WELCOME

This document, which is available at aisc.org/ssbc, describes the Student Steel Bridge Competition (SSBC) and states the 2023 rules for the Regional Competitions and National Finals. Clarifications, which include any revisions to the rules, are published at aisc.org/ssbc and do not appear in this document although they are formal addenda to the rules. The website includes the form for requesting clarifications and other information. Information at the website takes priority over any other source except as herein noted.


NEW FOR 2023 RULES

The list of changes below is meant to summarize major changes to the SSBC rules for the 2023 competition as compared to the 2022 competition. This list is not an exhaustive list of changes to the rules. Teams should read through the 2023 SSBC Rules in their entirety to ensure all requirements are met when competing.

- New or updated definitions of bend, connection, corner, and faying surface. (Glossary)
- New problem statement involving the San Diego National Wildlife Refuge (Section 3)
- Change to the maximum number of eligible teams from a Regional Competition that can advance to the National Finals (Sub-Section 4.4.2)
- Updated Construction Economy and Structural Efficiency equations (Sub-Sections 6.2.5 and 6.2.6)
- Updated lateral and vertical load locations (Table 7.1)
- Loose bolts and loose nuts shall only be used to create a connection between members (Sub-Section 8.2.2)
- Bolts and nuts of any kind shall not be welded to the bridge (Sub-Section 8.2.2)
- New dimensional requirements for the bridge (Sub-Section 9.3)
- Updated connection requirements and penalties for violations (Sub-Section 9.4)
- Addition of a designated builder area in the staging yard for the start of construction (Sub-Section 10.6.1)
- Single lateral load test with a 1 inch allowable sway (Sub-Section 11.4)
- Updated vertical load locations, deflection observation locations, and sway observation locations (Sub-Section 11.5)
- Clarification on the Regional Competition appeals procedure (Sub-Section 15.1)
- New construction site plan (DWG 1)
- New bridge envelope (DWG 2)
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GLOSSARY

**Accident.** Fault committed during timed construction and subsequently penalized.

**Aesthetics.** Award category based on the presentation of the *bridge* as it will be erected during timed construction with all parts of the assembled *bridge* visible for judging and the *poster* describing the design.

**Aggregate deflection.** The sum, rounded to the nearest 0.01 inch, of the absolute values of *deflections* measured at *D1* and *D2*.

**Assembled Tool.** A *tool* that is created by combining two or more *tools* during timed construction.

**Bend.** An angle formed by deforming a plate or part of a steel section along a line or crease.

**Bolt.** An unaltered, commercially available rigid connector that contains a head and has external threads around its full circumference, but the threads need not extend over its full length.

**Box.** A right-rectangular prism made out of non-deformable material that is used to measure the maximum allowable size of *tools* and *members*.

**Bridge.** Structure constructed of *members*, *loose bolts*, and *loose nuts* that spans the *river* and is supported by piers.

**Builder.** Undergraduate or graduate student who constructs the *bridge* and is part of a competing *team*. See Section 4, “Eligibility”.

**Captain.** One *builder* designated to represent the *team* for the entire competition, and who signifies when the *builders* are ready to start timed construction, declares the finish of timed construction, and signs the *data forms*.

**Connection.** A location where all *faying surfaces* resulting from two or more *members* coming in contact are penetrated by at least one *loose bolt* and secured by a *loose nut* preventing the *members* from separating at that location without first removing the *loose bolt(s)* that connect them.

**Constructed portion.** A single *member* in contact with the *footing*, or two or more *members* in contact with one another, with or without *loose nuts* and *loose bolts*, assembled during timed construction by *builders* on the *ground* in the *construction zone*.
Construction cost. Dollar amount used to determine a bridge’s construction economy based on the number of builders, construction time, total time and load test penalties.

Construction economy. Award category based on construction cost.

Construction site. The location where all construction activities occur comprising the river, construction zones, transportation zones and the staging yards.

Construction speed. Award category based on the total time required for construction of the bridge.

Construction time. Time required to complete construction of the bridge without consideration of construction penalties.

Construction zone. Location in the construction site where builders put the members together to construct the bridge.

Corner. An angle between two, non-coplanar plates and/or sides of a steel section that is formed by welding the plates and/or steel sections together.

Cost estimation. Award category based on the estimate of the expected overall performance rating of a team’s bridge submitted to the host school prior to the selection of the controlling load case.

D1, D2. Locations where the vertical deflections are measured during vertical load testing.

Data form. Forms printed from the official scoring spreadsheet used by judges to record data collected for each team throughout the competition.

Decking. Grating that spans transversely between stringers and is used to hold load placed on the bridge.

Deflection. Vertical translation of the bridge or parts of the bridge under load.

East end. End of the bridge determined by a randomizing process (e.g., coin flip) and opposite the west end.

Faying Surface. Surface of a member that is in contact with the surface of another member at a connection.

Footing. Areas marked on the ground within the construction zones where the bridge may contact the ground.
Ground. Floor inside the site boundary, including footings, construction zones, transportation zones, and staging yards, but excluding the river.

Guest Competitor. A team from a school that is not eligible to compete per Sub-Section 4.3.2 but has obtained the approval of ASCE and the Regional Competition host school to participate in accordance with Sub-Section 4.3.3.

Head Judge. Person with full authority over the conduct of the competition, safety and interpretation of the rules.

Judge. Person who assists the head judge with the conduct of the competition, safety and interpretation of the rules.

L1, L2. Dimensions for positioning the decking units for the vertical load test that also define locations of observed deflection and sway during the vertical load test.

Lateral restraint. Means of inhibiting sliding of the bearing surfaces during lateral loading applied by the loading crew.

Lightness. Award category based on the total weight of the bridge.

Load. Weight applied to the bridge to assess its stiffness and strength.

Loose bolt. Bolt not installed in or welded to the constructed portion of the bridge.

Loose nut. Nut not installed on a bolt or welded to the bridge.

Measured weight. The weight of the bridge, not including decking, tools, lateral restraint devices, and posters, as determined by scales provided by the host school.

Member. A rigid component of the bridge.

North side. Side of the bridge relative to the west and east ends that corresponds to the location where measurement D1 is taken during vertical loading.

Nut. A commercially available, mechanically unaltered portion of a connector that has the shape of a hexagonal prism over its full length and contains internal threads around its full circumference over its full length.

Overall performance. Overall award category based on the sum of construction cost, structural cost, and any fines incurred as a violation of a Team Contract.

Personal protective equipment. Articles provided by the team for safety worn by builders and team members conducting construction and loading.
Poster. Informative flat display that must be posted and is judged during aesthetics judging.

Pouch. Optional article of clothing that is used to carry nuts, bolts, and tools and includes tool belts, magnets, lanyards, and other accessories worn by builders having the same function.

River. A restricted natural feature in the construction site that builders are not allowed to enter.

S. Dimension for positioning the decking unit for the lateral load test that also defines the location where the lateral load is applied and sway is measured during the lateral load test.

Safety. Prevention of personal injury and damage to the competition location.

Safety support. Equipment provided by the host school used to limit the consequences of a bridge collapsing.

Scales. Calibrated equipment provided by the host school used to measure the measured weight of the bridge.

School. College or university that a student team represents.

Scoring spreadsheet. Official location where a team’s score is input by the scoring official at the end of the team’s competition.

Site boundary. Border of the construction site.

South side. Side of the bridge relative to the west and east ends that corresponds to the location where the lateral load is applied and sway is observed during the lateral load test as well as where measurement $D_2$ is taken and sway is observed during vertical loading.

Staging yard. Location within the construction site occupied by builders, tools, and materials at the start and finish of timed construction.

Steel. Iron alloy that is strongly attracted to the magnet provided by the host school.

Stiffness. Award category based on the bridge’s aggregate deflection under vertical loading.

Stringer. Contiguous decking support aligned longitudinally along the bridge.
**Structural cost.** Dollar amount used to determine a bridge’s structural efficiency based on its total weight, measured weight, aggregate deflection, and load test penalties.

**Structural efficiency.** Award category based on structural cost.

**Sway.** Horizontal translation of the bridge.

**Team.** Group of students from the school that they are representing who are undergraduate or graduate students during all or part of the fall through spring of the current competition academic year.

**Template.** Equipment provided by the host school to measure clearances within the passageway of the bridge and the location of the stringers at the top of the bridge.

**Tool.** A device provided by a team that is used during construction of the bridge, but is not part of the completed bridge.

**Total time.** Time required for construction modified by construction penalties.

**Total weight.** Sum of measured weight and weight penalties.

**Transportation zone.** Portion of the construction site between the construction zones and staging yards over which builders carry members, tools, nuts, and bolts.

**Video.** Optional award category based on a recording that conveys the features of the design, analysis process undertaken to verify the design meets the structural specifications, fabrication methods, construction procedures and overall appeal of the bridge to the owner.

**West end.** End of the bridge that is opposite the east end of the bridge and from which L1, L2, and S are measured.
Section 1
MISSION AND SUMMARY

VISION
Empower students to acquire, demonstrate, and value the knowledge and skills that they will use as the future generation of design professionals and to contribute to the structural steel design community and construction industry.

MISSION
Challenge students to extend their classroom knowledge to a practical, hands-on steel design and construction project that grows their interpersonal and professional skills, encourages innovation, and fosters impactful relationships between students with faculty, industry professionals and professional organizations.

SUMMARY
Civil Engineering students are challenged to an intercollegiate competition that supplements their education with a comprehensive, student-driven project experience from conception and design through fabrication, erection, and testing. This experience culminates in a steel structure that meets client specifications and optimizes performance and economy. The Student Steel Bridge Competition (SSBC) increases awareness of real world engineering issues such as spatial constraints, material properties, strength, serviceability, fabrication, erection processes, safety, aesthetics, project management, and cost estimating. Success in competition requires application of engineering principles and theory, effective teamwork, and inclusive practices. Future engineers are stimulated to innovate, practice professionalism, and use structural steel efficiently.

Students design and erect a steel bridge by themselves but may consult with faculty and other advisors. Students gain maximum benefit if they fabricate the entire bridge themselves. However, because appropriate shop facilities and supervision are not available at all schools, students may use the services of a commercial fabricator if they develop the work orders and shop drawings and observe the operations. Students are encouraged to maximize their involvement in fabrication.

