



Sustainable Dam

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Pacific Southwest Conference 2019

1. Objective

The sustainable dam competition offers students the chance to challenge their knowledge of structures and hydraulics, while keeping a sustainable focus. Students will design a lightweight, efficient, and sustainable dam using recycled hard plastics that have been collected through student-organized recycling programs. The dam will be constructed on the day of competition and will be tested to withstand a load of water without failure.

2. Participant Rules

- Each university may enter only one team
- Teams must consist of a minimum of four members and a maximum of six members
- The team must have at least one underclassman
- The team must have at least one male and female
- Everyone on the team must be a registered participant of PSWC 2019

3. Event Description

The objective of this competition is to design and build a 3-dimensional dam from recycled materials that conforms to specific criteria. No construction materials can be bought or obtained specifically for this event, instead all materials used must be recycled from somewhere else. The constructed dam will be tested to withstand 5 gallons of water that will be poured in by the team. In addition, teams will write and submit a report outlining the materials used and the recycling program enacted to collect these materials. The written report will be assessed and factor into the overall competition scoring. At the conference, teams will have 45 minutes to construct their dams. The dams will then be weighed and inserted into the container (outlined below) and tested.

- All construction materials must be recycled hard plastics (i.e. water bottles, take-out containers, etc)
- Tools to be used in construction cannot be electric or battery powered (i.e. scissors, X-Acto Knives, etc.)
- Teams must provide their own construction materials and tools

4. Materials

Construction Materials

Allowable materials are restricted to rigid plastics such as water bottles or plastic take-out boxes. The use of other materials in the dam construction will result in disqualification. No tape or glue may be used. To clarify if a specific material can or cannot be used please fill out this [request form](#) and our team will determine approval on an individual basis and update the materials list accordingly.

Materials List

Testing Container

The testing container (shown in Figure 1) will have the interior dimensions of $11 \frac{1}{2}$ tall by $15 \frac{5}{8}$ long by $20 \frac{5}{8}$ wide [inches]. Once built the dams will divide the testing container into 2 spaces. Water will be poured into one side, and the water retained will be calculated by subtracting the amount of water that drains into the other space. This measurement will be recorded 30 seconds after the 5 gallons of water are poured into the container. The dams will be attached to this container by sliding them into grooves along the 2 vertical sides. A non-hardening putty will be provided to seal the bottom and side edges of each dam. The top edge will remain unattached.

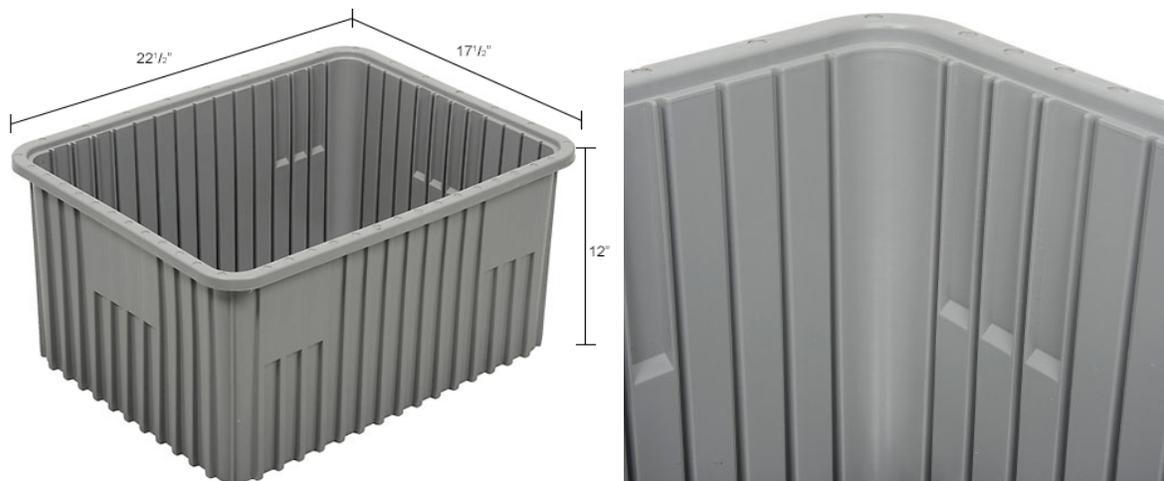


Figure 1: Dimensions of the testing container with the exterior dimensions and a close up of the ridges that the dams will need to be inserted into.

