

# ***Preliminary Mission***

## **15<sup>th</sup> Annual 2012 RoboSub Competition**

### **“Ides of TRANSDEC”**

Discuss this and other questions on the [AUVSI Underwater competition forum](#)  
28-Oct-2011

We are releasing this preliminary mission statement for comment by the teams. Please direct your comments and questions to the underwater forum (link above). Teams are encouraged to participate in the forum and to help guide the final rules for the competition. Discussion of the rules will be open for a while. After which, the final rules will be released.

**Reminder:** Along with the paper, each team will also submit a 3-5 minute video. The video will “introduce” the team and their approach to the event. This video will be scored, and will be used online and onsite during the webcast. It will not be used for the oral presentation. More information to follow.

**Reminder:** A team may choose to have their own playlist playing during their semi-final runs (but not during the webcast of the finals). Please remember, this is a family event, so no explicit lyrics. This privilege can be revoked.

**J AUS:** The J AUS portion of the competition is currently in limbo. If it is included, information will be released about the tasks and how it fits into the competition in a timely manner.

**Mission:** The fundamental goal of the mission is for an AUV to demonstrate its autonomy by completing an underwater Ides of TRANSDEC mission. They will be able to commence in training (dock/release buoys), pass over an obstacle course (PVC pipe to pass over), enter the gladiator ring (drop markers), kill Caesar (shoot torpedoes through a cutout), feed grapes to the emperor (manipulate a cylinder), and finally collect the Laurel wreath and crown the new emperor (find a pinger, grab an object and move/release the object).

We expect each vehicle to have 15 minutes to complete the tasks (with an additional 5 minutes of dock preparation time). Any vehicle that touches a buoy, places at least one marker in the bin or on the lip (or fires at least one torpedo through the cutout) and surfaces fully within the octagon (no part outside the structure) will receive bonus points proportional to the unused time. Each vehicle must begin the run by passing under a validation gate. At any time during the run, if a vehicle breaches the surface, the run is terminated (See the section “Breaching” for the exception).

**Weight and Size Constraints:** For the RoboSub Competition, each entry must fit within a six-foot long, by three-foot wide, by three-foot high “box” (1.83m x 0.91m x 0.91m). Table 1 shows the bonuses and penalties associated with a vehicle's weight in air.

	<b>Bonus</b>	<b>Penalty</b>
AUV Weight > 110 lbs (AUV Weight > 50 kg)	<b>N/A</b>	<b>Disqualified</b>
110 lbs ≥ AUV Weight > 84 (50 kg ≥ AUV Weight > 38)	<b>N/A</b>	<b>Loss of</b> <b>250 + 5(lb - 84)</b> <b>250 + 11(kg - 38)</b>
84 lbs ≥ AUV Weight > 48.5 (38 kg ≥ AUV Weight > 22)	<b>Bonus of</b> <b>2(84 - lb)</b> <b>4.4(38 - kg)</b>	<b>N/A</b>
AUV Weight ≤ 48.5 lbs (AUV Weigh ≤ 22 kg)	<b>Bonus of</b> <b>80 + (48.5 - lb)</b> <b>80 + 4.7(22 - kg)</b>	<b>N/A</b>

**Pingers:** The pingers will be ORE model 4330B transponder/responder units. They will be operated in responder mode, and each unit will be preset to one of the following frequencies: 22, 23, 24, 25, 26, 27, 28, 29 or 30 kHz.

**Placement of Competition Elements in the Arena:** The launch point, gate, path, training, obstacle course, Gladiator ring, kill Caesar, feed Emperor grapes and the laurel wreath will be placed in such a way as to not have any three elements along a line.

