



TURTLE TRIALS

2021 Game Manual



www.team3100.com

Mendota Heights, MN



Lightning Turtles



Revision	Description	Date
1.0.0	Initial Game Release	25 Sept. 2021
1.1.0	<ul style="list-style-type: none">- Clarification on Game Piece capacity in Transfer Station (pg 8)- Corrected number from "sixty" to "fifty" or PARCELS (pg 9)- Corrected definition of "continued pinning" penalty (pg 12)	12 Oct. 2021
Most recent changed have text highlighted in Green		



TABLE OF CONTENTS

1 INTRODUCTION	4
1.1 ABOUT THE TEAM	4
1.2 TRAINING & DEVELOPMENT	4
1.3 GOALS & OUTCOMES	4
2 2021 GAME OVERVIEW	5
3 ARENA	6
3.1 FIELD	6
3.2 ZONES & MARKINGS	7
3.3 ALLIANCE STATION	7
3.3.1 DRIVE TEAM ZONES	7
3.3.2 TRANSFER STATION	8
3.4 DELIVERY PLATFORMS	8
3.5 GAME PIECES	9
3.5.1 CARRIER	9
3.5.2 PARCEL	9
4 MATCH PLAY	10
4.1 SETUP	10
4.1.1 GAME PIECES	10
4.1.2 ROBOTS	11
4.1.3 HUMANS	11
4.2 AUTONOMOUS PERIOD	11
4.3 RUSH DELIVERY (TELE-OPERATED) PERIOD	11
4.4 STANDARD DELIVERY (END GAME) PERIOD	11
4.5 SCORING	12
4.6 RULE VIOLATIONS	12
4.7 DRIVE TEAM	13
4.8 MATCH LOGISTICS	13
5 SAFETY RULES	14
6 GAME RULES	15
6.1 ROBOTS	15
6.1.1 BEFORE/AFTER THE MATCH	15
6.1.2 DURING AUTONOMOUS ONLY	15
6.1.3 GAME PIECE INTERACTION	15
6.1.4 FIELD INTERACTION	16
6.1.5 ROBOT RESTRICTIONS	16
6.1.5 ROBOT TO ROBOT INTERACTION	16



6.1.6 ZONE SPECIFIC RESTRICTIONS	17
6.2 HUMANS	17
6.2.1 BEFORE THE MATCH	17
6.2.2 DURING THE MATCH	18
6.2.3 IN THE ARENA	18
7 ROBOT CONSTRUCTION RULES	19
7.1 OVERVIEW	19
7.2 GENERAL ROBOT DESIGN	19
7.3 ROBOT SAFETY & DAMAGE PREVENTION	19
7.4 FABRICATION CONSTRAINTS	20
7.5 MOTORS & ACTUATORS	20
7.6 POWER DISTRIBUTION	20
7.7 CONTROL, COMMAND & SIGNAL REQUIREMENTS	20
7.8 PNEUMATIC SYSTEM	21
7.9 OPERATOR CONSOLE	21
8 TOURNAMENT	22
8.1 MATCH SCHEDULES	22
8.2 PRACTICE MATCHES	22
8.3 QUALIFICATION MATCHES	22
8.3.1 QUALIFICATION RANKING	23
8.4 PLAYOFF MATCHES	23
8.4.1 PLAYOFF SCHEDULE	23
8.4.2 PLAYOFF PERFORMANCE	23
8.4.3 TIMEOUTS	24
8.5 TIEBREAKERS	24
8.6 AWARDS	24
A Appendix	25
A.1 DEFINITIONS	25
A.2 FAQ	25



1 INTRODUCTION

1.1 ABOUT THE TEAM

Team 3100, the Lightning Turtles is a team that competes at the *FIRST* Robotics Competition level of the *FIRST* family of programs. The team is based out of Two Rivers High School in Mendota Heights, MN. Team 3100 has been competing since the 2009 season. However, they made a complete transformation of the team after their FRC 2017 season. Since the change, the team has been focused on improving the student experience and their competitive results.

With the continued development and improvement of the team, the team has adopted “**Learn. Perform. Lead.**” as their mission statement. This simple statement encompasses everything each student should be able to achieve during their time on this team. Students should be able to come into this program to learn a new skill, improve upon it through performance, and teach the next generation of members through their leadership.

1.2 TRAINING & DEVELOPMENT

Turtle Trials was created to remedy the disconnects and shortcomings of the team's teaching style from the recent years. The team leaders recognized that fall training did not translate effectively into useful skills once students needed for brainstorming, designing, fabricating, and controlling a robot during the short build season. *Turtle Trials* aims to forge a direct relationship between fall training and build season by creating a platform that mimics a build season, but with an emphasis on having time to teach and explain key topics every step of the way.

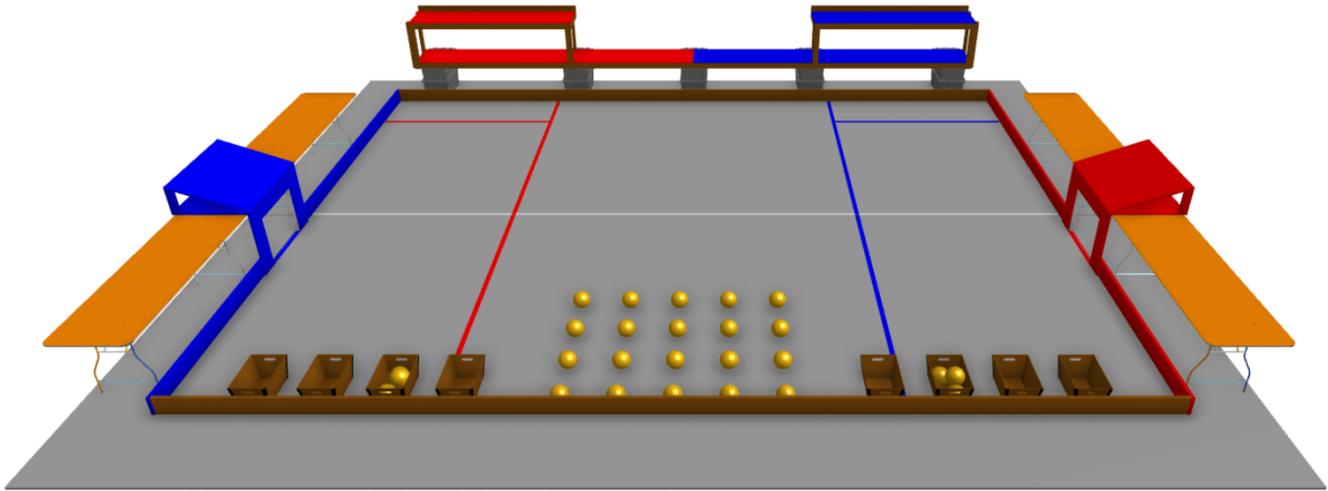
1.3 GOALS & OUTCOMES

The goal of this program is to provide direct comparisons between how we train in the fall to the skills that need to be applied during the build season. Direct deliverables and outcomes of this program will coalesce in a multi-team tournament made up of students from multiple FRC teams in our region, with a competition taking place prior to the start of build season.

