SCOUT product demonstration prop building instructions

Many product demonstration items have flotation added, either inside the PVC pipe or externally. Flotation added to a mission prop is intended to make those items easier to carry, keep them upright on the bottom if they are dropped while moving, and/or keep them attached to an object (Velcro to Velcro stick) when released by the ROV.

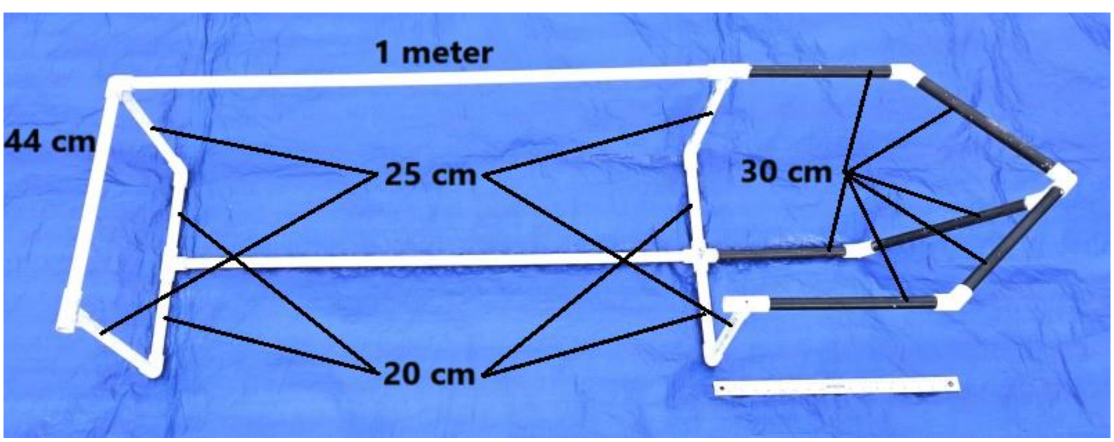
Regional competitions may build product demonstration props out of materials other than PVC pipe. Your regional coordinator will inform you of any changes to materials for your regional competition. NOTE: Look for a regional information document posted on your [regional website](). This document will list any changes to the product demonstration props.

Companies should be aware that tolerances in lengths of cut pipe and length of pipe inserted into joints can change the overall dimensions of product demonstration tasks. Except where noted, companies should expect tolerances in all product demonstration props and should build their ROVs and tools accordingly. In no case should the dimensions given in this document for a product demonstration prop be used to calibrate a measuring device.

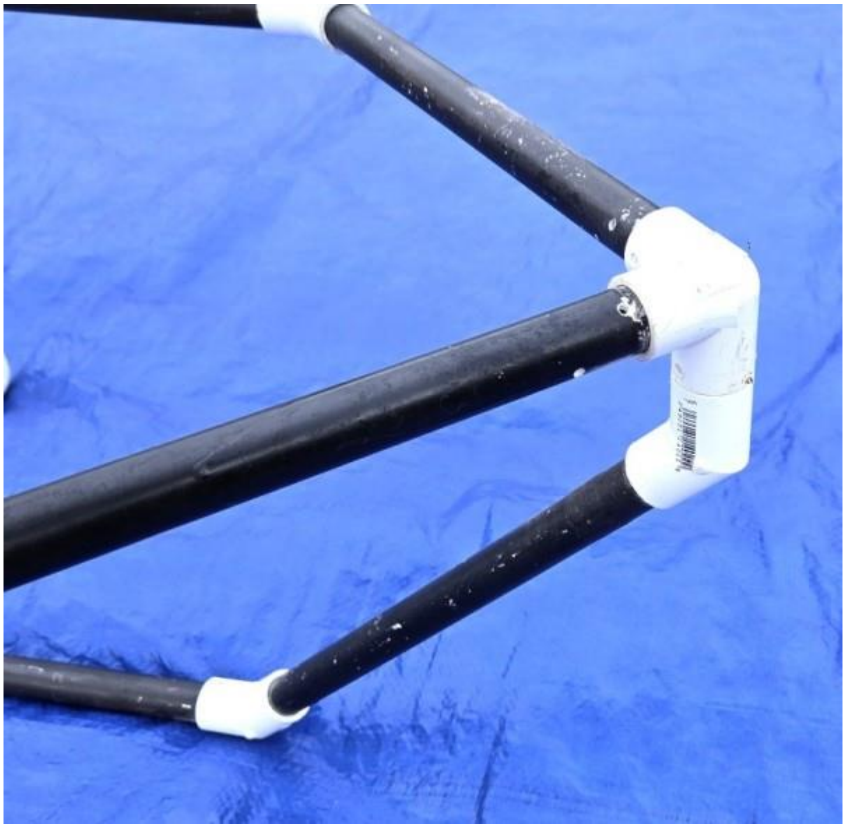
Online links and Home Depot part numbers are given for certain construction items. However, some Home Depot stores may not carry the listed items or Home Depot may not be available in your area. MATE recommends checking other local hardware stores or online sources, such as those listed below, for the required component.
https://www.pvcfittingsonline.com/
https://pvcpipesupplies.com/pvc-fittings/schedule-40-pvc-fittings/

See last page for update notes (if any).

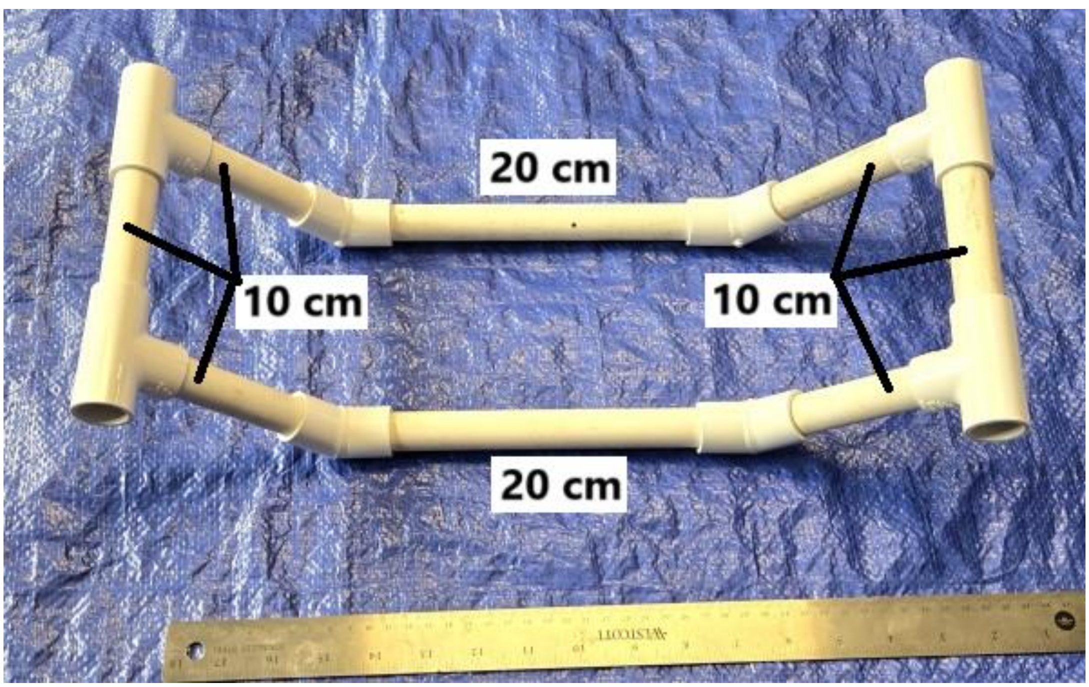
Task 1:
Task 1.1 Shipwrecks



The shipwreck is constructed from ½-inch PVC pipe.



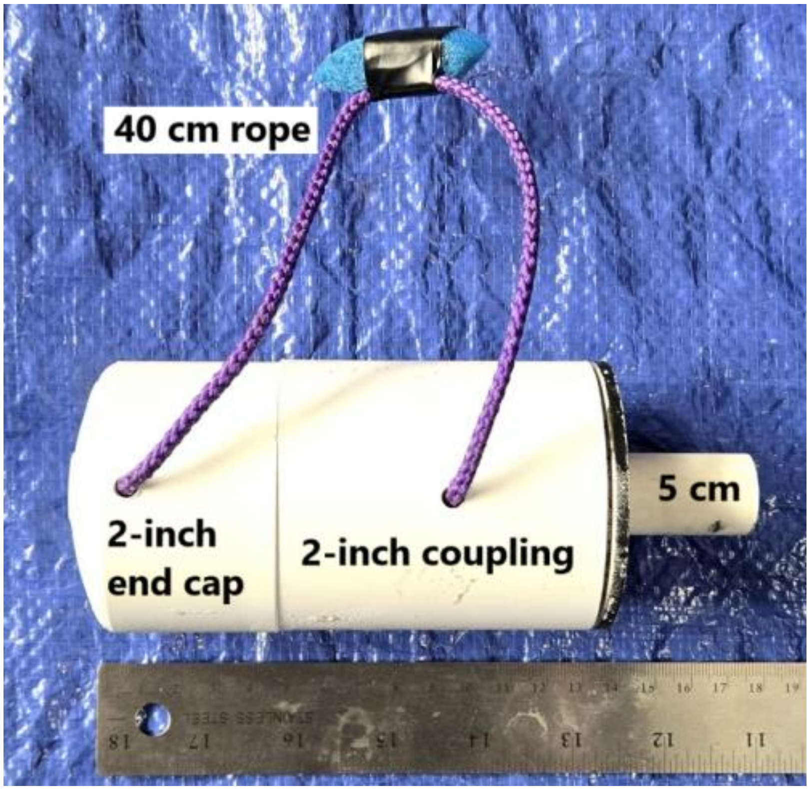
The bow of the shipwreck.



The framework of the dinner platter is constructed from ½-inch PVC pipe.

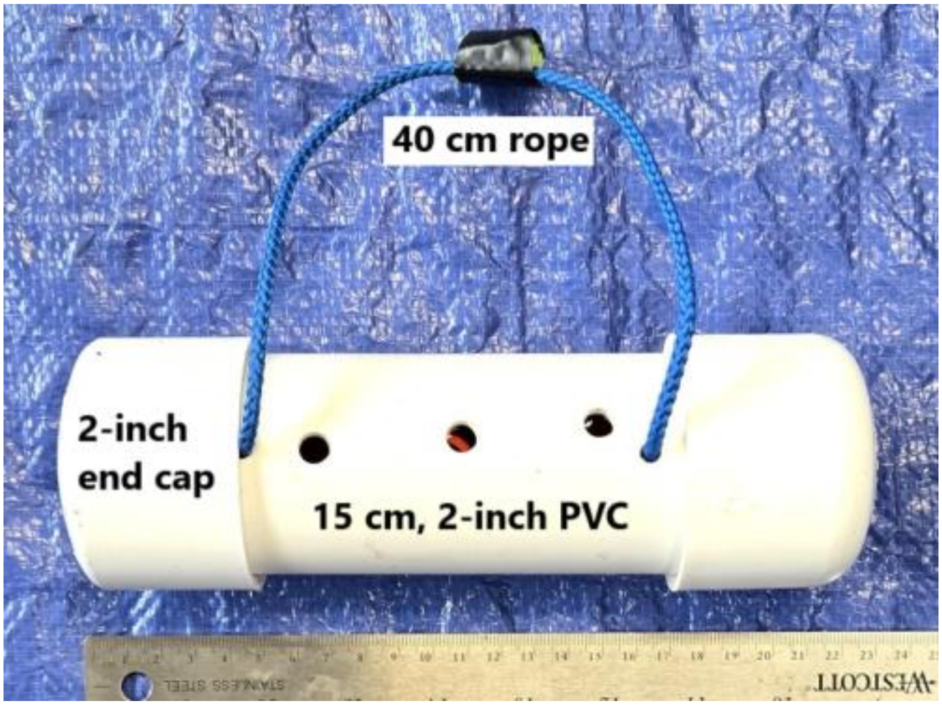
Left: A 2-gallon bucket lid is screwed onto the framework to complete the dinner platter.

The build date of the ship is printed on a clear label and adhered to the underside of the dinner platter.

