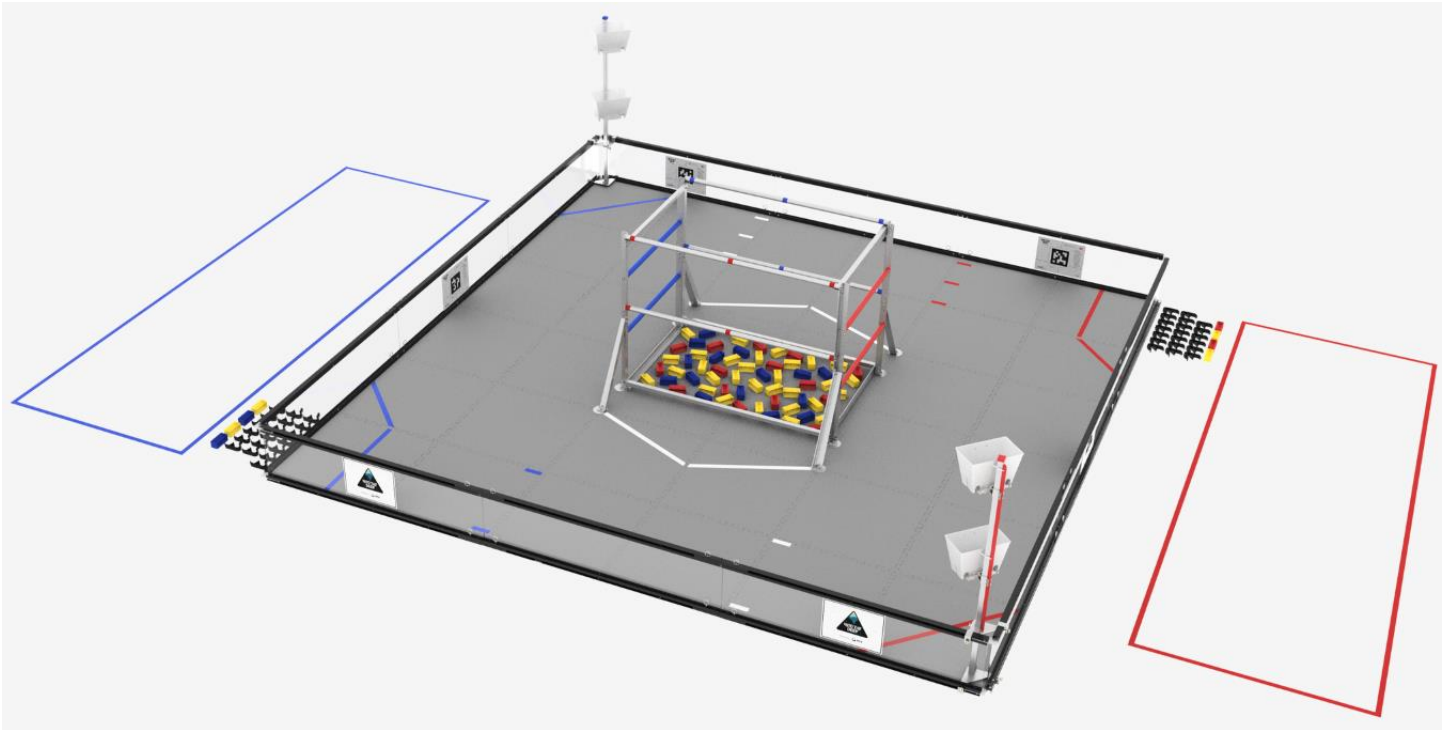


## 10 Game Details

Figure 10-1: FIELD for INTO THE DEEP presented by RTX



In INTO THE DEEP, 2 ALLIANCES (an ALLIANCE is a cooperative of 2 FIRST Tech Challenge teams) play MATCHES, set up and implemented per the details described below.

### 10.1 MATCH Overview

MATCHES run on a typical 6-10-minute cycle time per FIELD, which consists of pre-MATCH setup, a 30 second AUTO period, an 8 second transition period between AUTO and TELEOP, and a 2-minute TELEOP period, followed by the post-MATCH reset.

