



2017 ROBOTICS CONTEST

28TH SKILLS ONTARIO COMPETITION

Football

Team of 4, Secondary

Contest Date:

Monday, May 1 and Tuesday May 2, 2017

Sign in is at 7:00 am on the contest site

NEW LOCATION! – Toronto Congress Centre, 650 Dixon Road, Toronto

TECHNICAL COMMITTEE CHAIR: Bob Tone, **Tech On eh!**

TECHNICAL COMMITTEE MEMBERS:

Mario Blouin, École Secondaire de Hearst

Mark Dimonte, 1Francis Libermann Catholic High School,

FURTHER COMMUNICATIONS

Questions for clarification of the rules can be made to the Technical Committee

Chair bobtone@rogers.com

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To ensure that competitors have a positive experience at the Skills Ontario Competition, a competitor and their educator should review the scope document well in advance, as well as check back to the website for updated versions of the scope up until the event.

For technical questions that are contest specific, please contact the technical chair – Bob Tone at bobtone@rogers.com or the Skills Ontario competition department at soc@skillsontarioc.com .

For questions about the **registration process and eligibility** please refer to the Competition Information Package www.skillsontario.com

MAJOR CHANGES MADE FOR ROBOTICS

The Technical Committee has made some major changes to the overall format of the Robotics contest. The bullet points are intended to only highlight changes, not fully explain them. Please review the scope document in detail to fully understand these changes.

- To better align Ontario with the National and World Skills Competitions, there will now be two separate components to the Robotics competition. In addition to the traditional Robotics competition component there will be an independent autonomous Robot Component.
- Teams will participate in both components and be awarded points based on performance in each of the components and the team with the highest point total after both components are added together will be the Gold Medalist.
- Teams will bring two different separate Robots – One for the Tele-operated component and one for the Autonomous component.
- At the Skills Ontario Competition we will continue to have teams of 4. New for 2017 is at the Skills Canada National Competition only **2 competitors** per Robotics team are permitted. The Gold Medal winning team will need to identify which two students from their team will advance immediately following the Closing Ceremony on May 3.

PURPOSE OF THE CONTEST:

To create an engineering project to encourage individuals with different skill sets to form co-operative teams to design, fabricate and operate a robot. The intent of the challenge is to have teams of students independently designing / fabricating / operating robots capable of completing the competition tasks in competition with other student-fabricated robots. Teams are not allowed to develop or implement strategies based on interfering with their opponent's ability to complete the competition task set.

SKILLS AND KNOWLEDGE TO BE TESTED:

- Drafting
- Mechanics
- Electronics
- Metalwork
- Woodworking
- Communications

EQUIPMENT AND MATERIALS:

Supplied by Skills Ontario Technical Committee:

- One worktable with access to a 120V (min 1000W) power outlet
- For the Tele-operated component
 - Playing Field, including Team Home Area
- For the Autonomous Component
 - Playing Field

Supplied by Competitor:

Competitors must bring the following items at a minimum:

- For the Tele-operated Component
 - Tele-Operated Robot (may have Autonomous components)
 - Easily accessible fuses
 - Easily accessible kill switch(es)
 - Robot accessories (including batteries, controller(s), battery charger, spare parts)
 - Table top robot stand
 - Tool box including the various tools required to modify and repair robots onsite
 - Safety equipment, including mandatory eye protection
 - Power Bar/extension cord
 - Completed Pre-inspection Checklist
 - Wiring diagram
- For the Autonomous Component
 - Autonomous Robot
 - Microcontroller for Autonomous task
 - Microprocessor/software (LEGO, VEX, Raspberry Pi, etc.)
 - Computer

*teams will not be permitted to contact anyone outside the contest area or access files not saved to the desktop of the computer. Teams caught corresponding with those outside the contest area electronically or in person may be disqualified.

- Résumé for Job Interview Component

Media devices, such as cell phones, smart phones, mp3 players or PDAs are not permitted on the contest site.

Prior to attending the Skills Ontario Competition, students should be familiar and competent in the use of the tools and equipment listed above as well as what safety precautions will be observed during the Skills Ontario Competition.

As always teams are able to use whatever components they wish, obtained from sources of their own choosing, when creating their Tele-operation Robot Solutions.

Teams are responsible to provide their OWN components used to create their '2017 Skills Ontario Robotics Competition Built In Advance At School Tele-operation Robots.

Teams are permitted to use the platform of their chose for the Autonomous component (LEGO, VEX, Raspberry Pi, etc.)

Studica has agreed to provide ALL Teams participating in the 2017 Skills Ontario Robotics Competitions at the School Board and Provincial Levels with 36 Mini-footballs at no cost to the teams.

Ontario Teams MUST send the following Contact Information to **soc@skillsontario.com**. We require the following information to enable the necessary delivery arrangements can be put in place to ensure all teams receive the Football Collections.

Required Football Collection Contact Information

Robot Team's Teacher Advisor(s) Name(s):

Robot Team's Teacher Advisor(s) email address(es):

School Name:

School Address including Postal Code:

School Phone Number:

School Board Name:

The email addresses and address provided will be shared with the Technical Committee Chair and Studica to create the new Ontario Robotics group email list and to deliver the mini-footballs.

SAFETY:

Safety is a priority at the Skills Ontario Competition. At the discretion of the judges and technical chairs, any competitor can be removed from the competition site for not having the proper safety equipment and/or not acting in a safe manner.

1. It is mandatory for all competitors to wear CSA approved eyewear (including side shields for prescription eyewear) when doing any fabrication work on the robots.

*Competitors will not be permitted to compete until they have the needed safety equipment. Competition judges will have final authority on matters of safety.

Competitors must show competence in the use of tools and/or equipment outlined in this scope and can be removed at the discretion of the judges and technical chairs if he/she does not display tool and/or equipment competency.

CONTEST STATUS

- This contest is offered as an official contest at the Skills Ontario Competition is a team of 4 contest.
- This contest is offered at the Skills Canada National Competition (SCNC) as a team of two (2) contest. The Gold medal team will need to identify which two students will be advancing to the SCNC immediately following the Closing Ceremony on May 3.

- 2017 is NOT a qualifying year for WorldSkills*

*To be eligible to advance to the WorldSkills Competition you must NOT be older than 22 years in the year of the competition. 2018 will be a qualifying year for WorldSkills 2019.

RULES, REGULATIONS AND ELIGIBILITY:

Please be sure to review all eligibility criteria in the complete Competitor Information Package, available online at www.skillsontario.com.

Eligibility Criteria:

Secondary students must:

- **Be 21 years of age or younger as of December 31st in the competition year (2017).**
- Compete in only one contest at the Skills Ontario Competition. Students competing at a Qualifying Competition who do not advance in their designated contest area are not permitted to then register for a different contest at the.
- Possess a Canadian citizenship or landed immigrant status and be a resident of Ontario.

Other Rules and Regulations all competitors need to be aware of prior to attending the Skills Ontario Competition:

- Translators or other assistants (e.g. hearing impaired) are permitted in the contest site **only if this request was made during the registration process and approved in advance by the Skills Ontario office.**

- During the contest, no one will have access to the contest site except the Technical Committee Members, Judges, Skills Ontario staff and Competitors. Spectators, including teacher/advisors, will be provided a viewing area if possible.
- If there is any discrepancy between the English and French information in the scope, the English will be taken as the correct information.

Immediate disqualification may occur at the discretion of the technical chair if a competitor displays any one of the following:

- Acts inappropriately
- Shows disregard for the safety of themselves or those around them
- Breaks the established rules and regulations including:
 - Uses equipment or material that is not permitted
 - Dishonest conduct (cheating, plagiarism)
 - Speaks with those outside the contest area
 - Arrives to the contest site late

Sign-in for all contests will happen on the contest site the morning of the competition. Registration must take place prior to the deadline of March 25, 2017.

CLOTHING REQUIREMENTS:

Competitors are to be dressed in a clean and appropriate manner. Competitors are not permitted to wear clothing with logos or printing. The exception to this rule is the logo of the school, school board, college or MTCU District that the competitor is representing. ONLY the logo of the institution under which the space is registered can be visible. Corporate logos or names are not permitted on a competitor's clothing.

MEALS:

Skills Ontario will provide a basic lunch and a beverage for competitors. Lunch will be confirmed closer to the competition; no alternative meals will be provided. If the competitor has specific dietary needs, specific tastes or feels that they may require additional sustenance, it is recommended they bring the necessary food with them. If the competitor is part of a contest of a physical nature, it is highly recommended they bring additional snacks.
ANY FOOD BROUGHT TO THE VENUE MUST BE NUT FREE. ANY NUT PRODUCTS FOUND ON SITE WILL BE REMOVED.

SKILLS ONTARIO COMPETITION AGENDA:

Monday, May 1 and Tuesday, May 2, 2017
Skills Ontario Competition

Monday, May 1 – Tele-operated Tournament Play and Autonomous Tournament Play

7:00am – 7:30am	Sign-in at the contest site
7:30am – 7:45am	Orientation ^
7:45am – 9:00am	On-court practice time (for both Tele-operated and Autonomous Components), Inspection for Tele-Operated Robots and Job Interviews
9:00am – 11:45am	Tele-Operated and Autonomous Tournament Games will be hosted simultaneously
11:45am – 12:30pm	Lunch
12:30pm – 4:30pm	Tele-Operated and Autonomous Tournament Games will be hosted simultaneously
*4:30pm – 5:15pm	*Open Courts for teams to practice
*To ensure all teams receive an equal number of games, this practice time may be reduced. All teams must be off the court and out of the pit area by 5:30pm. Both Tele-operated and Autonomous Robots must remain in the Pit Area overnight.	