5. Recycling Report

- Please include the following in your report
 1. Introduction
 - a. Name of University.
 - b. Names of team members.
 - c. Captain's name, email address, and cell phone number.
 2. Recycling Program
 - a. Name, and specifications
 - b. Flyer design depicting the program
 - c. Pictures of the collection process
 - d. Collection charts and/or graphs based on types of items collected and locations they were collected from
 - e. How the program can continue to expand and grow past the conference
 3. Materials
 - a. Descriptive list of recycled materials to be used in the dam, including how many of each item you estimate that you will need in your dam construction.
 - b. How it was decided which materials to use for each aspect of the dam
 - c. What would happen to these materials if they were not recycled

- Report Logistics
 - Reports will be due on March 15, 2019
 - Submitted by email in .PDF format to pswc2019@gmail.com
 - Reports will be reviewed by industry professionals
 - The scoring of the report is outlined under "Scoring"
 - There will not be a presentation component of this project

6. Testing

Teams are responsible for bringing their own construction materials and tools which will be inspected before construction begins. Each team will be given 45 minutes to construct their dam. Electric and battery powered tools will not be allowed during construction. Once the team has completed their dam or the time expires the dam will be weighed. After the weight is recorded the team will have 1 minute to install their dam into the testing container using the provided putty. All teams will be given the same amount of putty, measured by weight. Once the team is satisfied that the dam is installed or the time expires, the team will be given a 5 gallon bucket of water. The team is allowed to pour the water in however they like, but the pouring sequence cannot last longer than 1 minute. A 30 second timer will be started once all of the water has been poured, even if this is before the teams allotted pouring minute ends. After 30 seconds the water retained will be calculated. This calculation will be based of the change in height of the water on either side of the dam.

7. Scoring

Teams will be scored based on:

- 1) The materials report
- 2) The weight of their constructed dam
- 3) The amount of water the dam holds, up to 5 gallons.

Table 1: Materials Report

Materials Report	Creativity in the Recycling Program	Were all of the requirements from the outline met?	Grammar and Spelling	Organization of the Report	Theoretically, can the program grow and continue?
6pts	The program uses ideas creatively and effectively	All outline bullets were addressed	Less than 3 grammar or spelling errors	Ideas are easy to follow and presented well	Yes, it would be easy to continue this program.
3pts	The program uses old ideas in inefficient ways	Partial credit is not available for this category	Between 3 and 6 grammar and spelling errors	Most ideas are easy to follow and presented well	This program could continue with some work
0pts	There is no program	Outline bullets were not all addressed	More than 6 grammar and spelling errors	Ideas are not easy to follow and presented poorly	No, this program could not continue

The reports will be due March 15, 2019 to be graded by people from industry before the weekend of the event. The report score will then be taken into account in each team's overall ranking.

Table 2: Dam Weight

Weight	Points
Less than 75 grams	30
75 to 100 grams	25
100 to 125 grams	20
125 to 150 grams	15
150 to 175 grams	10
175 grams and above	5

Dams will be weighed before being inserted into the testing bucket.

Table 3: Water Retained

	Points
5 gallons	30
4.5 to 5 gallons	25
3.5 to 4.5 gallons	20
2.5 to 3.5 gallons	15
Less than 2.5 gallons	10
Dam collapses while pouring	5

Water Retained will be calculated by how much water the wall is able to hold back 30 seconds after the team has finished pouring.

Table 4: Overall Scoring

	Points Earned
Materials Report	X/30
Dam Weight	X/30
Water Retained	X/30
Total Points:	X/90

Teams will be ranked off their overall scoring and ties will result in both teams receiving the points for that place. For example, if 2 teams tied for 3rd they would both receive 3rd place points and there would be no 4th place.