

2027

60TH ANNUAL

COLORADO HIGH SCHOOL BRIDGE CONTEST

MARCH 6, 2027 | DENVER FEDERAL CENTER – BUILDING 56

CONTESTANT INFORMATION PACKET

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REVISION 1: SEPTEMBER 15, 2026



Theodore Roosevelt Lake Bridge
Theodore Roosevelt Lake,
Maricopa County, AZ

SPONSORED BY:



— BUREAU OF —
RECLAMATION

Section 1: Introduction

Started in 1968, the annual Colorado High School Bridge Building Contest is a statewide program aimed at providing interaction and communication among practicing engineers, high school students, and other professionals. Its underlying objectives are to enhance the appeal of engineering careers to high school students, begin establishing their relationships with the professional community, and improve the prospects that such careers will be mutually beneficial to both society and the individual. The U.S. Bureau of Reclamation has been a cosponsor and host of the contest since 1974. Other sponsors include the National Society of Professional Engineers – Colorado (NSPE-CO), the American Council of Engineering Companies of Colorado (ACEC/CO), and Horrocks engineering consultants.

On Saturday, March 6th, 2027, the Bureau of Reclamation's Concrete and Structural Laboratory will host the 60th Annual Colorado High School Bridge Building Contest at their laboratory in Building 56. Students from around the state will bring their model bridges to compete for scholarships and other prizes. Reclamation volunteers will test each bridge to failure during the competition to determine the winners. This is a great time to bring the family out to see the contest and tour the laboratory. A grand finale to the contest is a demonstration of the 5,000,000-pound testing machine as it breaks a large concrete cylinder.

Students construct model bridges to precisely conform to specifications established every year by the NSPE contest committee (see http://www.nspe-co.org/events_bridge_building.php). The models are constructed using basswood and glue, and each bridge is tested by applying an increasing load to it until it breaks, which often happens dramatically with bridge pieces flying every direction. The winning bridge is the one having the highest efficiency number; the efficiency number is the maximum weight the bridge held divided by the weight of the bridge. In past contests bridges have held more than 20,000 times their own weight – this has been as high as 2,500 pounds!

High school students from across the state are encouraged to participate in the contest by their physics and science teachers. Some teachers give extra credit for building a bridge. Building a bridge gives practical reinforcement of the physics and engineering principles learned in class. While participation varies every year, contests have had as many as 150 participating bridges from 50 schools from around the state.

Prizes have included scholarships to an accredited Colorado engineering program and gift cards, donated by the NSPE-CO, ACEC and Horrocks. The top two winners in each region of the Colorado contest are eligible to participate in the International Contest. Reclamation has cosponsored and hosted the International Contest twice in past years. Previously, a student from Parker, Colorado took first place in the international competition and received a four-year scholarship to the Illinois Institute of Technology! For more information on the International Contest, see the National Bridge Contest link: <http://bridgecontest.phys.iit.edu/>.



Section 2: Bridge Contest Specifications

1. Eligibility

- A. The competition is open to all Colorado High School students for the 2026-2027 academic year.

2. 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 covered or coated in any fashion with any foreign substance such as stain, paint, epoxy, or adhesives.

3. Construction

- A. The bridge mass shall be no greater than 60.00 grams.
- B. The horizontal surface of the support at each end will be at different elevations: one support will be 25mm higher than the other.
- C. 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 enforced 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 have a maximum height of 100mm at all locations except for directly above the lower support surface, where a maximum height of 125mm is permitted; reference Item B above.

- g. The bridge shall have a clear area in alignment with the higher support surface; the bridge may only drop below this elevation directly above the lower support surface.
 - h. The bridge bearings shall be 50mm maximum from the face of the support.
 - i. Dimension limits above apply to the unloaded condition. Deflections beyond these limits during loading will be permitted. See also deflection limits in Section 4.
- D. The bridge must be constructed to provide for the loading plate (see section 3 below) at the loading point, designated along the span centerline.

4. 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 the centerline of the span. The load plate is 50mm by 50mm as illustrated in Figure 3 and Figure 4.
- 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.

