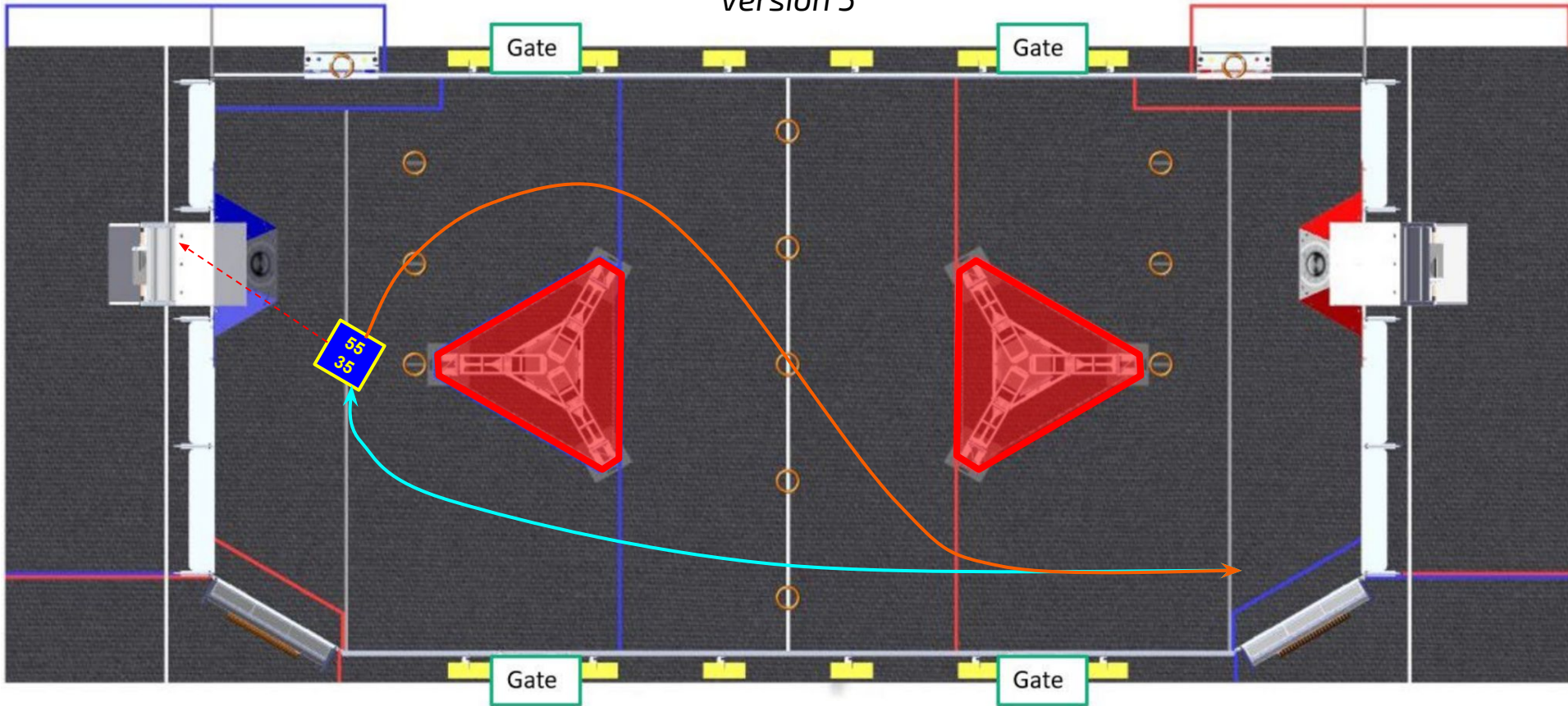# ROBOTICS 2024 CRESCENDO COMPETITION PROGRAMMING PLAN TEAM 5535

Version 5

General Strategy

To Get Melody RP without Dependence on Teammates, Autonomous, Cooperetition, or Endgame Time:
6.8 Seconds per Note in Speaker

Realistic Average Time Estimate per Note:
7 Seconds per Note
(16 Notes Total; enough for Melody RP if Cooperetition Bonus)

General Tip:
Generally Keep Robot Pointed Towards You Until Endgame Climb Time

General Tip:
Drive with FULL CONFIDENCE and at FULL SPEED; Hesitancy will only ruin us.

DO NOT GO UNDER EITHER STAGE! ROBOT DOES NOT FIT!!!!!

Job of Driver:
Run Over Note; Drive By Speaker; Repeat.

Job of Co-Driver:
Watch.
(And be ready for if something goes horribly wrong)

Endgame Job of Driver and Co-Driver:
Go to Chain *with Other Robot*; Move Right Stick Up; Drive Over Chain; Move Right Stick Down

About the Amp:
Amp is worth using when there are plenty of notes in our alliance wing ready to pick up and score; otherwise it is not worth the time.

Human Player at Amp:
Please Always Hit the Cooperetition Button When at the Amp
(It's polite to the other alliance *and* it will increase our chance of getting the Cooperetition Award.)