Safety is paramount. AISC and ASCE request that competitors, advisers, hosts, and judges take all necessary precautions to prevent injury to competitors, judges, host personnel, and spectators. Risky procedures are prohibited. Load testing is stopped if sway or deflection exceeds specified limits, or if collapse is imminent. Bridges that cannot be constructed and loaded safely are withdrawn from competition and are only eligible for awards in the categories of aesthetics and video. In addition, the rules identify and penalize construction errors that represent accidents in full-scale construction.

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The Student Steel Bridge Competition provides design and management experience, opportunity to learn fabrication processes, and the excitement of networking with and competing against teams from other schools.

AISC and ASCE require all students to follow safety precautions in regards to the COVID-19 pandemic when participating in activities associated with the SSBC. Student teams should respect and follow all safety rules put in place by their respective schools as safety and student health are paramount. Given the continually changing environment surrounding COVID-19, modifications to the Regional Competitions and National Finals may be required and will be assessed as deemed appropriate.
Section 2
INTRODUCTION

The rules simulate a request for proposal that requires a scaled model to demonstrate the efficacy of competing designs. Section 3, “Problem Statement,” relates the rules to realistic challenges encountered in bridge design and construction.

Sections titled “Material and Component Specifications,” “Structural Specifications,” and “Construction Regulations” set standards for strength, durability, constructability, usability, functionality, and safety that reflect the volumes of requirements that govern the design and construction of full-scale bridges. Criteria for excellence in the award categories of stiffness, lightness, construction speed, aesthetics, cost estimation, video, structural efficiency, and construction economy are listed in “Scoring.” Competition judges and the SSBC Rules Committee take the role of the owner or owner’s agent and have authority to accept and reject entries.

The rules accommodate a variety of designs and encourage innovation. Designers must consider the comparative advantages of various alternatives. Successful teams compare alternatives prior to fabrication using value analysis based on scoring criteria. The rules change every year to renew the challenge and ensure new bridges are designed and built.

The rules are intended to be prescriptive, but may require interpretation. The procedure for requesting clarification of the rules is described in Section 13, “Interpretation of Rules.” Competitors, judges, and host personnel are encouraged to read this rules document from beginning to end and then review the Host and Competitors Guides at aisc.org/ssbc. That site also is the source of the official scoring spreadsheet which generates data forms for recording data. Judges should be familiar with these data forms prior to competition.

Results of the previous years’ competitions are posted at aisc.org/ssbc.

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- Drew Dudley, S.E., P.E., Principal / Lecturer, Dudley Engineering /Texas A&M University
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- Kimberly Stillmaker, MBA, Ph.D., P.E., Assoc. Professor, California State Univ., Fresno

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- Christopher Garrell, P.E., Chief Bridge Engineer, National Steel Bridge Alliance
Section 3

PROBLEM STATEMENT

The San Diego National Wildlife Refuge was established in 1996 and provides over 12,300 acres of preserved habitat as part of the San Diego Multiple Species Conservation Program. Open grasslands, riverine corridors, and oak woodlands are some of the restored habitats that can be found within the refuge. The refuge stretches from the city of Jamul to communities in Spring Valley and eastern Chula Vista and provides not only a safe location for wildlife, but also opportunities for hiking, mountain biking, and horseback riding. Near the trailhead of the Sweetwater Interpretive Loop trail is located the historical four hundred and sixty feet long and twenty-two feet wide Sweetwater River Bridge, which is a steel Parker Through Truss bridge built in 1929. The bridge was retired from road use in 1987 and now serves as a pedestrian bridge and the gateway into the San Diego National Wildlife Refuge.

In order to provide better access for service vehicles and more opportunities for San Diego National Wildlife Refuge users to access trails on both sides of the Sweetwater River, a new bridge that pays tribute to the Sweetwater River Bridge’s use of steel has been proposed further down river. The use of steel for the bridge also provides versatility in the design, ease of prefabrication, ability to rapidly erect, superior strength to weight ratio, durability, and a high level of recycled content. The bridge shall be aesthetically pleasing and have the ability to support pedestrians, bicycles, horses, park service vehicles, and emergency vehicles while prohibiting private motor vehicles.

A feasibility study is being conducted that includes a competition to identify the best design for the new bridge. Your company is invited to compete by submitting a 1:10 scale model to demonstrate its concept. The bridge must have the ability to support the weight of pedestrians, cyclists, equestrians, and maintenance and park vehicles. Scale models will be erected under simulated field conditions and will be tested for stability, strength, and serviceability using standardized lateral and vertical loads. Structural cost, construction cost and duration, and aesthetics are important considerations. Virtual costs are assigned to critical features, including a sliding scale for material that promotes robustness without wastefulness. The ability of your company to accurately estimate the overall performance of your bridge also will be judged. Engineers associated with the U.S. Fish and Wildlife Service will judge the competition and will award the design/build contract to the company whose model satisfies the specified requirements and best achieves the project objectives.

In order to maintain existing habitats, no construction activity can take place within the river’s confines. Designs with permanent or temporary piers within the confines of the river will not be considered. Soil conditions and concerns about existing wildlife habitats also preclude temporary piers elsewhere, as well as restricting the location of footings and the
size of construction zones. Remote staging of material and equipment is required. The size and quantity of members to be transported also is limited. Models will not include deck, foundations, and approaches.

Design companies are encouraged to gather diverse teams and treat everyone with respect. A team that creates a respectful, welcoming, and inclusive environment, and is not predisposed to defined roles and biases, will benefit greatly from the creativity that diversity affords.

Any attempt to gain advantage by circumventing the intent of the competition as expressed by the rules, including this problem statement, will be grounds for rejecting a model and terminating that company’s eligibility.
Section 4
ELIGIBILITY

4.1 REQUIRED CONDUCT

Invitations to competitions are a privilege, not a right. Failure to act professionally can result in letters of reprimand, mandatory behavior management plans, and loss of invitations.

4.2 LEVELS OF COMPETITION

There are two levels of the Student Steel Bridge Competition in North America: Regional Competitions and the National Finals. The Regional Competitions are typically held in conjunction with ASCE Student Symposia. Outstanding performance in Regional Competitions, and only participation in those competitions, qualifies eligible teams for the Student Steel Bridge Competition National Finals, which is organized by AISC in collaboration with ASCE. At its discretion, ASCE may organize an International Competition and is evaluating this possibility for the future.

4.3 REGIONAL COMPETITIONS

4.3.1 Only one bridge per school may compete in a Regional Competition, and a school may compete in only one Regional Competition.

4.3.2 A school is eligible to compete if it has an ASCE student chapter located in North America, which is in good standing with ASCE at the start of the Regional Competition, and is competing in their ASCE assigned Student Conference. A list of conference assignments and symposium host chapters are listed at asce.org/communities/student-members/conferences.

4.3.2.1 For an ASCE Student Chapter to be in good standing with ASCE at the start of a Regional Competition, they must:

(a) have paid their annual dues, as received by ASCE, no later than 11:59 p.m. EST on February 1, 11:59 p.m.;

(b) have submitted their student chapter full Annual Report or EZ Annual Reporting Form no later than 11:59 p.m. on February 1, 2023

4.3.3 A school may participate as a Guest Competitor in a Regional Competition at the discretion of the host school and ASCE if they:
4.3.3.1 Have an established AISC Student Club and have not competed as a *Guest Competitor* for more than three consecutive years; or

4.3.3.2 Have submitted a *Statement of Intent to Establish an ASCE Student Chapter* to ASCE and have not competed as a *Guest Competitor* for more than three consecutive years; or

4.3.3.3 Have an ASCE Student Chapter located outside of North America; or

4.3.3.4 Have an ASCE Student Chapter that is not in good standing with ASCE prior to the start of the Regional Competition according to Sub-Section 4.3.2.1.

4.3.4 *Guest Competitors* will be scored and are eligible to receive the awards in Section 6.

4.3.5 A *team* shall consist only of undergraduate and graduate students enrolled at the *school* for which they are representing during all or part of the fall through spring of the current competition academic year.

4.3.6 The official *scoring spreadsheet* shall be used, and all *teams* shall be listed on that spreadsheet. The official *scoring spreadsheet* may be downloaded from aisc.org/ssbc.

4.3.7 The host *school* shall promptly submit scans of the individual *team’s data forms* and the completed official *scoring spreadsheet* file for the Regional Competition to ssbcscorekeeper@aisc.org. *Teams* from that Regional Competition will not be invited to the Student Steel Bridge Competition National Finals until the *data forms* and *scoring spreadsheet* file are received and eligibility is confirmed.

4.4 NATIONAL FINALS

4.4.1 A *team* is eligible to be invited to the National Finals based on competition placement if it is ranked for all awards at its Regional Competition as a non-*guest competitor* and it meets the following qualifications for ASCE Student Chapters.

4.4.1.1 An ASCE Student Chapter must be in good standing with ASCE as shown that they:

(a) Have paid their annual dues, as received by ASCE, no later than February 1, 11:59 p.m. EST.

(b) Submitted their student chapter’s full Annual Report no later than 11:59 p.m. EST on February 1, 2023 and have received a minimum score of 40 points out of a possible 100. Student Chapters that submit an EZ annual reporting form do not qualify to advance on to the National Finals.
4.4.1.2 An ASCE Student Chapter must attend and participate in their assigned Student Symposium as shown through their school’s:

(a) On-time attendance and active participation by a member of the ASCE Student Chapter at the Student Symposium Business Meeting.

(b) Participation in the Student Symposium Paper Competition, including submission and presentation by a member of the ASCE Student Chapter. Note that any papers/presentations created for any other competition do not count as an entry into the Student Symposium Paper Competition.

4.4.2 The maximum number of eligible teams from a Regional Competition that will be invited to compete in the National Finals is based on the number of non-guest competitors that competed at that Regional Competition (that is, presented bridges and staged them for timed construction).

(1) The single eligible team with the best overall performance rating will be invited from a Regional Competition in which two to five teams competed.

