

Trial/Pilot Event

Contact the organizers of your tournament to find out what trial/pilot events will be held.
BEAM BUILDING

DESCRIPTION: The object of this event is to design and build the lightest beam capable of supporting a given load over a given span. Each team may enter only one beam.

A TEAM OF UP TO: 2

MAXIMUM TIME: 10 minutes

1) THE COMPETITION:

IMPOUND: Yes

a) Materials:

- i) The beam is to be a single structure constructed of wood and bonded by glue. No other material shall be used. Bamboo is a grass and may not be used.
- ii) Particle board, wood products, or commercially laminated wood may not be used. Unlimited laminations by the students are allowed.
- iii) Individual pieces of wood used may not be more than 3mm./1/8" thick. Commercially available Wood sold as 1/8" thickness will be accepted. There is no limit on the width or length of individual wood pieces used in the construction.
- iv) Any type of glue may be used.

2) CONSTRUCTION;

- a) Any type of beam that meets the specifications below may be constructed.
- b) All construction must be completed prior to the tournament.
- c) BEAM:
 - i) Span - Must span the 350mm opening. There is no maximum length.
 - ii) Height - The maximum height above the test supports shall be 40.0 mm, including any camber or arching of the beam.
 - iii) Width - Maximum width of the beam shall be 20.0mm.
 - iv) No portion of the beam may extend below the top surface of the test supports prior to testing.

3) LOADING;

- a) The load point of the beam will be at the center of the test base's opening.
- b) ii. The beam must accommodate a loading bracket or plate at mid-span. See description of the loading apparatus under testing.
- c) iii. Before impounding, the beam must be marked in such a way that the team to which it belongs is easily identified.

4) TESTING;

- a) All beams must be impounded before the start of the competition. Beams may be released immediately after they are tested. However, once a team has taken their beam they may not file an appeal.
- b) The event supervisor will provide all equipment/materials needed for testing the beam. Students must provide and wear safety glasses during loading and testing.