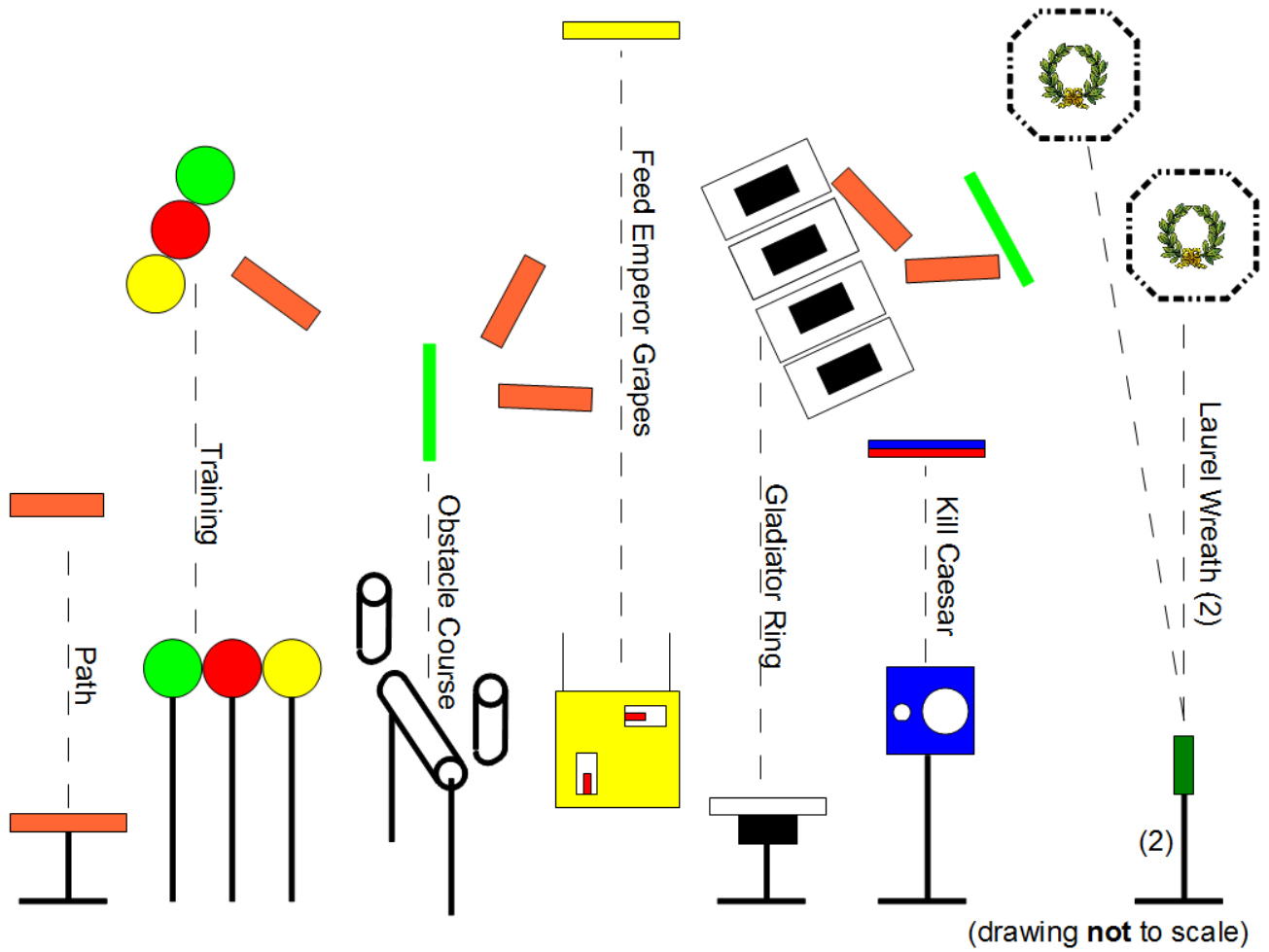


Figure 1: Various Competition Tasks



## Description of Tasks:

**The Path** – There will be six sections of the path which are 4 feet (1.2 m) long by 6 inches (15 cm) wide PVC sheet. The path will be covered in **BLAZE ORANGE** colored Duck Tape. Each path segment will be directly after the current task, and point to the next task or tasks. There will be one following the gate that points to the training (buoy) task. After the training task, one will point to one of the two obstacle courses (structure to pass over). There will be two after the first obstacle course, one which points to the feed the Emperor grapes task (cylinder manipulation), and one which points to the Gladiator Ring (bins)/kill Caesar (cutouts) tasks. Note that there will be no directional markers from the cylinder manipulation task. Following the bins and cutouts, there will also be two paths. One which points to the cylinder manipulation task, and one that passes over the second obstacle course, and towards the laurel wreaths (object pickup / octagons).

**Training (Buoy)** – The task consists of a **green**, **red**, and **yellow** (Question: use other colors?) 9" float. If all goes well, there will be two methods for scoring. The first is to bump the buoy. The second will be to touch a similarly colored square plate (colored Duck Tape: **Neon Green**, **Red**, **Yellow**), located below the buoy, to release the buoy.