(2) The top two eligible teams in overall performance will be invited from a Regional Competition in which six to ten teams competed.

(3) The top three eligible teams in overall performance will be invited from a Regional Competition in which eleven to sixteen teams competed.

(4) The top four eligible teams in overall performance will be invited from a Regional Competition in which seventeen or more teams competed.

4.4.3 In addition to qualifying for the National Finals by meeting the requirements of Sub-Sections 4.4.1 and 4.4.2, the following exceptions may be made:

4.4.3.1 The Rules Committee may, with suitable notice to participating teams, modify the number of qualifying schools as well as develop rules for additional “wildcard” participants and qualifiers based on receiving special awards;

4.4.3.2 If an eligible school declines to participate in the National Finals, other schools may be named as a replacement at AISC’s and ASCE’s joint discretion;

4.4.3.3 AISC may, with ASCE’s consent, name additional participants in the National Finals.

4.4.4 A team competing at the National Finals shall consist only of undergraduate and graduate students who were enrolled at the school for which they are representing during all or part of the fall through spring of the current competition academic year leading up to the National Finals.

4.4.5 Bridges may be modified in preparation for the National Finals.
Safety has the highest priority; risk of personal injury will not be tolerated. Judges are empowered to halt and prohibit any activity that they deem to be hazardous. If a bridge cannot compete safely, it must be withdrawn from competition.

Sub-Sections 9.4, 9.5, 10.2, 10.3, 11.1, 11.2, and 11.5.2 of these rules identify potential hazardous conditions and actions that can result in withdrawing a bridge from competition if not corrected. Judges will document these safety violations by checking the appropriate boxes on the data forms. If the problem is not listed, a judge should write a brief description of the problem on the data form.

Students are requested to practice safe fabrication procedures and seek appropriate instruction and supervision. Sub-Section 8.1 provides a warning for a welding hazard, and precautions listed in Sub-Sections 11.1, 11.2, 11.5.1.2, and 11.5.2 guide safe load testing prior to competition.
6.1 RECORDING DATA, ANNOUNCING RESULTS, SUBMITTING SCORES

Scoring data shall be recorded for every team that competes using the data forms printed from the official scoring spreadsheet downloaded from aisc.org/ssbc. Data from these forms are then entered into the scoring spreadsheet. After all scoring information has been collected for a team, the scoring official reviews each data entry with the captain of that team. The captain is given adequate time to verify the data before signing the form. Then a paper or electronic copy of the team’s “Computation” worksheet from the scoring spreadsheet is given to the captain.

Formulas and links in the scoring spreadsheet shall not be modified.

The “Rankings” worksheet from the spreadsheet summarizes the performance of all teams and is distributed at the awards ceremony, electronically or as paper copies.

Scans of the individual team’s data forms and the completed official scoring spreadsheet file for a Regional Competition shall be submitted to ssbcscorekeeper@aisc.org by the host school as soon as possible after the competition. Regional Competition results are not final until the data forms and scoring spreadsheet file are submitted. Questions and comments regarding the spreadsheet should be sent to ssbcscorekeeper@aisc.org.

The original data forms shall be retained by the Regional Competition host school until the scanned files are submitted and a confirmation email is received indicating that the hard copies are no longer needed.

6.2 COMPETITION CATEGORIES

Competition categories are aesthetics, construction speed, lightness, stiffness, construction economy, structural efficiency, and cost estimation. In addition, overall performance is rated. Teams also may compete in an optional video category.

6.2.1 Aesthetics

An award is given for aesthetics. All bridges presented for aesthetics judging and staged for timed construction are eligible for this award. The bridge’s appearance and a poster describing the bridge design contribute to the Aesthetics ranking. Aesthetics is judged by the following criteria.
6.2.1.1 Bridge appearance.

6.2.1.1.1 Bridge appearance includes the bridge’s balance, proportion, elegance, and finish. Fabrication quality, including welding, shall not be considered because some bridges may be fabricated professionally rather than by students.

6.2.1.1.2 The bridge is presented exactly as it will be erected during timed construction and all parts of the assembled bridge must be visible during aesthetics judging.

6.2.1.1.3 Permanent identification of the bridge consisting of the school’s name is required. The name shall be formed from steel or applied to steel with paint or decals and should be easily legible (lettering at least 1” high is recommended). A bridge that lacks appropriate identification will receive a very poor aesthetics rating.

6.2.1.2 Poster describing design.

6.2.1.2.1 The following items are required on the poster and provide the basis for judging the poster for aesthetics:

(1) identification of the school, using the same name that appears on the bridge,
(2) brief explanation of why the overall bridge configuration was selected,
(3) scaled, dimensioned side view of the bridge,
(4) brief explanation of analysis conducted to verify that the design meets the structural specifications (may include steps used to verify the model and analysis procedures used to consider lateral deflections, vertical deflections and stability under load)
(5) free-body diagram of a single beam that represents one of the bridge stringers, with the same end-to-end length, supports at appropriate locations to represent the piers, loads for one of the cases specified in Sub-Sections 7.1(8) and 11.5, and reaction forces,
(6) shear and moment diagrams of the beam corresponding to the free-body diagram, showing peak magnitudes,
(7) brief explanation of the team’s use of Accelerated Bridge Construction (ABC), such as design features, construction sequencing, and procedures intended to minimize construction time, or Lean Construction, such as reduced or eliminated unnecessary movement, inventory, waiting during production, and scrap, and
(8) acknowledgement of the school’s technicians, faculty, and others who helped fabricate the bridge or provided advice.

6.2.1.2.2 The following items are encouraged on the poster, but remain optional, and will not factor into aesthetics judging:

(1) a brief summary and/or pictures on the poster of any diversity, equity, and inclusion activities that have been undertaken,
(2) names of financial sponsors (alternatively, an optional second poster that can accommodate financial sponsors’ logos can be used), and
(3) additional information of the team’s choice.

6.2.1.2.3 The poster shall

(1) be flat with maximum dimensions of two by three feet,
(2) present all information on one side,
(3) not have attached pages that must be lifted or turned, and
(4) be in English.

6.2.1.2.4 The aesthetics rating will be very poor if there is no poster or if it is grossly inadequate. The poster is not part of the bridge but must be displayed during aesthetic judging. Judges will only assess the poster and its content. Supports used for the poster will not be considered in judging the poster.

6.2.1.2.5 If English is not the dominant language where the competition is conducted, an optional additional poster may be displayed that is a translation into the local language of the required English language design poster.

6.2.1.3 Aesthetics is the tie breaker for all competition categories unless otherwise indicated in the rules. Judges shall not declare ties in aesthetics.

6.2.2 Construction Speed

The bridge with the lowest total time will win in the construction speed category. Total time is the time required for construction modified by construction penalties prescribed in Sub-Sections 9.4, 9.5, 10.4.1, 10.4.2, 10.4.3, and 10.8.1. There is an upper limit on construction time (see Sub-Section 10.8.2).

6.2.3 Lightness

The bridge with the least total weight will win in the lightness category. Total weight is measured weight plus weight penalties prescribed in Sub-Sections 8.2, 9.3, and 10.4.2. Decking, tools, lateral restraint devices, and posters are not included in measured or total weight.

6.2.4 Stiffness

The bridge with the lowest aggregate deflection will win in the stiffness category. Aggregate deflection is determined from measurements as prescribed in Sub-Section 11.5.
6.2.5 Construction Economy

The bridge with the lowest construction cost \( C_c \) will win in the construction economy category. Construction cost is computed as

\[
C_c = \text{Construction time (minutes)} \times \text{number of builders (persons)} \times 100,000 \left( \$/\text{person-minute} \right) + (\text{Total time} - \text{Construction time}) \times 250,000 \left( \$/\text{minute} \right) + \text{load test penalties (}$)\].

“Load test penalties” are prescribed in Sub-Section 11.5.2.

6.2.6 Structural Efficiency

The bridge with the lowest structural cost \( C_s \) will win in the structural efficiency category. Structural cost is computed as

\[
C_s = \left[ \text{Measured weight (pounds)} \right]^{1.85} \times 45 \left( \$/\text{pound}^{1.85} \right) + (\text{Total weight} - \text{Measured weight}) \text{ (pounds)} \times 2,500 \left( \$/\text{pound} \right) + \text{Aggregate deflection (inches)} \times 2,750,000 \left( \$/\text{inch} \right) + \text{Load test penalties (}$)\].

Sub-Section 11.5.2 prescribes “load test penalties.”

6.2.7 Overall Performance

The overall performance rating of a bridge is the sum of construction cost \( C_c \), structural cost \( C_s \), and any fines incurred as a violation of a Team Contract (Student Steel Bridge Competition National Finals only). The bridge achieving the lowest value of this total wins the overall competition.

6.2.8 Cost Estimation

An award will be given to the team that best estimates their overall performance rating and completes the competition.

6.2.8.1 Prior to the selection of the load case as prescribed in Sub-Section 7.1(8) (e.g., at the captain’s meeting), all teams will submit their estimated overall performance rating to the host school for all 6 load cases. The host school will input the values into the scoring spreadsheet.

6.2.8.2 The team that has the smallest absolute value of the difference between the actual overall performance rating and estimated overall performance rating will win the award.

6.2.8.3 Ties for the cost estimation award will first be broken by the team that overestimates their overall performance rating being ranked ahead of a team that underestimates their overall performance rating and then by aesthetics ranking, if necessary.
6.2.9 Video

Teams may compete in the optional video award category provided their bridge is presented for aesthetics judging and staged for timed construction at a Regional Competition. Being able to convey the features of the bridge’s design, the analysis conducted to verify that the design meets the structural specifications, the fabrication process, and the procedure by which it will be constructed is critical to a client accepting the work of an engineer. Videos are one means of accomplishing this task if they are professional, concise, informative, and consider the level of knowledge of the viewing audience.

All teams competing in the optional video award category must submit their entry before 5:00 p.m. EDT on May 1, 2023 to be considered. The submission form can be found at aisc.org/ssbc. The winning team will be announced at the National Finals and their video will be shown during the National Finals’ award ceremony.