Human Player at Source:
Please BE QUICK and Fling Note As Far Away from the Source As Possible When Robot Coming

Robot LED Color Meanings

What it means when the robot's LED strip is lighting up a certain color

LED Color	Meaning
Orange	Robot **detects a note** it is running over and is not already holding a note (Useful when getting note from far away and unsure if it is reached or not)
Green	Robot is disabled and **safe** (When robot first booted, will light up green while blinking detected alliance color every 2 seconds)
Blue	Robot is in teleop mode while on the **blue alliance** and not holding a note
Red	Robot is in teleop mode while on the **red alliance** and not holding a note
Turquoise	Robot is in **final 20 seconds** of match and wants to climb
Yellow	Robot is **holding** a note and ready to launch
Magenta	Robot is **E-Stopped** or **A-Stopped**
White	Robot is in **test mode**

Points Chart

		MATCH points		Ranking Points	Coopertition Points
		AUTO	TELEOP		
LEAVE		2			
NOTES	AMP NOTE	2	1		
	SPEAKER NOTE (not AMPLIFIED)	5	2		
	SPEAKER NOTE (AMPLIFIED)		5		
STAGE	PARK		1		
	ONSTAGE (not SPOTLIT)		3		
	ONSTAGE (SPOTLIT)		4		
	HARMONY		2		
	NOTE in TRAP (max. 1/TRAP)		5		
Coopertition Bonus					1
MELODY	At least 18 (15 if Coopertition Bonus) AMP & SPEAKER NOTES*			1	
ENSEMBLE	At least 10 STAGE points and at least 2 ONSTAGE ROBOTS*			1	
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	

Autonomous Plan Summary

Robot can be placed in any position within the starting zone. While the robot is disabled, it will compute its orientation by using the nearest AprilTag in view. A note should be preloaded into the launcher, pushed back barely behind the thrusters. When the match starts, the robot will "swallow" the note (put it into launch position), aim at the speaker and then launch the note. If Shuffleboard says to not grab any specific notes, the robot will simply exit the starting zone; otherwise, if it is configured to get note 1, 2, or 3, it will get the selected note and promptly score it. After either that or simply exiting the starting zone, if Shuffleboard says to go get more notes, it will drive around the alliance's half of the field collecting and scoring any remaining notes, including positioned notes that were missed, notes that missed the speaker, and notes on the centerline. The robot will not launch a note during the last half second of autonomous. When teleop begins, the robot will automatically enable "teleauto", resuming it's previous task at full speed until the driver tries to drive or cancels teleauto with "X" on the primary controller.

Autonomous Plan Diagram
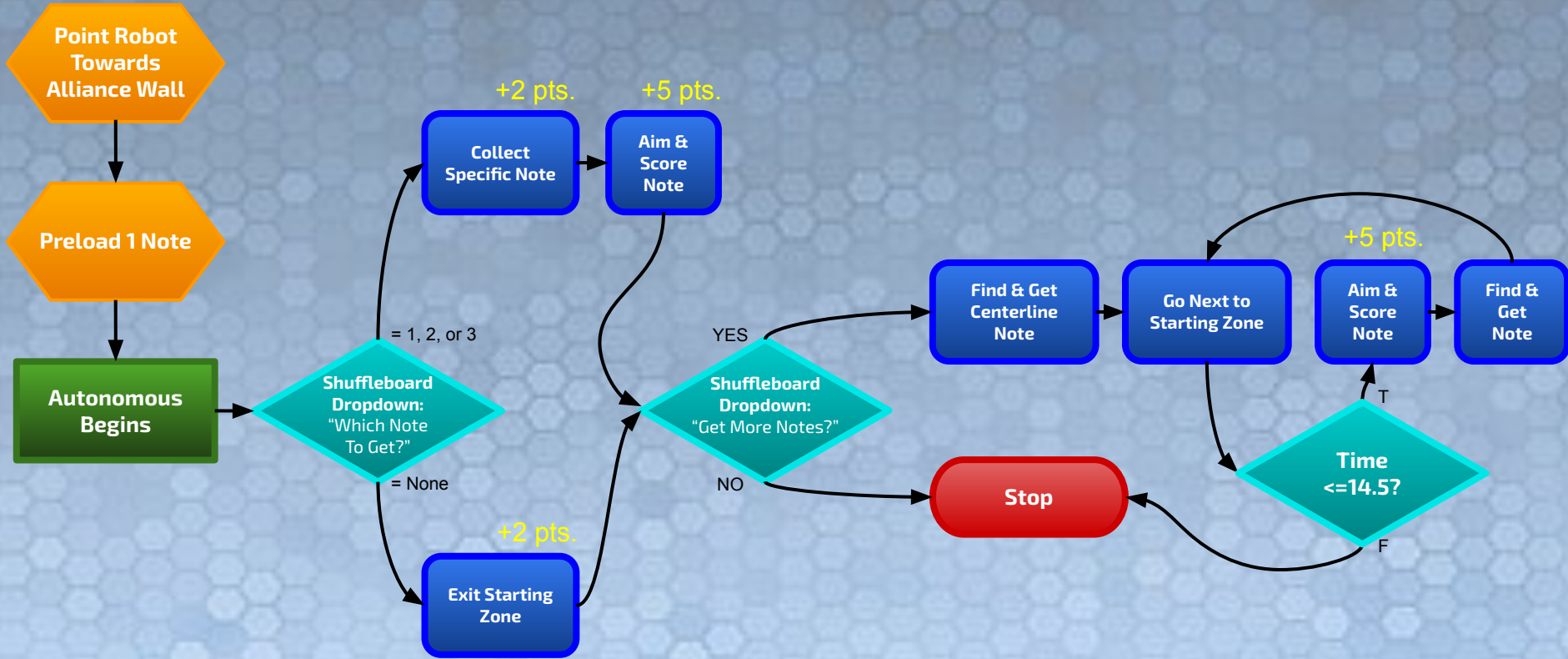
Main Controls
What you have to do

Yes. It is that simple.

