OFFICIAL RULES FOR THE

2024 TULSA ENGINEERING CHALLENGE

TOOTHPICK BRIDGE BUILDING COMPETITION

OBJECTIVE

All Divisions: Design and build a model bridge, which will support the most weight, using only wood toothpicks and carpenter's wood glue.

DESIGN STATEMENT

Each entrant will design and build a model bridge using only toothpicks and glue. The bridge must have a roadbed (skeletal or solid) on which a 1-1/2" (3.81 cm) (outside diameter) x 30" (76.20 cm) PVC pipe can be placed. The opening for the PVC pipe must be within the skeletal framing of the bridge so the PVC pipe can be inserted to protrude from both ends of the bridge. Laying the PVC pipe on top or underneath the bridge will not be considered as fulfilling this requirement.

MATERIALS SPECIFICATIONS

Materials used to construct your bridge are restricted to the following:

Standard round wood toothpicks (unlimited number - toothpicks must be round entire length);

Carpenter's wood glue (not hot glue), and one (1) metal eye bolt with 3/4" (1.91 cm) diameter opening (minimum) and if necessary, attaching mechanism (see below). (Hint - don't let the eye bolt be the weakest link.)

CONSTRUCTION SPECIFICATIONS

Dimensions of the bridge MUST be as follows:

Length: 24" ± 1" (60.96 cm ± 2.54 cm)

Width: 2½" ± ¼" (6.35 cm ± 0.64 cm)

Height: Must not exceed 8" (20.32 cm) [hook not included]

Weight: Must not exceed 1 lb. (453.6 grams) including the eyebolt and attaching mechanism.

The round toothpicks may be used in any configuration and cut to lengths less than 2-1/2" (6.35 cm), but 50% of the surface area of each and ALL toothpicks must be visible. The number of toothpicks that can be bunched together for a bridge structural member is three toothpicks for a

specific member. Box girders used as structural members and that are enclosed on the ends can only be one toothpick row thick. If visible from both sides, members in which a line of toothpicks are placed continuously side by side, as in decking, can be two toothpick rows thick. **The bridge may be of any design but MUST conform to the specifications stated above. If the bridge does not meet the specifications, it will be disqualified from the competition.**

The round toothpicks are to be the primary stress (load) carrying elements. The carpenter's wood glue is to be used only to transfer stress (load) between toothpicks.

"Painting" or "dipping" the bridge with multiple layers of glue such that the glue is a primary stress carrying element will be grounds for disqualification. It is recognized that the construction of some bridge types, such as box girders that require toothpicks to be placed side by side, requires extensive use of glue. This is acceptable provided the bridge is not painted by brush or other means with glue or dipped in glue. Judge's decision will be final.

The "testing eye bolt" must extend 1 " to 2 " (2.54 cm - 5.08 cm) below dead center of the bottom of the bridge. The opening of the eyebolt must be at least 3/4" (1.91 cm) diameter and may be attached to the bridge by means of a wood block (attaching mechanism) not to exceed a 2" (5.08 cm) square by 1/2" (1.27 cm) thickness (2" x 2" x 1/2") (5.08cm x 5.08cm x 1.27 cm). In some cases, the wood block and eye bolt will block the insertion of the PVC pipe. This will be acceptable if there are no other blockages.

COMPETITION SPECIFICATIONS

Testing will be achieved by means of a custom-designed "Bridge Tester" (specifically designed for the Challenge by GEOCAL, Oklahoma). Load will be applied to the bridge by attaching a loading device to the test hook, in a downward vertical line. A strain indicator will be located between testing hook and loading device. As load is applied, the load indicator will display the load at which the bridge fails.

Failure will be determined at:

(a) maximum load sustained at point of collapse, or

(b) the deflection of the base of the bridge or the "testing eye bolt" exceeds two inches (2") (5.08 cm).

The bridge will be positioned on the "bridge tester" with a clear span of 20" (50.80 cm) between the support posts. The bridge must be free standing with no external anchors. No repairs or modifications are allowed once testing has begun. The PVC pipe (to verify roadbed area) and the scales (to weigh each bridge prior to testing) will be supplied by the judges.

Competition will run continuously during the Challenge hours between 8:30 a.m. and 11:30 a.m. Separate tables will be provided for the inspection, staging and competition. The competition area will be marked. This area will be off limits during competition hours to everyone except the competitors and officials.

JUDGING AND SCORING

Prior to the testing, each bridge will be inspected, weighed, and initialed by the judges to indicate compliance with contest construction specifications. A bridge shall be registered and operated by one and only one team.

NO re-registration is permitted. A team may register only one bridge. After inspection by the judges, the bridge shall be placed on designated staging tables. Each team is responsible for the security of its bridge. Decision of judges, during all phases of competition, will be final.

Judges will determine winning entries at the close of the Challenge (winners need not be present.) In the event of a tie, the bridge determined to have the most creative design will be declared the winner.

Any appeals are to be brought to the attention of the TECh Chair as soon as possible on the day of the competition. The TECh Chair and 2 advisors will collect relevant information from the student and the judges and will make a decision on how to proceed.

GENERAL

The contest is limited to four (4) entries per division per school. Each entry may be an individual or a team project of two to four students.

Registration will be done via the TECh web page which can be accessed through www.tulsaengineer.org.

Questions may be sent directly to the lead judge Allen Bates at jabpe@msn.com. Please cc: tulsatechchallenge@gmail.com

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PRIZES

Prizes will be awarded for three divisions as follows: Upper Division (9th thru 12th), Middle Division (7th thru 8th), and Lower Division (6th grade and under). In the event of a tie, prizes will be equally distributed between winning entries.

First Place:	$100 cash and $25 cash for their classroom.
Second Place:	$75 cash and $25 cash for their classroom.
Third Place:	$50 cash and $25 cash for their classroom.

To be eligible for a prize, the entry must support a minimum load of 5 lbs. for the lower division, 10 lbs. for the middle division, and 15 lbs. for the upper division. If there are fewer than three (3) entries in a division that will support the minimum required load, the unclaimed prize money will be distributed as a bonus between the top two teams whose bridges supported the highest load above the minimum of 15 lbs. regardless of division. The team with the highest supported loading will receive 60% of the unclaimed prize money and the team with the second highest supported loading will receive 40% of the unclaimed prize money. The amount and distribution of these additional prizes will be determined based on the value of unclaimed prizes and the performance of the winning entries.

Any cash prizes will be awarded by a bank check and issued to the teacher/school listed on the registration to be cashed and distributed to the winning student(s). We will mail a check to the address listed on the registration within a few weeks of the competition. If you do not receive your prize or certificates within a few weeks, please email info@tulsaengineer.org with your team name, school, and competition won.

Revised March 10, 2023