Tuesday, May 2 - Tele-Operated and Autonomous Tournament Play in the morning **Tele-Operated and Autonomous Playoffs in the afternoon**

7:00am – 8:30am	Practice Time on Court
8:30am – 11:45am	Tele-Operated and Autonomous Tournament Games will be hosted simultaneously
11:45am – 12:30pm	Lunch
12:30pm – 4:30pm	Tele-Operated and Autonomous Playoff Games
4:00pm	Autonomous 3 rd place game
4:10pm	Tele-operated 3 rd place game
4:20pm	Autonomous 1 st place game
4:30pm	Tele-operated 1 st place game

A more detailed schedule of what times each team will compete will be released each morning of the competition. Although it will not be intentionally scheduled this way, teams may be required to compete on both the Autonomous and Tele-operated courts at the same time.

May 3, 2017 **Closing Ceremony**

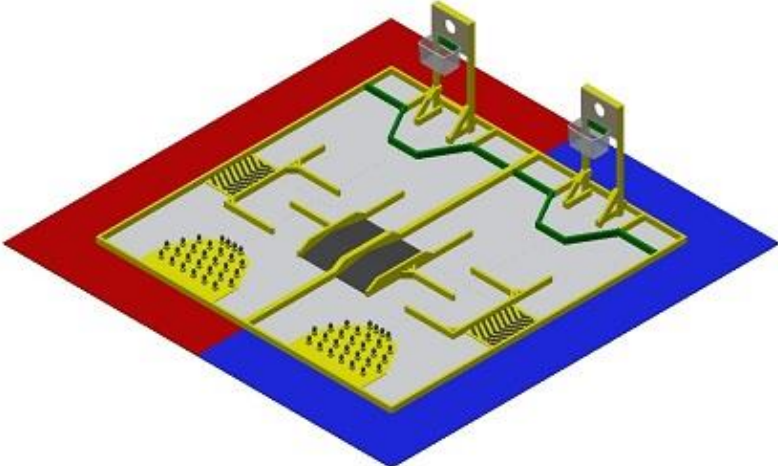
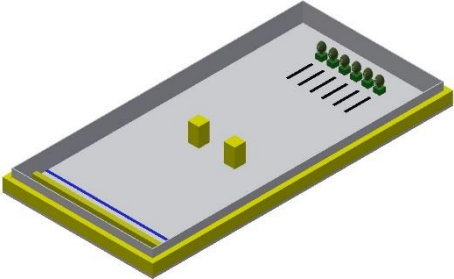
9:00am – 11:30am	Closing Ceremony
12:00pm – 1:00pm	Team Ontario Meeting

Judging Criteria

Tele-Operated Robot tournament and playoffs – 70%

Autonomous Robot tournament and playoffs- 25%

Job Interview Component- 5%

Tele-operated Robot Football with the Option of including Autonomous Robot Elements	100% Autonomous Robot Football
	
<p>Competitor entries involve <u>Built At School / Home</u> and brought to the Competition Site Robot Equipment</p>	<p>Competitor entries involve <u>Built in advance at School/Home</u> and brought to the Competition Site Robot Equipment and Robot Control Program Files</p>

Components of the scope and contest:

There are three components to the 2017 Robotics Contest

- Job Interview – please see the Job Interview section on Page 10 of the scope
- Tele-Operated Component – This is the traditional contest that has been seen over the past at the Skills Ontario Competition. It is permitted to have both tele-operated and autonomous parts used in this component.
- Autonomous Component – This is a new component for 2017. Teams will build a second separate Robot to be tested on a different court and will be 100% Autonomous.

Judging Criteria: Total of 100 Marks

Tele-operated Football Tournament Play

45 Marks

- Highest Scoring Tele-operated Football Tournament Team = 45 Marks
- All Other Teams awarded Tele-operated Football Tournament Marks based on the following formula:
 - $(45) \times (\text{Individual Team Total Score} / \text{Highest Team Total Score})$
- The TOP 16 Teams based on Final Football Tournament Play Results advance to the Tele-operated Football Playoffs

Tele-operated Football Playoff Play

25 marks

- 5 marks per Winner's Bracket Playoff Game Win
- 3 marks per Loser's Bracket Playoff Game Win

100% Autonomous Robot Football Game

25 marks

- Highest Scoring 100% Autonomous Robot Football Tournament Team = 15 marks
- All Other Teams awarded 100% Autonomous Robot Football Tournament marks based on the following formula:
 - $(15) \times (\text{Individual Team Total Score} / \text{Highest Team Total Score})$
- The TOP 16 teams based on the Final 100% Autonomous Robot Football Tournament Play results advance to the 100% Autonomous Robot Football Playoffs

100% Autonomous Robot Football Playoff Play

10 marks

- 2 marks per Winner's Bracket Playoff Game Win
- 1 marks per Loser's Bracket Playoff Game Win

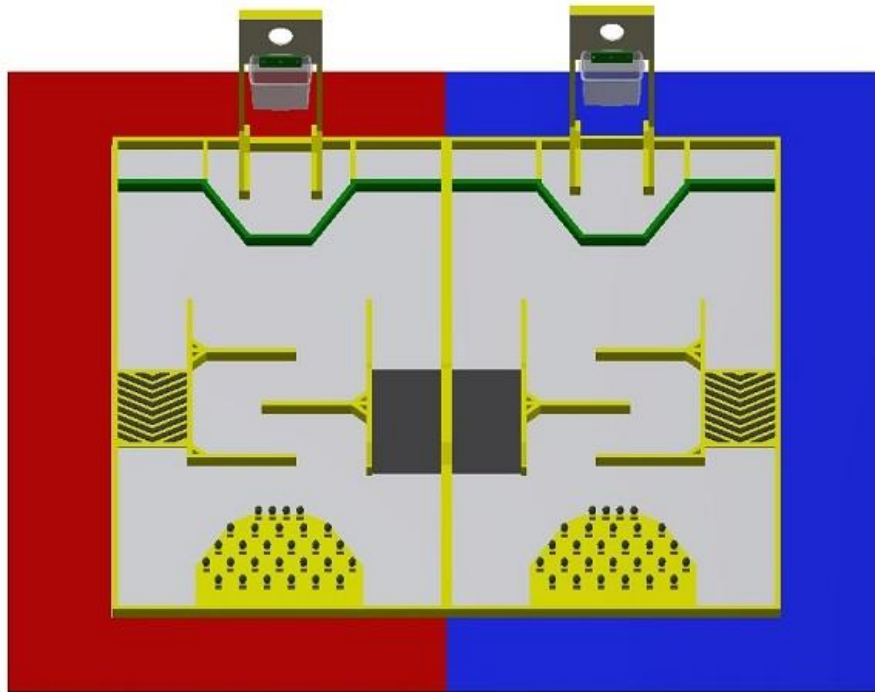
NOTE: The two Football Game Formats are INDEPENDENT of one another. It will be possible for a Team to qualify for the Playoffs in ONE Football Game Format and NOT in the other Football Game Format.

Job Interview

5 marks

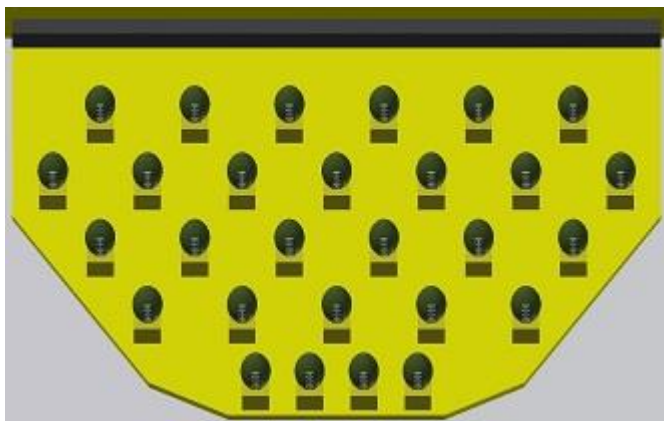
To assist competitors in preparing for their eventual job searches there is a "job interview" incorporated into this contest. It is expected that the competitors will arrive **WITH A RÉSUMÉ** and be prepared for interview questions and discussion. Performance in the interview accounts for 5% of the individual's/team's overall mark.

