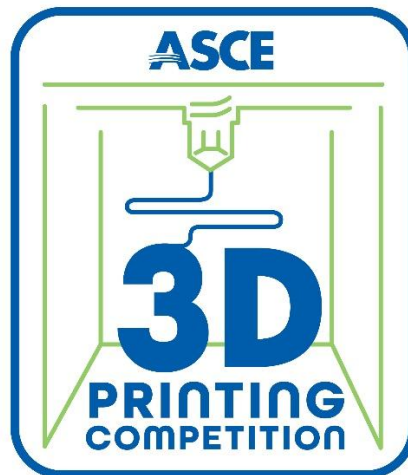




3D Printing Competition: Bridging the Future

2026 Rules and Requirements



IN PARTNERSHIP WITH  NJIT

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1. Welcome

The American Society of Civil Engineers (ASCE) supports and encourages a fully inclusive culture that celebrates individual uniqueness, engenders a sense of belonging, and promotes equitable opportunity for all people to participate in the 3D Printing Competition. (See ASCE [Policy statement 417 - Justice, equity, diversity, and inclusion.](#)) Participation should be inclusive, open, and fair to all interested and eligible students. Welcome!

2. About the Competition

Three-dimensional printing (3DP) is an emerging construction technology. Construction using 3DP operates by adding sequential layers of material to create a three-dimensional object, which saves labor cost, minimizes material waste, and optimizes building time. While 3DP has been used to create prototypes and small-scale models of the built environment for some time, the technology has advanced to the construction of houses and bridges.

The goal of the 3D Printing Competition is to promote the application of 3D printing technology in the field of civil engineering. This year the goal for students is to design an aesthetically-pleasing, strong, and stiff bridge that will take the least amount of assembly time and meets the geometric requirements.



Figure: [The first 3D-printed home in the United States, 2021, Williamsburg, VA \(Alquist 3D\)](#)



Figure: [The world's first 3D printed steel footbridge, 2021, Amsterdam, The Netherlands \(Ana Fernandez/SOPA Images/LightRocket via Getty\)](#)

Students must pay attention not only to the design, but also the details of the print, which play a significant role in the shape, tolerances, and capacity of the bridge. Students will demonstrate teamwork, organization, analytical skills, and creativity throughout the process of the competition.

The 3D Printing Competition has its origin at the New Jersey Institute of Technology's inter-collegiate competition in November 2021. ASCE gratefully acknowledges NJIT's efforts in creating the competition and working to expand its reach among civil engineering students.

3. Participation and Eligibility

a. Team Member Requirements

Team members must be undergraduate students, enrolled during all or part of the current competition academic year, members of an ASCE Student Chapter in good standing, registered participants of the student symposium, and Society Student Members of ASCE. (Society student membership is free; be sure to [join](#).)

Graduate students are encouraged to serve as advisors.

b. Team Requirements

It is an expectation that teams will reflect diversity, foster an inclusive culture, and treat everyone with dignity and respect. The team can be as small as just one member with no limit on the number of members.

Only one team per ASCE Student Chapter may compete in the competition. A student chapter may compete in only one ASCE Student Symposium per year. Each team must designate one team member to serve as the team captain. Conference assignments and this year's student symposium hosts are listed [here](#).

Official Guest Teams

ASCE Student Chapters hosting student symposia may invite Official Guest teams, which are teams from Region 10 that have an official ASCE Student Chapter not yet assigned to any Student Conference. Official Guest teams may compete in only one student symposium per year and are eligible to place and receive awards at the student symposium competition (if they meet the other requirements, including eligibility requirements). ASCE Student Programs shall be notified by the student symposium host school of an Official Guest team prior to the start of the student symposium via email to student@asce.org.

Exhibition Teams

A university group that is in the establishment phase of becoming an ASCE Student Chapter may request to compete at their potential future ASCE Student Symposium as an exhibition team. If the student symposium host grants permission, the exhibition team may compete.

An ASCE Student Chapter team wanting to enter a competition that is NOT being hosted at their assigned student symposium, may request to compete at another ASCE Student Symposium as an exhibition team. If the student symposium host grants permission, the exhibition team may compete.