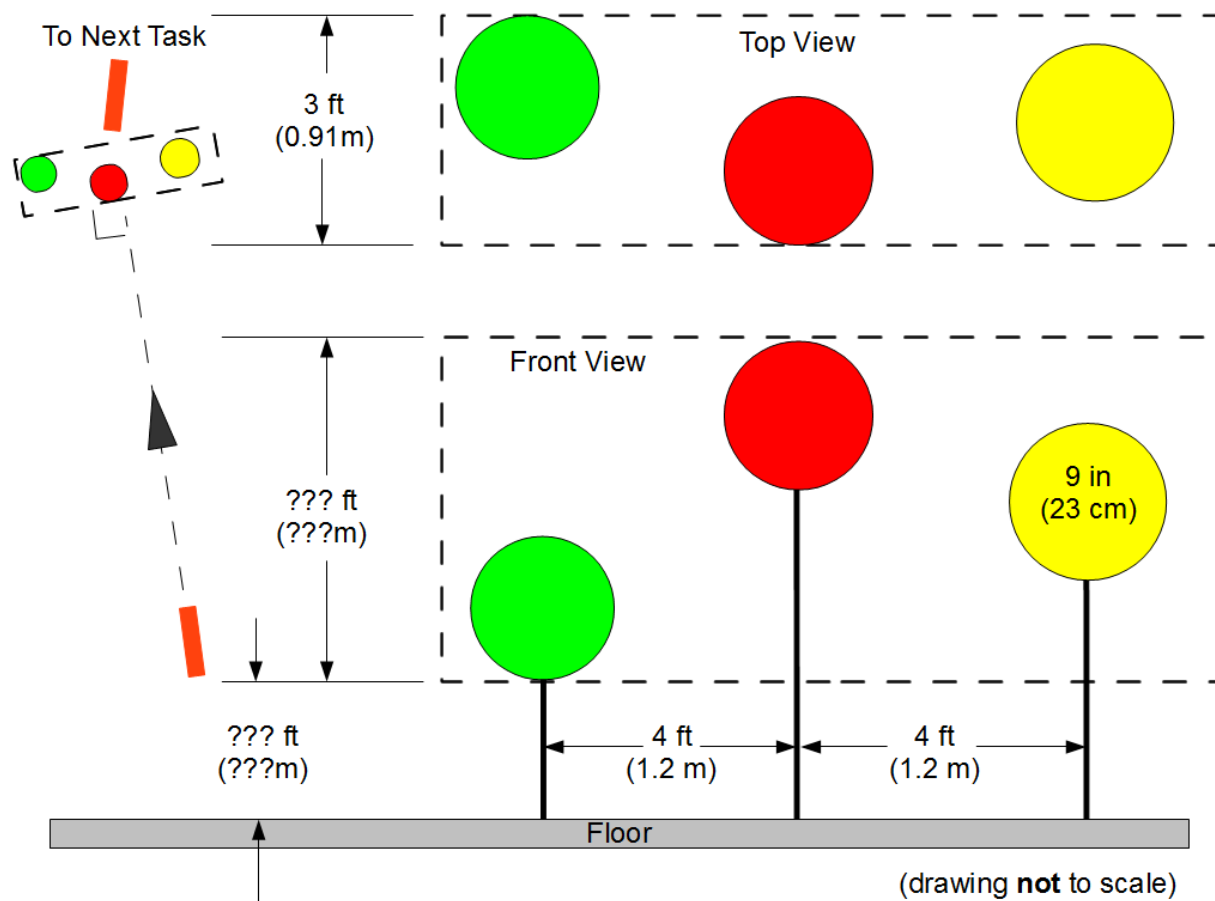
