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BUREAU OF RECLAMATION

2025 Colorado High School Bridge Contest Specifications

1. Materials

A. The bridges must be constructed only from 3/32-inch square cross-section basswood, cables, and any commonly available adhesive. The NSPE-CO website lists several suppliers of basswood under the Competition Guidelines page.

B. The basswood may be notched, shaped, cut, sanded, or laminated in any manner but must still be identifiable as the original basswood.

C. Cables may be any flexible, non-metal material such as string or fishing line. **Metal wire is not permitted**.

D. No other materials may be used. The bridge may not be stained, painted, or coated in any fashion with any foreign substance.

2. Construction

A. The bridge mass shall be no greater than 60.00 grams.

B. Bridge dimensions:

a. The allowable bridge construction envelope is shown in Figure 1 and Figure 2.

b. The bridge must span a gap of 300mm.

c. The bridge shall be no longer than 400mm.

d. The bridge shall have a minimum width of 50mm. The minimum width is required at all points over the length of the bridge.

e. The bridge shall have a maximum width of 100mm. The maximum width is enforced at all points over the length of the bridge.

f. The bridge shall extend no more than 40mm above the support surfaces.

g. The bridge shall extend no more than 50mm below the support surfaces at the bearings; 25mm below the support surfaces at the span center.

h. Dimension limits above apply to the unloaded condition. Deflections beyond these limits during loading will be permitted. See also deflection limits in Section 4.

C. The horizontal surface of the support at each end will be at the same elevation.

D. The bridge may thrust against the vertical surface of the support at each end.

E. The bridge must be constructed to provide for the loading plate (see section 3 below) at each of the two loading points 20mm and 40mm on either side of the center of the 300mm span along the longitudinal axis of the bridge.

F. The bridge must be symmetric about both the longitudinal and transverse centerlines.

3. Loading

A. The load will be applied downward (from above) by means of a load device. The load will be applied to the longitudinal center axis of the bridge at one of two loading points: 20mm and 40mm on either side of the center of the 300mm span, Load Points 1 and 2 respectively, as shown in Figure 1 and Figure 3. The load plate will be 50mm by 50mm square.

   a. On the day of the competition, the judges will randomly select which of the two loading positions will be used. Bridges will only be loaded at one point and it will be the same for all bridges.

B. The plate will be attached to a rod from above to the center of the load device. The bottom surface of the load device will be horizontal and will not pivot during loading.

C. The load device will be lowered from above until it makes contact with the bridge.

D. If the bridge is designed to be loaded below the top of the superstructure (i.e., below the uppermost part of the bridge), an opening must be provided to allow the load device to pass through.

E. The load device will not be removed from and reattached to the testing machine at any time.

4. Testing

A. The bridge will be placed on the support surfaces. The student may choose the orientation of their bridge. If the student is not present, or if bridge the entry is a mail-in and has no written instructions, the contest personnel will place the bridge on the support surfaces using their best judgement.

B. The loading plate will be positioned on the bridge and the load will be steadily applied from above the bridge onto the specified loading location.

C. The load will be increased until failure occurs.

D. Failure is defined as the inability of the bridge to carry additional load or a load plate deflection of 25 mm, whichever occurs first.

E. The structural efficiency, η, of each bridge will be determined by the following formula:

$$\eta = \frac{P}{W}$$
$$P = peak\ load\ (lbs)$$
$$W = weight\ of\ bridge\ (grams)$$

F. Ranking of the bridges will be determined by the structural efficiency value.

5. Qualification

A. Registration and Qualification will close at 10:30 AM on the day of the contest.

B. All construction and material requirements will be checked by the judges prior to testing. Bridges that fail to meet these specifications at the conclusion of the allowable time for qualification will be disqualified. Disqualified bridges may be tested as exhibition bridges at the discretion of the builder and the contest directors.

