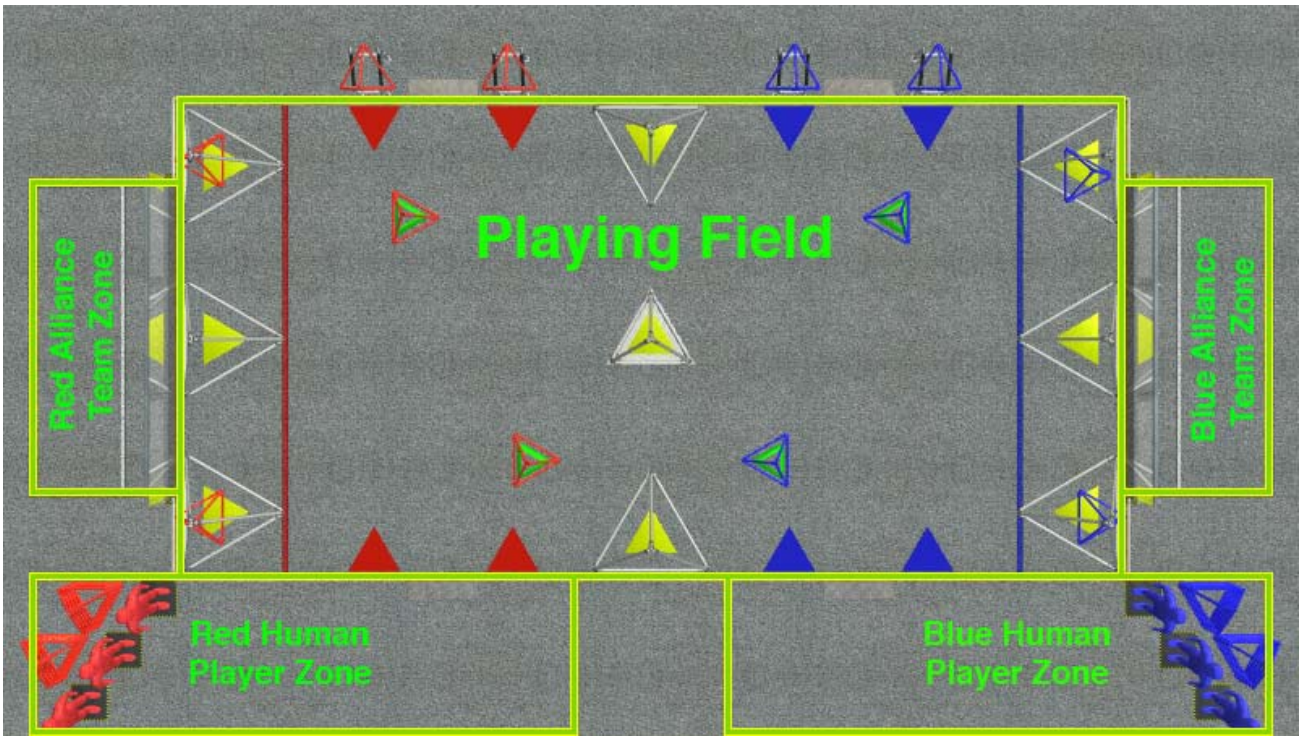
Table of Contents

3 THE ARENA

3.1 OVERVIEW



Note: The illustrations in this section of the manual are for a general visual understanding of the field only. Teams should refer to the drawings for exact dimensions and field construction.

The Playing Field is a rectangular area in which the Robots compete. The Red and Blue Alliance Stations are rectangular areas, each consisting of three (3) Team Zones, which are located outside of the ends of the Playing Field. The three teams that make up each Alliance play the game from these stations.

The specifications below are for the FIRST playing fields used in competition. These fields are welded aluminum, which are built to withstand rigorous play and damage from frequent shipping. Specifications and drawings for low cost versions of the field components are available on the FIRST website at http://www.usfirst.org/robotics/doc_updt.htm.