During the MATCH, ROBOTS score SAMPLES into BASKETS and SPECIMENS on the CHAMBERS. ALLIANCE-colored SAMPLES can be turned into SPECIMENS by returning them to the OBSERVATION ZONE where the HUMAN PLAYER can add a CLIP.

ROBOTS conclude the MATCH by either PARKING in their OBSERVATION ZONE or ASCENDING the RUNGS of the SUBMERSIBLE.

### 10.2 DRIVE TEAM

A DRIVE TEAM is a set of up to 4 people from the same FIRST Tech Challenge team responsible for team performance for a specific MATCH. There are 3 specific roles on a DRIVE TEAM which ALLIANCES can use to assist ROBOTS, and no more than 1 member of the DRIVE TEAM is allowed to be a non-STUDENT.

The intent of the definition of DRIVE TEAM and DRIVE TEAM related rules is that, barring extenuating circumstances, the DRIVE TEAM consists of people who arrived at the event affiliated with that team and are responsible for their team’s and ROBOT’S performance at the event (this means a person may be affiliated with more than 1 team). The intent is not to allow teams to “adopt” members of other teams for strategic advantage for the loaning team, borrowing team, and/or their ALLIANCE (e.g., an ALLIANCE CAPTAIN believes 1 of their DRIVERS has more experience than a DRIVER of their ALLIANCE partner, and the teams agree the first pick team will “adopt” that DRIVER and make them a member of their DRIVE TEAM for playoffs).

The definition is not stricter for two main reasons. First, to avoid additional bureaucratic burden on teams and event volunteers (e.g., requiring that teams submit official rosters that Queuing must check before allowing a DRIVE TEAM into the ARENA). Second, to provide space for exceptional circumstances that give teams the opportunity to display *Gracious Professionalism* (e.g., a bus is delayed, a DRIVE COACH has no DRIVERS, and their pit neighbors agree to help by loaning DRIVERS as temporary members of the team until their bus arrives).

Table 10-1: DRIVE TEAM roles

Role	Description	Max./ DRIVE TEAM	Criteria
<b>DRIVE COACH</b>	a guide or advisor	1	any team member and may be an adult, must wear “DRIVE COACH” badge
<b>DRIVER</b>	an operator and controller of the ROBOT	2	STUDENT, must wear a “DRIVER” badge
<b>HUMAN PLAYER</b>	a SCORING ELEMENT manager	1*	STUDENT, must wear a “HUMAN PLAYER” badge

\*Only one HUMAN PLAYER will represent an ALLIANCE in a MATCH.

A STUDENT is a person who has not completed high-school, secondary school, or the comparable level in their home region as of September 1<sup>st</sup> of the current season.

