2018 ROBOTICS CONTEST

29TH SKILLS ONTARIO COMPETITION

Pipeline

Team of 4, Secondary

Contest Date:

Monday, May 7 and Tuesday May 8, 2018
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:

Mark Dimonte, Francis Libermann Catholic High School,
Mario Blouin, École Secondaire de Hearst

FURTHER COMMUNICATIONS

Questions for clarification of the rules can be made to the Technical Committee Chair bobtone@rogers.com

Table of Contents

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 competitions@skillsontario.com .

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

DEFINITION OF TERMS REFERENCED IN THIS DOCUMENT:

a) Tele-operated Robot Elements are elements under the direct / active control of competitors during game play through the use of one or two radios / game controllers held by the courtside competitors.

b) Mobile Independent Autonomous Mobile Robot Elements are elements that at the start of a game have a competitor pressing their start button or enter on a computer keyboard as the only competitor to Independent Autonomous Mobile Robot Element communication during the entire game.

c) Stationary Independent Autonomous Elements are elements that have their power on at the start of games but have no direct contact with a competitor during game play. These units may interact with the team's tele-operated mobile robot with the actions of the tele-operated mobile robot triggering an active response by the Independent Autonomous Element which may be managed either by a mechanical based system (eg. A series of limit switches / no programmed elements) or a pre-programmed system (eg. Managed by an Arduino or other microprocessor) internal to the Independent Autonomous Element.

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
- Computer Programming
- Metalwork
- Woodworking
- Communications

EQUIPMENT AND MATERIALS:

Supplied by Skills Ontario Technical Committee:

- One worktable with access to a 120V (min 100W) power outlet per team
- For the Tele-operated component
    - Exclusive Use Playing Fields for each Team's Game and Evaluated Robot Experiences
- For the Autonomous Component
    - Exclusive Use Playing Fields for each Team's Game and Evaluated Robot Experiences

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/laptop

      *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 2018 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.)

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 9.

NOTE: The **National Robotics Competition involves Teams of TWO Competitors** and Teachers will be required to identify which Two of their Ontario Team of Four will advance to Edmonton in the event they win the Skills Ontario Robotics Gold Medal.

- 2018 is 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 (2018).**
- 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 23, 2018.

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 7 and Tuesday, May 8, 2018
Skills Ontario Competition

Monday, May 7 – Tele-operated Tournament Play and Autonomous Tournament Play

7:00am – 7:30am	Sign-in at the contest site
7:30am – 7:45am	Orientationˆ
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 8 - 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 3rd place game
4:10pm	Tele-operated 3rd place game

4:20pm	Autonomous 1st place game
4:30pm	Tele-operated 1st 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 9, 2018
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%

There are three components to the 2018 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 – 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 Pipeline Tournament Play 45 Marks

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

Tele-operated Pipeline 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 Pipeline Game 25 marks

- Highest Scoring 100% Autonomous Robot Pipeline Tournament Team = 25 marks
- All Other Teams awarded Autonomous Robot Pipeline Tournament marks based on the following formula:

- (25) (Individual Team Total Score / Highest Team Total Score) so if you got half the points compared to the winning team, you will get 12.5 points.

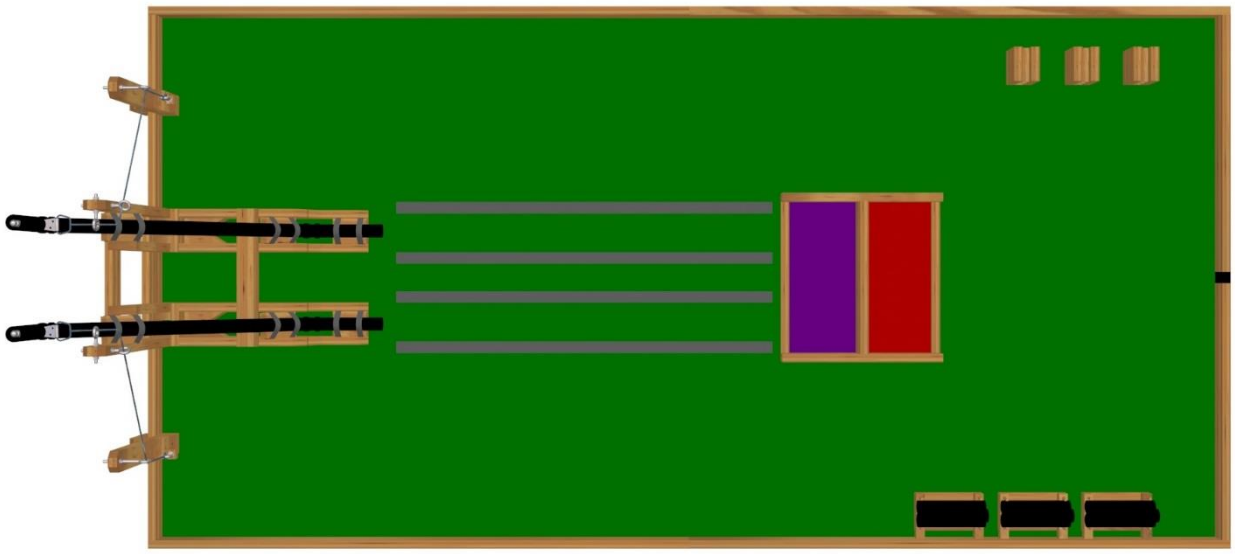
There will be no playoffs in the Autonomous Competition. Final standing will be based on total points scored in ALL Task runs of a Teak over the two competition days.

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: Pipelines

The core game situation requires a Robot or Robots to build a pair of Pipelines to deliver the oil (One Inch Ball Bearings) through these Pipelines to the Refinery. In the event of a spill, the Robots will be required to clean up the spill by delivering the Oil (Bearings) to a Designated Hazardous Waste Containment Site.



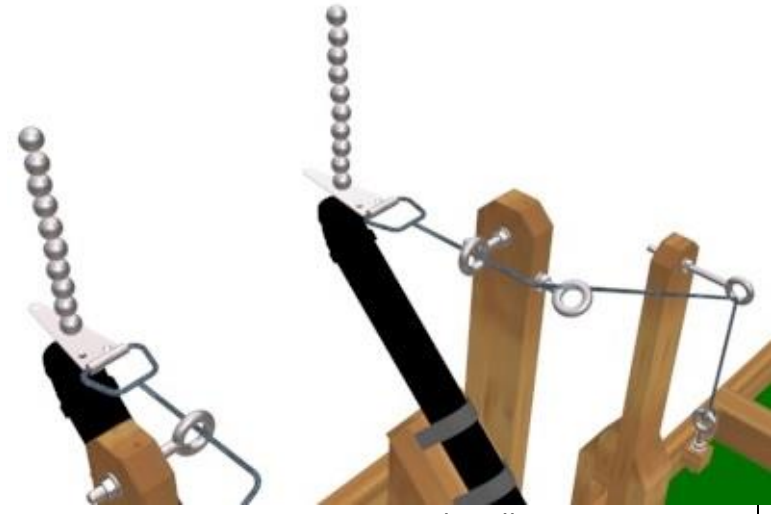
Each Team's Exclusive Use Area is approximately 8 ft. by 16 ft.

One Team's 3 Cradle Stacks

One Team's 3 Pipe Racks

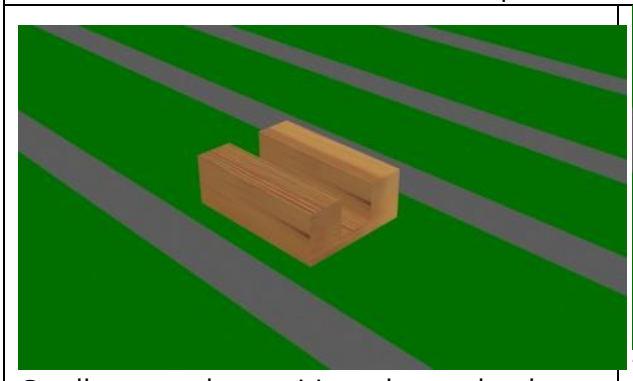
Each Team's Exclusive Use Space has:

- 9 Pipe Cradles 6.0 by 4.5 by 2.0 in.
- 9 Pipes: 12 in. long and 1.5 in. Inside Dia.
- The Pipes are stacked in fixed position Racks.
- The Pipe Cradles are in stacks of three.
- Each Team has 2 Oil Wells with 10 One Inch Dia. Ball Bearings (Oil) in each Well