6.2.9.1 The video requirements include:
(1) maximum of 6 minutes long and formatted so that it can be posted to YouTube;
(2) be directed toward the owner who is using it to assist in the decision of which team to select to move forward with the bridge project (assume the owner has some technical background);
(3) summarize the design, analysis, fabrication, and construction aspects of the team’s bridge with a particular emphasis on innovation; and
(4) involve more than one team member presenting the content.

6.2.9.2 Video submissions will be judged based on:
(1) the quality of how the information is conveyed through the video, whether proper explanations are provided, and whether supporting material was effectively used;
(2) the information provided to allow the owner to evaluate the design, analysis, fabrication and construction aspects of the bridge; and
(3) the confidence the owner has after watching the video that the team’s bridge is the right one to be selected for the project.

6.3 SPREADSHEET FOR SCORING

The scoring spreadsheet is available at aisc.org/ssbc. Questions and comments regarding the spreadsheet should be sent to ssbcscorekeeper@aisc.org. The spreadsheet also is useful for comparing alternatives when designing a bridge. Teams are encouraged to download, understand, and verify the spreadsheet before the competition.
6.4 SPECIAL AWARDS

In addition to the competition category awards, special awards are given to eligible participating teams. These awards do not factor into the category scores or overall performance rating of a bridge as defined in Sub-Section 6.2.7.

6.4.1 SSBC Team Engagement Award

The SSBC Team Engagement Award is presented to a team that demonstrates an outstanding commitment to building a diverse team, creating an inclusive environment, and appreciating the value of remarkable individuals working together to succeed. The basis for this competition is a one- to two-page written narrative that details the team’s efforts towards diversity, equity and inclusion during any phase of the competition: e.g. recruiting, training, design, and/or construction activities, and how these diversity, equity and inclusion efforts positively impacted the team’s technical outcomes.

All teams that compete at a Regional Competition are eligible for this award; participation is not mandatory. Information on this award and the submission form can be found at aisc.org/ssbc. Entries must be received before 5:00 p.m. EDT on April 3, 2023 to be considered. The winner will be selected by the Rules Committee and announced by April 21. The winning team will receive an invitation to the National Finals.

6.4.2 Robert E. Shaw, Jr. Spirit of the Competition Award

The award is named for Robert E. Shaw, Jr. who founded the Student Steel Bridge Competition in the spring of 1987 as a means of challenging university and college students to use their engineering skills to design, fabricate, construct and test a scaled-version of a steel bridge in a friendly competition.

The Robert E. Shaw, Jr. Spirit of the Competition Award is presented to a team that demonstrates outstanding team comradery, professionalism, positive work ethic and respect for their competition peers.

All teams that compete at the National Finals are eligible for this award.

6.4.3 Frank J. Hatfield Ingenuity Award

The award is named for Frank J. Hatfield who was the Chair of the Student Steel Bridge Competition Rules Committee during its first three decades of existence. He was responsible for orchestrating the many evolutions of the rules since the first Student Steel Bridge Competition in 1992 and was involved in the competition from its inception.

The Frank J. Hatfield Ingenuity Award is presented to a team that shows the most engineering ingenuity in the design and/or construction of their bridge based on the requirements of the competition rules.

All teams that compete at the National Finals are eligible for this award.
Section 7
SCHEDULE OF COMPETITION

In the months before the competition, students design their bridges, fabricate members, test load, designate the competition team, and practice construction. The regional host school procures a venue, organizes equipment (Section 12), and recruits judges (Section 14). Judges prepare by reviewing the current rules and all clarifications (Section 13). Clarifications, some of which may have been posted immediately prior to the competition, are found at aisc.org/ssbc.

7.1 RECOMMENDED SCHEDULE

(1) The official scoring spreadsheet is downloaded from aisc.org/ssbc, and data forms are generated from that spreadsheet.
(2) Using a random process, the head judge or host school determines the order in which teams will compete.
(3) The head judge conducts a meeting with the other judges to clarify any rules concerns and to inspect the construction and loading facilities.
(4) Bridges are erected for public viewing and are judged for aesthetics. After the start of aesthetics judging, bridges shall not be altered, modified, or enhanced in any way with the exception of modifications made to the bridge during the construction portion of the competition and made solely for the purpose of rectifying rules violations.
(5) Bridges are disassembled.
(6) In a meeting at which all captains are present, the head judge clarifies rules and conditions of the competition, and answers questions.
(7) Teams submit their estimated overall performance ratings to the host school at the captains meeting and the host school inputs the values into the scoring spreadsheet.
(8) Immediately before timed construction of the first bridge, the head judge rolls a die to determine the location of the decking units along the bridge for the lateral and vertical load tests. This designation will guide the lateral load test as described in Sub-Section 11.4 and vertical load test as described in Sub-Section 11.5, and the associated Test Plan Diagrams. For each possible result of the roll (N), Table 7.1 gives the dimensions for positioning the decking units along the bridge and locations where the lateral and vertical load are applied and vertical deflection and sway are measured. The same values of $L_1$, $L_2$, and $S$ will be used for all bridges at the same Regional Competition.
(9) Bridge members, tools, nuts, and bolts are staged for construction and inspected by the judges. See Section 8, “Material and Component Specifications,” and Sub-Sections 10.2.3, 10.2.4, 10.2.5, and 10.6 for details.
(11) Judges inspect assembled bridges. For details, see Section 9, “Structural Specifications.” Between corrections described in Sub-Section 9.4 and the start of load testing, force shall not be applied to the bridge except as necessary to move it. For example, leaning or sitting on the bridge is not allowed.

(12) West and east ends of the bridge are determined individually for each bridge by a randomizing process (e.g., coin flip).

(13) Bridges are weighed (if it is impractical to weigh the entire bridge, its individual parts may be weighed). All bridges shall be weighed, including those that fail as well as those which are withdrawn from competition and are not eligible for all awards.

(14) Bridges are load tested. See Section 11, “Load Test Instructions,” for details.

(15) Data entry is conducted. After a team has completed all phases of the competition, data for the team is transcribed from the data forms into the official scoring spreadsheet and checked by the captain. After data entry has been completed, a copy of the team’s “Computation” worksheet from the scoring spreadsheet is given to the captain electronically or on paper.

(16) Scores and rankings are determined using the official scoring spreadsheet.

(17) Paper or electronic copies of the “Rankings” worksheet of the official scoring spreadsheet are distributed to captains of all teams at the awards ceremony.

(18) The host school submits scans of each individual team’s data forms and the completed official scoring spreadsheet file by email to ssbcscorekeeper@aisc.org as soon as possible after completion of the competition.

(19) The host school retains the data forms until a confirmation email has been received.

<table>
<thead>
<tr>
<th>N</th>
<th>L1</th>
<th>L2</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4'-0&quot;</td>
<td>7'-6&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>2</td>
<td>4'-6&quot;</td>
<td>8'-6&quot;</td>
<td>7'-0&quot;</td>
</tr>
</tbody>
</table>
| 3 | 7'-0"| 13'-0"| 10'-0"
| 4 | 8'-6"| 13'-6"| 13'-0"
| 5 | 10'-0"| 15'-0"| 10'-0"
| 6 | 11'-6"| 16'-0"| 13'-0"

7.2 ALTERNATIVES

The order recommended above may be altered. However, it is essential that

(1) Bridges are not modified after the die is rolled with the exception of modifications made to the bridge during the construction portion of the competition and made solely for the purpose of rectifying rules violations.

(2) Bridges are not modified between aesthetics judging and timed construction.

(3) Estimated overall performances ratings are submitted by all teams prior to any team weighing their bridge or starting timed construction.

TABLE 7.1 Determination of L1, L2, and S

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(4) No components or tools are added to or removed from the construction site after staging for inspection.
(5) Modifications between timed construction and load testing are limited to connection corrections described in Sub-Section 9.4.
Section 8
MATERIAL AND COMPONENT SPECIFICATIONS

8.1 MATERIAL

Some grades of steel are not magnetically attractive. If any member, nut, or bolt is not strongly magnetic steel or incorporates parts that are not strongly magnetic steel, the bridge will not be eligible for awards listed in Sub-Section 6.2, except for aesthetics and video. The bridge shall be constructed and load tested at the head judge's discretion if that can be done safely within available time. See Sub-Section 8.2 for specifications on "members", "loose bolts", and "loose nuts".

Health Advisory: The bright silvery or colored coating on bolts, nuts, threaded rods, and other hardware contains zinc and cadmium. At welding temperatures, both elements create hazardous fumes. Inhalation of zinc fumes causes symptoms resembling those of influenza. Cadmium gas can damage lungs and kidneys and is a potential carcinogen. Only plain (uncoated) hardware should be welded.

8.2 COMPONENTS

Violation of the specifications in this Sub-Section (8.2) will result in penalties being added to the weight of the bridge. The penalty is 20 pounds for each individual non-compliant loose nut and loose bolt, and 40 pounds for each individual non-compliant member. See Sub-Sections 8.2.2, 8.2.3, and 8.2.4 for specifications on "members", "loose bolts", and "loose nuts".

8.2.1 Bridge

A bridge shall be constructed only of members, loose bolts, and loose nuts. Solder, brazing, and adhesives are not permitted. Exceptions: Purely decorative items such as coatings and decals are permitted, and bridge parts may be labeled.

8.2.2 Members

8.2.2.1 Parts of a member are welded together. A member shall retain its shape, dimensions, and rigidity during timed construction and load testing. A member shall not have parts that are cables. Exception: Deformations caused by mechanical strain (e.g., bending, stretching) during construction and load testing are not violations.

8.2.2.2 All members shall fit into a right rectangular prism (i.e., box) of dimensions of 3'-6" x 6" x 4".
8.2.2.3  *Loose bolts* shall only be used to create a *connection* between *members*.

8.2.2.4  *Loose nuts* shall only be used to create a *connection* between *members*.

8.2.2.5  *Bolts* and *nuts* of any kind shall not be welded to the *bridge*.

8.2.2.6  Holes in *members* for *loose bolts* shall not be threaded.

8.2.3  Loose Bolts

8.2.3.1  *Loose bolts* shall not have parts that flex or move. *Loose bolts* shall be commercially available, have a head, and shall not be mechanically altered or modified in any way, but may be painted.