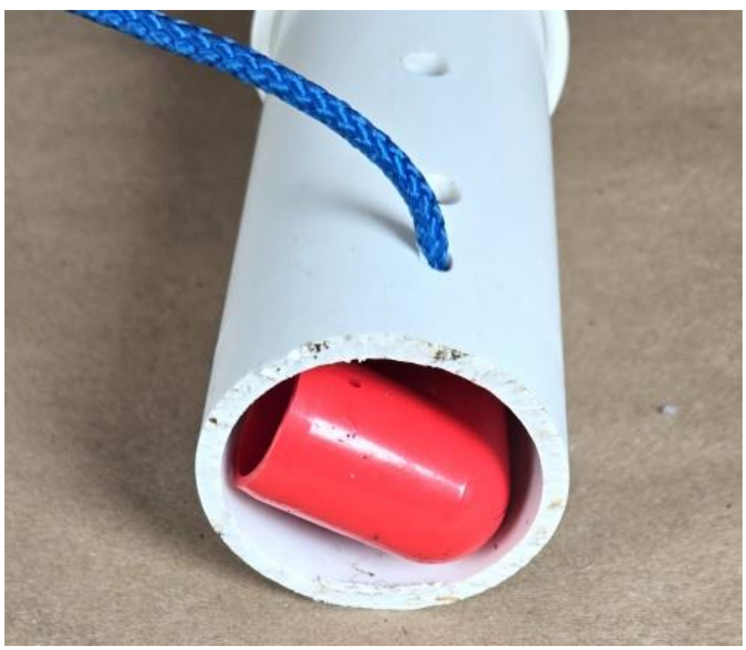


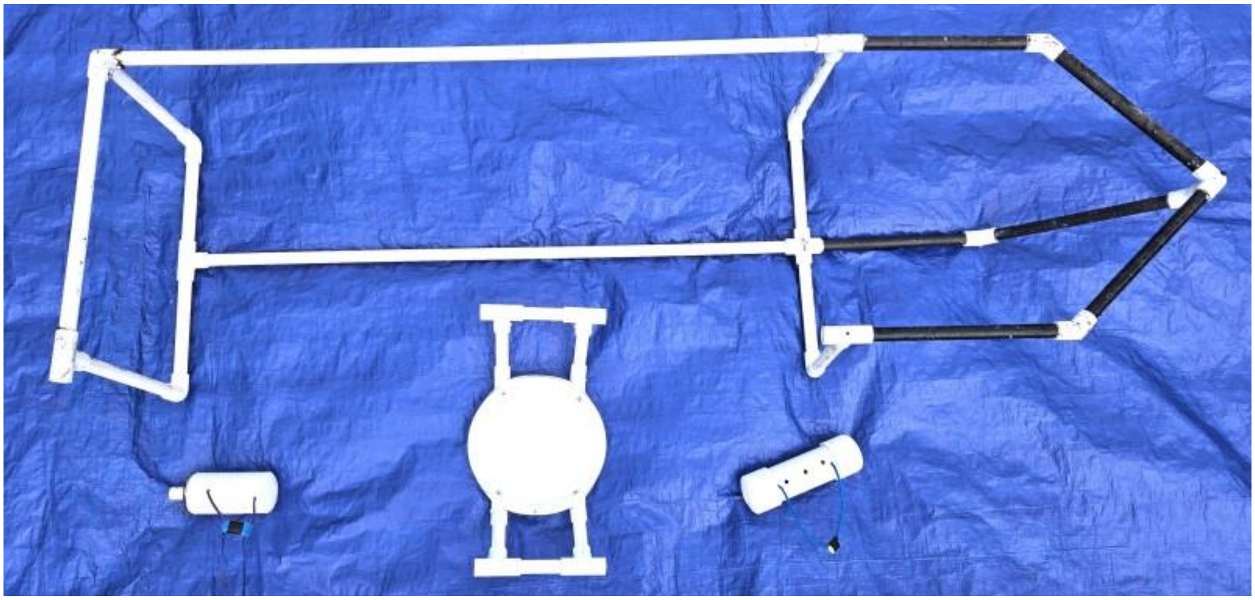
The bottle is constructed from 2-inch and ½-inch PVC pipe. A 2-inch to ½-inch reducer bushing connects the two sizes of pipe. 40 cm of rope acts as a carrying mechanism for the bottle.

The home port of the ship is printed on a clear label and adhered to the underside of the bottle.



The cargo container is constructed from 2-inch PVC pipe. 40 cm of rope acts as a carrying mechanism for the cargo container. ¼-inch holes in the 2-inch pipe on the top and bottom, allow water to drain in and out of the cargo container.

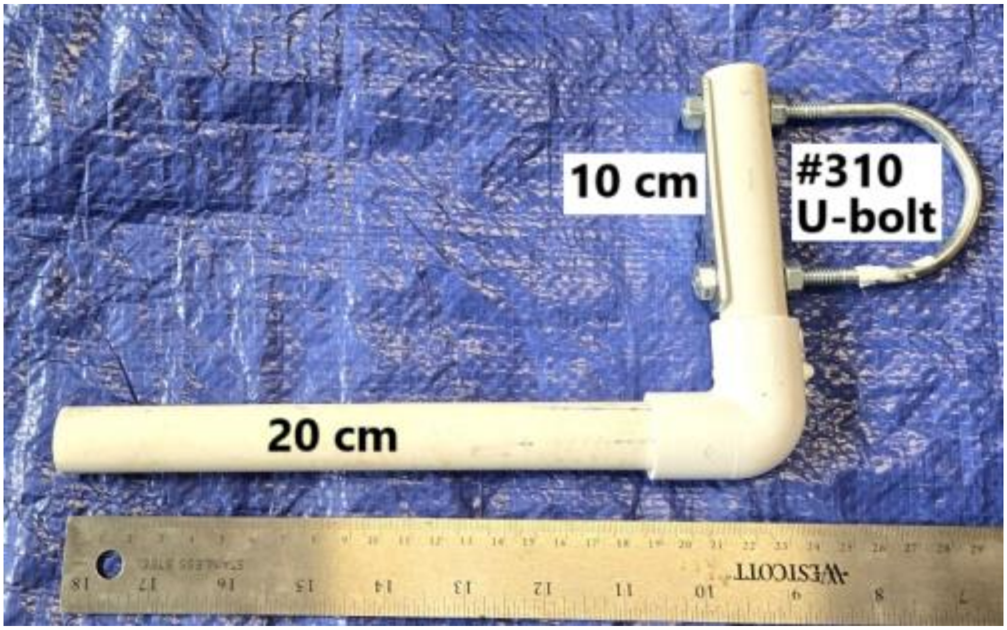

When opened, the cargo inside the cargo container can be identified. The cargo consists of 90° elbows. Yellow elbows represent wheat. Red elbows represent bricks. Black elbows represent coal. White elbows represent furnace sand.



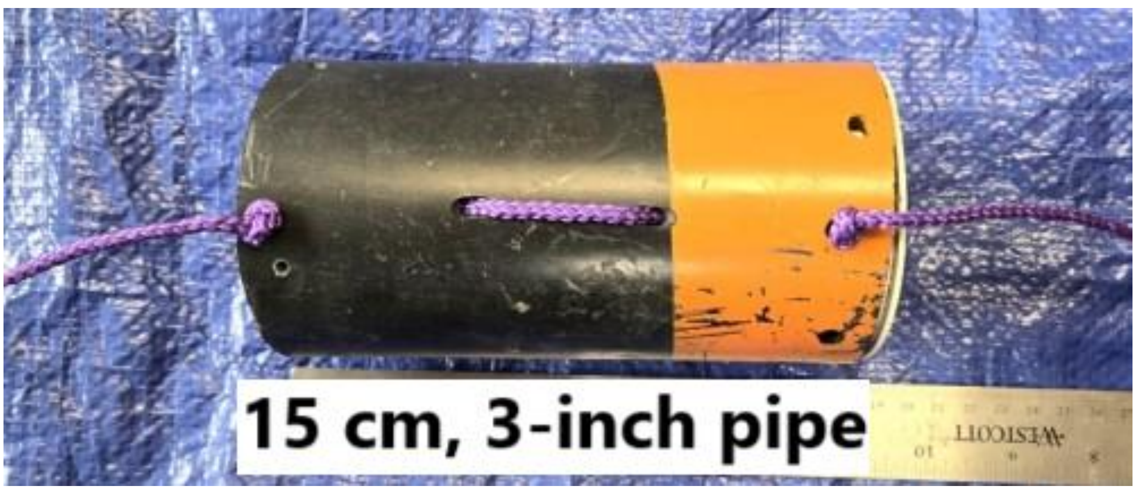
The platter, bottle, and cargo container next to the shipwreck.

Task 1.2 Spotter Buoys

The Spotter buoy is constructed from a 2-inch tee and filled with foam flotation. A length of rope connects the buoy to the base on the bottom of the pool.

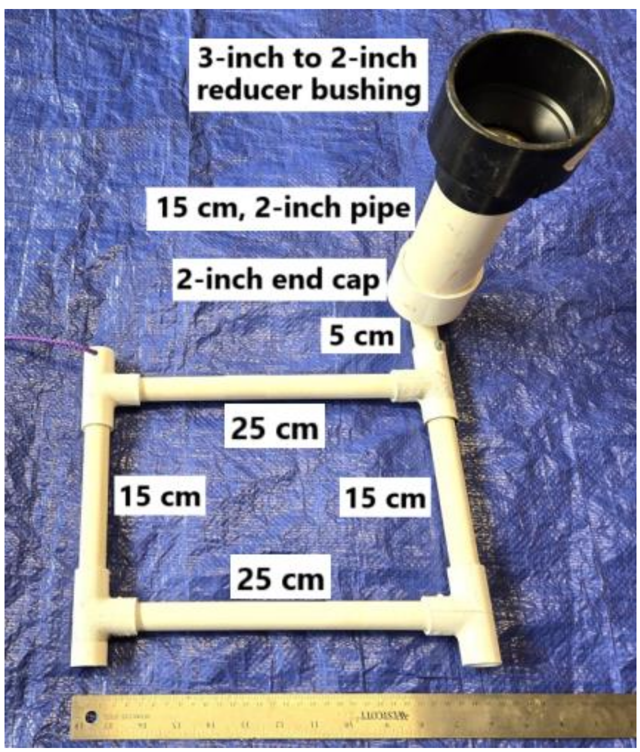


Both the damaged and new thermistor are constructed from ½-inch PVC. A #310 U-bolt acts as a carrying mechanism for the thermistors.

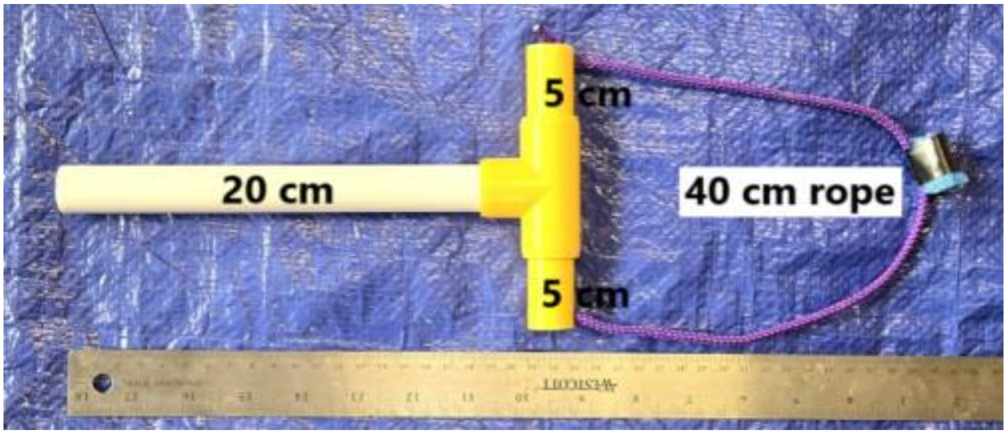


The holder for the thermistor is constructed from 3-inch pipe. A 3-inch knockout cap covers the bottom of the holder.

The thermistor installed into the holder.



