

## 2019 TORONTO CHALLENGE SCENARIO

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### SCENARIO:

Your team has been commissioned to design a controlled pneumatic or hydraulic device that will safely move an object from a starting position to one of three zones.

### THE CHALLENGE PROBLEM:

Your team will design and build a device that picks up wooden cylindrical objects from the “START” position and then place them in one of three destination zones. The object must be moved and placed in an upright position in your chosen destination zone. *Your task will be to transport as many objects as possible in a time frame of two minutes.*

### SPECIFICATIONS:

*(Please refer to plan and isometric drawings on pages 3 and 4.)*

The base of your device will sit in a FOOTPRINT area which consists of a rectangle 203mm by 146mm surrounded by a wall 8mm wide and 25mm high.

The plane of the START area which is a small circle where cylinders will be placed is the same as the FOOTPRINT area.

The DESTINATION area consists of three zones. The planes of two of them, Zones “A” and “C”, are 25mm above the FOOTPRINT area, while the third Zone “B” is on the same plane as the START position and the FOOTPRINT area. There is a 50mm high wall between Zones “A” and “C” and Zone “B”. The wall is 12mm wide.

The objects being moved are represented by wooden cylinders each 70mm high by 32mm in diameter and weighing approximately 43g.

Your team will choose the destination zone for each cylinder. A cylinder moved correctly to Zone “A” is worth 2 points; to Zone “B” 4 points and to Zone “C” 5 points. Your team can move cylinders to any of the destination zones every time you move a cylinder.

Any cylinder dropped in transit will be returned to its starting position. Once a cylinder is moved to its destination zone it will be returned to its starting position ready to be moved again.

*All movements of the device **MUST** be controlled using fluid power.*

## DEDUCTIONS:

- *If your team manufactures a device that **only works when it is stabilized by hand(s)** then **only 50% of the “moving object” score will count.***
- *If your team **breaks the device** during the allocated 2 minutes, then your team can repair it during those 2 minutes, and **subsequent “moving object” scores will count 50%.***
- *If your device is **touched by hand in any other way**, then **the “moving object” score will be zero.***

## BEFORE THE COMPETITION DAY (April 25<sup>th</sup> 2019):

On the Workshop Day (March 28<sup>th</sup>, 2019), members of your team will be introduced to a variety of tools and the materials that you can use to build a device.

Between the Workshop and Competition Day you must design, build and test a prototype device to move the cylinders and record your work in a Design Portfolio.

In that portfolio, you will also have noted how you could improve your prototype and what you plan to do differently on the Competition Day. Every member of your team should understand these sections of your portfolio completely so that you can implement those improvements on the Competition Day. Remember that credit will be given to a well-designed device *particularly* one that is strong and stable (i.e. counter-balanced and rotating efficiently).

## AT THE COMPETITION DAY:

Your team will bring two copies of your Design Portfolio to the Competition Day. One of these (for the judges) must be a print out. The second copy – to be used by your team to guide construction of your device – can be a second print-out or in electronic form on a tablet or laptop computer.

You will be provided with a kit of materials to build your device with.

Referring to your portfolio and working co-operatively and within strict time limits, your team will build the device you have previously designed to meet the Challenge.

You are encouraged NOT to use hot glue unless it is an emergency – wood glue and cardboard gussets are much stronger and less likely to become loose if in contact with water.

Using the *Local Challenge Rubric*, The Challenge Judges will evaluate your Design Portfolio, Teamwork & Work Habits and the Design, Construction and Performance of your device as well as asking you four questions.

Prizes will be awarded for the best *Overall Score* and the best *Design Portfolio Score*.