Traditional Tele-Operated Component: The Football Game



Game Overview

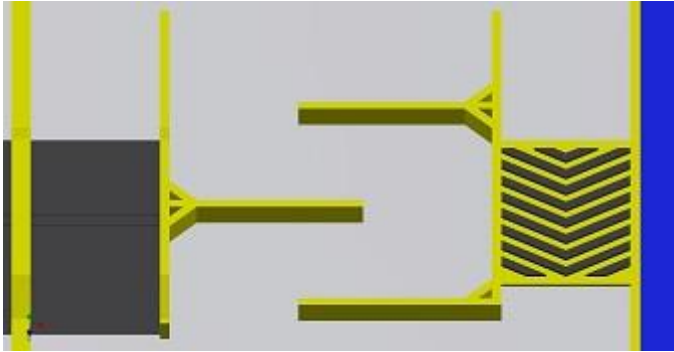
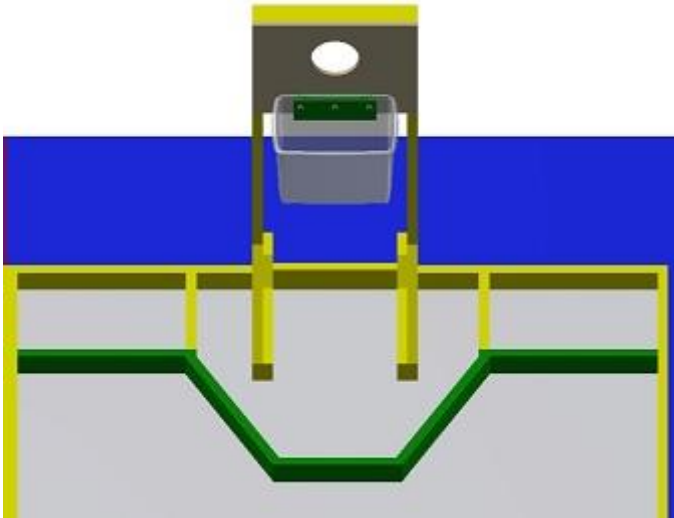
The core game situation is Football with the focus on can a Higher Reward / More Technically Difficult Passing Game beat a Lower Reward / Less Technically Difficult Running Game.

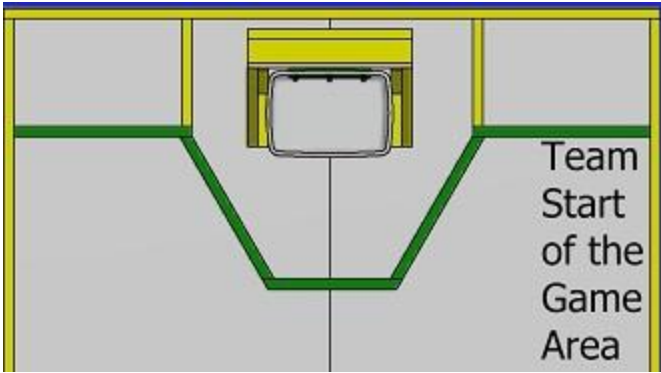
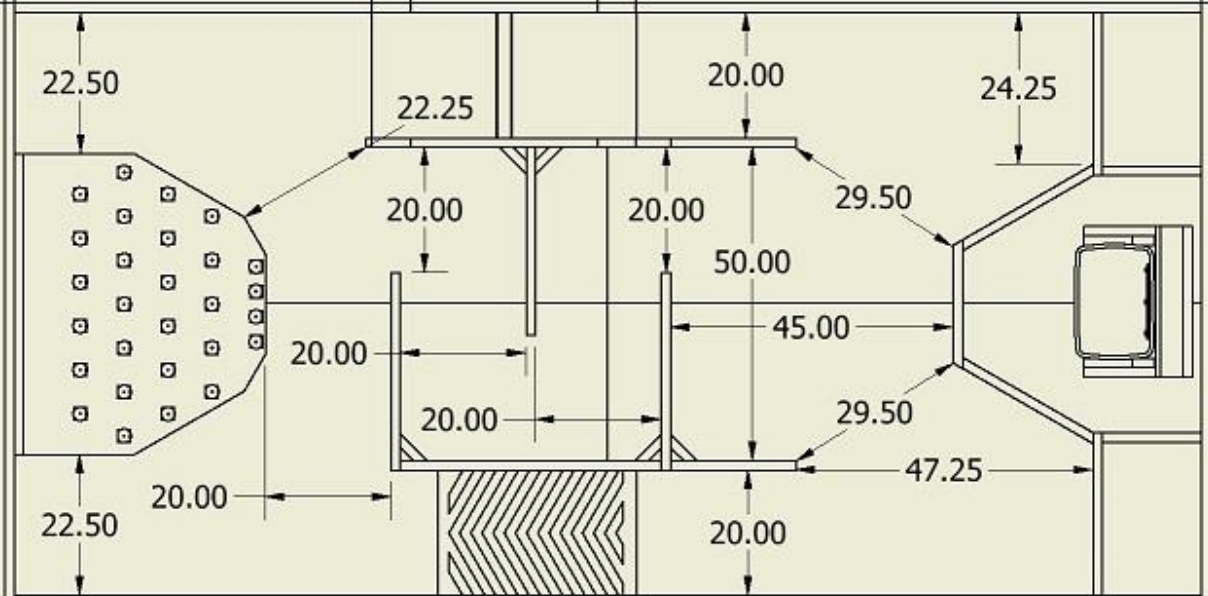
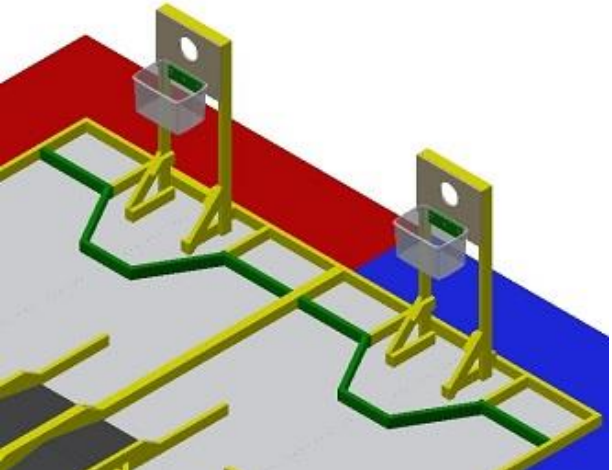





Each Team's Exclusive Use Space has a Football Source Platform where 28 Sponge Footballs approximately 3.25 in. long with a major dia. of 2.25 in. are located.

These Footballs are positioned in a Grid Pattern on fixed in place stands that are 2 by 2 by 1.5 in.

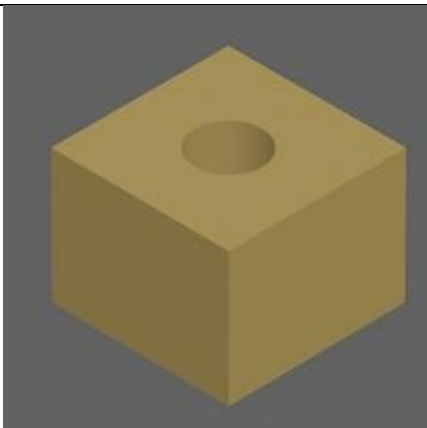
The Tee Blocks form a Passive Defensive Team with 5.0 in. spaces between the rows of Tee

	Blocks with the exception of the Front Row where the Tee Blocks are 2.0 in apart.
	<p>The Transition Zone separating the Ball Source Area from the Scoring Area provides THREE travel options:</p> <ol style="list-style-type: none"> 1) A Straight Line Path that includes travel over a Two-Sided Ramp 2) A Straight Line Path that includes travel over a Bumpy Road Section 3) A Winding Path that provides a Flat, Smooth Surface at ALL Times
	<p>Teams can score:</p> <ol style="list-style-type: none"> a) Rushing touchdowns (Deliver a football to the Floor Area beyond the Green End Zone Line / Barrier), Value: 1 Point b) Passing Touchdowns (Deliver a football into the Elevated Receiver's Bin), Value: 2 Points, or c) 'Hail Mary Touchdowns' by shooting the football into the 7" Dia. hole in the backboard. Value: 3 Points <p>Football MUST be completely free of contact with the robot when the end of the game Buzzer sounds for points to be awarded.</p>

	<p>Each Team's Complete Entry Start of the Game Position is in the Outside Corner of their Scoring Area.</p> <p>Each Team's <u>Entire Entry</u> must be IN the Starting Position and Incompliance with the Overall Maximum 4 Cubic Feet Size Restriction.</p>
	<p>Each Team's Exclusive Use Area is approximately 8 ft. by 16 ft. and provides a minimum Passageway Opening of 20 inches at all times.</p>
	<ul style="list-style-type: none"> Games will involve Two Teams at a time. Both Competitors are allowed unrestricted movement around the perimeter of their Team's Assigned Court Area. Teams can utilize a Maximum of 2 Tele-operated Robots. Teams will NOT be in possession of a Football at the Start of a Game.