5. 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 entry 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 25mm, whichever occurs first.



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

- i. $\eta = \frac{P}{W}$
- ii. $P = \text{peak load (grams)}$
- iii. $W = \text{weight of bridge (grams)}$

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

6. Qualification

- A. Registration and Qualification will open at 8:00 AM and 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 unofficial 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 unofficial 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

FIGURE 1 SUPPORT SURFACE AND BRIDGE ENVELOPE DIMENSIONS (SECTION VIEW-NOT TO SCALE)

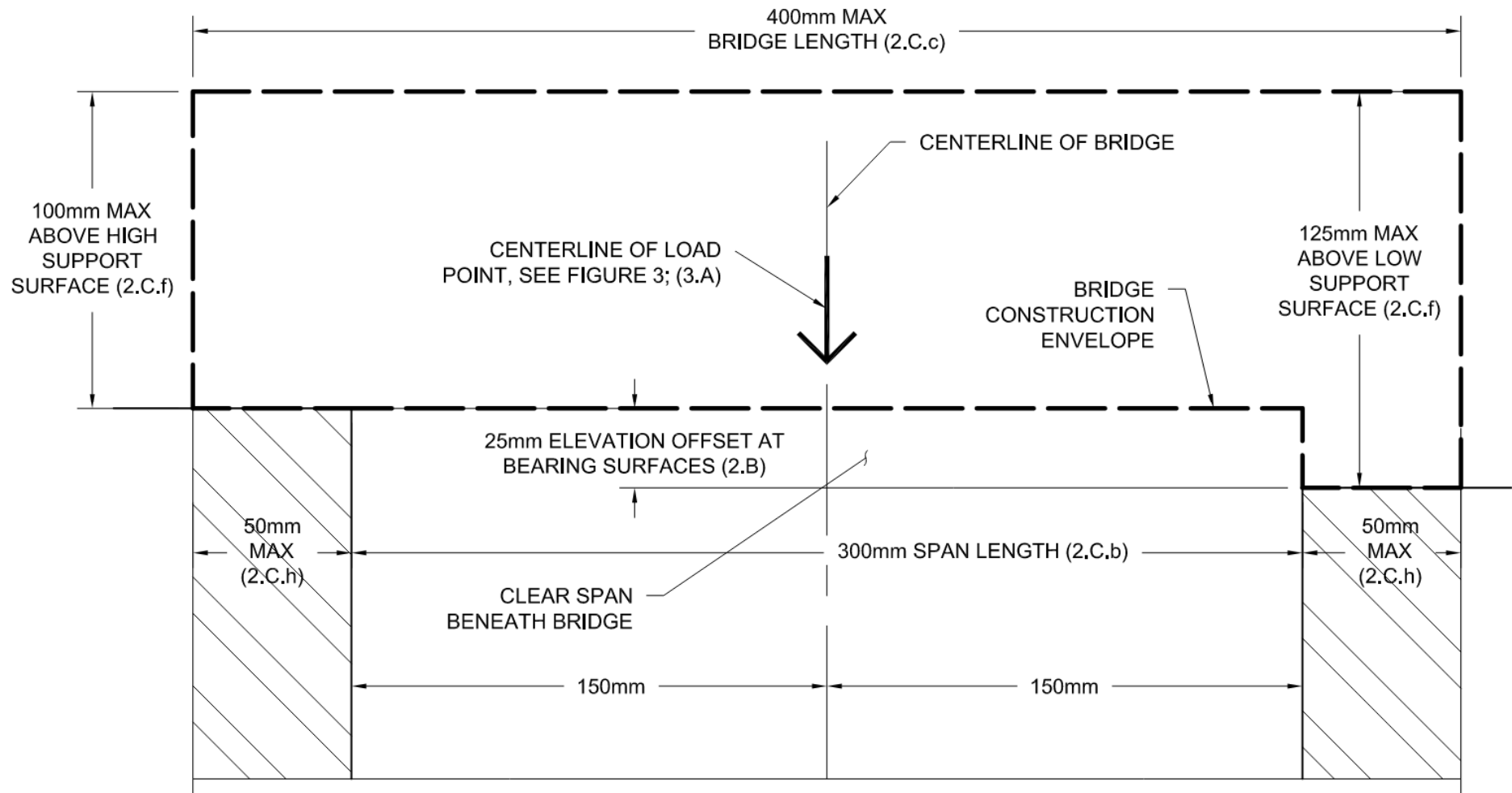


FIGURE 2 SUPPORT SURFACE AND BRIDGE ENVELOPE DIMENSIONS (PLAN VIEW-NOT TO SCALE)

