End Game*.

1.5.1 Pre-Match

Teams will receive an *Alliance*-colored *Robot*-identification flag from field personnel; this flag must be securely mounted on the *Robot* as defined in the *Robot* rules. *Drive Teams* place their *Robots* in any orientation on the *Playing Field* with the following constraints:

- a. *Robots* must be *Completely Inside* their *Alliance's Area* of the *Playing Field*.
- b. *Robots* must be in contact with the *Playing Field Wall* that is along the boundary of their *Alliance Station*.
- c. *Robots* may not be in contact with a *Mountain*.
- d. *Robots* may not be in contact with another *Robot*.
- e. *Robots* may not extend beyond the *Outside* edge of the *Playing Field Wall*.
- f. *Teams* may pre-load up to two *Climbers* per *Robot*. The pre-loaded *Climbers* must be in contact with a single *Robot* and they may touch the *Playing Field*. *Teams* may elect not to pre-load some or all of their *Climbers*. *Climbers* that are not pre-loaded are placed by field personnel in a random location and orientation, lying flat, and *Completely Inside* the corresponding *Alliance Floor Goal*.

After placing their *Robot* on the *Playing Field*, the *Drive Team* pre-loads the *Climbers*, selects their *Autonomous Period* Operational Mode (Op Mode) on their *Driver Station* Android device and initializes their *Robot* by triggering the *Team's* initialization event software. *Drive Teams* wait *Completely Inside* their assigned *Alliance Station* for the start of the *Match* with their *Driver Station* in a hands off location.

Field personnel will press the randomization button on the *Rescue Beacons*. Once the first *Rescue Beacon* has been randomized, *Teams* may no longer touch their *Robots* until the conclusion of the *Match*, and may not touch their *Driver Stations* until the *Autonomous Period* has ended. Field personnel will disperse the *Debris* onto the *Playing Field* by cascading the *Debris* down the corresponding *Alliance* side of the *Mountains*. For example, *Debris* will cascade down the Red *Alliance Climbing Area* for the *Mountain* located in the Red *Alliance* side of the *Playing Field*. Approximately half of the *Debris* will enter the *Playing Field* by way of each *Mountain*. *Debris In a Mountain Goal* or *Completely On the Mountain*

will be removed from the Mountain and dispersed onto the *Playing Field* by field personnel before the *Match* starts. *Debris In a Floor Goal* will remain in place.

1.5.2 Autonomous Period

The *Match* starts with a thirty second *Autonomous Period* where *Robots* are operated via pre-programmed instructions only. *Teams* are not allowed to control *Robot* behavior with the *Driver Station* or any other actions during the *Autonomous Period*. The *Driver Station* is placed in a hands-off location during the *Autonomous Period* so that it is evident that there is no human control of *Robots*. The only exception is to allow *Drive Teams* to start their *Robot* with a single start command issued on the *Driver Station* Android device using the built-in thirty second stop timer. The *Autonomous Period* begins following a start countdown (e.g. 3-2-1-go) by field personnel; signaling *Drive Teams* to issue a *Robot* start command with their *Driver Station*. Failure to adhere to this procedure may subject the *Team* and/or *Alliance* to a *Penalty* as specified in the game rules in Section 1.6.2.

The *Autonomous Score* is based on the state of the *Rescue Beacons* and the locations of the pre-loaded *Climbers* and *Robots* at the end of the *Autonomous Period* after all *Game Elements* and *Robots* have come to rest. Points are awarded for the following achievements:

1. **Rescue Beacons** – The *Rescue Beacons* are randomly set up at the start of a *Match* so that *Robots* must use onboard sensors to identify the correct button to trigger the *Rescue Beacon* in favor of their *Alliance*. *Rescue Beacons* are randomized independently of each other.

During the *Autonomous Period*, each *Robot* may trigger the *Rescue Beacon* on its *Alliance's* side of the *Playing Field* one time. The *Rescue Beacon* is triggered by pressing a button under either the red or blue LEDs; the *Alliance* matching that color will receive 20 points, even if it is the opposing *Alliance*, so *Robots* should choose carefully.

The first time a *Rescue Beacon* is triggered, the LEDs above the selected button become brighter. The second time a *Rescue Beacon* is triggered; the LEDs on the second half are illuminated with the color above the just-pressed button. All of the LEDs will flash twice when the second button is pressed or thirty seconds after the first button is pressed, whichever occurs first. The *Rescue Beacon* then displays the LED pattern for the referees to record on the scoresheets. Each *Rescue Beacon* can be triggered up to two times during the *Autonomous Period* – once per *Robot* on the *Alliance* – for a total of up to forty points awarded.

Once a *Rescue Beacon* has been triggered twice, the buttons no longer have an effect on the state of the *Rescue Beacon's* LEDs and it can not be set to a different state. To help prevent accidental resetting of a *Rescue Beacon* twice by a single *Robot*, there is a five second delay after a button is released before the buttons become active and are able to trigger the *Rescue Beacon* a second time.

If no buttons are pressed during the *Autonomous Period*, the LEDs will not brighten or change color, indicating that zero points are awarded for the *Rescue Beacon*. *Rescue Beacons* that have not been triggered by a *Robot* during the *Autonomous Period* or are triggered during the *Driver-Controlled* portion of the *Match* do not contribute to the *Match Score*.

2. **Climbers** – *Climbers In* an *Alliance-specific Shelter* earn ten points per *Climber* for the *Alliance*.
3. **Mountains** – *Robots* earn points based on where they are *On* the *Mountain* at the end of the *Autonomous Period*. *Robots* earn points for the lowest zone that they are *On*. For example, a *Robot* that is *On* both the *Low-* and *Mid-Zones* earns points for the *Low-Zone achievement*. At the

end of the *Autonomous Period*, Robots may be in either *Alliance's Climbing Area* to earn these points. Point levels are based on the *Area of the Mountain* that *Supports the Robot*. The *Score* is not dependent upon being *In* or *Completely In* an *Area*. Point values for *Parking* are listed below.

- a. *On the Playing Field* tile floor and the *Mountain*: five points
 - b. *Low Zone*: ten points
 - c. *Mid Zone*: twenty points
 - d. *High Zone*: forty points
4. **Rescue Beacon Repair Zone** – Robots *Parked In* their *Alliance's Rescue Beacon Repair Zone* earn five points.
 5. **Floor Goal** – Robots *Parked In* their *Alliance's Floor Goal* earn five points.

A *Robot* will receive only one *Score* based on its position. For example, a *Robot* that is *In* both the *Rescue Beacon Repair Zone* and the *Floor Goal* earns only five points.

1.5.3 Driver-Controlled Period

At the conclusion of the *Autonomous Period*, referees fill out scoresheets and *Drive Teams* pick up their *Driver Stations*. When the referees are ready, field personnel will instruct *Teams* to select their *Driver-Controlled Op Mode* and initialize their *Robots* by triggering the *Teams' initialization event software* with their *Driver Station Android device*. A two minute *Driver-Controlled Period* begins following a start countdown (e.g. 3-2-1-go) by field personnel. *Teams* start their *Robots* by pressing the start button on their *Driver Station Android device*. Failure to adhere to this procedure may subject the *Team* and/or *Alliance* to a *Penalty* as specified in the game rules in Section 1.6.2.