	<ul style="list-style-type: none"> • Each Team's robot CANNOT be in possession of more than one Football at any time. • Robots in Double Tele-operated Robot Entries may possess One Football each <p>Teams may also have Independent Autonomous Elements as part of their entry. These elements may possess <u>ONLY ONE</u> Football at a Time each and these Football(s) do <u>NOT</u> count against their Team's Maximum Two Footballs at a time limitation.</p>
	
<p>Game Footballs:</p> <ul style="list-style-type: none"> • ALL Schools preparing a 2017 Skills Ontario Robotics Team will be provided with 36 Mini-footballs at NO COST to the school by Studica. <div style="text-align: center;">  <p>Studica</p> </div> <ul style="list-style-type: none"> • Schools requesting a Competition Set of Mini-footballs MUST NOT contact Studica directly to request their footballs. • Schools requesting a Competition Set of Mini-footballs MUST do the following: <ul style="list-style-type: none"> ○ send the following Contact Information to soc@skillsontario.com . <ul style="list-style-type: none"> ○ Robot Team's Teacher Advisor(s) Name(s) ○ Robot Team's Teacher Advisor(s) email address(es) ○ School Name ○ School Address including Postal Code ○ School Phone Number ○ School Board Name 	

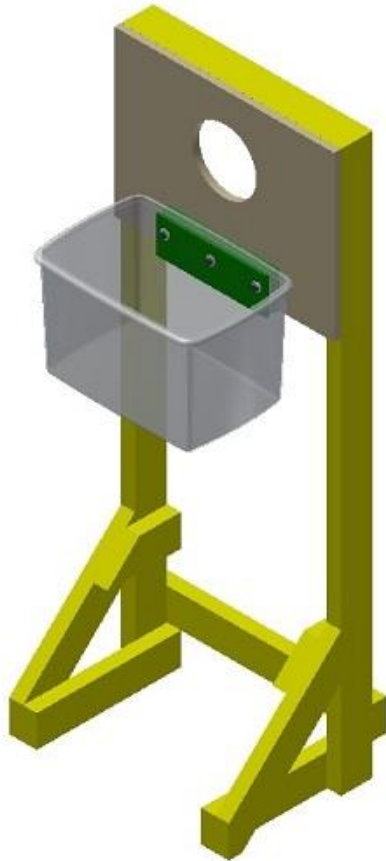
**to facilitate the shipping of footballs and communication of Robotics contest information, this information will be shared with Studica and the Skills Ontario Competition Robotics Technical Committee Chair.



- All Footballs will be Standing on 2.0 x 2.0 x 1.5 in Tees (Blocks) that have a 1 in Diameter 0.75 in. Deep Hole at the Center Point of the Block's Top Surface.



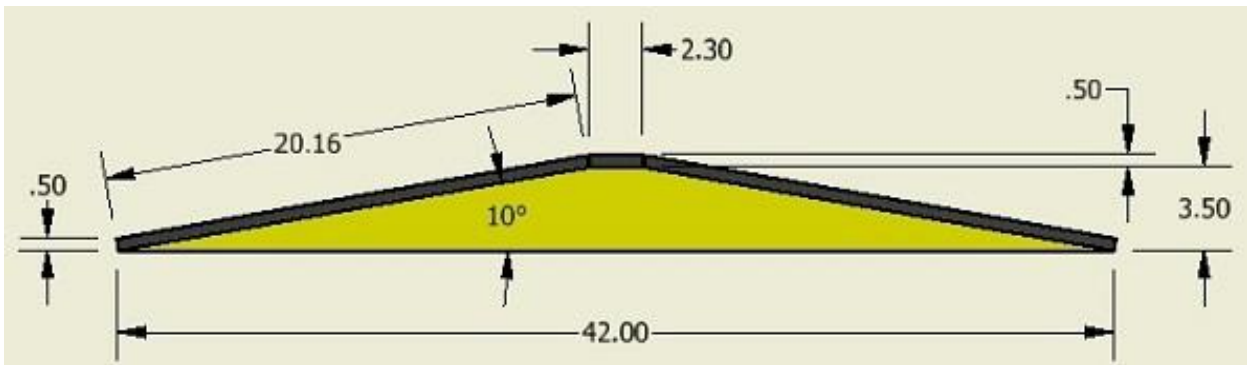
- The Receiver's Hands are a Canadian Tire 28 L Ultra Latch Bin, Product ID: 142-0954-2 cost \$13.99 (CAN)
- NOTE: The Bin comes with a Lid that **WILL NOT** be used during Game Play



The Receiver's Hands (the Elevated Bins) provide:

- a) An approximately 16 by 12 In. Top Opening positioned 48 Inches above the Court Floor
- b) Has its' Forward Edge 22 in. back from the End Zone Line / Barrier
- c) Has a 7 In. Dia. Hole positioned in the Center of the Backboard above the Elevated Bin.

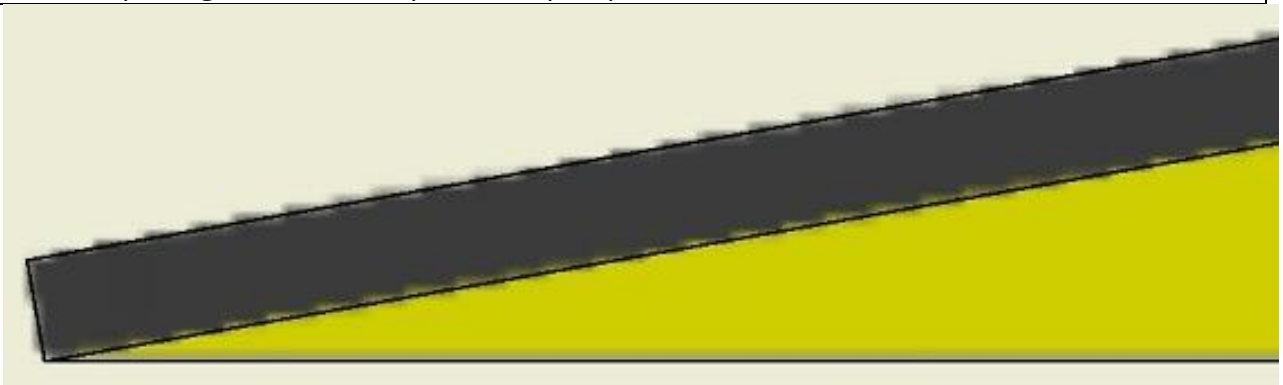
The Receiver's Hands Details are provided in the Appendix Section of this document.



- The Ramp runs Side to Side in One Passageway and the Two Sided Ramp's Details are provided in the Appendix Section of this document.



- The Ramp Slope and Top Caps ALL have Straight Edge Cuts. This results in a small Opening where the Slope and Top Caps meet.



- These Straight Edge Cuts result in a 0.5 in. Tall Sloped Edge where the Ramp Cap meets the Court Floor.

In Summary Teams will have exclusive use of a court area with:

- An Open Smooth Surface, 2 Sided Ramp, Bumpy Road and Winding Passageway
 - Robot Starting Positions in the Outside Corner of the Scoring Area
 - The Running Scoring End Zone is an Irregular shaped 7 ft. 9.75 in. wide area defined by a 3.5 in. Tall End Zone Line / Barrier.
 - Running Touchdowns are scored by delivering the football onto the floor of the End Zone Area.
 - Robots are NOT allowed to climb onto the End Zone Line / Barrier or to grasp hold of the End Zone Line / Barrier
 - Robots are ALLOWED to contact / touch the Front of the End Zone Line / Barrier or to reach over it.
 - Passing Touchdowns are scored by Delivering a Football into the Receiver's Hands (the Elevated Bins).
 - No Part of a Robot may make Direct Contact with the Receiver's Hands (Bin) or the structure supporting it. (Touch or Lean on these items for Support)
 - Balls **CANNOT** be retrieved from the End Zone and put into play a second time.
- Robots must stop all operation when the End of the Game Buzzer Sounds.

PIT AREA AND COURT ACCESS

Robots must be designed and built by students to the criteria outlined in this document. A pit area is provided so that students may make repairs and improvements to their robots between games. (Note: Teachers are not permitted in the pit area once the competition has started).

Teams MUST bring their Robots into the Competition Space when the Orientation meeting is held. Teams are NOT allowed to remove their robot from the competition area during the over-night periods between Competition Day 1 and Competition Day 2.

The pit area and competition court may be available to teams to work or practice during lunch breaks.

SCORING

Teams will be awarded Game Points on the following basis:

1. **One Point** will be awarded for each Football delivered into the **End Zone**
2. **Two Points** will be awarded for each Football delivered into the **Receiver's Hands**
3. **Three Points** will be awarded for each Football delivered through the **Backboard Hole**
4. **Tournament Standing** will be determined based on the Total Points Scored in ALL Tournament Games played by each Team.
5. All Teams will play an equal number of Tournament Games.

2017 Skills Ontario - Toronto Robotics Score Sheet				
Game # Court A Team Name	Total Number of Running Touchdowns Value: One Point Each	Total Number of Passing Touchdowns Value: Two Points Each	Total Number of 'Hail Mary' Touchdowns Value: Three Points Each	Total Game Score
Team Signature:				
Game # Court B Team Name	Total Number of Running Touchdowns Value: One Point Each	Total Number of Passing Touchdowns Value: Two Points Each	Total Number of 'Hail Mary' Touchdowns Value: Three Points Each	Total Game Score
Team Signature:				

RULES AND REGULATIONS

1. Each Team will be assigned Exclusive Use of a Court Space.
2. Each team will be assigned a Team Court Side Area.
3. Both Competitors are allowed to move freely throughout their Team's Assigned Court Side perimeter.
4. Robots may reach over the End Zone Line / Barrier BUT Robots may NOT Touch any element of the court within the End Zone.
5. Teams may NOT install a camera or other image generating device on their robot for the purpose of sending a signal / image to an outside the court surface lap top or other type of signal receiver visible to either the Spotter or Driver.
6. An Autonomous Robot by Competition Definition is a device that is turned on at the start of the game and operates without input from the user during. This robot may perform based on feedback from on board sensors or may be pre-programmed to perform or repeat a routine task

TOURNAMENT PLAY

- Tournament Standing will be based on the total number of points scored in all games played by each team.
- Teams will play in an equal number of Tournament Games.
- The Top 16 teams from Tournament play will advance to the Playoffs
- Tournament games will last 4 minutes.
- The amount of time between games will be determined by the number of participants. This information will be provided to teams at the start of the tournament.
- Between tournament games, battery changes and repairs to robots may be completed at the team's assigned Pit Area Worktable.
- During the competition, protective safety glasses and appropriate Personal Protective Equipment is expected to be worn while performing material removal tasks (cutting, drilling, etc.).
- **During game play, referees will have ultimate authority over game rulings, and will have full authority over team conduct in the court area.**
- Damaging the court area is illegal. If a robot's design causes damage to the Footballs, or court elements, then it will not be allowed to compete until it can operate without causing damage. Games missed due to this situation will be forfeited.