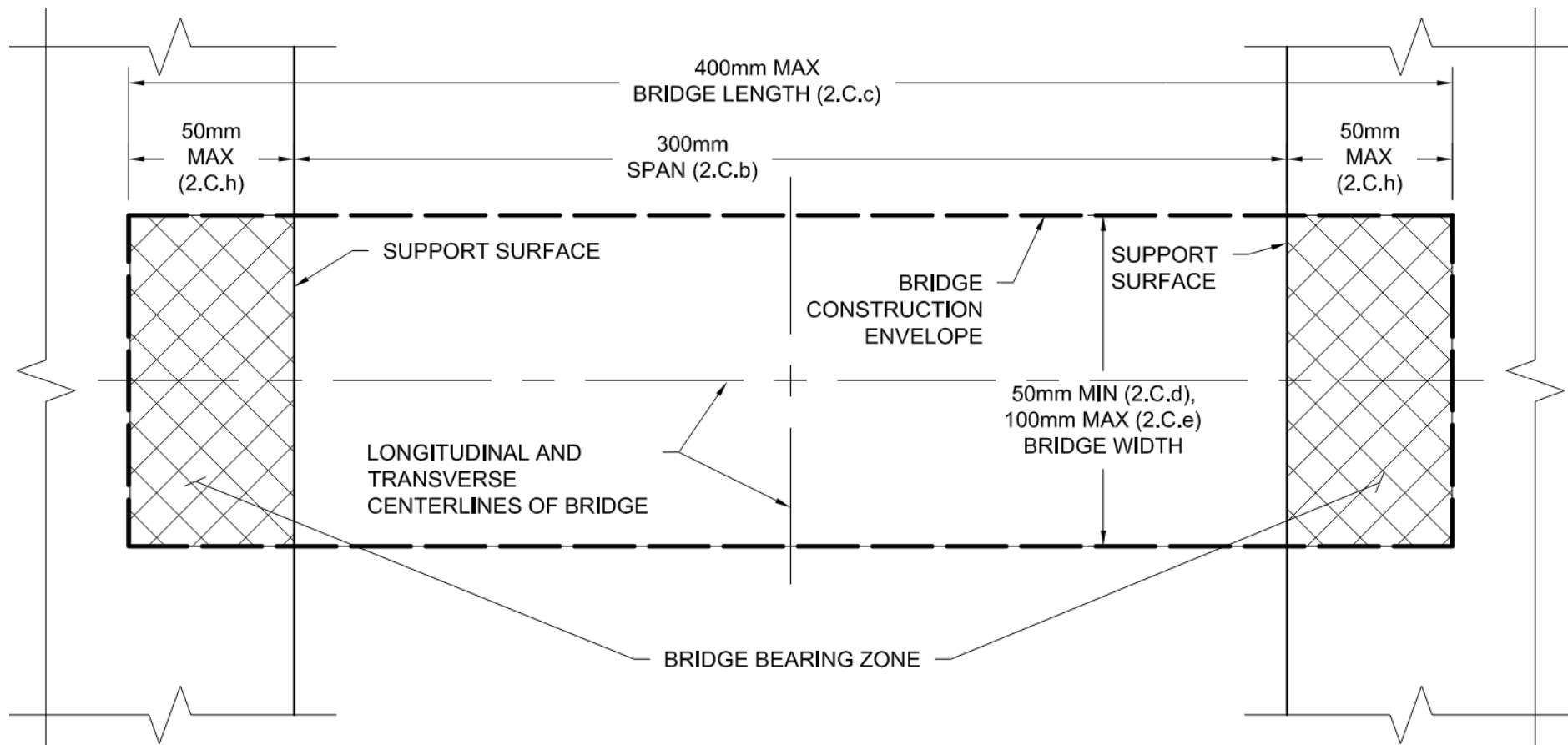


FIGURE 3 LOAD DEVICE AND EXAMPLE BRIDGE (NOT TO SCALE)