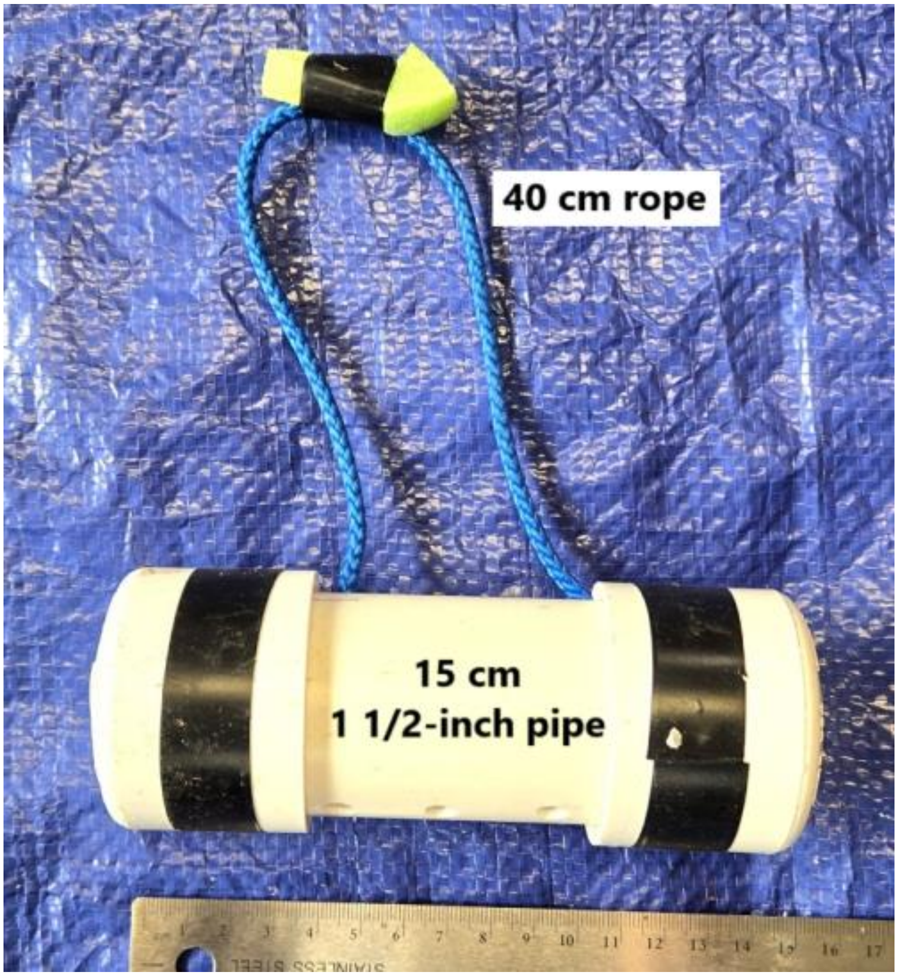
The base of the Spotter buoy is constructed from 2-inch and ½-inch PVC pipe, with a 3-inch to 2-inch reducer bushing at the top of the 2-inch pipe. Weight can be added to the base of the Spotter buoy.



The pC02 sensor is constructed from ½-inch PVC pipe.


The pC02 connector installed into the base of the Spotter buoy.

Task 1.3 Lake Acidification and Invasive Carp

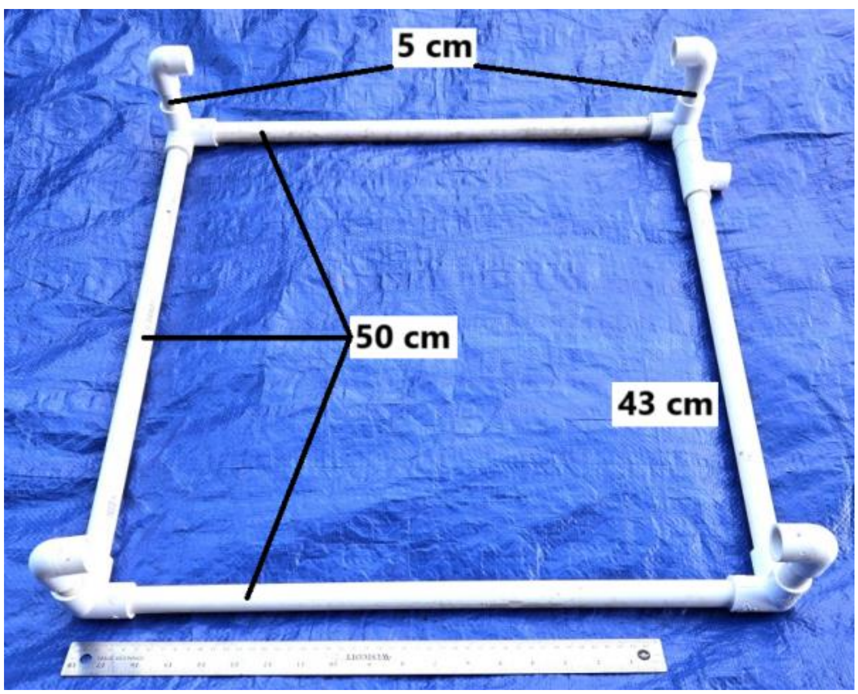


The water sample is constructed from 1 ½-inch PVC pipe.

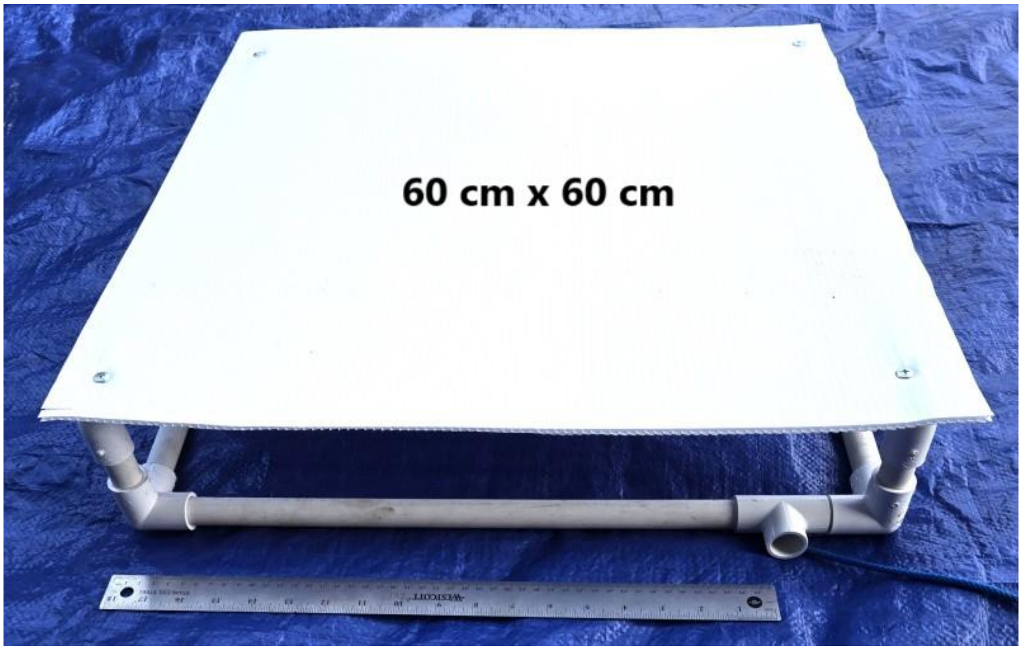
Test tubes inside the water sample. One test tube is labeled pH. One test tube is labeled dissolved CO2.

MATE will provide a litmus strip pH test at each station. Companies may bring their own pH sensor to test the sample as well.

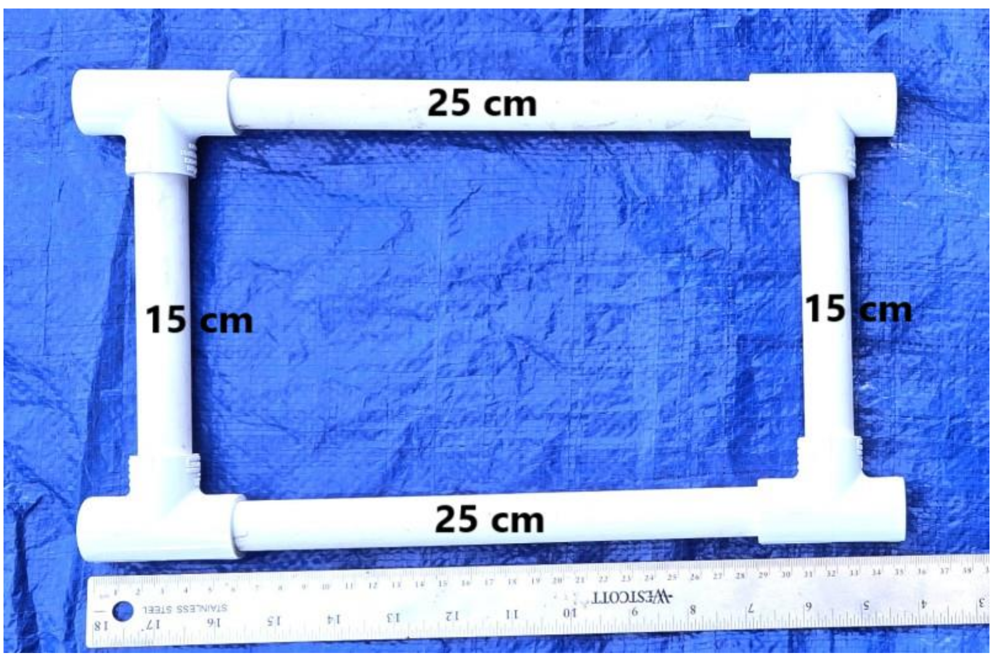
Task 2:
Task 2.1 Produce Power



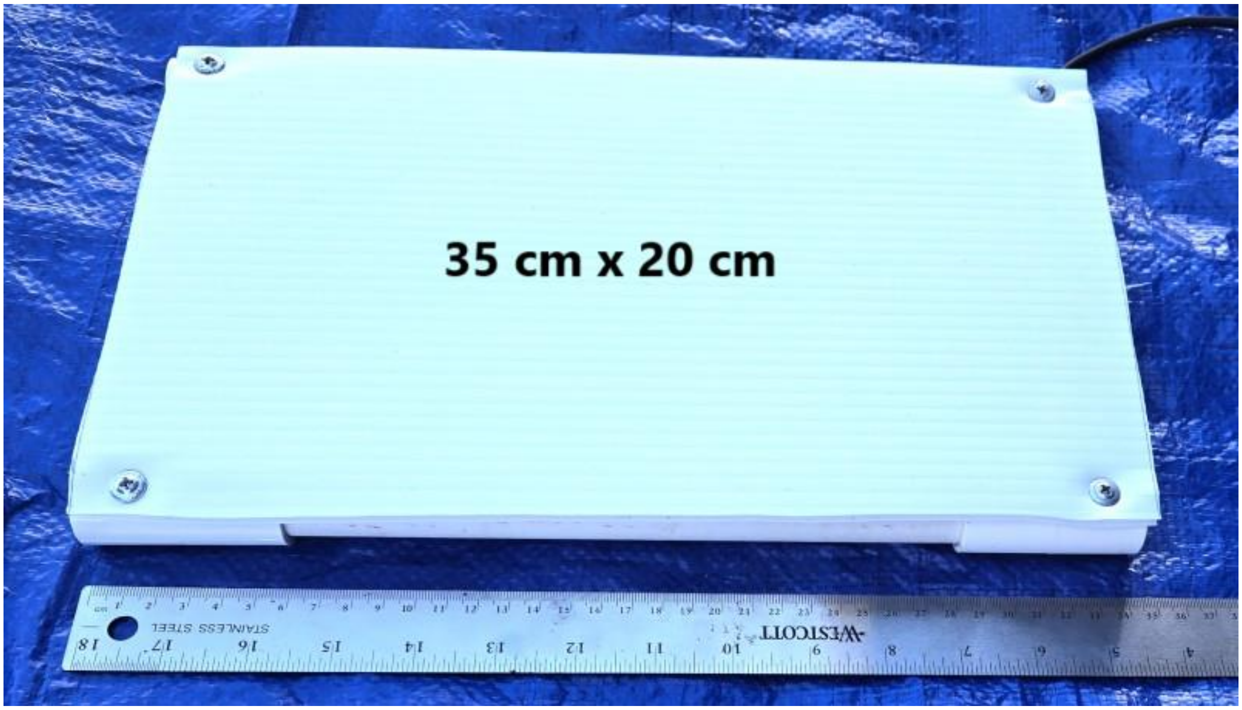
The floating solar panel array surface structure is constructed from ½-inch PVC pipe and corrugated plastic sheeting. A rope connects this to the solar panel array sub-surface structure on the bottom of the pool.