C. If, during testing, a condition becomes apparent (i.e., use of ineligible materials, inability to support the loading plate, etc.) which prevents testing as described above in Section 4, that bridge shall be disqualified. If the disqualified bridge can accommodate loading, it may still be tested as an exhibition bridge as stated above.

D. Bridges disqualified prior to testing may be modified and rechecked by the judges prior to the conclusion of the allowable time for qualification. If modifications lead to a bridge meeting the specifications, the bridge will then be considered an official bridge.

E. If a student wishes to repair and/or modify a bridge after it has been tested, the bridge may be retested as an unofficial exhibition test, subject to the availability of time and the approval of judges and event staff.

F. The decisions of the judges will be final. These rules may be revised at the event organizer's discretion. Please check the NSPE-CO Bridge Building website for updates:

http://nspe-co.org/events_bridge_building.php

6. Mail-In Entries

A. Mail-in entries for the contest will be accepted.

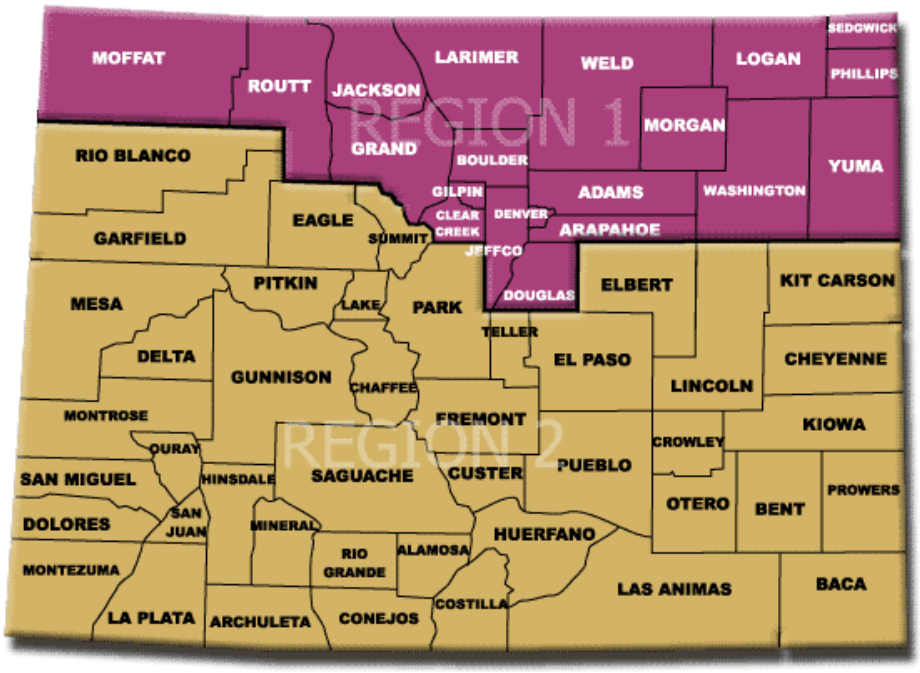
B. Mail-in entries must be received a minimum of 5 days before the contest date.

C. Mailing Address:

Bridge Building Contest, ATTENTION 86-68530
Bureau of Reclamation
P.O. Box 25007
Building 67, Room 152
Denver Federal Center
Denver, CO 80225-0007

D. Each bridge must have the students name and school clearly printed in ink on the bridge. All mail-in bridges must have a removable tag firmly attached to the bridge with the following information clearly and legibly printed in ink:

a. Student's name
b. Student's email address
c. Student's phone number
d. Name of sponsoring teacher (if any)
e. School Name
f. School Return Address
g. Specify Region 1 or 2
h. Specify if you would like your bridge returned after the contest