Forte will take care of intaking notes — just run them over.

Forte will take care of preparing to launch — just let the robot do its thing.

Forte will take care of aiming and rotating to face the speaker — just drive over to it.

Forte will take care of launching the note into the speaker — just drive close enough to the speaker so Forte will be sure that the note will make it in.

Forte will *not* take care of climbing, but will light up turquoise to let you know when it is time.

Move:
Drive Forward/Backward and Left/Right relative to alliance wall

All The Way Up: Prepare to Climb
All The Way Down: Climb

Controllers 1 & 2
Smart Mode Controls

Definitions:

➜ **Point in Direction** Points in the selected direction, up being away from the local alliance

➜ **Launch Sequence** Searches for april tags and aims at alliance speaker while rotating to point robot towards it and firing up the thrusters. When at least 1.1 seconds have passed, launches note when close enough to be sure of hit.

➜ **Start Intake** Will most likely not have to be used as the robot will automatically run the intake when necessary, but can be used to manually run the intake system until canceled with "B" or detection of received note. Will put launcher into intake position.

➜ **Amp Score** Move launcher down and then fire as if pressed against amp.

➜ **Teleauto** Automatically enabled; allows the robot to do most of the work while you simply guide it to where it should go. (See slide 6)

Launch Sequence

Enter Raw Mode
(In case of emergency)

Amp Scoring
Press Down: Instantly Rotate to face amp
Release: Score in AMP (when against it)
(automatic angle and launch sequence)

Move:
Drive Forward/Backward and Left/Right relative to alliance wall

Toggle Teleauto

Press Down: Start Thrusters and Aim
Release: Launch Note

Point In Direction....

Cancel Action, such as Intake or Launch

Start Intake

Left/Right: Rotate Robot
Press Down while Holding Start: Reset NavX Yaw
All The Way Up: Prepare to Climb
All The Way Down: Climb

Controllers 1 & 2

Raw Mode

Definitions:

➔ **Raw Launch Sequence** Fires up thrusters and launches note without aiming

➔ **Start Intake** Will most likely not have to be used as the robot will automatically run the intake when necessary, but can be used to manually run the intake system until canceled with "B" or detection of received note. Will put launcher into intake position.

➔ **Score In Amp** Tilt launcher down and immediately launch note into amp as if pressed against it

➔ **Go to Closeup Launch Position** Puts the launcher to the angle at which it should fire should it be directly pressed up against the subwoofer.

Raw Launch Sequence

Tilt Launcher Down

Return to Smart Mode

Score in Amp

Go to Closeup Launch Position

Press Down: Start Thrusters
Release: Launch Note

Drive Forward/Backward and Left/Right

Tilt Launcher Up

Stop Intake

Start Intake

Left/Right: Rotate Robot
All The Way Up: Prepare to Climb
All The Way Down: Climb