On a robot level, the goal is for each team to create a robot that challenges their skills and allows them to learn new techniques along the way. The robots that are competing at the event do not have to be FRC-level or complexity of robot. As long as the robot can work through operator control, it can be as complex or primitive as each team is comfortable with. For example, the game-specific mechanism can be made out of wood with a simple mechanism to play the game. The games are intentionally designed to allow for different levels of robot complexity to be effective and still have opportunities to succeed.

The hope is to grow this program in the future years and invite more teams in the Upper Midwest region of the United States to use this to train their students their own way, but still come together to compete and network with other teams, much like what the [OCCRA](#) accomplishes in Michigan and [BunnyBots](#) in PNW/CHS regions.

2 2021 GAME OVERVIEW



In **PARCEL PANIC**, two ALLIANCES of two ROBOTS each will compete on a flat, carpeted 24' x 30' field, with DELIVERY PLATFORMS spanning across the length of the field on one side (scoring table side). The object of **PARCEL PANIC** is to score as many points as possible by placing PARCELS inside of CARRIERS and placing those CARRIERS on/in a DELIVERY AREA. The ALLIANCE with the most points by the end of the two (2) minute match wins the GAME.

AUTONOMOUS

During the first fifteen (15) seconds of the MATCH, ROBOTS will follow pre-programmed instructions. During this time, ALLIANCES score by:

- placing CARRIERS filled with PARCELS onto either the MIDDLE or HIGH DELIVERY PLATFORMS
- or not contacting the CENTRAL LINE once the period is over

At the end of AUTON, points will be awarded for the scored GAME PIECES and those GAME PIECES will be cycled to the opposing ALLIANCE'S TRANSFER STATION.

RUSH DELIVERY PERIOD (TELEOPERATED MID-GAME)

During the time immediately after AUTON up until forty-five (45) seconds remaining in the MATCH, ROBOTS may continue to score GAME PIECES onto the MIDDLE or HIGH DELIVERY PLATFORMS. These scored GAME PIECES will continue to be cycled back into play through the opposing ALLIANCE'S TRANSFER STATION.

STANDARD DELIVERY PERIOD (TELEOPERATED END-GAME)

The final forty-five (45) seconds of the MATCH are considered the END GAME period, where any GAME PIECES scored onto the MIDDLE or HIGH DELIVERY PLATFORMS, as well as either ALLIANCE DELIVERY ZONE will remain in place until the match is over, and will be officially scored once the match ends. Any GAME PIECES scored in an ALLIANCE DELIVERY ZONE during this period can be DESCORED for purposes to either RESCORE that GAME PIECE for your ALLIANCE, or to reduce the score of the opposing ALLIANCE.

3 ARENA

The ARENA will include all elements of the GAME infrastructure that are required to play **PARCEL PANIC**: the FIELD, the GAME PIECES, and all equipment required for the FIELD control, ROBOT control, and scorekeeping.

3.1 FIELD

The FIELD for **PARCEL PANIC** is roughly 24-feet wide by 30-feet long, carpeted area bound by and including the Guardrails. It is populated by the preset PARCELS and CARRIERS prior to the start of the match. The MIDDLE and HIGH DELIVERY PLATFORMS are located just off of the FIELD on the opposite side of the far side Guardrails.

The FIELD is divided up into three (3) Zones using colored Gaffers Tape. Two (2) ALLIANCE DELIVERY ZONES of equal size are at either end of the FIELD and a NEUTRAL ZONE in the middle of the field.

The surface of the FIELD is low pile carpet, matching what is traditionally used in FRC games. The edge of the carpet may be secured to the venue floor using tape to prevent the carpet from coming up or shifting throughout the event.

The Guardrails are made of primarily 2-inch by 8-inch lumber, with some additional support to aid in the structure and stability of the walls. There are two (2) gates on the long side of the field opposite to the DELIVERY PLATFORMS that open to allow DRIVE TEAM members and VOLUNTEERS access on and off the field safely between matches.

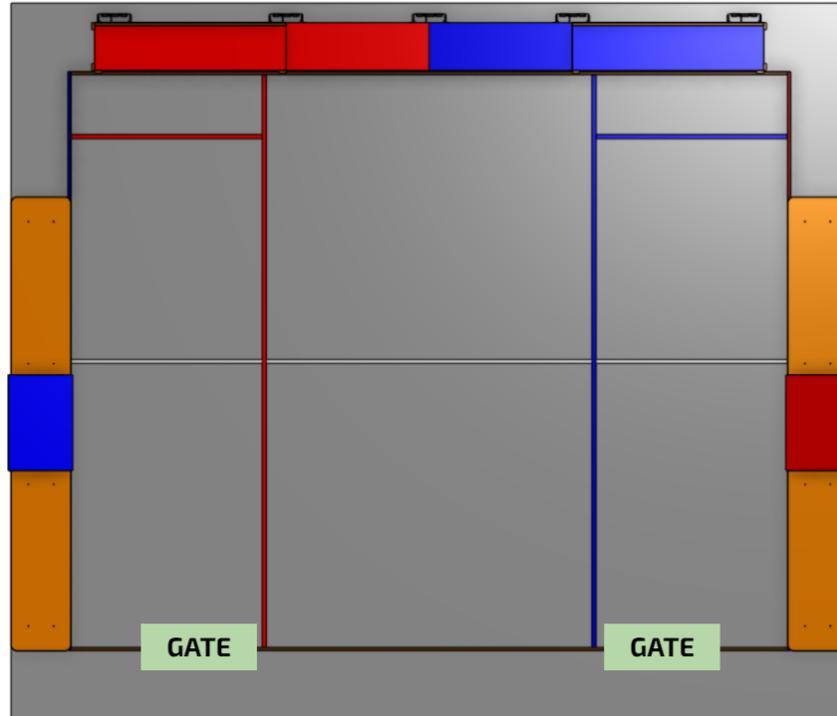


Figure 3-1: Gate Locations

3.2 ZONES & MARKINGS

FIELD zones and markings of consequence are described below. Unless otherwise specified, the tape used to mark lines and zones throughout the FIELD is 2-inch Gaffers Tape of a denoted color.

Each ALLIANCE DELIVERY ZONE is of equal size that spans the width of the FIELD and extends out 8-feet (includes tape line) from the ALLIANCE STATION Wall. Each ALLIANCE DELIVERY ZONE also turns into an active DELIVERY LOCATION during the END GAME period of the match. The NEUTRAL ZONE also spans the width of the FIELD and is 13-feet, 7-inches wide. Each ALLIANCE DELIVERY ZONE contains an ALLIANCE SAFE ZONE that comes out 30-inches away from the Side Border (includes tape line).