An ASCE Student Chapter team wanting to enter a competition that is being hosted at their assigned student symposium but has circumstances that prevent participation at their assigned student symposium, may contact ASCE Student Programs (student@asce.org) with a description of the circumstances to explore options.

The exhibition team will be scored but shall not be ranked or win awards at the student symposium competition.

c. Student Chapter Eligibility

Eligibility criteria for the Student Symposium Competition are shown in Appendix B.

d. Intent and Eligibility Acknowledgement Form

Teams must submit online [Intent and Eligibility Acknowledgement Forms](#), no later than **5:00 p.m. Eastern Time (ET) on November 3, 2025**.

By completing this form, a student chapter states:

- Their intent to have a team participate in the competition at their assigned student symposium; and
- Their acknowledgement of the eligibility requirements for student symposium competition participation (Appendix B).

The form must be completed and separately submitted by the:

- 1) Team Captain;
- 2) ASCE Student Chapter Faculty Advisor; and
- 3) Competition Team Faculty Advisor.

All three parties will use the same form to submit. If the ASCE Student Chapter Faculty Advisor and the Competition Team Faculty Advisor are the same person, the form has a field to indicate as such and only one faculty advisor submission is required.

Teams can verify that all three parties have submitted an Intent and Eligibility Acknowledgement form by checking the [Intent Form Status Report](#) in Cerberus.

4. Ethics and Required Conduct

This competition is to be conducted with the highest regard for ethical responsibility per [ASCE's Code of Ethics](#). All members of ASCE, regardless of their membership grade or job description, commit to all the ethical responsibilities in this Code. All ASCE members should make themselves familiar with ASCE's Code of Ethics.

All participants shall act professionally and respectfully at all times. Failure to act appropriately may result in sanctions, disqualifications, and loss of invitations to future symposia competitions or Society-wide

competitions. The inappropriate use of language, alcohol, or materials, uncooperativeness, and general unprofessional or unethical behavior will not be tolerated.

5. Safety

Safety is the highest priority and behaviors that increase the risk of or cause personal injury will not be tolerated. Judges and student symposium hosts, including the Safety Officers, are empowered to stop or prohibit an activity which is deemed to be hazardous, or to postpone an activity until the hazard is rectified.

Issues to Consider (not an exhaustive list)

- Participants acknowledge that there are risks when creating and testing 3D printed structures. Bridges should be printed in a well-ventilated area, and care should be taken to avoid injury when working with a 3D printer.
- Connections that are 3D printed are prone to some error, and participants are encouraged to print tests of connections to account for tolerance issues. If any parts need to be filed or cut, participants need to ensure proper caution and use hand and eye protection.
- When testing bridges, participants must be cognizant of PLA's brittle nature. Bridges can fail suddenly and even explosively. Only participants actively involved with the testing of bridges should be within 10 feet of the loading apparatus and should wear eye protection as well as work gloves if handling the bridge or the loading apparatus during testing. Hands or feet should never be put below the loading bucket. Participants are responsible for providing their own eye protection and gloves during the competition. Participants should consistently use the safety features included with the loading apparatus (e.g., plexiglass shield).

All participants are responsible for complying with all campus/venue protocols and procedures, including those deemed necessary for public health purposes.

It should be noted that the load to be applied to a bridge is at most 70 pounds to eliminate a safety issue when significant weight is released when a bridge fails. Rather than having a competition where the competitors seek to carry as much load as possible, this 3DP competition seeks to design a structurally efficient bridges with the highest capacity to weight ratio. There is a requirement that a bridge must be able to support 25 pounds of load. Therefore, for example, a bridge that fails at 26 pounds of load could win if this bridge has the highest capacity to weight ratio. In fact, a bridge that can support more than 70 pounds is overdesigned and not as structurally efficient as it could have been.

Given continually changing environments, virtual competition provisions may be provided and may be activated in coordination with ASCE.

If there is a thunderstorm, all outdoor activities shall cease and may not resume until at least 30 minutes have passed since the last observed occurrence of thunder or lightning.