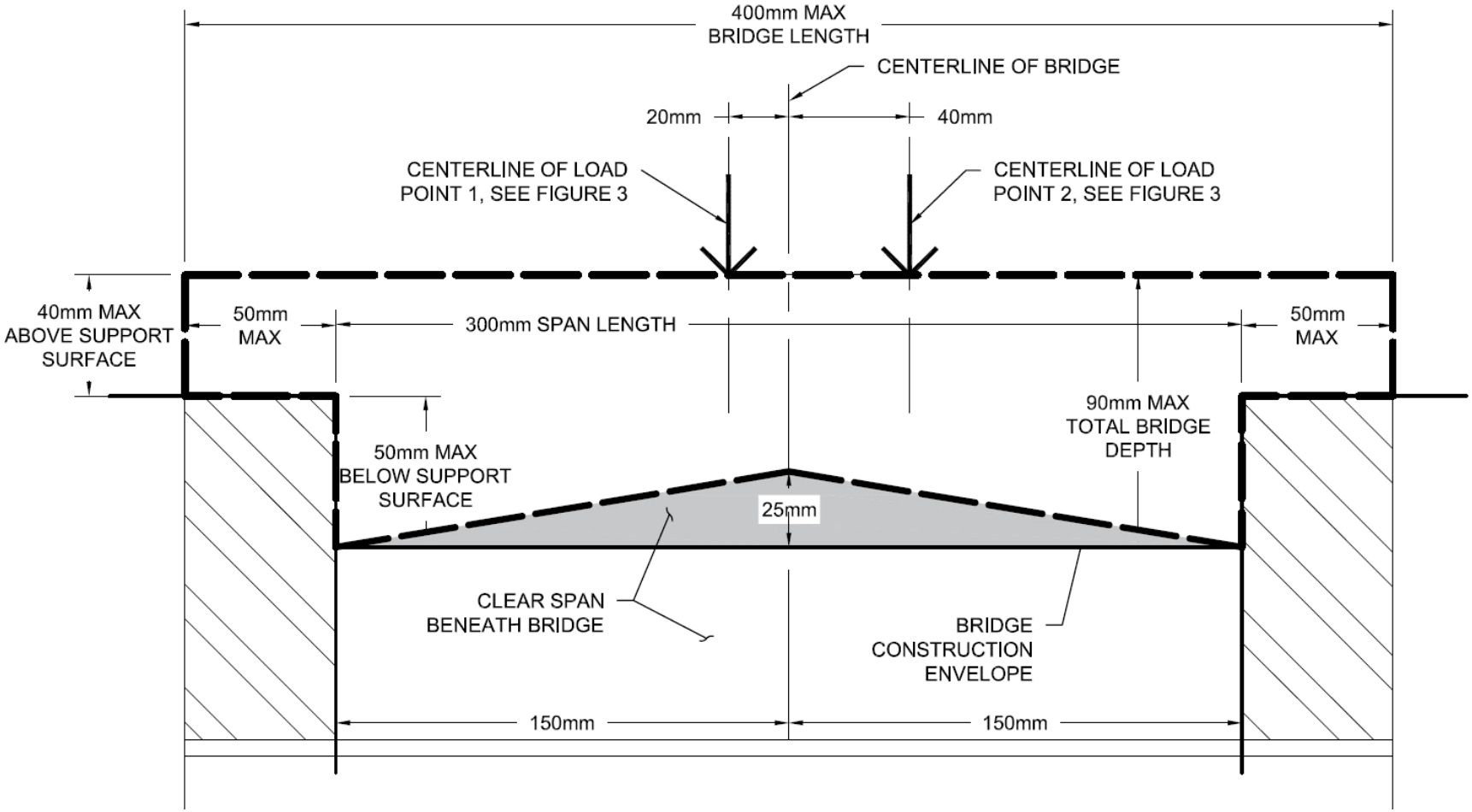


FIGURE 1 SUPPORT SURFACE AND BRIDGE ENVELOPE DIMENSIONS (SECTION VIEW)

