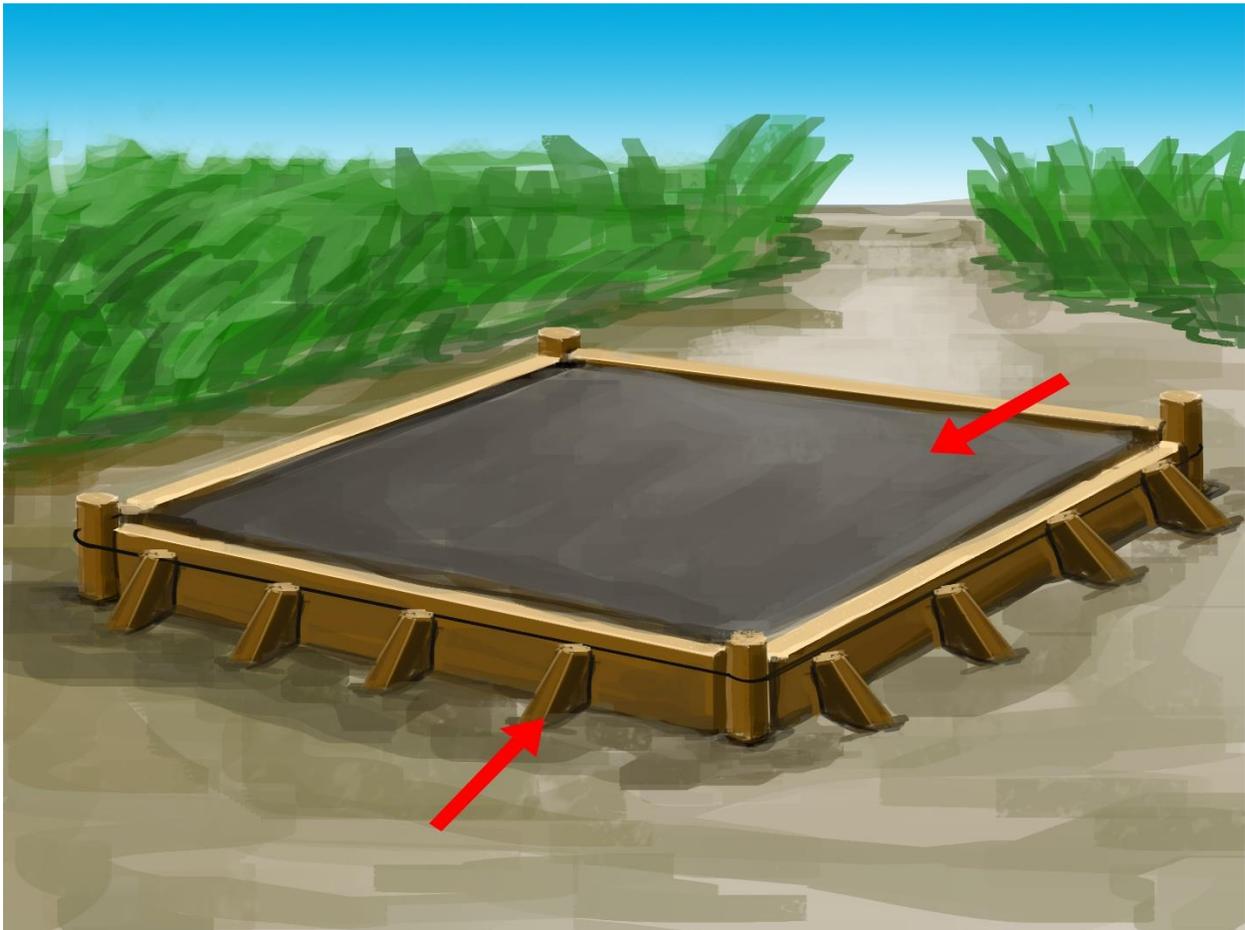


**2019 MATE INTERNATIONAL COMPETITION
NOT-SO-SECRET (BONUS!!!) MISSION**

In addition to the requirements in Task 1, the Tennessee Valley Authority (TVA) has requested that the ROVs assist with the construction of a new section of the dam. To expedite construction, the ROVs will be working together, at the same time.