6. Bridge Dimensions

The bridge must span a clear span of 20 inches (508 mm). The total bridge length should be 24 inches (610 mm) or less. If the bridge is more than 24 inches in length, a penalty will be applied that increases the weight of the bridge and reduces the structural efficiency score. It should also be noted that the host is only required to have a load apparatus to test bridges up to 24 inches in length. If the host cannot test the bridge due to its overlength, the bridge will be disqualified (DQ'd) from the competition. See Appendix A - Figure 1.

The bridge shall be less than or equal to 8 inches (203 mm) from the extreme bottom surface to the extreme top surface, and less than or equal to 6 inches (152 mm) in width. The bridge superstructure must not extend more than 6 inches (152mm) below the top of the bearing surface of the abutment nor more than 6 inches (152mm) above the top of the bearing surface of the abutment. If the bridge cross section is non-compliant, a penalty will be applied that increases the weight of the bridge and reduces the structural efficiency score. If the host cannot test the bridge due to its actual geometry, the bridge will be DQ'd from the competition. See Appendix A - Figure 1.

The cross section through the bridge must have a continuous open width greater than 3.5 inches and a continuous open height greater than 3.5 inches (89 mm x 89 mm) through the entire length of the superstructure to allow a vehicle (of square cross section) of those dimensions to pass across the bridge without obstructions. If the bridge has a non-compliant vehicle passway, a penalty will be applied to increase the weight of the bridge and reduce the structural efficiency score. See Appendix A - Figure 2. The 3.5-inch clear width of the vehicle passageway should be underlain by a continuous / non-porous bridge deck representing the vehicle driving surface. The deck must be 3D printed and will need to be made of multiple segments but must provide a smooth continuous surface after assembly. The deck must be absent from any voids or obstructions besides the required void to allow the threaded rod attached to the loading plate to extend through the deck. The deck is considered as part of the bridge when determining the weight of the bridge. The deck, at a minimum, must cover the clear span of 20 inches and the 3.5-inch width of the required vehicle passageway. If the bridge has a non-compliant deck, a penalty will be applied to increase the weight of the bridge and reduce the structural efficiency score. See Appendix A - Figure 1.

Loading will be applied to the bridge by a host-provided loading plate that is 3-inch by 3-inch (76mm x 76mm) located at the center of the clear span and center of the bridge width. Load will be applied to the loading plate by a ¼-inch (6 mm)-diameter threaded steel rod with a washer and nut bearing on the top surface of the loading plate. The bridge deck must have a minimum ½-inch diameter hole located at the center of the clear span and center of the bridge width for the ¼-inch diameter loading rod to pass through the bridge deck and extend at least 8 inches below the deck surface. If the host cannot test the bridge due to an inability to install the loading plate and threaded rod, the bridge will be DQ'd from the competition. See Appendix A - Figure 3.

During load testing of the bridge, no surfaces of the bridge other than the original horizontal bearing surfaces in direct contact with the abutment can touch any portion of the load apparatus regardless of orientation of the surface. If another surface contacts the load apparatus during loading, the loading will be stopped, and the capacity of the bridge will be the load at stoppage.

7. Bridge Parts

The following rules and deductions are applicable for the bridge parts.

- a. All parts must be printed with 100% Plain PLA (Polylactic acid). No other filament material is allowed to be used. If any bridge part is printed with a non-compliant filament, the bridge will be DQ'd.
- b. The design must include the name of the team's school (or organization) using a font size that is legible. Raised or embossed (partial or full depth) printing of the name is acceptable, and the full name can be printed on adjacent parts of the bridge and readable once the bridge is assembled. If the name is not printed on a bridge part or parts, a downgraded design score will reflect this omission.
- c. All bridge parts must fit in a closed box with inside dimensions of 8.7 in. (220 mm) wide, 8.7 in. (220 mm) long, and 6.5 in. (165 mm) tall. The weight of any part that does not fit in the box is added to the actual weight of the bridge. In essence, the weight of non-fitting parts is considered in both the actual weight and the penalty weight. Spare parts that are printed in case a part breaks or is lost during assembly must also fit in the box and contribute to the total weight of the bridge.
- d. Only mechanical connections between parts are allowed. In addition, a bridge part cannot be fabricated from two smaller parts that are bonded together prior to the competition. The presence of an adhesive or weld (melting or plastic to fuse) to fabricate bridge parts or assemble the bridge will result in the bridge being DQ'd.
- e. No unextruded filament may be used in the bridge as a part or connector. The presence of unextruded filament in the assembled bridge will result in the bridge being DQ'd.