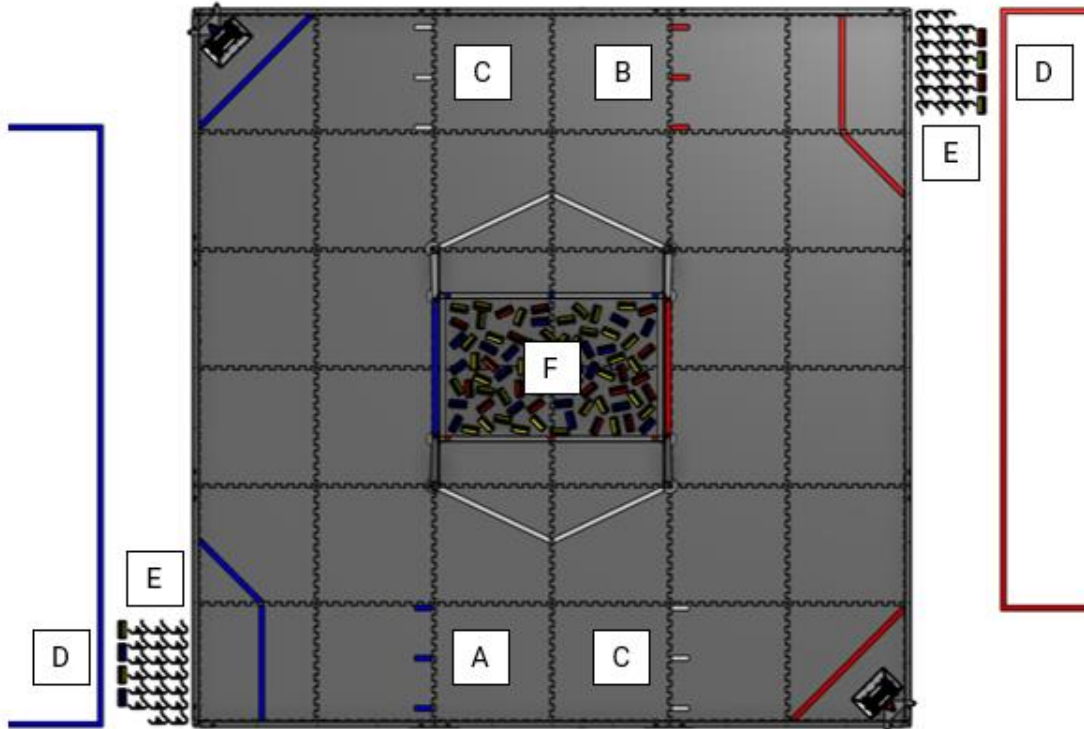
### 10.3 Setup

Before each MATCH begins, FIELD STAFF stage SCORING ELEMENTS as described in section [10.3.1 SCORING ELEMENTS](#). DRIVE TEAMS stage their ROBOTS (as described in section [10.3.4 ROBOTS](#)) and OPERATOR CONSOLES (as described in section [10.3.3 OPERATOR CONSOLES](#)). Then, DRIVE TEAMS take their places as described in section [10.3.2 DRIVE TEAMS](#).

### 10.3.1 SCORING ELEMENTS

Before each MATCH begins, FIELD STAFF stage SCORING ELEMENTS according to Figure 10-2.

Figure 10-2: SCORING ELEMENTS staging positions



80 SAMPLES (20 red, 20 blue, and 40 neutral) and 40 CLIPS that are staged as follows:

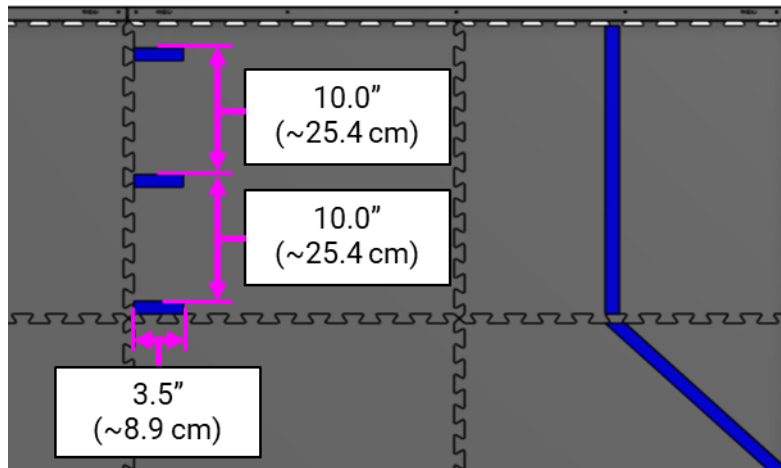
- A. Blue ALLIANCE SAMPLES – 3 blue SAMPLES are placed on each of the 3 SPIKE MARKS on TILE B1
- B. Red ALLIANCE SAMPLES – 3 red SAMPLES are placed on each of the 3 SPIKE MARKS on TILE E6
- C. Neutral SAMPLES – 3 neutral SAMPLES are placed on each of the 3 SPIKE MARKS on TILES B6 and E1
- D. 2 neutral SAMPLES and 2 corresponding ALLIANCE SPECIFIC SAMPLES are placed on the floor outside the FIELD wall between the ALLIANCE AREA and the wall
- E. 20 CLIPS are placed on the floor outside the FIELD wall between the ALLIANCE AREA and the wall
- F. SAMPLES inside the SUBMERSIBLE ZONE – 15 red SAMPLES, 15 blue SAMPLES, and 30 neutral SAMPLES are randomly placed inside the SUBMERSIBLE

From the SCORING ELEMENTS provided in D and E each ROBOT may be pre-loaded with either 1 SAMPLE or one SPECIMEN such that it is in contact with the ROBOT and not in the OBSERVATION ZONE or NET ZONE. SAMPLES or CLIPS not pre-loaded will remain in setup locations D and E.