A 60 cm x 60 cm square of corrugated plastic sheeting covers the top of the solar panel array framework. Flotation keeps the solar panel array on the surface.

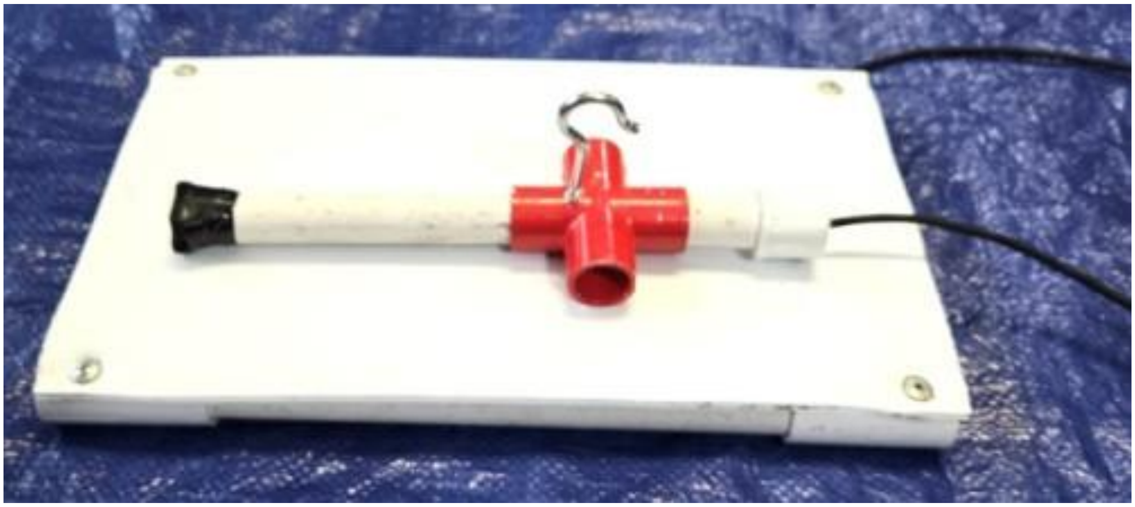


The floating solar panel array subsurface structure is constructed from ½-inch PVC pipe and corrugated plastic sheeting. A rope connects this to the solar panel array surface structure.

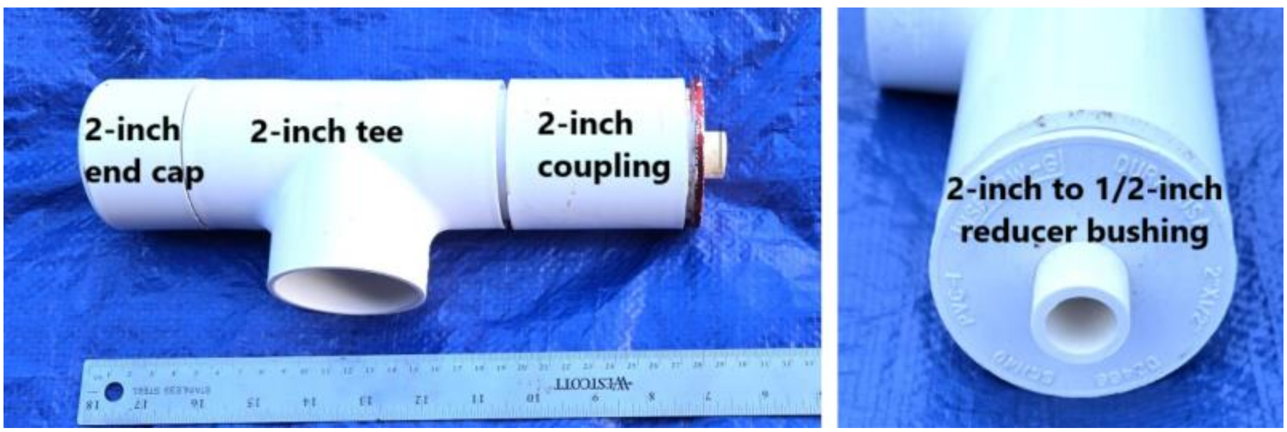


A 35 cm x 20 cm sheet of corrugated plastic tops the connector platform.

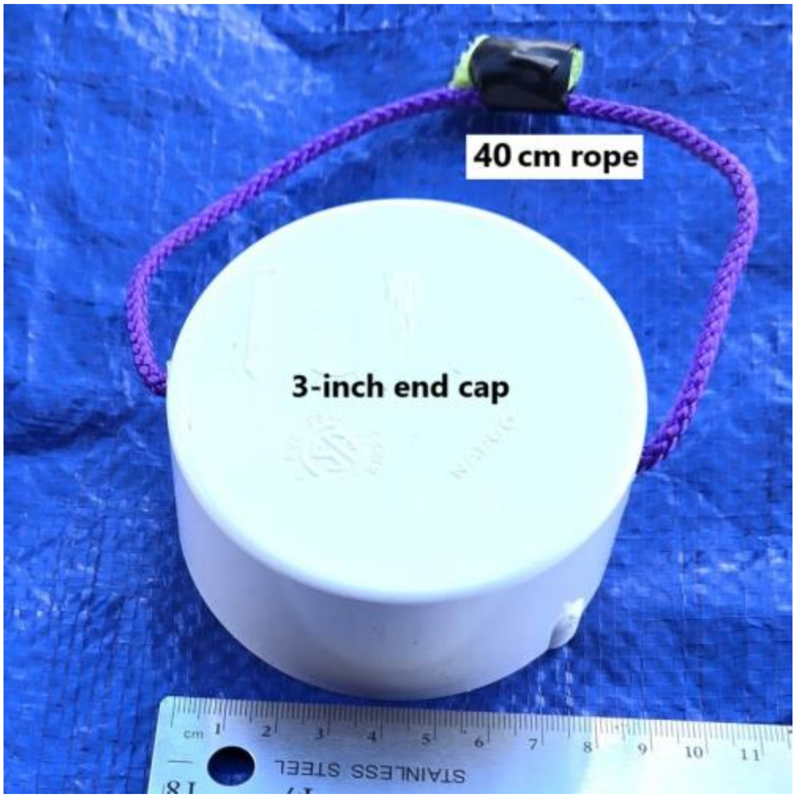
Left: The power connector is constructed from ½-inch PVC pipe. A [#6 screw hook] can be used to carry the connector. A 4-meter length of wire connects the power connector to the array's sub-surface structure. Right: A 6 cm x 4 cm rectangle of Velcro hooks covers the open end of the 15 cm length of pipe.



The power connector resting on its platform.

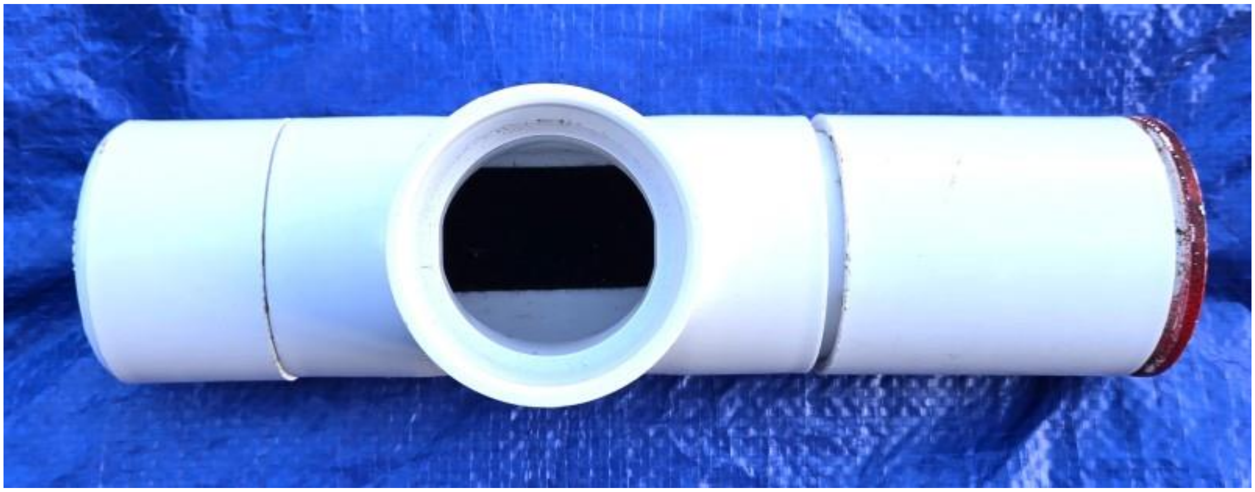


The connection port is constructed from 2-inch PVC pipe. Left: Top view. Right: Side view with a 2-inch to ½-inch reducer bushing. ½-inch pipe connects the port to the floating wind farm bottom structures.

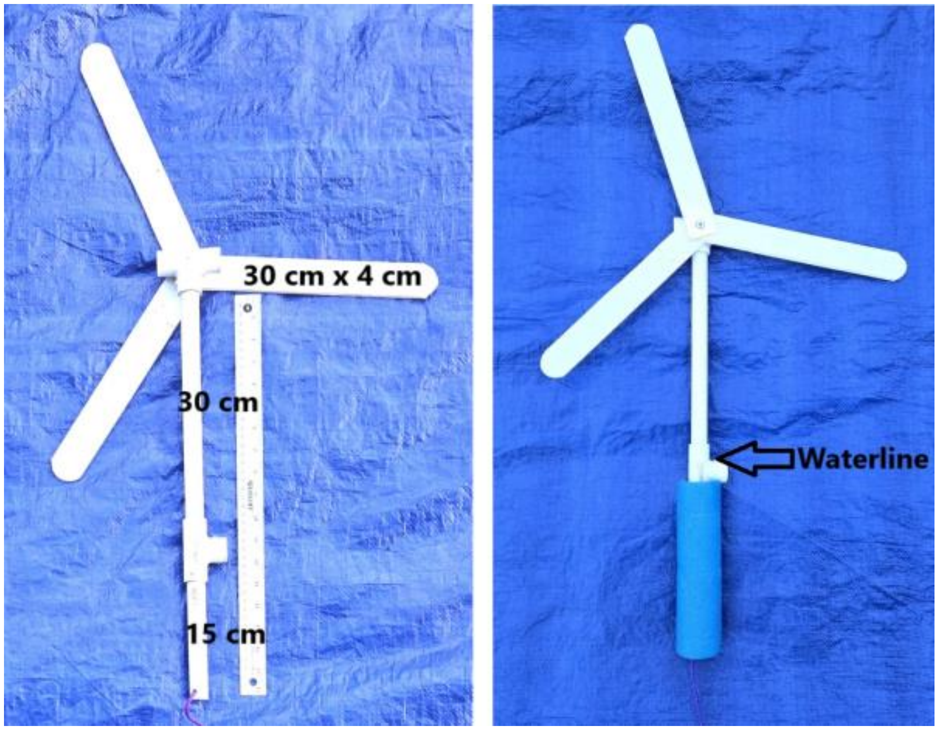


The cover of the connection port is constructed from a 3-inch PVC end cap. A 40 cm length of rope acts as a carrying mechanism for the cover. The connection cover is considered debris; companies must return the cover to the surface, side of the pool or it must be under control of their ROV at the end of the product demonstration run.