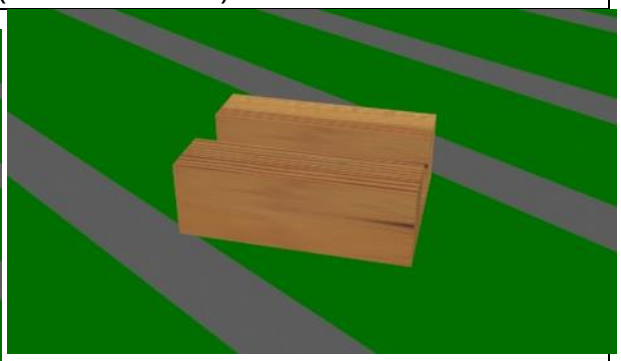


One Team's 2 Oil Wells

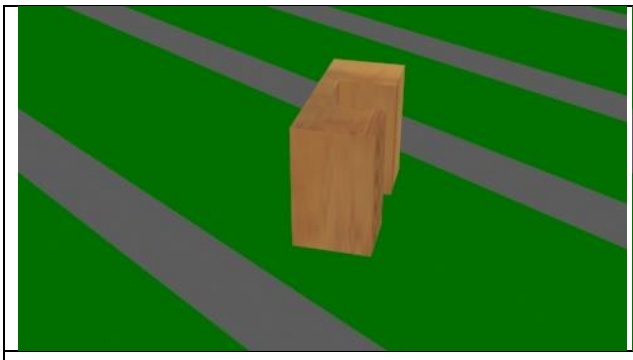
Each Team has 2 Pipeline Pathways defined by the Tape Lines shown above. A Refinery destination for the Oil Delivery (Purple Area above). A Hazardous Materials Containment Area destination for Spilled oil (Red Area above).

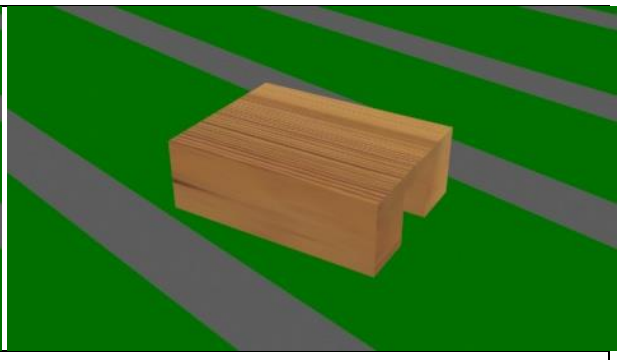


Cradles must be positioned completely between the Pipeline Pathway Tape Lines to be awarded a point.

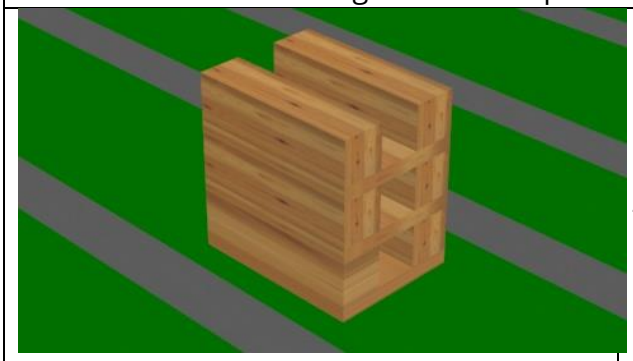


The Inside Edge of the Pipeline Pathway Tape Lines establishes a Vertical Plane. Cradles breaking this plane will NOT be awarded any points.

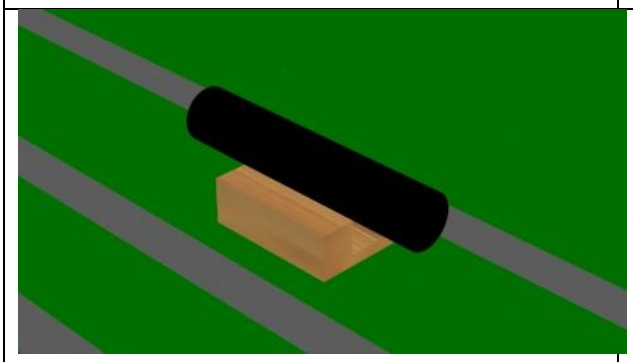




Cradles standing On End or Upside Down will NOT be awarded points.

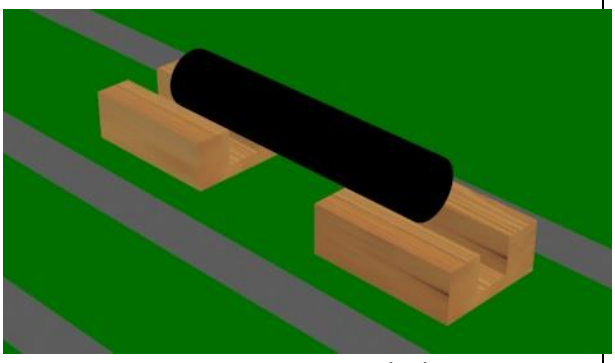


If a stack of Cradles are correctly positioned between the Pipeline Pathway Tape Lines a Point will be awarded for ONLY the Bottom Cradle.

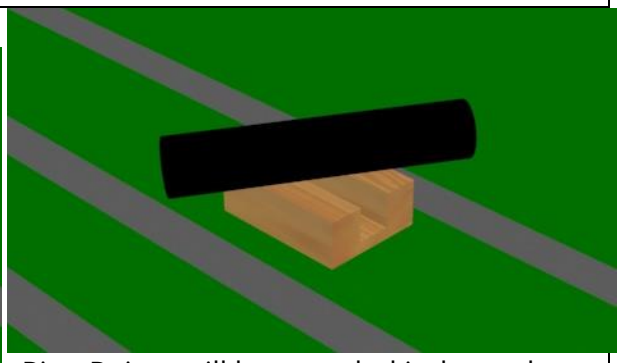


Pipes must be held above the court floor to be awarded points.

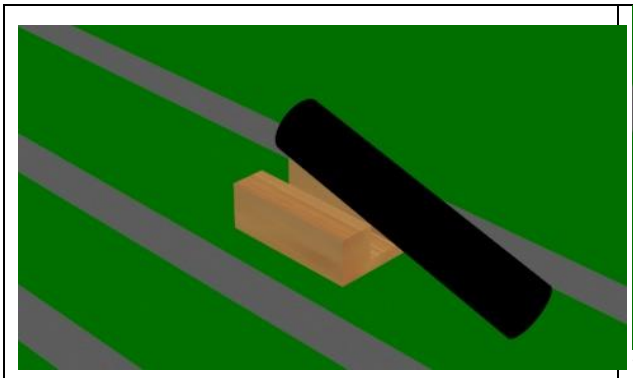
One Cradle and Two Pipe Points Awarded



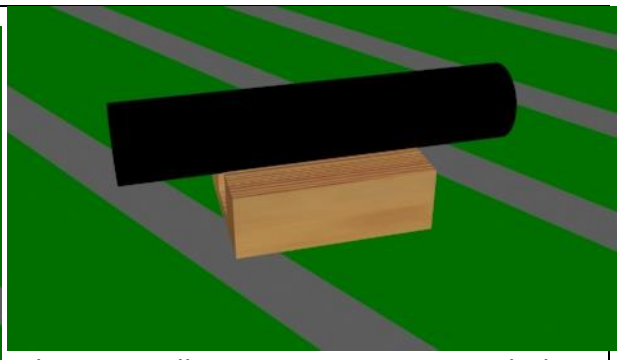
One Point Awarded



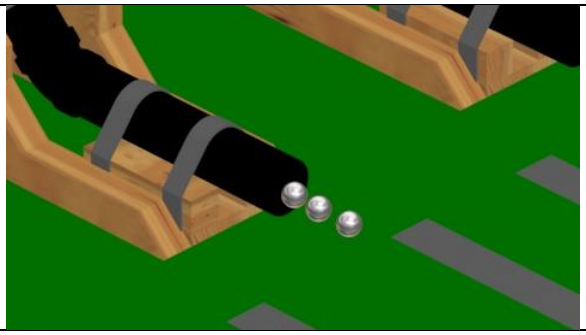
Pipe Points will be awarded independent of whether or not the Pipe is breaking the Tape Line Vertical Plane



NO Point Awarded when the pipe is touching the court floor.



When a Cradle is in a No Point Awarded Position then No Point will be awarded for a Pipe supported by that Cradle.



Any bearings that are spilled from the oil well must be allowed to touch the ground. They **cannot** be collected directly from the oil well pipe.

Any bearing in the open court can be collected and put in the Hazardous Material Containment Area.