The *Driver-Controlled Score* is based on the location of the *Scoring Elements*, *All Clear Signals*, and *Robots* at the end of the *Match* after all objects have come to rest. Points are awarded for the following achievements:

1. **Debris** *Inside Alliance-specific Goals* earn points based on the elevation of the *Goal*:
 - a. *Floor Goal* – one point *per Debris*.
 - b. *Low Zone Goal* – five points *per Debris*.
 - c. *Mid Zone Goal* – ten points *per Debris*.
 - d. *High Zone Goal* – fifteen points *per Debris*.

Debris In a Goal earns points for an *Alliance* based on the color of the *Goal* regardless of which *Alliance's Robot* placed *Debris In* the *Goal*.

2. **Zip Line Climbers** – *Climbers* that have slid down the *Alliance's Zip Line* to safety earn twenty points each, regardless of which *Alliance* released the *Climbers*.
3. **Climbers** – *Climbers Inside* an *Alliance-specific Shelter* earn ten points *per Climber* for their *Alliance*. The *Zip Line Climbers* are not eligible for *Scoring In a Shelter* (i.e. do not remove *Climbers* from the *Zip Line*; their removal is considered a violation of rule <S1>).

Climbers that were *Scored* into a *Shelter* during the *Autonomous Period* will be counted again at the end of the *Driver-Controlled Period* if they are still *In a Shelter*, contributing a total of twenty

points to the *Match Score* (ten points for the *Autonomous Period* plus ten points for the *Driver-Controlled Period*).

4. **Mountains** – Robots earn points based on where they are *Parked On* the *Mountain* at the end of the *Driver-Controlled Period*. Robots earn points for the lowest zone that they are *On*. For example, a *Robot* that is *On* both the *Low-* and *Mid-Zones* earns points for the *Low-Zone*. Robots receive points only if they are *In* their *Alliance's Climbing Zone* (unless <GS12> applies). Point levels are based on the *Area* of the *Mountain* that *Supports* the *Robot*. The *Score* is not dependent upon being *In* or *Completely In* an *Area*. Point values for *Parking* are listed below.
 - a. *On the Playing Field* tile floor and the *Mountain*: five points
 - b. *Low Zone*: ten points
 - c. *Mid Zone*: twenty points
 - d. *High Zone*: forty points
 - e. *Cliff Zone*: See *End Game* scoring

1.5.4 End Game

The last thirty seconds of the *Driver-Controlled Period* is called the *End Game*. During the *End Game* – and not before – Robots may climb the *Cliff* at the top of the *Mountain* and/or claim the *All Clear Signal* for their *Alliance*. Robots may continue to perform all of the *Driver-Controlled* scoring activities during the *End Game*. Points are awarded for the following *End Game* achievements:

1. **Cliff Pull-up Bar** – A *Robot Fully Supported* (i.e. hanging) by the *Cliff Pull-up Bar* earns eighty points for its *Alliance*. Robots may touch the *Cliff Vertical Divider*, rest against the *Cliff Low Bar*, and be in contact with an opposing *Alliance Robot* if the contact is *Inadvertent* and *Inconsequential*. The intent of this *Scoring* achievement is for the *Cliff Pull-up Bar* to support the *Robot's* weight. If the *Cliff Vertical Divider*, *Cliff Low Bar* and the opposing *Alliance Robot* are removed from the *Mountain*, a *Robot* that is *Fully Supported* by the *Cliff Pull-up Bar* would not fall from the *Cliff*.
2. **All Clear Signal** – The first *Robot* to trigger the *All Clear Signal* on a *Mountain* by rotating the corresponding *Alliance* color baton upward into an approximate vertical orientation earns twenty points for the *Alliance* indicated by the color of the baton. *Alliances* may trigger up to two *All Clear Signals*, one per *Mountain*. However, only one *Alliance* earns *All Clear Signal* points per *Mountain*. The first claimed *All Clear Signal* will be recorded as *Scored* by the referees. *All Clear Signals* that change orientation from their first claimed state will not change which *Alliance* is credited for the *Score*. *All Clear Signals* that *Inadvertently* rotate into a *Scored* orientation prior to the start of the *End Game* do not count as *Scored* unless a *Robot* claims it during the *End Game* by touching the *All Clear Signal* baton in place or changing the orientation of the *All Clear Signal*.

1.5.5 Post Match

After the *Match* is over, referees record the locations of *Robots*, *Climbers*, *All Clear Signals*, and *Debris*. The *Rescue Beacons* do not contribute to the *Driver-Controlled Period Score*. After they are finished scoring the *Playing Field*, referees will signal for the *Drive Teams* to enter the *Playing Field* and retrieve their *Robots*. Teams should not step on or climb the *Mountains* when retrieving their *Robots*. The *Drive Teams* should return *Debris* and *Climbers* that are *Possessed* by the *Robot* to the *Playing Field* and return

the *Alliance*-colored *Robot* identification flag to the field personnel. The *Playing Field* reset crew will set up the *Playing Field* for the next *Match*.

1.5.6 Penalty Scoring

Penalty points are added to the non-offending *Alliance*'s *Score* at the end of the *Match*. *Minor Penalties* give the opposing (non-offending) *Alliance* ten points per occurrence. *Major Penalties* give the opposing (non-offending) *Alliance* forty points per occurrence.

1.6 Rules of Game Play

Game play is restricted by the Safety rules (<S#>), the General rules (<G#>), and the Game Specific rules (<GS#>). Other rules to pay close attention to are the *Robot* rules, the inspection rules, and the tournament rules defined in Part 1 of the Game Manual. Violation of rules may lead to *Penalties*, a *Disabled Robot*, or *Disqualification* of the offending *Team* and/or *Alliance*. Rules apply to all periods of play unless specifically called out as omitted. If rules are in conflict, Safety rules trump all rules and Game Specific rules take precedence over General rules. The official FTC Question & Answer Forum rulings take precedence over all information in the game manuals.

1.6.1 Safety Rules

<S1> Unsafe Robot and Playing Field Damage – If at any time the *Robot* operation is deemed unsafe or has damaged the *Playing Field*, another *Robot*, *Game Element*, *Playing Field* surface, or *Playing Field Wall*, by the determination of the referees the offending *Robot* may be *Disabled* and/or the *Team* may be *Disqualified*. Re-inspection of the *Robot* is required before it may play another *Match*.

The intent of this rule is to immediately stop unsafe *Robot* actions or *Playing Field* damage that is likely to persist with continued *Robot* operation. *Robots* that are able to continue safe operation without damaging the *Playing Field* will receive a warning and may continue to play the *Match*. *Robots* will be *Disabled* for unsafe operation or *Playing Field* damage that occurs after the first warning.

Referees will issue a warning before *Disabling* a *Robot* or *Disqualifying* a *Team* for violating this rule.

<S2> Robot Extension Outside the Playing Field Perimeter – If any portion of the *Robot* makes contact with anything *Outside* the *Playing Field Perimeter*, it will be *Disabled* for the remainder of the *Match*, unless specifically allowed by game-specific rule(s) listed in Section 1.6.3. See the game definitions in section 1.4 for a complete description of the *Playing Field Perimeter*. Repeated offenses of this rule may lead to *Disqualification*.

<S3> Safety Gear – All members of the *Drive Team* are required to wear safety glasses and shoes with closed-toes and a closed-back. If any member of the *Drive Team* is not wearing these safety items, the referee will issue a warning and if the situation is not remedied within thirty seconds, the offending member(s) of the *Drive Team* must leave the *Competition Area* for the remainder of the *Match* and may not be replaced by another *Team* member. Failure to comply with a request to leave the *Competition Area* violates rule <G25>.