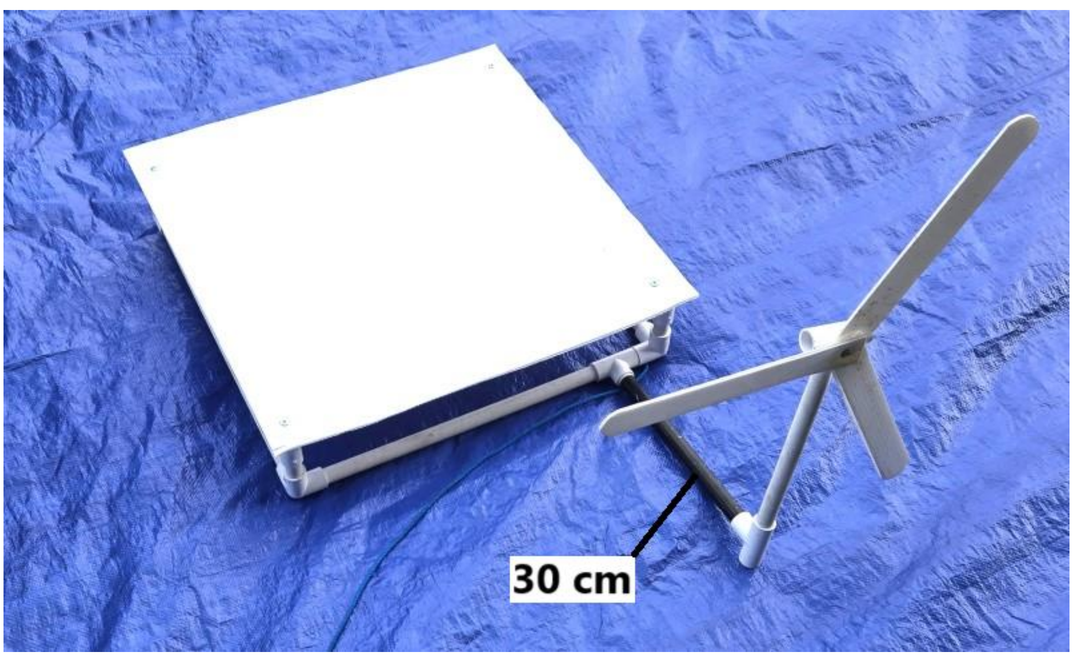

The cover over the connection port.


The inside of the connection port is covered with Velcro loops.

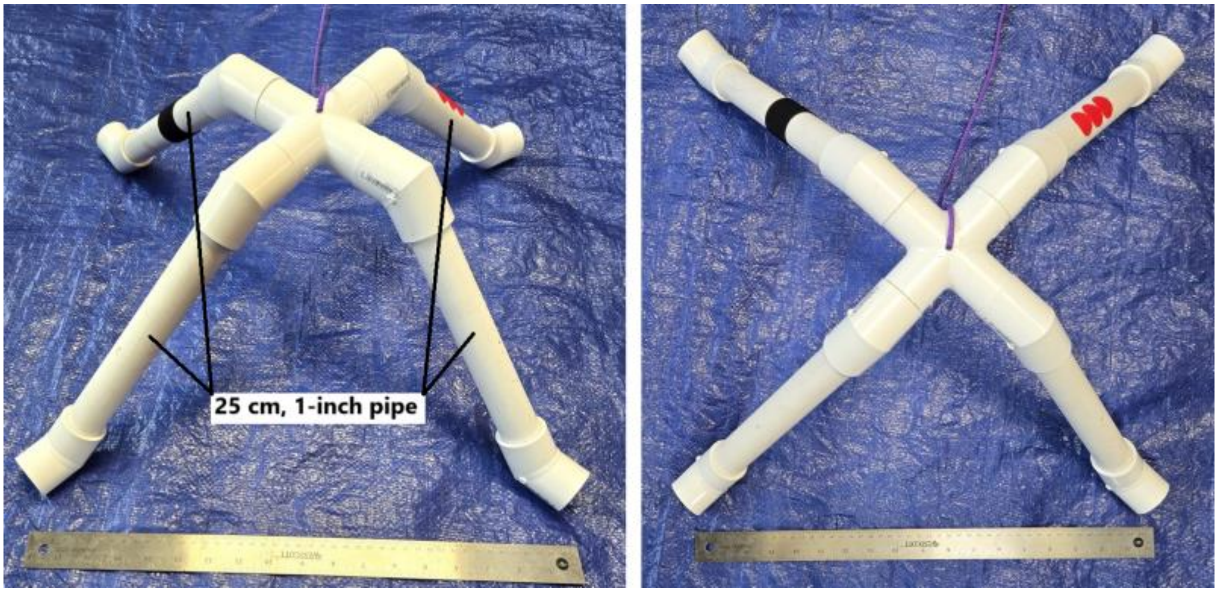

The solar panel array connector inserted into the port.



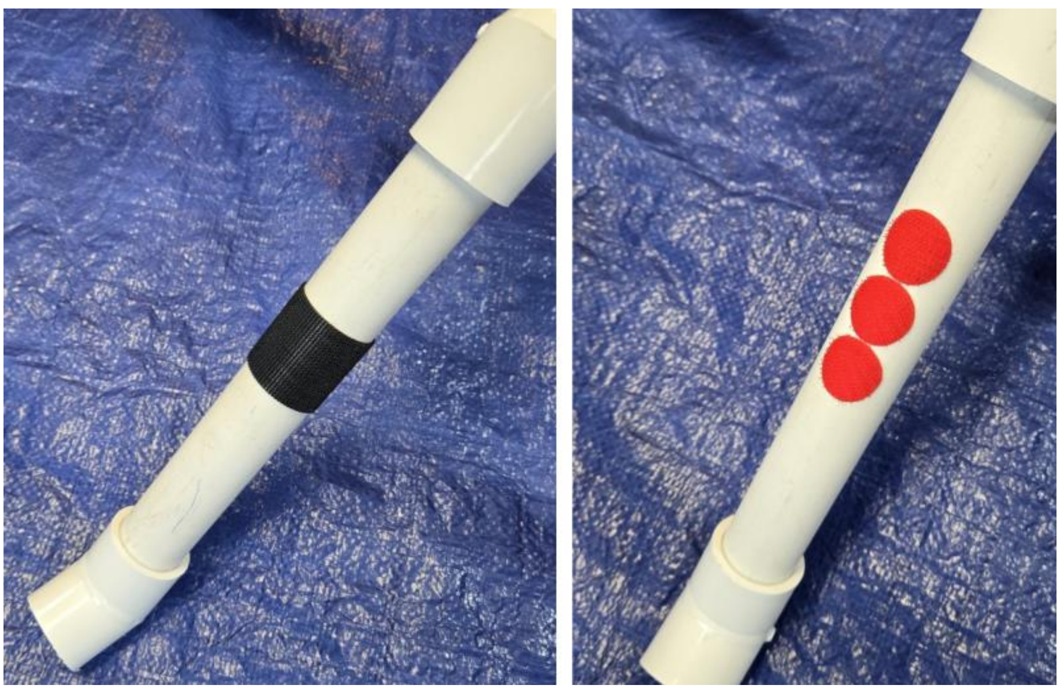
Left: The offshore wind farm surface turbine is constructed from ½-inch PVC pipe and corrugated plastic sheeting. Right: Note the indicated water line. Flotation is used to hold the wind turbine upright in the water. Additional flotation may need to be added around the base to keep the turbine upright. A length of rope connects the turbine on the surface to the wind farm structure on the bottom of the pool.



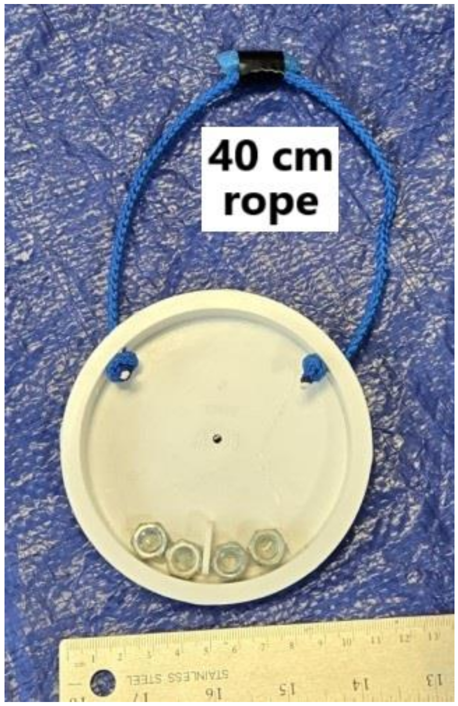
The wind farm turbine can be attached to the floating solar panel array with ½-inch pipe. This serves to stabilize both the wind farm and the solar panel array.



The subsurface structure of the offshore wind turbine is constructed from 1-inch PVC pipe. The subsurface structure is connected to the surface structure by a length of rope. Left: Side view. Right: Top view.



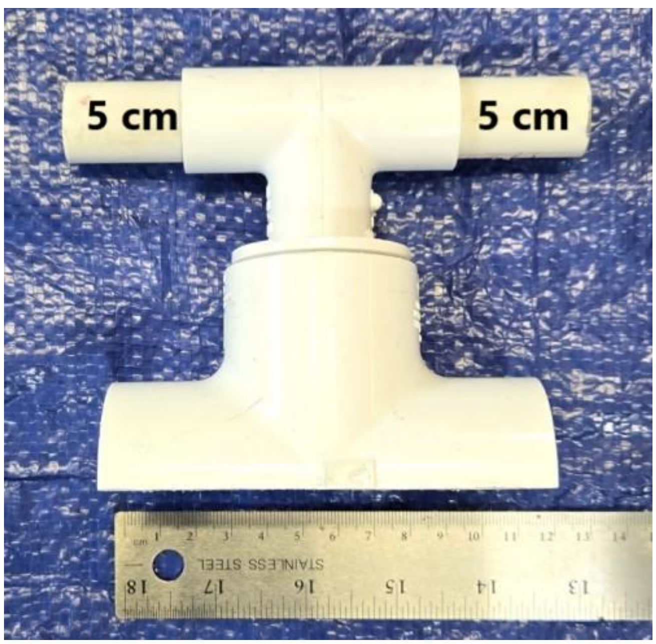
Left: Velcro hooks wrap around one “leg” of the subsurface structure. The sacrificial anodes is attached to these Velcro hooks. Right: Corrosion is simulated by three adjacent red Velcro hook 1-inch circles on another “leg” of the subsurface structure.



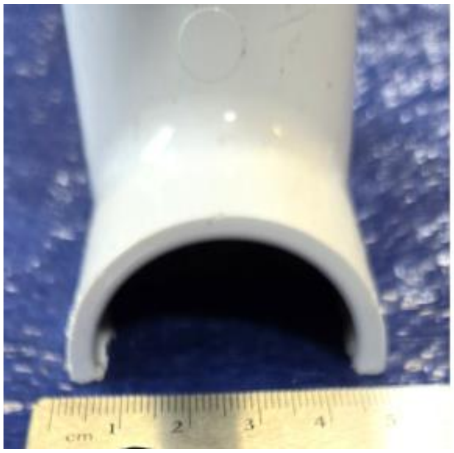
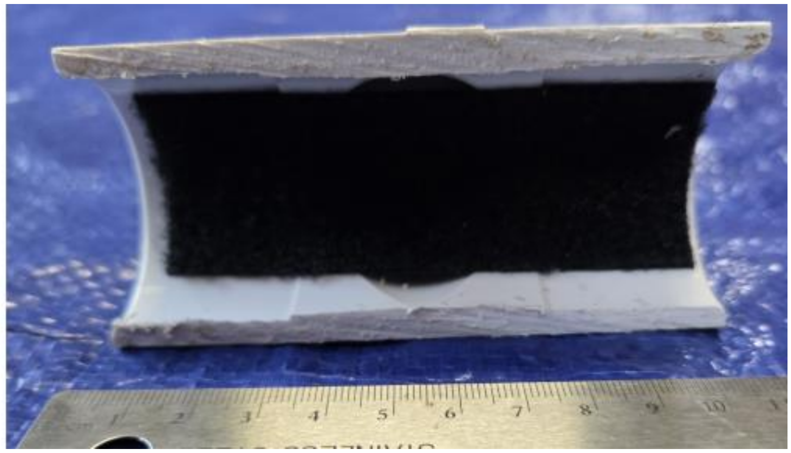
Both the old and new sacrificial anodes are constructed from a [4-inch knockout cap](). 40 cm of [rope]() acts as a carrying mechanism for the anodes. Nuts are used as weight for the sacrificial anodes.