Smart Mode Intelligence Systems to Be Aware Of

Automatic Pickup

When you run over a note, the robot will automatically pick it up and load it into the launcher. When the robot knows that you are still holding a note that you have not yet launched, it will not automatically pick up the notes it detects.
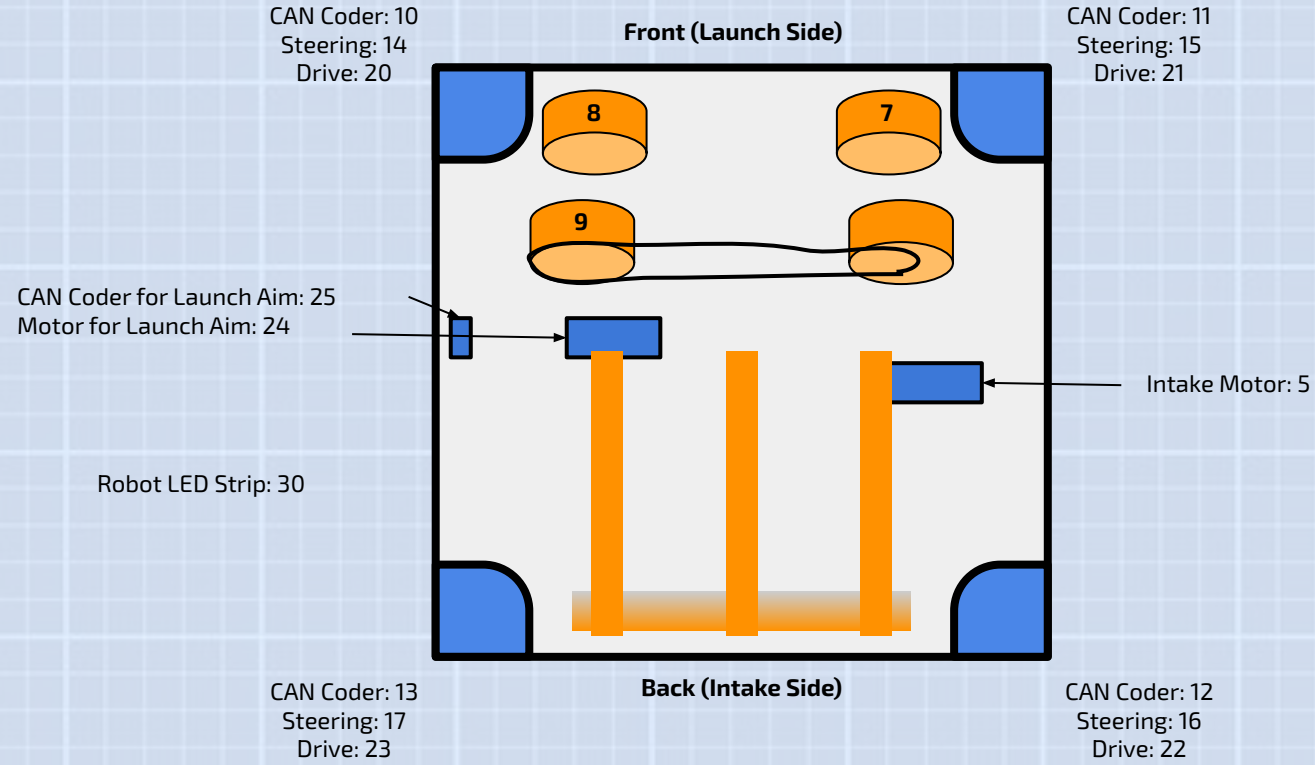
Automatic Launch Prep

After the robot has successfully collected a note, it will pull it back a bit and fire up the thrusters. When it is in this process and it sees the center AprilTag on the alliance speaker, it will aim and rotate to face toward the speaker without changing the location that you have it at. It will continue to aim and rotate as you drive until a launch occurs. To cancel launch preparation, simply press "B".

Automatic LAUNCH

If the robot, while holding a note and preparing its launch, detects that it is close enough to the speaker to make it in for sure, it will automatically launch. If you want to launch from further away, simply press the "Launch Sequence" button to fire the note. This automatic functionality can be very useful for quickly scoring while zooming by the speaker.

Robot CAN IDs

CAN Coder: 10
Steering: 14
Drive: 20

CAN Coder: 11
Steering: 15
Drive: 21

Front (Launch Side)

8

7

9

CAN Coder for Launch Aim: 25
Motor for Launch Aim: 24

Intake Motor: 5

Robot LED Strip: 30

CAN Coder: 13
Steering: 17
Drive: 23

Back (Intake Side)

CAN Coder: 12
Steering: 16
Drive: 22

Limelight Pipelines

| #	Name	Purpose
0	View	For livestreaming the robot's view to the driver; optimal viewing settings
1	General AprilTag	Detects closest AprilTag and returns the ID; to help with location detection
2	Note Detector	Detects the orange notes for autonomous collection purposes
3	Blue Speaker	Detects point to aim at in blue speaker based on AprilTag 7
4	Red Speaker	Detects point to aim at in red speaker based on AprilTag 4
5	Blue Speaker Side	Detects AprilTag on left side of blue speaker (ID 8) for more accurate calculation of robot position relative to speaker
6	Red Speaker Side	Detect AprilTag on right side of red speaker (ID 3) for more accurate calculation of robot position relative to speaker
7	Blue Amp	Detects AprilTag 6 (above blue amp)
8	Red Amp	Detects AprilTag 5 (above red amp)
9	Lighted View	For livestreaming the robot's view to the driver with the limelight headlights on

AprilTag Locations
(Most Important Tags Highlighted)