3.1.1 Dimensions and Tolerances

All official dimensions are on the following drawings:

Drawing Hosted on	
	Field Layout
www.usfirst.org	2005 Field Lines and Layout
	Power Distribution
www.usfirst.org	2005 Robot Power Distribution
	Field Elements
www.usfirst.org	2005 Tetra Connector
www.usfirst.org	2005 Team Field elements TETRA LOADER
www.usfirst.org	2005 Team Field elements Tetra / Goal
www.usfirst.org	2005 Team Field elements CENTER GOAL FAB
www.usfirst.org	2005 Team Field elements CENTER GOAL ASSY
www.usfirst.org	2005 Team Field elements Vision Tetra
www.usfirst.org	2005 Field elements Vision Tetra
www.usfirst.org	2005 Field Elements Tetra Loader
www.usfirst.org	2005 Field elements Tetra
www.usfirst.org	2005 Field Elements Field Targets
	Field Perimeter
www.usfirst.org	2005 Corner Support Assembly
www.usfirst.org	2005 Corner Support Fabrication
www.usfirst.org	2005 Drivers Station Panel Assembly
www.usfirst.org	2005 Drivers Station Panel Fabrication
www.usfirst.org	2005 Drivers Station Support Fabrication & Assembly
www.usfirst.org	2005 Field, End Rails
www.usfirst.org	2005 Field, Gate Ramps
www.usfirst.org	2005 Field, Rail / Gate Fabrication & Assembly
www.usfirst.org	2005 Field, Rail Fabrication & Assembly
www.usfirst.org	2005 Field, Rail Side Outriggers
www.usfirst.org	2005 Weights, Field End Supports
www.usfirst.org	2005 Weights, Side Outriggers
www.innovationfirst.com	*Goal, PVC with IFI hardware*
www.innovationfirst.com	*Goal, metal with IFI hardware*
www.innovationfirst.com	*Center Goal (metal)*

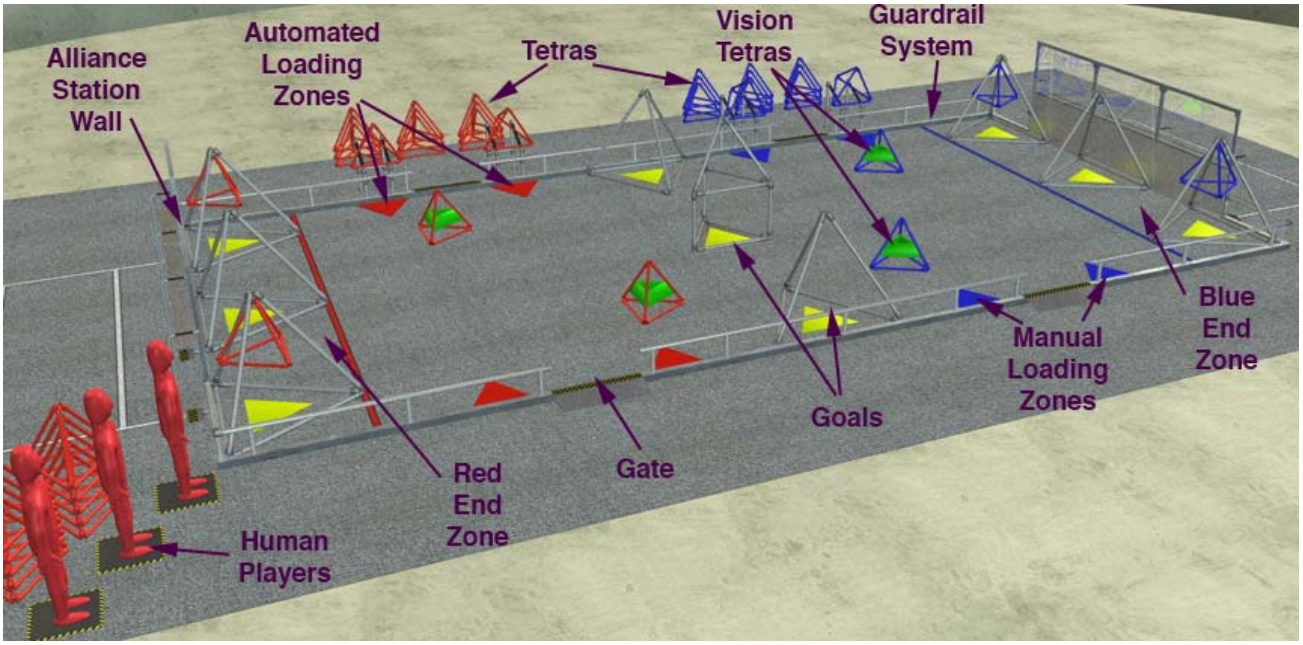
Where surfaces are indicated as flush, there may be variations either direction of as much as ¼ inch. This is not considered abnormal and is part of the game challenge. The reasons for these variations are numerous; different arenas are manufactured at different sites, set up by different volunteers, and undergo different temperature extremes. Volunteers and FIRST staff at each competition site will do their best to make the Arena and its elements as close to nominal as reasonably possible.

