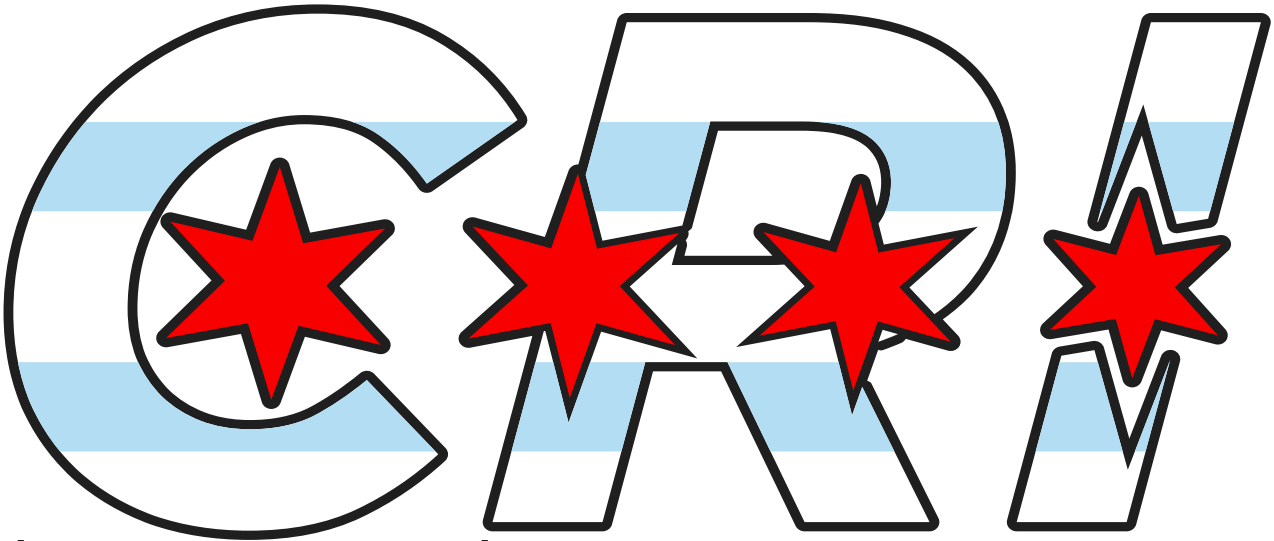


Chicago Robotics Invitational
Premier Event

2025 Rules for
INTO THE DEEP℠ presented by RTX

The following rules are in addition or modification to the most recent version of the *FIRST* Tech Challenge 2025 Game, INTO THE DEEP℠ presented by RTX, and its Competition Manual. Refer back to Competition Manual, and the Field Assembly and Setup Guide for rules and details not explicitly listed here.

Contents

Revision History		Date
V1	• Initial release	May 7, 2025

V2	• Updated Section 1.9 CRI Modifications and Updates to reflect Team Updates being published.
	• Added Section 6 Awards (A)
	• Fixed typo in Figure 9-1
	• Added link to CRI's FIELD CAD in Section 9.1 Field.
	• Split OBSERVATION ZONE to better support multiple ROBOTS at once.
	  ▸ Adjusted rules in Section 11 Game Rules (G) and Section 10.5 Scoring to reflect the new split OBSERVATION ZONES. In particular, note updates to Section 10.5.3 ROBOT Scoring Criteria, G431 (and its blue box), G432, and the general update from "the OBSERVATION ZONE" to "an OBSERVATION ZONE"/"one of the OBSERVATION ZONES" throughout.
	  ▸ Adjusted Figure 9-3 to reflect this new dimension, but most other diagrams in Section 9 Arena are not updated.
	  ▸ Modified the definition of OBSERVATION ZONE to MATCH new dimensions in Section 16 Glossary
	• Added Figure 9-9 for CHAMBER and BASKET location naming.
		June 27, 2025

1 Introduction

1.7 This document and its conventions

The 2025 CRI Competition Manual serves as an expansion to the 2025 *FIRST* Tech Challenge INTO THE DEEP℠ presented by RTX Competition Manual. Unless otherwise specified in this manual, all rules present in the unmodified game are still present and applicable to CRI.

CRI Modifications to the INTO THE DEEP℠ presented by RTX Competition Manual are indicated using the following formatting:

- Additions are highlighted in light red. This is an example.
- Deletions are indicated with a strikethrough. ~~This is an example.~~
- Large blocks of additions will have a light red bar on the left of the section. This section is an example of this.
- "…" indicates large blocks of unchanged text for the rest of a section.

Warnings, cautions, and notes appear in blue boxes.

> This is an example.

1.9 CRI Modifications and Updates

Only one CRI Competition Manual update is scheduled, which will provide details on Judging. However, additional updates may occur as needed. No updates to the CRI Competition Manual will occur after July 16, 2025.

Any updates will come with an accompanying Team Update Document detailing the changes included within. A summary of these changes will also be present in the Revision History table above. Inside of these Team Updates, changes are indicated using the following formatting:

- Additions are bold and dark blue. **This is an example.**
- Deletions are bold, dark blue and indicated with a strikethrough. ~~**This is an example.**~~

1.10 CRI Questions and Answer System

Please also refer to the CRI materials below:

- Q&A Forum for more detailed information about the rules: https://cri.fyi/qa
- for more detailed information about the event: https://cri.fyi/2025

3 Competition Eligibility and Inspection (I)

3.3 MATCH Eligibility Rules

This section describes the rules governing MATCH participation. A team has participated in a MATCH if any member of their DRIVE TEAM is in the ALLIANCE AREA, with or without the ROBOT on the FIELD, at the start of the MATCH.

This section describes the rules and requirements for team participation in MATCH play. ROBOTS are required to pass ROBOT inspections before being allowed to compete. These inspections are to help ensure that all section 12 ROBOT Construction Rules (R) are satisfied.

At each event, the lead ROBOT INSPECTOR (LRI) has final authority on the legality of any COMPONENT, MECHANISM, or ROBOT. INSPECTORS may re-inspect ROBOTS at any time to ensure compliance with the rules. Teams are expected to consult with INSPECTORS or the LRI if they have any questions regarding the legality of a ROBOT or about how to make a ROBOT legal.

The inspection process may progress in blocks, i.e., it may pause for a team to make a correction or participate in a scheduled practice MATCH. The process may employ various INSPECTORS throughout the process based on availability. At the team's discretion, they may request a different INSPECTOR or invite the lead ROBOT INSPECTOR to participate in their ROBOT'S inspection.

> ROBOTS are permitted to participate in scheduled practice MATCHES prior to passing inspection. However, the FTA, LRI, or Head REFEREE may determine at any time that the ROBOT is unsafe and may prohibit further participation in practice MATCHES until the condition is corrected and/or the ROBOT passes inspection.

Events may assign specific inspection time slots for teams to better facilitate a quick and orderly inspection process. Teams should plan to report to their assigned inspection times fully ready to complete inspection.

Prior to the start of a MATCH, any ROBOT which is unable or ineligible to participate in that MATCH, as determined by the team, the *FIRST* Technical Advisor (FTA), LRI, or Head REFEREE, is DISABLED and can be removed from the FIELD with permission of the Head REFEREE or FTA. A team whose ROBOT is DISABLED or not present is eligible to receive qualification MATCH Points or playoff MATCH points provided that its ROBOT has passed inspection, per I302, and as long as at least one STUDENT DRIVE TEAM member is present in the ALLIANCE AREA.

5 Event Rules (E)

E101 ***Personal safety comes first.** All team members must observe the following safety practices throughout the event:

A. ...

B. ...

C. ...

D. ...

E. ...

F. ...

Teams are responsible for bringing their own personal protective equipment.

For more information about safety at *FIRST* events, please reference the *FIRST* Safety Manual.

> A partial list of footwear that is not allowed: Crocs, slides, sandals, flip flops, Birkenstocks, sandals with an ankle strap, clogs.

6 Awards (A)

Judging at the Chicago Robotics Invitational (CRI) will be very similar to judging at a traditional *FIRST* Tech Challenge event, with the main distinction being the awards. Awards at CRI are all Chicago themed and are unique to CRI. The awards at CRI aim to celebrate all of the hard work teams have put in throughout the season, especially in areas that the traditional FTC awards do not recognize. JUDGES understand that the awards given at CRI are different from traditional FTC awards and teams might not have specific content for all award categories.

In addition to the modifications presented below, here are some clarifications about judging at CRI:

- On Saturday morning, teams will have a formal interview with a panel of 2-3 JUDGES in a classroom. Teams will have 5 uninterrupted minutes to present to the JUDGES. Following the presentation, JUDGES will ask teams questions for 5-10 minutes.
- On Saturday afternoon and Sunday, there will be pit interviews where JUDGES will ask teams additional follow-up questions.
- Teams will submit hard copies of their PORTFOLIO during their interview on Saturday morning. Teams are *highly* encouraged to submit two hard copies of their PORTFOLIO at this time.

A101 ***Team PORTFOLIOS have limits.** Teams ~~have the opportunity to~~ must submit a team PORTFOLIO to be used as part of the judging process. No other printed or digital content not directly included in this document will be collected by the JUDGES to consider during deliberations. PORTFOLIOS must meet the following requirements:

A. must consist of 1 cover page including the team number and optionally: team name, PORTFOLIO table of contents, team organizations, sponsors, logo, motto, and picture of the ROBOT and/or team.
B. no more than ~~15~~ 17 pages of JUDGED content (if printing front and back, ~~8~~ 9 sheets of paper, including the cover page)
C. use only US Letter (8.5” x 11”) or A4 (210 x 297 mm) size paper.
D. font minimum of 10 point or larger
E. must only include progress, challenges, and accomplishments which take place during the current season and, for returning teams, after the conclusion of their last official event that they participated in. For the purposes of CRI, this means the 2024-2025 season.

A115 ***Teams can only receive one JUDGED AWARD.** Teams are only eligible to win or be a runner-up for a single JUDGED AWARD at the event.

6.2 **Team JUDGED Award Descriptions**

The following awards are listed in no particular order.

6.2.1 **The Golden Bean Award**

Inspired by the iconic Cloud Gate sculpture (known more commonly as The Bean) in Millenium Park, the Golden Bean award recognizes a team who brought a ROBOT with an iconic design to the Chicago Robotics Invitational.

This award is looking at the overall form and function of the robot. Every aspect of the ROBOT should be well thought out and cohesive, just like the seamless mirror finish that makes up Chicago's Bean.

The Golden Bean Award Criteria		
Required	1	The PORTFOLIO must include all of the following: A. How the team utilized the design process for at least one component of their robot B. Breakdown of the subsystems and features of their robot C. Drawings (CAD or hand-drawn) of their robot
Required	2	ROBOT must have a cohesive design with all components of the ROBOT designed to work well with each other. The ROBOT must have a clean and iconic design.
Required	3	ROBOT must feature intentionally placed control system components/ electronics and a wiring management system. Wires should be secure and neatly routed. Electronics should be placed in a manner designed to protect components and improve serviceability.
Encouraged	4	Teams should be able to discuss, describe, display, or document their design philosophy and how they balanced form and function when designing their robot.
Encouraged	5	Teams should be able to discuss, describe, display, or document the design iterations and improvements made to their ROBOT as the season progressed.

6.2.2 **The Loop Award**

Success does not occur in one step, but many iterative improvements. The Loop Award celebrates the process of building upon your previous designs to create better robots. Like a CTA train transiting from station to station, the winner must explain the various steps they took and show how those decisions led to their current robot. Ultimately this award is about the journey and not the final destination, and can be applied to a single component/feature of the ROBOT rather than the whole.

The Loop Award Criteria		
Required	1	Teams must submit a PORTFOLIO. The PORTFOLIO must include all of the following: A. How the team utilized the design process for at least one component of their robot B. How the team iterated on this design C. Documentation of various versions of this component / sub-system and lessons learned along with improvements made throughout the season
Required	2	ROBOT must have a component that was iterated upon throughout the year, with different versions of the same type of sub-system used at multiple tournaments.
Required	3	The component should be one that has improved since initially used in competition, whether in form, function or a mix of both.
Encouraged	4	Iterations should be summarized with motivation for the new design, why the new design was chosen, and how it performed compared to previous iterations.
Encouraged	5	Team can show examples of old versions of a component whether via photos or physical past versions that the team created.