8.2.3.2  Nominal length of *loose bolts* shall not exceed 3” measured from the bottom of the head to the end. *Loose bolts* shall have external threads that extend around the full circumference, but need not extend over their full length.

8.2.4  Loose Nuts

8.2.4.1  *Loose nuts* shall have the external shape of a hexagonal prism over their full length and not have parts that flex or move. *Loose nuts* shall be commercially available and shall not be mechanically altered or modified in any way but may be painted.

8.2.4.2  *Loose nuts* shall have internal threads that extend for the full circumference over their full length.
9.1 MEASUREMENT

Conformance with the specifications in this Section (9) will be checked with the bridge in its as-built condition after termination of timed construction and before the bridge is moved from the construction site or load tested. The bridge shall not be modified or distorted from its as-built condition in order to conform to these specifications except as prescribed by Sub-Section 9.4. Dimensions will be checked without decking or applied load. Judges may touch the bridge but shall not turn nuts or bolts or alter the condition of the bridge in any other way.

9.2 FUNCTIONALITY

If any specification in this Sub-Section (9.2) is violated, the bridge will not be eligible for awards in any category, except for aesthetics and video. The bridge shall be load tested at the head judge’s discretion if it can be done safely within available time.

9.2.1 The bridge shall have exactly two stringers, each of which is contiguous. Each stringer shall extend from inside the west end footing to inside the east end footing. Sections of the stringer may be part of members that serve other functions in the bridge. See the Bridge Elevation Diagram.

9.2.2 The bridge shall provide access for safely placing 3’-6” wide decking and load at any point between the ends of the stringers.

9.2.3 The decking shall not be attached or anchored to the bridge. This prohibition includes but is not limited to protrusions, irregularities, and textures that inhibit movement of decking relative to the stringers.

9.2.4 Decking shall not distort the bridge from its as-built condition when positioned for lateral and vertical load testing.

9.2.5 The bridge shall not be anchored or tied to the floor.

9.2.6 Teams shall accept and bridges shall accommodate conditions at the competition site.

9.3 USABILITY

Specifications in this Sub-Section (9.3) are illustrated by the Bridge Elevation Diagram.
A weight penalty will be assessed for each specification in this Sub-Section (9.3) that is violated, rather than for every violation of that specification. If there are multiple violations of the same specification, the penalty will be based on the largest violation.

The penalty for violation of each of the specifications in this Sub-Section (9.3) will be an addition to the weight of the *bridge* determined as follows:

1. 20 pounds for a dimensional violation not exceeding 1/4”;
2. 100 pounds for a violation greater than 1/4” but not exceeding 1”;
3. 200 pounds for a violation greater than 1” but not exceeding 2”;
4. 400 pounds for a violation greater than 2” but not exceeding 3”, and
5. if a violation exceeds 3”, the *bridge* will not be eligible for awards in any category, except *aesthetics* and *video*. The *bridge* shall be *load* tested at the *head judge’s* discretion if it can be done safely within available time.

9.3.1 The *bridge* shall not touch the *river* or the *ground* outside the *footings* except when the exception in Sub-Section 10.4.2 is invoked.

9.3.2 The *bridge* shall not extend more than 5’-0” above the *ground* or *river*.

9.3.3 The *bridge* shall not be wider than 5’-0” at any location along the span.

9.3.4 Vertical clearance shall be provided at all points directly over the *ground* and *river*. The clearance shall be no less than 4”, measured from the surface of the *ground* or *river*. Parts of the *bridge*, including *nuts* and *bolts*, shall not extend below this limit. Exception 1: No clearance is required for the portion of the *bridge* for which the exception in Sub-Section 10.4.2 is invoked. Exception 2: No clearance is required over the *footings* except as necessary to accommodate *restraint* applied during the lateral *load* tests described in Sub-Section 11.4.1.

9.3.5 At the ends of the *bridge*, parts of the *bridge* shall not extend away from the *river* beyond the vertical planes that make up the *construction zone* boundary shown on the Site Plan Diagram.

9.3.6 Each *stringer* shall be at minimum 23 feet long and at maximum 24 feet long, measured along their top.

9.3.7 The tops of the *stringers* shall be no more than 2’-2” and no less than 1’-10” above the surface of the *river*, *ground*, or *footings* at any location along the span.

9.3.8 The *bridge* shall provide a straight, clear decking support location conforming to the *Stringer Template* detail on the Bridge Elevation Diagram. To verify compliance with 9.3.8.1 and 9.3.8.2, *judges* will slide the *stringer template* along the tops of the *stringers* while holding it plumb and perpendicular to the span of the *bridge*. If the same obstruction causes a violation of both 9.3.8.1 and 9.3.8.2, the *judge* will record only the larger violation.
9.3.8.1 At no location along the full length of the stringers shall part of the bridge, including nuts and bolts, obstruct passage of the stringer template. The measurement for non-compliance is the distance an obstruction projects onto the stringer template, measured perpendicularly from the obstructed edge.

9.3.8.2 The tops of both stringers shall contact the tops of the two rabbets in the stringer template at every location along the full length of the stringers during the verification procedure described in 9.3.8. The measurement for non-compliance is the vertical distance between the top of a rabbet and the top of the corresponding stringer.

9.3.9 Tops of stringers shall be free of splits, separations, protrusions, and abrupt changes in elevation or slope, except that between adjacent members that comprise a stringer there may be a horizontal separation not exceeding 1/4” and a change in elevation not exceeding 1/8”.

9.4 CONNECTION SAFETY

After termination of timed construction and inspection by the judges, builders will be granted the option to correct violations of Sub-Sections 9.4.1, 9.4.2, 9.4.3, and 9.4.4. Builders will be allowed five minutes to correct only those connections in violation of the rules that are identified by the judges with a penalty of 5 minutes added to the construction time regardless of how long corrections take. Only tools, loose nuts, and loose bolts that were in the staging yard at the start of timed construction shall be used to correct violations. Safe construction practices (Sub-Sections 10.2 and 10.3) are required, but accidents (Sub-Section 10.4) will not be penalized. If any connection identified by the judges still violates Sub-Sections 9.4.1, 9.4.2, 9.4.3, or 9.4.4 after the correction period is concluded or if the team chooses not to correct the identified violations, a penalty of 2 minutes will be added to the construction time for each individual violation of Sub-Section 9.4.1, 9.4.2, 9.4.3, and 9.4.4. Bridges with violations will be eligible for awards in all categories and will be load tested provided that it can be done safely in the opinion of the head judge.

During inspection judges may touch the bridge, bolts, and nuts, but shall not turn nuts or bolts, or alter the condition of the bridge in any other way.

9.4.1 All locations where one member touches another member require a connection. Multiple members may be connected at the same location. If two or more members touch at multiple locations where the points of contact are not associated with a continuous surface or occur at different locations along the member, then a connection shall be required at each location.

9.4.2 Each connection shall contain at least one and at most two faying surfaces associated with each member being connected.
9.4.2.1  *Faying surfaces* are the only locations where *members* are in contact with each other.

9.4.2.2  *Faying surfaces* that are a gradual curve shall not have inflection points. Contact surfaces on either side of a *corner* or *bend*, as opposed to a gradual curve, shall be treated as separate *faying surfaces*.

9.4.2.3  Every *faying surface* shall be penetrated by at least one *loose bolt* secured by a *loose nut* such that the *members* cannot be separated without first unscrewing and removing the *loose bolt(s)* that connects them. A *loose bolt* may connect more than two *members*.

9.4.2.4  Minor, unintentional gaps between the *faying surfaces* of *members* due to *member* and fabrication imperfections shall be allowed and treated as continuous *faying surfaces* provided the resulting waves or protrusions in the *faying surfaces* are not large enough to resist movement without the presence of a *bolt*.

9.4.2.5  Cam locks, dovetails, tube-in-tube/sleeved and other mechanical/interlocking connections that are designed to resist movement without the presence of a *bolt* are prohibited regardless of whether a *bolt* penetrates the *faying surfaces*.

9.4.3  Each individual hole in a *member* for a *loose bolt* shall be completely surrounded by the *member*. Furthermore, such holes in the outer plies of a *connection* shall be small enough that the *nut* or *bolt* head cannot pass through.

9.4.4  Each individual *nut* shall at least fully engage the threads of the matching *bolt*. That is, the terminal threads of the *bolt* shall extend beyond or be flush with the outer face of the *nut*. The threads of the *nut* shall match the *bolt* so that installation and removal require relative rotation.

9.5  **INSPECTABILITY**

Each individual *faying surface*, *nut*, head of a *bolt*, and threaded end of a *bolt* shall be visible in the completed *bridge* so that compliance with Sub-Section 9.4 can be verified. **If any individual faying surface, bolt head, threaded end of a bolt, or nut cannot be inspected, a penalty of 2 minutes will be added to the construction time for each individual violation.** *Bridges* with violations will be eligible for awards in all categories and will be *load* tested provided that it can be done safely in the opinion of the *head judge*. 

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Section 10
CONSTRUCTION REGULATIONS

10.1  GENERAL CONSTRUCTION REGULATIONS

10.1.1  The team designates one builder to serve as captain for the entire competition.

10.1.2  All construction activities are conducted within the site boundary. The host school marks the site boundary and its enclosed features on the floor before the competition, as illustrated by the Site Plan Diagram.

10.1.3  Builders on the ground in the construction zones put members together to assemble the bridge.

10.1.4  Builders carry members, tools, loose nuts, and loose bolts across the transportation zones.

10.1.5  Builders shall wear hardhats that meet ANSI standard Z89.1 and protective eyewear or safety goggles that meet ANSI standard Z87.1 as personal protective equipment during all construction activities.

10.1.6  There may be multiple constructed portions. If a member that is part of the constructed portion is removed from contact with the constructed portion, it becomes an individual member again.

10.2  PRE-CONSTRUCTION CONDITIONS

Timed construction will not commence if any provision of this Sub-Section (10.2) is violated.

10.2.1  Only builders and judges are permitted within the site boundary during timed construction. Other team members and associates of the team, coaches, faculty, advisers, and spectators shall remain in designated areas at a distance from the construction site that assures they are not at risk and cannot interfere with the competition.