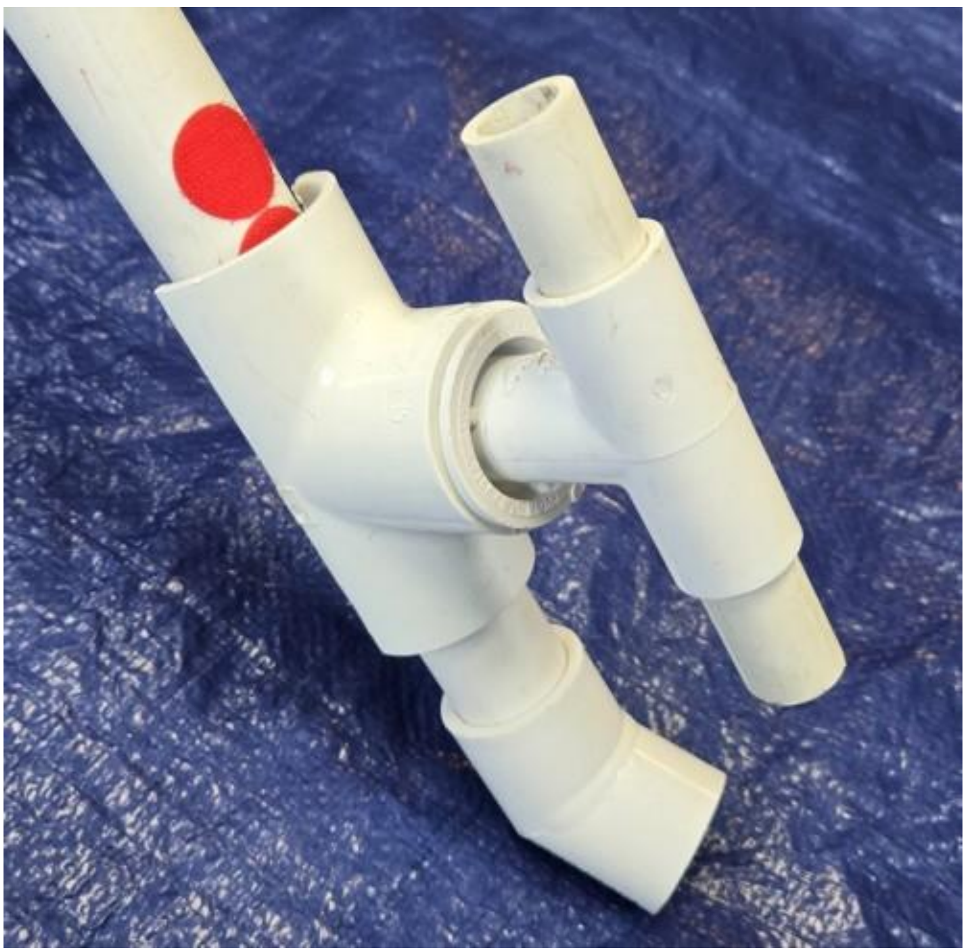
Left: A 0.5 cm x 0.5 cm square of Velcro loops holds the old sacrificial anode to the base of the wind farm. Right: A 4 cm x 4 cm length of Velcro loops secures the new sacrifical anode to the base of the wind farm.

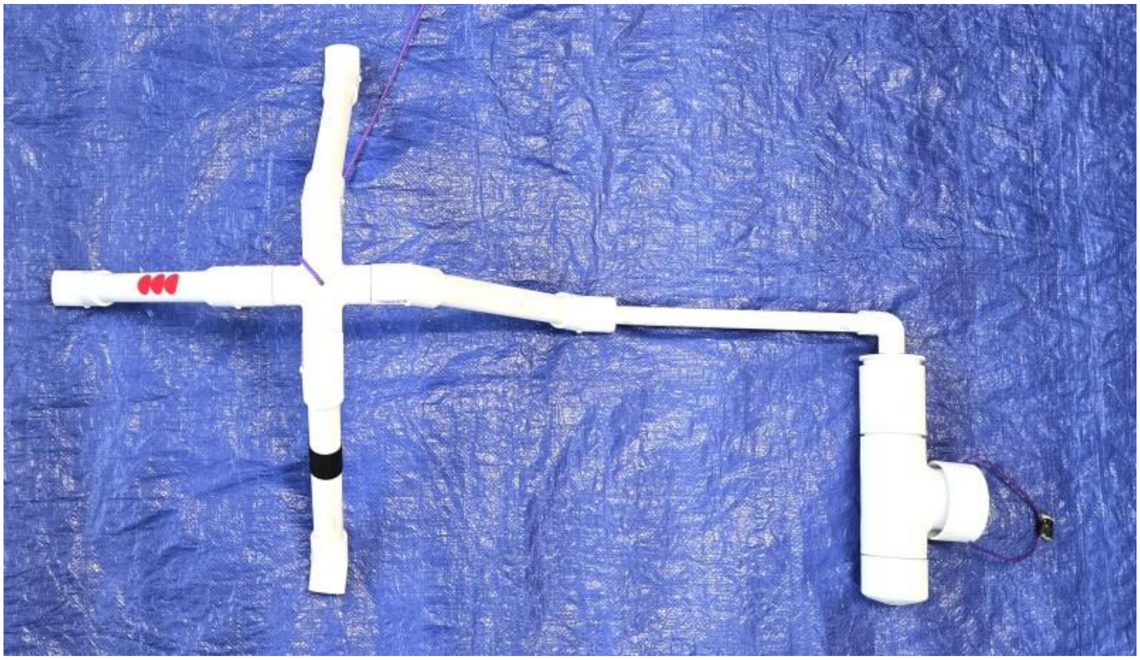
The sacrificial anode on the subsurface structure of the offshore wind turbine.



The epoxy patch is constructed from a 1 ¼-inch PVC tee cut lengthwise and ½-inch PVC pipe.

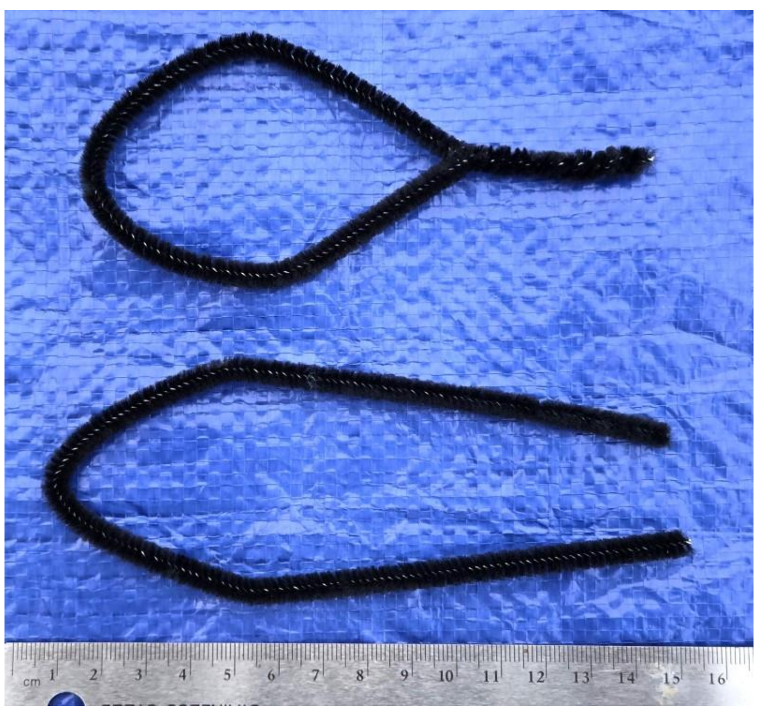


Left: The tee is cut lengthwise. Right: The inside edge of the epoxy patch is covered with a 10cm x 4 cm rectangle of Velcro loops.


The epoxy patch applied over the corrosion on the base of the wind farm.

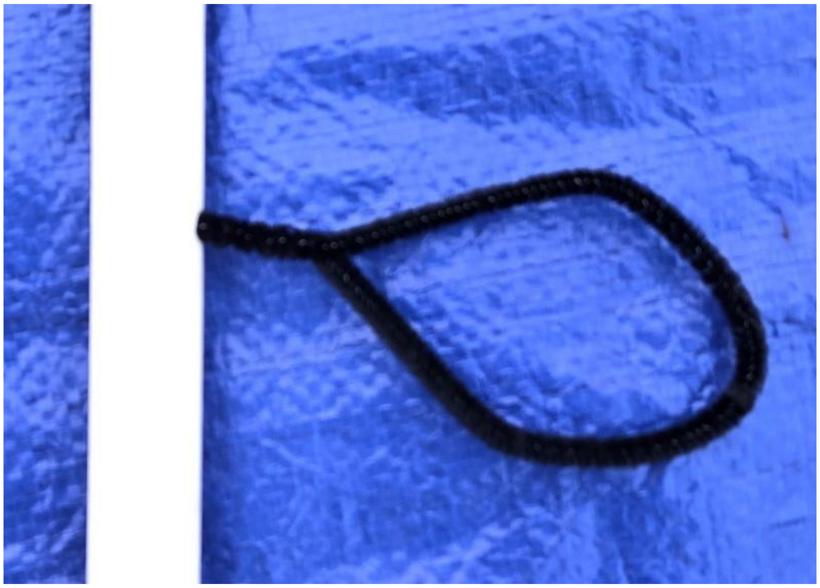


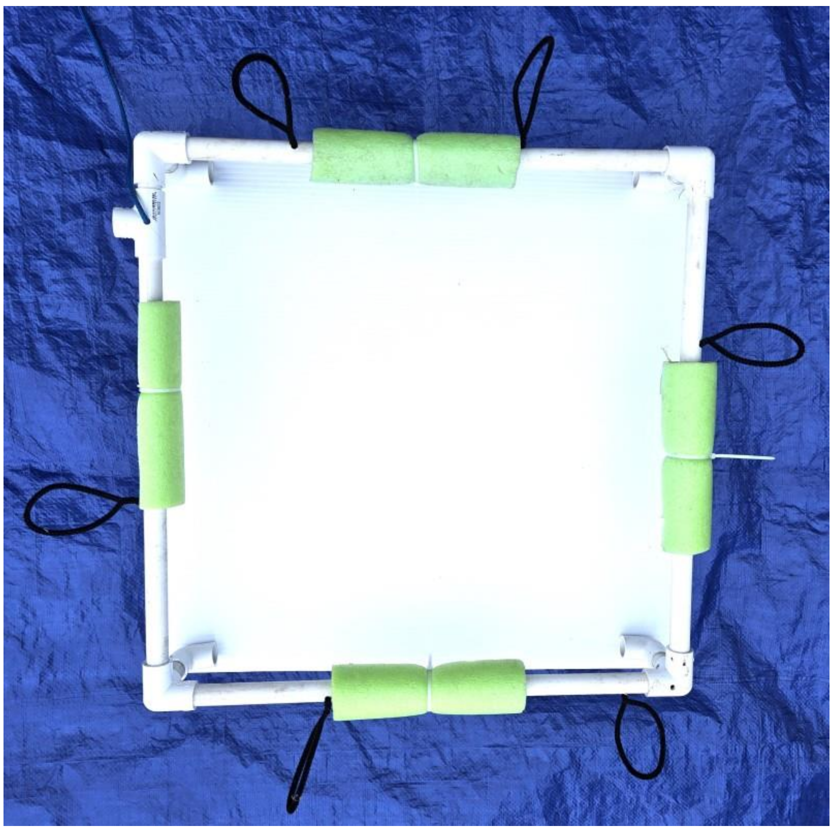
The wind farm sub-surface structure. 30 cm of ½-inch PVC pipe connects the sub-surface structure to the connection port for the offshore solar panel array.