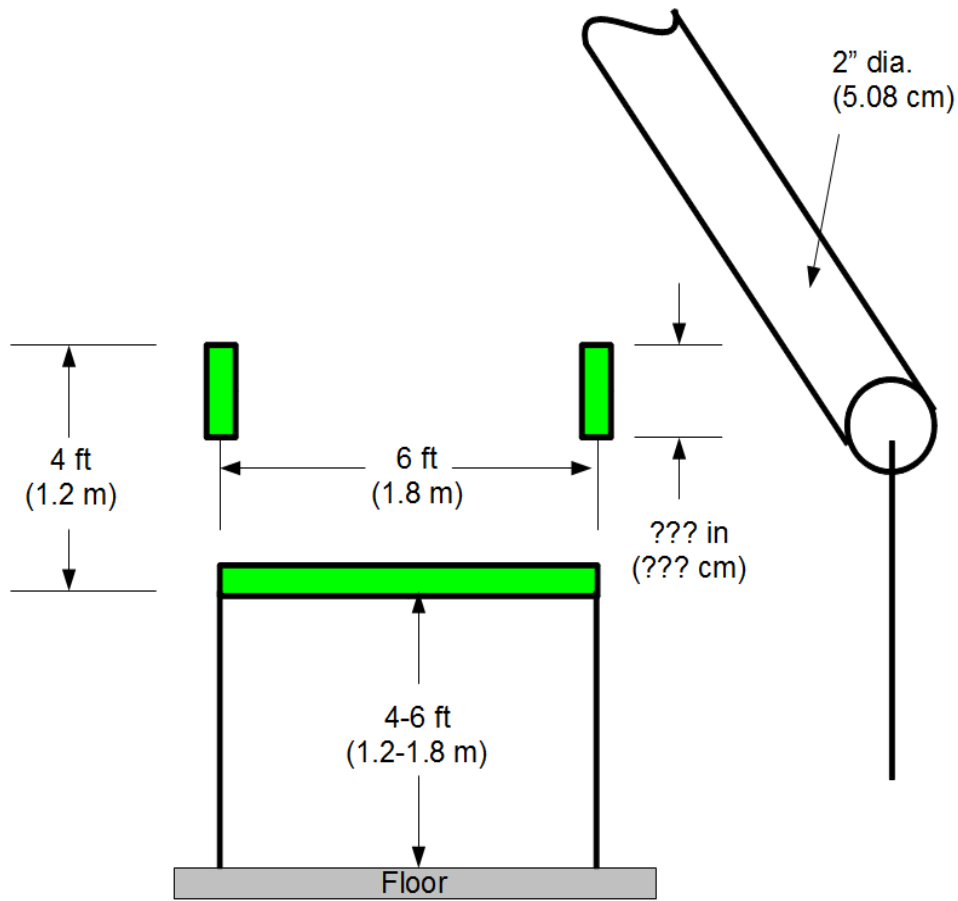