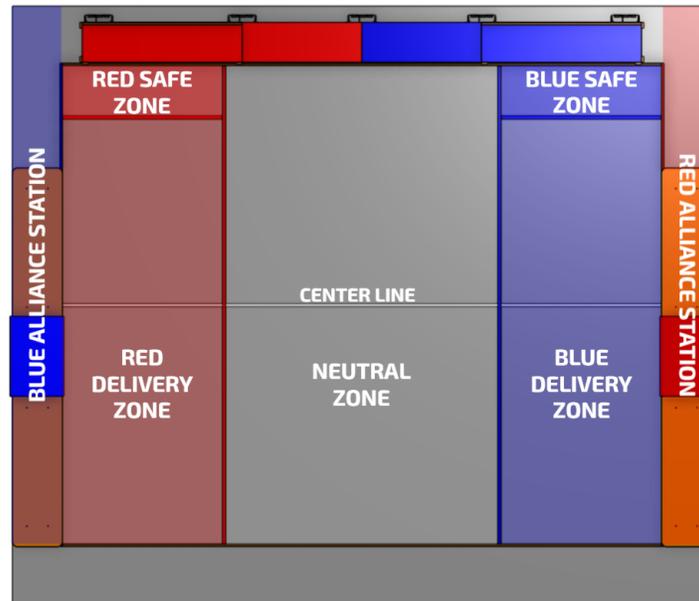


Figure 3-2: Field Zones & Lines

3.3 ALLIANCE STATION

3.3.1 DRIVE TEAM ZONES

An ALLIANCE STATION exists on either end of the FIELD for either Alliance that contains a TRANSFER STATION, DRIVER STATIONS, and GAME PIECE RETURN Zones. Each ALLIANCE STATION will contain two (2) DRIVE TEAMS, each of which will have the DRIVER, CO-DRIVER, COACH, and a HUMAN PLAYER. During the MATCH, all members of each DRIVE TEAM must stay within the general zone, although there may not be tape lines to denote each zone.

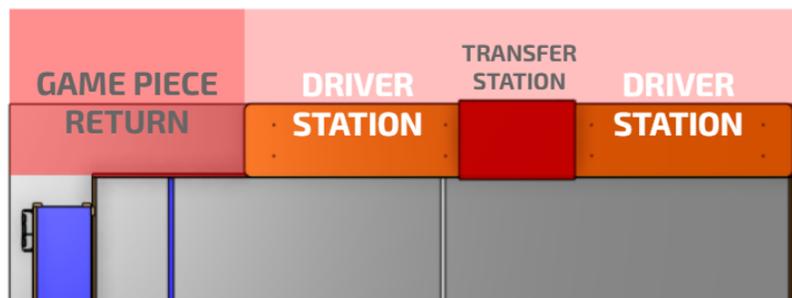


Figure 3-3: Alliance Station Zones

The GAME PIECE RETURN zone is where GAME PIECES will be handed back to HUMAN PLAYERS from FIELD VOLUNTEERS once those GAME PIECES have been removed from a DELIVERY PLATFORM and scored.

3.3.2 TRANSFER STATION

The TRANSFER STATION is where a HUMAN PLAYER may receive GAME PIECES from a ROBOT or return GAME PIECES to a ROBOT. The LOWER OPENING allows transfer of GAME PIECES in either direction, and the RETURN RAMP only allows transfer of GAME PIECES from a HUMAN PLAYER to a ROBOT.

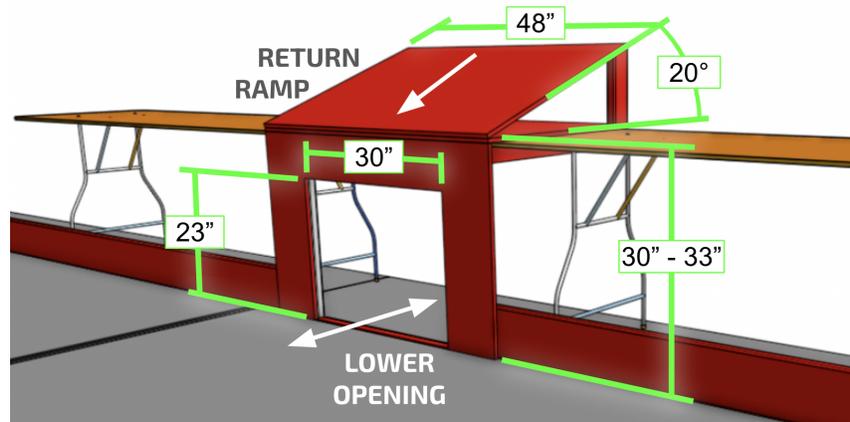


Figure 3-4: TRANSFER STATION

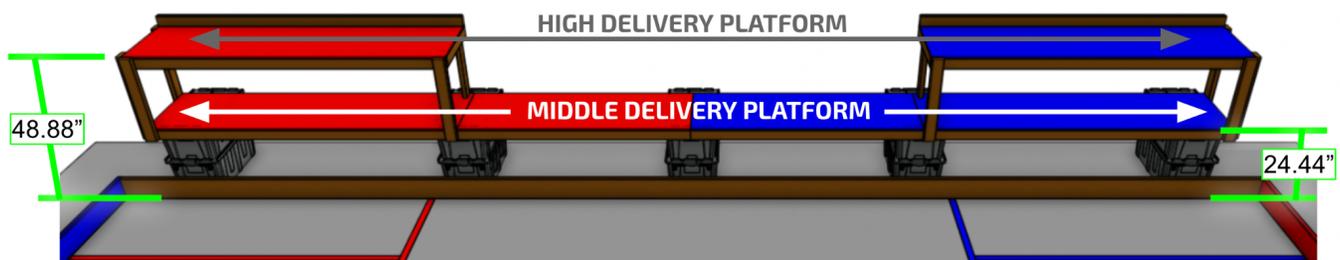
The LOWER OPENING is a 30-inch wide by 23-inch tall opening with a roughly ¼-inch bump covered by Gaffers Tape at the bottom of the opening.

The RETURN RAMP sits atop the DRIVER STATION tables with the FIELD side of the ramp between 30-inches to 33-inches off the ground (*varies depending on tables available at competition*), with a width of 48" and the ramp sloped at a 20-degree angle. The overall importance of the ramp height is to ensure that it is at least 4-inches taller than the height of the MIDDLE DELIVERY PLATFORM.

Each ALLIANCE TRANSFER STATION can hold at most 12 PARCELS and 9 CARRIERS. Excess GAME PIECES will be returned to the field in the NEUTRAL ZONE opposite to the DELIVERY PLATFORMS.

3.4 DELIVERY PLATFORMS

Each Alliance has their own DELIVERY PLATFORMS that consists of a MIDDLE DELIVERY PLATFORM and a HIGH DELIVERY PLATFORM. Each Alliance's MIDDLE DELIVERY PLATFORM is approximately 24 ½-inches tall, 2-feet deep, and 14-feet long with an interruption near the middle which acts as support for the HIGH DELIVERY PLATFORM. Each Alliance's HIGH DELIVERY PLATFORM is approximately 4-feet, 7/8-inches off the ground, 22 ½-inches deep with a 2x4 as a backstop, and is 8-feet long.



3.5 GAME PIECES

There are two (2) types of GAME PIECES in **PARCEL PANIC**: CARRIERS and PARCELS. PARCELS are only counted as points for this game if they are contained within a CARRIER and placed in an active DELIVERY LOCATION during the period of a MATCH.

3.5.1 CARRIER

Each CARRIER is a corrugated cardboard totes from [Uline \(S-7885\)](#), with added Gaffers Tape on all exterior edges for reinforcement. The CARRIER is 10-inches tall, with a 16-inch long by 9 ¼-inch wide bottom and 20-inch long by 13 ½-inch wide top. There are a total of twenty-four (24) CARRIERS in play per MATCH.