Constructing the new section of the dam involves creating a form, which is a solid outer structure into which concrete for the foundation will be poured. A framework of pipe has already been installed. The forms will need to be attached to this framework.



www.wikihow.com/Build-a-Straight-Form-for-Concrete

This is your company's BONUS MISSION, if you choose to accept it...

MISSION NOTES

During check-in, each company will receive 1) a piece of corrugated plastic and four rings cut from 1 ¼-inch PVC fittings and 2) a schedule that includes the time that they will undertake this task and a list of

the other companies they will be working with. Companies must assemble the plastic and fittings to create the sidewall of the form before transporting it to the framework and putting it in place.

Companies must attach the four rings to the corrugated plastic in designated locations (black marks) on the sheet. How this is accomplished is up to each company. Companies may bring tools or additional materials to attach the rings to the plastic sheet. The designated locations are 30 cm apart and are equal to the distance between the PVC pipe that creates the framework.

Companies must determine how to transport the form to the framework. Companies may bring additional materials to facilitate carrying the form (rope, U-bolt, etc.). Companies may make small modifications to the form as needed.

On Saturday morning, each company will receive one attempt at adding their form to the foundation of the dam framework. Up to four companies (a mix of RANGER and EXPLORER classes) will attempt to place their forms simultaneously onto one of four different walls of one dam foundation framework. The four walls of the framework will be within 1 meter of each other. Companies will have 10 minutes to place their form. Companies will have 5 minutes to set up and 3 minutes to demobilize their ROV.

The form must be placed with the rings facing outwards (away from the center of the dam foundation).

Companies may only place their own section of the form; they cannot place another company's section onto the framework. However, companies may assist other companies by providing directions and guidance, returning a dropped section of the form to the surface (only if asked), or allowing another company to operate their vehicle to place the form. Note that companies should not interfere with another company placing their own section of the form.

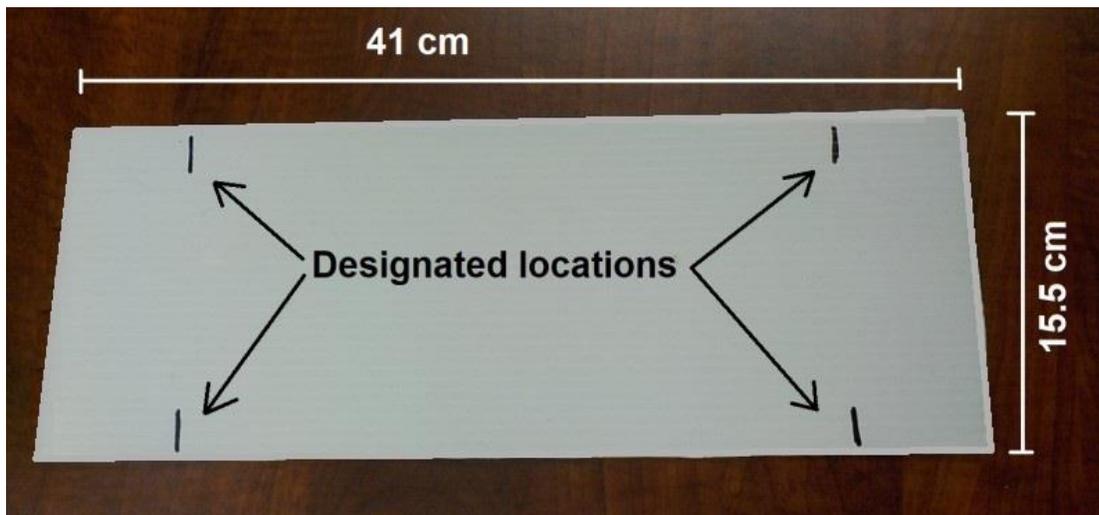
Companies will receive 5 points for successfully adding their section of the form to the framework. Successfully adding the section of the form is defined as both 1 ¼-inch sections of PVC pipe around the ½-inch framework and the section of the form resting on the section below it.