Figure 3: Training

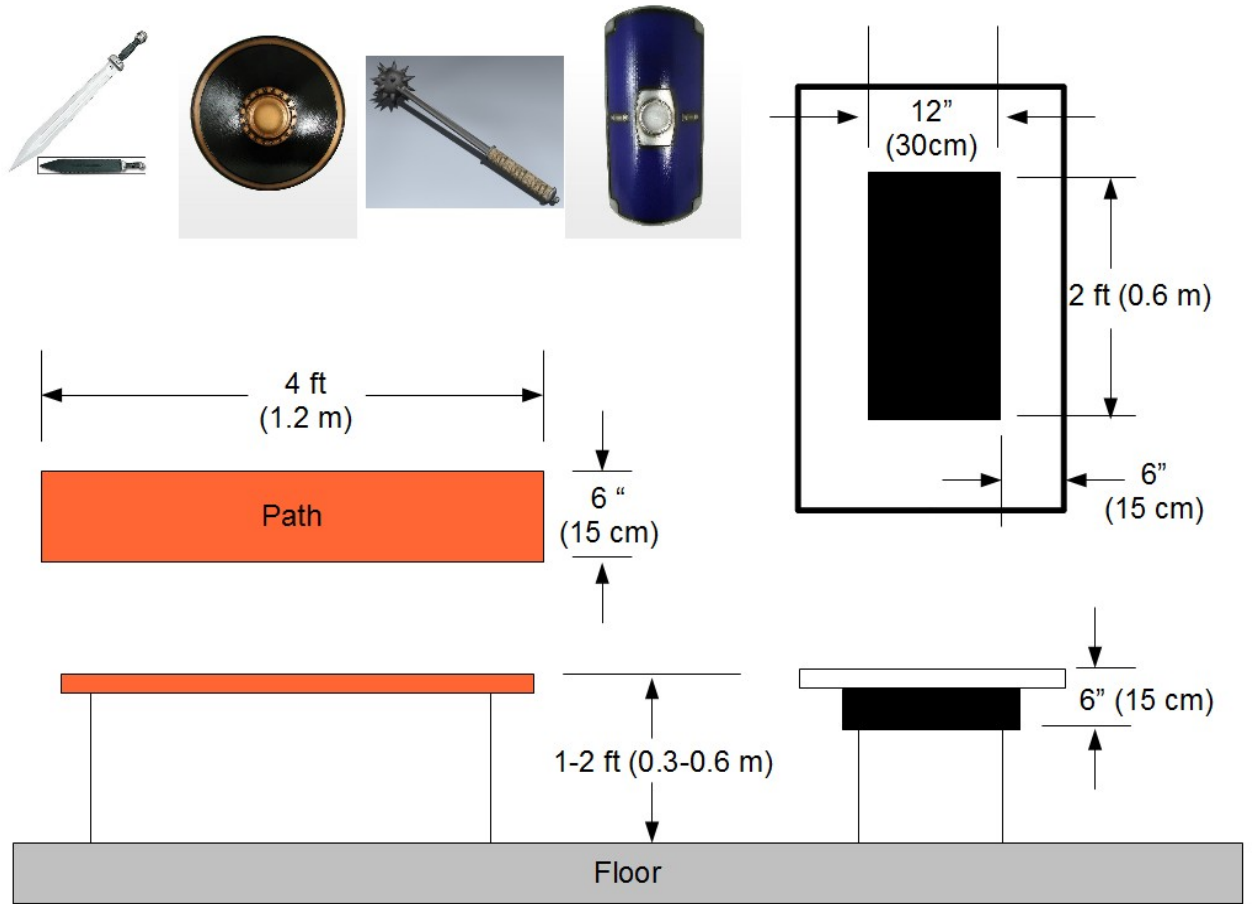
**Obstacle Course (PVC to pass over)** – A “U” shaped section of 2” PVC pipe (**Question: Color?**) will be moored to the floor and consist of one long horizontal section, with two smaller vertical posts secured to the horizontal section and suspended above it. To get full points, a vehicle must pass inside the vertical segments and  $\frac{1}{2}$  or more of it's height below the plane created by the top of the vertical segments.



(drawing **not** to scale)

Figure 4: Obstacle Course

**Gladiator Ring (Bins)** - Each black bin will be surrounded by a 6" white border. A total of two markers can be dropped from the vehicle. Inside the bins will be silhouettes. There will be 2 types of gladiator weapons and two types of shields (total of 4 bins) (**Question: suggestions for silhouettes, color?**). Maximum points awarded for dropping a marker in the correct weapon and shield, some points awarded for dropping a marker in any bin (or landing on the white border).



(drawing not to scale)

Figure 5: Path and Bins

**Kill Caesar (Window Cutouts)** – A 24" x 24" (61 x 61 cm) window, **red** on one side, **blue** on the other (**Question: different size, colors?**). It will be moored to the floor, and will have two different size circular cutouts on the face (**Question: size, different shape?**). One torpedo must be marked as blue, and one as red. Maximum points for firing the red torpedo through the small circle on the red side and the blue torpedo through the small circle on the blue side. Other points will be awarded for firing any torpedo through any cutout.