1.6.2 General Game Rules

<G1> Drive Team – Each *Drive Team* shall include up to two *Drivers* and one *Coach*. Electronic communications (cell phone, two-way radio, Wi-Fi, Bluetooth, etc.) by *Drive Team* members after an *Alliance* has been called from the queue to the *Playing Field* for its *Match* are not allowed. The first instance of violating this rule will result in a warning, with any following instances during the tournament resulting in a *Minor Penalty*. Repeated offenses may result in *Disqualification* for the *Match*. Items that may be mistaken by a casual observer as being in violation should not be brought to the *Playing Field*. The *Driver Station* is exempt from this rule, but must be used only for operating the *Robot*.

<G2> Pre-Match Robot Setup – At the beginning of a *Match*, each *Alliance Robot* must be set up on the *Playing Field* in accordance with section 1.5.1 Pre-Match. After *Robots* have been set up on the *Playing Field*, *Drive Teams* are required to stand *Completely Inside* the *Alliance Station* at the location (*Station one* or *Station two*) specified by the Qualification *Match* schedule. *Teams* are not assigned *Alliance Station* positions (1 or 2) for the Elimination *Matches*.

- a. During the Qualification *Matches*, the Blue *Alliance Robots* are set up on the *Playing Field* first, unless the Red *Alliance* waives their right to set up on the *Playing Field* second.
- b. During the Elimination *Matches*, the lower seeded (e.g. 3rd seed is lower than 2nd seed) *Alliance Robots* are set up on the *Playing Field* first, unless the higher seeded *Alliance* waives their right to set up on the *Playing Field* second.
- c. *Teams* may waive their right to place their *Robots* on the *Playing Field* last by placing their *Robots* on the *Playing Field* before or in conjunction with the opposing *Alliance*. There is no need to notify the referees; *Teams* waive their right by the act of placing their *Robots* on the *Playing Field*.
- d. *Teams* that deliberately or repeatedly delay the start of the *Match* will incur a *Minor Penalty* for each offense. Repeated offenses may lead to *Disqualification*.

<G3> Robot Starting Volume – Before the start of a *Match*, each *Robot* in its starting location must not exceed a volume of 18 inches (45.7cm) wide by 18 inches (45.7cm) long by 18 inches (45.7cm) tall. The *Alliance* identification flag and pre-loaded *Scoring Elements* may extend *Outside* the 18-inch (45.7cm) cube volume constraint. An offending *Robot* will be *Disabled* and powered off for the *Match* at the Head Referee's discretion and must remain on the *Playing Field* in its starting location for the length of the *Match*.

<G4> Robot Setup Alignment Devices – Alignment devices are allowed during *pre-Match* setup if they are constructed from legal components, they are part of the *Robot*, and they remain *Completely Inside* the 18-inch (45.7cm) cube starting volume constraint during the setup process. A *Minor Penalty* will be assessed for violation of this rule, and repeated offenses may lead to *Disqualification*.

The intent of this rule is to prohibit the use of devices external to the *Robot* and to prevent the extension of any object or tool *Outside* the 18-inch (45.7cm) cube starting volume.

<G5> Alliance Station – During a *Match*, the *Drivers* and *Coach* must remain *Completely Inside* their *Alliance Station*. The first instance of leaving the *Alliance Station* will result in a warning, with any following instances resulting in a *Minor Penalty* and/or *Disqualification*. Leaving the *Alliance Station* for safety reasons will not result in a warning or *Penalty*.

<G6> Starting Game Play Early – *Robots* that start to play the game (*Autonomous* or *Driver-Controlled Period*) prior to competition personnel announcing the start of a *Match* period receive a *Minor Penalty*. Referees have the option of issuing a *Major Penalty* in place of the *Minor Penalty* if the early start results in a competitive advantage for the offending *Alliance*.

<G7> Late Start of the Autonomous Period – *Teams* participating in the *Autonomous Period* are expected to press the start button on their *Driver Station* Android Device and then place the *Driver Station* in a hands-off location without delay when field personnel signal the start of the *Autonomous Period*. A *Minor Penalty* is assessed for violating this rule. Referees have the option of issuing a *Major Penalty* in place of the *Minor Penalty* if the late start results in a competitive advantage for the offending *Alliance*.

<G8> Stopping Game Play Late – Robots that do not stop playing the game at the end of the *Autonomous* or *Driver-Controlled Periods* when competition personnel announce the end of a *Match* period receive a *Minor Penalty* and the actions of the *Robot* occurring after the end of a *Match* period do not count towards their *Alliance's Score*. Referees have the option of issuing a *Major Penalty* in place of the *Minor Penalty* if the late stop results in a competitive advantage (other than *Scoring*) for the offending *Alliance*.

Robot Scoring achievements that occur after the announced end of the *Autonomous Period* and before the start of the *Driver-Controlled Period* do not count towards the *Score* for the *Autonomous* and *Driver-Controlled Periods*. Referees may remove any *Scoring Elements* that are improperly *Scored* in this manner.

<G9> Drive Team Contact with the Playing Field or Robot – During a *Match*, the *Drivers* and *Coaches* are prohibited from making contact with the *Playing Field*, any *Game Element*, or any *Robot*. The first instance of contact will result in a warning, with any following instances resulting in a *Minor Penalty* and/or *Disqualification*. Contact that affects *Scoring* and/or game play will result in *Disqualification* at the discretion of the referees. Contact with the *Playing Field*, a *Game Element*, or a *Robot* for safety reasons will not result in a warning or *Penalty*.

<G10> Autonomous to Driver-Controlled Period Transition – At the conclusion of the *Autonomous Period* the Head Referee at his or her discretion will untangle *Robots*, place *Robots* on their drivetrains, make minor adjustments to *Robot* position, etc. so that the *Robots* can participate in the *Driver-Controlled* portion of the *Match*. The referees will do this after finding out from the *Team* where the best place is to touch their *Robot*. At this time, if a *Robot* has lost its Wi-Fi Direct connection to the *Team's Driver Station* or if it is locked-up, power to the *Robot* may be reset under supervision of the Field Technical Advisor as long as the *Match* is not extraordinarily delayed. If the *Robot* is not controllable after attempts to get it working with the *Team's Driver Station*, it will be *Disabled* and remain in place for the remainder of the *Match*.

When instructed by field personnel to do so, *Drive Teams* may use their *Driver Station* to select an Op Mode, initialize, start, and reset their *Robot* as appropriate.

<G11> Drive Team Coach Interference – During the *Driver-Controlled Period*, *Robots* must be remotely operated only by the *Drivers* using the *Team's Driver Station* and/or by software running in the on-board *Robot* control system. The first instance of *Coach* interference (e.g. touching a Gamepad) will result in a warning, with any following instances resulting in a *Major Penalty* and/or *Disqualification*. During the *Driver-Controlled Period*, *Drive Team Coaches* and/or *Drivers* are allowed to hold the *Team's Driver Station* Android Device and interact with it to select an Op Mode, view information displayed on the screen, and initialize, start, stop, and reset the *Robot*.

<G12> Recording the Score After Objects Come to Rest – Referee scoresheets will be filled out at the end of the *Autonomous* and *Driver-Controlled Periods* when all objects on the *Playing Field* have come to rest. A change in the state of a *Game Element* or *Robot* that occurs before a referee records the *Score* on the scoresheet will affect the *Match Score*. A change in state of a *Game Element* or *Robot* after its *Score* is recorded on the scoresheet will not change an already-recorded *Score*.