Scoring Summary (scoring will be done at the end of the 4 min. match):

a) **1 Point** for **each** Pipe Cradle placed between the Tape Guidelines,
b) **2 Points** for each Pipe successfully placed on a cradle, Note: MUST be placed on a scored cradle
c) **2 points** for each bearing delivered into the refinery,
Note: Bearings MUST be delivered into the Refinery through a completed pipeline
d) **1 point** each for each bearing placed in the Hazardous Material Waste area.
e) **MINUS 1 point** for any bearing left on the floor
f) **0 points** for Bearings in the possession of the robot (off the floor) at the end of the game
g) A **Bonus point** will be awarded to the team that delivers all of the Oil (Bearings) through the pipelines into the Refinery first.

2018 Skills Canada Ontario Robotics Pipeline Game Score Sheet

Game # Court A Team Name	Total Number of Pipe Cradles Positioned Correctly Value: One Point Each	Total Number of Pipes Positioned Correctly Value: Two Points Each	Total Number of 'Barrels of Oil' (Bearings) Delivered into the Refinery Value: Two Points Each	Total Number of 'Barrels of Oil' (Bearings) Delivered into the Hazardous Material Containment Area Value: One Point Each	Total Number of 'Barrels of Oil' (Bearings) Remaining on the Open Court Floor Value: MINUS One Point Each	Total Game Score
Team Signature:				**Finished 1st Bonus 1 Point**		

Game # Court B Team Name	Total Number of Pipe Cradles Positioned Correctly Value: One Point Each	Total Number of Pipes Positioned Correctly Value: Two Points Each	Total Number of 'Barrels of Oil' (Bearings) Delivered into the Refinery Value: Two Points Each	Total Number of 'Barrels of Oil' (Bearings) Delivered into the Hazardous Material Containment Area Value: One Point Each	Total Number of 'Barrels of Oil' (Bearings) Remaining on the Open Court Floor Value: MINUS One Point Each	Total Game Score
Team Signature:				**Finished 1st Bonus 1 Point**		

NOTE: Competitors will participate in BOTH the Teleoperation Pipeline Game and the Built On-site Autonomous Robot Tasks during BOTH Competition Days.

TELEOPERATION PIPELINE GAME DESCRIPTION

- 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 may also have Independent Autonomous Elements as part of their entry.
- Teams will NOT be in possession of a part at the Start of a Game.
- Each Team's robot CAN be in possession of more than one Cradle or Pipe at any time.
- Teams must build their Pipelines using only the provided Cradles and Pipes.
- Teams cannot use any mechanical devices or tape elements to secure Pipes or Cradles in place
- When Teams release the Oil (Bearings) from a Well they must ensure that ALL Elements of their Robots are well away from the Pipeline to ensure that no element of their robot's (Frames / Wheels / Object Management Systems) are in a position to prevent / hold the Pipeline from breaking apart.

PIT AREA AND COURT ACCESS

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 robots from the competition area during the over-night periods between Orientation Day, Competition Day 1, and Competition Day 2 of the competition. Laptops may be removed overnight by competitors.

The pit area and competition court may be available to teams to work or practice during lunch breaks if a committee member is present.

Medals will be awarded based on:

Medals will be determined by the overall results of the two days of competition in all competition elements (Teleoperation Robot Pipeline / Built On-Site Autonomous Robot Task Set / Competitor Resume / Competitor Human Resources Interview).

TOURNAMENT PLAY

- Pipeline Game Tournament will be based on an 'Unseeded Tournament Format'.
- Pipeline Tournament Standing will be based on total score in all games played by each team.
- Teams will play in an equal number of Tournament Games.

- If Time Permits, Teams will participate in an equal number of games against each opponent Team.
- In the event of a Tournament Standing Tie a special 2 minute Tie Breaking Game will be played.
- Pipeline Playoffs will follow a 'Seeded Tournament Format'.
- Pipeline Playoffs will be a double knockout format.
- Tournament and playoff 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 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 Designated 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 piece delivery took place before or after the game-ending buzzer sounded.
- If a pipe, cradle or bearing falls out of the court, it may not be retrieved and will be out of limits of play.
- Robots must build their pipeline using ONLY the provided Pipes and Cradles.
- Robots cannot use tape or mechanical devices to hold pipeline elements together.
- Robots must be positioned outside the Pipeline Tape Pathway, when the Oil is released from the well, to ensure no part of a Robot (wheels / frame / object management system) is providing support for or holding the pipeline together.
- Scoring will take place after the End of the Game Buzzer
- No aerial (flying) robots are allowed.

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 Plywood Sheets **OR** the facility floor **OR** the smooth side of Masonite Sheeting.

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

THE ROBOT(S)

RESTRICTIONS

All tele-operated Robots 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 designated Starting Location.
3. If Team Entries involve multiple Robots / Mechanisms then all of them must be placed in the designated 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:

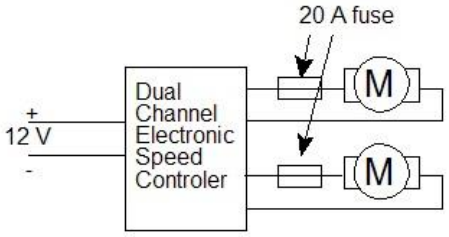
Volume = Length x Width x Height

POWER SOURCES / MANAGEMENT

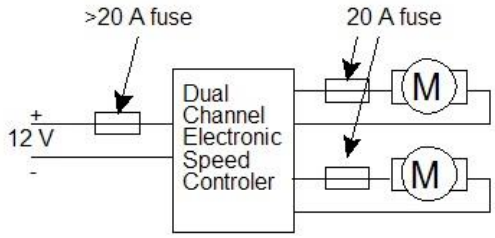
1. The total voltage in any individual circuit **cannot** exceed **24 Volts**.
2. The **maximum continuous** power rating allowed in any circuit branch is **240 W**, which will be limited by voltage and fuse selection. A larger main fuse can be used to provide protection for motor controllers. To calculate power in any given circuit, use the following formula:

   Power (Watts) = Voltage (Volts) x Current (Amps)

***Acceptable* Circuit Protection: (ESC is NOT protected by fuse)**



***Recommended* Circuit Protection: (ESC *IS* protected by fuse)**



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 competition space.
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 during tournament play.
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.

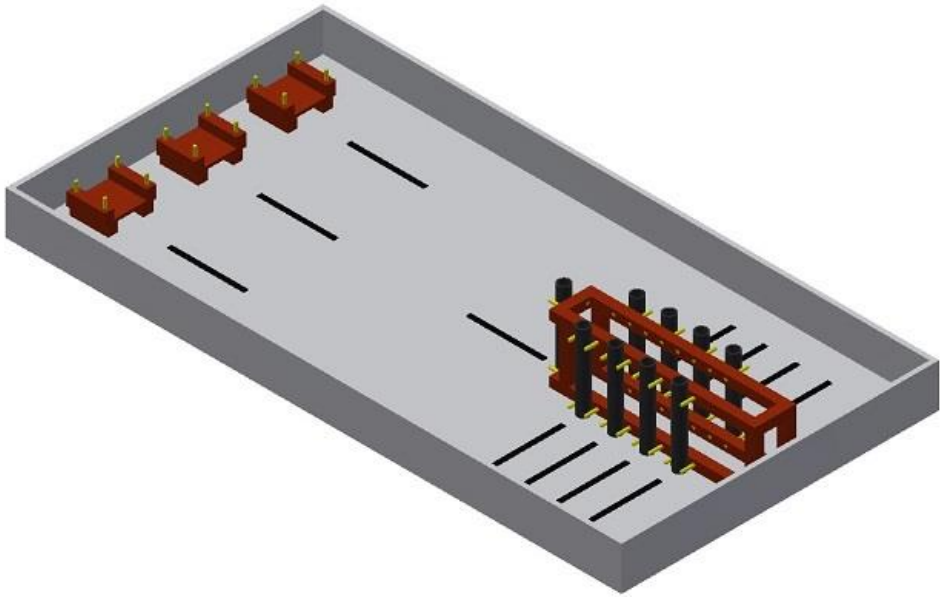
PRE-INSPECTION FOR COMPLIANCE WITH SAFETY AND DESIGN RULES

- ❑ Mandatory Wiring Diagram provided.
- ❑ Table Top Robot Stand
- ❑ **Overall volume ≤ 4 ft³ or 6,912 in³**
- ❑ 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 **branch** 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

Additional concerns:

Robot Evaluator Signature

Team Representative Signature

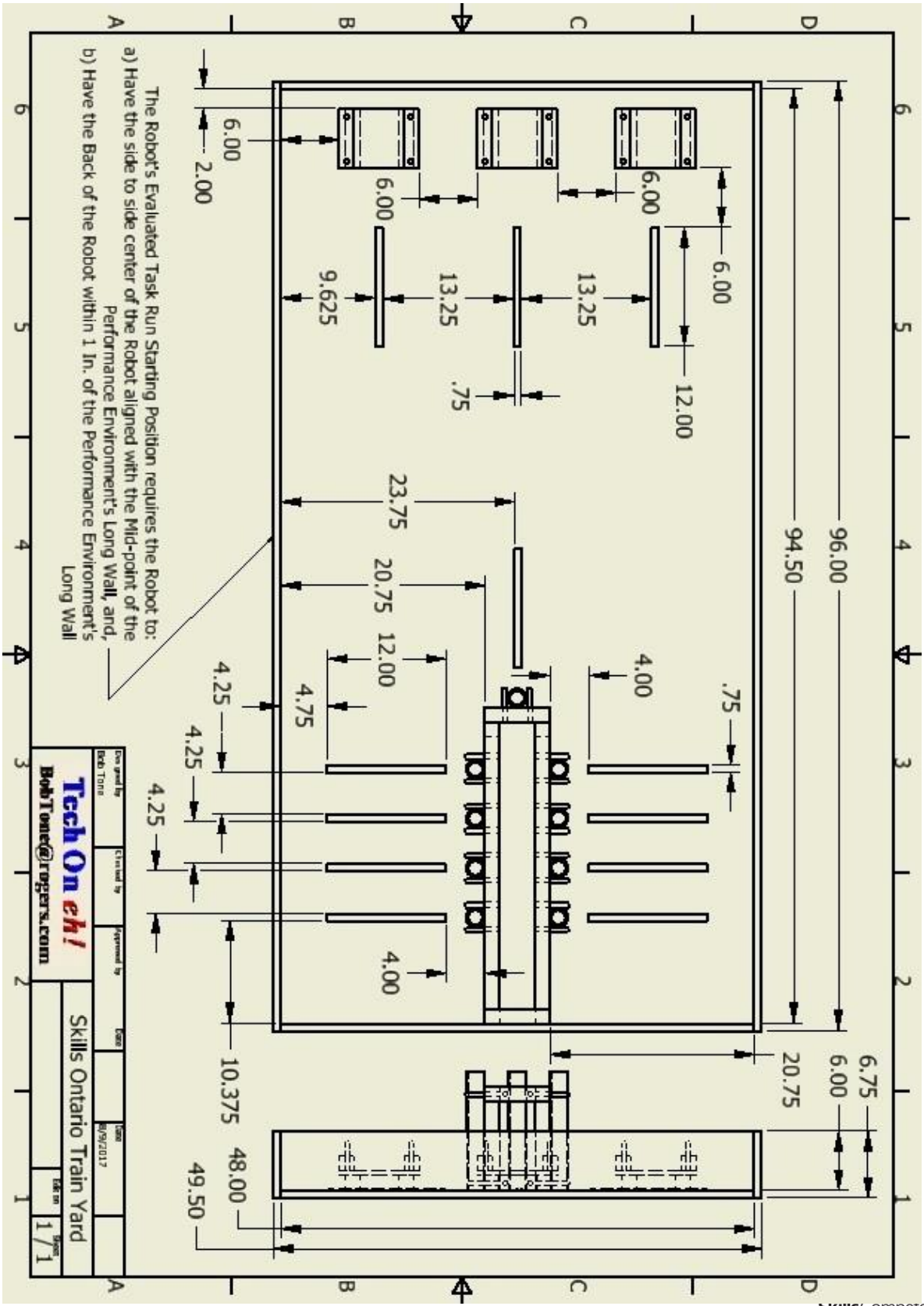


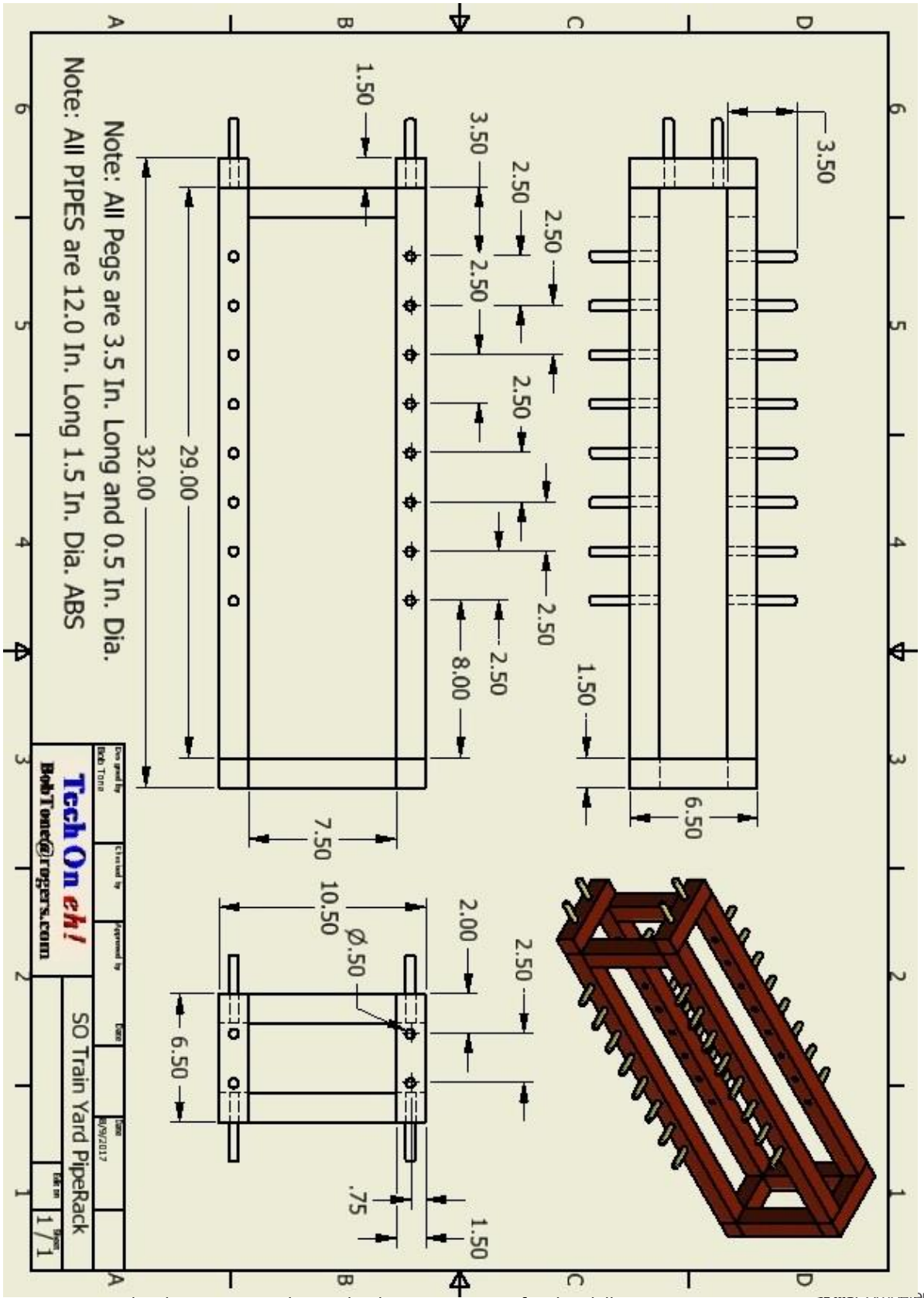
<u>Autonomous Competition Overview</u>:

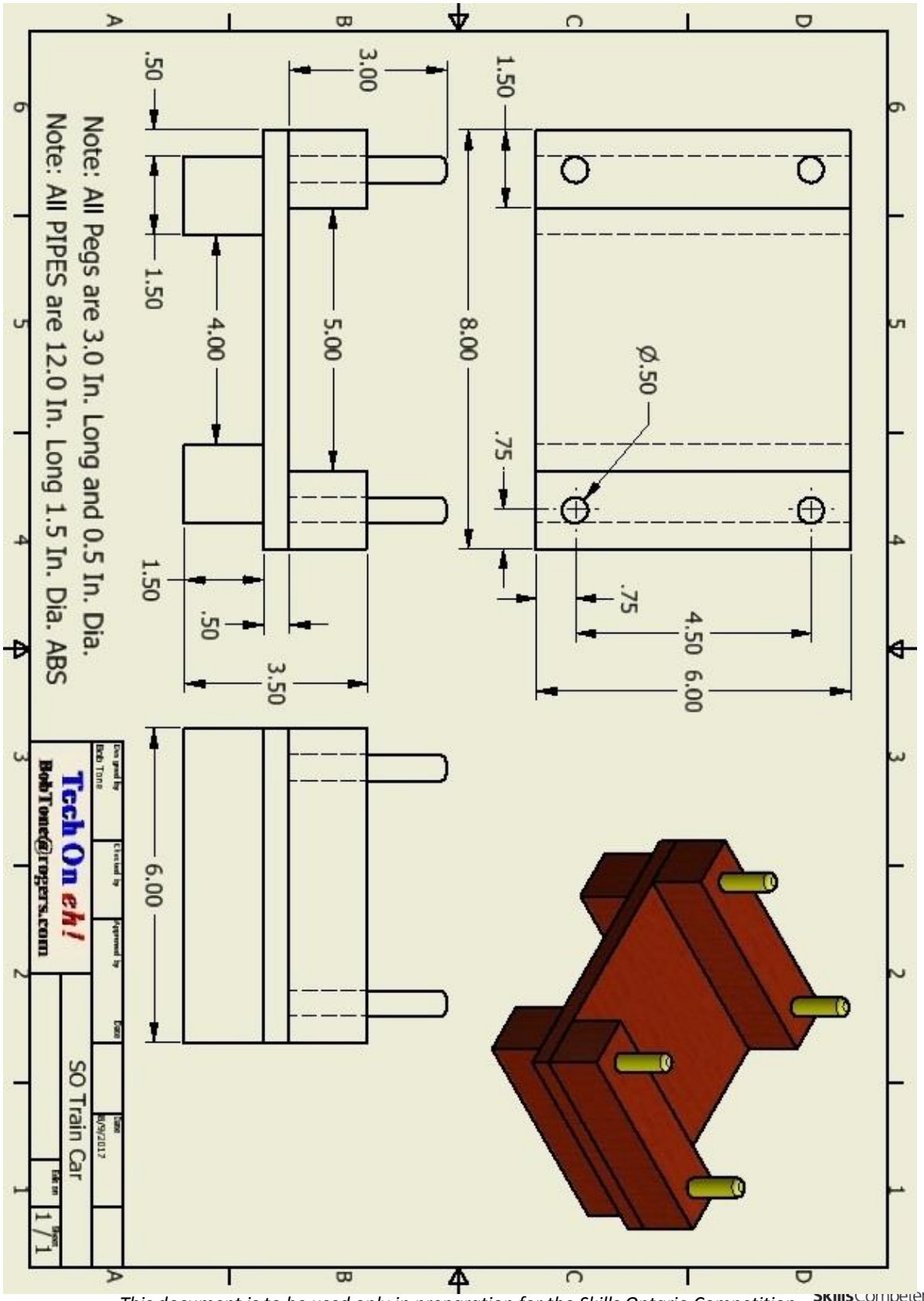
The Ontario Teams will:

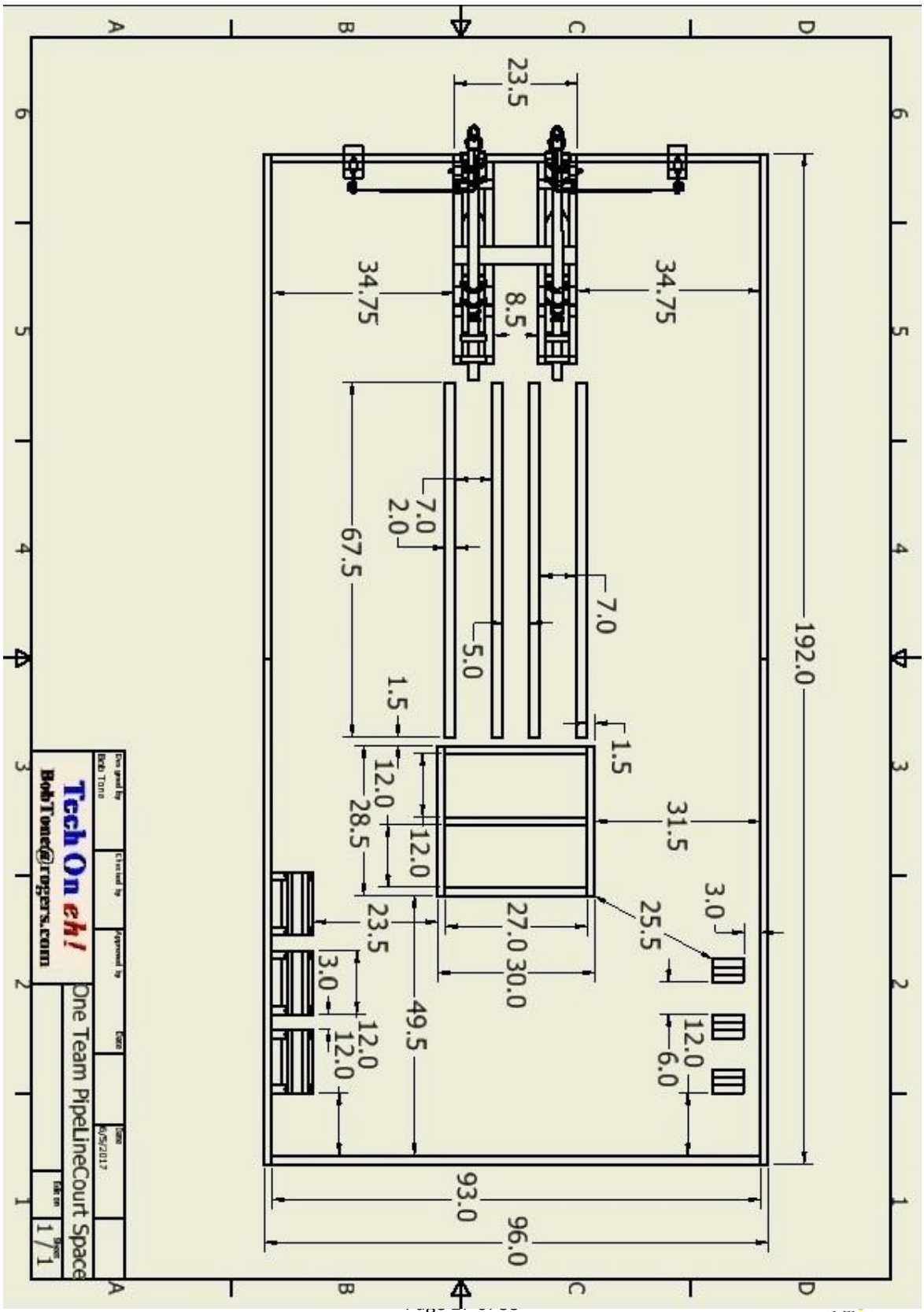
- Build their autonomous robots at school and bring them fully assembled to the competition.
- Ontario teams are free to use whatever hardware and software available at their school when creating their 2018 Skills Ontario Autonomous Robot Entry
- Autonomous robots may occupy a total space no more than 2,744 Cubic Inches at the start of a task run
- The court provides a 4 by 8 foot hard, smooth surface (White Melamine) with a 6 inch tall perimeter wall
- The Target Objects are 12 inch long 1.5 inch ABS Pipes standing in a central rack at one end of the performance environment
- The Destination Structures are Three Flatbed Train Cars positioned at the opposite end of the performance environment
- The Robot's Starting Position along the Perimeter Wall at the Mid-point of the performance environments long walls
- Black Tape Lines identify the Pipe Positions and Train Car Locations
- Scoring is based on One Point per Pipe removed from the Pipe Rack and 2 points per Pipe loaded onto a Train Car to a MAXIMUM of THREE Pipes per Train Car
- NO POINTS will be awarded for a fourth pipe if a Robot places a fourth pipe on a train car

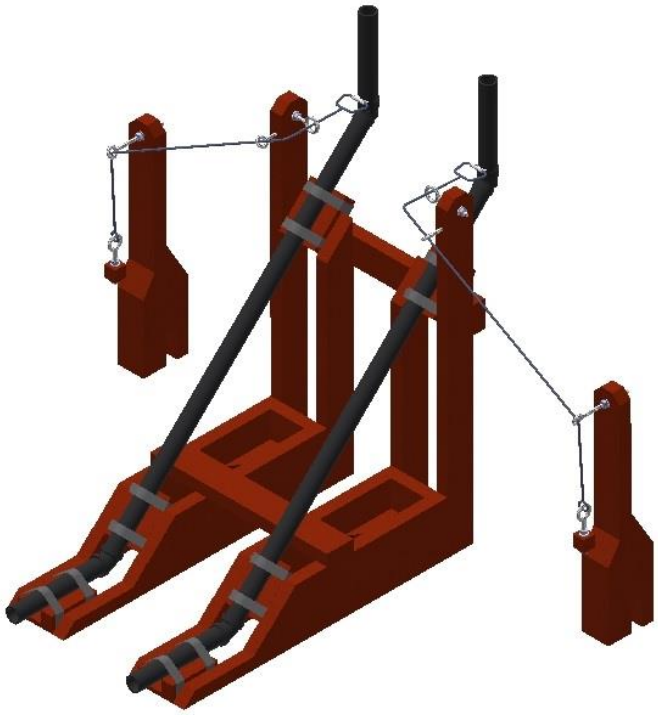
- Teams will have SEVEN Minutes to complete an Evaluated Task Run
- There will be NO PLAYOFFS in the Autonomous Competition. Final standing will be based on total points scored in ALL Task Runs of a Team over the two competition days.
- A description of the National Competition Component Collection will be posted to Studica.ca in September 2017.