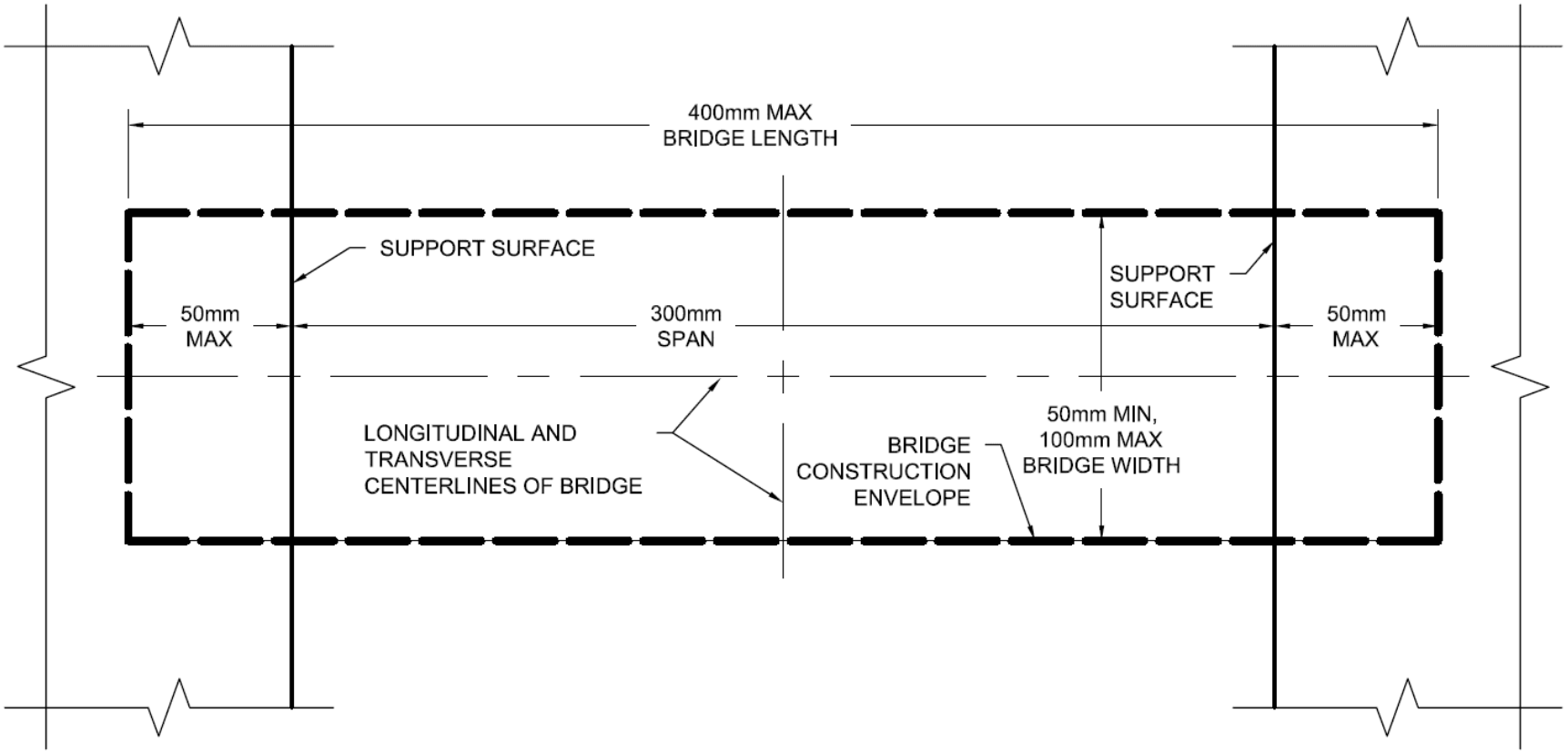


FIGURE 2 SUPPORT SURFACE AND BRIDGE ENVELOPE DIMENSIONS (PLAN VIEW)