All AprilTags on the field will be utilised by the robot to perpetuously detect
its (x,y) location on the field and yaw angle. However, the highlighted
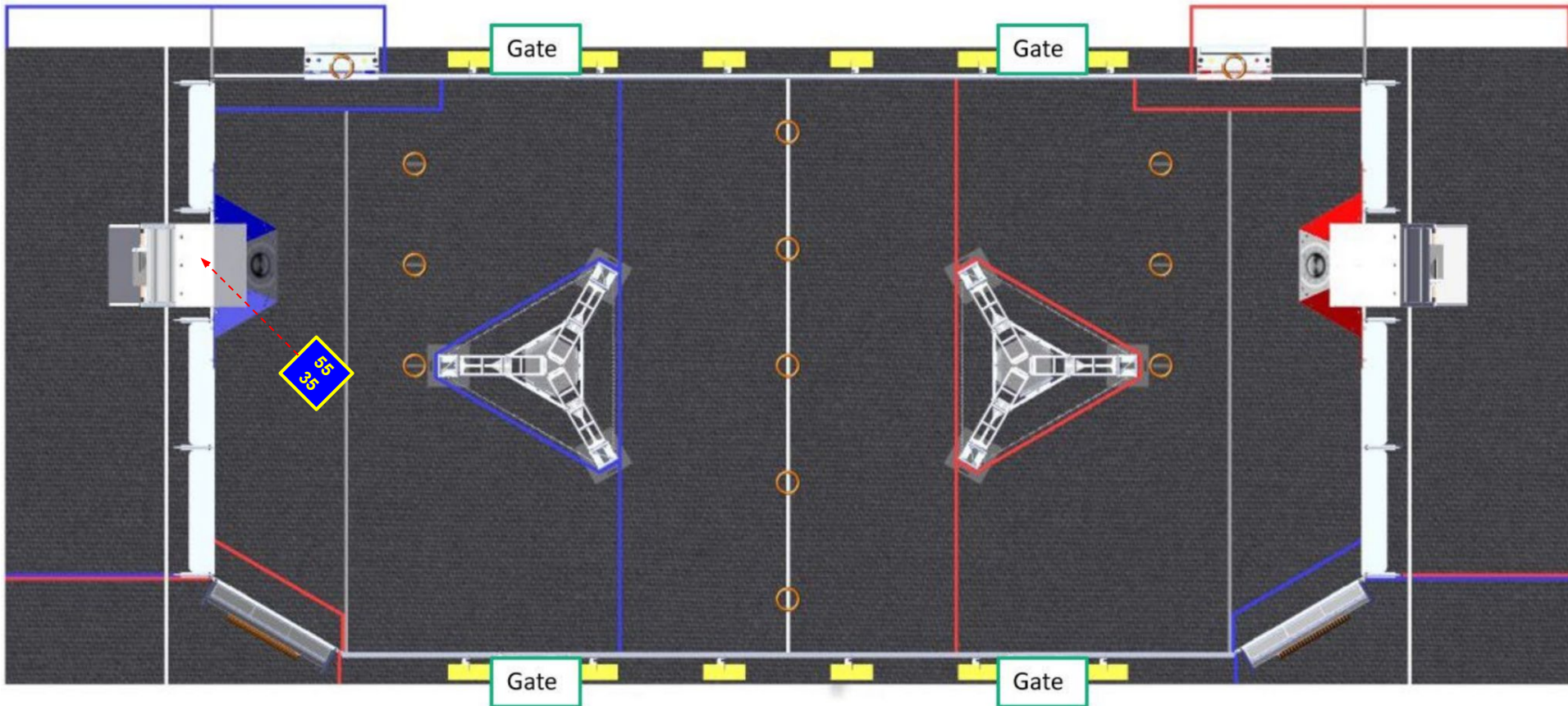AprilTags will also be specifically