<G13> Robots Deliberately Detaching Parts – *Robots* may not deliberately detach parts during a *Match*, or leave mechanisms on the *Playing Field*. If a deliberately-detached component or mechanism prevents additional *Scoring* by any *Robot*, the offending *Robot* will be *Disabled* and the *Team* will be *Disqualified*. Multiple infractions may result in tournament *Disqualification*.

<G14> Robots Grasping Game Elements – *Robots* may not grab, grasp or attach to any *Game Element* or structure other than *Scoring Elements*, unless specifically allowed by game-specific rule(s) listed in Section 1.6.3. The first instance will result in a warning with any following violations resulting in a *Major Penalty* and/or *Disqualification*.

<G15> Destruction, Damage, Tipping, etc. – Strategies and mechanisms aimed solely at the destruction, damage, tipping over, or entanglement of *Robots* or *Game Elements* are not in the spirit of the *FIRST* Tech Challenge and are not allowed. However, FTC games are highly interactive and *Robot-to-Robot* contact and defensive game play should be expected. Some tipping, entanglement, and damage may occur as a part of normal game play. If the tipping, entanglement, or damage is ruled to be deliberate or chronic, the offending *Team* may receive a *Major Penalty* and/or a *Disabled Robot* and *Team Disqualification* for that *Match*. Repeated offenses may result in tournament *Disqualification*.

<G16> Pinning or Trapping – A *Robot* cannot cause an opposing *Alliance Robot* to become *Pinned* or *Trapped* for more than five seconds. If a referee determines this rule is violated, the offending *Alliance* will receive a *Minor Penalty* for every five seconds that they are in violation, and the offending *Robot* may be *Disabled* for the *Match*. If a referee declares a *Pinning* or *Trapping* warning during the *Match* the offending *Robot* must move away at least 3 feet (0.9 m), approximately 1.5 floor tiles from the *Pinned* or *Trapped Robot*.

A *Robot* cannot incur a *Pinning* or *Trapping Penalty* during the *Autonomous Period*. If a *Pinning* or *Trapping* occurrence happens during the *Autonomous Period*, the first action done by the offending *Robot* during the *Driver-Controlled Period* must be to move away from the *Pinned* or *Trapped Robot* or a *Minor Penalty* will be assessed immediately and again for every five seconds that they are in violation, and the offending *Robot* may be *Disabled* for the *Match*.

<G17> Forcing an Opponent to Break a Rule – The actions of an *Alliance* or their *Robots* shall not cause an opposing *Alliance* or *Robot* to break a rule and thus incur *Penalties*. Any rule violations committed by the affected *Alliance* shall be excused, and no *Penalties* will be assigned.

<G18> Removing Game Elements from the Playing Field – *Robots* may not deliberately remove *Game Elements* from the *Playing Field* during a *Match*. *Game Elements* that incidentally fall *Outside* the *Playing Field* will be returned to the *Playing Field* by field personnel at the earliest safe and convenient opportunity. *Teams* deliberately removing *Game Elements* from the *Playing Field* will incur a *Minor Penalty* per *Game Element* removed from the *Playing Field*. Continued violation of this rule may lead to the *Robot* being *Disabled* and *Disqualification* of the *Team*. Game-specific rule(s) listed in Section 1.6.3 that allow the removal of *Scoring Elements* from the *Playing Field* take precedence over this general game rule.

<G19> Scoring Elements in Contact with Robots – *Alliance-neutral Scoring Elements* that are in contact with a *Robot* on the corresponding *Alliance* for the *Goal* or *Shelter* have zero *Score* value when referees record the *Score* at the end of the *Autonomous* and *Driver-Controlled Periods*. Game-specific rule(s) listed in Section 1.6.3 that allow *Robot* contact with *Scoring Elements* take precedence over this general game rule.

<G20> Post-Match Removal of Game Elements from Robots – *Robots* must be designed to permit easy removal of *Game Elements* from any grasping, containing, or holding mechanism after the *Match*. *Robots* should also be able to be removed from the *Playing Field* without damaging the *Playing Field*. A *Minor Penalty* will be assessed for violations of this rule, and repeated offenses may lead to *Disqualification*.

The intent of this rule is to have timely removal of *Robots* from the *Playing Field* following a *Match*.

<G21> Robot Manipulation of Scoring Elements – *Scoring Elements* that are *Possessed* or *Controlled* by a *Robot* are considered to be part of the *Robot*.

<G22> Robot or Scoring Element In two or more Scoring Areas – *Robots* or *Scoring Elements* that are *In* two or more *Scoring Areas* earn points only for the highest value achievement. If the achievement values are equal, only one achievement counts as *Scored*. Exceptions to this general rule may be specified in the *Game Play* section or in the game-specific rules.

<G23> Playing Field Tolerances – *Playing Field* and *Game Elements* will start each *Match* with tolerances that may vary by as much as +/-1.0 inch (2.5cm). *Teams* must design their *Robots* accordingly.

<G24> Match Replay – *Matches* are replayed at the discretion of the Head Referee only for a failure of a *Game Element* or verified Wi-Fi interference that was likely to have impacted which *Alliance* won the *Match*.

Unexpected *Robot* behavior in itself will not result in a *Match* replay. *Team*-induced failures, such as low battery conditions, processor sleep time-outs, *Robot* mechanical/electrical/software/communication failures, etc. are NOT valid justifications for a replaying of a *Match*.

<G25> Egregious Behavior – Egregious *Robot* or *Team* member behavior at the *Playing Field*, as determined by the referees, will result in a *Major Penalty* and possible *Match Disqualification*. Subsequent violations will result in *Team Disqualification* from the tournament. Egregious behavior includes, but is not limited to, repeated and/or flagrant violation of game rules, unsafe behavior or actions, and uncivil behavior towards *Drivers*, *Coaches*, competition personnel, or event attendees.

1.6.3 Game-Specific Rules

<GS1> Drive Teams Touching Robots or Driver Stations After Rescue Beacon Randomization – *Drive Teams* are not allowed to touch or interact with their *Robots* or *Driver Stations* once field personnel have randomized the first *Rescue Beacon*. If this occurs, a *Minor Penalty* will be assessed per *Robot* and the affected *Robot* is not eligible to trigger a *Rescue Beacon*. This *Penalty* only affects the offending *Team*. The non-offending *Alliance Partner Robot* remains eligible for the *Rescue Beacon Scoring* achievement. *Drive Teams* are allowed to start their *Robot* with a single start command issued on the *Team's Driver Station* Android device when they are instructed to do so by field personnel.

<GS2> Drive Team or Robot Pressing the Rescue Beacon Randomization Button – *Drive Teams* and *Robots* are not allowed to press the randomization button on the *Rescue Beacon*. A *Major Penalty* will be assessed for violating this rule.

<GS3> Triggering Rescue Beacons – A *Robot* may trigger its *Alliance's Rescue Beacon* no more than one time per *Match*. Violation of this rule results in zero *Score* awarded to the offending *Alliance* for the *Alliance's Rescue Beacon*. The opposing *Alliance* remains eligible to receive points from the affected *Rescue Beacon* if the *Rescue Beacon* is triggered in their favor. The offending *Alliance* remains eligible to receive points from the opposing *Alliance's Rescue Beacon*.

The intent of this rule is to require both *Robots* on an *Alliance* to trigger their *Alliance's Rescue Beacon* in order to earn the maximum forty points.