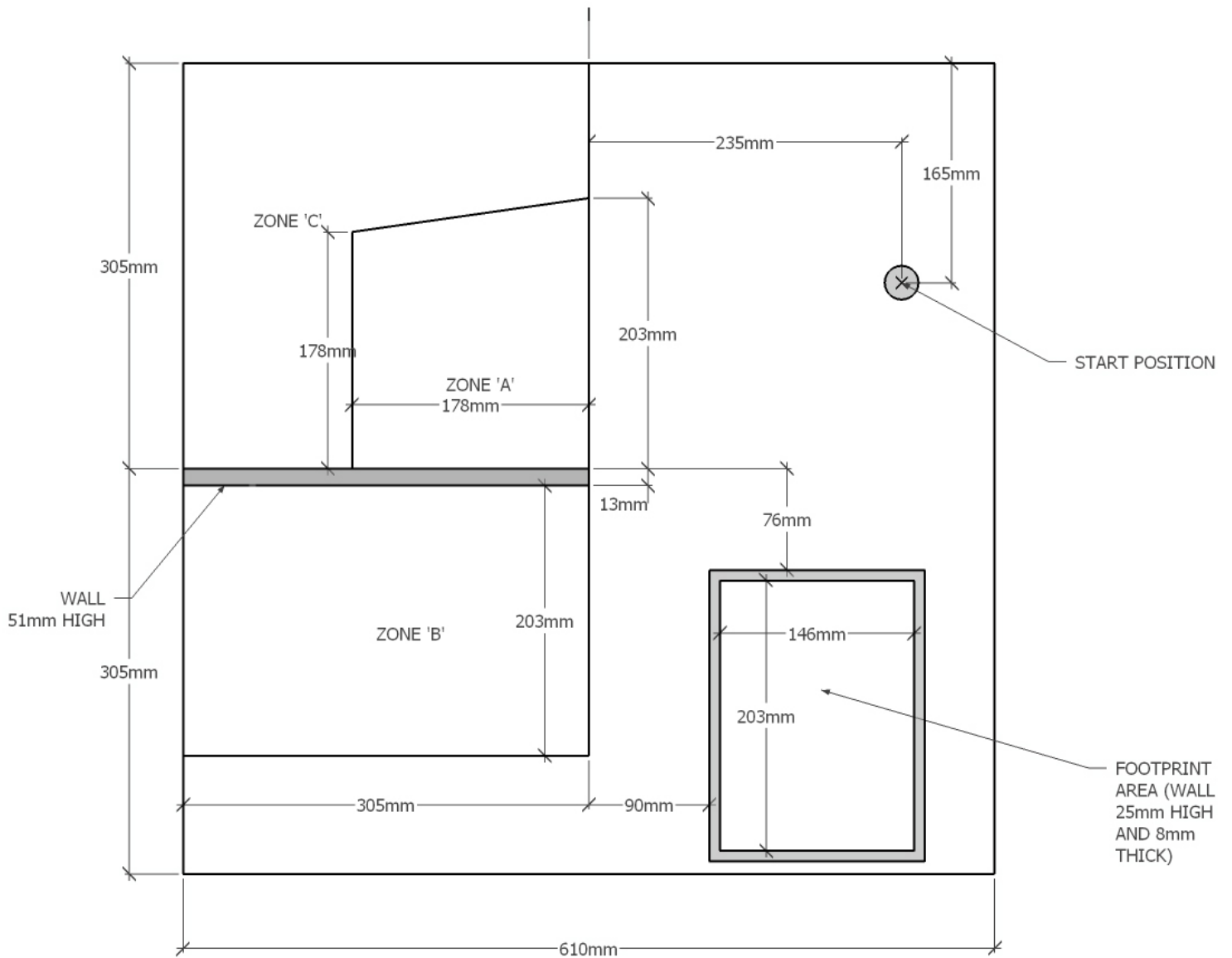


Canadian Fluid  
Power Association  

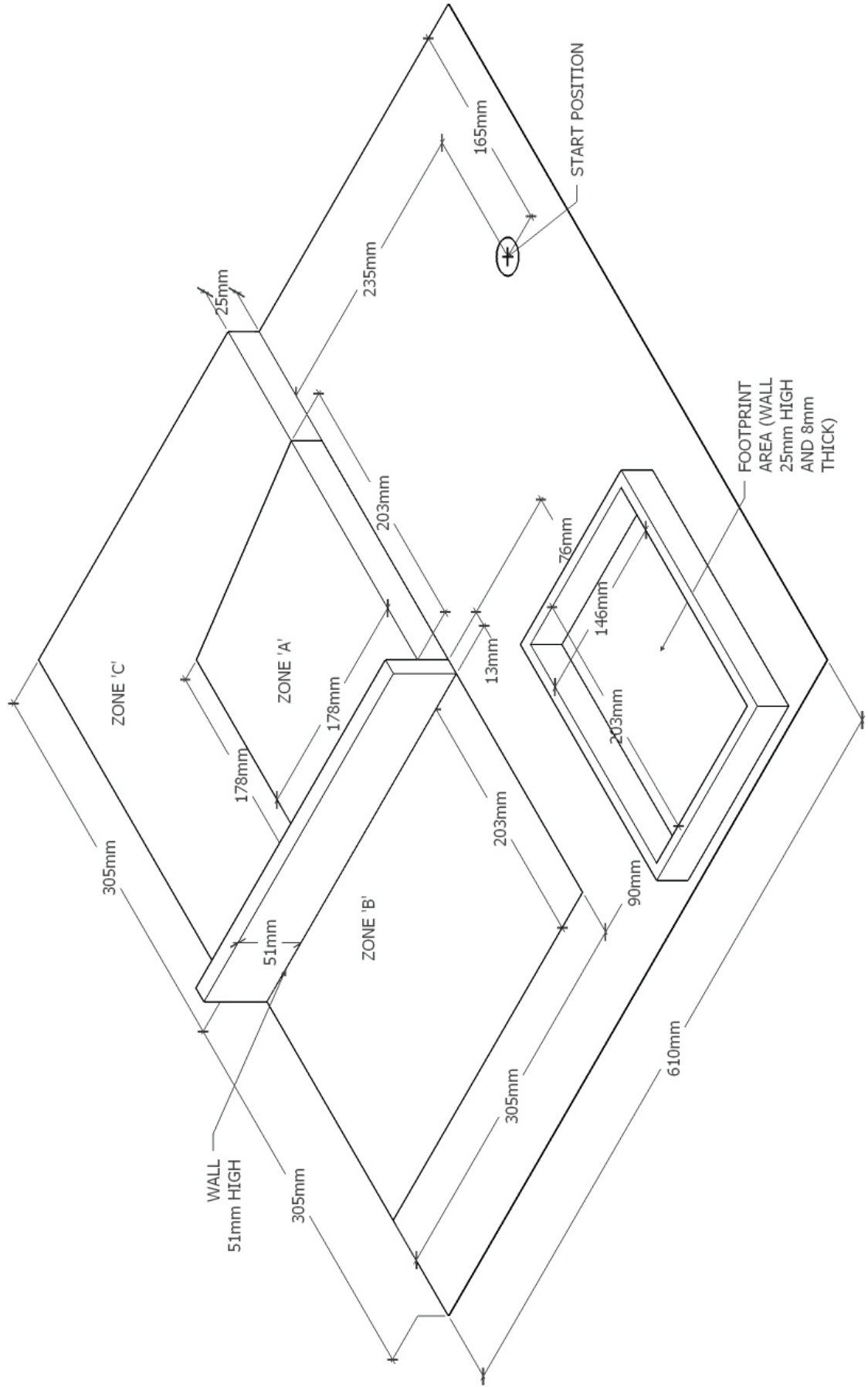
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Association canadienne  
d'énergie des fluides

# 2019 TORONTO CHALLENGE SCENARIO LAYOUT PLAN VIEW



# 2019 TORONTO CHALLENGE SCENARIO LAYOUT ISOMETRIC VIEW



**2019 TORONTO CHALLENGE SCENARIO LAYOUT  
PLAN VIEW PHOTO**