The scoring objects are made of PVC and are expected to undergo extensive robot and person handling. They are likely to become misshapen and some edges may become slightly bent instead of straight. Because of a variety of environmental conditions at various competition sites, their resilience and durability are expected to vary. Slightly misshapen scoring objects are expected, and they are considered to be part of the game challenge.

3.2 PLAYING FIELD

Note: The official Playing Field layout and dimensions are contained in the"2005 Field Lines and Layout" Drawing. Diagrams and dimensions below are for illustrative purposes only.

3.2.1 Boundaries and Markings



The carpeted Playing Field is 54 feet by 27 feet, bounded by two Alliance Station Walls and a Guardrail System.

The Alliance Station Wall is 6-1/2 feet high, composed of a 3-foot high base of diamond plate with a 3-1/2-foot high transparent acrylic top. The Alliance Station Wall is 18 feet wide, centered on the ends of the field.

The Guardrail System is a 20-inch high horizontal pipe with vertical supports mounted on a 3" aluminum angle. A 20-inch high polycarbonate shields is attached on the field side of the Guardrail system, extending from the floor to the top of the guardrail, and running the length of the guardrail. The Guardrail System defines the borders of the Playing Field in all areas not occupied by the Alliance Station Wall.

There are four gates in the Guardrail System, to allow easy access to the Playing Field for placement and removal of robots. The gates are four feet wide, and located in each quadrant of the field. The centerline of the gate opening is located twelve feet from the midline of the Playing Field. The gates are closed during game play.

At each end of the Playing Field, a two-inch wide line of gaffers tape runs the width of the field, from one side to the other. The center of the line is located approximately six feet from the Alliance Station Wall, and marks the Alliance End Zone. The tape is colored red or blue, to correspond with the alliance located at the respective end of the field.

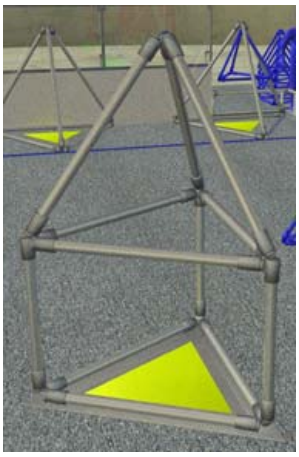
Two colored Loading Zones are located in each quadrant of the Playing Field. The Loading Zone is colored red or blue, to correspond with the alliance located at the respective end of the field. The zone is in the shape of an equilateral triangle of three feet per edge, constructed of 1/4" HDPE, and attached to the carpet with Velcro. The zones in each quadrant are located immediately adjacent to the gate opening in the Guardrail System of that quadrant.

3.2.2 Goals

The Goals are three-dimensional tetrahedral shapes, with each face in the form of an equilateral triangle. Each edge of the shape is defined by a six-foot length of 1-1/4" Schedule 40 aluminum pipe (approximately 1.6" OD). The ends of the pipes are attached to "Tetra Connector" to form each apex of the Goal. When properly constructed, the top of the Goal is approximately 5-1/4 feet from the floor.

A vision system target is located in the center of the base of each Goal. The vision system goal is constructed of a triangular piece of yellow 1/8" HDPE on the floor, with each side of the triangle three feet in length. The vision system target is centered within the base of the Goal.

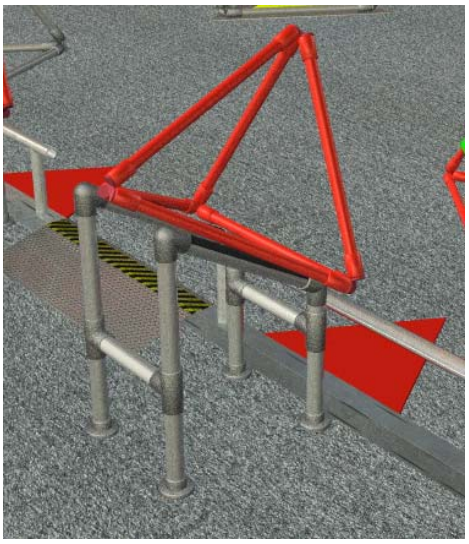
3.2.3 Center Goal



The Center Goal on the Playing Field is constructed in a manner similar to the other Goals. However, each edge is constructed of a four-foot length of 1-1/4" Schedule 40 aluminum pipe (approximately 1.6" OD). The tetrahedral element of the Central Goal is secured to the top of a 43-inch tall base constructed of similar pipe and end caps. The entire Central Goal is secured to a base that is fixed to the Playing Field carpet with Velcro to prevent movement. When properly constructed, the top of the Center Goal is 7 feet from the floor.