All of the SPIKE MARK locations are measured relative to the inner tooth TILE edge towards the center of the FIELD as shown in Figure 10-3.

SAMPLES should be placed on SPIKE MARKS such that they are completely covering the SPIKE MARK. Teams may adjust the placement of SAMPLES on the SPIKE MARKS in front of their DRIVE TEAM as long as the SAMPLE completely covers the SPIKE MARK and there is no delay to the start of the MATCH.

Figure 10-3: SPIKE MARK Locations on TILE B1



### 10.3.2 DRIVE TEAMS

DRIVE TEAMS prepare for a MATCH by staging in the ALLIANCE AREA after the DRIVE TEAM from the previous MATCH has left. DRIVE TEAM starting conditions are listed below, and a DRIVE TEAM obstructing or delaying any of the conditions is at risk of violating [G301](#).

- A. only DRIVE TEAM members assigned to the upcoming MATCH are present.
- B. only DRIVE TEAM members whose ROBOTS have passed initial, complete Inspection are present.
- C. one HUMAN PLAYER per ALLIANCE has been identified and is standing in their designated ALLIANCE AREA.
- D. DRIVERS are standing in their designated ALLIANCE AREA. If members of the ALLIANCE cannot agree where their DRIVERS and COACH will stand, the team listed on the MATCH schedule as "Red 1" or "Blue 1" will stand in the station closest to the audience.
- E. DRIVE TEAM members clearly display their designated badges above their waists.

### 10.3.3 OPERATOR CONSOLES

DRIVE TEAMS set up their OPERATOR CONSOLES as soon as they are staged in their ALLIANCE AREA. OPERATOR CONSOLES must be compliant with all relevant rules, specifically those in section [12.9 OPERATOR CONSOLE](#). A DRIVE TEAM obstructing or delaying OPERATOR CONSOLE set up is at risk of violating [G301](#).

- A. DRIVE TEAMS running an AUTO OpMode during the AUTO period must select an OpMode within their DRIVER STATION app with the 30 second timer enabled.
- B. DRIVE TEAMS not running an OpMode during the AUTO period must select a TELEOP OpMode within the DRIVER STATION app.
- C. the OpMode must be initialized by pressing the "INIT" button on the DRIVER STATION app.

### 10.3.4 ROBOTS

DRIVE TEAMS stage their ROBOT in accordance with [G303](#). A DRIVE TEAM obstructing or delaying ROBOT setup requirements is at risk of violating [G301](#).

If order of placement matters to either or both ALLIANCES, the ALLIANCE notifies the head REFEREE or their designee before set up for that MATCH, and the head REFEREE instructs ALLIANCES to alternate placement of ROBOTS. REFEREE instructions are that ROBOTS are placed in the following order:

1. first red ROBOT
2. first blue ROBOT
3. second red ROBOT
4. second blue ROBOT

In qualification MATCHES the ROBOT assigned to Red 1 or Blue 1 places first within their ALLIANCE. In playoff MATCHES the ALLIANCE CAPTAIN decides which ROBOT places first within their ALLIANCE.

### 10.4 MATCH Periods

The first period of each MATCH is 30 seconds long and called the autonomous period (AUTO). During AUTO, ROBOTS operate without any DRIVER control or input. ROBOTS attempt to score SAMPLES, PARK in the OBSERVATION ZONE, contact the SUBMERSIBLE, hang SPECIMENS onto a CHAMBER, and retrieve additional SAMPLES. There is an 8-second delay between AUTO and TELEOP for scoring purposes as described in Section [10.5 Scoring](#).

The second period of each MATCH is 2 minutes (2:00) and called the teleoperated period (TELEOP). During TELEOP, DRIVERS remotely operate ROBOTS to retrieve and score SAMPLES, hang SPECIMENS onto the CHAMBER, and PARK in the OBSERVATION ZONE or ASCEND the RUNGS to achieve points.