6.2.3 **The Mies Van Der Rohe “Less is More” Award**

The Mies Van Der Rohe “Less is More” award is named in honor of a pioneer of Modernist architecture. Ludwig Mies Van Der Rohe is well known for his work as dean of the architecture school and architect of the Illinois Institute of Technology campus, located here in Chicago, including buildings such as the world renowned S.R. Crown Hall. Utilizing simple materials or off-the-shelf products, many modernist buildings look very utilitarian at first with simple looking construction methods, but have beauty and creativity in the details. Similarly, this award recognizes teams that utilize mechanisms that are constructed with off-the-shelf components and little custom manufacturing, but still perform well in the competition.

For the purposes of this award, crowdsourced designs (such as Open Odometry or the Loony Claw) that are still primarily constructed at home, or designs sold directly for the *FIRST* Tech Challenge market (such as Gobilda’s Odometry Pods or the SWYFT Drive system) will typically not fit the spirit of this award. However, creative or exceptional uses of these aforementioned products may be an exception to this guidance. This award focuses on ROBOT MECHANISMS, and as such, COTS software (such as Roadrunner) does not fit the criteria of this award.

The Mies Van Der Rohe “Less is More” Award Criteria		
Required	1	Must submit a PORTFOLIO, which includes details about a simple MECHANISM.
Required	2	The PORTFOLIO must explain how this MECHANISM is constructed, utilizing few if any manufacturing tools.
Encouraged	3	The MECHANISM should be well constructed and be effective at its goal. This does not mean the MECHANISM does not fail or is the highest performing, but it should still achieve the intended purpose of the MECHANISM.
Encouraged	4	The PORTFOLIO should include details about other solutions the team investigated or compared to arrive at their MECHANISM’S design.

6.2.4 **The Tom Skilling Accuracy Award**

Chicago’s local TV station, WGN, was home to a beloved meteorologist who recently retired, Tom Skilling. He was known for adapting new technologies throughout his career for highly accurate weather forecasts, and gained a cult following over the many years he was on the air because of it. This award named in his honor recognizes a team with a highly accurate autonomous routine. While the autonomous routine doesn’t need to be the most complex or high scoring, it needs to consistently work just about every MATCH.

The Tom Skilling Accuracy Award Criteria		
Required	1	The PORTFOLIO must include all of the following: A. hardware and/or software control COMPONENTS on the ROBOT B. which challenges each COMPONENT or system is intended to solve, and C. how does each COMPONENT or system work
Required	2	Team must use one or more hardware or software solutions to improve ROBOT functionality by using external feedback and control during the autonomous period.
Required	3	The control solution(s) should work consistently during most MATCHES.
Encouraged	4	Team could discuss, describe, display, or document how the solution should consider reliability either through demonstrated effectiveness or identification of how the solution could be improved.
Encouraged	5	Use of the engineering process to develop the control solutions (sensors, hardware and/or algorithms) used on the ROBOT includes lessons learned.

6.2.5 **The CTA - Creative Teleop Award**

Chicago's public transit operator, the Chicago Transit Authority, can only operate the hundreds of thousands of trips it provides each day with automation working hand in hand with the operators and employees of the CTA. Our CTA, the Creative Teleop Award, similarly recognizes a team that goes above and beyond with the control of their ROBOT during the Teleop period.

For this award teams should be able to drive their ROBOT efficiently and score with ease. Teams should incorporate pre-programmed routines into tele-op and other advanced programming into their controls. The ROBOT code and design should mean that humans never have to take the "L". Code does not need to be submitted.

The CTA - Creative Teleop Award Criteria		
Required	1	The PORTFOLIO must include all of the following: A. hardware and/or software control COMPONENTS on the ROBOT B. which challenges each COMPONENT or system is intended to solve, and C. how does each COMPONENT or system work
Required	2	Team must use one or more hardware or software solutions to improve ROBOT functionality by using external feedback and control during the TELEOP period.
Required	3	The control solution(s) should work consistently during most MATCHES.
Encouraged	4	Team could discuss, describe, display, or document how pre-programed routines assist team drivers during the driver controlled period.
Encouraged	5	Use of the engineering process to develop the control solutions (sensors, hardware and/or algorithms) used on the ROBOT includes lessons learned.

6.2.6 **The Enrico Fermi Discovery Award**

Enrico Fermi, Nobel Laureate in Physics, created the world's first nuclear reactor at the University of Chicago (under their football field of all places). Fermi's first projects were in the field of statistical mechanics. Today the Fermi National Accelerator Laboratory (Fermilab) in the suburbs of Chicago continues to honor his name through its many research projects in the field of physics. In honor of his many discoveries, the Enrico Fermi Discovery Award honors a team's dedication to and proficiency in scouting, MATCH strategy, and game analysis.

Enrico Fermi Discovery Award Criteria		
Required	1	There are no PORTFOLIO requirements for this award. A team should be able to discuss, describe, display, or document some of the following: A. Scouting methods used B. How scouting data is both collected and analyzed
Required	2	Team should be able to discuss, describe, display, or document how collected data is applied to serve their needs during competitions, including, but not limited to, individual MATCH strategy and alliance selection picklists. This can include planning for complementary autonomous routines, complementary subsystems, defensive strategies, and / or general MATCH strategy.
Encouraged	3	Team could have an innovative scouting experience to engage student scouters through an app, spreadsheet, printed worksheets, or another unique medium.
Encouraged	4	Team shows how automated systems or code is used to simplify or enhance the team's strategy decisions.

6.2.7 **The Walter Payton Team of the Year Award**

In the National Football League (NFL), the Walter Payton Man of the Year Award recognizes a player who demonstrates a commitment to service, philanthropy, and impacting one's community. Walter Payton, a long-time player for the Chicago Bears, was a superb football player and the model for giving back to one's community. His foundation continues to give back to the City of Chicago to this day. We honor his legacy with the Walter Payton Team of the Year Award to celebrate a team's commitment to community outreach and gracious professionalism, and to make it loud to those outside of *FIRST*.

Walter Payton Team of the Year Award Criteria		
Required	1	The PORTFOLIO must include all of the following: A. Teams must submit a PORTFOLIO with a designated community outreach section B. Teams must document both the events/activity and should discuss the impact of the team's efforts C. Must have documented hours committed to outreach and amount of people impacted cited within the PORTFOLIO
Required	2	Team must be active in their local community and beyond through outreach and other areas.

Walter Payton Team of the Year Award Criteria		
Required	3	Team must embody the values of Gracious Professionalism throughout the tournament weekend.
Encouraged	4	The PORTFOLIO should detail how the team ensures that these programs and objectives will be sustained beyond any given student's involvement.

6.2.8 **The Clark Street Bridge Builders Award**

Chicago is well known for its sweeping river that runs through the heart of downtown and branches off to the North / South, eventually reaching the Mississippi river if one goes far enough. Thirty-seven moveable bridges span the downtown and adjacent areas, with over 300 other bridges dotting the city, making Chicago a land of many bridges. The Clark Street Bridge is a few miles south of the CRI venue and helps connect both sides of Chicago's downtown area. The Clark Street Bridge Builders award is awarded to the team who best "builds a bridge" to connect the next generation of students to *FIRST*.

Clark Street Bridge Builders Award Criteria		
Required	1	The PORTFOLIO must include the following: A. How the team is helping to build the next generation of *FIRST* students
Required	2	The outreach that is presented must have an actionable impact on teams, whether that be through efforts to start or sustain teams directly, or other means that have a less direct impact such as support programs, open source designs, software, online resources, workshops or more.
Required	3	Team must follow the FTC Award Terms and Definitions. (https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/award-terms-and-definitions.pdf)
Encouraged	4	Team should discuss, describe, display, or document how the team ensures that these programs and objectives will be sustained beyond any given student's involvement.

6.2.9 **The Water Tower Award**

When Chicago burned down during the Great Chicago Fire in 1871, only one building was left standing among the rubble: The Water Tower. This building still stands today as a testament to the city's perseverance in the face of adversity. This award celebrates a team that refused to give up when faced with significant and unforeseen challenges. Whether technical, logistical, personal, or environmental, this team tackled obstacles with resilience, resourcefulness, and

determination. Just like the City of Chicago, which is known for its history of rebuilding stronger after adversity, this team should embody perseverance and keep pushing forward, showing what it truly means to rise against all odds.

Teams are encouraged to reflect on how their season's challenges shaped their identity, strengthened their collaboration, and helped them grow as individuals and as a team.

The Water Tower Award Criteria		
Required	1	There are no PORTFOLIO requirements for this award. A team should be able to discuss, describe, display, or document the following: A. One or more significant and unforeseen challenges they encountered during the season
Required	2	Team must clearly articulate how they responded to these challenges and what actions they took to overcome them.
Encouraged	3	Team demonstrates a positive attitude and determination throughout their season, especially during times of adversity.
Encouraged	4	Team describes how the challenge helped them grow closer, more skilled, or more confident as a result.

6.2.10 **The Star Image Award**

Chicago is known for one of the most iconic city flags in the world. The flag features four red stars, representing historic events in Chicago, in between two blue stripes, representing the iconic Chicago River and Lake Michigan. The four stars represent its founding with Fort Dearborn, both of its historic world's fairs, and the great fire that burned down most of the city in 1871. You'll see this flag all over Chicago, even embedded in our logo, in a point of civic pride like no other.

Just like the Chicago flag, the Star Image Award recognizes the team with a brand that is seen throughout all aspects of their team. The team's ROBOT, uniform, and pit have a visual image that is part of a cohesive theme that transcends a simple logo.

The Star Image Award Criteria		
Required	1	The team's image must align with and be supportive of *FIRST* core values.
Required	2	Team has a cohesive theme between team apparel, pit, and ROBOT.
Encouraged	3	The team's image must be original and representative of the team's history, character, or environment.

The Star Image Award Criteria		
Encouraged	4	A team should be able to discuss, describe, display, or document some of the following: A. Mission / purpose / values of the team and how they guide the imagery B. A team mascot, hand signals / handshakes, signs / imagery used C. The ROBOTS design, side panels, and / or team numbers MATCH the team's branding D. Process of determining team name / team branding. Teams are allowed to use their branding from previous seasons and can describe how logos/colors/the outward brand of their team has evolved over the years

6.2.11 **The Illi(noise) Award**

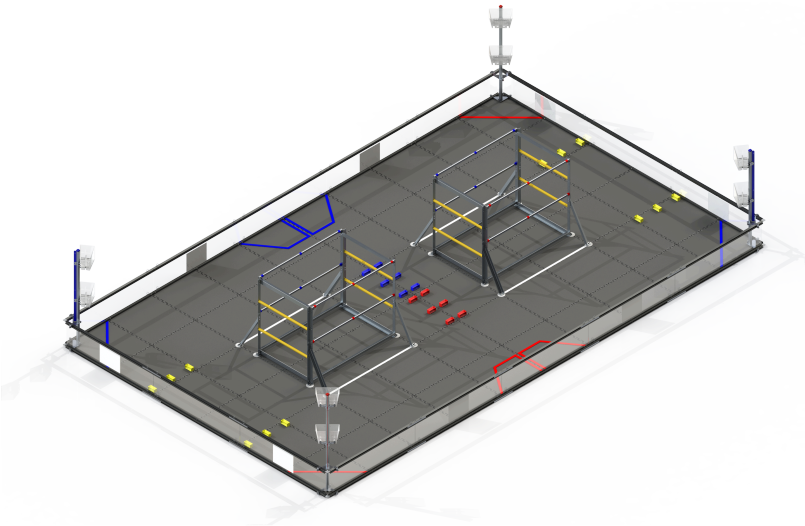
The Chicago Robotics Invitational invites you to turn up the volume to amplify the message of *FIRST*!