Figure 3-6: CARRIER Game Piece

3.5.2 PARCEL

Each PARCEL is a FRC 2020-2021 game piece, which is a 7-inch diameter Medium Bounce Dino-Skin foam ball from [AndyMark \(am-4200\)](#), but the color does not need to be yellow if unavailable. There are a total of **50** (50) PARCELS in play per MATCH.



Figure 3-7: PARCEL Game Piece

4 MATCH PLAY

4.1 SETUP

During each PARCEL PANIC MATCH, two (2) ALLIANCES of two (2) TEAMS each play MATCHES, set up and execute per the details described below.

4.1.1 GAME PIECES

Fifty (50) PARCELS are staged prior to the match as follows:

- A. Twenty (20) PARCELS placed in a five (5) by four (4) grid on the side of the FIELD opposite to the DELIVERY PLATFORMS in the NEUTRAL ZONE
 - a. Each PARCEL spaced 20-inches apart (center-to-center) in both directions of the grid
 - b. Grid layout centered on the length of the FIELD
- B. Two (2) CARRIERS located on the floor contain three (3) PARCELS each
- C. Each ALLIANCE will contain at least five (5) PARCELS at their TRANSFER STATION
- D. Each ALLIANCE can distribute up to seven (7) PARCELS between their ROBOTS
 - a. Each unused PARCEL to be placed in that ALLIANCE's TRANSFER STATION
 - b. ROBOTS do not need to start the match with possession of a PARCEL

Twenty-four (24) CARRIERS are staged prior to the match as follows:

- A. Eight (8) CARRIERS placed on the side of the FIELD opposite to the DELIVERY PLATFORMS and in contact with the side wall
 - a. CARRIERS equally divided to either side of the starting grid of PARCELS
 - b. For each side, one (1) CARRIER aligned just inside the NEUTRAL ZONE with the rest equally distributed 11-inches apart (nearest surfaces) towards each ALLIANCE STATION wall
- B. Each ALLIANCE will contain at least six (6) CARRIERS at their TRANSFER STATION
- C. Each ROBOT may start with up to one (1) CARRIER
 - a. Each unused CARRIER to be placed in that ALLIANCE's TRANSFER STATION
 - b. ROBOTS do not need to start the match with possession of a CARRIER

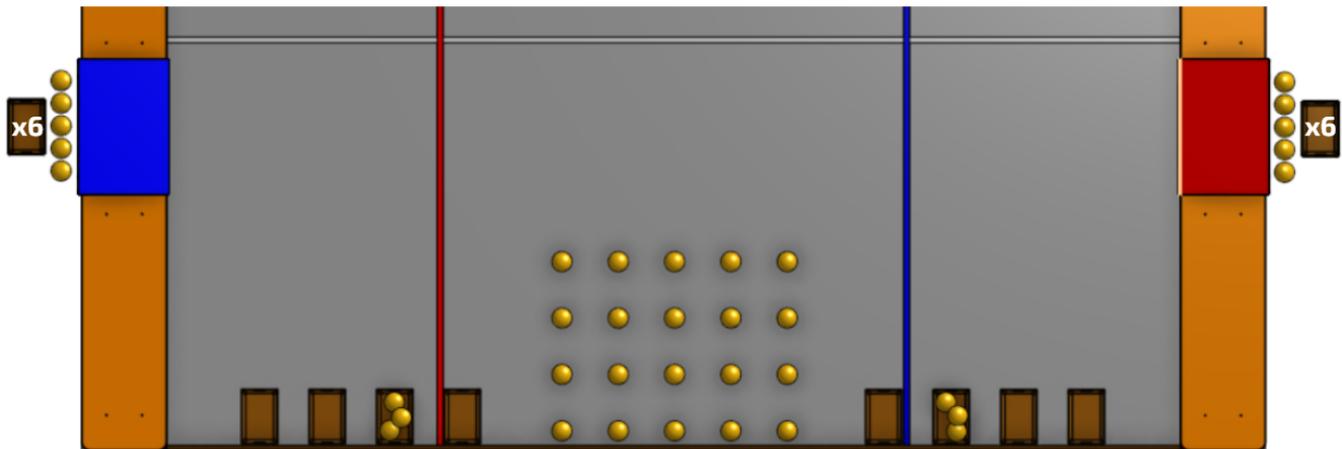


Figure 4-1: Game Piece Starting Layout

4.1.2 ROBOTS

TEAMS may stage their ROBOT in contact with the CENTER LINE (see Figure 3-2, pg. 7) and either in their ALLIANCE DELIVERY ZONE or in the NEUTRAL ZONE as long as they are not in contact with an opposing ALLIANCE DELIVERY ZONE or opposing ROBOT.

4.1.3 HUMANS

DRIVERS, CO-DRIVERS, COACHES, and HUMAN PLAYERS must stay within their ALLIANCE STATION throughout the pre-MATCH and MATCH process, and may enter the FIELD after a MATCH once given permission by FIELD Volunteers.

4.2 AUTONOMOUS PERIOD

The AUTONOMOUS PERIOD is a fifteen (15) second period at the start of each MATCH, during which ROBOTS operate only on pre-programmed instructions. During this period, ROBOTS work to place CARRIERS filled with PARCELS onto the DELIVERY PLATFORMS for double their normal teleoperated point values.

ROBOTS also gain points as long as it is not in contact with the CENTER LINE at the end of the autonomous period.

Once the time has passed, the MATCH is paused for 10 seconds as the scores are counted and GAME PIECES are cycled back into play by being returned to the appropriate TRANSFER STATION.

4.3 RUSH DELIVERY (TELE-OPERATED) PERIOD

The RUSH DELIVERY PERIOD begins once the field is given the all clear after scoring and resetting the AUTONOMOUS PERIOD. During this time, ALLIANCES must continue to score CARRIERS filled with PARCELS onto the DELIVERY PLATFORMS. Any GAME PIECES scored during this time will be removed from the platform, calculated into the LIVE SCORE, and cycled back into play to the appropriate TRANSFER STATION.

This period is active until forty-five (45) seconds remain on the clock, which moves the MATCH into the STANDARD DELIVERY PERIOD.

4.4 STANDARD DELIVERY (END GAME) PERIOD

The last forty-five (45) seconds of the match is the STANDARD DELIVERY PERIOD. Any GAME PIECES scored during this time will not be removed from play and will not be updated in the LIVE SCORE until the match has ended. During this time, the floor of each ALLIANCE DELIVERY ZONE will also become an active DELIVERY LOCATION. GAME PIECES left in an ALLIANCE DELIVERY ZONE to be scored may be taken from the other ALLIANCE and can be rescored.

Once the match has ended, the scored GAME PIECES will be calculated and the live score updated to reveal the winner of the match.

4.5 SCORING

An ALLIANCE is rewarded for accomplishing various actions throughout the course of a MATCH, including ROBOT movements during AUTONOMOUS and placing filled CARRIERS into the appropriate active DELIVERY LOCATIONS.

Table 4-1: Match Scoring Opportunities

ACTION/LOCATION	AUTON	TELE-OP	END GAME
CENTER LINE Contact	5 pts	-	-
HIGH DELIVERY PLATFORM	8 pts/PARCEL	4 pts/PARCEL	4 pts/PARCEL
MIDDLE DELIVERY PLATFORM	4 pts/PARCEL	2 pts/PARCEL	2 pts/PARCEL
ALLIANCE DELIVERY ZONE Floor	-	-	1 pt/PARCEL

Reminder, a PARCEL will only be counted for points if it is fully contained by a CARRIER when scored.