### 10.5 Scoring

ALLIANCES are rewarded for their performance during MATCHES via MATCH points and RANKING POINTS (RP), which increase the measure used to rank teams per section [13.5.3 Qualification Ranking](#).

ALLIANCES are rewarded MATCH points for accomplishing tasks through the course of a MATCH, including:

- PARKING in the OBSERVATION ZONE
- scoring SAMPLES in the NET ZONE and BASKETS
- scoring SPECIMENS on their CHAMBERS, and
- ASCENDING their RUNGS

All accomplishments are tracked live by FIELD STAFF and certified at the end of the MATCH.

Accomplishments are officially scored at the end of each MATCH period based on the status of the FIELD, when all ROBOTS and SCORING ELEMENTS have come to rest, except as follows:

- A. assessment of ASCENT and PARKING points is made 3 seconds after the ARENA timer reaches the end of the MATCH period following AUTO and TELEOP, or when all ROBOTS have come to rest following the conclusion of the MATCH period, whichever happens first.
- B. scoring achievements that occur after the end of the AUTO period and before the start of the TELEOP period will count in the TELEOP period but may violate [G403](#).

ALLIANCES are rewarded RANKING POINTS (RP) for winning or tying MATCHES, which is determined by MATCH points earned by each ALLIANCE.

### 10.5.1 SAMPLE Scoring Criteria

A SAMPLE is scored in the NET ZONE when it is fully or partially inside the NET ZONE.

A SAMPLE is scored into the BASKET when fully or partially contained within the volume of the inside surface of the BASKET or fully supported by the BASKET either directly or transitively through other SAMPLES.

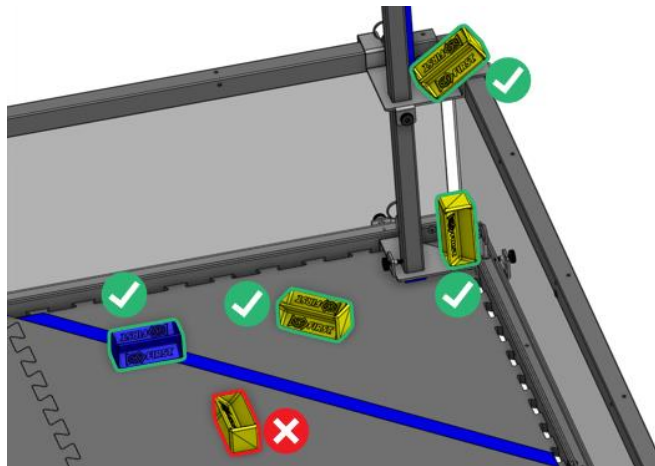
SAMPLES that are scored in either the LOW or HIGH BASKET only count as scored in a BASKET and not in the NET ZONE.

SAMPLES scored into a NET or BASKET count for the ALLIANCE that owns that NET or BASKET.

A neutral SAMPLE with a CLIP attached in the NET ZONE or either the LOW or HIGH BASKETS have no score value.

A SAMPLE of any color will score in any BASKET or NET ZONE, but beware of violating [G407](#) and [G411](#).

Figure 10-4: Example NET ZONE scoring



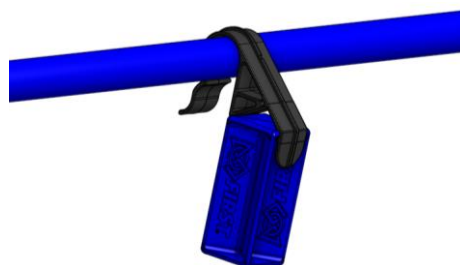
### 10.5.2 SPECIMEN Scoring Criteria

A SPECIMEN is considered scored if the SPECIMEN is fully supported by a corresponding ALLIANCE SPECIFIC CHAMBER (Figure 10-5) either directly or transitively through other SPECIMENS.

SPECIMENS in the NET ZONE or either the LOW or HIGH BASKETS have no score value.

For example, the SPECIMEN composed of a red ALLIANCE SPECIFIC SAMPLE and a CLIP will only score on the red CHAMBERS.

Figure 10-5: SPECIMEN scored on a CHAMBER



### 10.5.3 ROBOT Scoring Criteria

A ROBOT receives PARKING points when the ROBOT is fully or partially inside the OBSERVATION ZONE at the end of a MATCH period.