The Illi(noise) Award celebrates a team that makes the loudest impact in their community through creative media, engaging storytelling, and innovative outreach. This award recognizes teams that go beyond traditional STEM engagement, using videos, music, parodies, and other high-energy content to spread the mission of *FIRST* in unique and memorable ways. Whether through social media, school events, or community initiatives, these teams bring enthusiasm, originality, and passion to their advocacy, leaving a lasting impression on those they reach.

The Illi(noise) Award Criteria		
Required	1	Team must provide a deliverable to share with the JUDGES that documents their outreach efforts. This could be a video, sound recording, or other creative digital medium. If the submission is audio or video based, the submission cannot be longer than 60 seconds. Submissions must be received by 8 AM on Saturday July 19, 2025.
Required	2	Content must be engaging and effectively communicate the mission and values of *FIRST* to a broad audience.
Required	3	All content used within the digital media (including images, videos, sound, music, or other works) must be used with permission from its copyright owner, with attribution if required by the content's license.
Required	4	The team's outreach must be accessible and inclusive, ensuring it resonates with diverse audiences.

The Illi(noise) Award Criteria		
Encouraged	5	Team should demonstrate innovative approaches to communication, using media like videos, songs, parodies, or live events to engage their community.
Encouraged	6	Evidence of sustained impact, such as increased engagement with *FIRST* programs or new partnerships inspired by their advocacy efforts.

8 Game Overview



In the CRI version of INTO THE DEEP℠ presented by RTX℠ presented by RTX, two competing ALLIANCES collect deep sea SAMPLES to score in their NET ZONES or BASKETS, work with HUMAN PLAYERS to create SPECIMENS to score on the CHAMBERS of the SUBMERSIBLES and ASCEND from the depths before time runs out.

During the first 30 seconds of the MATCH the ROBOTS operate autonomously. Without guidance from their drivers, the ROBOTS score SAMPLES in their BASKETS or NETS, or SPECIMENS on the CHAMBERS. They can collect additional SAMPLES to score in BASKETS or make into SPECIMENS and PARK before the end of the period.

During the remaining 2 minutes of the MATCH, human drivers take control of their ROBOT. ROBOTS collect and sort SAMPLES from under the SUBMERSIBLES in the center of the FIELD. The yellow SAMPLES are scored in the BASKETS and the ALLIANCE SPECIFIC (i.e., elements owned or associated with a specific ALLIANCE) red and blue SAMPLES are returned to ~~the~~ an OBSERVATION ZONE for the HUMAN PLAYERS to collect.

HUMAN PLAYERS can pick up SAMPLES delivered to ~~the~~ an OBSERVATION ZONE and add a hanging CLIP to create a SPECIMEN. SPECIMENS can then be returned to ~~the~~ an OBSERVATION ZONE on the FIELD where ROBOTS can pick them back up and score them on the CHAMBERS located on ~~the~~ a SUBMERSIBLE. Each CHAMBER awards points for the number of SPECIMENS on it, as well as whichever ALLIANCE has the most SPECIMENS scored on it at the end of each MATCH period.

As time runs out, ROBOTS can either PARK in ~~the~~ an OBSERVATION ZONE or race back to climb the RUNGS on the SUBMERSIBLES so they can ASCEND out of the deep.

The ALLIANCE that earns the most points wins the MATCH!

9 Arena

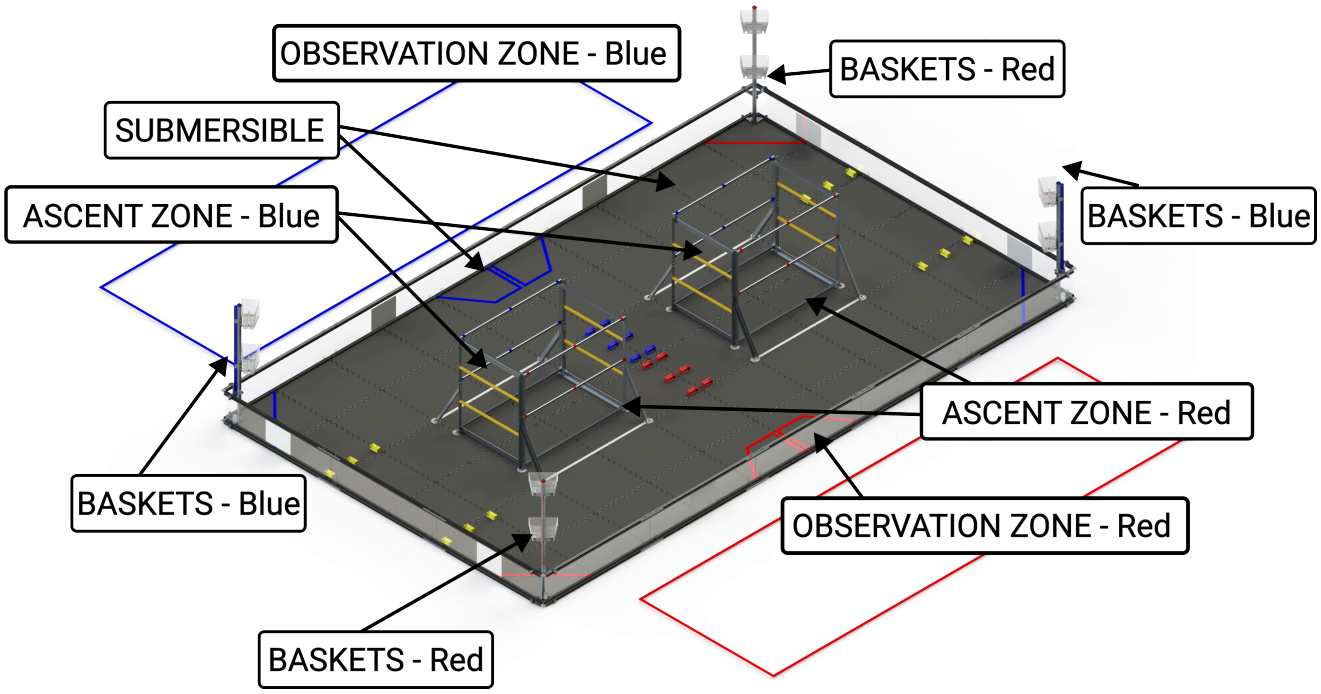


Figure 9-1: INTO THE DEEP℠ presented by RTX ARENA (queue area, field display, and optional media area not pictured)

9.1 Field

Each FIELD for the CRI version of INTO THE DEEP℠ presented by RTX is an approximately ~~12 ft. (3.66m)~~ 20 ft. (6m) by 12 ft. (3.66m) area bounded by the outside edge of the extrusion that frames the walls of the FIELD perimeter. The flooring surface of the FIELD is made of ~~36~~ 60 (nominal) 24 in. x 24 in. x 5/8 in. interlocking soft foam TILES.

The FIELD is populated with the following elements:

- ~~2~~ 4 BASKETS per ALLIANCE, and
- ~~1~~ 2 SUBMERSIBLES per FIELD.

~~Official events use the full INTO THE DEEP℠ presented by RTX FIELD~~ The CRI version of INTO THE DEEP℠ presented by RTX uses a modified combination of INTO THE DEEP℠ presented by RTX FIELD elements, equivalent to two full field sets manufactured and sold by AndyMark (am-5400_Full), with some modified parts, such as yellow CHAMBERS.

> More information about the field can be viewed with on the field CAD, hosted on Onshape here.

9.2 **Areas, Zones, & Markings**

...

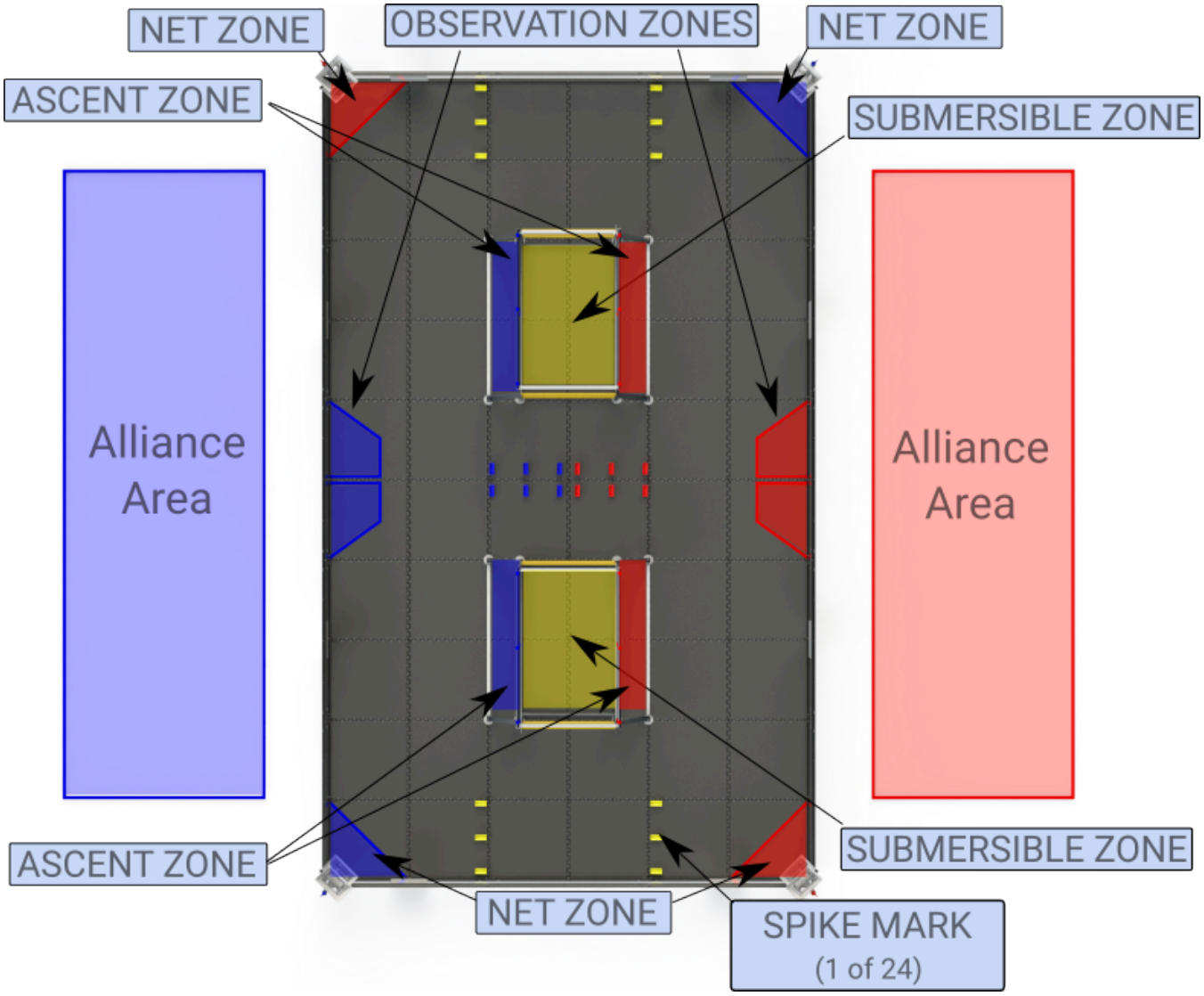


Figure 9-2: Areas, markings, and zones

- ALLIANCE AREA: a ~~120 in. (304.8 cm) wide by 42 in. (106.7 cm) deep~~ rectangle 186 in. (472.5 cm) wide by 60 in. (152.4 cm) deep by infinitely tall volume formed by placing ALLIANCE colored tape onto the flooring surface outside of the FIELD. The ALLIANCE AREA includes the taped lines.
- ASCENT ZONE: an infinitely tall ~~5-sided polygon that is formed from two 9.25 in. (23.5 cm) long sides bounded by the SUBMERSIBLE outriggers, one 44.75 in. (113.7 cm) long side bounded by the barrier of the SUBMERSIBLE, and the two 26 in. (66 cm) long sides bounded by white tape that extend from the outriggers to a point 20 in. (50.8 cm) from the barrier~~ rectangle that is 8.25 in. (21.0 cm) deep by 44.75 in. (113.7 cm) in between

the outriggers located on either side of each SUBMERSIBLE. The ASCENT ZONE includes the taped lines. ASCENT ZONES are only ALLIANCE SPECIFIC zones during the last ~~30~~ 20 seconds of a MATCH.