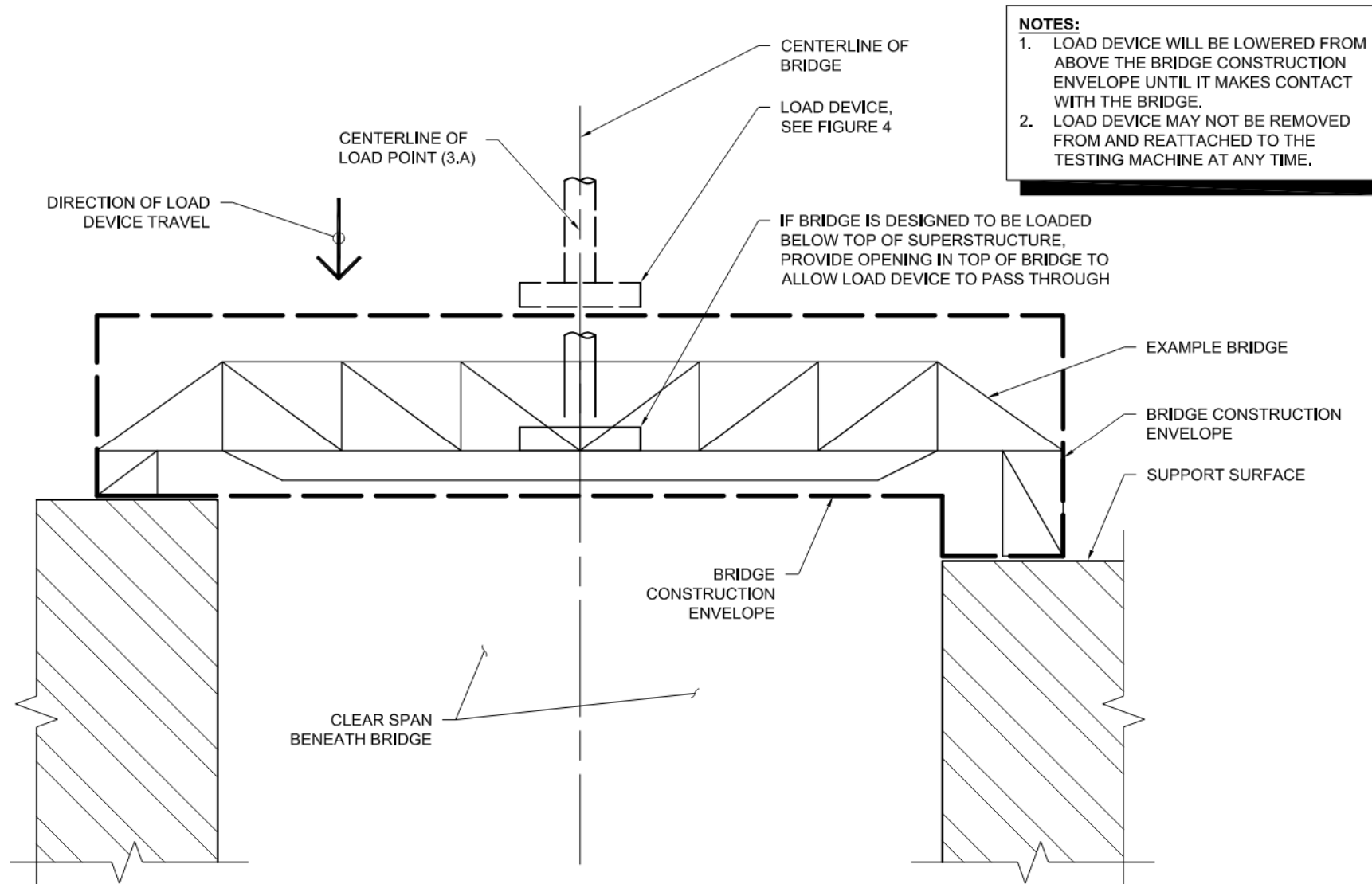
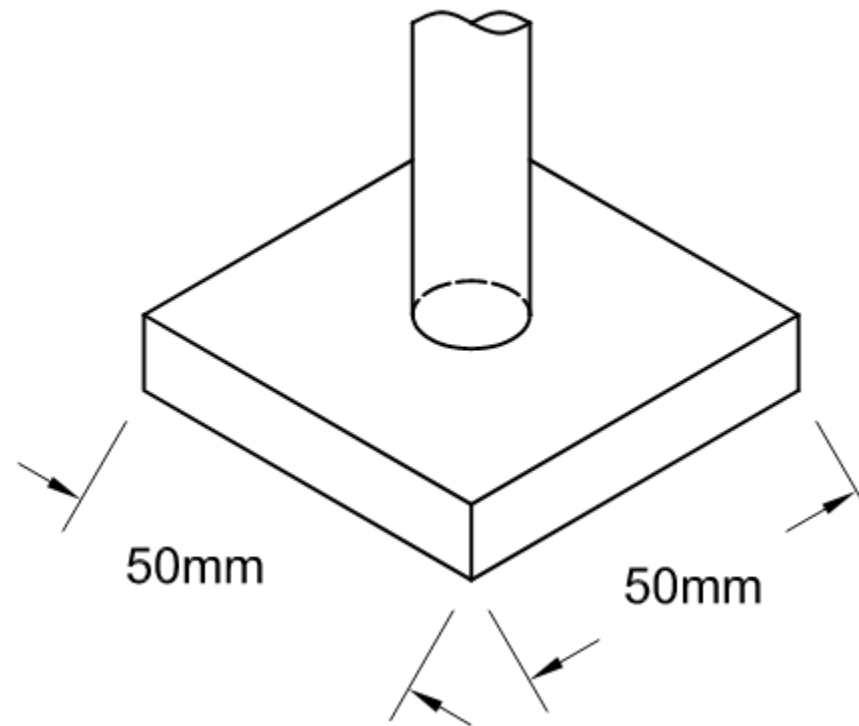