ASCENT points are assigned as follows:

Table 10-2: ASCENT LEVEL Criteria

ASCENT	Definition
<b>LEVEL 1</b>	ROBOT is in contact with the LOW RUNG at the end of a MATCH period (per section <a href="#">10.5 Scoring</a> item A)
<b>LEVEL 2</b>	ROBOT is fully supported by the HIGH and/or LOW RUNGS at the end of the MATCH (per section <a href="#">10.5 Scoring</a> item A)
<b>LEVEL 3</b>	ROBOT is fully supported by the HIGH RUNG and completely above the top of the LOW RUNG at the end of the MATCH (per section <a href="#">10.5 Scoring</a> item A)

The intent of the use of “fully support” language is that the ROBOTS are solely using the RUNGS to climb. ROBOTS which make incidental contact to vertical SUBMERSIBLE structural elements or ALLIANCE partner ROBOT as judged by the REFEREES, during or at the conclusion of their ASCENT are still eligible for ASCENT points.

Additionally, the following conditions must be met:

- A. ROBOTS can only ASCEND their own ALLIANCE SPECIFIC RUNGS.
- B. ROBOTS must start ASCENDING from outside the SUBMERSIBLE ZONE.
- C. for a LEVEL 3 ASCENT, ROBOTS may not contact the HIGH RUNG while:
  - i. supported by the TILES directly or transitively through another object (e.g., SCORING ELEMENTS or another ROBOT), or
  - ii. supported by any other part of the SUBMERSIBLE structure except for the LOW RUNG
- D. ROBOTS that are eligible for multiple ASCENTS or ASCENT and PARKING points only earn points for the highest value achievement.

If any of the above conditions are not met, it is not a valid ASCENT. If a ROBOT does not meet ASCENT criteria, the ROBOT may disengage from the SUBMERSIBLE and attempt the ASCENT again.

A ROBOT is considered ASCENDING once it is attempting to achieve an ASCENT LEVEL, and ASCENDED once it has achieved an ASCENT LEVEL.

The intent of part B of this rule is for the ROBOT to start its ASCENT outside of the SUBMERSIBLE ZONE except for minor elements used by the ROBOT to contact the RUNG. Once ROBOTS start their ASCENT, parts of the ROBOT may swing into the SUBMERSIBLE ZONE, which is not a violation of this rule.

ROBOTS attempting a LEVEL 3 ASCENT which then violate C. i or ii, may still be eligible for lower LEVEL ASCENT points as long as all other lower LEVEL ASCENT criteria are met at the end of the MATCH period. In this scenario, if a ROBOT

would like to reattempt a LEVEL 3 ASCENT they must disengage from the HIGH RUNG and attempt their LEVEL 3 ASCENT again.

ROBOTS supported by an ALLIANCE partner ROBOT, SCORING ELEMENTS, other sections of the SUBMERSIBLE or the FIELD floor will not be awarded an ASCENT LEVEL 2 or 3.

### 10.5.4 Point Values

Table 10-3: INTO THE DEEP point values

		MATCH points		RANKING POINTS	
		AUTO	TELEOP		
<b>PARK</b>	OBSERVATION ZONE	3	3		
	NET ZONE	2	2		
<b>SAMPLE</b>	LOW BASKET	4	4		
	HIGH BASKET	8	8		
<b>SPECIMEN</b>	LOW CHAMBER	6	6		
	HIGH CHAMBER	10	10		
<b>ASCENT</b>	LEVEL 1	3	3		
	LEVEL 2		15		
	LEVEL 3		30		
<b>Tie</b>	completing a MATCH with the same number of MATCH points as your opponent				1
<b>Win</b>	completing a MATCH with more MATCH points than your opponent				2

### 10.6 Violations

FIRST Tech Challenge uses 3 words in the context of how durations and actions are assessed with regards to evaluation of rules and assignment of violations. These words provide general guidance to describe benchmarks. It is not the intent for REFEREES to provide a count during the time periods.

- MOMENTARY describes durations that are fewer than approximately 3 seconds.
- CONTINUOUS describes durations that are more than approximately 10 seconds.
- REPEATED describes actions that happen more than once within a MATCH.