4.6 RULE VIOLATIONS

Upon a rule violation, one or more of the penalties listed in Table 4-2 below will be assessed.

Table 4-2: Rule Violation Summary Chart

PENALTY	PENALTY TYPE
+5 Pts	<ul style="list-style-type: none"> - GAME PIECE mis-use or repeated damage - Pinning longer than 5 seconds - Hands on controls during AUTON - Coaches contacting controls during match - HUMAN PLAYER not using ramp or Lower Opening to enter GAME PIECES back into play - Intentionally removing a GAME PIECE from field of play improperly - Expanding beyond overall size restriction - Driving faster than Speed Limit - Possession of too many PARCELS (additive per PARCEL) - Contact inside another ROBOT that causes inhibiting damage to opposing ROBOT'S function
+10 Pts	<p>Continued pinning of opposing ROBOT beyond initial 5-second Pinning Penalty</p> <ul style="list-style-type: none"> - COACH violates "hands-off" - Continued Pinning past first Pinning offense - Possession of too many CARRIERS (additive per CARRIER) - Contacting opponent ROBOT while you or they are in their SAFE ZONE - Two ROBOTS on same ALLIANCE trapping opposing ROBOT (additive for continued action) - Contacting opposing ROBOT inside opposing ROBOT'S SAFE ZONE
+25 Pts	<ul style="list-style-type: none"> - Descoring GAME PIECES from a DELIVERY PLATFORM - Safety violation penalties
YELLOW CARD	Issued for the egregious ROBOT or TEAM member behavior or rule violations. A subsequent YELLOW CARD within the same Tournament phase will lead to a RED CARD.
RED CARD	Issued for egregious ROBOT or TEAM member behavior or rule violations which result in a TEAM being DISQUALIFIED for the MATCH.

4.7 DRIVE TEAM

A DRIVE TEAM is a set of up to four (4) members from the same TEAM responsible for TEAM performance for a specific MATCH. There are four (4) specific roles on a DRIVE TEAM which ALLIANCES can use to assist ROBOTS in **PARCEL PANIC**.

Table 4-3 Drive Team Member Roles

Role	Description	Max
Driver	Controls the drivetrain of the ROBOT	1
Co-Driver	Controls the SUBSYSTEM mechanisms of the ROBOT	1
Coach	A guide or advisor	1
Human Player	Aids in setup of the ROBOT prior to a MATCH; Can introduce GAME PIECES into their ROBOT or onto the FIELD and retrieve GAME PIECES after scored	1

4.8 MATCH LOGISTICS

GAME PIECES that (1) leave the FIELD in an unintended manner or (2) are entered back into the field due to a full TRANSFER STATION will be placed back into play from the side of the FIELD opposite the DELIVERY PLATFORMS in the NEUTRAL ZONE by a FIELD VOLUNTEER.

An ARENA FAULT may occur if a primary scoring structure has failed or if a situation within the ARENA arises and is deemed unsafe or too large a hazard for TEAMS currently competing in that MATCH to play around it without a large or uneven detriment to a TEAM or ALLIANCE.

An ARENA FAULT will not be called for MATCHES that accidentally begin with the incorrect number of, incorrectly positioned, or damaged GAME PIECES. Damaged GAME PIECES will not be replaced until the next FIELD reset period after the currently ongoing MATCH. DRIVE TEAMS should alert the FIELD Staff to any missing or damaged GAME PIECES prior to the start of a MATCH.

Once the MATCH is over and the FIELD STAFF determines that the FIELD is safe for all parties on the FIELD during that MATCH, FIELD STAFF will announce that the FIELD is safe and DRIVE TEAMS may retrieve their ROBOT.

In addition to the two (2) minutes of play, each MATCH also has a pre- and post-MATCH time for setup and reset of the ARENA. During ARENA reset, the ARENA is cleared of ROBOTS and OPERATOR CONSOLES from the MATCH that just ended. The ROBOTS and OPERATOR CONSOLES for the subsequent MATCH are loaded in the ARENA by DRIVE TEAMS at this time. FIELD STAFF also use this time to reset the ARENA elements and GAME PIECES.

5 SAFETY RULES

Safety is paramount at all times, and each rule below is intended to establish norms that will mitigate injury risk to all participants.

S01. Dangerous ROBOTS: not allowed. ROBOTS whose operation or design is dangerous or unsafe are not permitted.

*Violation: If before the MATCH, the offending ROBOT will not be allowed to participate in the MATCH, if during the MATCH, the offending ROBOT will be **DISABLED**.*

S02. Wait for the ALL CLEAR before entering the FIELD. TEAM members may only enter the FIELD if the designated FIELD STAFF has given the ALL CLEAR signal or has verPARCELY allowed TEAMS to enter onto the FIELD.

*Violation: **Verbal warning**. If repeated at any point during the event, **YELLOW CARD**. If egregious, **RED CARD**.*

S03. Never step/jump over the Guardrail. TEAM members & FIELD STAFF may only enter or exit the FIELD through open gates.

*Violation: **Verbal warning**. If repeated at any point during the event, **YELLOW CARD**. IF egregious, **RED CARD**.*

S04. Humans, stay off the FIELD during the MATCH. DRIVE TEAMS may not extend body parts into the FIELD during the MATCH. HUMAN PLAYERS must be especially aware of these actions.

*Violation: **YELLOW CARD**.*

S05. ROBOTS, stay on the FIELD during the MATCH. ROBOTS and anything they control, e.g. a GAME PIECE, may not contact anything outside the FIELD that is not the designated DELIVERY LOCATIONS.

*Violation: Offending ROBOT will be **DISABLED**.*

S06. Stay off the DELIVERY PLATFORMS. All participants in the ARENA may not sit, climb, or hang on the DELIVERY PLATFORMS.

*Violation: Verbal Warning. If repeated at any point during the event, **YELLOW CARD**.*

6 GAME RULES

6.1 ROBOTS

6.1.1 BEFORE/AFTER THE MATCH

G01. Know your ROBOT setup. When placed on the FIELD for a MATCH, each ROBOT must be:

- A. In compliance with all ROBOT rules, i.e. has passed inspection,
- B. The only item left on the FIELD by the DRIVE TEAM,
- C. Confined to its overall ROBOT SIZE RESTRICTION,
- D. Set in contact with the CENTER LINE and within the appropriate ZONES, and
- E. Possessing no more than one (1) CARRIER

*Violation: If fix is a quick remedy, the MATCH won't start until all requirements are met. If it is not a quick remedy, the offending ROBOT will be **DISABLED**.*

G02. ROBOTS must be removed from the FIELD by hand (i.e. no enabling, power, etc.). ROBOTS will not be re-enabled after the conclusion of the MATCH, nor will TEAMS be permitted to tether the ROBOT unless with express permission from designated FIELD STAFF.

*Violation: **YELLOW CARD**.*

6.1.2 DURING AUTONOMOUS ONLY

G03. During AUTON, hands off the controls. During AUTON, DRIVE TEAM members in ALLIANCE STATIONS may not contact any of the OPERATOR CONSOLES on the DRIVER STATIONS.