used for aim and alignment.
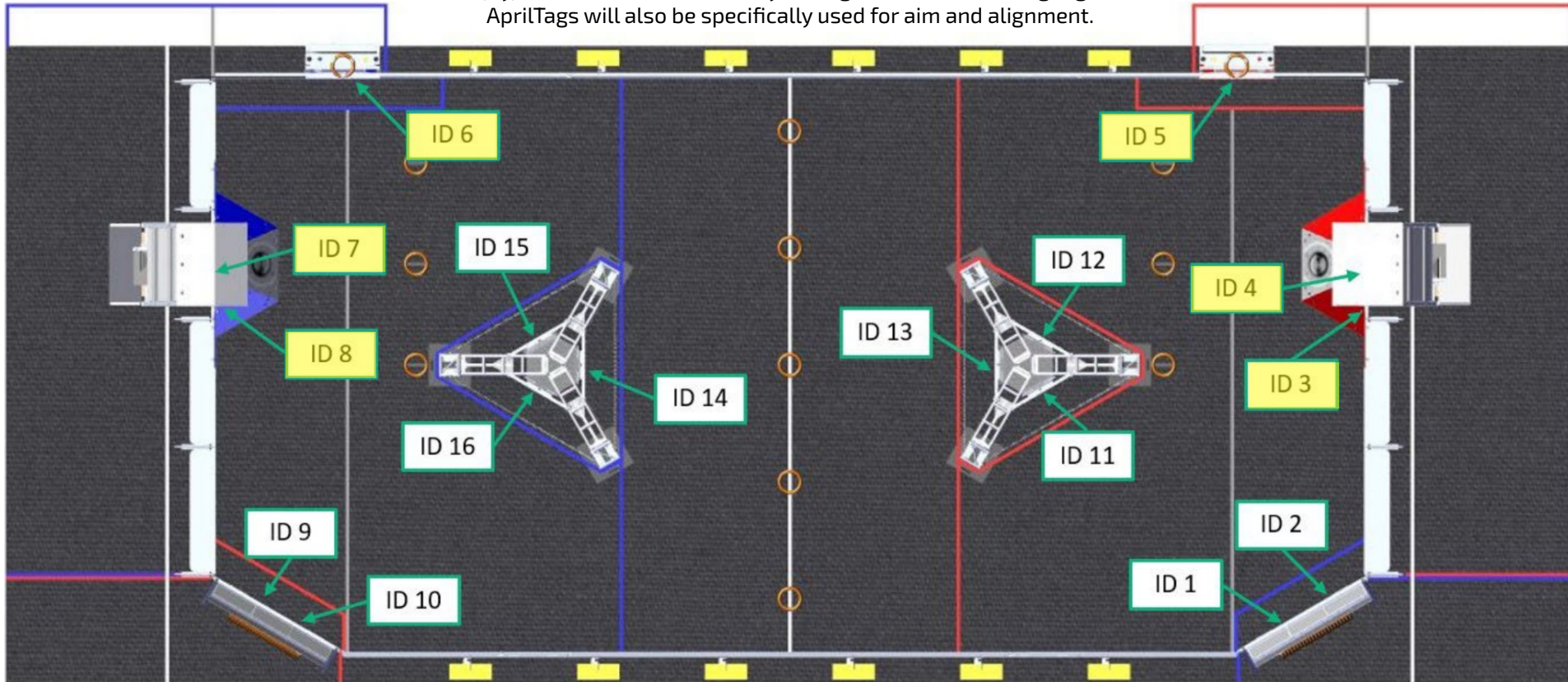
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 0) 0:00
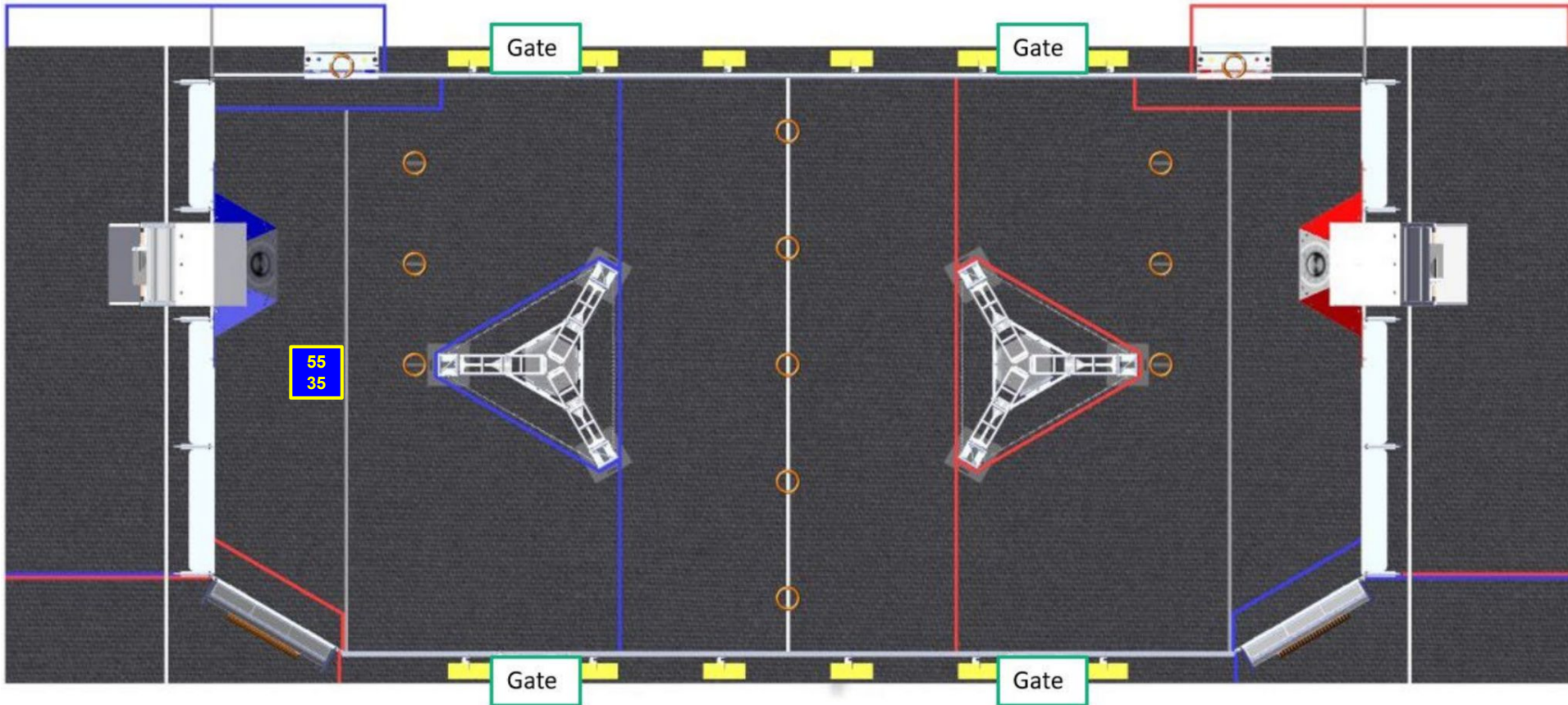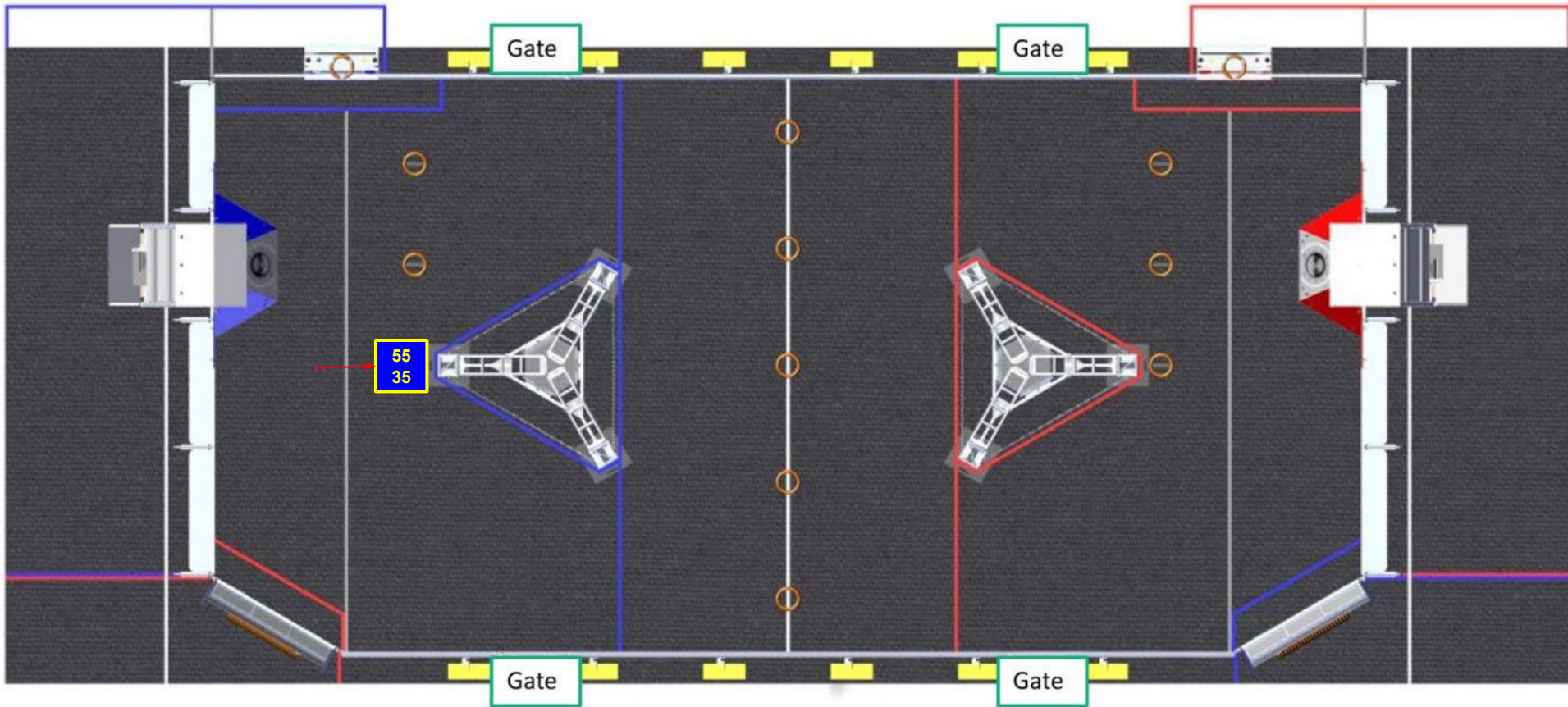