The Robot's Evaluated Task Run Starting Position requires the Robot to:
a) Have the side to side center of the Robot aligned with the Mid-point of the Performance Environment's Long Wall, and,
b) Have the Back of the Robot within 1 In. of the Performance Environment's Long Wall
Tech On eh!
BobTone@rogers.com
Skills Ontario Train Yard
1/1
96.00
94.50
49.50
48.00
23.75
20.75
20.75
13.25
13.25
12.00
12.00
10.375
9.625
6.75
6.00
6.00
6.00
6.00
6.00
4.75
4.25
4.25
4.25
4.00
4.00
2.00
.75
.75

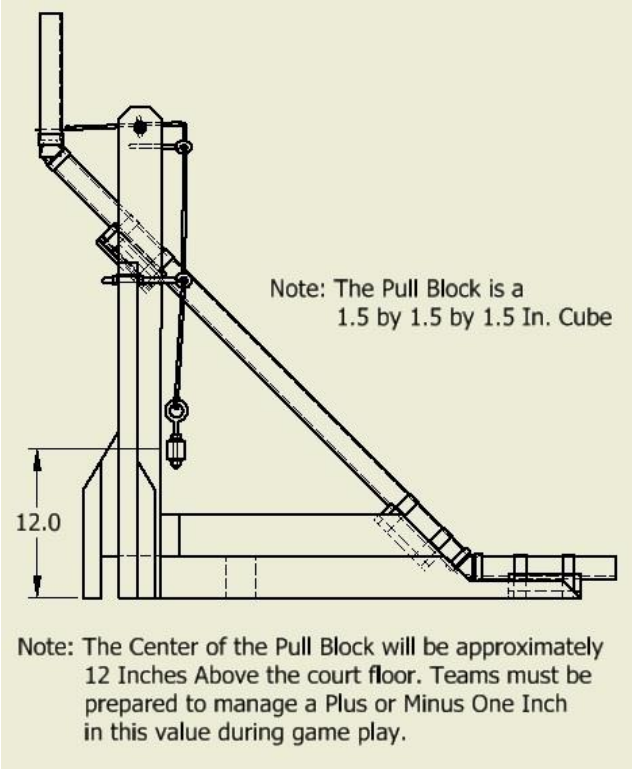

Note: All Pegs are 3.5 In. Long and 0.5 In. Dia.
Note: All PIPES are 12.0 In. Long 1.5 In. Dia. ABS
Tech On eh!
BobTonet@rogers.com
SO Train Yard PipeRack
3.50
2.50
1.50
6.50
8.00
7.50
32.00
29.00
10.50
Ø.50
2.00
.75


Note: All Pegs are 3.0 In. Long and 0.5 In. Dia.
Note: All PIPES are 12.0 In. Long 1.5 In. Dia. ABS
Tech On eh!
BobTone@rogers.com
SO Train Car
1/1
3.00
.50
1.50
4.00
5.00
1.50
.50
3.50
1.50
8.00
Ø.50
.75
.75
4.50
6.00
6.00

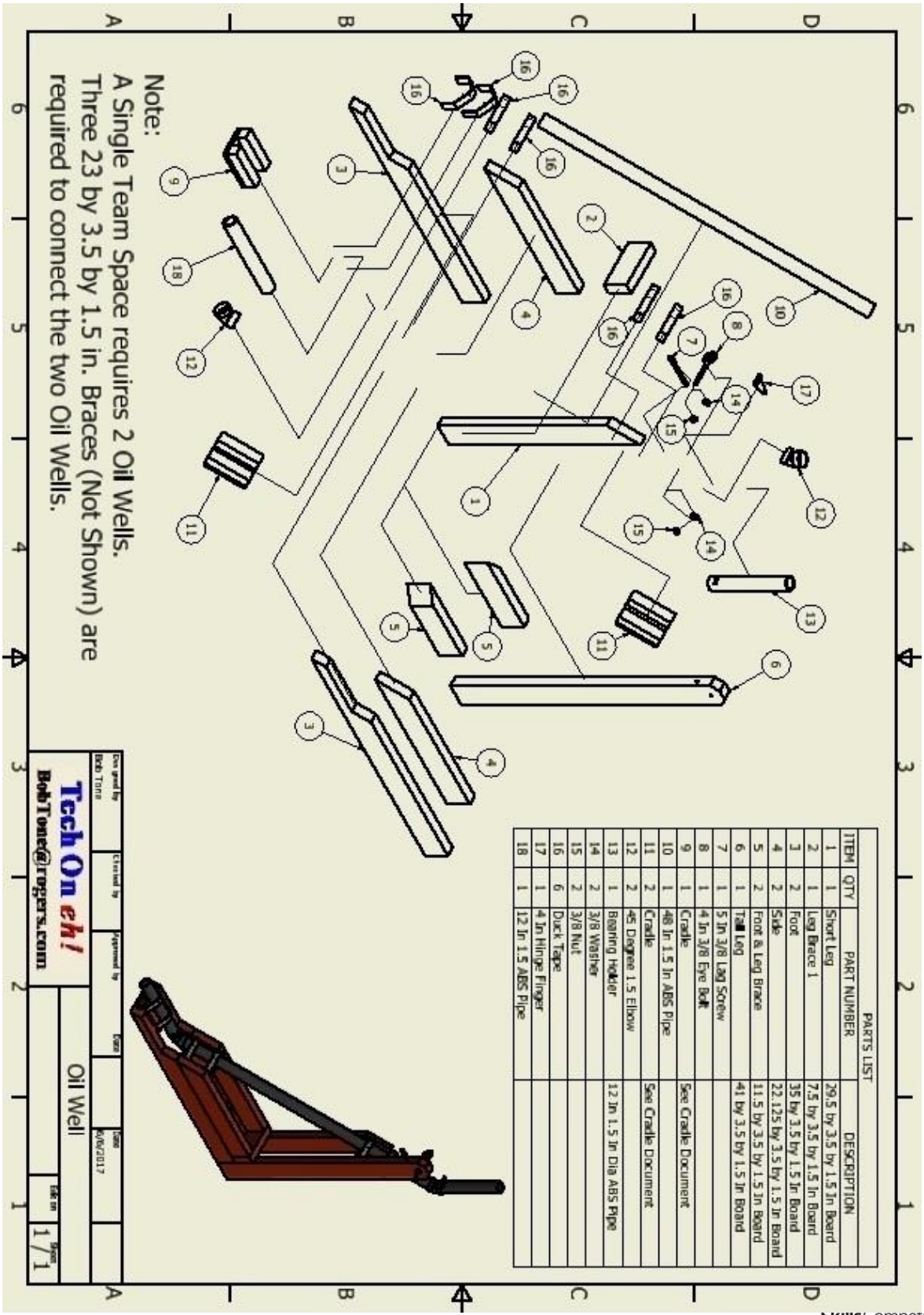

23.5
34.75
8.5
34.75
192.0
7.0
2.0
67.5
5.0
7.0
1.5
1.5
12.0
28.5
12.0
31.5
3.0
25.5
27.0
30.0
23.5
3.0
49.5
12.0
12.0
12.0
6.0
93.0
96.0
Tech On eh!
BobTonne@rogers.com
One Team PipeLineCourt Space
1/1