*Violation: **5-Point Penalty** per item contacted.*

G04. During AUTON, let the ROBOT do its thing. During AUTON, DRIVE TEAMS may not directly or indirectly interact with ROBOTS or OPERATOR CONSOLES unless for personal safety, OPERATOR CONSOLE safety, or pressing an E-Stop.

*Violation: **5-Point Penalty** and **YELLOW CARD** per item contacted.*

6.1.3 GAME PIECE INTERACTION

G05. Don't hold more than one (1) CARRIER at a time. ROBOTS may not fully possess (i.e. a GAME PIECE being primarily supported by the ROBOT) more than one (1) CARRIER at a time.

*Violation: **10-Point Penalty** for each CARRIER being possessed past one (1) CARRIER.*

G06. Don't hold more than four (4) PARCELS at a time. ROBOTS may not fully possess (i.e. a GAME PIECE being primarily supported by the ROBOT) more than four (4) PARCELS at a time.

*Violation: **5-Point Penalty** for each PARCEL being possessed past four (4) PARCELS.*

Note: Any PARCEL contained within a CARRIER while that CARRIER is possessed by a ROBOT does not count towards the four (4) PARCEL possession. Only PARCELS primarily supported by the ROBOT counts towards possession.

Ex. A ROBOT that is holding a CARRIER with five (5) PARCELS inside the CARRIER and also holding four (4) PARCELS in the collector or hopper of the ROBOT is *not* in violation of this rule.



G07. Don't remove GAME PIECES once they've been scored on DELIVERY PLATFORMS. GAME PIECES may not be removed from the DELIVERY PLATFORMS at any time in the match.

Violation: 25-Point Penalty for each descored CARRIER, regardless of the number of PARCELS contained within that CARRIER.

G08. Use GAME PIECES as directed. ROBOTS may not deliberately use GAME PIECES in an attempt to ease or amplify the challenge associated with FIELD elements.

Violation: 5-Point Penalty for each GAME PIECE. Repeated at any point during the event or egregious violations of this rule are likely to escalate rapidly to YELLOW CARD or RED CARD.

G09. Keep GAME PIECES in bounds. ROBOTS may not intentionally eject GAME PIECES from the FIELD.

Violation: 5-Point Penalty for each GAME PIECE. Repeated at any point during the event or egregious violations of this rule are likely to escalate rapidly to YELLOW CARD or RED CARD.

6.1.4 FIELD INTERACTION

G10. Don't hurt the FIELD. ROBOTS may not intentionally or repeatedly cause damage to the FIELD.

Damaging the FIELD can include:

- A. deformation of FIELD or FIELD elements,
- B. significant movement of FIELD or FIELD elements,
- C. or significant damage of FIELD or FIELD elements.

Violation: Verbal warning after first offense; escalation to YELLOW CARD or RED CARD with repeated or intentional attempts to damage the FIELD.

6.1.5 ROBOT RESTRICTIONS

G11. Keep it together. ROBOTS may not intentionally detach or leave parts on the FIELD.

Violation: RED CARD.

G12. Don't overextend yourself. ROBOTS may not extend past the ROBOT SIZE RESTRICTION

Violation: 5-Point Penalty for every 5 seconds past extension after a seven (7) second countdown. DISABLED after 3 consecutive offenses.

G13. Stay within the SPEED LIMIT. ROBOTS should not exceed the speed of 10.5 fps.

Violation: 5-Point Penalty for every 5 seconds past extension after a seven (7) second countdown. DISABLED after 3 consecutive offenses.

6.1.5 ROBOT TO ROBOT INTERACTION

G14. There's a 5-count on pins. ROBOTS may not PIN an opponent's ROBOT for more than five (5) seconds. A ROBOT is PINNING if it is preventing the movement of an opponent ROBOT by contact, either direct or transitive (such as against a FIELD element). A ROBOT is considered PINNED until the ROBOTS have separated by at least six feet from each other or either ROBOT has moved six feet from where the PIN initiated, whichever comes first. The PINNING ROBOT(S) must then wait for at least three (3) seconds before attempting to PIN the same ROBOT again.

Violation: 5-Point Penalty, plus an additional 10-Point Penalty for every five (5) seconds in which the situation is not corrected.



G15. Don't collude with your partners to shut down major parts of game play. Two ROBOTS that appear to a REFEREE to be working together may not isolate or close off any major component of MATCH play.

Violation: 10-Point Penalty, plus an additional 10-Point Penalty for every five (5) seconds in which the situation is not corrected.

G16. Don't tear others down to lift yourself up. ROBOT actions that appear to be deliberate to a REFEREE and that cause damage or inhibition via attaching, tipping, or entangling to an opponent ROBOT are not allowed

Violation: 10-Point Penalty and a YELLOW CARD. If harm or incapacitation occurs as a result of the strategy, RED CARD.

G17. Stay out of other ROBOTS. A ROBOT with a SUBSYSTEM(S) outside its PRIMARY FRAME may not initiate direct contact with an opponent ROBOT inside the vertical projection of its PRIMARY FRAME using that SUBSYSTEM.

Violation: 5-Point Penalty per contact.

G18. Damaging other ROBOTS, not allowed. Regardless of intent, a ROBOT may not initiate direct contact inside the vertical projection of an opponent ROBOT'S PRIMARY FRAME that damages or functionally impairs the opponent ROBOT.

Violation: 10-Point Penalty and a YELLOW CARD.

6.1.6 ZONE SPECIFIC RESTRICTIONS

G19. Matching color gets right of way. A ROBOT whose BUMPERS are intersecting the opponent's SAFE ZONE may not contact opponent ROBOTS, regardless of who initiates contact.

Violation: 10-Point Penalty for contacting opposing ROBOT in opposing ROBOT'S SAFE ZONE.

G20. Give opponents some space. An opponent ROBOT may not contact a ROBOT who is intersecting its SAFE ZONE, regardless of who initiates contact.

Violation: 10-Point Penalty for contacting opposing ROBOT in opposing ROBOT'S SAFE ZONE.

6.2 HUMANS

6.2.1 BEFORE THE MATCH

G21. Rotate your DRIVE TEAM for Qualification MATCHES. The point of the *Turtle Trials Challenge Series* is to provide valuable DRIVE TEAM experience to as many students as possible on the TEAM. No TEAM Member is allowed to be DRIVER or CO-DRIVER for a second time until everyone else on their TEAM has had an opportunity to be one of those roles in a Qualification MATCH.

Violation: MATCH will not start until the situation has been corrected.

G22. Know your DRIVE TEAM positions. Prior to the start of the MATCH, DRIVE TEAMS must be positioned as follows:

- A. DRIVER, CO-DRIVER, HUMAN PLAYER, and COACH must be within the ALLIANCE STATION,
- B. Not in contact with the OPERATOR CONSOLE

Violation: MATCH will not start until the situation is remedied.



G23. Self-serve GAME PIECE locating. Prior to the start of the MATCH, DRIVE TEAMS are responsible for placing and distributing GAME PIECES onto the FIELD and into their respective ALLIANCE STATIONS.

Violation: MATCH will not start until the situation is corrected.

