

Stick Together – Extreme!

Spring Challenge 2026

LEVEL: Middle School
DIVISION(S): No divisions, will just be 3 winners per school – 1st, 2nd, 3rd
COMPOSITION OF TEAM: 2-3 of Students per team

OVERVIEW: Students will use math and science to implement engineering concepts in the design and construction of a model bridge from their own plans that will carry a maximum load while using as few craft sticks as possible; stressing neatness, craftsmanship, and creativity. **Bridge testing will happen at your school site. MESA advisors must request a testing day through Pacific MESA.**

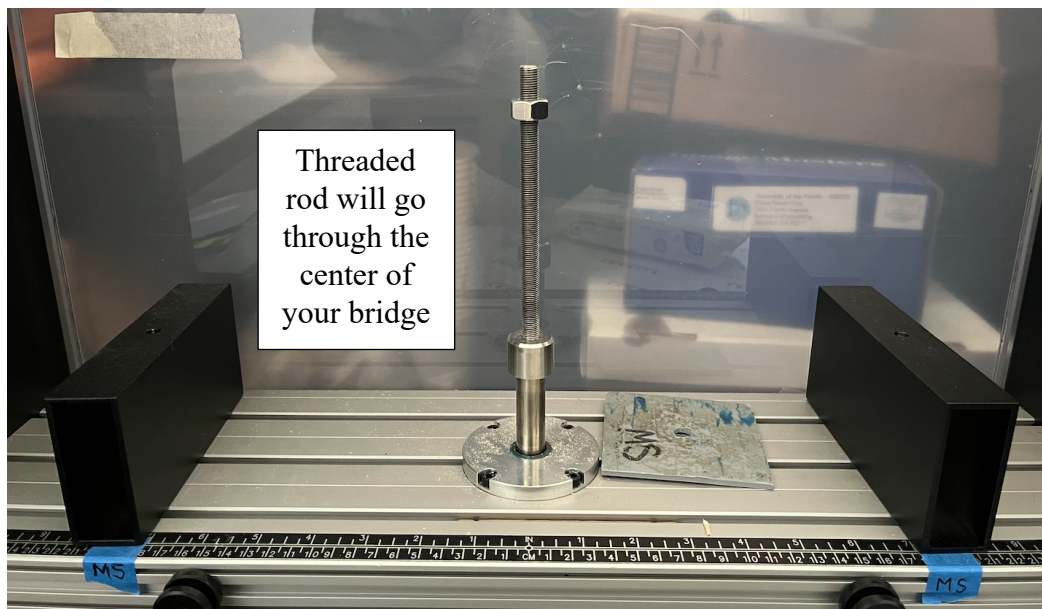
MATERIALS:

- Only solid untreated (no manufactured notches or holes), natural wood craftsticks (e.g., popsicle sticks) with the following approximate dimensions may be used:
 - Length= 4 ½ inches (11.4cm)
 - Width = 3/8 inches (0.95cm)
 - Thickness = 1/16 inches (0.2cm)
- Maximum number of sticks allowed, including partial sticks, is 200. Each piece of stick, regardless of size, will be counted as one structural member.
- Only water-soluble Elmer's-type white glue must be used.

GENERAL RULES:

- 1) Stick Together structures should be labeled with team members' name, grade level, school, and MESA Center. There will be a 10% penalty in the strength to weight score for improper labeling.
- 2) No kits are allowed.
- 3) Structure must visibly look like a bridge. i/e: towers or flat roadways not accepted.
- 4) Only Elmers type white glue may be used.
- 5) A maximum of 50% of a craft stick's total wide/flat surface may be glued. Both sides of each stick can be considered in the 50% calculation (e.g., 100% of side 1 and 0% of side 2; 75% of side 1 and 25% of side 2). NOTE: if a whole craft stick is divided into smaller pieces, then this rule also applies to those members. See Appendix B
- 6) Glue must only be used at joints – excessive glueing is not allowed; i/e: bridge should not be coated with glue. Students should sand areas with excess glue.
- 7) Sticks must not be painted or coated with anything.
- 8) The bridge MUST meet the following dimension restrictions:
 - a. **Minimum** horizontal length = **15 inches**
 - i. Bridge must be at **least** this long to be able to properly sit on the bridge tester supports
 - b. **Maximum** horizontal length = **17 inches**
 - c. **Minimum** height = **2 inches**
 - d. **Maximum** height = **7 inches**
 - e. **Maximum** width = **5 inches**

- 9) The bridge may not have a roof, covering or any other object that will interfere with the 3½ x 3½ inch test plate.
- There must be a flat space in the middle of the bridge to allow the test plate to rest on the bridge.
 - There must be an empty space in the center of the bridge to allow the rod to stick through – see photo of tester (see rule 12).
- 10) The bridge must rest on the tester support blocks in a stable manner (i.e., bridge substructure may NOT interfere with testing apparatus).
- 11) Project must be the original work of student(s).
- 12) Please remember that the purpose of this contest is to use creativity to build the best structure within the framework of the rules.
- 13) **IMPORTANT!:** There must be a space in the center of the bridge that is at least 3/8 inch to allow for the testing rod to fit through the bridge. The best way to do this is to not put any popsicle sticks in the center of the bridge. If there is no hole or space here, we will drill a hole into the center of the bridge.