NOTE: Damage is considered to be BREAKING court components. Robots bumping into court components and causing them to shift position without breaking any court element will NOT be considered to be damaging the court. It is expected that

all court components will be fixed firmly in place so that the court is a Neutral Factor in the competition.

- Games will start on time. Teams are responsible to know when their games are scheduled. Teams arriving late will be allowed to use the remainder of the time in the game. Competitors cannot enter onto the court surface or make adjustments to their robot during a game.
- If a robot is mal-functioning and represents a hazard to participants, other robots or itself in the opinion of the Referee, then, the referee may stop the clock, and may authorize the shutting off of the robot during a game. Disabled robots or parts of robots not generating any safety concerns will be left on the court until the game time expires.
- It is a Team Decision what roles team members will fill. Drivers are the competitors holding the robot controller and asserting direct control over a Tele-operated robot.
- The Spotter would be the competitor providing navigational guidance to the driver.
- Competitors may change roles while a game is in progress.
- Competitors (Driver/s and/or Spotters) can move freely in their Assigned Courtside Team Area throughout the game.
- Competitors may **not** enter an opponent team's Assigned Courtside Team Area at any time during game play.
- At the start of a game, robots are expected to be in their Team Selected Starting Positions.
- Robots arriving AFTER a game has started will be allowed to enter the game and use the Time remaining in the 4 min. game.
- Robots must not leave the competition court at any time during a game.
- It will be a referee's ruling that decides if an 'End of the Game 'Football Delivery' took place before or after the game-ending buzzer sounded.
- Scoring will take place after the End of the Game Buzzer
- Footballs miss shot by Teams that land in an Opponent's End Zone or Receiver's Bin will remain where they landed and will score Touchdown Points for the Opponent Team at the end of the game.
- Footballs landing outside the court boundaries, as a result of robot behavior, **will not be returned** to the competition court.
- No aerial (flying) robots are allowed.

TELE-OPERATED COURT LAYOUT

Please note: Although great pains will be made to keep the court in compliance with the drawings, some inaccuracies in construction may occur. **Please make your robot designs allowing for a possible ½ inch tolerance.**

The primary court items that have a direct bearing on robot design are:

- 1) The open court surface will consist of the good side of 'White Melamine Sheets' **OR** the facility floor **OR** the smooth side of Masonite Sheeting.
- 2) The perimeter court wall, Passageway Sides and the End Zone Line / Barrier are made from 2 by 4 inch planks laying on their narrow side.
- 3) The Football Tees / Blocking Blocks are 2.0 by 2.0 by 1.5 in.
- 4) The Football Source Platform is a 0.75 In. Thick Plywood Sheet

Detailed court information has been included in the Appendix Section of this scope document.

THE TELE-OPERATED ROBOT(S)

RESTRICTIONS

All Teleoperated Robots used in the traditional game play must **pass** a pre-competition inspection for compliance with the safety and design rules before they will be allowed to participate in tournament games.

Note: Robots must remain in compliance with these rules throughout the competition. If teams fall out of compliance with these rules then they will not be permitted to compete and will forfeit all of their scheduled games until they have corrected the problem.

START OF THE GAME ROBOT STATUS

When a robot's main power is turned on prior to the start of a game the robot must be in an overall 'Idle State' and the following conditions must exist:

1. Robots must be stationary
2. Robots must be in their Team Selected Starting Location.
3. If Team Entries involve multiple Robots / Mechanisms then all of them must be placed in the team selected starting location and must be positioned to not exceed the allowed total 4 cu ft. volume per Team.
4. All systems may be ON.
5. Air System Circuits may be fully charged to 100 PSI and their compressors can be ON.

OVERALL TEAM ROBOT ENTRY SIZE

Complete Team Entries must not exceed an overall size of **4 cubic feet** (6,912 cubic inches) at the start of each game.

Team Entries may expand to a larger size once a game has started.

Overall Team Entry Size will be calculated by using the maximum single dimension in each category (Length / Width / Height) of the Complete Team Entry not average dimensions.

This overall size maximum will allow Team Entries to be any variation / combination of elements that does not exceed **6,912** cubic inches, using the following formula:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$

POWER SOURCES / MANAGEMENT

1. The total voltage in any individual circuit **cannot** exceed **24 Volts**.
2. The **maximum continuous** power rating allowed in any circuit is **240 W**, which will be limited by voltage and fuse selection. To calculate power in any given circuit, use the following formula:

$$\text{Power (Watts)} = \text{Voltage (Volts)} \times \text{Current (Amps)}$$

3. Teams are reminded that it is the purpose of a fuse to protect the students themselves and the equipment in their circuits. Teams must develop circuit diagrams, and calculate the appropriate values for all circuits on their robot. Teams must submit a wiring diagram of their robot's circuits.
4. Each current branch path from the battery must include either an **in-line fuse, resettable fuse, circuit breaker**, or be connected to a dedicated fuse in a rack.
5. Batteries must be complete sealed commercial battery packs.
6. ALL Robots must be able to be turned off with a single motion.
7. Robot Controller receivers may be in an independent circuit.
8. No explosive materials of any kind may be used (ether, gunpowder, acetylene etc.).

NON-ELECTRICAL (BATTERY) ENERGY SOURCES

Pressure based energy sources (air or other) may be pre-charged to a maximum of 100-PSI pressure in their reservoirs (cylinders) at the start of each game.

1. Air pressure systems using Competitor-made or modified air pressure hardware are **NOT** permitted.
2. All pressurized tanks on robots must have a pressure gauge to indicate the stored pressure and a form of automatic overpressure safety relief system.
3. The pressure tanks and related gauges / controls must be shielded from damage due to collisions or flying target objects.
4. The stored pressure in the tank must not exceed a maximum of 100 PSI at any time.
5. Tension-based energy sources (elastics, springs or other) may be in either a relaxed at rest state or in a tense / compressed state at the start of each game.
6. Laser devices are prohibited.

RECOMMENDED ROBOT CONTROLLERS

1. It is recommended (not required) that all teams use 2.4 GHz "non-crystal" control systems on Tele-operated Robots.
2. **Teams are allowed the use of an unlimited amount of channels, but only two separate tele-operated robots. Teams assume full responsibility if any**

interference is to occur with their respective communication systems that could render the robot(s) useless.

3. Tele-operated Robots may not transmit audio/visual information to off the robot devices. (Ex: Having a camera transmit images real time to a computer near the driver, etc.)

PIT AREA

1. Competitors **MUST** wear safety glasses when doing fabrication work involving material removal processes (grinding / cutting).
2. Only registered robot competitors are permitted in the pit area.
3. Designated teacher/industry team advisors are permitted in the pit area **only** to inspect the worktable setup of their team prior to the start of the tournament.
4. Designated teacher/industry team advisors are **not** allowed in the pit area at any time after the initial set up of the worktable. This includes after play is complete on Day 1 and the beginning of Day 2. Only after all tournament and play-off games are complete may a teacher enter the pit are to help pack up/remove the robots.
5. Teachers and industry advisors are not permitted to handle tools or robot parts. Students must affect all repairs and modifications on their robot.
6. Teams will be provided with a pit area workspace on a standard project table. Depending on the number of teams and availability of space, teams may have to **share** a 60 by 30 inch table.
7. Each pit area table will have access to one electrical outlet. Teams are requested to bring a 25-foot multi-outlet extension cord / power bar as part of their equipment.
8. It is required that teams fabricate a **tabletop stand** for holding their robot(s) in the pit area. This stand or these stands should hold the robot(s) securely and be capable of preventing the robot(s) from driving on or off the table in the case of either deliberate motor testing during repairs or due to random, unexpected motor activity.

Overall Court Description:

- The Court Playing Surface will be a 16' by 16' square.
- Individual Exclusive Use Team Spaces are 8' by 16' rectangles.
- The Perimeter Court Walls will be made using 2 by 4 inch planks.
- This wall will as a result be approximately 3.5 inches tall.
- The court surface may vary between melamine, concrete, hardboard, or plywood.