10.2.2  There shall be no more than six builders.

10.2.3  Welding machines and tools requiring external power connections shall not be used during timed construction. Tools powered by batteries or other internal energy supplies are acceptable.
10.2.4 A tool shall fit within a right rectangular prism (i.e., box) of dimensions 3'-6" x 6" x 4". During timed construction, multiple tools may be combined to form an assembled tool that does not need to meet the requirements of Sub-Section 10.2.4.

10.2.5 Containers of lubricant shall not be in the construction site at any time.

10.3 SAFE CONSTRUCTION PRACTICES

If any rule in this Sub-Section (10.3) is violated during timed construction, the judge will stop the clock and explain the violation. Before the clock is restarted, builders, tools, members, nuts, and bolts will be returned to the positions they occupied immediately before the violation. Builders will then be asked to resume construction using safe procedures. Builders will have the opportunity to construct their bridge safely. However, if they are not able to construct the bridge completely using safe procedures, construction will cease and the bridge will not be eligible for awards in any category, except for aesthetics and video.

10.3.1 Builders, judges, host personnel, and spectators shall not be exposed to risk of personal injury. Only builders and judges may be in the construction site.

10.3.2 At all times during timed construction every builder shall wear personal protective equipment in the proper manner.

10.3.3 A pouch or other article of clothing shall not be removed from a builder's person or held in a builder's hand(s).

10.3.4 Loose nuts, loose bolts, or tools shall not be held in the mouths of builders.

10.3.5 Throwing anything is prohibited.

10.3.6 A builder shall not cross from the ground on one side of the river to the ground on the other side.

10.3.7 A builder who is outside a staging yard shall not simultaneously support or touch, directly or with tools, more than one member that is not in a constructed portion.

10.3.8 A builder shall not use the bridge, a constructed portion of the bridge, a member, or a tool to support all or part of the builder's body weight. However, a builder may be partially supported by a constructed portion if the builder is kneeling on the floor on both knees, kneeling on the floor on one knee with the other foot on the floor, or standing with the heels and toes of one or both feet on the floor.

10.3.9 A builder shall not depend on another builder or builders for support or balance.

10.3.10 Construction of the bridge shall commence by creating a constructed portion. Each constructed portion shall be started on the ground within a footing.
10.3.11 A builder who is outside a construction zone shall not touch (or touch with tools) a constructed portion, and shall not install a member, loose nut, or loose bolt on a constructed portion.

10.3.12 At no time shall a builder or builders support the entire weight of a constructed portion. However, a builder or builders may remove a single member from a footing or from a constructed portion.

10.3.13 No part of a constructed portion shall extend beyond the site boundary at any time.

10.3.14 A team shall construct its bridge safely using the site and floor surfaces provided by the host school. Bridges and participants shall accommodate local conditions.

10.4 ACCIDENTS

Accident types are described in Sub-Sections 10.4.1, 10.4.2, and 10.4.3. In general, the clock is not stopped when there is an accident.

A penalty is assessed for each separate accident. If an accident is continuous (for example, a builder stands in the river, or a dropped item is not retrieved promptly) it will be counted as multiple occurrences until corrected. Builders involved in accidents may continue to build. Items involved in accidents shall be recovered promptly and may be used.

Construction cannot depend on deliberately committing an accident. Therefore, the clock will be stopped if any work is accomplished by committing an accident. Before timed construction is resumed, builders, tools, members, nuts, and bolts will be returned to the positions they occupied immediately before the accident.

10.4.1 A builder, builder’s footwear, pouch, or article of clothing touches the river or the floor outside the site boundary. **Penalty is 2 minutes for every occurrence.** Exception: There is no penalty for stepping out of bounds or entering the river to retrieve an object that has been dropped, such as a member, tool, nut, bolt, or personal protective equipment.

10.4.2 A member, constructed portion, tool, nut, bolt, or personal protective equipment touches the river, the ground outside the staging yard, or the floor outside the site boundary. **Penalty is 1/4 minute (15 seconds) for each item during each occurrence.** Exception: There is no penalty for a member or constructed portion touching the ground within a footing. However, construction may proceed if it is no longer possible to hold the bearing surfaces of a constructed portion within the footings. In this situation, the captain may request that the clock be stopped while the difficulty is demonstrated to the head judge. If the head judge is convinced, no additional accidents will be cited for a constructed portion touching the ground outside the footings (regulation...
10.4.2), the clock will be restarted, construction will resume, and a 200-pound weight penalty will be assessed, even if the bearing surfaces of the bridge are within the footings when it is completed. All penalties applied associated with this rule prior to the exception being taken remain.

10.4.3 Outside the staging yards, a member that is not part of a constructed portion touches or is in contact with another member that is not part of a constructed portion. **Penalty is 1/4 minute (15 seconds) for each occurrence.** Exception: There is no penalty if a member that is on the ground within a footing touches another member.

### 10.5 CONSTRUCTION SITE

See the Site Plan Diagram for the construction site layout. The host school lays out the site before the competition. The construction site shall be laid out so that the tape that designates lines is river or out of bounds. That is, the edges of the tape, not the centerlines, designate the lines shown on the drawing.

### 10.6 START

10.6.1 Before construction begins, only the following are allowed in the staging yards: all builders, members, loose nuts, loose bolts, and tools. Every member, loose nut, loose bolt, and tool must be in contact with the ground and must fit entirely within the assigned area of a staging yard as designated on the Staging Yard detail on the Site Plan Diagram. Loose nuts may be installed on loose bolts. Tools cannot touch each other. Builders are wearing personal protective equipment as well as optional clothing such as pouches. At the start, builders must be in their designated areas within the staging yards and cannot touch members, tools, nuts, or bolts, which may only be picked up and passed from one builder to another after timed construction begins. There shall be nothing within the construction site that is not in a staging yard.

10.6.2 Judges inspect members, loose nuts, loose bolts, and tools as they are placed in the staging yards. Tools that do not conform to regulation 10.2.3 and 10.2.4 shall be removed from the staging yard and shall not be used. After inspection and throughout timed construction, additional members, tools, nuts, bolts, or other items shall not be brought into the construction site nor shall anything be removed. Additional builders shall not enter the construction site after the beginning of timed construction.

10.6.3 Timing and construction begin when the captain signifies that the team is ready and the judge declares the start.

### 10.7 TIME

10.7.1 Time is kept from start to finish of construction. The clock will be stopped under the following conditions:
(1) if a builder or judge sees a condition that could cause injury, or
(2) when a safety regulation has been violated (see Sub-Section 10.3), or
(3) when work has been accomplished by committing an accident. The clock is not
stopped if the accident does not contribute to the construction process (see
Sub-Section 10.4), or
(4) if a builder or judge is injured or incapacitated.

10.7.2 Construction ceases while the clock is stopped. After the situation has been
corrected, builders, tools, and bridge components are returned to the positions they
occupied immediately before the interruption, the clock is restarted, and construction
resumes.

10.8 TIME LIMIT

10.8.1 If construction time exceeds thirty minutes, the scoring spreadsheet will
count construction time as 180 minutes. Accidents (10.4) that occur after thirty minutes
will not be penalized but safety regulations (10.3) will still be enforced. Judges may inform
the team when this time limit is approaching and shall inform them when it is reached.

10.8.2 If construction time exceeds 45 minutes, judges will halt construction. If local
conditions allow and the head judge approves, the team may move its bridge off site for
continued, untimed construction if it can be done safely. The bridge will not be eligible for
awards in any category, except for aesthetics and video, but it may be load tested at the
discretion of the head judge if that can be done safely within available time.

10.9 FINISH

10.9.1 Construction is complete when

(1) the bridge has been completed by connecting all the members that were in the
staging yard at the start of timed construction,
(2) all builders are in the staging yards,
(3) all tools are in contact with the ground in the staging yards or in a builder’s
possession, and
(4) all extra nuts and bolts are held in the hands of builders, or are in clothing worn
by builders, or are on the ground in the staging yards.

10.9.2 The clock is stopped when the captain informs the judge that construction is
complete. If the requirements of Sub-Section 10.9.1 are not met when the clock is
stopped, builders, tools, members, nuts, and bolts will be returned to the positions they
occupied immediately before the clock was stopped. The clock will then be restarted and
builders will be required to complete construction as designated in Sub-Section 10.9.1
prior to the clock being stopped when the captain again informs the judge that
construction is complete.

10.9.3 Installation of decking is not included in timed construction.
10.9.4 The *bridge* shall not be modified after construction, except for correction of *connections* as prescribed in Sub-Section 9.4.
Section 11
LOAD TEST INSTRUCTIONS

11.1 DAMAGE

A bridge with damage that would reduce its strength or stability (such as a fractured weld, missing or broken member, broken bolt, or missing nut) will not be approved for load testing and will not be eligible for awards, except for aesthetics and video. Repair and modifications are not permitted after timed construction except as prescribed in Sub-Section 9.4.

11.2 SAFETY PRECAUTIONS

It is the responsibility of judges, host personnel, and competitors to employ effectively all precautions, which are summarized in this Sub-Section (11.2). Competitors should follow the same precautions when proof testing bridges in preparation for competition.

11.2.1 General Precautions

11.2.1.1 An activity shall be halted if a judge considers it to be hazardous. If a team cannot load its bridge safely, loading will cease and the bridge will not be eligible for awards, except aesthetics and video.

11.2.1.2 Competitors who are not participating in loading, faculty, advisers, and other spectators shall observe from a safe area designated by the judges and host school.

11.2.1.3 While participating in load testing, competitors shall wear personal protective equipment consisting of hardhats meeting ANSI standard Z89.1, protective eyewear or safety goggles meeting ANSI standard Z87.1, work gloves, and leather construction boots. This safety equipment is provided by each team. Judges will not permit load testing by competitors who are not wearing the specified personal protective equipment or are wearing it improperly.