- NET ZONE: an infinitely tall triangle bounded by the FIELD walls located beneath the BASKETS and ALLIANCE colored tape that is diagonal from corner to corner across the TILE. The outside edge of the tape is 22.75 in. (57.8 cm) away from the FIELD corner when measured at the FIELD wall. The NET ZONE includes the taped lines.
- OBSERVATION ZONE: an infinitely tall ~~4-sided polygon which is 36.6 in. (92.9 cm) at the widest point by 13.1 in. (33.3 cm) long~~ trapezoid that has parallel sides that are 12 in. (63.5 cm) long and 23 in. (119.4 cm) long along the FIELD wall that extends to 10 in. from the next TILE seam bounded by ALLIANCE colored tape and the adjoining FIELD wall (see Figure 9-3). The OBSERVATION ZONE includes the taped lines. There are two adjacent OBSERVATION ZONES per ALLIANCE.

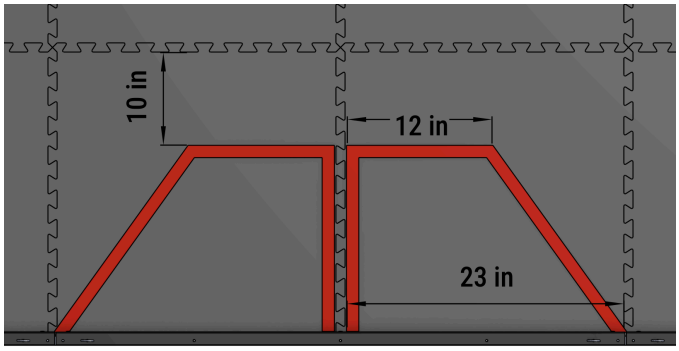


Figure 9-3 CRI OBSERVATION ZONE sizing

- SPIKE MARK: one of ~~twelve~~ twenty-four (24) 3.5 in. (8.9 cm) long marks used to identify the placement of SAMPLES before the MATCH. The ~~3~~ 6 marks in front of the OBSERVATION ZONES are of ALLIANCE colored tape and the 3 marks in front of each NET ZONE are made of white tape.

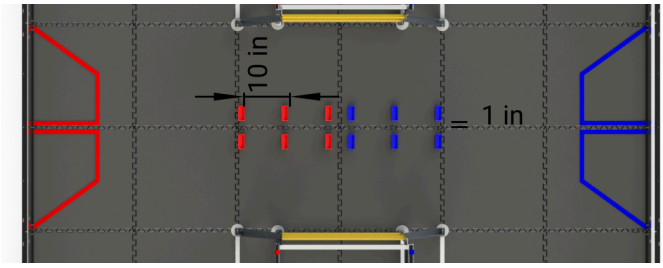


Figure 9-4 SPIKE MARK placement at center of FIELD

- SUBMERSIBLE ZONE: a 27.5 in. (69.9 cm) wide by 42.75 in. (108.6 cm) long, infinitely tall volume bounded by the inner most edge of the barriers of ~~the~~ each SUBMERSIBLE.

9.3 **Tile Coordinates**

TILE coordinates are used to assist with FIELD setup. Figure 9-5 defines the intersections of each of the TILES on the FIELD where the TILE tabs interlock. Figure 9-6 defines the grid coordinate system for each of the TILES.

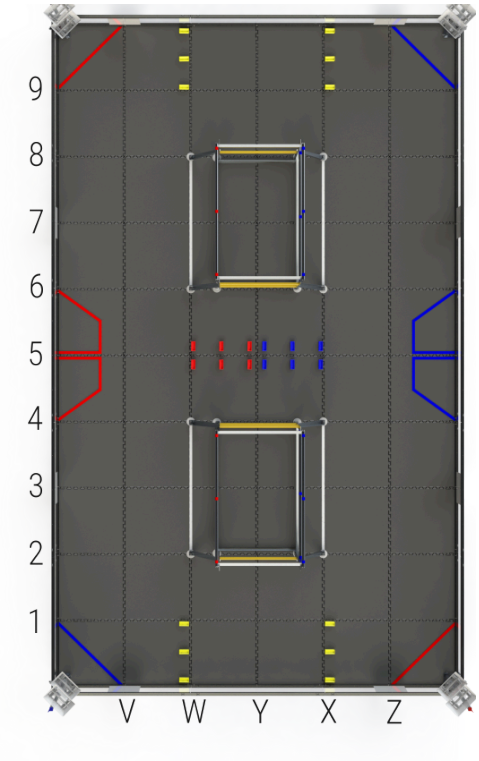


Figure 9-5: TILE tab-line locations

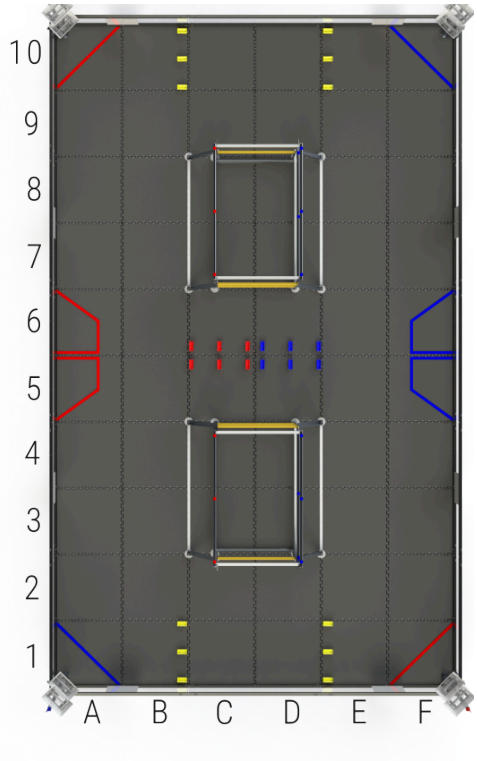


Figure 9-6: TILE locations

9.4 **ALLIANCE AREA**

...

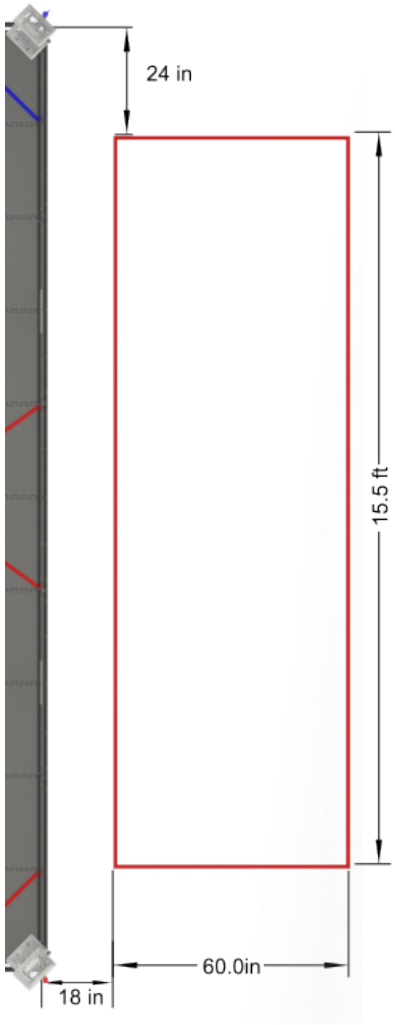


Figure 9-7: ALLIANCE AREA

9.5 **SUBMERSIBLE**

The LOW CHAMBERS and HIGH CHAMBERS, made of ~~red and blue~~ yellow HIPS pipes, run on opposite sides of the SUBMERSIBLES, with ~~two red CHAMBERS facing the red ALLIANCE AREA, and two blue CHAMBERS adjacent to the blue ALLIANCE AREA~~ four ALLIANCE NEUTRAL yellow CHAMBERS per SUBMERSIBLE.

9.5.1 **CHAMBERS**

There are ~~two~~ four ALLIANCE NEUTRAL CHAMBERS ~~per ALLIANCE~~ in ~~the~~ each SUBMERSIBLE. The LOW CHAMBER is made of HIPS plastic pipe and is 13 in. (33.0 cm) from the FIELD floor to the top of the 1.05 in. (2.7 cm) pipe. The HIGH CHAMBER is made of the same plastic pipe and

is 26 in. (66 cm) from the FIELD floor to the top of the pipe. ~~Both the red and the blue~~ All CHAMBERS are 26.5 in. (67.3 cm) wide and are attached to the vertical metal frame of the SUBMERSIBLE.

> HIPS pipe used for yellow CHAMBERS used at CRI is purchased through AndyMark, product code am-4809, which can be purchased on the AndyMark website.
>
> Yellow CHAMBERS can be made with used FIELD elements from POWER PLAY, by cutting down the longest yellow pipes from that game. The above link is equivalent to these elements.

Below the CHAMBERS and sitting on top of the FIELD TILES is a 2 in. (5 cm) tall metal barrier. This barrier helps to keep SCORING ELEMENTS inside the SUBMERSIBLE during gameplay.

9.6 BASKETS

There are ~~two~~ four (4) BASKETS per ALLIANCE: ~~a~~ two (2) LOW BASKETS and ~~a~~ two (2) HIGH BASKETS. The lowest lip of the each LOW BASKET is 25.75 in. (65.4 cm) from the FIELD floor. There is one LOW BASKET and one HIGH BASKET located in each NET ZONE. The two NET ZONES for each ALLIANCE are located on opposite corners of the FIELD. The lowest lip ~~of the~~ each HIGH BASKET is 43.0 in. (109.2 cm) from the FIELD floor.

9.7 Scoring elements

9.7.1 SAMPLES

A SAMPLE is a 3.5 in. (8.9 cm) long by 1.5 in. (3.8 cm) wide by 1.5 in. (3.8 cm) high rectangular prism shaped SCORING ELEMENT. There are ~~forty (40)~~ eighty (80) yellow SAMPLES, ~~twenty (20)~~ fourty (40) red SAMPLES, and ~~twenty (20)~~ fourty (40) blue SAMPLES. An ALLIANCE SPECIFIC SAMPLE with a CLIP attached is no longer a SAMPLE and is now a SPECIMEN. A neutral SAMPLE with a CLIP attached is still considered a SAMPLE.

9.7.2 CLIPS

The CLIP is a black plastic SCORING ELEMENT which is designed to be connected to an ALLIANCE SPECIFIC SAMPLE by a HUMAN PLAYER or ROBOT to create a SPECIMEN. The CLIP is 2.5 in. (6.4 cm) high by 3.2 in. (8.1 cm) long by 1 in. (2.5 cm) wide . There are ~~forty (40)~~ eighty (80) CLIPS, evenly distributed between each ALLIANCE AREA.

9.8 **AprilTags**

AprilTags are placed outside of the FIELD perimeter walls facing inward to help aid in ROBOT navigation. AprilTags for INTO THE DEEP℠ presented by RTX are ~~six~~ eight 4 in. (10.16 cm) square targets from the 36h11 tag family, IDs ~~11-16~~ 9-16. Each marker has an identifying “ID” text label.