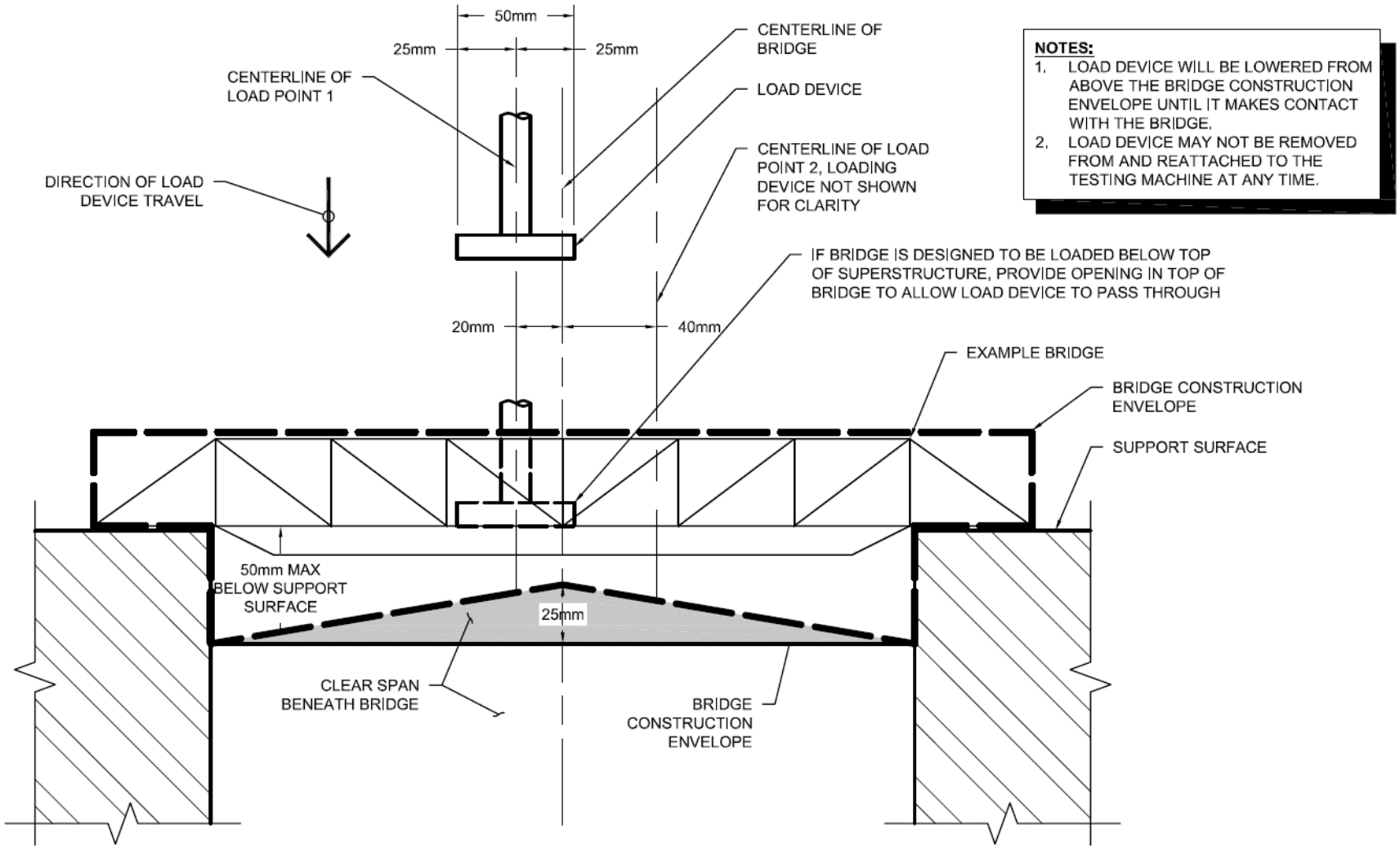


FIGURE 3 LOAD DEVICE AND EXAMPLE BRIDGE