<GS4> Opposing Alliance's Rescue Beacon – *Robots* are not allowed to press the buttons on the opposing *Alliance's Rescue Beacon*. A *Major Penalty* will be assessed for violating this rule and the *Rescue Beacon* has zero *Score* value for both *Alliances*.

<GS5> Autonomous Period Robot Keep Out Area – *Robots* may not go *Inside* the opposing *Alliance's Area* of the *Playing Field* during the first ten seconds of the *Autonomous Period*. A *Major Penalty* will be assessed for violating this rule. The red and blue gaffers tape on the *Playing Field* floor bisects the *Playing Field* into equal-sized *Alliance Areas*.

The intent of the Game Design Committee is to delay the start of defensive strategies by requiring *Robots* to stay *Completely Inside* their *Alliance's Area* during the first ten seconds of the *Autonomous Period*. The unpredictability of events during the *Autonomous Period* may result in unintentional entry into the opposing *Alliance Area*. For example, *Robot* collisions may result in an *Inadvertent* ingress into the opposing *Alliance Area*. *Inadvertent* and *Inconsequential* ingress into the opposing *Alliance Area* will not be *Penalized*. Entering into the opposing *Alliance Area* during the first 10-seconds of the *Autonomous Period* that results in an *Alliance* gaining an advantage is not *Inconsequential* and it will be *Penalized*.

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<GS6> Robots Grasping Game Elements – Robots may grab, grasp, and attach to the *All Clear Signal*, *Mountains*, *Zip Line Climber-release Triggers*, *Mountain Pull-up Bars*, *Debris*, and *Climbers*. Robots may not grab, grasp, etc. the *Mountain Goals*, *Rescue Beacons*, *Shelters*, *Zip Line*, or any *Climber* that is attached to a *Zip Line*. A *Major Penalty* will be assessed per occurrence for violating this rule. Grasping one, two, or three *Zip Line Climbers* in the same occurrence counts as a single violation of the rule, resulting in one *Major Penalty* for the action. *Inadvertent* and *Inconsequential* contact with restricted *Game Elements* will not result in a *Penalty*.

<GS7> Debris Possession/Control Constraint – Robots may not *Possess* or *Control* more than five *Debris* (cubes or balls) in any combination. If a *Robot* is *Possessing* or *Controlling* more than five *Debris*, the *Alliance* will incur an immediate *Minor Penalty* for each *Debris* above the limit plus an additional *Minor Penalty* per extra *Debris* for each five second interval that this situation continues.

Debris placed *In Goals* while a *Robot Possesses* or *Controls* more than five *Debris* will cause the *Alliance* to receive a *Minor Penalty* for each *Debris* placed *In a Goal* until the *Robot Possesses/Controls* five or fewer *Debris*.

For example, a *Robot Possesses* six *Debris* for seven seconds before placing all six *Debris Into* a *Goal*. The *Penalty* assigned to the *Alliance* is two *Minor Penalties* for *Possessing* one *Debris* over the limit during two five-second intervals, plus an additional *Minor Penalty* for placing one *Debris Into* a *Goal* while *Possessing* one *Debris* over the five *Debris Possession* constraint. For a total of three *Minor Penalties*. All six *Debris* will count as *Scored* by Referees at the end of the *Driver-Controlled Period* if they remain *In the Goal*.

The intent of this rule is to disallow the deliberate *Possession* or *Controlled* movement of a mass quantity of *Debris*. Plowing (bumping, moving, touching, etc.) *Debris* located on the *Playing Field* floor is allowed and does not count towards the five *Debris Possession/Control* constraint if the movement of the *Debris* is not purposeful. *Debris* will be scattered around the *Playing Field* and some interaction between *Robots* and *Debris* is expected and should not be *Penalized*, provided that the *Robot* is not deliberately *Controlling* the *Debris*. *Robot* designs or game strategies that attempt to circumvent this rule are not allowed and may be *Penalized* at the discretion of the referees. For example, *Robot* designs or intentional actions that use the floor or *Mountain* ramp to *Possess* or *Control* more than five *Debris* violates the intent of this rule.

<GS8> Debris Score Value During the Autonomous Period – At the conclusion of the *Autonomous Period*, *Debris* has zero *Score* value. *Debris* contributes to the *Alliance Score* only at the end of the *Driver-Controlled Period*. *Robots* are allowed to collect *Debris* subject to the limitations of rule <GS7> and place *Debris In Scoring Areas* during the *Autonomous Period*. Field personnel will not remove *Debris* from *Scoring Areas* at the end of the *Autonomous Period*.

<GS9> Blocking Access – During the *Driver-Controlled Period*, a *Robot* may not obstruct ALL access, prevent a *Robot* from escaping, or interfere with the opposing *Alliance's Mountain Area* when an opposing *Alliance Robot* is actively attempting to access or escape from that *Area*. The offending *Alliance* will incur a *Major Penalty*. Additional *Major Penalties* will be assessed for every five seconds that the condition persists. This rule does not apply during the *Autonomous Period*.

The intent of this rule is to allow reasonable *Robot* ingress and egress to an *Alliance's Low Zone* (entrance ramp) of the *Mountain Climbing Area* and to prevent interference with the opposing *Alliance's Mountain Climbing Area*. A *Robot In* an opposing *Alliance Climbing Area* during the *Driver-Controlled Period* that isn't *Inconsequential* and *Inadvertent* is *Blocking Access* and it will be *Penalized*.

<GS10> Ingress into an opposing Alliance Climbing Area – *Robots* may not enter or extend *Inside* an opposing *Alliance's Mountain Climbing Area* during the Driver-Controlled Period. The close proximity of the

Red and Blue *Alliance Climbing Areas* will likely lead to some *Inadvertent* and *Inconsequential Robot* ingress into the opposing *Alliance's Area*, which is allowed without incurring a *Penalty* at the discretion of the referees. A *Minor Penalty* will be assessed for violating this rule in the *Low, Mid, and High Zones*. Two *Major Penalties* for a total of eighty points will be assessed for violating this rule in the *Cliff Zone*.

The three *Alliance-specific Goals* for *Scoring Debris* on the *Mountain* are *In* an *Alliance-shared* space between the two *Climbing Areas*. Ingress into this shared *Area* is allowed.

Robots may enter an opposing *Alliance Climbing Area* during the Autonomous Period without receiving a warning or *Penalty*. The intent of the Game Design Committee is for *Robots* to stay within their *Alliance's* reserved *Climbing Areas*. However, the unpredictability of events during the *Autonomous Period* may result in *Robots* entering and/or *Parking Inside* the opposing *Alliance Climbing Area*. No warnings are issued and no *Penalty* is assessed for a *Robot Inside* or *Completely Inside* an opposing *Alliance Climbing Area* during the *Autonomous Period*. The required first action of a *Robot* that is *Inside* or *Completely Inside* an opposing *Alliance Climbing Area* at the start of the *Driver-Controlled Period* is to immediately move *Out* of the opposing *Alliance Climbing Area*. A *Robot* that does not leave the opposing *Alliance Climbing Area* in a reasonable length of time incurs <GS10> *Penalties*. A guideline for referees is to allow five seconds for each zone the *Robot* needs to travel *In* to exit the *Climbing Area*. For example, a *Robot In* the *Mid Zone* is expected to exit the opposing *Alliance Climbing Area* within ten seconds. Since the Game Design Committee can not predict all circumstances, referees may allow additional time to exit the *Climbing Area* at their discretion.