TELE-OPERATED PRE-INSPECTION FOR COMPLIANCE WITH SAFETY AND DESIGN RULES

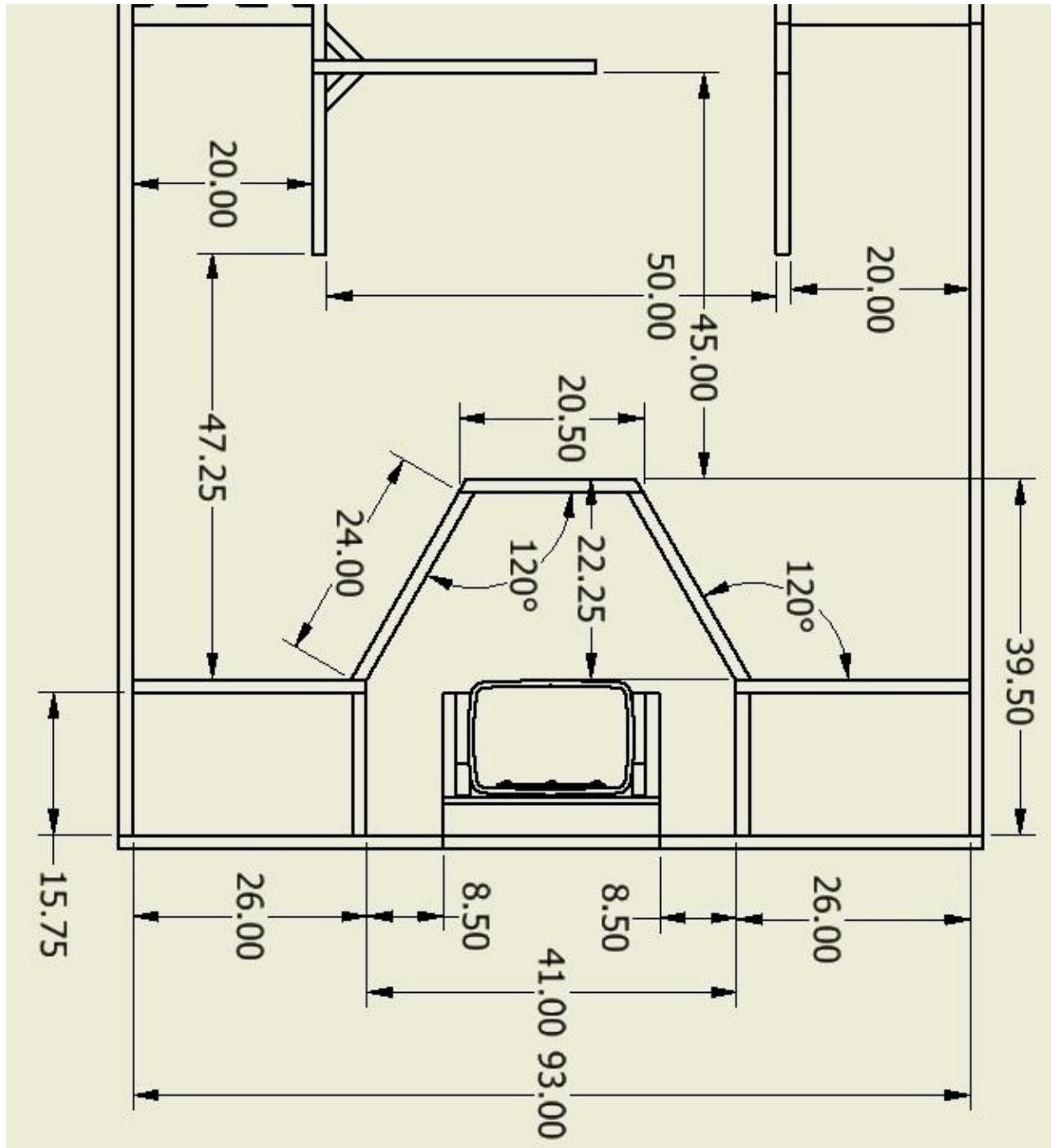
- ☐ Mandatory Wiring Diagram provided.
- ☐ Table Top Robot Stand
- ☐ **Overall volume $\leq 4 \text{ ft}^3$ or $6,912 \text{ in}^3$**
- ☐ No explosives/combustibles
- ☐ No lasers
- ☐ All batteries are sealed commercial batteries in good physical condition
- ☐ Batteries wired in series should be the same amp hour rating (ex. both 1500 mAh) and batteries in parallel are of same voltage (ex. both 12 volts).
- ☐ Batteries securely mounted
- ☐ Total voltage in any individual circuit does not exceed 24V
- ☐ No circuit exceeds 240W (Voltage x Fuse Current Rating, easily accessible)
- ☐ All circuits have a fuse or breaker (breakers must have **DC rating**) and all Fuses / Breakers must be readily accessible.
- ☐ Mandatory Pressure System Circuit Diagram provided.
- ☐ No Competitor-made or modified air pressure hardware being used.
- ☐ Only commercially manufactured Pressure Tanks (cylinders) can be used.
- ☐ Pressure indicator
- ☐ Pressure in tanks does not exceed 100 psi
- ☐ Over-pressure safety valve
- ☐ Pressure tanks and related gauges and controls are shielded from damage due to collisions
- ☐ **Robot is able to be turned off with a single motion.** Radio receivers / Logic circuits may be independent of the kill switch.
- ☐ Control unit to support operator to robot communication are being used.
- ☐ Demonstration of robot functionality