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 1) 0:02
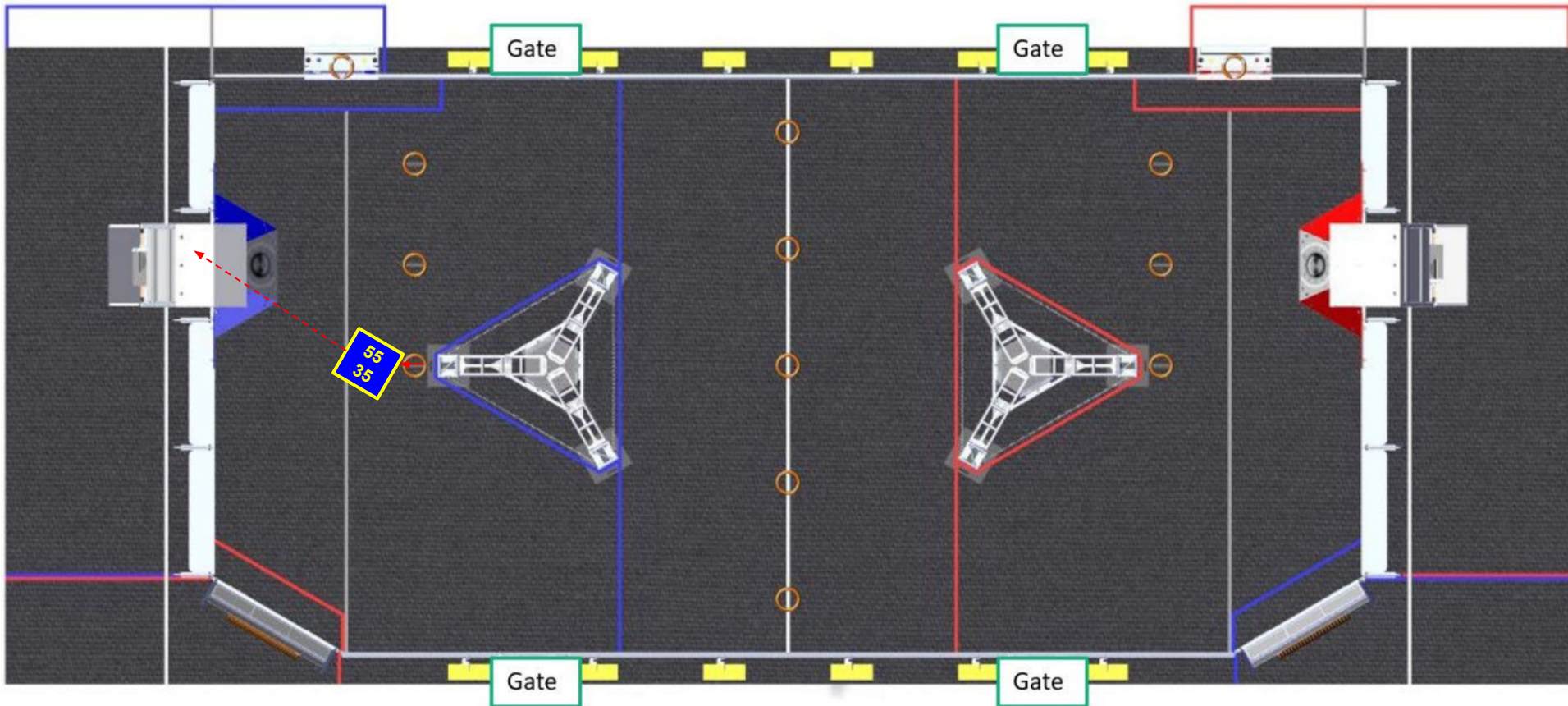
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 2) 0:04
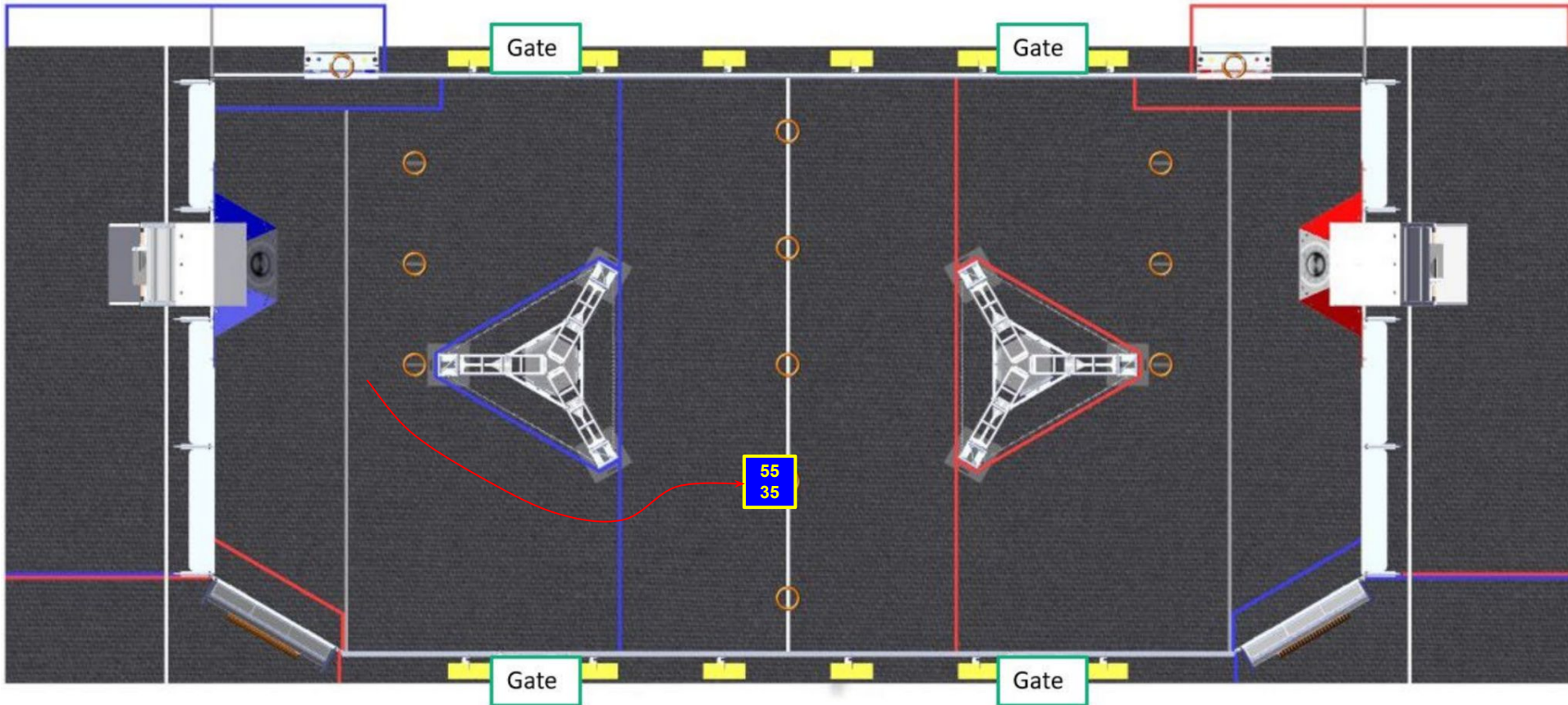
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 3) 0:07

A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 4) 0:11

A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 5) 0.14s

+17 pts. total = EXCEPTIONAL AUTO (:

5 + 2 + 5 + 5