Companies will receive additional points depending on the total number of sections of the form added by all companies. Points will be awarded as follows:

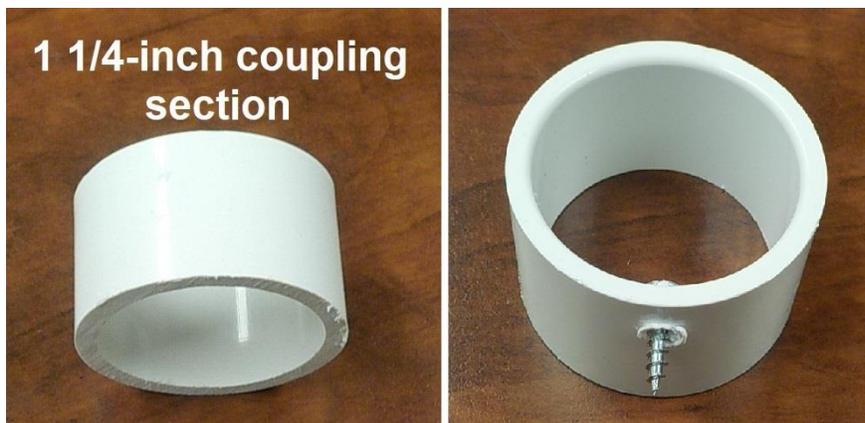
- 0 to 10 pieces placed: 0 points
- 11 to 30 pieces placed: 5 points
- 31 to 45 pieces placed: 10 points
- 46 to 69 pieces placed: 15 points
- All 70 pieces placed: 20 points

So, each company can receive up to a total of 25 bonus points. These points will be added to each company's total, overall score.