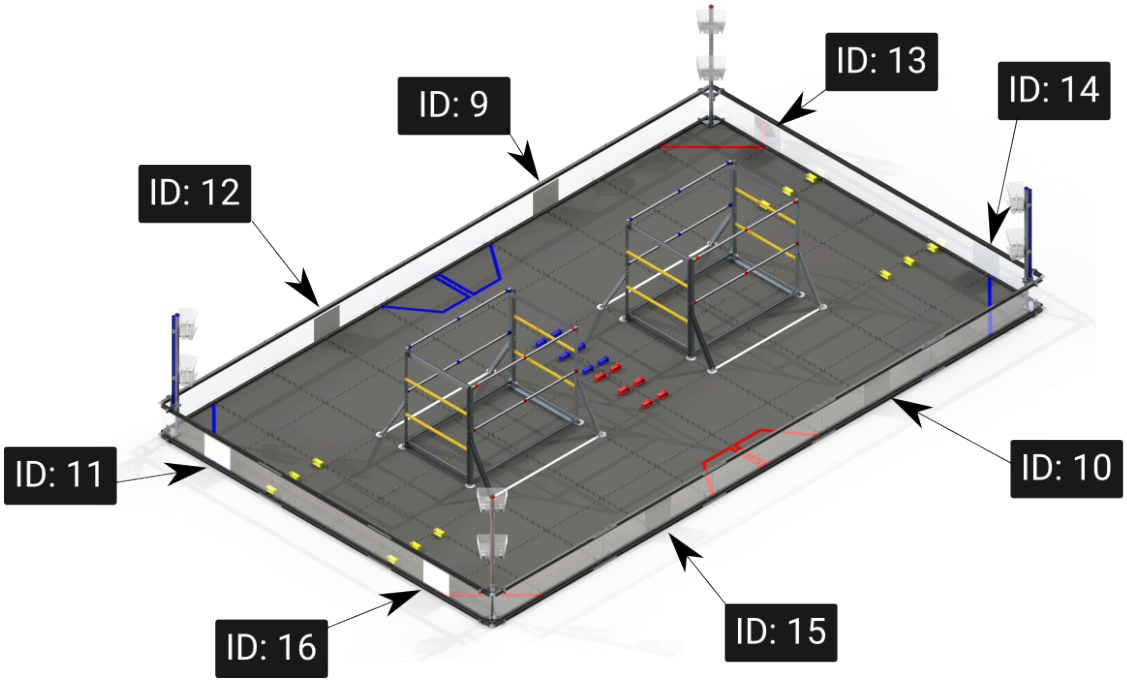


Figure 9-8: AprilTag Locations

9.10 **Event Management System**

The *FIRST* event management system is the software responsible for managing the MATCH scores and other event inputs. The system encompasses all FIELD electronics, including computers, displays, REFEREE and other volunteer electronic devices, the wireless access point, ethernet cables, etc.

The *FIRST* event management system alerts participants to milestones in the MATCH using audio cues detailed in Table 9-1. Please note that audio cues are intended as a courtesy to participants and not intended as official MATCH markers. If there is a discrepancy between an audio cue and the visual FIELD timers, the visual FIELD timers are the authority.

Table 9-1: Audio Cues

Event	Timer Value	Audio Cue
MATCH start	2:30	“Cavalry Charge”
AUTO ends	2:00	“Buzzer x 3”
AUTO to TELEOP transition	0:07 to 0:01	“Drivers, pick up your controllers, 3-2-1”
TELEOP begins	2:00	“3 Bells”
Final ~~30~~ 20 seconds	~~0:30~~ 0:20	“Train Whistle”
MATCH end	0:00	“3-second Buzzer”

For the purposes of score tracking in the *FIRST* event management system, each BASKET and CHAMBER location is referred to as detailed in Figure 9-9.

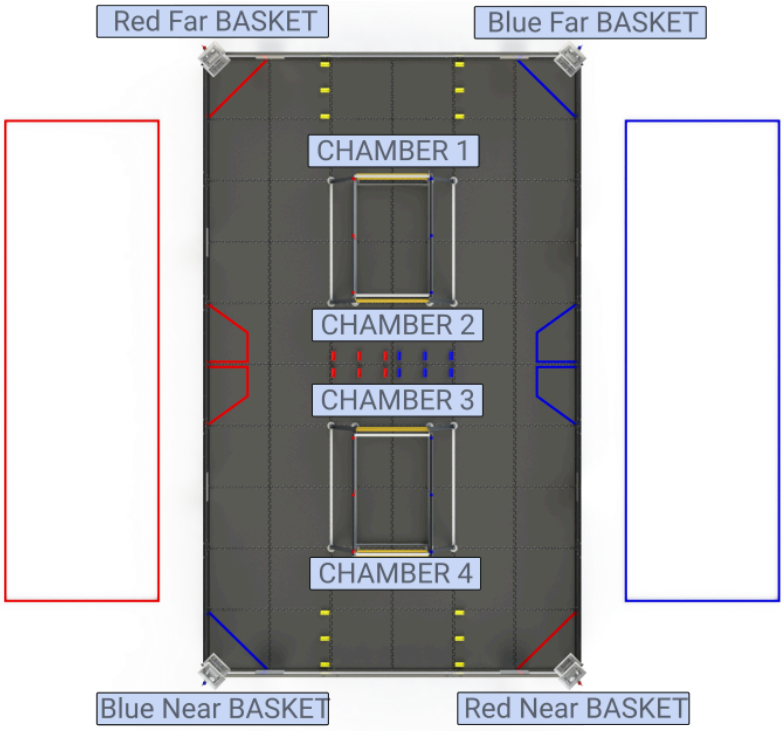


Figure 9-9: Scoring locations

10 Game Details

In INTO THE DEEP℠ presented by RTX, two (2) alliances (an alliance is a cooperative of ~~2~~ 3 *FIRST* Tech Challenge teams) play MATCHES, which are set up and implemented per the details described below.

10.2 Drive team

*~~Only one~~ Up to two (2) human player~~S~~ will represent an alliance in a MATCH. If an alliance cannot agree on which team's human player(s) will participate in a MATCH, The human player(s) from the team listed as "Red 1" and "Red 2" or "Blue 1" and "Blue 2" in the MATCH schedule will be used

> The maximum number of DRIVE TEAM members per team and their roles remains unchanged. The total number of DRIVE TEAM members on an ALLIANCE during qualification MATCHES may be a maximum of 11.
>
> DRIVE TEAM members are not allowed to change roles or swap badges during a MATCH.

10.3 Setup

10.3.1 SCORING ELEMENTS

Before each MATCH begins, FIELD STAFF stage SCORING ELEMENTS according to Figure 10-1.

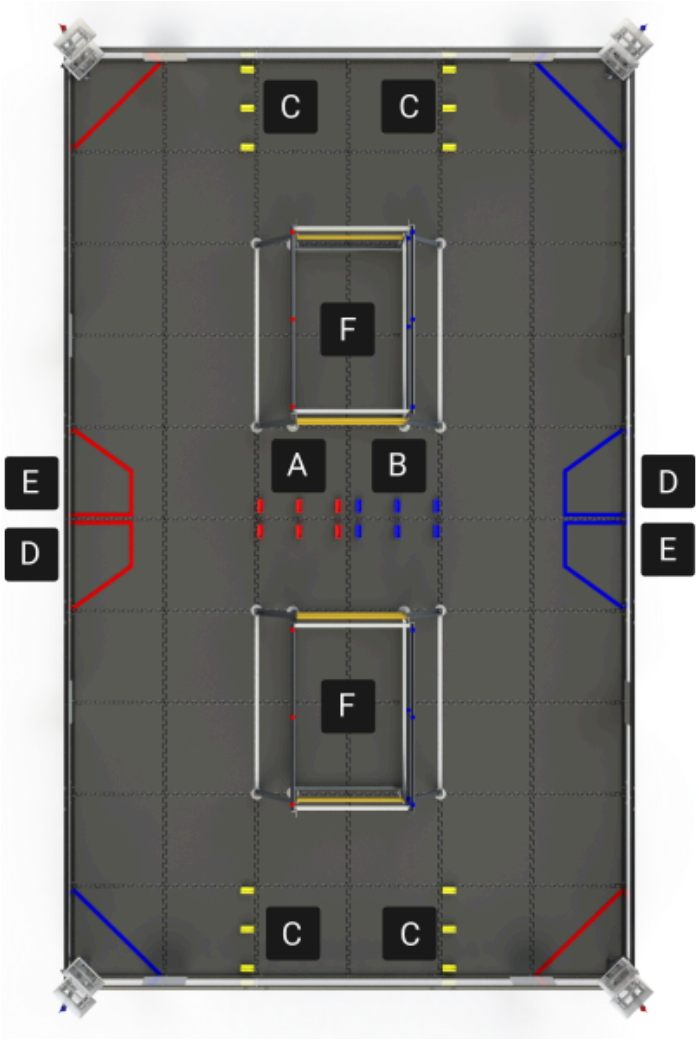


Figure 10-1: SCORING ELEMENTS staging positions

~~80~~ 160 SAMPLES (~~20~~ 40 red, ~~20~~ 40 blue, and ~~40~~ 80 neutral) and ~~40~~ 80 CLIPS that are staged as follows:

A. Blue ALLIANCE SAMPLES – 3 blue SAMPLES are placed on each of the 3 SPIKE MARKS on TILES ~~B1~~ C5 and C6
B. Red ALLIANCE SAMPLES – 3 red SAMPLES are placed on each of the 3 SPIKE MARKS on TILES ~~B1~~ D5 and D6
C. Neutral SAMPLES – 3 neutral SAMPLES are placed on each of the 3 SPIKE MARKS on TILES ~~B6 and E1~~ B1, B10, E1 and E10

D. ~~2~~ 4 neutral SAMPLES and ~~2~~ 4 corresponding ALLIANCE SPECIFIC SAMPLES are placed on the floor outside the FIELD wall between the ALLIANCE AREA and the wall
E. ~~20~~ 40 CLIPS are placed on the floor outside the FIELD wall between the ALLIANCE AREA and the wall
F. SAMPLES inside ~~the~~ each SUBMERSIBLE ZONE – approximately 15 red SAMPLES, 15 blue SAMPLES, and 30 neutral SAMPLES are randomly placed inside ~~the~~ each SUBMERSIBLE

> Each color of SAMPLE (red, blue and yellow) will be approximately evenly distributed between each SUBMERSIBLE.

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:

A. first red ROBOT
B. first blue ROBOT
C. second red ROBOT
D. second blue ROBOT
E. third red ROBOT
F. third 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.

> FIELD STAFF may ask teams to indicate their intended location and are not required to wait for a team to stage their ROBOT in its exact location before moving to the next team.

10.5 **Scoring**

...

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

- PARKING in ~~the~~ an 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.~~ equal to their MATCH score, plus additional RP for winning or tying MATCHES. (see Section 13.5.3 Qualification Ranking).

10.5.2 **Specimen Scoring Criteria**

A SPECIMEN is considered scored if the SPECIMEN is fully supported by a corresponding ALLIANCE SPECIFIC CHAMBER (Figure 10-2) either directly or transitively though other SPECIMENS.

Figure 10-2: SPECIMEN scored on a CHAMBER

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.~~

10.5.3 **ROBOT Scoring Criteria**

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

NOTE: PARKING in two OBSERVATION ZONES concurrently will score the same as PARKING in a single OBSERVATION ZONE.

...

10.5.4 **OWNED CHAMBER Scoring Criteria**

A CHAMBER is scored as an OWNED CHAMBER by an ALLIANCE if more of that ALLIANCE's SPECIMENS are scored on the CHAMBER at the end of a MATCH period. A CHAMBER with no SPECIMENS scored on it or with an equal number of red and blue SPECIMENS scored on it is not owned by either ALLIANCE. One bonus per CHAMBER is given at the end of AUTO, and another bonus per CHAMBER is given at the end of TELEOP.

10.5.5 **COOPERTITION BONUS Criteria**

During qualification MATCHES only, ALLIANCES can earn MATCH points by achieving the COOPERTITION BONUS. The COOPERTITION BONUS is achieved if, at the end of the MATCH, at least two (2) SCORING ELEMENTS are scored in every scoring location on the FIELD. This includes:

- all four (4) NET ZONES,
- all eight (8) BASKETS, and
- all eight (8) CHAMBERS.

Both ALLIANCES receive the COOPERTITION BONUS when the criteria is met.