A vision system target is located in the center of the base of each Goal. The vision system target is identical to those found in the other Goals.

3.2.4 Tetra Loading Station

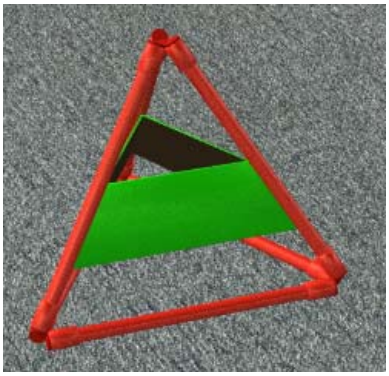


The vision system can use the colored Loading Zone indicators to locate and navigate to the Tetra Loading Stations during either the autonomous or teleoperated phases of the match. A vision system target is located in front of each Tetra Loading Station. The vision system goal is constructed of a triangular piece of red or blue 1/4" HDPE on the floor, with each side of the triangle three feet in length.

A field attendant will be positioned behind the Tetra Loading Station, and will place a Tetra on the loading station each time one is removed by a Robot. Minor variations in the precise position and orientation of the Tetra on the Tetra Loading Station are to be expected, and are considered part of the challenge of the competition.

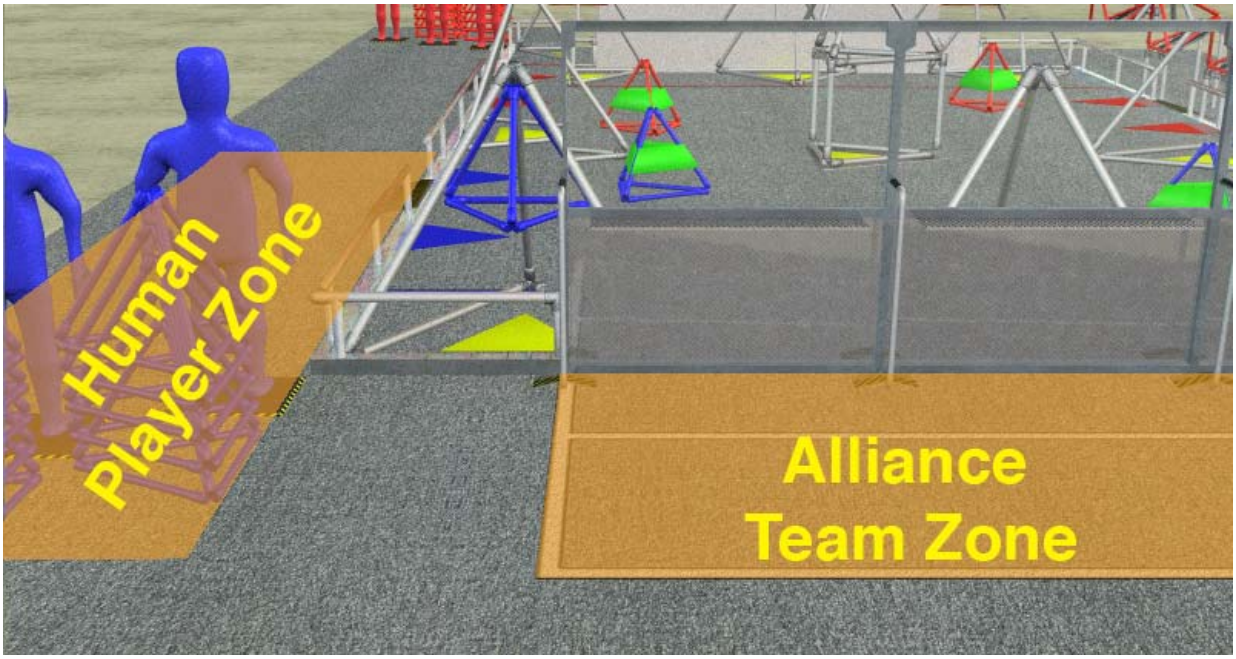
3.3 SCORING OBJECTS

The Scoring Objects for the game are three-dimensional tetrahedral shapes with each face in the form of an equilateral triangle, known at "Tetras." Each edge of the Tetra is defined by a 30-inch length of 1-1/4" Schedule 40 (approximately 1.6" OD) PVC pipe. The ends of the pipes are attached to "Tetra Connector" to form each apex of the Tetra. The Tetra Connector is a custom injection molded part. When properly constructed, a Tetra stands approximately 28 inches tall and weighs approximately 8-1/2 pounds. Each Tetra is colored either red or blue. When a Tetra is placed in a scoring position, it will score points for the alliance of the corresponding color. Forty Tetras of each color will be available for each match.