The intent of the Game Design Committee is for *Robots* to perform a pull-up *Completely Inside* their *Alliance's Climbing Area*. However, ingress into the opposing *Alliance's Cliff Zone* and contact with an opposing *Alliance Robot* during the *End Game* that is *Inadvertent* and *Inconsequential* is allowed.

<GS11> Interfering with Climbing Robots – During the Driver-Controlled Period, a *Robot* may not make contact with an opposing *Alliance Robot* that is *Completely In* its *Alliance's Mountain Climbing Area*. For example, a Red *Alliance Robot* may not make contact with a Blue *Alliance Robot* that is *Completely In* the Blue *Alliance Mountain Climbing Area*. Violations will result in a *Major Penalty* per occurrence. Two *Major Penalties* totaling eighty points will be assessed for violations occurring in the *Cliff Zone*. The close proximity of the *Robots* on opposing *Alliances* will likely lead to some *Inadvertent* and *Inconsequential* contact that is allowed without incurring a *Penalty* at the discretion of the referees.

Climbing the *Mountain* and performing a pull-up *In* the *Cliff Zone* may place *Robots* in precarious situations. The intent of this rule is to prevent outside forces from: disrupting the stability of a *Robot*, preventing a *Robot* from placing *Debris* into a *Mountain Goal*, or interfering with a *Robot* that is *Supported* by the *Pull-up Bar*.

<GS12> Disabled Robot Blocking Access to or In the opposing Alliance Climbing Area – If a *Disabled Robot* is *Blocking Access* to the opposing *Alliance's Mountain Climbing Area*, one *Robot* from the affected *Alliance* may enter an opposing *Alliance Mountain Climbing Area* (on either *Mountain*) that is not occupied by another *Robot* to *Score In Goals*, *Park*, hang from the *Cliff Zone Pull-up Bar*, and claim its *Alliance's All Clear Signal*. Further, this *Robot* is not subject to rule <GS9> while it is *In* this *Area*. If access to both of an *Alliance's Climbing Areas* are blocked by *Disabled* opposing *Alliance Robots*, both of the affected *Alliance's Robots* may enter opposing *Alliance Climbing Areas*.

The intent of rules <GS9>, <GS10>, <GS11> and <GS12> is to assure free access to the *Mountain* and unimpeded opportunities to complete the *Scoring* tasks on the *Mountain*.

<GS13> Mountain Scoring Constraints – *Robots* may *Score Debris* into the *Low Zone Goal* and engage the *Low Zone Zip Line Trigger* from any location on the *Playing Field*. *Robots* are required to be *Completely On* the *Mountain* and the *Robot's* drivetrain (e.g. wheels, tread) must only be in contact with the portions of the *Mountain* above the two inch tall buffer *Area* that is defined by white gaffers tape located at the bottom/entrance to the *Mountain* ramp to perform the following actions:

- a. Attach to or be Supported by the Cliff Pull-up Bar
- b. Score Debris In the Mid Zone and High Zone Goals
- c. Claim the All Clear Signal
- d. Release Zip Line Climbers with the Mid and High Zone Triggers

The 2-inch buffer Area is considered to be part of the *Low Zone*. Robot actions performed while violating this rule do not contribute to the *Alliance's Score*.

The intent of this rule is for *Robots* to climb onto the *Mountain* in order to earn points for all of the *Mountain's Scoring* achievements except for placing *Debris* into the *Low Zone Goal*, partially *Parking On the Mountain*, and engaging the *Low Zone Zip Line Trigger*.

<GS14> Releasing Climbers – Triggers on the *Mountain* are the only valid way to release the *Zip Line Climbers*. Zero points are Scored for *Climbers* that are released to slide down the *Zip Line* by any other method. *Zip Line Climbers* have a Score value only at the end of the *Driver-Controlled Period*; however, *Robots* may release them during the *Autonomous* and *Driver-Controlled Periods*.

The intent of this rule is for the *Mountain Triggers* to release the *Zip Line Climbers*. Robot interaction with the *Mountain* and/or *Playing Field Walls* may cause an *Inadvertent* release of *Zip Line Climbers* without a *Robot* engaging the *Triggers*. Referees will credit an *Alliance* for releasing *Climbers* if the *Triggers* are engaged after *Climbers* have been released by other means. Referees will also award credit for releasing a *Climber* under the following circumstances:

- a. A *Trigger* appears to be engaged and the corresponding *Climber* does not release and travel the entire length of the *Zip Line*.
- b. A *Trigger* rotates from an engaged/Scored orientation back to its *pre-Match* starting orientation after the corresponding *Climber* has been released by a valid method.

<GS15> De-Scoring Debris – *Robots* may not *de-Score Debris* from the *Mountain Goals*, however *Debris* may be *de-Scored* from any *Floor Goal*. If *Debris* is *de-Scored* illegally, the offending *Alliance* will incur a *Major Penalty* for each *de-Scored Debris*. In other words, once a *Debris* is Scored In a *Mountain Goal*, it may not be removed by any *Robot*, even one of the same *Alliance's* color. *De-Scored Debris* do not count towards an *Alliance's Match Score*.

The intent of this rule is to prevent intentional *de-Scoring*. *Debris* that fall out of a *Mountain Goal* due to *Robots* climbing the *Mountain*, bumping into a *Mountain Goal* or *Mountain*, placing *Debris* into a *Mountain Goal*, engaging *Triggers*, etc. will not be *Penalized*.

<GS16> De-Scoring Climbers – *Robots* may not *de-Score* a *Climber* from a *Shelter*. If *Climbers* are *de-Scored* illegally, the offending *Alliance* will incur a *Major Penalty* for each *de-Scored Climber*. *Climbers* that are *Inadvertently de-Scored* while attempting to Score *Climbers* will not be *Penalized*. *De-Scored Climbers* do not count towards an *Alliance's Match Score*.

<GS17> Removing a Climber from the Playing Field – A *Robot* may remove a *Climber* from the *Playing Field* without incurring a *Penalty* if it is a consequence of an attempt to Score the *Climber* In a *Shelter*. Field personnel will return the *Climber* to the *Playing Field* at the earliest safe and convenient opportunity.

<GS18> Robot Contact with the All Clear Signal or Mountain Cliff Zone Before the End Game – Robots that contact, engage, grasp, grab, etc. an *All Clear Signal*, the *Pull-up Bar*, or the *Cliff Low Bar* prior to the start of the *End Game* cause their *Alliance* to receive zero *Score* for both of the *End Game Scoring* achievements on the corresponding *Mountain*. The offending *Robot* remains eligible for the *Low*, *Mid* and *High Zone Parking* achievements on the same *Mountain*. The *All Clear Signal* and *Pull-up Bar* on the other *Mountain* remain in play for both *Robots* on the offending *Alliance*. *Inadvertent* and *Inconsequential* contact made with the *All Clear Signal*, the *Pull-up Bar*, or the *Cliff Low Bar* will not result in a *Penalty* of loss of *Score*.

<GS19> Robot Contact with the All Clear Signal at the End of the Match – Robots are allowed to be in contact with the *All Clear Signal* at the end of the *Match* and earn the *All Clear Signal* and pull-up *Scores* for their *Alliance*. Robots are not required to be in contact with the *All Clear Signal* to earn points for their *Alliance*.

<GS20> Robot Extension Outside the Playing Field Perimeter – Robots will not be *Penalized* for extending beyond the *Mountain's Cliff Zone* or the *Shelter*. The *Drive Team* and field personnel in these *Areas* should be situationally aware to avoid contact with *Robots*.