10.5.6 **Point Values**

Table 10-1: CRI INTO THE DEEP℠ presented by RTX point values

		MATCH Points		RANKING Points
		AUTO	TELEOP	
PARK	OBSERVATION ZONE	3	3	
SAMPLE	NET ZONE	2	2	
	LOW BASKET	4	4	
	HIGH BASKET	8	8	
SPECIMEN	LOW CHAMBER	6	6	
	HIGH CHAMBER	10	10	
OWNED CHAMBER		10	20	
ASCENT	Level 1	3	3	
	Level 2		15	
	Level 3		30	
COOPERTITION BONUS			50	
~~Tie~~	~~completing a MATCH with the same number of MATCH points as your opponent~~			~~1~~
~~Win~~	~~completing a MATCH with more MATCH points than your opponent~~			~~2~~

10.6 **Violations**

10.6.1 **YELLOW and RED CARD application**

YELLOW and RED CARDS are applied based on the following:

Table 10-2: CRI YELLOW and RED CARD application

Time YELLOW or RED CARDS earned:	**MATCH to which CARD is applied:**
before the start of qualification MATCHES	~~team's first qualification MATCH~~ REFEREES may or may not be present during practice MATCHES. With input from event staff, The Head REFEREE may opt to perpetuate a verbal warning or YELLOW CARD earned prior to qualification MATCHES to the first qualification MATCH for particularly egregious behavior.
during the qualification MATCHES	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.
between the end of qualification MATCHES and the start of playoff MATCHES	ALLIANCE'S first playoff MATCH
during the playoff MATCHES	ALLIANCE'S current (or just completed) MATCH

11 Game Rules (G)

11.2 Pre-MATCH

G210 ***Do not expect to gain by doing others harm.** Actions clearly aimed at forcing the opponent alliance to violate a rule are not in the spirit of *FIRST* Tech Challenge and not allowed. Rule violations forced in this manner will not result in an assignment of a penalty to the targeted alliance.

Violation: Minor foul plus major foul if repeated. The alliance that was forced to break a rule will not incur a foul.

This rule does not apply for strategies consistent with standard gameplay, for example:

A. a red alliance ROBOT ASCENDING in their ASCENT zone in the final 30 seconds of the MATCH contacts a blue alliance robot
B. a red ROBOT attempts to enter their net zone to place a SPECIMEN and pushes a blue ROBOT that was less than 1 TILE away into the NET ZONE.

This rule requires an intentional act with limited or no opportunity for the team being acted on to avoid the penalty, such as:

A. trapping an opposing ALLIANCE ROBOT in your ALLIANCE'S ASCENT ZONE during the last ~~30~~ 20 seconds of the MATCH.
B. pushing an opposing ALLIANCE ROBOT into one of your ALLIANCE'S OBSERVATION ZONE intentionally or from more than 1 TILE away.
C. placing ~~your ALLIANCE SPECIFIC~~ any SAMPLE or SPECIMEN in an opposing ALLIANCE'S ROBOT.
D. a ROBOT becomes pinned in their opposing ALLIANCE'S OBSERVATION ZONE by the opposing ALLIANCE ROBOT

G211 ***Egregious or exceptional violations.** Egregious behavior beyond what is listed in the rules or subsequent violations of any rule or procedure during the event is prohibited.

In addition to rule violations explicitly listed in this manual and witnessed by a REFEREE, the Head REFEREE may assign a YELLOW or RED CARD for egregious ROBOT actions or team member behavior at any time during the event.

Continued violations will be brought to *FIRST* Headquarters' attention. *FIRST* Headquarters will work with event staff to determine if further escalations are necessary, which can include removal from award consideration and removal from the event.

Please see Section 10.6.1 YELLOW and RED CARD application for additional detail.

The intent of this rule is to provide the Head REFEREES with the flexibility necessary to keep the event running smoothly, as well as keep the safety of all the participants as the highest priority. There are certain behaviors that automatically result in a YELLOW or RED CARD because this behavior puts the *FIRST* community at risk. Those behaviors include, but are not limited to the list below:

A. inappropriate behavior as outlined in the orange box of G201,
B. reaching into the FIELD and grabbing a ROBOT during a MATCH,
C. PINNING in excess of 15 seconds,
D. a DRIVE TEAM member reaching into the FIELD and removing a stuck SCORING ELEMENT from a ROBOT,
E. descoring SCORING ELEMENTS strategically or REPEATEDLY

The Head REFEREE may assign a YELLOW or RED CARD for a single instance of a rule violation such as the examples given in items above, or for multiple instances of any single rule violation. Teams should be aware that any rule in this manual could escalate to a YELLOW or RED CARD. The Head REFEREE has final authority on all rules and violations at an event.

11.4 In MATCH

G401 ***Let the ROBOT do its thing.** In AUTO, a DRIVE TEAM member may not directly or indirectly interact with a ROBOT or an OPERATOR CONSOLE, with the following exceptions:

A. to press the (▸) start button at the start of the MATCH.
B. to press the (■) stop button before the end of AUTO either at the team's discretion or instruction of the Head REFEREE per T202.
C. for personal safety or OPERATOR CONSOLE safety

Violation: MINOR FOUL or MAJOR FOUL if actions result in ROBOT motion.

G404 **No AUTO opponent interference.** FIELD columns A, and B, ~~C~~ constitute the blue ~~side~~ section of the FIELD, and columns ~~D~~, E, and F (see Figure 9-6) constitute the red ~~side~~ section of the FIELD. FIELD columns C and D constitute the shared section of the FIELD. During AUTO ROBOTS may not:

A. contact an opposing ALLIANCE'S ROBOT which is completely within the opposing ALLIANCE'S ~~half~~ section of the FIELD.

B. ~~contact~~ move an opposing ALLIANCE'S pre-set SAMPLE that started on a SPIKE MARK ~~on the opposing ALLIANCE'S half of the FIELD.~~

C. move SCORING ELEMENTS onto the opposing ALLIANCE'S ~~half~~ section of the FIELD ~~outside of the SUBMERSIBLE ZONE.~~

Violation: MAJOR FOUL each occurrence.

The intent of this rule is to protect ROBOT actions performed while completely in their ALLIANCE'S ~~half~~ section of the FIELD. Navigating into the opposing ALLIANCE'S ~~half~~ section of the FIELD during AUTO is a risky gameplay strategy.

> Interactions with opposing ALLIANCE ROBOTS should be an expected part of AUTO gameplay for ROBOTS that enter the shared section of the FIELD during AUTO.

G406 ***ROBOTS are motionless at the end of TELEOP.** ROBOTS must no longer ~~be actively controlled by DRIVERS~~ be moving under power after the end of the TELEOP period. This can be done by a DRIVE TEAM member pressing the (■) stop button on the DRIVER STATION app or by discontinuing any operation of the ROBOT by the end of the MATCH period.

Violation: MINOR FOUL or MAJOR FOUL if actions result in a scoring achievement by the offending ROBOT.

DRIVE TEAMS should make their best effort to stop gameplay immediately at the end of the MATCH period. The end of MATCH period buzzer audio cue is approximately 3 seconds long and is used as an unofficial indicator to teams and REFEREES that the MATCH has ended.

> Acceptable actions or situations include:
> A. Motors remain powered to maintain the ROBOT's position
> B. OpMode continues to be active
> C. DRIVE TEAM member presses the (⬛) stop button
> D. ROBOT coasts to a stop after power to motors is removed/OpMode is stopped
> E. ROBOT slumps after power to motors is removed/OpMode is stopped
> F. ROBOT supported by a RUNG swings or sways
> G. ROBOT falls due to gravity
>
> Violations include:
> A. DRIVER continues to drive the ROBOT using active inputs
> B. An automated program continues to move the ROBOT
> C. A ROBOT's intake continues to spin

G407 ***ROBOTS use SCORING ELEMENT as directed.** A ROBOT may not deliberately use a SCORING ELEMENT in an attempt to ease or amplify a challenge associated with a FIELD element other than as intended.

Violation: MAJOR FOUL per SCORING ELEMENT.

Examples include, but are not limited to:

A. ~~placing SCORING ELEMENTS on other ROBOTS,~~ *(See G210/G410/G411)*
B. using SCORING ELEMENTS to elevate ROBOTS in an attempt to ASCEND the RUNGS of the SUBMERSIBLE, and
C. positioning SCORING ELEMENTS to impede opponent access to FIELD elements.

G410 **1 SAMPLE or SPECIMEN at a time.** A ROBOT may not CONTROL more than 1 SAMPLE or 1 SPECIMEN at a time, either directly or transitively through other objects. There is no limit to the number of CLIPS a ROBOT may possess.

A ROBOT is in CONTROL of a SAMPLE or SPECIMEN if:

A. the SAMPLE or SPECIMEN is fully supported by the ROBOT or
B. it intentionally pushes a SAMPLE or SPECIMEN to a desired location or in a preferred direction (i.e., herding, often with a concave surface)

Exceptions to this rule are as follows:

C. ROBOTS may MOMENTARILY exceed CONTROL limits while collecting SAMPLES or SPECIMENS that are in ~~the~~ a SUBMERSIBLE ZONE.
D. scored SAMPLES or SPECIMENS for the corresponding ALLIANCE are exempt from the CONTROL limit.
E. SAMPLES or SPECIMENS stuck on or in a ROBOT due to opposing ALLIANCE actions.

Violation: MINOR FOUL per additional SAMPLE and/or SPECIMEN plus YELLOW CARD if excessive.

Examples of interaction with a SAMPLE or SPECIMEN that are not “CONTROL” include, but are not limited to:

A. PLOWING or “bulldozing” (inadvertent contact with a SAMPLE or SPECIMEN, typically via a flat or convex surface, while in the path of the ROBOT moving about the FIELD).
B. “deflecting” (being hit by a SAMPLE or SPECIMEN that bounces off a ROBOT).

Excessive violations of CONTROL limits include, but are not limited to, simultaneous CONTROL of 3 or more SAMPLES and/or SPECIMENS, or frequent, greater-than MOMENTARY CONTROL (i.e., more than twice in a MATCH) of 2 or more SAMPLES and/or

SPECIMENS. REPEATED excessive violations of this rule do not result in additional YELLOW CARDS unless the violation reaches the level of egregious to trigger a G201 violation.

G411 **ROBOTS may not CONTROL the opposing ALLIANCE'S SPECIFIC SAMPLES or SPECIMENS.** ROBOTS may only have MOMENTARY CONTROL of opposing ALLIANCE SPECIFIC SAMPLES or SPECIMENS in a SUBMERSIBLE ZONE. ROBOTS may not CONTROL opposing ALLIANCE SPECIFIC SAMPLES or SPECIMENS in any other part of the FIELD.

Exceptions to this rule are as follows:

A. SAMPLES or SPECIMEN stuck on or in a ROBOT due to opposing ALLIANCE actions.

Violation: MINOR FOUL per SCORING ELEMENT plus an additional MINOR FOUL per opposing SCORING ELEMENT for each 5-second interval that the situation continues. A MAJOR FOUL is applied for each SCORING ELEMENT that is scored while in CONTROL.

G412 **ROBOTS may not de-score opposing ALLIANCE SCORING ELEMENTS.** ROBOTS may not affect the following opposing ALLIANCE achievements.

A. removal of SAMPLES from the NET ZONE
B. removal of SAMPLES from the BASKETS
C. removal of SPECIMENS that are fully clipped onto the CHAMBERS.

Violation: MAJOR FOUL per SCORING ELEMENT that is de-scored plus two (2) MAJOR FOULS if the OWNED CHAMBER status for the MATCH period is changed.

SPECIMENS that are not fully clipped onto a CHAMBER and are de-scored from a CHAMBER ~~during normal ROBOT interactions with the SUBMERSIBLE~~ are not penalized.

A SPECIMEN that is taken apart while scored onto the CHAMBER is a violation of this rule and does incur a FOUL.

> A ROBOT is deemed to have affected the OWNED CHAMBER status if, at the end of the MATCH period when the SPECIMEN(S) were de-scored, restoring any de-scored SPECIMENS would change the CHAMBER's OWNED status for that MATCH period.

G418 **Horizontal expansion limit.** After the MATCH has started, ROBOTS may expand beyond the STARTING CONFIGURATION but are still subject to sizing constraints. The sizing constraints are specified in R104).