6.2.2 DURING THE MATCH

G24. Controllers for DRIVERS only. A ROBOT shall be operated solely by DRIVERS and CO-DRIVERS of that TEAM.

Violation: DISABLED.

G25. COACHES, hands off. During a MATCH, COACHES may not touch GAME PIECES or DRIVER controls unless for safety purposes.

Violation: 5-Point Penalty per instance.

G26. Transfer GAME PIECES appropriately. GAME PIECES may only enter and leave the FIELD of play as seen in section 3.3.2.

Violation: 5-Point Penalty per GAME PIECE.

G27. Roll or push, never throw. HUMAN PLAYERS must roll or push game pieces back into play such that the GAME PIECE is in contact with the traversing surface the entire way as it travels back into play.

Violation: 5-Point Penalty per GAME PIECE being re-entered too aggressively.

6.2.3 IN THE ARENA

G28. By invitation only. Only DRIVE TEAMS from the current MATCH are allowed in their respective ALLIANCE STATIONS during that MATCH.

Violation: MATCH will not start until the situation is corrected. YELLOW CARD for teams who introduce non DRIVE TEAM members after the match has begun.

G29. Identify yourself. DRIVE TEAMS must wear proper identification while in the ARENA. Proper identification consists of members of the DRIVE TEAM wearing the appropriate member button.

Violation: MATCH will not start until the situation is corrected. Those not displaying identification must leave the ARENA.

G30. Teams can cheer, but shouldn't COACH. TEAM members outside the DRIVE TEAM may not COACH or use signaling devices during the MATCH.

Violation: YELLOW CARD.

G31. Don't mess with GAME PIECES. TEAMS may not intentionally modify or damage GAME PIECES in any way.

Violation: RED CARD.



7 ROBOT CONSTRUCTION RULES

This section of the 2021 Turtle Trials Game Manual presents legislation relevant to the construction of the 2021 Turtle Trials ROBOT. ROBOTS must pass Inspection at the event to confirm compliance before being allowed to compete.

7.1 OVERVIEW

The ROBOT construction rules closely mirror those of a traditional FRC game. Many times in this section, you will be directed to view the [FRC 2020/21 Game Manual](#) for further details. The following sections will further explain the unique differences that are specific to the Turtle Trials program.

Turtle Trials is meant to help train students of TEAMS on the processes they will be using during the official FRC season when making their ROBOTS. An emphasis should be placed on the training and education of students when constructing ROBOTS for Turtle Trials. That also means that the expectation for the appearance of ROBOTS in this program should not look like a top-end FRC ROBOT. It should more closely resemble ROBOTS along the lines of an [Everybot](#) or [Ri3D](#) ROBOT.

In general, we want the comparisons between ROBOTS at the competition to be about decisions made to accomplish a task versus the perceived quality/resources one team had versus another to make that mechanism.

7.2 GENERAL ROBOT DESIGN

R1. The ROBOT must always stay inside the ROBOT VOLUME of 36"x36"x54".

Unlike traditional FRC, TEAMS may have ROBOTS with a STARTING CONFIGURATION outside what is traditionally known as a FRAME PERIMETER. I.e. as long as the ROBOT is within the ROBOT VOLUME dimensions at all times, subsystems are allowed to exist outside of the drivetrain prior to the start of the match.

R2. The ROBOT weight must not exceed the weight of 125 lbs.

Battery and bumpers do not count towards the 125 lbs limit.

R3. The ROBOT should be completely developed by Students. ROBOTS must be designed, built, and programmed by Students. Teachers, mentors, parents, etc. may answer questions, give instruction on practices, help build Field Elements, assist in tool and safety education, etc. but should not be involved in the design, build, programming, or development of the ROBOTS.

Note: This rule is enforced via the "honor system", as there is no way for OCCRA to enforce this rule on Teams outside of events. We ask that all Teams, and specifically all teachers, mentors, parents, etc. use their best judgement as to whether they should do something or not. If there are any questions, the OCCRA Soccer Shootout Q&A can be utilized.

R4. The ROBOT may have components made prior to kickoff. Components, whether it be parts or assemblies, can be used to compete with, even if they were used in a previous Turtle Trials or FRC season, so long as the components used meet the requirements of all other rules in this manual.

7.3 ROBOT SAFETY & DAMAGE PREVENTION

R5. Traction devices must not have surface features such as metal, sandpaper, hard plastic studs, cleats, hook-loop fasteners, or similar attachments that could damage the ARENA. Traction devices include all parts of the ROBOT that are designed to transmit any propulsive and/or braking forces between the ROBOT and FIELD carpet.

R6. Protrusions from the ROBOT and exposed surfaces on the ROBOT shall not pose hazards to the ARENA elements (including the GAME PIECES) or people.

R7. ROBOT parts shall not be made from hazardous materials, be unsafe, cause an unsafe condition, or interfere with the operation of other ROBOTS.

For more details on this rule, see the blue box section of [FRC 2020 Game Manual](#)'s R8.

R8. ROBOTS must allow removal of GAME PIECES from the ROBOT and the ROBOT from the FIELD elements when DISABLED and powered off.

R9. Lubricants may be used only to reduce friction within the ROBOT. Lubricants must not contaminate the FIELD or other ROBOTS.

R10. BUMPERS are not required, and TEAMS wishing to create BUMPERS for their ROBOT do not need to conform with the official FRC BUMPER rules. TEAMS must be aware that if their ROBOT does not have bumpers, it will be more prone to damage that may inhibit the capabilities of that ROBOT.

7.4 FABRICATION CONSTRAINTS

R11. The total cost of all items on the ROBOT, including software, shall not exceed \$1000.

There will not be an officially checked BOM, and teams participating will be trusted on their merit to not abuse this rule and stay within the spirit of this program.

A list of exempted items that are viewed as widely commonly used items below also will not count towards the limit. Items that are part of a vision processing system (like the Limelight in the table below) are also exempt from the individual item cost limit. This is intended to allow teams to utilize existing systems without spending time and developing new systems.

Exemption Item	Cost	Exempt Qty
KoP Drivetrain Kit (am-14U4)	\$689.00	1
Limelight	\$399.99	1

R12. No individual, non-KOP item or software used on the ROBOT shall have a Fair Market Value that exceeds \$300 USD. The total cost of COMPONENTS purchased in bulk may exceed \$300 USD as long as the cost of an individual COMPONENT does not exceed \$300 USD.

7.5 MOTORS & ACTUATORS

R13. Rules in section 9.6 of the [FRC 2021 Game Manual](#) (R27 - R31) all apply.

7.6 POWER DISTRIBUTION

R14. Rules in section 9.7 of the [FRC 2021 Game Manual](#) (R32 - R56) all apply.



7.7 CONTROL, COMMAND & SIGNAL REQUIREMENTS

R15. Rules in section 9.8 of the [FRC 2021 Game Manual](#) (R57 - R73; exclude R62, R63) all apply.

R16. During a MATCH, ROBOTS are controlled via communication between a TEAM'S Operator Console and their ROBOT'S radio.

Turtle Trials (at least for the Fall 2021 season) will not run using a centralized Field Management System. Teams will manually change configurations and enable/disable their robots during a MATCH, similar to what FTC used to do.