Two special Vision Tetras of each color will also be used in the match. The basic construction of the Vision Tetras is identical to that of all the other Tetras. The Vision Tetras will also have an eight-inch tall band of green HDPE attached to three sides of the structure that is intended to be detected by the Robot vision system. A vision tetra weighs approximately 12-1/2 pounds.

3.4 ALLIANCE STATIONS



Each Alliance Station is 9'x 18', with three identical team stations. All Human Players stand on one side of the field, in the Human Player Zone, where they can move between the stacks of supply Tetras, and the Tetra Loading Zones.

3.4.1 Boundaries and Markings

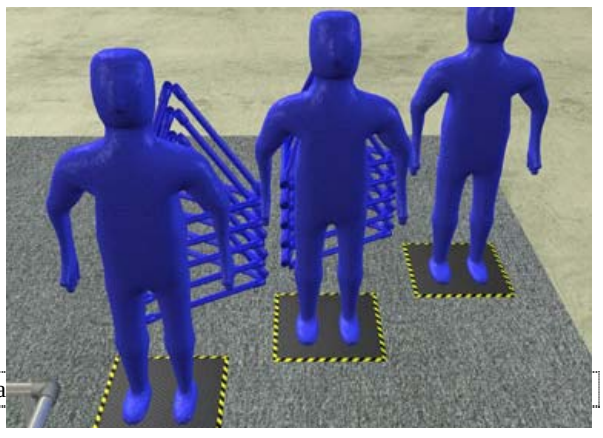
Each Team Zone shares the Alliance Station Wall with the Playing Field and has its outer and back edges marked with white gaffer tape on the carpet. The Team Zone extends eight feet back from the Alliance Station Wall, and is the width of the Alliance Station Wall. Three feet from the Alliance Station Wall, the Starting Line is marked on the carpet with a two-inch wide line of white gaffers tape. The Human Player Zone is approximately eight by thirty feet and appropriately marked on the venue floor.

3.4.2 Shelf

Attached to the Alliance Station Wall are three aluminum shelves to support the alliance robot control systems of the three teams. At the setup location for each team a Competition Cable (to attach to the "Competition Port" of the Operator Interface) and a Communications Cable (to attach to the "Radio Port" of the Operator Interface) will be attached to the Alliance Station Wall. These cables will provide power and communications for the team's Operator Interface. Three Emergency Stop (E-Stop) buttons are located in the alliance station, one for each team.

3.4.3 Pressure Pad Sensors

Three Pressure Pad Sensors are located along one side of the Playing Field, adjacent to the Team Zone behind the Alliance Station Wall. The Human Players from each team must stand on the Pressure Pad Sensor corresponding to their team to activate the sensor and enable operation of their Robot during the match. If the Human Player moves



off the Pressure Pad Sensor at any time during the match, their team's Robot will be temporarily disabled until they resume their position on the sensor. The match clock does not stop when the Human Players step off the Pressure Pad Sensors and their robot is temporarily disabled.

3.5 DRAWING NOTES

- Supplier for the White Gaffer's Tape for field markings: Go to http://www.tapemonster.com
    - Order Shurtape PC-628 2" x 60 yds Red Gaffers Tape for the line that marks the Red Alliance End Zone. Cost is approximately $19 per single roll or $12 per roll in 24 roll case lots.
    - Order Shurtape PC-628 2" x 60 yds Blue Gaffers Tape for the line that marks Blue Alliance End Zone. Cost is approximately $19 per single roll or $12 per roll in 24 roll case lots.
    - Order Shurtape PC-628 2" x 60 yds White Gaffers Tape for the lines that mark the Team Zones. Cost is approximately $19 per single roll or $12 per roll in 24 roll case lots.

- Supplier for plastics & HDPE: Go to http://www.plasticsupply.com/ Plastic Supply Inc., located in Manchester, NH, is available to help you with all of your plastic material needs for the 2005 FIRST Robotics Competition. Identify yourself as a FIRST team and give them your team number. [800-752-7759 or 603-669-2727; Fax 603- 668-1691; Email: plasticsupply@conversent.net]