> Exceptions to this rule are as follows:
>
> A. Over-expansions caused by unintentional ROBOT damage or a ROBOT unintentionally tipping over and not used for strategic benefit.

Violation: If more than MOMENTARY, MINOR FOUL, or MAJOR FOUL if the over-expansion is used for strategic benefit, including if it impedes or enables a scoring action.

This rule is intended to limit the amount of floor area each ROBOT can cover with the maximum range of motion of all extensions. All possible movement of extensions outside the STARTING CONFIGURATION must be constrained as described in R104.

During the MATCH REFEREES may use ARENA elements to help gauge ROBOT expansion during the MATCH. For example:

A. TILES are approximately 24 in. (61 cm)
B. The RUNGS on the SUBMERSIBLE are 44.5 in. (113 cm) wide

G419 **Watch Out For Humans.** A ROBOT may not:

A. enter ~~the~~ an OBSERVATION ZONE while a HUMAN PLAYER is in ~~the~~ that OBSERVATION ZONE.
B. contact a SCORING ELEMENT, either directly or transitively, that is controlled/possessed by a HUMAN PLAYER.

Violation: MINOR FOUL per occurrence plus YELLOW CARD if the ROBOT contacts ~~the~~ a HUMAN PLAYER.

G424 ***Do not use strategies intended to shut down major parts of gameplay.** A ROBOT or ROBOTS may not, in the judgment of a REFEREE, isolate or close off any major element of MATCH play for a greater-than-MOMENTARY duration.

Violation: MINOR FOUL plus an additional MINOR FOUL for every 5 seconds in which the situation is not corrected.

Examples of violations of this rule include, but are not limited to:

A. shutting down access to all SCORING ELEMENTS,
B. quarantining an opponent to a small area of the FIELD,
C. quarantining all unscored SCORING ELEMENTS of one or more types (e.g., neutral SAMPLES) out of the opposing ALLIANCE'S reach,

D. blocking all access to opponent's BASKETS, NET ZONE, ~~CHAMBERS~~, or both OBSERVATION ZONES, ~~and~~
E. blocking all access to SCORING ELEMENTS of one or more types in any ~~the~~ SUBMERSIBLE ZONE, and
F. blocking all access to a set of CHAMBERS.

> ROBOTS attempting offensive tasks (i.e., collecting SAMPLES, scoring) are not considered blocking a NET ZONE, BASKET, CHAMBER, etc. until the offensive task is complete or their actions are determined to be strategically defensive.
>
> Blocking an element of MATCH play requires an opposing ROBOT to attempt offensive MATCH play with that element.

G427 **Climbing ROBOTS are protected.** In the last ~~30~~ 20 seconds of the MATCH, a ROBOT may not contact (either directly or transitively through a SCORING ELEMENT CONTROLLED by either ROBOT and regardless of who initiates contact) an opponent ROBOT if any part of either ROBOT is in the opponent's ASCENT ZONE. Exceptions to this rule are as follows:

A. Incidental contact occurring while both ROBOTS have met the scoring requirements to achieve LEVEL 2 or LEVEL 3 ASCENT.
B. Contact occurring with an opponent ROBOT who is extending more than approximately 7 inches (i.e., roughly the length of two SAMPLES) into the SUBMERSIBLE ZONE as measured from the barrier.
C. Contact occurring in the SUBMERSIBLE ZONE that does not impact the opponent's ASCENT or ability to ASCEND.

Violation: MAJOR FOUL plus the affected ALLIANCE ROBOT is awarded a LEVEL 3 ASCENT.

The intent of exception A is that teams should be aware that the SUBMERSIBLE ZONE is a constrained space and ROBOTS swinging during their ASCENT may contact each other and teams should design their ROBOTS to be resilient to incidental contact.

The intent of exception B is to allow minor extensions into the SUBMERSIBLE ZONE while attempting to ASCEND while also allowing incidental contact between longer MECHANISMS.

> The intent of exception C is to allow for normal gameplay that is not ASCENT-related (e.g., SAMPLE collection from the SUBMERSIBLE ZONE) to continue without causing G427 violations.

ROBOTS that are attempting to play defense within the SUBMERSIBLE ZONE or the ASCENT ZONES during the last ~~30~~ 20 seconds of the MATCH are likely to incur penalties.

G431 **HUMAN PLAYERS manipulate SCORING ELEMENTS within limits.** Only ~~the~~ a HUMAN PLAYER may introduce SCORING ELEMENTS into or retrieve SCORING ELEMENTS from ~~the~~ an OBSERVATION ZONE.

A. any number of SCORING ELEMENTS can be manipulated by ~~the~~ a HUMAN PLAYER at a time.
B. SCORING ELEMENTS may be placed in any orientation and/or in contact with other SCORING ELEMENTS.
C. HUMAN PLAYERS may only place and/or retrieve SCORING ELEMENTS into ~~the~~ an OBSERVATION ZONE during the AUTO and TELEOP periods of the MATCH.
D. HUMAN PLAYERS may not be in contact with a SCORING ELEMENT, either directly or transitively, that is possessed/controlled by a ROBOT.
E. HUMAN PLAYERS may reintroduce SCORING ELEMENTS to ~~the~~ an OBSERVATION ZONE that have left the FIELD as a result of a ROBOT attempting to collect it from ~~the~~ an OBSERVATION ZONE or FIELD wall within ~~the~~ an OBSERVATION ZONE, as long as no other rules are violated (e.g. rule G428).
F. HUMAN PLAYERS may manipulate opposing ALLIANCE SCORING ELEMENTS that have been placed into one of their ALLIANCE'S OBSERVATION ZONES. The opposing ALLIANCE SCORING ELEMENTS may not be removed from the OBSERVATION ZONES, but may be moved within the OBSERVATION ZONES.

Violation: MINOR FOUL per occurrence plus YELLOW CARD if ~~the~~ a HUMAN PLAYER contacts the ROBOT.

SPECIMENS hung from the FIELD wall in ~~the~~ an OBSERVATION ZONE are still considered in ~~the~~ an OBSERVATION ZONE and may be manipulated by ~~the~~ a HUMAN PLAYER.

G419 and G431 do not stack. One FOUL should be called per occurrence of the violation per ALLIANCE. For example, two FOULS would be called in the case where the ROBOT and HUMAN PLAYER are on separate ALLIANCES. Additionally, two FOULS would be called in the case where both HUMAN PLAYERS from an ALLIANCE are in an OBSERVATION ZONE when a ROBOT from the same ALLIANCE enters it.

> With two distinct adjacent OBSERVATION ZONES for each ALLIANCE, the intent is that a HUMAN PLAYER and a ROBOT should never be in the same OBSERVATION ZONE at any given time. Therefore:

A. A HUMAN PLAYER may enter one of the OBSERVATION ZONES for their ALLIANCE as long as there is not a ROBOT in that OBSERVATION ZONE – a ROBOT may be in the other OBSERVATION ZONE for the ALLIANCE.
B. A HUMAN PLAYER may place a SCORING ELEMENT such that it is in both OBSERVATION ZONES.
C. Either HUMAN PLAYER for the ALLIANCE may be in either of the ALLIANCE's OBSERVATION ZONES – they are not constrained to one OBSERVATION ZONE for the MATCH.
D. Both HUMAN PLAYERS can be in one OBSERVATION ZONE at once.
E. Multiple ROBOTS can be in one of the OBSERVATION ZONES at once.
F. If a ROBOT is in both of an ALLIANCE's OBSERVATION ZONES, no HUMAN PLAYER should be in either OBSERVATION ZONE and vice versa.

G432 **Watch out for ROBOTS.** A HUMAN PLAYER cannot break the vertical plane of the FIELD wall to access an OBSERVATION ZONE when a ROBOT is in ~~the~~ that OBSERVATION ZONE. The only exceptions are:

A. The ROBOT in the OBSERVATION ZONE has been declared DISABLED by a REFEREE.

Violation: MINOR FOUL per occurrence plus YELLOW CARD if the HUMAN PLAYER contacts the ROBOT.

G434 **No tools to introduce or retrieve SCORING ELEMENTS.** ~~The~~ A HUMAN PLAYER may not use a tool to manipulate a SCORING ELEMENT.

Violation: MINOR FOUL per occurrence.

Accommodations and/or exceptions for HUMAN PLAYERS with a disability and/or an extenuating circumstance will be made at the discretion of the head REFEREE and/or Event Director.

13 Tournament (T)

13.1 **Overview** Each *FIRST* Tech Challenge competition is played in a head-to-head tournament format. Each tournament may consist of practice MATCHES, qualification MATCHES, and playoff MATCHES.

> Practice MATCHES provide each team with an opportunity to operate its ROBOT on the FIELD prior to the start of the qualification MATCHES.

...

13.2 General Tournament Rules

T205 ***During optional FIELD measurement and calibration time(s) ROBOTS may not practice on the FIELD.** During any period when the ARENA is open for measurement, ROBOTS may run OpModes but cannot move the ROBOT (e.g., CHASSIS) under its own power around the FIELD ~~interact with (e.g., score, push, pickup) SCORING ELEMENTS, or other FIELD elements.~~

At the discretion of the Event Director ~~Head REFEREE~~ at the event, the ARENA may be open for at least 30 minutes prior to the start of qualification MATCHES, during which time teams may survey and/or measure the ARENA and bring ROBOTS on the FIELD to perform sensor calibration. The specific time that the FIELD is open will be communicated to teams at the event. Teams may bring specific questions or comments to the Head REFEREE or FTA.

~~ROBOT calibration and measurements can also be completed during scheduled field inspection times, as long as all teams get roughly the same time regardless of inspection length.~~

> Allowed activities during ROBOT calibration and measurement (times) include:
>
> A. ROBOT may be powered on
> B. Team may initialize an OpMode
> C. ROBOT may operate or extend MECHANISMS outside the ROBOT CHASSIS
> D. ROBOT may CONTROL SCORING ELEMENTS
> E. ROBOT may be connected to programming laptops and other devices
> F. Team members may be on the FIELD with the ROBOT
> G. Team members may manually move the ROBOT to multiple positions around the FIELD (e.g., without driving the ROBOT under its own power)
> H. Team members or ROBOTS may measure the FIELD with tools (e.g, tape measures) or sensors

Activities not allowed during ROBOT calibration and measurement time(s) include:

I. ROBOT CHASSIS is not allowed to move under its own power around the FIELD (e.g., “driving” as part of AUTO or TELEOP)

J. ROBOT is not allowed to attempt/complete an ASCENT

13.5 Qualification MATCHES

13.5.3 Qualification Ranking

RANKING POINTS (RP) are units credited to a team based on their ALLIANCE’S performance in qualification MATCHES. ~~These points are awarded to each eligible team at the completion of each qualification MATCH per Table 10-3.~~ The RANKING POINTS that a team receives from a qualification MATCH is influenced by whether they won, tied, or lost the MATCH, in addition to the total number of points scored by that ALLIANCE.

A team’s RANKING SCORE (RS) is the average number of RANKING POINTS earned by a team throughout their qualification MATCHES (excluding any SURROGATE MATCH).

All teams participating in qualification MATCHES are ranked by RANKING SCORE. If the number of teams in attendance is ‘n’, they are ranked ‘1’ through ‘n’, with ‘1’ being the team with the highest RANKING SCORE and ‘n’ being the team with the lowest RANKING SCORE. SURROGATE MATCHES are excluded from all calculations. A MATCH in which a team is DISQUALIFIED contributes 0 to all sort criteria.

The RANKING POINTS awarded to a team for a given qualification MATCH are calculated as follows:

- The MATCH points that the team’s ALLIANCE for that qualification MATCH achieved, plus
  - If the ALLIANCE won the MATCH: two (2) times the average MATCH score for all qualification MATCHES, or
  - If the ALLIANCES tied the MATCH: the average MATCH score for all qualification MATCHES.

The average MATCH score in the above calculations is constantly recalculated after each MATCH is posted, meaning a team’s RANKING SCORE will fluctuate as MATCHES are played, regardless of whether the team participated in them or not.