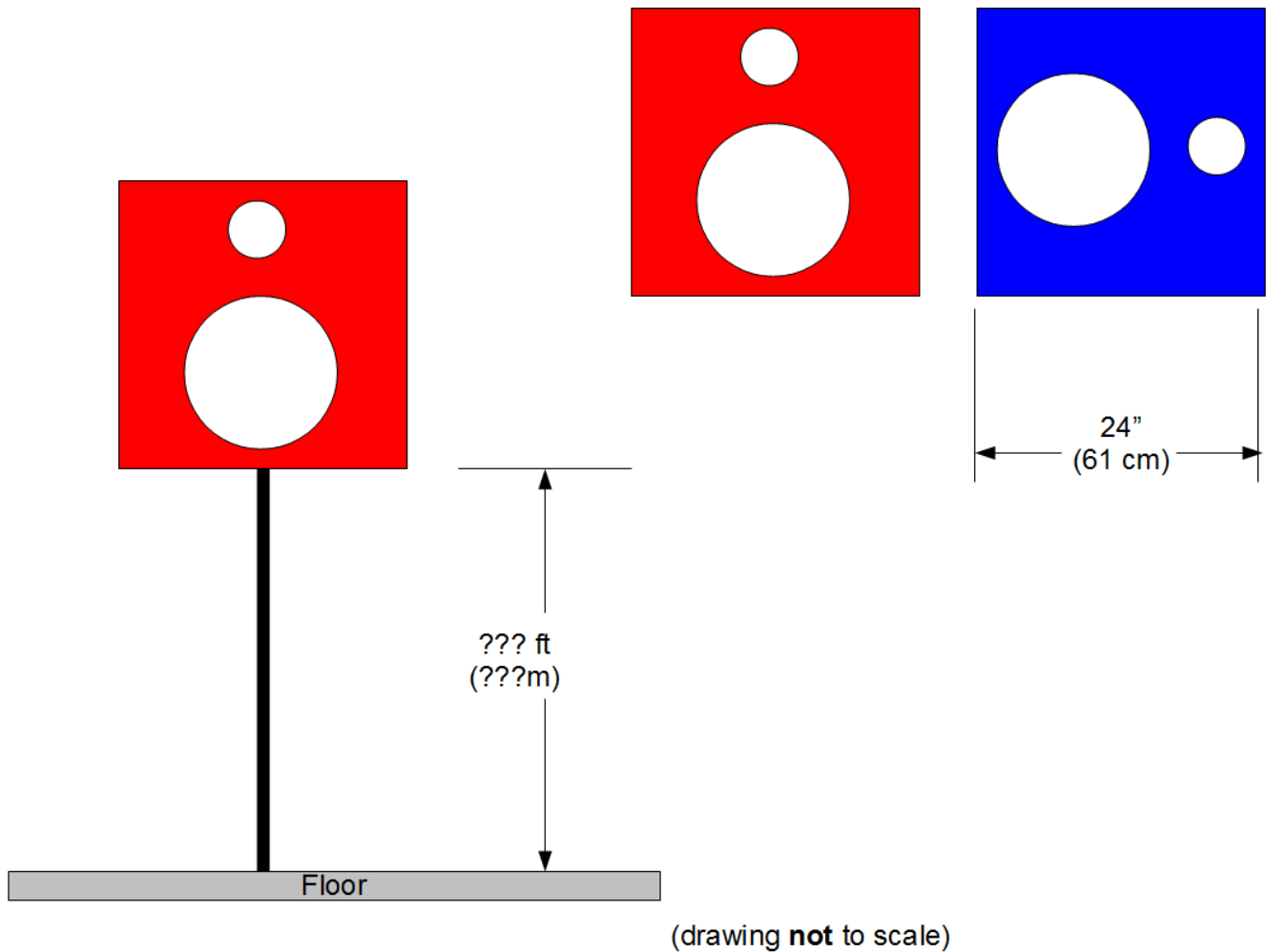


Figure 6: Window with cutouts



**(NEW) Feed Emperor Grapes (Manipulation Task)** – A single 4ft x 4ft (1.2 x 1.2 m) PVC square is placed vertically in the water column (**Question: color?**). It will be suspended from the water surface (from the cantilevered bridge across the TRANSDEC pond, see Figure 2). Two 1" (2.5 cm) PVC cylinders are placed within the cutout in the square (**Question: size of the cylinder, size of the cutouts?**). The cylinders must be removed from the square. They are held in place by a tab and must be moved either vertically (for the vertically orientated cylinder), or horizontally (for the horizontally orientated cylinder), and then released (they will be tied to the square so they can't be lost).