11.2.2 Lateral Load Test Precautions

11.2.2.1 There shall be no more than four students in the crew that participates in a lateral load test.

11.2.2.2 A bridge that sways in excess of 1 inch during lateral load testing shall not be loaded vertically and will not be eligible for awards, except for aesthetics and video.
11.2.3 Vertical Load Test Precautions

Bridges may collapse suddenly without warning, and a failure may involve only one side so that the load falls or slides sideways off the bridge. The intent of the provisions of this Sub-Section (11.2.3) is to prevent personal injury if a bridge collapses.

11.2.3.1 The number of people near the bridge shall be minimized during vertical load tests. The loading crew is limited to four students, but substitutions may be made during the loading process.

11.2.3.2 Safety supports shall be provided by the host school, and shall be of adequate strength, height, and number to arrest falling load if a bridge collapses. The use of the AISC provided jack stands is highly recommended. The height of the jack stands may be increased by placing wood blocks or concrete blocks underneath them provided the jack stand remains stable.

11.2.3.3 Safety supports shall be in place under the decking units before load is placed on the bridge.

11.2.3.4 The number and location of safety supports under a decking unit shall be sufficient to arrest the load even if only one side or one end of the bridge collapses. Therefore, safety supports are needed under the sides and ends of the decking units, not just in the middle. Safety supports should be directly under decking units rather than under bridge trusses or cross braces, if possible.

11.2.3.5 Safety supports shall be adjusted individually for each bridge so that load cannot drop more than approximately four inches. If the height of the safety supports is not adjustable in appropriate increments, they shall be augmented with pieces of wood, concrete blocks or other suitable material provided by the host school.

11.2.3.6 No one shall reach, crawl, or step under a bridge, or stand inside a bridge while any portion of the vertical load is in place. If safety supports must be adjusted during loading, the load shall first be removed without disturbing the bridge, adjustments made, and the load replaced as it was before being removed.

11.2.3.7 Bridges that inhibit safely placing vertical load shall not be tested and will not be eligible for awards, except for aesthetics and video.

11.2.3.8 Judges shall continuously observe sway carefully during vertical load testing. If sway exceeds 1 inch, loading shall cease and load shall be removed carefully.

11.2.3.9 Judges shall continuously observe deflections carefully. If any deflection exceeds 3 inches downward, loading shall cease and load shall be removed carefully.
11.2.3.10 **Judges** shall continuously observe the behavior of the *bridge*. Loading shall cease and the *load* shall be removed carefully if, in the opinion of a *judge*, collapse is imminent.

11.3 PREPARATION

The *captain* shall observe the *load* tests and may handle *load*. A *captain* who does not handle *load* shall comply with Sub-Section 11.2.1.3, but does not count toward the four-person limit.

*Teams* shall accept imperfect field conditions such as bent *decking*, sloping floors, and unfavorable floor surfaces. **Commencing the lateral load or vertical load test indicates acceptance of all starting conditions.**

For each *bridge*, the *judge* will determine by a randomizing process (e.g., coin flip) which end is the *east end*. The other end is the *west end*. The *north side* and *south side* of the *bridge* are relative to the designation of the bridge ends.

Position *S* designates the position of the *decking* unit for the lateral *load* test and position *L1* and *L2* designate the position of the *decking* units for the vertical *load* test. These positions are determined at the beginning of the competition as described in Sub-Section 7.1(8) and illustrated by the Lateral *Load* Test Plan and Vertical *Load* Test Plan on the *Load Test Plan Diagrams.*

At their discretion, *judges* may impose a penalty for a *bridge* that incorporates parts having the primary function of interfering with placement of *decking, load,* or measuring devices. If the *bridge* cannot be loaded safely, or *sway* or *deflection* cannot be measured in accordance with the provisions of this Section (11), the *bridge* shall not be *load* tested and will not be eligible for awards, except for *aesthetics* and *video*.

Typically, *sway* is determined by using a plumb bob attached to the *bridge* or *decking* at a specific point, but *sway* limits apply even if the plumb bob is displaced by contact with another part of the *bridge*.

11.4 LATERAL LOAD TEST

The provisions of this Sub-Section (11.4) are illustrated by the Lateral *Load* Test Plan on the Lateral *Load* Test Plan Diagram.

11.4.1 Set Up

The lateral *load* test is conducted with one *decking* unit positioned at a distance of *S* from the end of the stringer at the *west end* of the *bridge* as indicated on the Lateral *Load* Test Plan Diagram. Approximately 75 pounds of weight is placed on that *decking* above the *stringer* on the opposite side of the *bridge* from where the lateral *load* will be applied. This
*load* is intended to restrain the bearing surfaces of the *bridge* from lifting off the floor when lateral *load* is applied. No additional uplift restraint will be used, even if bearing surfaces lift.

Bearing surfaces are prevented from sliding by lateral *restraint* applied by the loading crew. This lateral *restraint* shall not restrain rotation or uplift. The restraint is applied as close to the floor as possible, at the locations shown on the Lateral *Load* Test Plan Diagram. *Teams* may provide and use optional devices to prevent sliding. However, the device must prevent sliding only. Devices designed to prevent vertical uplift will not be permitted. The lateral *load* test is failed if the *bridge* is restrained in other than the lateral direction, or if the restraint is not applied close to the *ground*, or if the restraint is not effective.

11.4.2 Lateral Load Test

A 50 pound lateral *load* is applied and *sway* is measured on the south side of the *bridge*, centered on the *decking* unit positioned at a distance *S* measured from the west end of the south side stringer. Lateral *load* is applied at the level of the *decking* or top of the *stringer*, which is the bottom of the *decking*. The *sway* measurement is made as close as possible to the location of the lateral *load*. The *sway* measurement device may be attached to the *decking* at the discretion of the *judges*.

To pass the lateral *load* test, the *sway* must not exceed 1 inch.

If the *bridge* fails the lateral *load* test, it will not be eligible for awards, except for *aesthetics* and *video*. Do not conduct the vertical *load* test. Check the appropriate box on the data form.

If the *bridge* passes the lateral *load* test, proceed with the vertical *load* test.

11.5 VERTICAL LOAD TEST SEQUENCE

The provisions of this section are illustrated by the Vertical *Load* Test Plan and Vertical *Load* Test Elevation on the Vertical *Load* Test Plan and Elevation Diagram.

11.5.1 Set Up

11.5.1.1 *Decking* units are 3’-0” long in the longitudinal (span) direction of the *bridge* so that the main bars of grating span laterally. Two *decking* units are used. *Decking* units are placed square with and centered on the *stringers*. *Decking* units shall not be attached to the *bridge* and shall not distort it (see Sub-Sections 9.2.3 and 9.2.4).

One *decking* unit is placed at a distance *L1* from the west end of the *bridge* measured along the top of the north side *stringer*. The other *decking* unit is placed at a distance *L2* from the west end of the *bridge* measured along the top of the north side *stringer*.

A *decking* unit that does not contact the top of a *stringer* at a location where *deflection* will be measured will be clamped to the *stringer* at or near that location. The clamp will be
removed when sufficient load is in place to hold the decking unit in contact with the top of the stringer.

11.5.1.2 Safety supports are placed under the decking units so that no portion of the load will drop more than approximately 4 inches if the bridge collapses.

11.5.1.3 Deflections are measured as close as possible to the tops of stringers, which are at the same level as the bottom of the decking. Deflection measurement devices may be connected to the decking. Measurements are made at the following locations

- D1 centered on the north side of the decking unit positioned at L1.
- D2 centered on the south side of the decking unit positioned at L2.

Sway is observed on the south side of the bridge, at the center of the decking unit positioned at L1.

11.5.2 General Loading Procedure

Load is laterally centered on the decking unit and distributed over the length of the decking unit as uniformly as possible. Load is distributed and aligned as identically as possible for each bridge. It is highly recommended that angles provided by AISC be used as the load. If angles are used, they shall be placed perpendicular to the span of the bridge in an interlocking manner to maintain safety in the event of a failure or a collapse. Load shall be placed at a steady pace, without hesitation. Crews shall stand outside the bridge while placing load.

As load is being placed, continuously observe deflection and sway. Stop loading if

(a) sway exceeds 1 inch, or
(b) any measured deflection exceeds 3 inches downward, or
(c) decking or any part of the bridge, other than the intended bearing surfaces, comes to bear on a safety support or the floor, or
(d) a decking unit or some of the load falls off the bridge, or
(e) the bridge collapses or a dangerous collapse is imminent in the opinion of the judge.

If loading is stopped for any of the situations a, b, c, d, or e, the bridge is not approved for further load testing and will not be eligible for awards, except aesthetics and video. Do not continue load testing. Ask the crew to remove the load carefully. Check the appropriate box on the data form.

Deflections measured while the vertical load is in place will be used by the scoring spreadsheet to compute aggregate deflection by adding the absolute values of deflections at D1 and D2, and then rounding the sum to the nearest 0.01 inch. If any measured deflection exceeds 2 inches, the scoring spreadsheet will add penalties of $4,000,000 to the Construction Economy score and $10,000,000 to the Structural Efficiency score.
11.5.3 Vertical Load Test

(1) The crew distributes 100 pounds of preload on the *decking* unit positioned at *L1* and 100 pounds of preload on the *decking* unit positioned at *L2*. The preload is distributed uniformly, centered laterally on the *decking* unit, and positioned identically for each *bridge*.

(2) Initialize the *sway* measurement devices.

(3) Initialize the two *deflection* measuring devices at *D1* and *D2* or record the initial readings.

(4) The crew places 1300 pounds of additional *load* on the *decking* unit at *L1*.

(5) The crew places 1000 pounds of additional *load* on the *decking* unit at *L2*.

(6) Record the final readings for *D1* and *D2*.

11.5.4 Loss of Data

If *deflection* data is lost or compromised, the *judge* will require the *team* to disassemble the *bridge*, repeat timed construction beginning with the initial conditions prescribed in Sub-Section 10.6, and redo lateral and vertical *load* tests. Compliance with all rules will be checked except those in Section 8 and Sub-Section 9.3, which will not be checked again. Scoring will be based on the run that results in the larger *construction cost*, \( C_c \) (not including *load* test penalties), but will not exceed 110% of \( C_c \) (not including *load* test penalties) for the initial run.