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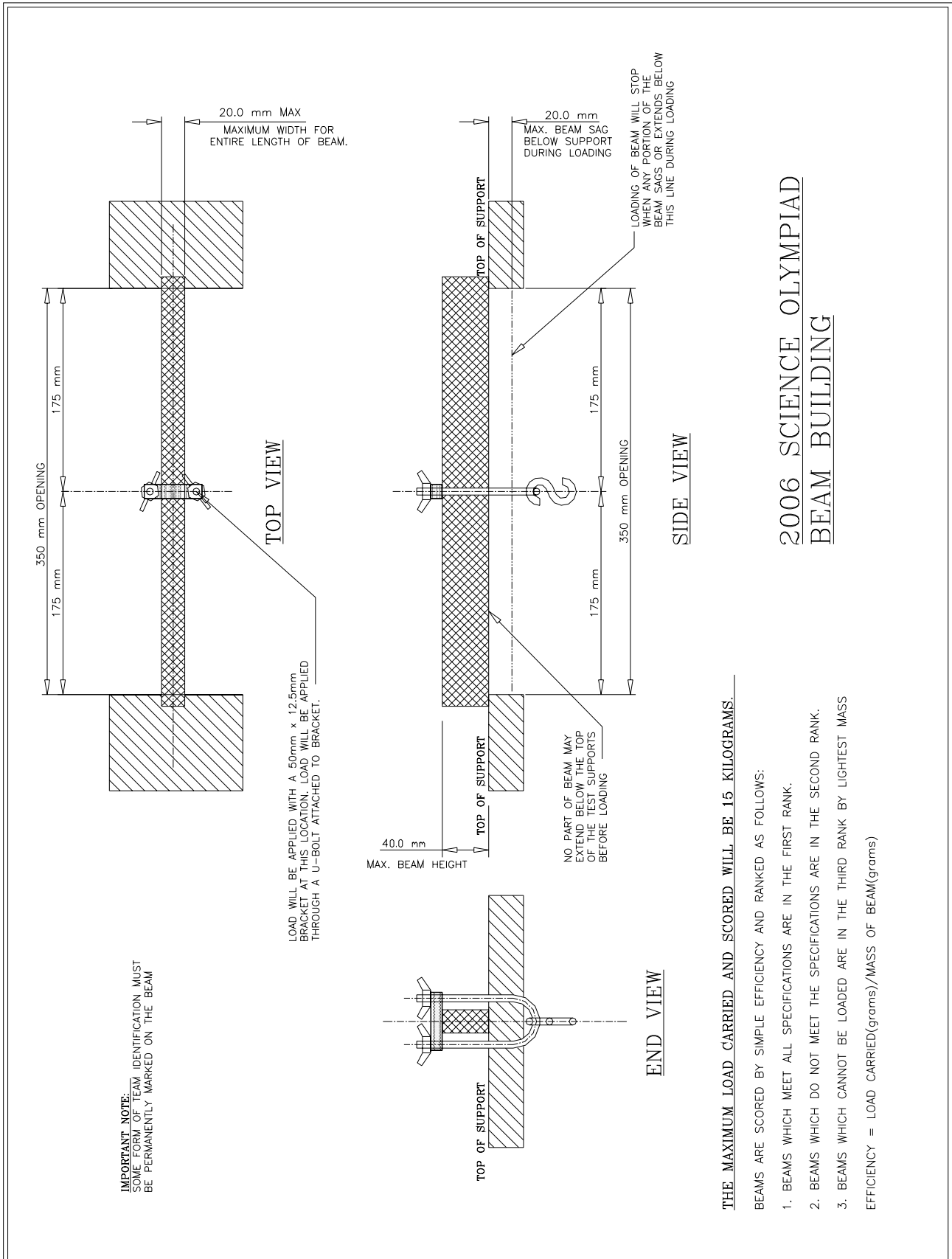
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- c) All beams will be assessed prior to testing to determine if they meet the specifications. The mass of the beams shall be determined immediately before they are tested.
- d) The beam will be centered on the testing apparatus that contains a 35.0cm opening between the test supports. The beam will be loaded on the top surface of the beam with a metal plate at least 12.5mm/1/2' wide x 50.0mm/2' long with a 7mm/ 9/32' hole at each end, set with the long dimension perpendicular to the direction of the beam. A 1/4' U-bolt shall be attached to the load plate with a pair of wing nuts so that the center of the U-bolt is directly under the center of the beam, but the U-bolt may not touch the beam at any time. One or more S-hooks or a length of chain shall be attached to the U-bolt and a standard 5-gallon bucket or similar container shall be hung so that the bottom of the container is a minimum of 50mm above the floor.
- e) Sand shall be added to the container by the students. Students have a maximum of 10 minutes to add the sand. If the time expires, loading shall stop.
- f) The students will add sand to the bucket until time expires, failure occurs, or the maximum load of 15 kilograms is reached. Failure is defined as the inability of the beam to carry additional load or when any part of the beam sags or extends more than 20mm below the top of the test supports.
- g) Sand added after failure will be removed by the supervisor.

SCORING

- a) The event supervisor shall determine the mass of the beam, the amount of load carried, and the deflection of the lowest part of the beam below the test supports.
- b) The score will be determined by the Structural Efficiency equation:
$$\text{Load Supported (grams) / Mass of Beam (gram)}$$
- c) Beams that hold more than 15kg will be scored using 15kg as the load supported.
- d) Beams will be scored in 3 tiers. Beams in the first two tiers will be ranked by their structural efficiency.
 - i) Beams that meet all specifications will be ranked in the first tier.
 - ii) Beams that DO NOT meet all specifications will be ranked in the second tier.
 - iii) Beams that cannot be tested for any reason (e.g., cannot accommodate the loading plate or teams that do not have safety glasses will be ranked in the third tier by the beams lighter mass.
 - iv) Ties shall be broken first by the lighter beam mass, and second by the least deflection of the beam under maximum load

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2006 SCIENCE OLYMPIAD BEAM BUILDING