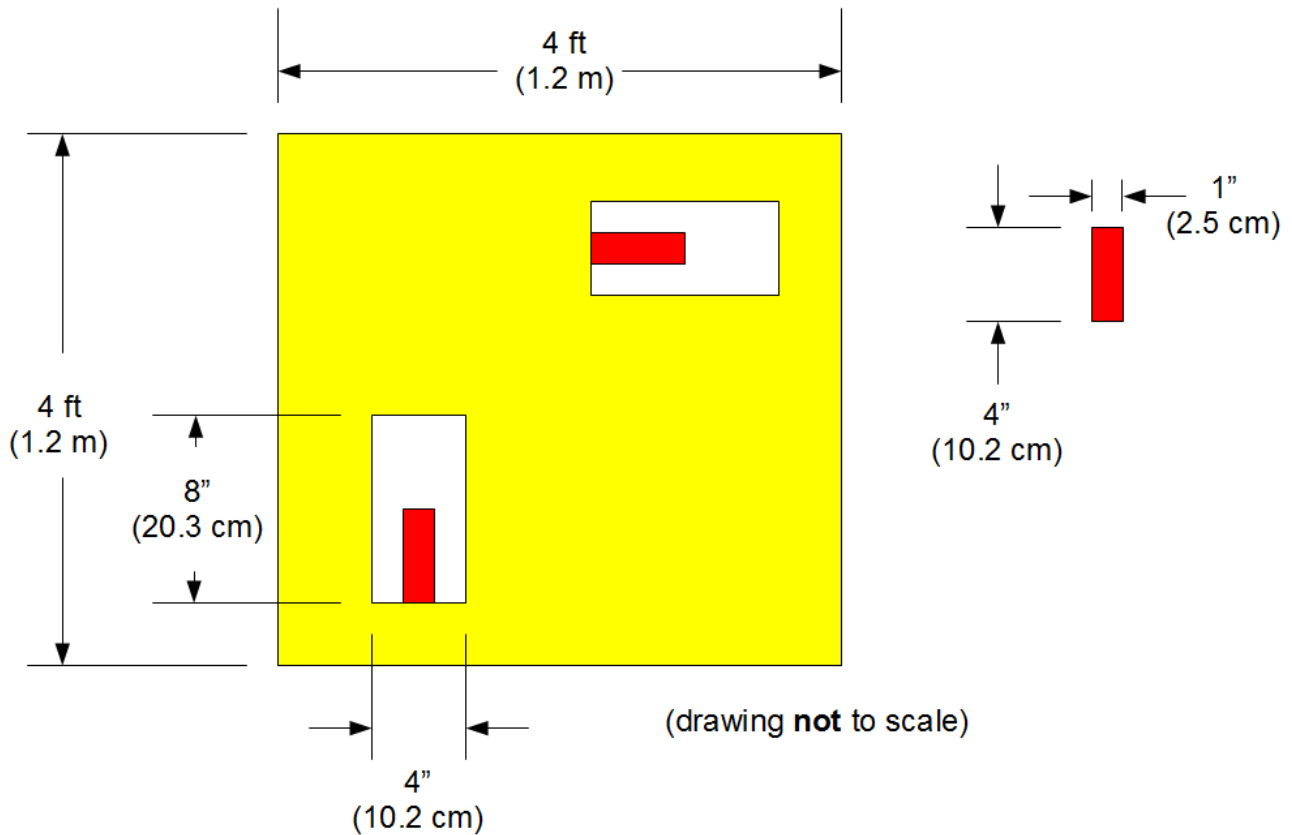


Figure 7: Feed Emperor Grapes

**Laurel Wreath ( PVC recovery and octagon) –** This task consists of an acoustic pinger located off the floor of the pool. Placed directly above the pinger is the laurel wreath (Question: different object, color?) for the vehicle to retrieve. Floating above the pinger on the surface will be an octagon representing the emperors palace. In order to obtain full points for the zone, the vehicle must surface fully inside the octagon.

There will be two different octagons on the competition side, and a team will get points for surfacing within either area. However, only one pinger will be on during a particular run (active), and a vehicle surfacing within the octagon with the active pinger will receive more points.

Points are awarded if the vehicle retrieves (maintaining control) the object. When the vehicle surfaces, more points will be awarded if the object is released. **(NEW)** Additional points will be awarded if, after the vehicle surfaces, it submerges to replace the object (a moot point if you knock over the stand, *you know who you are!*). A team may elect, before the vehicle surfaces, to switch the active pinger and traverse over and surface in the second octagon for extra points.