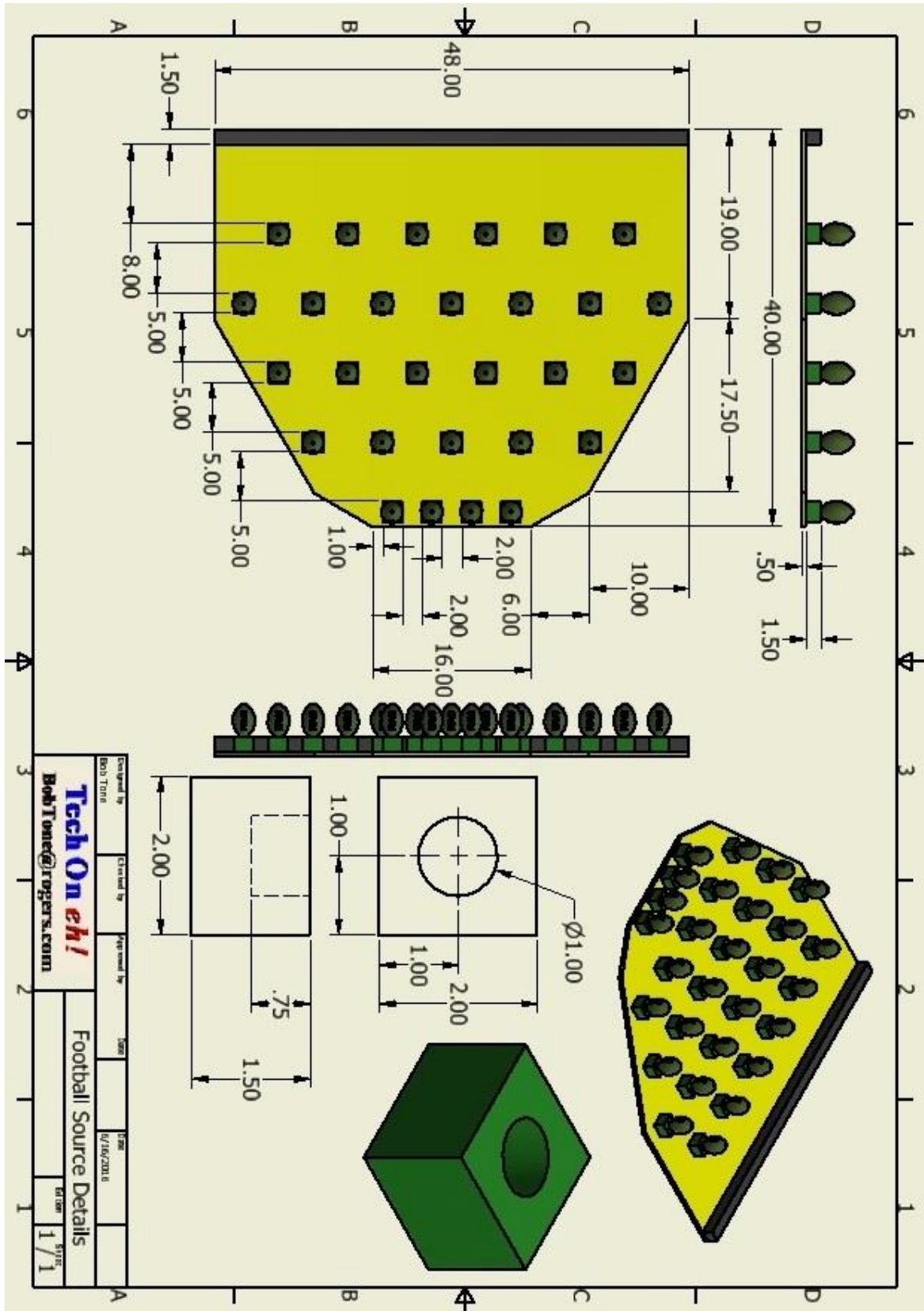
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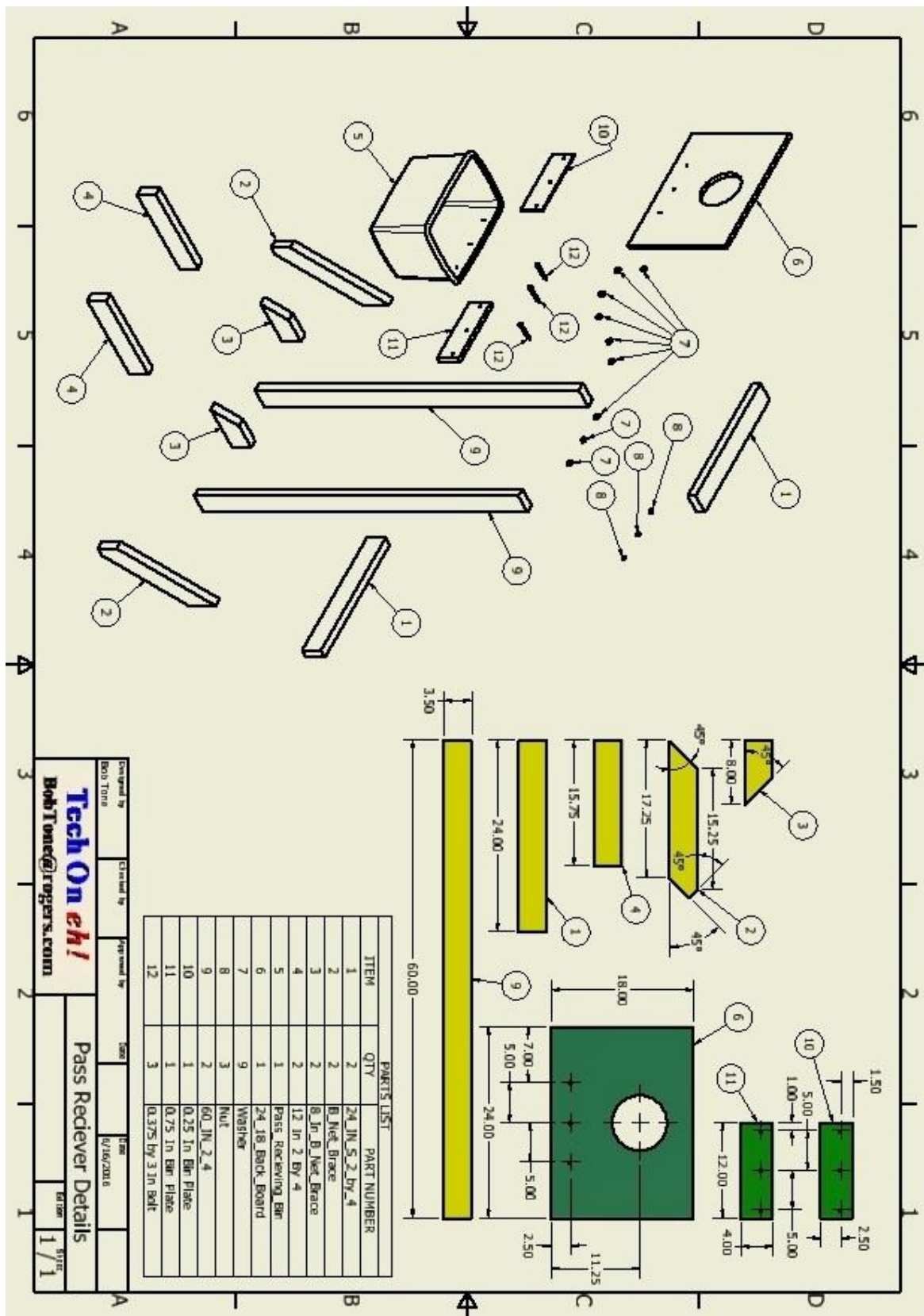
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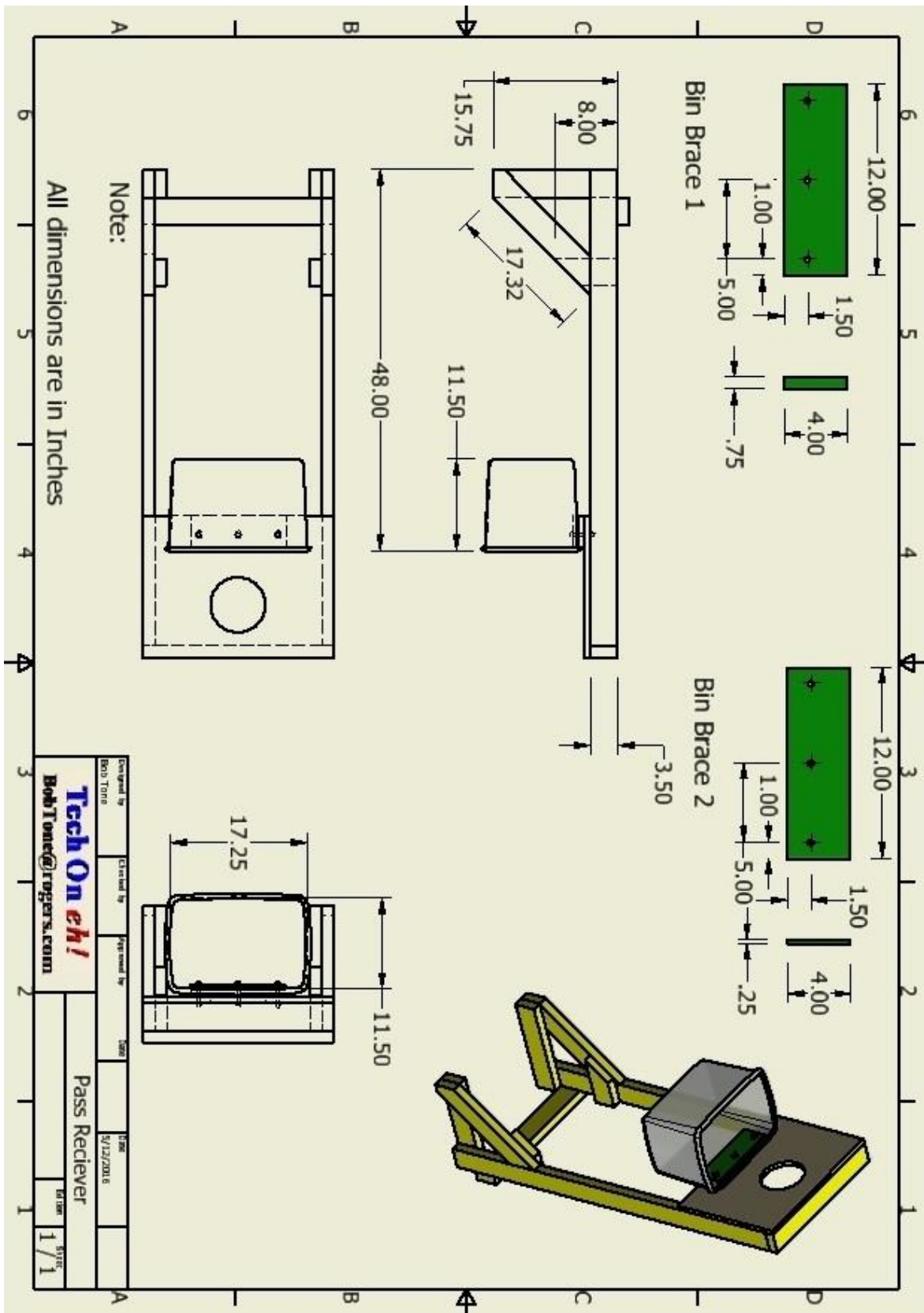
Robot Evaluator Signature