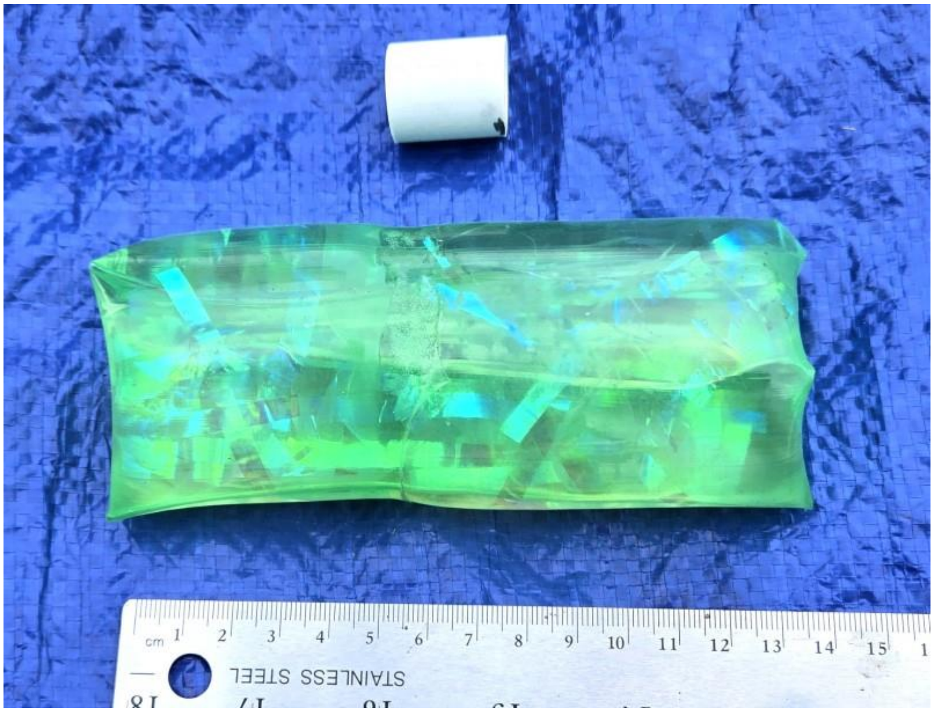
Task 2.2 Monitoring Environmental Impact



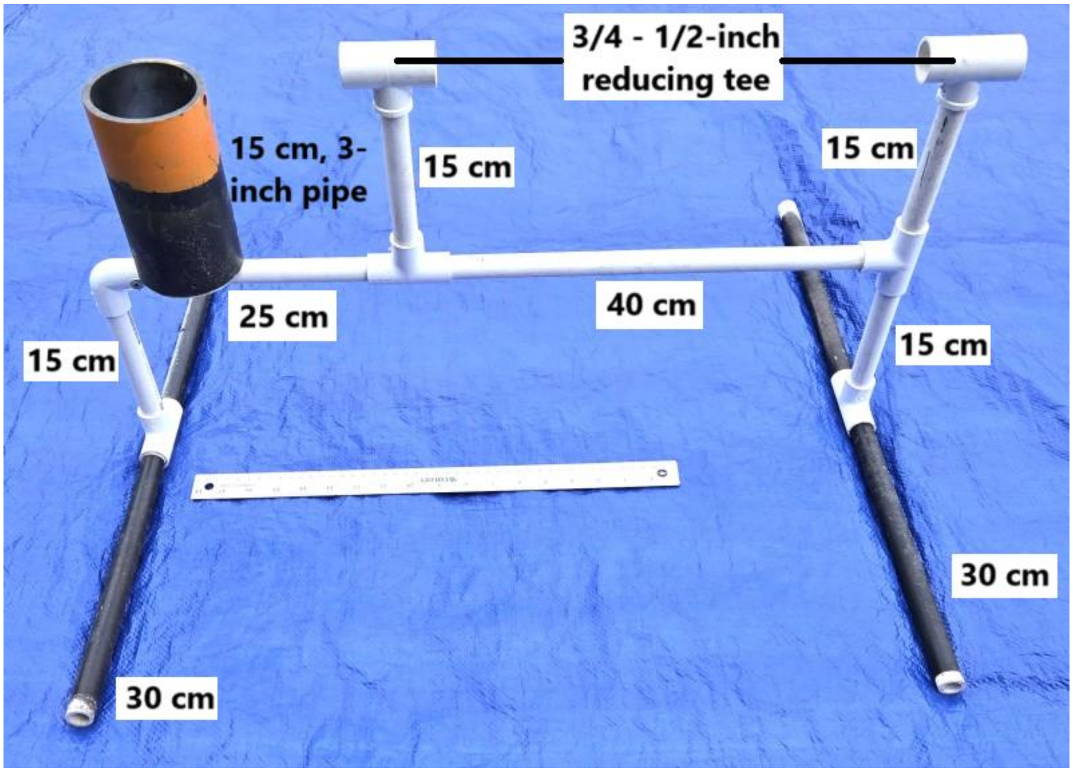
A jellyfish polyp stage. Four cm of the two ends of the chenille strip (pipe cleaner) are twisted together to create the jellyfish polyp.


The Jellyfish polyp inserted into a 3/16-inch hole.

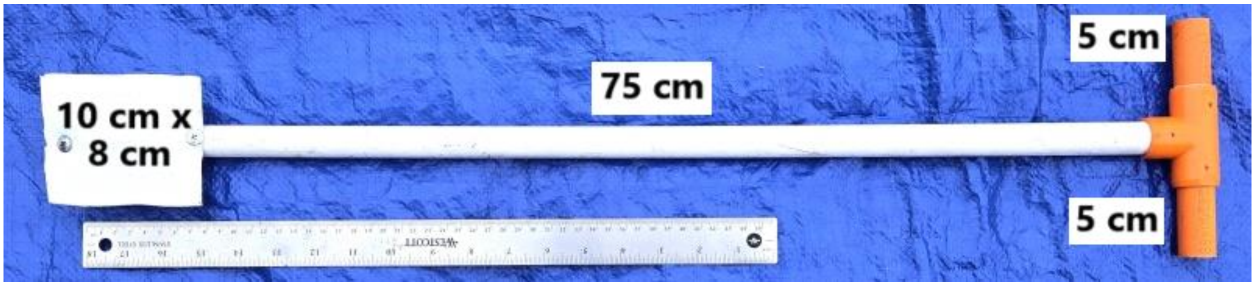

Six polyp stage jellyfish inserted into the solar panel array surface structure.



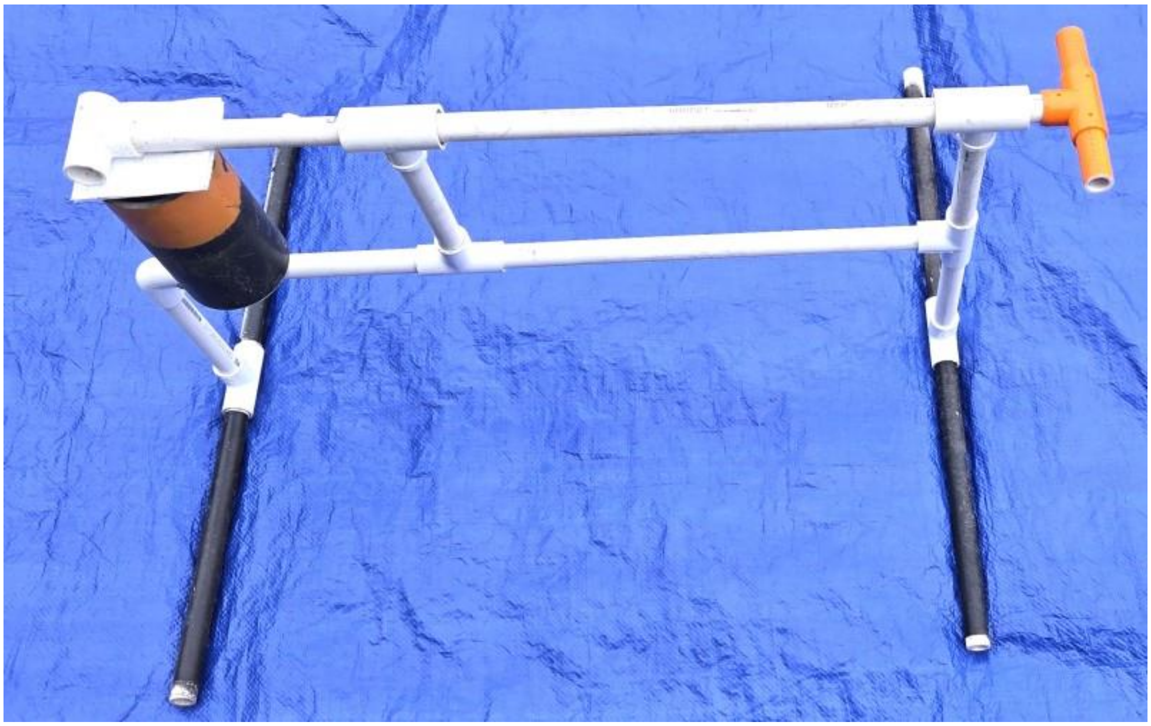
The medusa stage jelly is simulated by a water wiggler. A 1.5 cm to 2 cm section of ½-inch PVC pipe is inserted into the water wiggler to make it slightly positively buoyant.

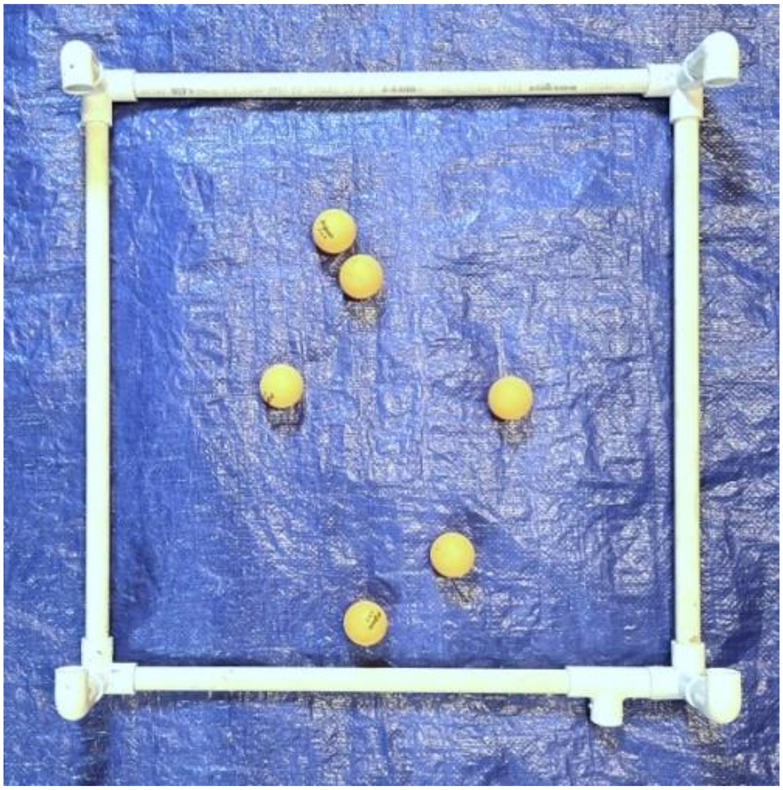


The medusa jellyfish holder is constructed from 3-inch PVC. A ½-inch PVC framework positions the holder up off the bottom.

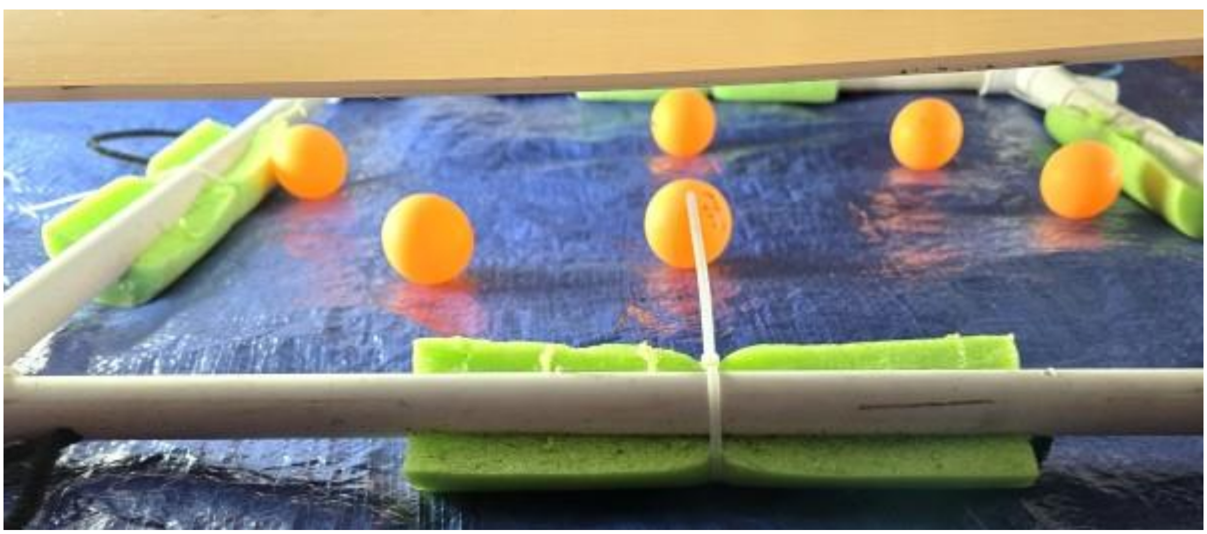


A PVC pin, constructed from ½-inch PVC pipe and corrugated plastic sheeting, keeps the medusa jelly in its holder.