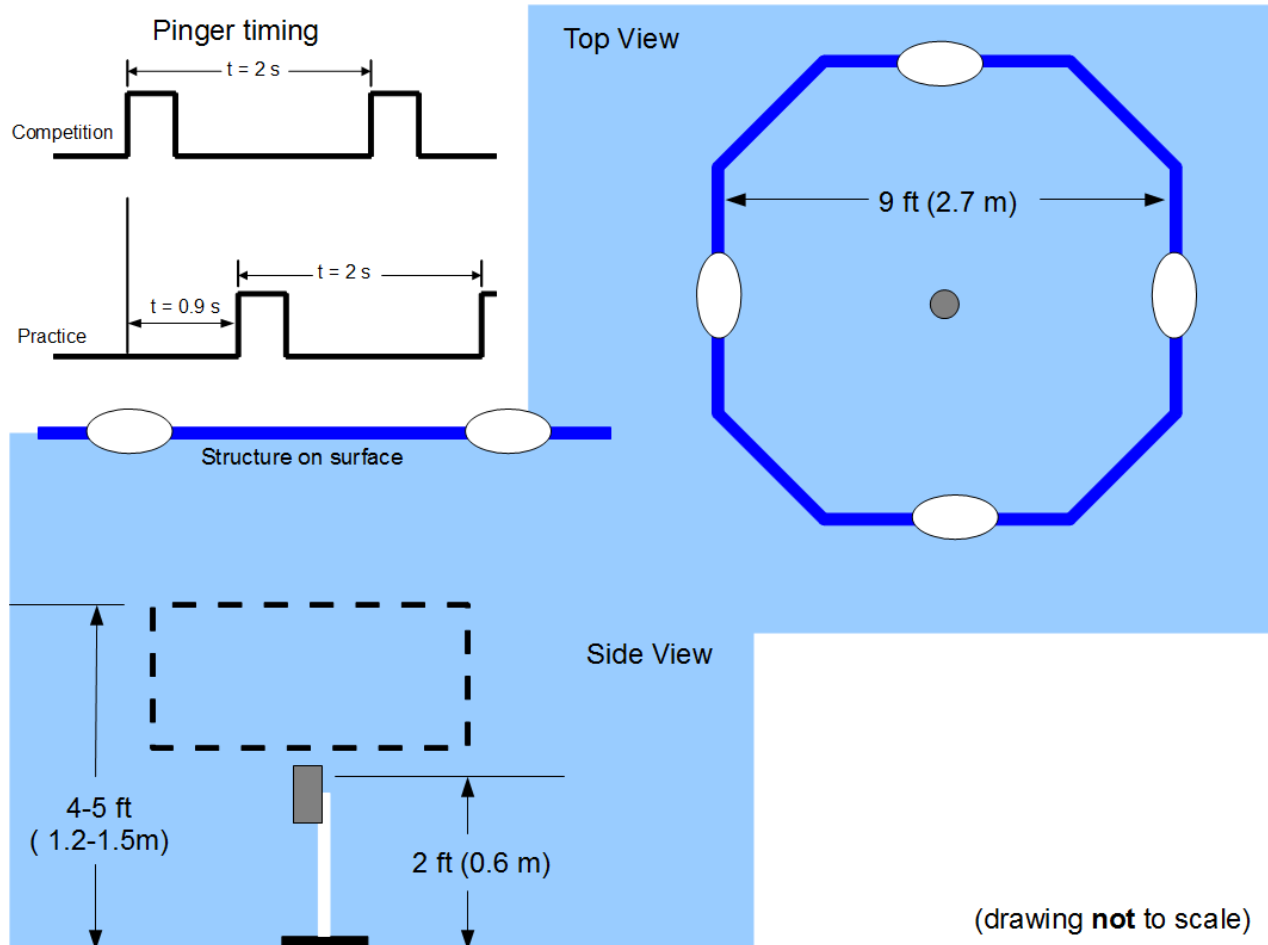


Figure 8: Laurel Wreath and delivery

**Scoring:** Each of the tasks has a point value associated with it. The tasks can be completed in any order. However, the recovery object must be attached to the vehicle at the end of the run in order to get full points for the recovery. Once the vehicle surfaces, it may then choose to drop/place the object for more points.

**Breaching:** When completing the sequence of tasks, the octagon may not be the last task attempted. In this case, if the vehicle surfaces fully or partially within the octagon it can then submerge again to accomplish the remaining tasks.

**Interference:** Vehicles that interfere with competition elements may be disqualified at the judges' discretion. "Interference" does not include cases where, in the opinion of the judges, a vehicle is attempting to complete one of the tasks. If a vehicle becomes entangled on a competition element the run will be declared complete. Teams may keep the points earned on that run, or may have the vehicle returned to the launching platform and start another new run. If a new run is begun, all points from the previous run are lost.