FIGURE 4 LOADING DEVICE (NOT TO SCALE)



Section 3: Mail-In Entries

1. Mail-In entries are accepted and encouraged by contestants that cannot be present for the competition.

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

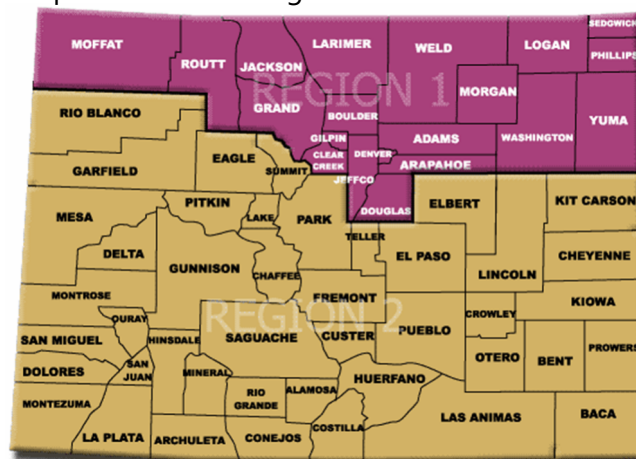
B. Mailing Address:

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

- C. Each bridge must have the student's 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. School Name
- e. Name of sponsoring teacher (if any)
- f. Specify Region 1 or 2 (see figure below)
- g. Specify if you would like your bridge returned after the contest
- i. Provide School Return Address

- D. Each bridge must also be accompanied by the **Contestant Form** with the "Registration Information" Section pre-filled. The Contestant Form can be found on the following page. Note, all other Contestant Form information shall be left blank by the contestant; contest judges complete the bridge inspection and testing.