<GS21> Number of Robots Supported by a single Pull-up Bar – Up to one *Robot* from each *Alliance* is allowed to be *Supported* by the same *Cliff Zone Pull-up Bar* (i.e. no double *Robot* hangs by an *Alliance* on the same *Pull-up Bar*). Two *Major Penalties* totaling eighty points will be assessed for violating this rule. *Robots* protected by rule <GS12> are eligible to earn *Cliff pull-up* and *All Clear Signal Points* along with their *Alliance Partner Robot* on the same *Mountain*.

The intent of this rule is for each *Mountain Pull-up Bar* to *Support* no more than two *Robots*, one from each *Alliance*.

1.7 Scoring Summary

The following table shows the possible *Scoring* achievements and their point values. The table is a quick reference guide and not a substitute for a thorough understanding of the game manual.

Scoring Achievement	Autonomous Points	Driver-Controlled Points	End Game Points	Reference
<i>Rescue Beacon Triggered</i> - First time - Second time	20 20			1.5.2.1
<i>Robot Parked</i> - Floor Goal - Rescue Beacon Repair Zone - Tile Floor and Mountain - Mountain Low Zone - Mountain Mid Zone - Mountain High Zone	5 5 5 10 20 40			1.5.2.5 1.5.2.4 1.5.2.3a 1.5.2.3b 1.5.2.3c 1.5.2.3d
<i>Climber in Shelter</i>	10	10		1.5.2.2 & 1.5.3.3
<i>Debris</i> - Floor Goal - Low Zone Goal - Mid Zone Goal - High Zone Goal		1 5 10 15		1.5.3.1a 1.5.3.1b 1.5.3.1c 1.5.3.1d
<i>Zip Line Climber</i>		20		1.5.3.2
<i>Robot Parked</i> - Tile Floor and Mountain - Mountain Low Zone - Mountain Mid Zone - Mountain High Zone		5 10 20 40		1.5.3.4a 1.5.3.4b 1.5.3.4c 1.5.3.4d
<i>Cliff Pull-up Bar</i>			80	1.5.4.1
<i>All Clear Signal</i>			20	1.5.4.2

1.8 Rule Summary

The following table shows the possible rule violations and their consequences. The table is a quick reference guide and not a substitute for a thorough understanding of the complete rule descriptions in section 1.6.

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
Safety Rules							
<S1>	Unsafe <i>Robot</i> or damage to the <i>Playing Field</i> .	Immediate <i>Disable</i> if unsafe operation or damage is likely to persist. Otherwise, warning escalating to <i>Disable</i> or <i>Disqualification</i> .	W			D	DQ
<S2>	Illegal <i>Robot</i> extension <i>Outside</i> the <i>Playing Field</i> and contacting anything <i>Outside</i> the <i>Playing Field</i> .	<i>Robot</i> will be <i>Disabled</i> and repeated offenses may lead to <i>Disqualification</i> .				D	DQ
<S3>	<i>Drive Team</i> missing safety gear.	Warning and if the situation is not remedied within thirty seconds, the offending member(s) of the <i>Drive Team</i> must leave the <i>Competition Area</i> for the remainder of the <i>Match</i> and may not be replaced.	W				
General Rules							
<G1>	<i>Drive Team</i> using disallowed electronic communication.	Warning with any following instances during the tournament resulting in a <i>Minor Penalty</i> . Repeated offenses may result in <i>Disqualification</i> .	W	1x			DQ
<G2>	<i>Pre-Match Robot</i> setup – Deliberately delaying the start of the <i>Match</i> .	<i>Minor Penalty</i> for each offense. Repeated offenses may lead to <i>Disqualification</i> .		1x			DQ
<G3>	<i>Robot</i> starting volume.	<i>Robot</i> is <i>Disabled</i> and powered off in a valid starting <i>Area</i> on the <i>Playing Field</i> .				D	
<G4>	<i>Robot</i> setup alignment devices.	<i>Minor Penalty</i> and repeated offenses may lead to <i>Disqualification</i> .		1x			DQ
<G5>	<i>Drive Team</i> member(s) leaving the <i>Alliance Station</i> .	Warning for the first instance with any following instances resulting in a <i>Minor Penalty</i> and/or <i>Disqualification</i> .	W	1x			DQ
<G6>	<i>Starting Game Play Early</i> .	<i>Minor Penalty</i> with the option of a <i>Major Penalty</i> in place of the <i>Minor Penalty</i> if the early start results in a competitive advantage for the offending <i>Alliance</i> .		1x	1x		

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
<G7>	Late Start of the Autonomous Period	Minor Penalty with the option of a Major Penalty in place of the Minor Penalty if the late start results in a competitive advantage for the offending Alliance.		1x	1x		
<G8>	Stopping Game Play Late.	Minor Penalty and the actions of the Robot that occur after the announced end of game play for the Match period do not count towards their Alliance's Score. Referees have the option of issuing a Major Penalty in place of the Minor Penalty if the late stop results in a competitive advantage for the offending Alliance.		1x	1x		
<G9>	Drive Team contact with the Playing Field or Robot.	Warning for the first instance with any following instances resulting in a Minor Penalty and/or Disqualification. Contact for safety reasons will not result in a warning or Penalty.	W	1x			DQ
<G10>	Autonomous to Driver-Controlled Period transition – Robot failure.	A Robot that can not be controlled by the Drive Team will be Disabled and remain in place for the remainder of the Match.				D	
<G11>	Drive Team Coach interference.	Warning for the first instance with any following instances resulting in a Major Penalty and/or Disqualification.	W		1x		DQ
<G12>	Referees record the Score after all objects come to rest.	Accurate completion of the Match scoresheets.					
<G13>	Robots deliberately detaching parts.	Robots will be Disabled and the Team Disqualified for deliberately detached parts that prevent additional Scoring by any Robot. Multiple infractions may result in tournament Disqualification.				D	DQ
<G14>	Robots illegally grasping Game Elements.	Warning for the first instance with any following instances resulting in a Major Penalty and/or Disqualification.	W		1x		DQ
<G15>	Destruction, damage, tipping, etc.	Deliberate or chronic violations of this rule may result in a Major Penalty and/or Disabling the Robot and Team Disqualification for that Match. Repeated offenses may result in tournament Disqualification.			1x	D	DQ