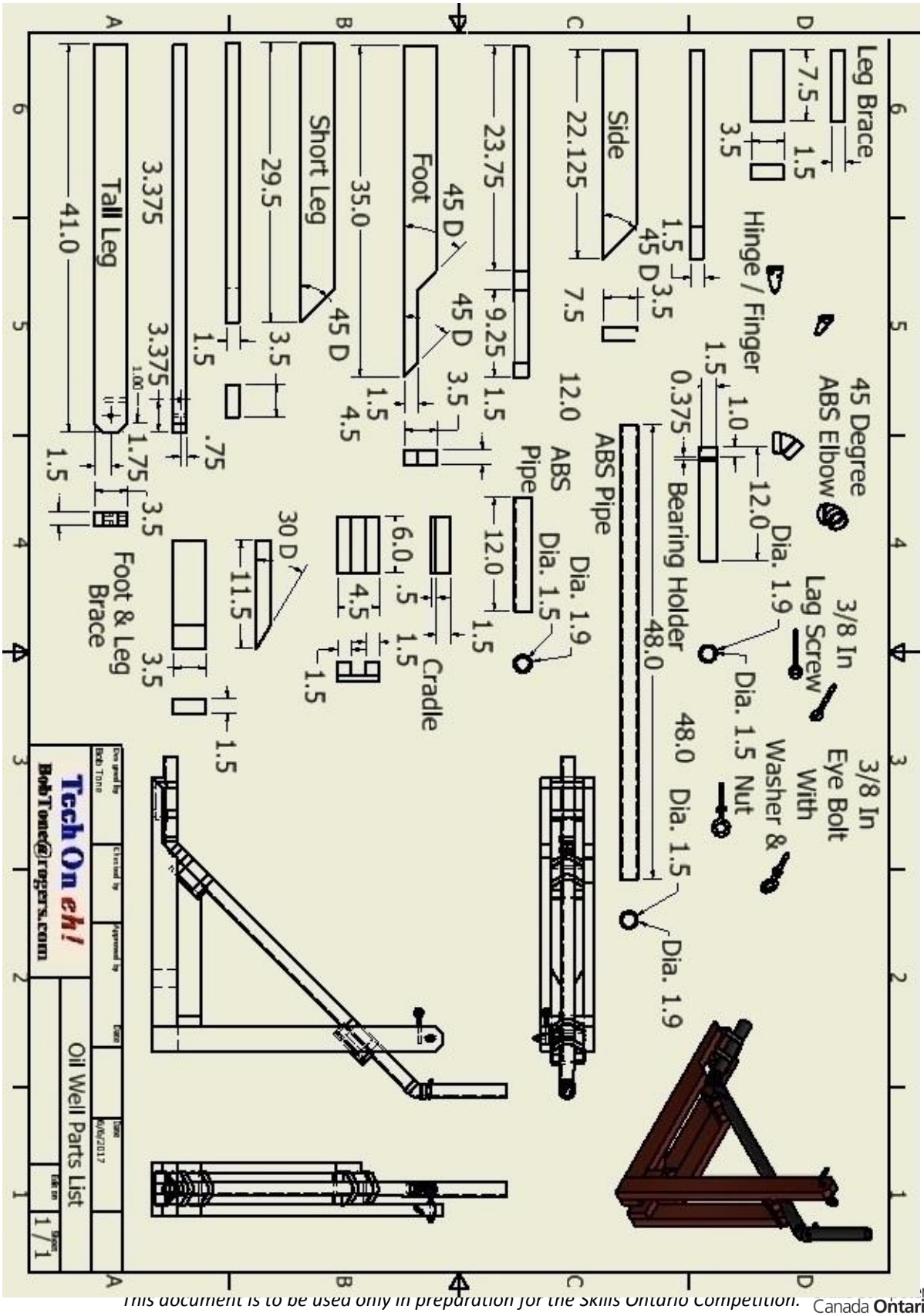


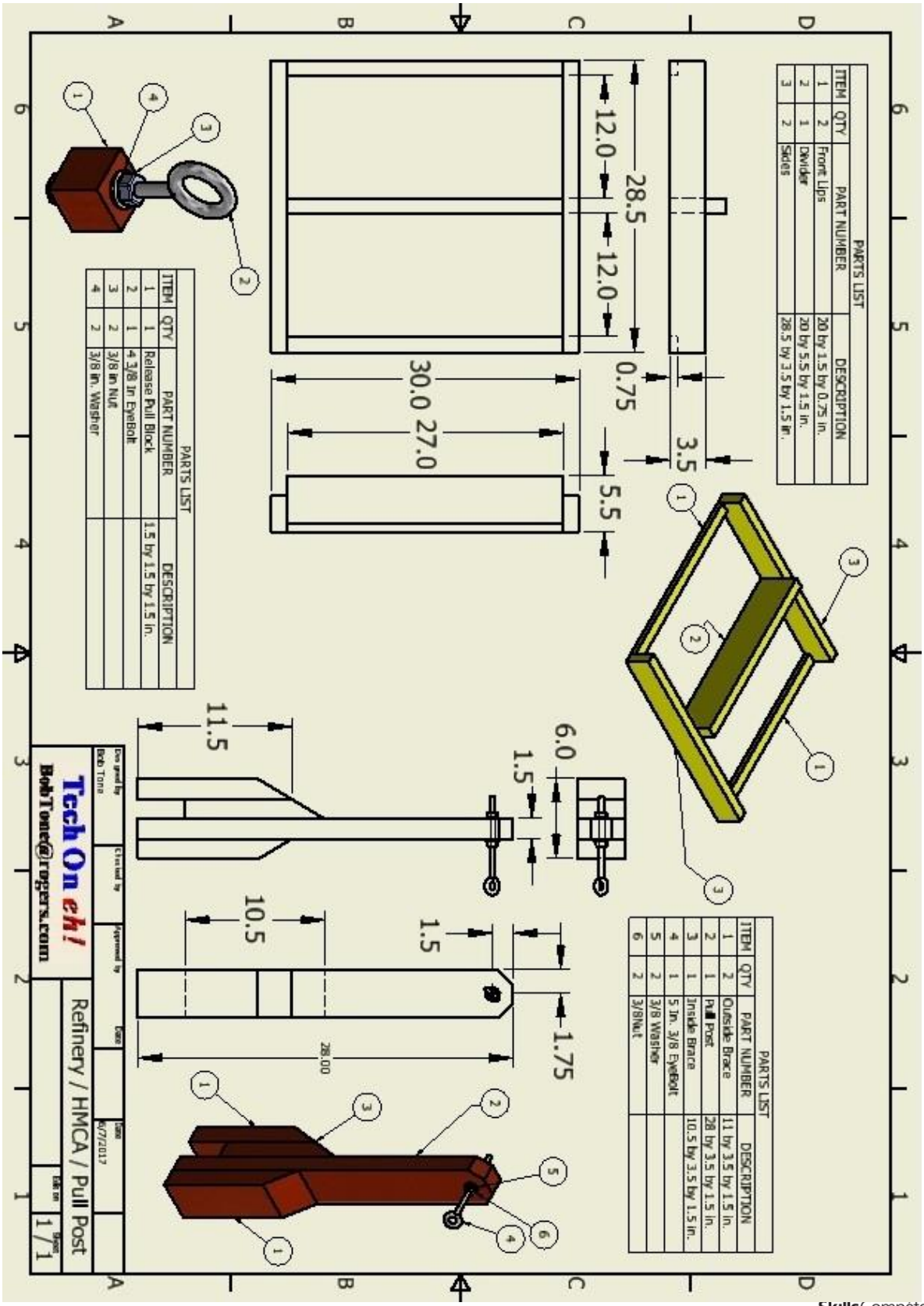
One Team's Exclusive Use Oil Wells

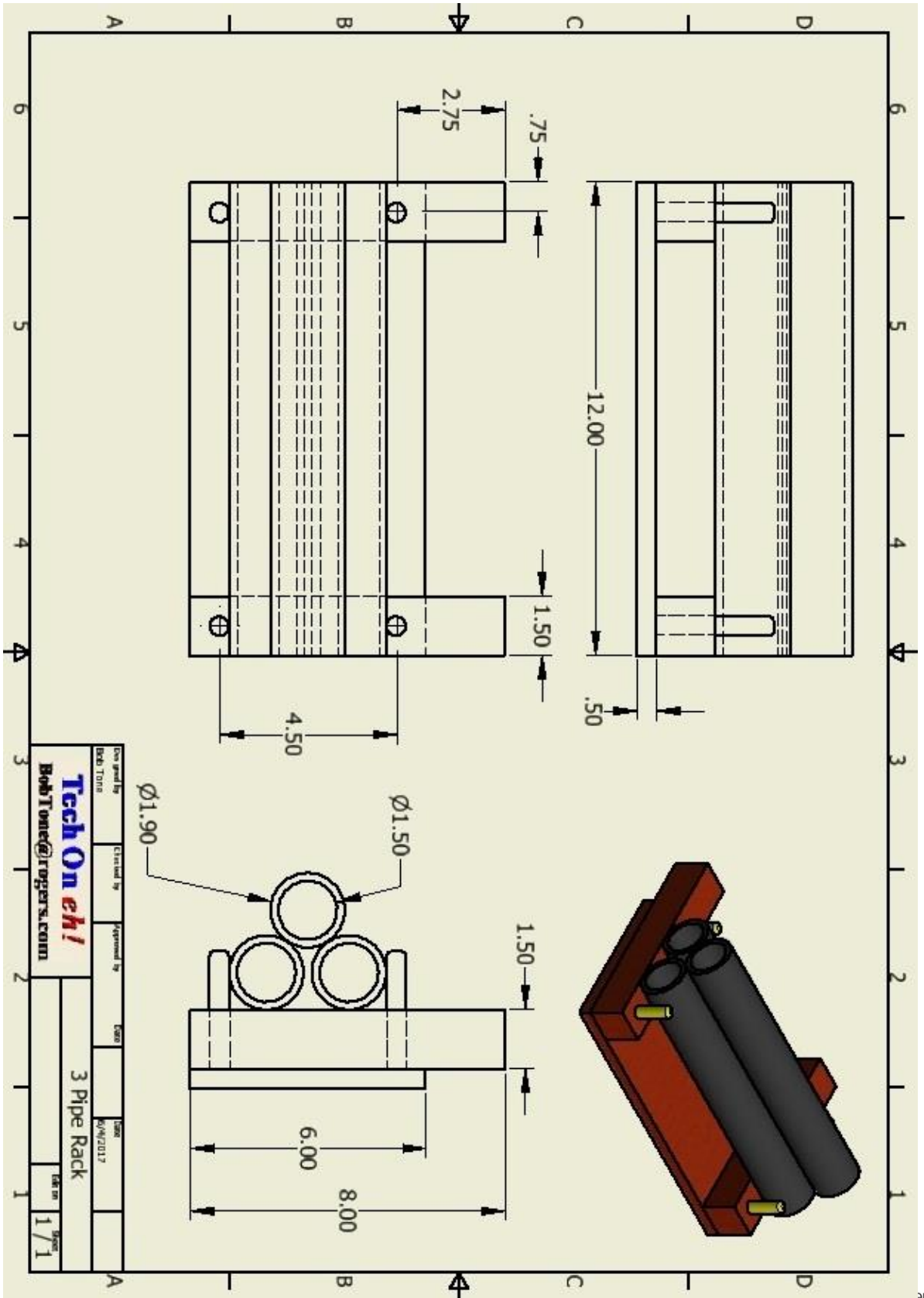


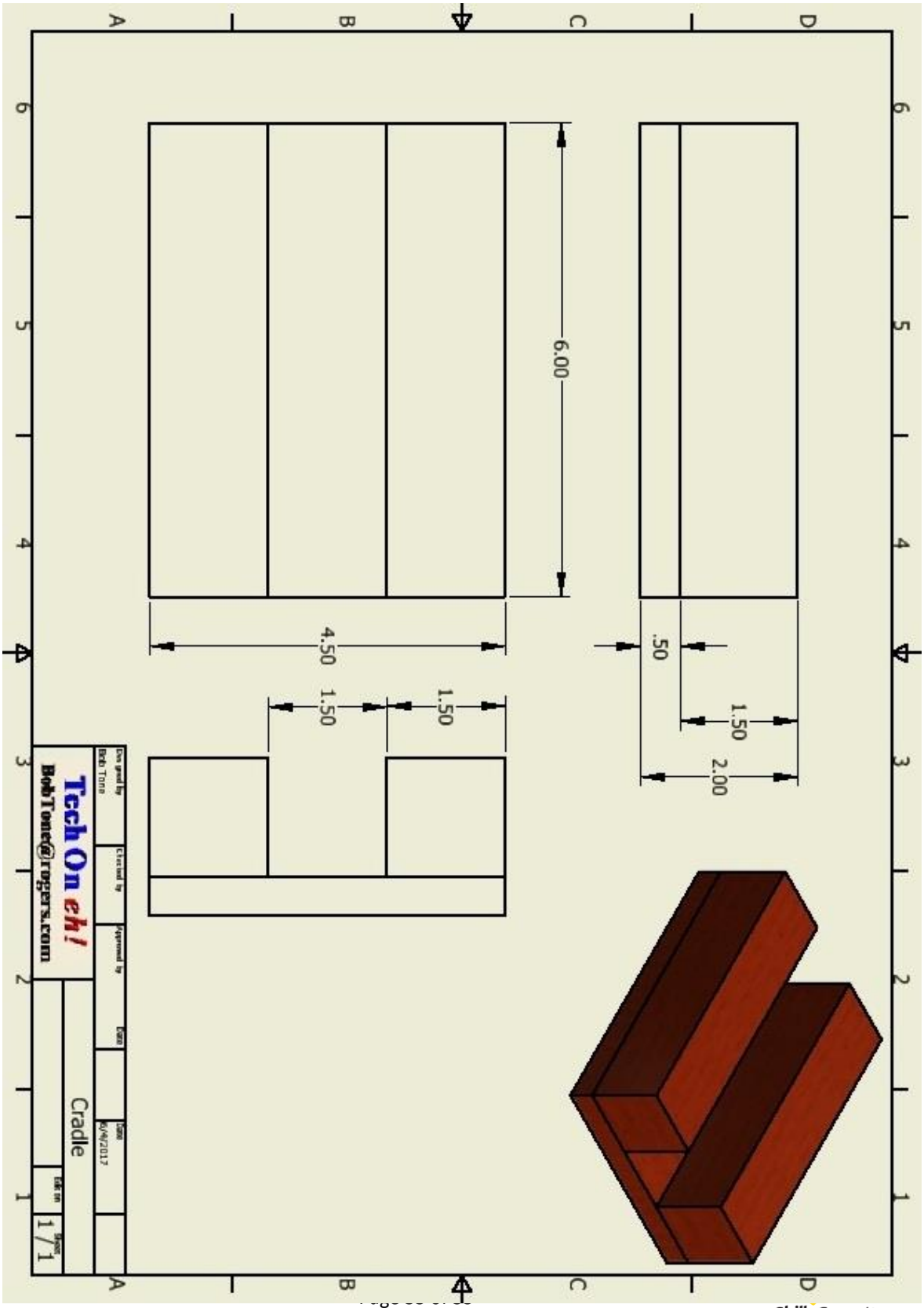
Oil Well Pull Block Details


Note:
A Single Team Space requires 2 Oil Wells.
Three 23 by 3.5 by 1.5 in. Braces (Not Shown) are required to connect the two Oil Wells.
PARTS LIST
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | Short Leg | 29.5 by 3.5 by 1.5 In Board
2 | 1 | Leg Brace 1 | 7.5 by 3.5 by 1.5 In Board
3 | 2 | Foot | 35 by 3.5 by 1.5 In Board
4 | 2 | Side | 22.125 by 3.5 by 1.5 In Board
5 | 2 | Foot & Leg Brace | 11.5 by 3.5 by 1.5 In Board
6 | 1 | Tall Leg | 41 by 3.5 by 1.5 In Board
7 | 1 | 5 In 3/8 Lag Screw
8 | 1 | 4 In 3/8 Eye Bolt
9 | 1 | Cradle | See Cradle Document
10 | 1 | 48 In 1.5 In ABS Pipe
11 | 2 | Cradle | See Cradle Document
12 | 2 | 45 Degree 1.5 Elbow
13 | 1 | Bearing Holder | 12 In 1.5 In Dia ABS Pipe
14 | 2 | 3/8 Washer
15 | 2 | 3/8 Nut
16 | 6 | Duck Tape
17 | 1 | 4 In Hinge Finger
18 | 1 | 12 In 1.5 ABS Pipe
Tech On eh!
BobToner@rogers.com
Oil Well
1/1




PARTS LIST
ITEM QTY PART NUMBER DESCRIPTION
1 2 Front Lips 20 by 1.5 by 0.75 in.
2 1 Divider 20 by 5.5 by 1.5 in.