60th Annual Colorado High School Bridge Contest

March 6, 2027

Contestant Form

DQ:

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REGISTRATION INFORMATION

STUDENT																			
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(20 CHARACTERS MAXIMUM)

EMAIL _____

(FOR AWARD PURPOSES)

SCHOOL _____

CITY _____

REGION 1 2

(CIRCLE ONE)

TEACHER																			
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(20 CHARACTERS MAXIMUM)

INSPECTION AND TESTING REPORT

ITEM	CRITERIA	Q	DQ
Materials	- Only 3/32-inch square cross-section basswood, cables, and commonly available adhesive. - The basswood may be notched, shaped, cut, sanded, or laminated in any manner but must still be identifiable as the original basswood. - Cables may be any flexible, non-metal material such as string or fishing line. <u>Metal wire is not permitted.</u> - No other materials may be used; bridge may not be covered or coated in any fashion with any foreign substance such as stain, paint, epoxy, or adhesives.		
Span	Bridge must be able to span a gap of 300mm (2.C.b)		
Length	400mm maximum (2.C.c)		
Height	100mm maximum at upper support, 125mm at lower support (2.C.f)		
Width	50mm minimum at all points over bridge length (2.C.d) 100mm maximum (2.C.e)		
Vertical Extensions	Bridge shall extend no more than 100mm above the upper support surface and have a clear span beneath bridge in alignment with upper support surface (2.C.g)		
Horizontal Extensions	Bridge shall extend no more than 50mm beyond edges of support surfaces (2.C.h)		
Weight	60.00 grams maximum (2.A) Weight (W) = _____ g		
Peak Load (P) = _____ kg		Structural Efficiency (η) = _____	

Q = Qualified

DQ = Disqualified

This sheet does not replace the official specifications.

$$\eta = (P \div W) \times 1000$$



Section 4: Contest Location and Site Access

1. Location

- A. The contest is held at the Bureau of Reclamation's Engineering and Laboratory Services building on the Denver Federal Center campus in Lakewood, CO:

**Bureau of Reclamation
Building 56, Door S-6
Denver Federal Center
Denver, CO 80225-0007**

- B. The Denver Federal Center campus and Building 56 are controlled access facilities. The following pages contain additional vital information regarding accessing the campus as well as a site map directing contestants to Building 56 and the entry door, S-6.
- C. While at the contest, please remain in the contest area unless accompanied by a designated tour guide. Areas will be marked with "Do Not Cross" tape to ensure visitor safety – Please observe these boundaries.



United States Department of the Interior

BUREAU OF RECLAMATION
P.O. Box 25007
Denver, CO 80225-0007



IN REPLY REFER TO:

2027 Colorado High School Bridge Contest

Greetings from the Bureau of Reclamation Laboratories!

We are again hosting the Colorado High School Bridge Contest at our laboratory facilities on March 6, 2027, and we are looking forward to another good competition. We encourage you to attend the competition and bring your family and friends to watch the bridges being tested.

Doors and registration open at 8 AM and testing can begin at any time for those who may need to test early. Registration closes at 10:30 AM and testing is typically completed around 12 PM, followed by an awards ceremony. Day-of testing will prioritize contestants that are present, followed by mail-in entries.

The Denver Federal Center is a controlled access facility and as such you and your guests will be subject to the following conditions during your visit here:

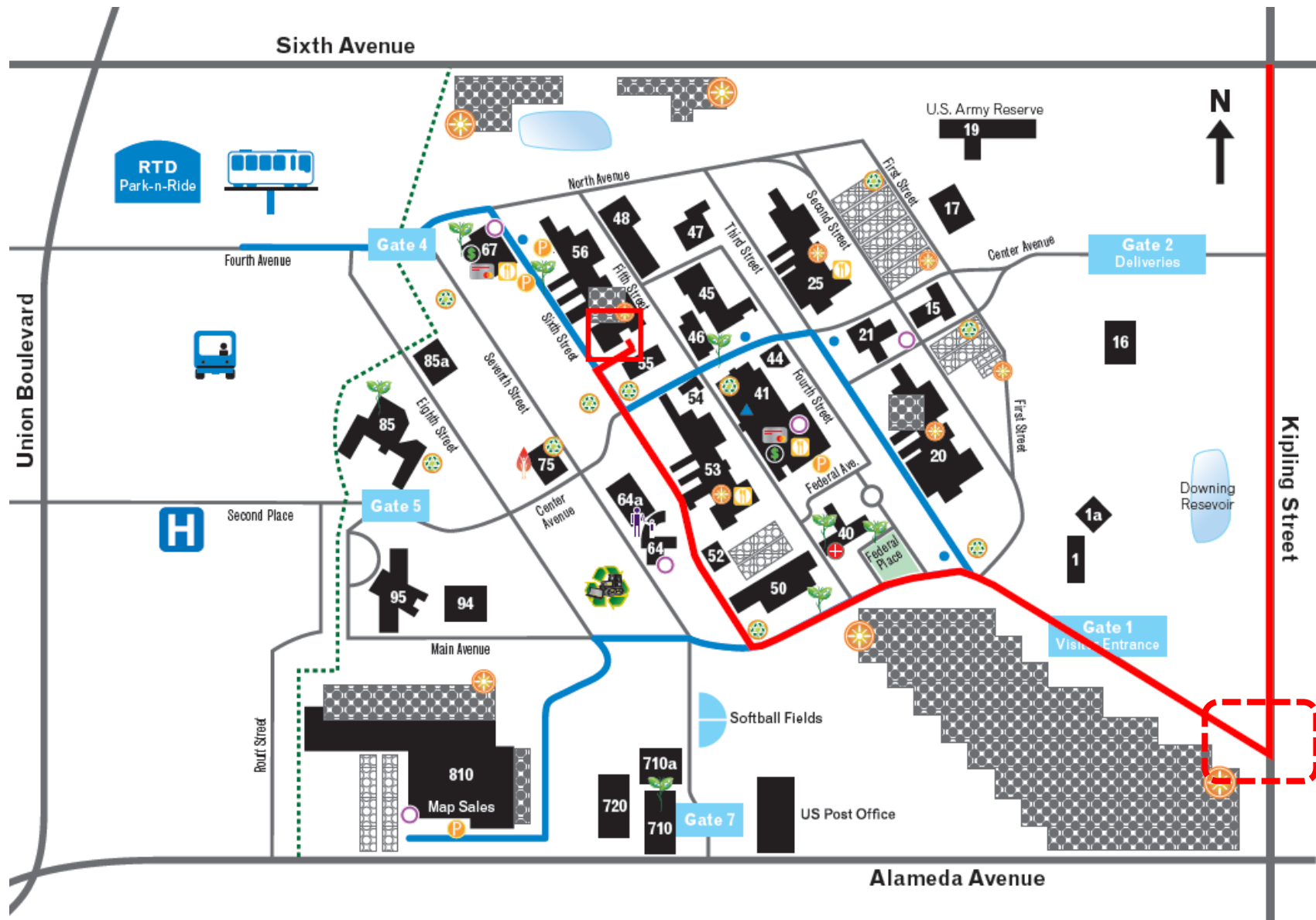
1. All visitors must enter through Gate 1, located off Kipling St., just north of Alameda Ave. – see map on reverse side.
2. The guard at Gate 1 will sign in each vehicle. The driver must present a valid driver's license.
3. All vehicles entering the Federal Center are subject to search when entering the facility at any time while on the facility.
4. **NO weapons are allowed on the facility.**
5. **NO alcoholic beverages are allowed on the facility.**
6. **NO pets are allowed on the facility (not even in the car).**

The map on the next page shows the location of Gate 1 and directions to Building 56. Signs will be posted along the red highlighted route directing participants to Building 56 and the parking lot at the south end of the building. All persons attending the contest must enter and exit through Door S-6.

While at the contest, please remain in the contest area unless accompanied by a designated tour guide. Areas will be marked with "Do Not Cross" tape to ensure visitor safety – Please observe these boundaries.

For any last-minute changes and the latest contest information check:

https://www.nspe-co.org/events_bridge_building.php



Enter the Denver Federal Center at Gate 1.
Check in with the guard at the gate. A valid driver's license or picture ID is required.
Follow signage to Building 56, Door S-6