For each instance of a rule violation, unless otherwise noted, 1 or more of the penalties listed in Table 10-3 are assessed.

Table 10-4 Rule violations

Penalty	Description
<b>MINOR FOUL</b>	a credit of 5 points towards the opponent's MATCH point total
<b>MAJOR FOUL</b>	a credit of 15 points towards the opponent's MATCH point total
<b>YELLOW CARD</b>	a warning issued by the head REFEREE for egregious ROBOT or team member behavior or rule violations. A subsequent YELLOW CARD within the same tournament phase results in a RED CARD.



Penalty	Description
<b>RED CARD</b>	a penalty issued by the head REFEREE for egregious ROBOT or team member behavior or rule violations which results in a team being DISQUALIFIED for the MATCH.
<b>DISABLED</b>	The REFEREE instructs the team to stop the ROBOT which will deactivate all outputs, rendering the ROBOT inoperable for the remainder of the MATCH.
<b>DISQUALIFIED</b>	the state of a team in which they receive 0 MATCH points and 0 RANKING POINTS in a qualification MATCH or causes their ALLIANCE to receive 0 MATCH points in a playoff MATCH

### 10.6.1 YELLOW and RED CARDS

In addition to rule violations explicitly listed throughout this document, YELLOW CARDS and RED CARDS are used in *FIRST* Tech Challenge to address team and ROBOT behavior that does not align with the mission, values, and culture of *FIRST*.

The head REFEREE may assign a YELLOW CARD as a warning, or a RED CARD for egregious behavior inappropriate at a *FIRST* Tech Challenge event. A team that has received either a YELLOW or a RED CARD carries a YELLOW CARD into subsequent MATCHES, except as noted below. A RED CARD results in MATCH DISQUALIFICATION.

A YELLOW or RED CARD is indicated by the head REFEREE holding a YELLOW and/or RED CARD in the air while a member of the FIELD STAFF describes the violation to the audience.

YELLOW CARDS are additive, meaning that a second YELLOW CARD is automatically converted to a RED CARD. A team is issued a RED CARD for any subsequent incident in which they receive an additional YELLOW CARD, including earning a second YELLOW CARD during a single MATCH. A second YELLOW CARD is indicated by the head REFEREE holding a YELLOW CARD and RED CARD in the air simultaneously after the completion of the MATCH. A team that has received either a YELLOW CARD or a RED CARD carries a YELLOW CARD into subsequent MATCHES, except as noted below.

Once a team receives a YELLOW or RED CARD, its team number is presented with a yellow background on the audience screen during all subsequent MATCHES, including any replays, as a reminder to the team, the REFEREES, and the audience that they carry a YELLOW CARD.

Egregious behavior by a team, which cannot be resolved locally by the head REFEREE or event director working directly with the STUDENT and adult team members, will be escalated to *FIRST* Headquarters. In consultation with *FIRST* Headquarters the team may be DISQUALIFIED from all subsequent MATCHES and removed from awards consideration.

Figure 10-6 Example audience screen graphic showing YELLOW CARD indicators



All YELLOW CARDS are cleared at the conclusion of qualification MATCHES, and division playoff MATCHES. Verbal warnings persist from qualification MATCHES through subsequent tournament phases, except when stated otherwise.

### 10.6.2 YELLOW and RED CARD application

YELLOW and RED CARDS are applied based on the following:

Table 10-5 YELLOW and RED CARD application

Time YELLOW or RED CARDS earned:	MATCH to which CARD is applied:
<b>before the start of qualification MATCHES</b>	team's first qualification MATCH
<b>during the qualification MATCHES</b>	team's current (or just completed) MATCH in which they are not a SURROGATE. For SURROGATE MATCHES the card is applied to the team's previous qualification MATCH.
<b>between the end of qualification MATCHES and the start of playoff MATCHES</b>	ALLIANCE'S first playoff MATCH
<b>during the playoff MATCHES</b>	ALLIANCE'S current (or just completed) MATCH

A MATCH is no longer the current MATCH once the score has been posted or the head REFEREE or their designee has indicated that teams can collect their ROBOTS, whichever is later.