In a hypothetical first qualification MATCH, if the final score of the MATCH has the red ALLIANCE with 100 points and the blue ALLIANCE with 200 points. The event average MATCH score is 150 points.

In this situation, each team on the blue ALLIANCE receives 100 RANKING POINTS, equal to the number of points they scored in that MATCH. Each team on the red ALLIANCE will receive 500 RP. This is based on the 200 MATCH points from the red ALLIANCE'S final MATCH score plus 300 – two times the event average MATCH score of 150.

In a second hypothetical qualification MATCH, the final score of the MATCH is tied 100 to 100. The event average MATCH score is now 125 points between the two MATCHES. This would result in all teams in the second MATCH, regardless of ALLIANCE, receiving 225 RANKING POINTS.

The RANKING POINTS for the first MATCH would also be recalculated with the new event average MATCH score, with the red ALLIANCE still receiving 100 RP. The blue ALLIANCE RP is now recalculated with the new event average MATCH score to be 450 RP.

Teams are ranked in order, using the sorting criteria defined in the INTO THE DEEP℠ presented by RTX Competition Manual Table 13-1. This table is unmodified from the in-season qualification ranking.

13.6 Playoff MATCHES

T601 ***Send your student representatives.** Each team must choose and send at least one (1), but not more than two (2) student team representatives to the arena at the designated alliance selection time (~~typically just after the last scheduled qualification MATCH~~ fifteen minutes after scores are posted from the last qualification MATCH) to represent their team.

Violation: Team is ineligible for the Playoff Tournament if they are not represented by the time they are announced.

If an absent team would have been an alliance lead, all lower ranked alliance leads are promoted 1 spot.

~~T603~~ ***~~There are no BACKUP TEAMs in playoff MATCHES.~~** This rule has been removed. BACKUP TEAMS for playoff MATCHES may be called as described in CRI Competition Manual Section 13.6.7.

T606 **Only 1 STUDENT may use the mic.** Only a single (1) STUDENT from the invited team is allowed to accept/decline an invitation, or invite new teams as an ALLIANCE lead.

Violation: The accept, decline, or invitation will not be accepted until the situation is remedied.

13.6.1 Alliance Selection Process

A break of fifteen minutes (15:00) occurs between the posting of scores from the last qualification MATCH (scheduled or replay, whichever comes later) and the start of the ALLIANCE selection process. The ALLIANCE selection process will begin at this time regardless of whether team representatives have checked in or not.

ALLIANCES at CRI will be formed in the same way they are at the *FIRST* Championship, where a second round takes place immediately after the first round with a reversed selection order, with ALLIANCE 6 picking first and ALLIANCE 1 picking last. This process results in six (6) ALLIANCES of three (3) teams each.

...

13.6.2 Playoff MATCH Bracket

CRI will be following a regular 6 ALLIANCE double elimination bracket, as outlined in the INTO THE DEEP℠ presented by RTX Competition Manual, section 13.6.5.

13.6.7 BACKUP TEAMS

In the playoff MATCHES, it may be necessary for an ALLIANCE to replace one (1) of its members due to a faulty ROBOT. In this situation, the ALLIANCE lead has the option to bring in the highest seeded Team from the BACKUP POOL to join its ALLIANCE. The team whose ROBOT and DRIVE TEAM get added to an ALLIANCE during the playoff MATCHES is called the BACKUP TEAM for this ALLIANCE.

The BACKUP TEAM is then added to the ALLIANCE, forming a four (4) team ALLIANCE for the remainder of playoffs. The BACKUP TEAM must be a part of the three (3) teams who are playing for the next MATCH after the ALLIANCE calls them. After the first MATCH that the BACKUP TEAM is playing is over, the ALLIANCE may play any three (3) of the four (4) teams on the ALLIANCE for any MATCH.

Each ALLIANCE is allotted one (1) BACKUP TEAM coupon during the Playoff MATCHES. If a second ROBOT from the ALLIANCE becomes inoperable, then the ALLIANCE must play the following MATCHES with only two (2) (or even one (1)) ROBOTS. Once a BACKUP TEAM coupon is submitted and accepted by the Head REFEREE, the BACKUP TEAM coupon may not be withdrawn by the ALLIANCE.

T607 **No BACKUP TEAM for replayed MATCHES.** An ALLIANCE may not request a BACKUP TEAM for a replayed MATCH. The sole exception is if, in the judgment of the Head REFEREE, the replay is due to an ARENA FAULT that rendered an ALLIANCE'S ROBOT inoperable.

Violation: The request is denied.

T608 **No BACKUP TEAMS for the first MATCH.** An ALLIANCE may not request a BACKUP TEAM until after their first Playoff MATCH.

Violation: The request is denied.

T609 **BACKUP TEAMS play when called.** A BACKUP TEAM must be playing in the ALLIANCE'S next MATCH following their recruitment.

Violation: The MATCH will not start until the BACKUP TEAM is present for the MATCH.

G301 may still apply if the BACKUP TEAM is not making a good faith effort to report to the MATCH in a timely manner after being called.

T610 **BACKUP TEAMS due 2 minutes before the MATCH start time.** The BACKUP TEAM Coupon must be submitted to the Head REFEREE (or their designee) by the ALLIANCE CAPTAIN no later than two (2) minutes before the expected MATCH start time in which the BACKUP TEAM is to play.

Violation: The request is denied.

If the Head REFEREE is busy, and there is no designee, the ALLIANCE CAPTAIN remains in the Question Box to submit the BACKUP TEAM coupon.

T611 **4 Team ALLIANCES in the ALLIANCE AREA.** Once an ALLIANCE has called a BACKUP TEAM, a representative from the team not included in a MATCH may serve in a DRIVE COACH role as an additional DRIVE TEAM member.

The maximum number of DRIVE TEAM members per team and their roles remains unchanged, with the exception of an additional DRIVE COACH from the TEAM not participating in the MATCH. The total number of DRIVE TEAM members on a four (4) TEAM ALLIANCE may be a maximum of 12.

13.6.8 **BACKUP POOL**

After the top ranked ALLIANCE has made their final pick during ALLIANCE Selection, the lead queuer (or their designee) polls the remaining eligible teams. In rank order, the lead queuer (or their designee) will invite remaining teams to accept or decline a position in the BACKUP POOL, i.e. the group of teams willing and able to join an ALLIANCE during the Playoff MATCHES, if needed, until up to six (6) teams accept.

T612 **Be there to be a BACKUP TEAM.** A team must be present after ALLIANCE Selection to accept the lead queuer's (or their designee) invitation to join the BACKUP POOL.

Violation: Team is ineligible to be a BACKUP TEAM.

T613 **Send a BACKUP TEAM Representative.** The top two (2) ranked BACKUP TEAMS must send at least one (1) STUDENT representative (and optionally one (1) additional STUDENT or mentor) to a designated area near the FIELD for the duration of the playoff MATCHES.

These BACKUP TEAMs should have their ROBOT, batteries, DRIVER STATION, and any other equipment they need to play a MATCH with them at this location.

These (up to) two (2) representatives are available to answer questions and accept invitations to be a BACKUP TEAM from ALLIANCE CAPTAINS. If one (1) of these two (2) teams joins an ALLIANCE or excuses themselves from the BACKUP POOL, the next highest ranked team in the BACKUP POOL must provide their representative. Once a BACKUP TEAM has declined an invitation to join an ALLIANCE, it is no longer a member of the BACKUP POOL and ineligible to join another ALLIANCE.

Violation: VERBAL WARNING, plus the team is removed from BACKUP POOL if the situation cannot be corrected within a reasonable amount of time.

13.8 **Practice MATCHES**

Practice MATCHES are played before qualification MATCHES. The practice MATCH schedule is available as soon as possible, but no later than the start of practice MATCHES. Practice MATCHES are randomly assigned, and teams may not switch scheduled practice MATCHES. Each team is assigned an equal number of practice MATCHES unless the number of teams multiplied by number of practice MATCHES is not divisible by 6. In this case, the scoring system randomly selects some teams to play an extra practice MATCH.

13.8.1 **FILLER LINE**

A FILLER LINE is used to fill open slots at events that employ scheduled practice MATCHES or all slots at events with an open practice MATCH schedule. Teams from the FILLER LINE are used on a first come, first served basis to fill empty spots in practice MATCHES left by

other teams that do not report to queueing. The number of teams in the FILLER LINE is dependent upon space at venues. Only teams that meet all criteria below qualify for the FILLER LINE:

A. ROBOTS in the FILLER LINE must have passed inspection,
B. DRIVE TEAMS must join the FILLER LINE with their ROBOT,
C. teams may not work on their ROBOT while in the FILLER LINE,
D. teams may not occupy more than one (1) spot in the FILLER LINE, and
E. if a team is queued for their scheduled practice MATCH, they may not also join the FILLER LINE.

16 Glossary

ALLIANCE a cooperative of ~~two~~ three (3) *FIRST* Tech Challenge teams

ALLIANCE AREA a ~~120 in. (304.8 cm) wide by 42 in. (106.7 cm) deep~~ rectangle 186 in. (472.5 cm) wide by 60 in. (152.4 cm) deep by infinitely tall volume formed by placing ALLIANCE colored tape onto the flooring surface outside of the FIELD.

ASCENT ZONE an infinitely tall ~~5-sided polygon that is formed from two 9.25 in. (23.5 cm) long sides bounded by the SUBMERSIBLE outriggers, one 44.75 in. (113.7 cm) long side bounded by the barrier of the SUBMERSIBLE, and the two 26 in. (66 cm) long sides bounded by white tape that extend from the outriggers to a point 20 in. (50.8 cm) from the barrier~~ rectangle that is 8.25 in. (21.0 cm) deep by 44.75 in. (113.7 cm) in between the outriggers located on either side of each SUBMERSIBLE. The ASCENT ZONE includes the taped lines. ASCENT ZONES are only ALLIANCE SPECIFIC zones during the last ~~30~~ 20 seconds of a MATCH.

BACKUP POOL The group of teams willing and able to join an alliance during the playoff MATCHES, if needed

BACKUP TEAM The team whose ROBOT and drive team replaces another ROBOT and drive team on an alliance during the playoff MATCHES

CHAMBERS There are ~~two CHAMBERS per alliance~~ four (4) alliance neutral CHAMBERS in ~~the~~ each submersible. The LOW CHAMBER is made of HIPS plastic pipe and is 13 in. (33.0 cm) from the field floor to the top of the 1.05 in. (2.7 cm) pipe.

COOPERTITION BONUS A bonus given during qualificiation MATCHES if the criteria in Section 10.5.5 COOPERTITION BONUS Criteria have been met.

FIELD an approximately 12 ft. (3.66m) by ~~12 ft. (3.66m)~~ 20 ft. (6m) tile area bounded by the outside edge of the extrusion that frames the walls

OBSERVATION ZONE an infinitely tall ~~4-sided polygon which is 36.6 in. (92.9 cm) at the widest point by 13.1 in. (33.3 cm) long~~ trapezoid that has parallel sides that are 12 in. (63.5 cm) long and 23 in. (119.4 cm) long along the FIELD wall that extends to 10 in. from the next TILE seam bounded by ALLIANCE colored tape and the adjoining FIELD wall (see Figure 9-3). The OBSERVATION ZONE includes the taped lines. There are two adjacent OBSERVATION ZONES per ALLIANCE.

OWNED CHAMBER A condition where one alliance has more alliance specific specimens scored on a CHAMBER than their opponents.

RANKING POINTS (RP) alliances are rewarded RANKING POINTs (RP) for winning or tying MATCHES, which is determined by MATCH points earned by each alliance, in addition to their MATCH points.

SPIKE MARK one of ~~twelve~~ twenty-four 3.5 in. (8.9 cm) long marks used to identify the placement of samples before the MATCH. The ~~3~~ 6 marks in front of the observation zones are of alliance colored tape and the 3 marks in front of each net zone are made of white tape

TILE flooring surface of the field is made of ~~36~~ 60 (nominal) 24 in. x 24 in. x 5/8 in. interlocking soft foam tiles