3 2 Sides 28.5 by 3.5 by 1.5 in.
28.5
12.0
12.0
0.75
30.0
27.0
3.5
5.5
PARTS LIST
ITEM QTY PART NUMBER DESCRIPTION
1 1 Release Pull Block 1.5 by 1.5 by 1.5 in.
2 1 4.3/8 in EyeBolt
3 2 3/8 in Nut
4 2 3/8 in. Washer
11.5
6.0
1.5
10.5
1.5
1.75
28.00
PARTS LIST
ITEM QTY PART NUMBER DESCRIPTION
1 2 Outside Brace 11 by 3.5 by 1.5 in.
2 1 Pull Post 28 by 3.5 by 1.5 in.
3 1 Inside Brace 10.5 by 3.5 by 1.5 in.
4 1 5 in. 3/8 Eyebolt
5 2 3/8 Washer
6 2 3/8Nut
Tech On eh!
BobTone@rogers.com
Refinery / HMCA / Pull Post
6/7/2017
1/1


2.75
.75
12.00
1.50
.50
4.50
Ø1.90
Ø1.50
1.50
6.00
8.00
Tech On eh!
BobTonet@rogers.com
3 Pipe Rack
1/1



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 18, 2018, 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 20, 2018, 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 June 3-6, 2018 in Edmonton, Alberta.

At the SCNC there are only two (2) team members permitted. Teams will need to inform Skills Ontario immediately following the Closing Ceremony May 9 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 Edmonton during their 'Autonomous Robot Built On-Site Experience' at the 2018 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 Edmonton 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.