



2025 ASCE Gulf Coast Student Symposium-Buried Structure Competition Rules
March 6-8th, Richard A. Rula School of Civil and Environmental Engineering,
Mississippi State University, MS

1. Objective: Buried structures, such as pipelines, highway culverts, and tunnels, are essential to people’s daily lives which involve several areas of civil engineering including geotechnical, structural, hydraulic, construction, and environmental engineering. The objective of the Buried Structure Competition is to help students understand the load transfer mechanisms around buried structures and inspire more Civil Engineering students to pursue an advanced degree by conducting research on this amazing interdisciplinary topic.

2. Eligibility: A Buried Structure competition team will consist of no more than 4 students with one student recognized as the team captain. Students must be enrolled during the Spring 2025 semester as full-time civil engineering students and meet all other eligibility requirements to participate in an ASCE student symposium. Each university is allowed only 1 competing team.

3. Description of Buried Structure Competition

- Competition tools participating teams should prepare and bring to symposium: A wood box with an inside dimension of 24 in. in width, 12 in. in length and 20 in. in height. Front and back side walls should be removable. A piece of PVC pipe with a diameter of 6 in. and a length of 12 in. A soil compaction tool to be selected by each team.

Requirements for backfill materials: The backfill material will be typical “concrete sand” per ASTM C33-24a provided by the symposium organizers on site. The sand will be clean, dry, rounded to subrounded sand with the grain size distribution specified in **Table 1**. Organizers will try their best to ensure the backfill materials meet the specifications in **Table 1**. The specified grain size distribution may be subject to change. Organizers will reach out to all participants if new specifications are adopted.

Table 1 Grain Size Distribution of Backfill Materials

Lower Bound		Upper Bound	
Size (mm)	% Finer	Size (mm)	% Finer
9.50	100	9.50	100
4.75	95	4.76	100
2.36	80	2.38	100
1.18	50	1.19	85
0.60	25	0.59	60
0.30	5	0.30	30
0.15	0	0.15	10
0.075	0	0.075	3

- Construction procedure: The following construction procedures shall be adopted by participating teams as shown in **Figure 1**:
 - (1) Mix the dry sand with volume of water selected by each team. The water content of backfill material should be determined by the participating teams. Water will be provided on-site along with water spray bottles.
 - (2) Place the wood box on a firm floor and backfill 1 in. thickness of sand as the bedding.
 - (3) Place the PVC pipe with paper sleeve on the compacted sand layer bedding in the middle of the box.
 - (4) Backfill the box on two sides of the PVC pipe and then above the pipe. Backfill material should be compacted during the construction process. The compaction energy and method should be determined by the participating teams. The thickness of soil cover (soil above the pipe crown) is required to be in the range of 10 to 12 in.
 - (5) Remove the front and back walls of the box and then push the PVC pipe out from the box to form a tunnel.
 - (6) Apply load (5-gallon buckets filled with water) on the top of the tunnel failing the whole structure with an increment of 500 mL water.



Step 1: Spray water on sand and mix



Step 2: Fill sand and compact to form 1 in. thick bedding



Step 3: Prepare paper sleeve for the pipe



Step 4: Spray oil between paper sleeve and pipe and install it



Step 5: Continue to fill and compact to reach the desired soil cover



Step 6: Remove front and back walls of the wood box



Step 7: Construction completed



Step 8: Push out the PVC pipe



Step 9: Place 5-gallon bucket on the top of the tunnel



Step 10: Dump water in the bucket to fail the tunnel

Figure 1. Construction and Competition Steps



4. Rules: The Buried Structure Competition team members shall obey the following rules:

- Team leaders should send a **Notice of Intent** to register for the Buried Structure Competition by emailing to asce25symposium@lists.msstate.edu **no later than the midnight of February 17th, 2025**. The email should include a statement indicating: (1) which Student Chapter intends to participate in the competition, (2) the name and email address of the team captain, and (3) the names of the team members.
- The sand mix must be finished before the construction starts. No more water shall be added to the backfill material during construction.
- The PVC pipe must be removed before load is applied.
- Team members should decide the starting load applied to the tunnel. If the tunnel fails under the first load increment, the score for the team would be zero.
- The construction and testing to failure must be finished in 60 minutes or less.

Failure to follow the instructions listed above could result in disqualification for this competition.

5. Judging: The team with the maximum load applied will win the competition. If multiple teams have the same load, the team with minimum construction and testing time will be the winner. All rule interpretations, adjudications, and additions will be at the sole discretion of the Head Judge.

6. Award: Recognition and awards will be provided to the 1st, 2nd, and 3rd place team.