JUDGING:

- The bridge is examined and measured by the judges to check whether it conforms to contest rules and specifications.
- Any bridge that does not meet the requirements will be disqualified.
- The bridge is weighed, and its weight recorded.
- The bridge will be placed on two 1-inch supports that are 14 inches apart (see Testing Setup & Apparatus).
- A 3½ x 3½ inch test plate is screwed onto the bridge at mid span so that it rests on the roadway. **A space must be present in the center of the bridge to allow the rod to go through it.**
- A load is applied to the bridge until the machine determines maximum load is reached.
- Disqualified bridges are not eligible for awards in any category; however, they may be tested, time permitting.
- Strength-to-Weight Ratio:** Determined by dividing maximum load at failure by weight of bridge. Bridge with greatest load bearing capacity compared to its weight wins.

Example calculation: Maximum load = 220.0 pounds
Bridge weight = 50.0 grams
Ratio = $[220 \text{ pounds} \times 454\text{g/pound})/50\text{g}] = 1997.6$

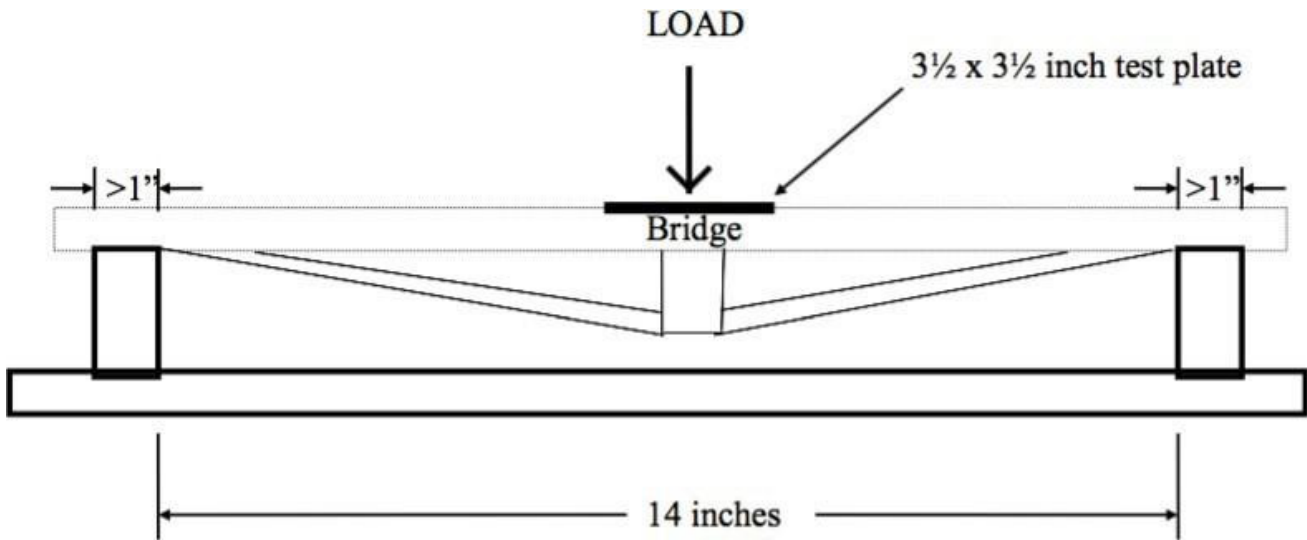
AWARDS:

- Awards will be given per school – each school will be awarded separately, there won't be a center-wide event
- Medals will be awarded for 1st, 2nd, and 3rd place based on the best Strength-to-Weight Ratio.

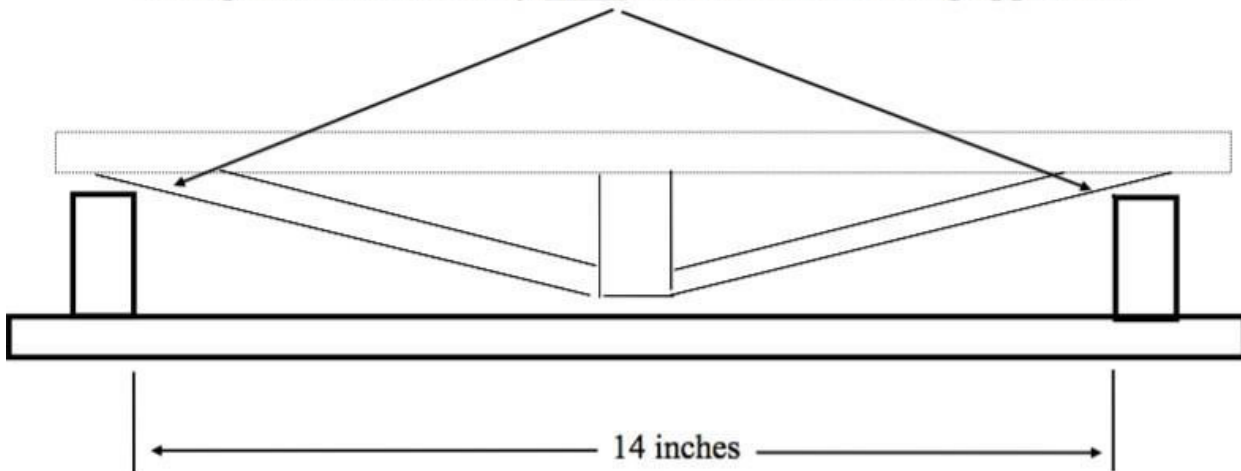
ATTACHMENTS/APPENDIX:

- A – Testing Setup & Apparatus
- B – Definitions and Samples
- C – Specification Checklist

Appendix A – TESTING SETUP & APPARATUS

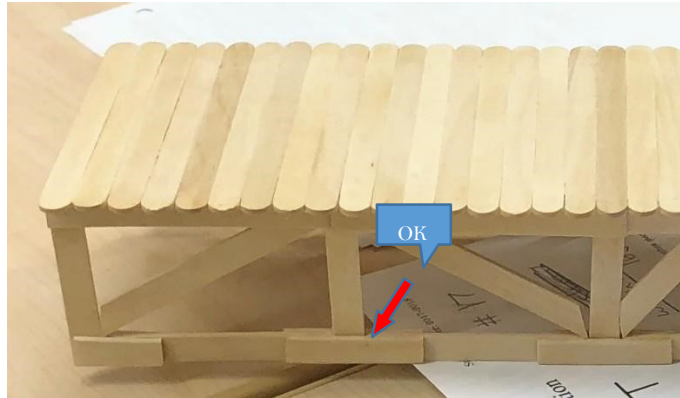


Bridge **MUST** rest on tester support blocks;
Bridge substructure may **NOT** interfere with testing apparatus



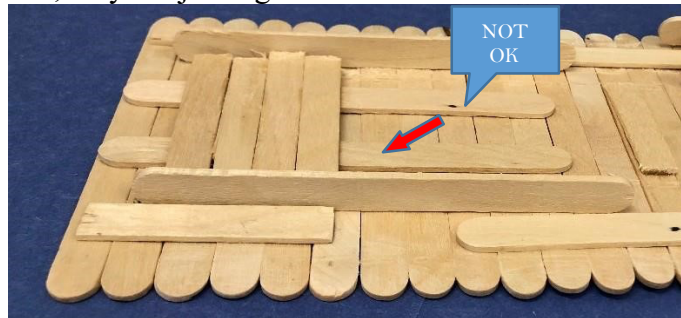
Appendix B – DEFINITIONS AND SAMPLES

Per General Rule #3

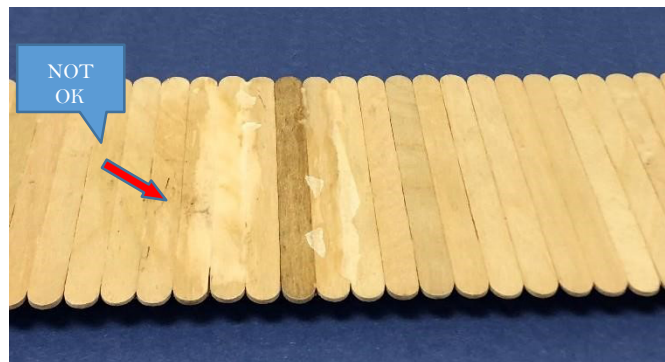


Top: Because the member that is covering 50% of its area are not in contact with any other member, it is considered legal.

Bottom: The members are already 50% in contact with the roadway and are also in contact with other members. Therefore, they are joining with member at more than 50% of its area.



Per General Rule #5



Glue is visible on areas other than the joints and the remains of wax paper left on the roadway are considered coating. Easy way to fix this is to sand off the excess glue or wax paper.

Per General Rules #8



The bridge is open and allows testing apparatus to be placed, is unobstructed, has no roof, and has a gap in the center to allow the testing rod to fit through.

Appendix C– SPECIFICATION CHECKLIST

**Note: As the name above implies, this list is intended simply as a guide for meeting the required competition specs. It should not be treated as an official judging document.*

- Bridge is properly labeled with team members names, school, and MESA Center
- Material is solid, natural wood craft sticks (popsicle sticks)
- Glue is water soluble Elmer's-type white glue
- Structure visually resembles a bridge
- Maximum number of members (sticks and/or partial sticks) ≤ 200
- Glue only at the joints
- Each stick glued $\leq 50\%$
- Sticks are not painted or treated
- Bridge open at the top (no roof or covering)
- Bridge has open area for placement of the test plate
- Bridge has supports suitable for placement on testing fixture
- Bridge substructure does not interfere with testing fixture

Meets Size Requirements:

- a. **Minimum** horizontal length = **15 inches**
- b. **Maximum** horizontal length = **17 inches**
- c. **Minimum** height = **2 inches**
- d. **Maximum** height = **7 inches**
- e. **Maximum** width = **5 inches**