Please see examples of the application of YELLOW and RED CARDS as shown in section [10.6.4 Violation Details](#).

### 10.6.3 YELLOW and RED CARDS during playoff MATCHES

During playoff MATCHES, YELLOW and RED CARDS are assigned to the violating team's entire ALLIANCE instead of to only the violating team. If an ALLIANCE receives 2 YELLOW CARDS, the entire ALLIANCE is issued a RED CARD which results in DISQUALIFICATION for the associated MATCH.

### 10.6.4 Violation Details

There are several styles of violation wording used in this manual. Below are some example violations and a clarification of the way the violation would be assessed. The examples shown do not represent all possible violations, but rather a representative set of combinations.

Table 10-6 Violation examples

EXAMPLE VIOLATION	EXPANDED INTERPRETATION
<b>MINOR FOUL</b>	Upon violation, a MINOR FOUL is assessed against the violating ALLIANCE.
<b>MAJOR FOUL AND YELLOW CARD</b>	Upon violation, a MAJOR FOUL is assessed against the violating ALLIANCE. After the MATCH, the head REFEREE presents the violating team with a YELLOW CARD.
<b>MINOR FOUL PER ADDITIONAL SCORING ELEMENT.</b>	Upon violation, a number of MINOR FOULS are assessed against the violating ALLIANCE equal to the number of additional SCORING ELEMENTS beyond the permitted quantity. Additionally, if the REFEREES determine that the action was egregious, the head

EXAMPLE VIOLATION	EXPANDED INTERPRETATION
<b>IF EGREGIOUS, YELLOW CARD</b>	REFEREE presents the violating team with a YELLOW CARD after the MATCH.
<b>MAJOR FOUL, PLUS AN ADDITIONAL MAJOR FOUL FOR EVERY 5 SECONDS IN WHICH THE SITUATION IS NOT CORRECTED</b>	Upon violation, a MAJOR FOUL is assessed against the violating ALLIANCE and the REFEREE begins to count. Their count continues until the criteria to discontinue the count are met, and for each 5 seconds within that time, an additional MAJOR FOUL is assessed against the violating ALLIANCE. A ROBOT in violation of this type of rule for 15 seconds receives a total of 4 MAJOR FOULS (assuming no other rules were being simultaneously violated).
<b>RED CARD FOR THE ALLIANCE</b>	After the MATCH, the head REFEREE presents the violating ALLIANCE with a RED CARD in the following fashion:  In a playoff MATCH, a single RED CARD is assessed to the ALLIANCE.  In all other scenarios, each team on the ALLIANCE is issued a RED CARD.

## 10.7 Head REFEREE

The head REFEREE has the ultimate authority in the ARENA during the event, but may receive input from additional sources, e.g., FIRST personnel, FTA, event director, or other event staff. The head REFEREE rulings are final. No event staff, including the head REFEREE, will review video, photos, artistic renderings, etc. of any MATCH, from any source, under any circumstances.

## 10.8 Other Logistics

SCORING ELEMENTS that leave the FIELD during a MATCH cannot be used in further gameplay during that MATCH and are not returned to gameplay by FIELD STAFF.

An ARENA FAULT (an error in ARENA operation described in section [13.3 MATCH Replays](#)) is not called for MATCHES that accidentally begin with damaged SCORING ELEMENTS, the incorrect number of SCORING ELEMENTS, or incorrectly placed SCORING ELEMENTS. Damaged SCORING ELEMENTS are not replaced until the next MATCH reset. DRIVE TEAMS should alert the FIELD STAFF to any missing, incorrectly placed, or damaged SCORING ELEMENTS prior to the start of the MATCH.

Once the MATCH is over and the head REFEREE or their designee determines that the FIELD and FIELD STAFF are ready, they will signal for FIELD reset and DRIVE TEAMS may retrieve their ROBOT.

During MATCH reset, the FIELD is cleared of ROBOTS and OPERATOR CONSOLES from the MATCH that just ended, ROBOTS and OPERATOR CONSOLES for the subsequent MATCH are loaded into the FIELD by DRIVE TEAMS, and FIELD STAFF reset ARENA elements.