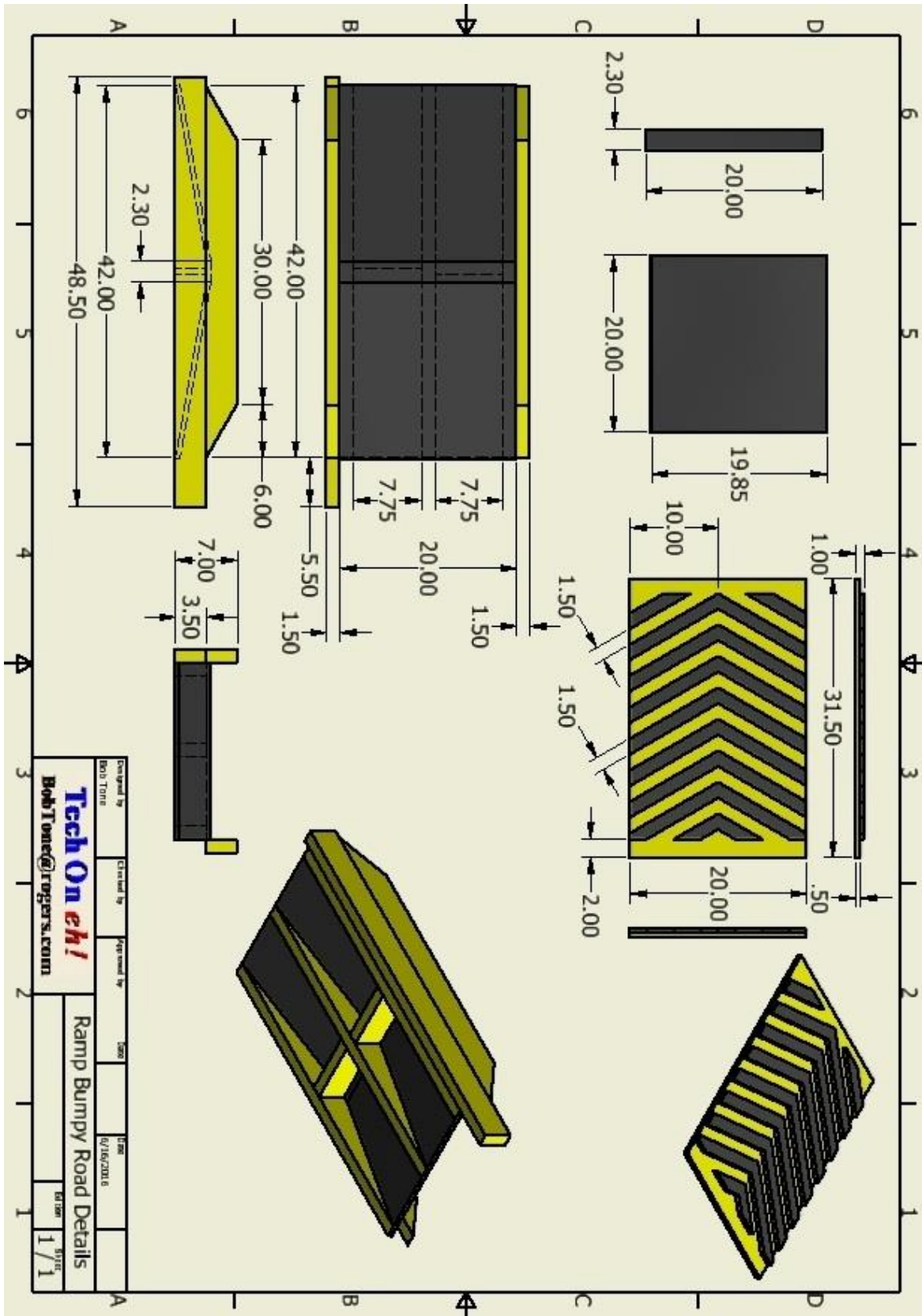
Team Representative Signature











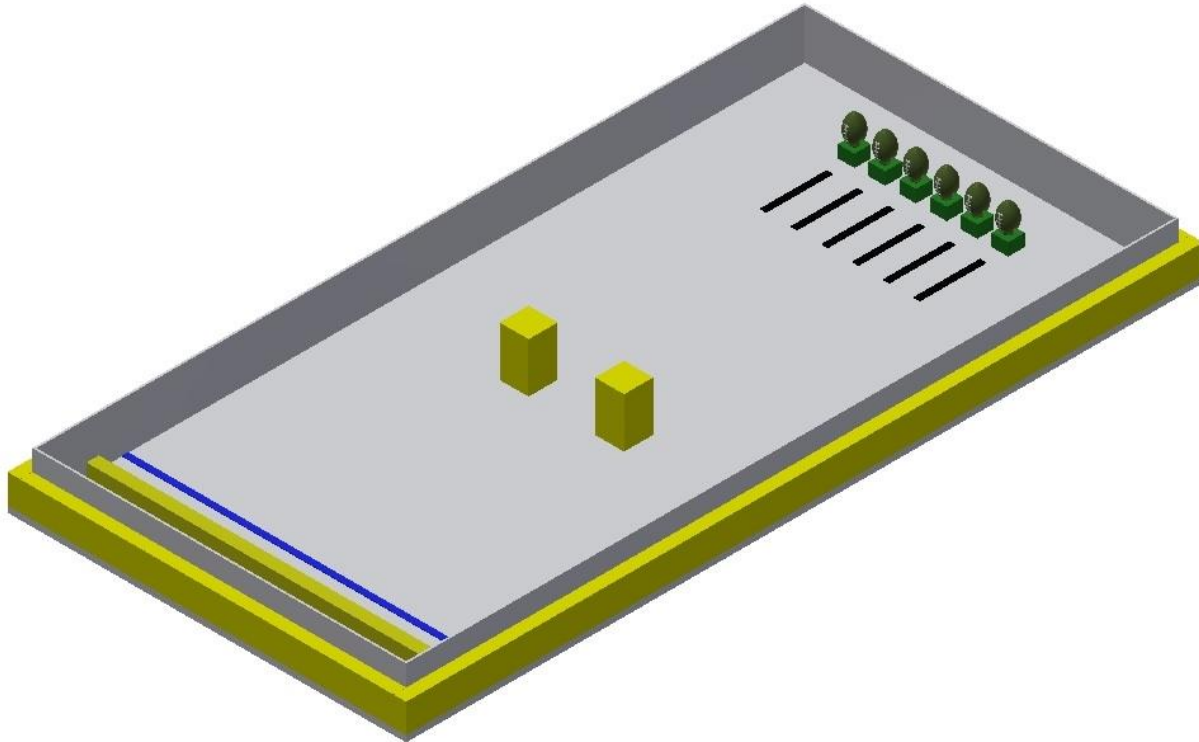
100% Autonomous Robot Football Overview:

- Teams can participate in the Ontario 100% Autonomous Football Game using either:
 - A 2017 Skills Canada Robotics Component Collection purchased through Studica.com, or,
 - Hardware and control software providing performance capabilities comparable to those of the 2017 Skills Ontario Component Collection that are either already owned by schools or obtained from other sources.
- Competitors will demonstrate their robots performance in a court composed of a 4 ft. by 8 ft. sheet of white melamine floor surface with 6 in. tall ¼ in. white hardboard perimeter walls.
- Size of the Autonomous Robot is up to the teams
- Teams will be awarded 2 Game Points for each 100% Autonomous Robot Football Game Touchdown Scored.
- 100% Autonomous Robot Football Game Touchdowns require the Football to be IN Contact With (Touching) the End Zone Floor Surface. The Football may be leaning against either the End Zone's Perimeter Walls or the Front of the End Zone Barrier.
- There will be **NO Time Factor** included in 100% Autonomous Robot Football Game Scoring.
 - Example: Team A scoring **Six** 100% Autonomous Robot Football Game Touchdowns in 3 minutes will receive the same 12 Tournament Points that will be assigned to Team B who also scores **Six** 100% Autonomous Robot Football Game Touchdowns in 3 minutes and 45 Seconds.

Autonomous component Tournament Play:

- Tournament Standing will be based on the total number of points scored in all games played by each team.
- Teams will play in an equal number of Tournament Games.
- The Top 16 teams from Tournament play will advance to the Playoffs
- Tournament games will last 4 minutes.
- The amount of time between games will be determined by the number of participants. This information will be provided to teams at the start of the tournament.

100% Autonomous Robot Football Court



Autonomous Component Sample Scoring Sheet

2017 Skills Ontario - Toronto Robotics Autonomous Score Sheet		
Game # Court A Team Name	Total Number of Running Touchdowns Value: Two Points Each	Total Game Score
Team Signature:		
Game # Court B Team Name	Total Number of Running Touchdowns Value: Two Points Each	Total Game Score
Team Signature:		

Medals will be awarded based on Total Score accumulated from:

- Traditional Game Round Robin Play
- Traditional Game Tournament Play (for those who qualify)
- Autonomous Game play
- Autonomous Tournament Playoffs (for those who qualify)
- Job Interview

ADDITIONAL INFORMATION

- The Competition Information Package can be found at www.skillsontario.com.
- Results for the Skills Ontario Competition will be posted online starting Friday, May 5, 2017, at www.skillsontario.com.
- Information on the Conflict Resolution Procedure can be found on our website in the Competition Information Package at www.skillsontario.com.
- If you have any questions regarding the Skills Ontario Competition or this contest, please contact Skills Ontario or the technical chair prior to April 21, 2017, as all staff will be onsite setting up the following week.

SPECTATORS

Competitors are encouraged to invite spectators to attend. It is free of charge to attend the Skills Ontario Competition, but there is a \$10 fee for attending the Closing Ceremony.

Please see <http://www.skillsontario.com/otsc--for-visitors> for more information on visiting the Skills Ontario Competition.

TEAM ONTARIO

The Gold-medal winning competitor(s) in this contest may be eligible to advance to the Skills Canada National Competition (SCNC), hosted May 31- June 3, 2017 in Winnipeg, Manitoba.

At the SCNC there are only two (2) team members permitted. Teams will need to inform Skills Ontario immediately following the Closing Ceremony May 3 which two students will be advancing. The two competitors advancing are expected to attend the Team Ontario Meeting.

For a student to represent Ontario at the SCNC they (or someone representing them) MUST be present at the Team Ontario meeting (taking place immediately following the Skills Ontario Competition Closing Ceremony) and must be ready to commit to attending the SCNC at that time.

For the Gold medalists at the Skills Ontario Competition - Studica has agreed to provide the component collections Teams will use **IN Winnipeg during their 'Autonomous Robot Built On-Site Experience' at the 2017 Skills Canada National Robotics Competition.**

A description of the Component Collections that will be provided at no cost to ALL Teams at the National Competition in Winnipeg is available at www.studica.com.

The Component Collection is capable of supporting the creation both a Tele-operation and / or an Autonomous Robot solution and will be available for purchase as an option by teams interested in utilizing it to build their Provincial or Territorial Robot Entries.