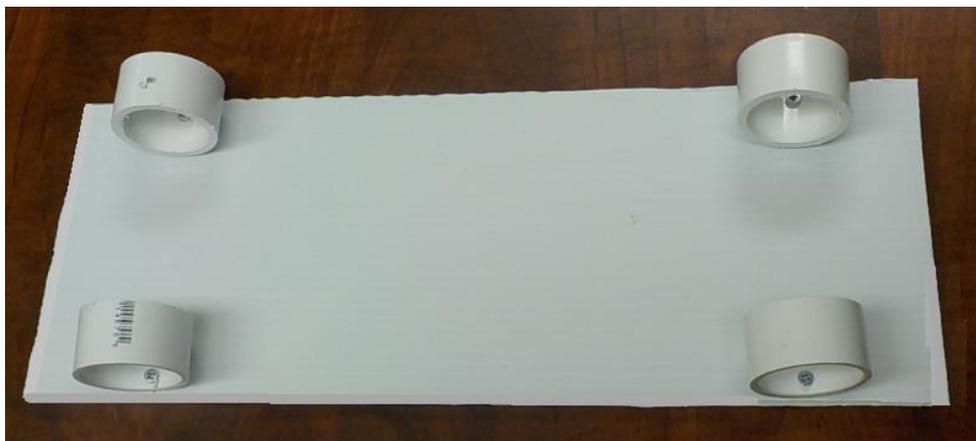
PHOTOS AND BUILD SPECIFICATIONS



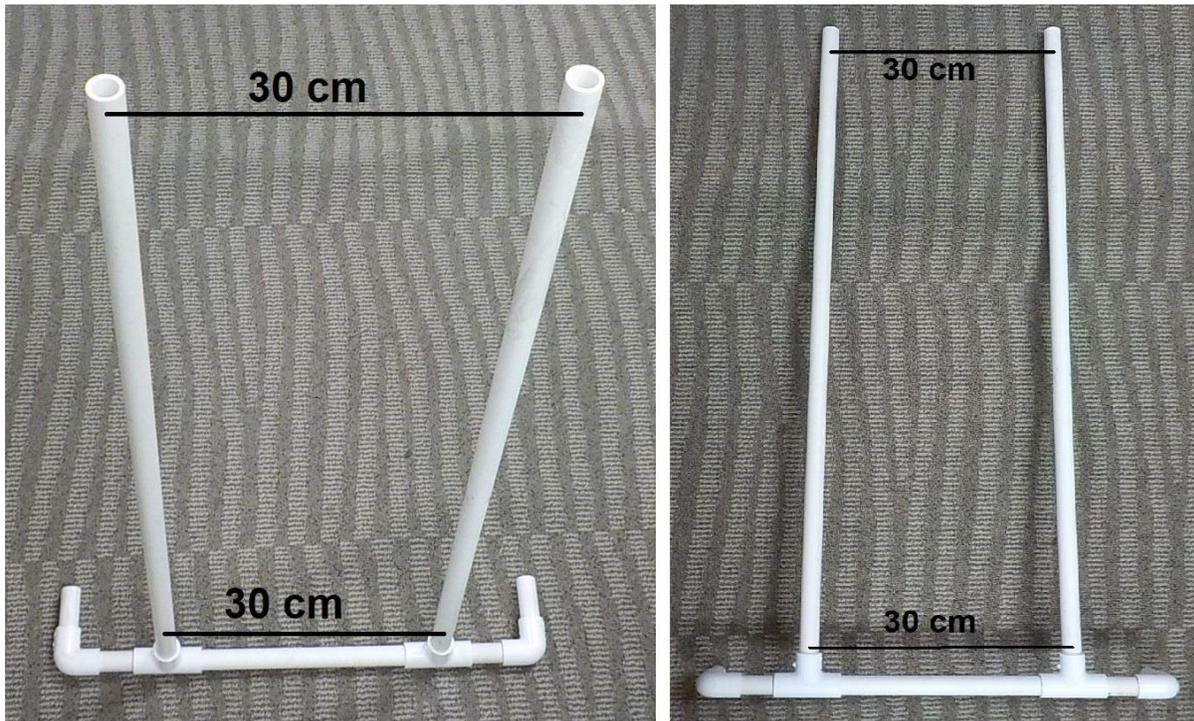
Corrugated plastic with designated locations marked.



Left: 1/4-inch ring. Right: A screw through ring to attach it to the corrugated plastic. Companies may use other methods than a screw to attach the ring.