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
<G16>	<i>Pinning or Trapping</i> for more than 5-seconds in the <i>Driver-Controlled Period</i> .	<i>Minor Penalty</i> for every five seconds the <i>Robot</i> violates this rule and the offending <i>Robot</i> may be <i>Disabled</i> for the <i>Match</i> . The offending <i>Robot</i> must move away 3 ft. (0.9 m) from the <i>Pinned or Trapped Robot</i> . The <i>Pinning or Trapping</i> rule does not apply during the <i>Autonomous Period</i> . If a <i>Pinning or Trapping</i> occurrence happens during the <i>Autonomous Period</i> , the first action by the offending <i>Robot</i> during the <i>Driver-Controlled Period</i> must be to move away or a <i>Minor Penalty</i> will be assessed.		1x		D	
<G17>	Forced by an opponent to violate a rule.	No <i>Penalty</i> is assessed to either <i>Alliance</i> .					
<G18>	Removing <i>Game Elements</i> from the <i>Playing Field</i> .	<i>Minor Penalty</i> per <i>Game Element</i> removed from the <i>Playing Field</i> unless the <i>Robot</i> is protected by rule <GS17>. Continued violation of this rule may lead to <i>Disable</i> and <i>Disqualification</i> .		1x		D	DQ
<G19>	<i>Scoring Elements</i> in contact with <i>Robots</i> .	<ul style="list-style-type: none"> - <i>Alliance neutral Scoring Elements</i> that are in contact with a <i>Robot</i> of the corresponding <i>Alliance Goal</i> have zero <i>Score</i> value. - <i>Alliance-specific Scoring Elements</i> in contact with a corresponding <i>Alliance Robot</i> have zero <i>Score</i> value. - The <i>All Clear Signal</i> is exempt from this rule per <GS19>. 					
<G20>	Delay caused by difficult <i>Post-Match</i> removal of <i>Robots</i> from the <i>Playing Field</i> and <i>Game Elements</i> from <i>Robots</i> .	A <i>Minor Penalty</i> will be assessed and repeated offenses may lead to <i>Disqualification</i> .		1x			DQ
<G21>	<i>Robot</i> manipulation of <i>Scoring Elements</i> .	Not applicable.					
<G22>	<i>Robot</i> or <i>Scoring Element</i> in two or more <i>Scoring Areas</i> .	Points are earned only for the highest value achievement. If the achievement values are equal, only one achievement counts as <i>Scored</i> .					

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
<G23>	<i>Playing Field</i> tolerances.	The <i>Playing Field</i> and <i>Game Elements</i> will start each <i>Match</i> within the specified tolerance.					
<G24>	<i>Match</i> replay.	A <i>Match</i> is replayed under the specified circumstances.					
<G25>	Egregious behavior.	<i>Major Penalty</i> and possible <i>Match Disqualification</i> . Subsequent violations result in <i>Team Disqualification</i> .			1x		DQ
Game Specific Rules							
<GS1>	<i>Drive Teams</i> touching <i>Robots</i> or <i>Driver Stations</i> after <i>Rescue Beacon</i> randomization.	<i>Minor Penalty</i> and the affected <i>Team's Robot</i> is not eligible to reset a <i>Rescue Beacon</i> .		1x			
<GS2>	<i>Drive Team</i> or <i>Robot</i> pressing the <i>Rescue Beacon</i> randomization button.	<i>Major Penalty</i> .			1x		
<GS3>	<i>Robot</i> triggers a <i>Rescue Beacon</i> more than once.	Zero <i>Score</i> for the <i>Alliance's Rescue Beacon</i> . The opposing <i>Alliance</i> is eligible to receive points from the affected <i>Rescue Beacon</i> .					
<GS4>	<i>Robot</i> presses a button on the opposing <i>Alliance Rescue Beacon</i> .	<i>Major Penalty</i> and the <i>Rescue Beacon</i> has zero <i>Score</i> value for both <i>Alliances</i> .			1x		
<GS5>	<i>Robot</i> enters the <i>Autonomous Period Robot keep Out Area</i> during the first 5-seconds of a <i>Match</i> .	<i>Major Penalty</i> .			1x		
<GS6>	<i>Robot</i> grasping a <i>Climber</i> that is on a <i>Zip Line</i> or a <i>Mountain Goal</i> .	<i>Major Penalty</i> per occurrence.			1x		
<GS7>	Exceeding the 5- <i>Debris Possession/Control</i> constraint.	<i>Minor Penalty</i> for each <i>Debris</i> above the limit plus an additional <i>Minor Penalty</i> per extra <i>Debris</i> for each five second interval that the situation continues. Additional <i>Minor Penalty</i> for each <i>Debris</i> placed in a <i>Goal</i> while the <i>Robot Possesses/Controls</i> more than five <i>Debris</i> .		1x			

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
<GS8>	<i>Debris Score</i> value for the <i>Autonomous Period</i> .	<i>Debris</i> has zero <i>Score</i> value for the <i>Autonomous Period</i> . <i>Debris</i> is not removed from <i>Scoring Areas</i> by field personnel at the end of the <i>Autonomous Period</i> .					
<GS9>	<i>Blocking Robot Access</i> to or preventing a <i>Robot</i> from escaping an <i>Alliance's Mountain Climbing Area</i> .	<i>Major Penalty</i> and additional <i>Major Penalties</i> assessed for every 5-seconds that the condition persists.			1x		
<GS10>	Ingress into an opposing <i>Alliance's Mountain Climbing Area</i> .	- <i>Minor Penalty</i> in the <i>Low, Mid and High Zones</i> . - Two <i>Major Penalties</i> in the <i>Cliff Zone</i> .		1x	2x		
<GS11>	Interfering with a climbing <i>Robot</i> .	<i>Major Penalty</i> in the <i>Low, Mid and High Zones</i> . Double <i>Major Penalty</i> in the <i>Cliff Zone</i> .			1x,2x		
<GS12>	<i>Disabled Robot Blocking Access</i> to or <i>In</i> the opposing <i>Alliance Climbing Area</i> .	No <i>Penalty</i> is assessed and one opposing <i>Alliance Robot</i> is allowed to enter the <i>Disabled Robot's</i> available <i>Alliance Climbing Area</i> subject to the restrictions listed in the rule.					
<GS13>	<i>Mountain Scoring</i> constraints.	Zero <i>Score</i> for the achievement(s) accomplished while violating this rule. See the rule for complete details.					
<GS14>	Releasing <i>Zip Line Climbers</i> .	Zero <i>Score</i> value for <i>Zip Line Climbers</i> that are released without using the <i>Triggers</i> . See the rule for complete details.					
<GS15>	<i>De-Scoring Debris</i> from a <i>Mountain Goal</i> .	<i>Major Penalty</i> per <i>de-Scored Debris</i> .			1x		
<GS16>	<i>De-Scoring a Climber</i> from a <i>Shelter</i> .	<i>Major Penalty</i> per <i>de-Scored Climber</i> .			1x		
<GS17>	Removing a <i>Climber</i> from the <i>Playing Field</i> while attempting to <i>Score In a Shelter</i> .	No <i>Penalty</i> is assessed.					
<GS18>	Contact with the <i>All Clear Signal</i> or <i>Mountain Cliff Zone</i> before the <i>End Game</i> .	Zero <i>Score</i> for both of the <i>End Game</i> achievements. The offending <i>Robot</i> remains eligible for the <i>Low, Mid and High Zone Parking</i> achievements on the same <i>Mountain</i> . The offending <i>Alliance's Scoring</i> eligibility for both <i>Robots</i> on the other <i>Mountain</i> is not affected.					

Rule #	Rule	Consequence	Warning	Minor Penalty	Major Penalty	Disable	Disqualify
<GS19>	Contact with the <i>All Clear Signal</i> at the <u>end</u> of the <i>Match</i> .	No <i>Penalty</i> is assessed and <i>Scoring</i> of the <i>All Clear Signal</i> and <i>Pull-up Bar</i> is allowed.					
<GS20>	<i>Robot extension Outside</i> the <i>Playing Field Perimeter</i> .	No <i>Penalty</i> for extending beyond the <i>Mountain's Cliff Zone</i> and <i>Climber Shelter</i> .					
<GS21>	More than one <i>Robot</i> per <i>Alliance Supported</i> by a single <i>Pull-up Bar</i> .	Two <i>Major Penalties</i> except for <i>Robots</i> protected by rule <GS12>.			2x		

Column Key	
W: Warning	1x: <i>Penalty</i> at normal (single) cost
D: <i>Disabled</i>	2x: <i>Penalty</i> at double cost
DQ: <i>Disqualify</i>	