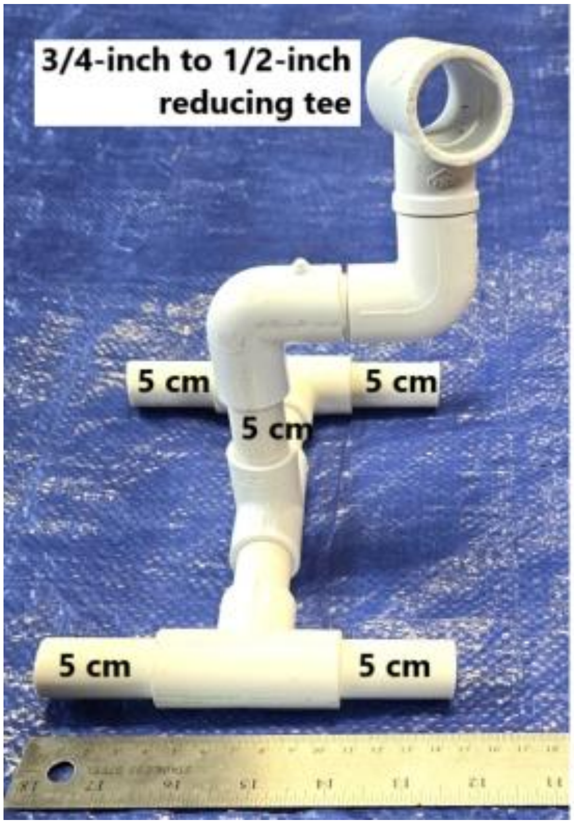

The pin contains the medusa stage jelly in the holder until companies release it into the water column.

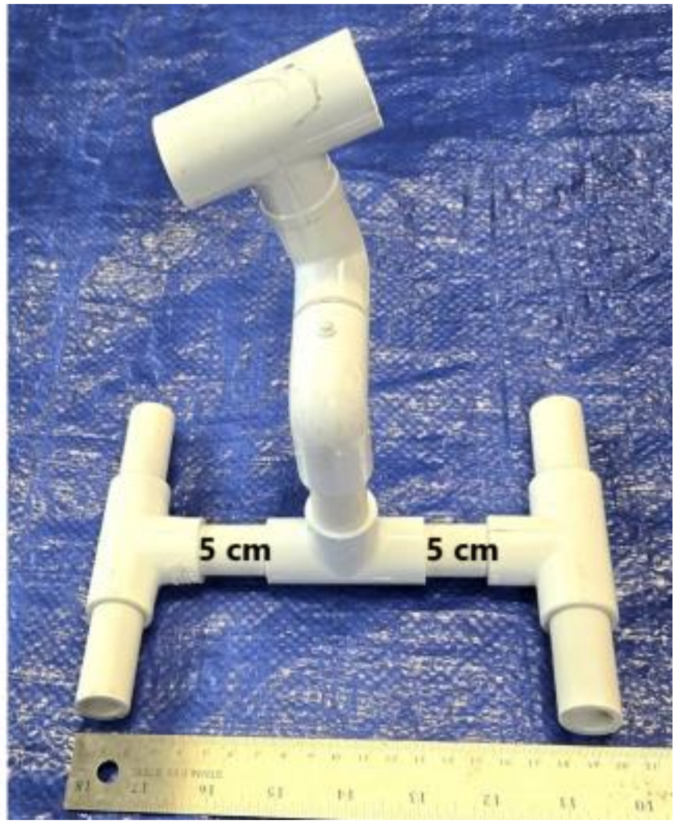


Six ping pong balls, simulating fish, are located inside the PVC framework of the solar panel surface structure. The top corrugated plastic sheeting is not shown.

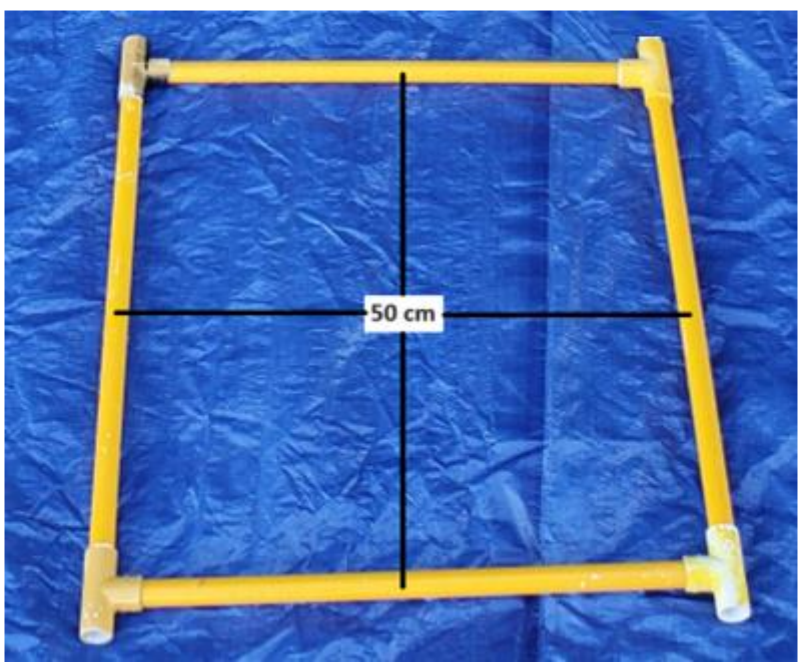


Ping pong balls, simulating fish, underneath the solar panel array surface structure. Flotation on the pipes keeps the structure on the surface. .

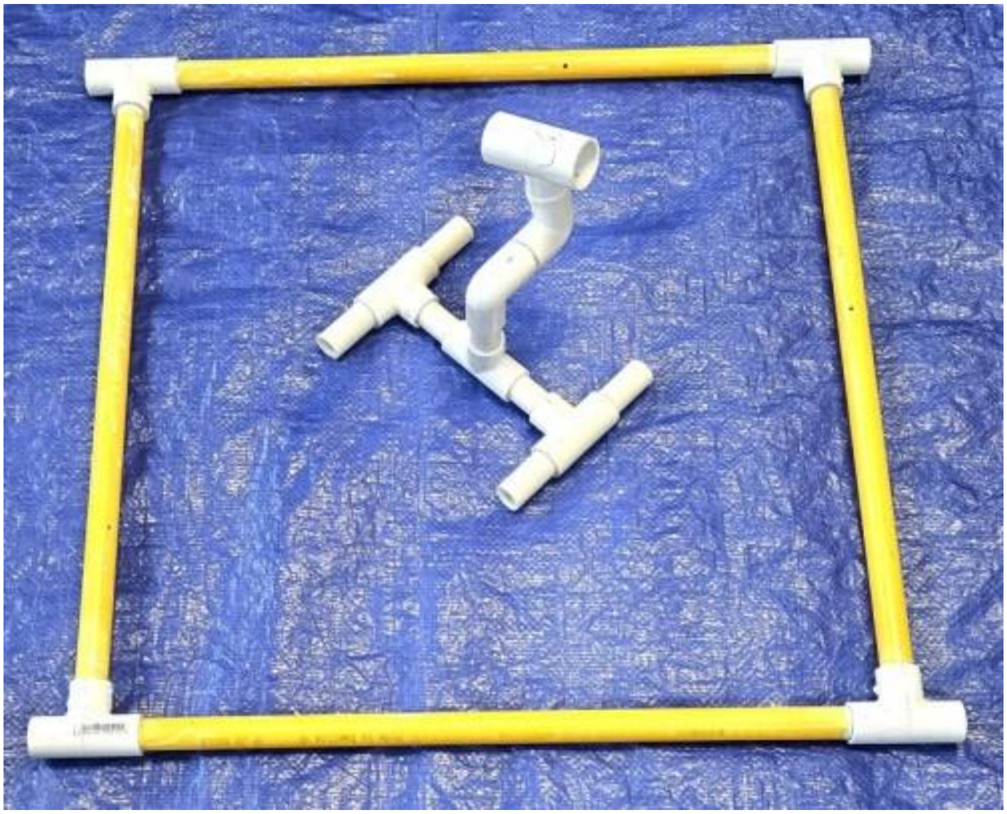




The hydrophone is constructed from 1-inch and ½-inch PVC pipe. Left: Side view. Right: Front view.

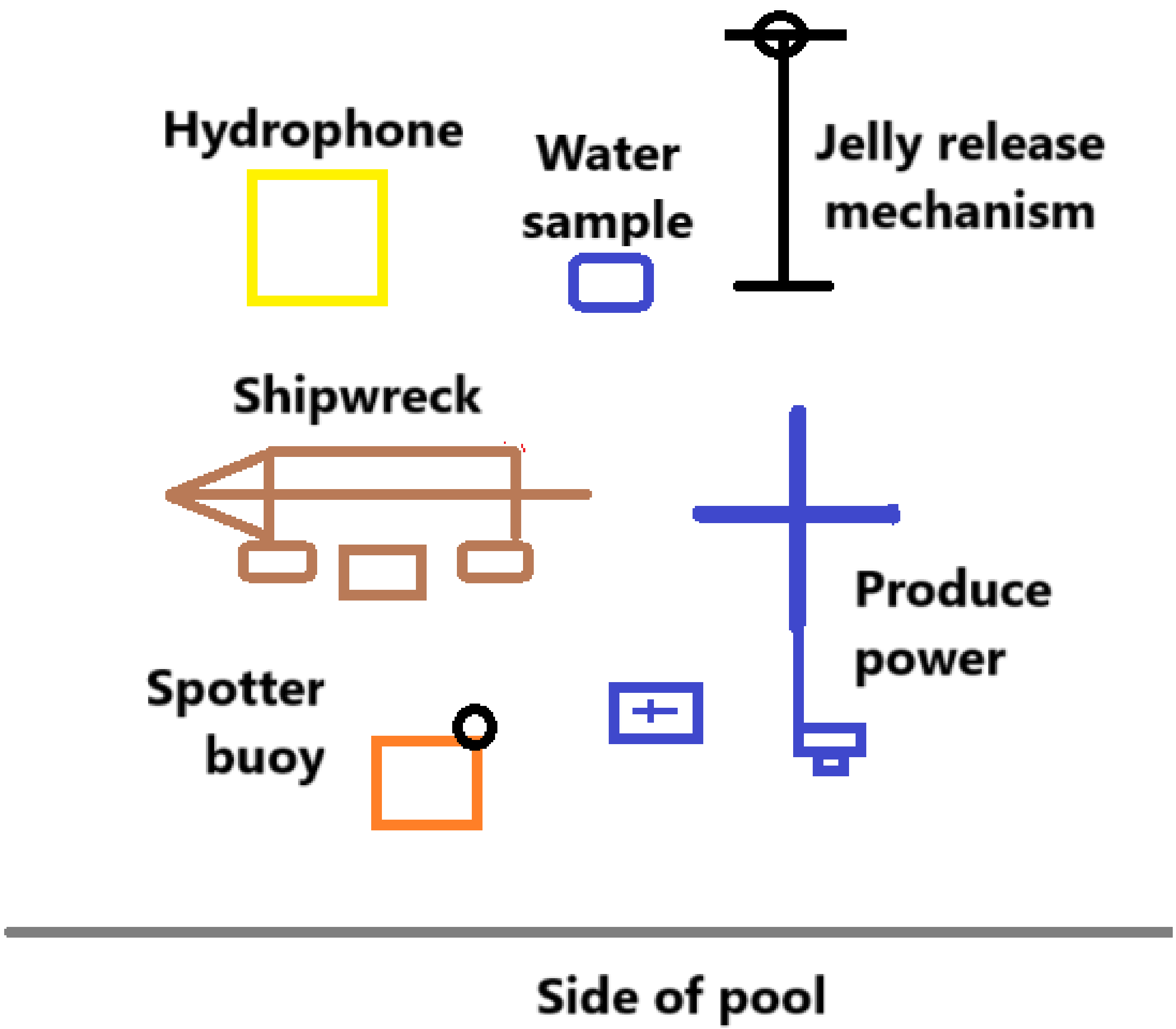


The hydrophone designated area is constructed from ½-inch PVC pipe and is painted yellow.


The hydrophone deployed in the designated area.

SCOUT class product demonstration set up:

The following is a possible underwater set up for the SCOUT class product demonstration. The set up at regional events may vary.



Update Notes:
Updates are highlighted in yellow.

SCOUT prop building instructions.
None