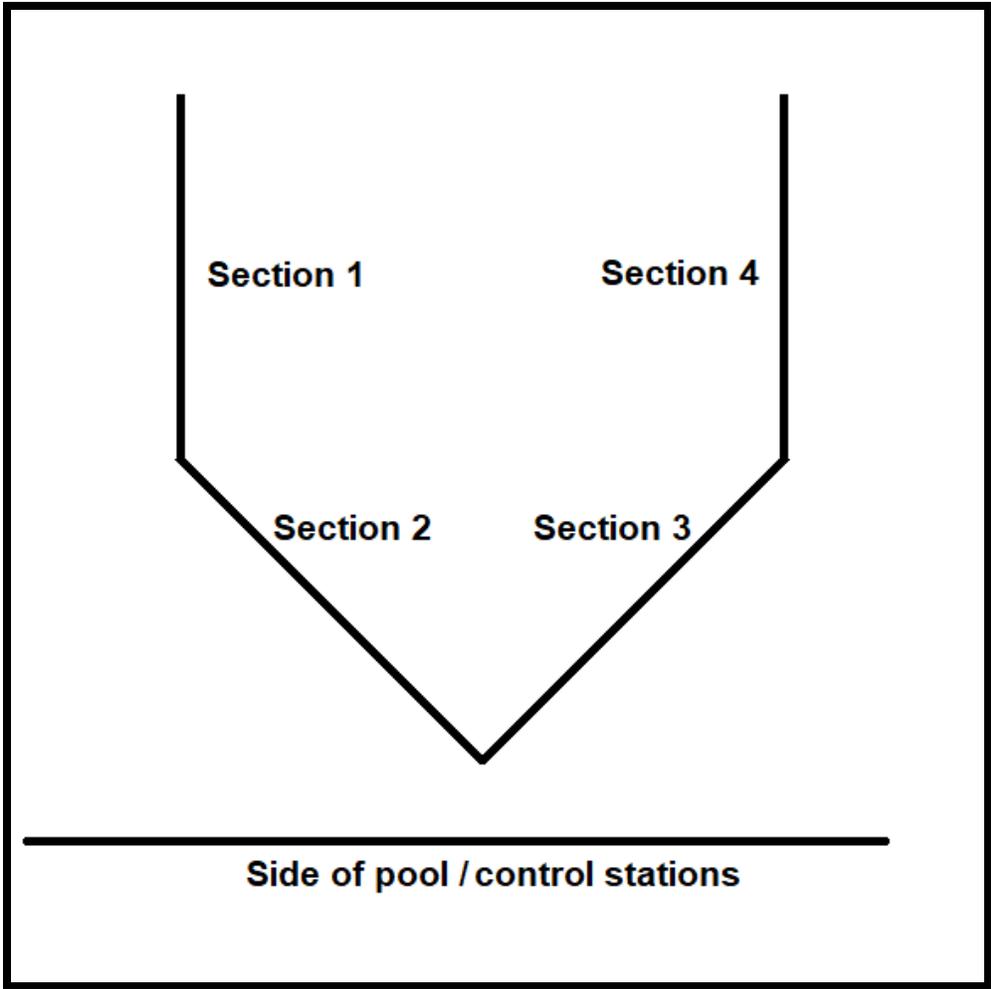
The four rings attached to the corrugated plastic.



One section of the dam foundation framework. The rings attached to the corrugated plastic will fit over two vertical lengths of PVC pipe. The length between the centers of the two pipes is 30 cm.



The form placed on the dam foundation framework.



Layout of the dam foundation sections.

Collaborative bonus mission schedule

STATION A

	Station 1A	Station 2A	Station 3A	Station 4A
8:40 AM	EX 3	RNG 1	RNG 19	RNG 35
9:00 AM	EX 4	RNG 2	RNG 20	RNG 36
9:20 AM	EX 5	RNG 3	RNG 21	RNG 37
9:40 AM	EX 6	RNG 4	RNG 22	RNG 38
10:00 AM	EX 7	RNG 5	RNG 23	RNG 39
10:20 AM	EX 8	RNG 6	RNG 24	EX 12
10:40 AM	EX 11	RNG 7	RNG 25	EX 13
11:00 AM	EX 20	RNG 8	RNG 26	EX 1
11:20 AM	EX 18	RNG 9	-	EX 10

Collaborative bonus mission schedule

STATION B

	Station 1B	Station 2B	Station 3B	Station 4B
8:40 AM	RNG 40	RNG 10	RNG 27	EX 15
9:00 AM	RNG 41	RNG 11	RNG 28	EX 16
9:20 AM	RNG 42	RNG 12	RNG 29	EX 2
9:40 AM	RNG 43	RNG 13	RNG 30	EX 19
10:00 AM	RNG 44	RNG 14	RNG 31	EX 21
10:20 AM	RNG 45	RNG 15	RNG 32	EX 23
10:40 AM	EX 14	RNG 16	RNG 33	EX 24
11:00 AM	EX 17	RNG 17	RNG 34	EX 25
11:20 AM	EX 22	RNG 18	-	EX 9

Note: Station 1 will place their corrugated plastic at section 1. Station 2 will place their corrugated plastic at section 2, etc.