11.6 UNLOADING

*Load* on the *decking* unit at *L2* is removed before the *load* on the *decking* unit at *L1*. If the *bridge* collapses during unloading (situation c, d, or e in Sub-Section 11.5.2), the *bridge* is not eligible for awards, except for *aesthetics* and *video*.
Section 12
EQUIPMENT PROVIDED BY HOST

12.1 SOURCES OF INFORMATION

Equipment for hosting a competition is listed in this section and described in the Host Guide at [aisc.org/ssbc](http://aisc.org/ssbc). The equipment provided by AISC is preferred for conducting the competition. The Host Guide also includes competition procedures and illustrations of bridge details that demonstrate compliance and noncompliance with specifications and regulations. Host personnel, judges, and competitors are encouraged to review the site and guide.

Although the equipment described in this Section (12) will be provided by the host school, competitors should acquire similar equipment for load testing before the competition.

All teams are required to accept/accommodate local conditions and equipment, including floor, decking, safety supports, load, templates, boxes, deflection measurement devices and scales.

12.2 DECKING

Preferred decking is steel bar grating identified as W-19-4 (1” x 1/8”). The dimensions of a unit of grating are approximately 3’-6” x 3’-0” x 1” and the weight is approximately fifty pounds. Grating has significant bending strength only in the direction of the main bars, which are 3'-6” long. The grating will be installed with the main bars perpendicular to the length of the bridge, creating a roadway that is 3’-6” wide. Therefore, support for the grating is needed for the edges that are parallel to the length of the bridge but not for the edges that are perpendicular to the length.

12.3 SAFETY SUPPORTS

Safety supports must be used during load tests and are intended to limit the consequences of a bridge collapsing. Safety supports shall be of sufficient height, strength, number, and extent so that none of the load will fall more than approximately four inches if the bridge collapses. Safety supports may be steel, nested stacks of plastic buckets, jack stands, timbers, sand bags, or masonry units. Jack stands with welded plates are the recommended safety supports because of their flexibility in height, ease of placement, and stability. The height of the jack stands can be increased by placing wood blocks or concrete blocks underneath them provided the jack stand remains stable.
12.4 LOAD

A total load of 2500 pounds should be supplied in pieces of uniform size and weight that can be handled safely. When in place, the load should not provide significant stiffness in the longitudinal direction of the bridge. The recommended load consists of 25-pound lengths of 4” x 4” x 3/8” or 5” x 5” x 5/16” steel angle placed perpendicular to the length of the bridge. Alternatively, sacks of material, containers of liquid, concrete blocks, or jacking systems can be used. Decking is not included as part of the 2500-pound load. If a jacking system is used, loading forces may be concentrated nine inches in from each end of the decking units.

12.5 TEMPLATE

A template as dimensioned in the Stringer Template detail on the Bridge Elevation diagram shall be used to check the stringer locations and clearance. Plywood is recommended. Holes for handholds are helpful but optional.

12.6 BOX

A box with inner dimensions of 3'-6” x 6” x 4” should be supplied to ensure that members and tools meet dimensional requirements specified in Sub-Sections 8.2.2.2 and 10.2.4. Wood or other non-deforming material is recommended.

12.7 SCALES

Four calibrated scales should be supplied to be used under the four bridge supports to determine the measured weight of the bridge. The scales should be checked prior to competition for measurement accuracy. If it is impractical to weigh the whole bridge at once, then each individual piece of the bridge can be weighed separately on a single scale and summed to determine the measured weight of the bridge.
Section 13
INTERPRETATION OF RULES

The website aisc.org/ssbc lists clarifications of the rules. Students, judges, and host personnel may submit questions via a form on that website, but should first read the previously posted clarifications, reread this rules document carefully in its entirety, and review the Host and Competitors Guides at aisc.org/ssbc. Submitters’ names and affiliations must accompany clarification requests and will be posted with the questions and answers. **Questions shall be limited to interpretation of rules; specific designs and procedures will not be validated.** Deliberation by the SSBC Rules Committee typically requires two weeks, but possibly longer. Questions must be submitted before 5:00 p.m. EDT on May 1, 2023.
Section 14
JUDGING

The host school will recruit judges. Judges are empowered to halt any activity that they deem to be hazardous. The head judge has full authority over the conduct of the competition and interpretation of the rules. Decisions, scoring, and ranking are the sole responsibility of the judges and will be final. The host school will assure that the judges are fully informed of the rules and procedures, and fully equipped for their tasks. More information for the host school and judges is available at aisc.org/ssbc, where the official scoring spreadsheet may be downloaded and the Host Guide reviewed.
15.1 REGIONAL COMPETITIONS

15.1.1 At the beginning of the competition, each team will identify its captain who is also a builder. The host school will identify the regional head judge (RHJ).

15.1.2 A penalty, decision, measurement, score, condition of competition, or interpretation of rules may be appealed only by the captain and only to the RHJ. The RHJ will not hear the appeal if they are approached by anyone other than the captain. The RHJ will refuse to hear protests regarding bridges other than the captain’s. An oral appeal must be made as soon as possible to the RHJ after the situation becomes apparent. The RHJ will hear the appeal from the captain as soon as possible and may interrupt the competition. The RHJ will make a decision in regards to the appeal prior to the team continuing on with the competition.

15.1.3 Upon receiving the decision from the RHJ, the captain shall be given 5 minutes to consult with the rest of the team in regards to whether the team consents to the decision of the RHJ. Only the captain will discuss the decision of the team with the RHJ.

15.1.3.1 If the captain consents to the decision of the RHJ, the decision is final and the team will continue on with the competition.

15.1.3.2 If the captain does not consent to the decision of the RHJ, they shall inform the RHJ that they plan to appeal to the SSBC Rules committee and write a brief explanation of what is being appealed on the data form before signing it. The team will complete the rest of the competition, provided that the bridge is deemed safe by the RHJ, with the scoring based on the decision made by the RHJ. Participants are reminded that civility and ethical behavior are expected during the competition, particularly concerning appeals.

15.1.4 After the Regional Competition, the SSBC Rules Committee will consider only those appeals that allege errors in interpretation of rules and only if those appeals were made to the RHJ during the Regional Competition in conformance with Sub-Section 15.1.2 and 15.1.3.2. Appeals should be submitted by e-mail to Ms. Dita Frank frank@aisc.org and shall include

(1) name of the college or university making the appeal,
(2) captain’s name, e-mail address, and telephone number,
(3) faculty advisor’s name, e-mail address, and telephone number,
(4) brief description of the problem, including citation of pertinent rules,
(5) action taken at the competition to deal with the problem,
(6) action that the appealing team feels should have been taken, and
(7) data showing that the team should have qualified for the National Finals.

The SSBC Rules Committee may review the submitted data forms documenting the problem and may confer with the RHJ.

**15.1.5** Appeals must be made by e-mail. An appeal will be considered only if the email is received by 5:00 p.m. EDT on the Wednesday immediately after the Regional Competition. Ms. Frank will forward the appeal to the SSBC Rules Committee for their evaluation. The SSBC Rules Committee will not respond to an appeal until the official scoring spreadsheet file for that Regional Competition has been submitted by the host school to ssbcscorekeeper@alsc.org. The only redress that may be made is an invitation to participate in the National Finals if the SSBC Rules Committee is convinced that the appeal is valid and that the appealing team should have qualified for the National Finals. Decisions and rankings made by regional judges will not be overturned.

**15.2 NATIONAL FINALS**

**15.2.1** Judges will refuse to hear protests from a team concerning any bridge other than their own.

**15.2.2** A penalty, decision, measurement, score, condition of competition, or interpretation of rules may be appealed only by a captain and only to the station head judge (SHJ). The SHJ will not hear the appeal if he or she is approached by anyone other than the captain. The appeal must be made as soon as possible after the situation becomes apparent and before the conditions at issue are changed (e.g., by further construction, loading, or disassembly of the bridge). The SHJ will hear the appeal as soon as possible and will make a ruling. The conditions at issue will not be changed during deliberation. Teams are reminded that civility and ethical behavior are expected during the competition, particularly concerning appeals.

**15.2.3** After hearing the SHJ’s ruling, the captain may request a five-minute recess to discuss the issue with the team. During the recess, the conditions at issue will not be changed. Immediately after that recess, if the team has justification to contest the SHJ’s ruling, the captain has the option to appeal that decision to the national head judge (NHJ). The NHJ will hear the appeal as soon as possible and will make a ruling. The NHJ may consult with the SSBC Rules Committee. The conditions at issue will not be changed during deliberation.

**15.2.4** If the team has justification to contest the NHJ’s ruling, the captain has the option to appeal that decision directly to the SSBC Rules Committee within fifteen minutes after hearing the NHJ’s ruling. The Committee may request information from the NHJ and SHJ but those judges will not vote on the final ruling.
15.2.5 The decision of the SSBC Rules Committee is final; there are no further appeals. However, AISC welcomes written suggestions for improving future competitions.
SOUTH SIDE ELEVATION

BRIDGE ELEVATION

1. DRAWINGS ARE NOT TO SCALE.
2. NO PART OF THE BRIDGE SHALL EXTEND AWAY FROM THE RIVER BEYOND THE CONSTRUCTION ZONE BOUNDARIES (9.3.6).
3. TOPS OF STRINGERS SHALL BE AT LEAST 23 FT. LONG AND AT MOST 24 FT. LONG (9.3.6).
4. BRIDGE SHALL PROVIDE A STRAIGHT, CLEAR DECKING SUPPORT LOCATION AND PASSAGE WAY (9.3.6).
**LATERAL LOAD TEST PLAN**

**NOTES:**
1. DRAWING NOT TO SCALE
2. DECKING LOCATION "S" IS DETERMINED BASED ON THE DIE ROLL AND IS THE SAME FOR ALL BRIDGES.
3. EAST END OF THE BRIDGE IS DETERMINED BASED ON A RANDOMIZING PROCESS FOR EACH BRIDGE.
4. LOCATIONS OF LATERAL PULL, LATERAL RESTRAINT, AND SWAY MEASUREMENTS ARE SPECIFIC TO THE NORTH AND SOUTH SIDE OF THE BRIDGE. (114)