7.8 PNEUMATIC SYSTEM

R17. Rules in section 9.9 of the [FRC 2021 Game Manual](#) (R74 - R87) all apply.

7.9 OPERATOR CONSOLE

R18. Rules in section 9.8 of the [FRC 2021 Game Manual](#) (R88 - R93) all apply.

8 TOURNAMENT

The 2021 *Turtle Trials* event is played in a Tournament format. The Tournament consists of Practice MATCHES, Qualification MATCHES, and Playoff MATCHES. The 2021 *Turtle Trials* Tournament will consist of between ten (10) to sixteen (16) TEAMS from FRC TEAMS around FIRST Upper Midwest.

Practice MATCHES provide each TEAM with an opportunity to operate its ROBOT on the FIELD prior to the start of the Qualification MATCHES.

Qualification MATCHES allow each TEAM to earn a seeding position that may qualify them for participation in the Playoff MATCHES.

Playoff MATCHES determine the event Champions.

8.1 MATCH SCHEDULES

A MATCH schedule is used to coordinate MATCHES at the Event. Figure 8-1 details information shown on each schedule.

Example Match Schedule

Event Name						
Matches Per Team		12				
Time	Description	Match	Blue 1	Blue 2	Red 1	Red 2
Sat 2:30p	Qualification 1	1	1	2	3	4
Sat 2:40p	Qualification 2	2	5	6	7*	8
Sat 2:50p	Qualification 3	3	9*	10	11	12

ALLIANCE Red or Blue (points to Blue 1, Blue 2, Red 1, Red 2)
 PLAYER STATION number 1, 2, or 3 (points to Blue 1, Blue 2, Red 1, Red 2)
 MATCH Start Time (points to Sat 2:30p)
 MATCH Type (points to Qualification 1)
 MATCH Number (points to 1, 2, 3)
 Asterisk (*) indicates SURROGATE MATCH (points to 7*, 9*)

Figure 8-1 Sample MATCH Schedule

8.2 PRACTICE MATCHES

Practice MATCHES are played before Qualification MATCHES. Practice MATCHES will be split between Open Practice (first half) and Assigned Practice (second half).

Each TEAM at the event will be given at least two (2) Assigned Practice MATCHES. Open Practice MATCHES will take place for the first half of the Practice Period of the event. During Open Practice MATCHES, TEAMS can play on a first-come, first-served basis to continue playing Practice MATCHES.

TEAMS may only play back-to-back Practice MATCHES (either Open or filler during Assigned) if there are no other TEAMS in the filler line who did not play in the previous Practice MATCH.

8.3 QUALIFICATION MATCHES

The Qualification MATCH schedule is made available as soon as possible, but no later than one (1) hour before Qualification MATCHES are scheduled to begin. TEAMS will receive one (1) hard copy of the MATCH schedule as well as being made available online. Each MATCH schedule consists of a series of rounds in which each TEAM will play at least ten (10) Qualification MATCHES.

The Event will assign each TEAM one (1) ALLIANCE partner for each Qualification MATCH using a predefined algorithm, and teams may not switch Qualification MATCH assignments.

In accordance with rule **G21**, every TEAM member must rotate into the DRIVER or CO-DRIVER positions at least once before allowing a TEAM member to become DRIVER or CO-DRIVER a second time.

8.3.1 QUALIFICATION RANKING

Ranking Points (RP) are units credited to a team based on their ALLIANCE'S performance in Qualification MATCHES. Ranking Points are rewarded to each eligible team at the completion of each Qualification MATCH, as seen on Table 8-1 Below.

Table 8-1 Qualification Ranking Points

RESULT	RP
Win	2
Tie	1
Loss	0

Exceptions to Ranking Point assignment are as follows:

1. A SURROGATE receives zero (0) Ranking Points
2. A DISQUALIFIED TEAM, as determined by the REFEREES, receives zero (0) Ranking Points in a Qualification MATCH or causes their ALLIANCE to receive zero (0) MATCH points during a Playoff MATCH
3. A "no-show" team is either DISQUALIFIED from or issued a RED CARD for that MATCH. A team is declared a no-show if no member of the DRIVE TEAM is in the ALLIANCE STATION at the start of the MATCH.

The total number of Ranking Points earned by a TEAM throughout their Qualification MATCHES will determine their Ranking for ALLIANCE Selections before tiebreakers (see section 8.5 for more details).

8.4 PLAYOFF MATCHES

The format for Playoff MATCHES will be announced in the first week of November, after registration has closed and the final number of registered teams have been determined. This section of the manual will be updated to inform all parties of the Playoff format.

8.4.1 PLAYOFF SCHEDULE

TBD - Update to release in the first week of November.



8.4.2 PLAYOFF PERFORMANCE

TBD - Update to release in the first week of November.

8.4.3 TIMEOUTS

During the Playoff MATCHES of the Tournament, each TEAM will be given a total of one (1) Timeout for the duration of the Playoff MATCHES. Each Timeout adds an additional ten (10) minutes of time from the original Cycle Time between MATCHES.

Timeouts must be requested within forty-five (45) seconds after the previous MATCH has ended to be awarded the timeout. TEAMS may not request a timeout between MATCHES that already have a built-in FIELD Timeout.

8.5 TIEBREAKERS

In the event of an exact Ranking Point tie at the end of the Qualification and total Score at the end of Playoff MATCHES, the tie breaking order is as follows:

1. Least amount of Penalty Points awarded
2. Highest total AUTONOMOUS score
3. Cumulative PARCEL score after AUTONOMOUS period (*sum of Rush Delivery Period and Standard Delivery Period*)
4. Best of three (3) Rock-Paper-Scissors MATCH between tied ALLIANCES

8.6 AWARDS

TBD - Update to release in the first week of November.

A Appendix

A.1 DEFINITIONS

See Glossary Section of the [FRC 2020 Game Manual](#) for additional definitions.

A.2 FAQ

Q1. Why such a small FIELD size?

A1. The size of the field is meant to allow an entire competition (field, pits, etc) within the size of a single basketball court to fit in more locations than a traditional FRC field.

Q2. Why 2 vs. 2 instead of 3 vs. 3?

A2. As a smaller competition with less teams overall, having a 2 vs. 2 format will allow teams more opportunities to play matches, and still provide a fun and challenging game that can be played with four (4) robots on the field instead of the traditional six (6).

Q3. Why the limit of maximum speed?

A3. A few reasons, (1) the field is much smaller so robots using traditional 12+fps drivetrains for FRC will traverse the field too fast, which would significantly affect the pace of the match, and (2) our field borders are much weaker, only using 2"x8" plywood.

Q4. Will this run on FMS or FMSlite?

A4. No, the communication for each team will be handled from each team's Driver's Station to their robots like you would normally when practicing wirelessly at your own build spaces.

Q5. How will live scoring be handled in a game that is very exact-score dependent?

A5. TBD, we will likely be using a combination of Google Suite files (like spreadsheets, forms, etc) to gather live scores and send them to an OBS overlay manually during each match.

Q6. Why rotate drive teams during qualification matches?

A6. The primary goal of Turtle Trials is to provide valuable experiences for as many students as possible in as many parts of the FRC program as possible. Since being on a drive team is typically much more restricted in traditional FRC, we want our program to give more "hands on sticks" time to more students than would normally have an opportunity to do so in a competition setting.