8. Tips

The following tips are provided for a successful bridge.

- a. Pre-competition testing of parts and bridge is permitted to optimize the bridge. Make sure that all parts you design can fit within the bed of the 3D printer you are using.
- b. 3D printed sockets tend to be slightly smaller than designed, so be sure to adjust your designs to accommodate shrinkage as the filament cools during printing. Test printing the connections will help you calibrate connection fit with your printer/filament.
- c. Check the fits of all components before the day of the competition. Parts can be sanded down to improve their fit.

- d. It is important to engage the entire superstructure in supporting the load—not just the bridge deck or the point at which the load is applied, so make sure the area where the load is applied to the deck is well-supported by the bridge structure to prevent a local failure.
- e. Because there is a maximum load of 70 pounds, a team only wants as much printed material as required to support the maximum load. Designing a bridge capable of carrying more than 70 pounds is of no benefit. (The 70-pound load is based on the volume of sand that will nearly fill a 5-gallon bucket and not spill out.)

9. Scoring

Five weighted metrics will be added in aggregate to determine a team’s overall score. The metrics and their weighted contribution are shown below in Table 1. In addition to overall 1st, 2nd, and 3rd place awards, the top team in each metric will be separately recognized for their superior performance in each metric.

Table 1: Maximum Point Value Per Metric

Load/Weight Efficiency	Stiffness Efficiency	Assembly Time	Presentation	Design
30	30	15	15	10

Adherence to the rules is crucial to ensuring fair competition. Teams will be subject to either a disqualification or penalties for non-compliance with the rules. The judges are solely responsible for identifying non-compliance with the rules and noting the issues in the scoresheet. The Head Judge has final say over disqualifications and penalties. The Head Judge may consult with the ASCE 3D Printing Rules Committee regarding disqualifications and penalties to be sure that the rules are correctly applied, but the Rules Committee will not overturn their decision.

The following table summarizes non-compliant issues that lead to the team/bridge being disqualified (DQ’d) from the competition and less severe non-compliant issues that lead to a penalty that impacts the competitiveness of the team/bridge.

Summary of Non-Compliant Issues and Resolutions

Issue	Rule Section	Resolution	Scoring Penalty
Non-PLA Filament	7.a.	DQ	N.A.
Use of Adhesive or Welding	7.d.	DQ	N.A.
Non-Extruded Filament	7.e.	DQ	N.A.
Bridge Span Too Short	6 (1 st Para.)	DQ	N.A.
No Hole in Deck for Load Hanger	6 (4 th Para.)	DQ	N.A.
Bridge Too Long	6 (1 st Para.)	Penalty	10% Increase in Bridge Weight
Bridge Extends Above Envelope	6(2 nd Para.)	Penalty	10% Increase in Bridge Weight
Bridge Extends Below Envelope	6(2 nd Para.)	Penalty	10% Increase in Bridge Weight
Bridge Wider Than Envelope	6(2 nd Para.)	Penalty	10% Increase in Bridge Weight
Bridge Height Too Tall	6(2 nd Para.)	Penalty	20% Increase in Bridge Weight
Vehicle Passageway Too Short	6 (3 rd Para.)	Penalty	15% Increase in Bridge Weight
Vehicle Passageway Too Narrow	6 (3 rd Para.)	Penalty	15% Increase in Bridge Weight
Noncompliant (Length, Width and/or Porous) Deck Surface	6 (3 rd Para.)	Penalty	15% Increase in Bridge Weight
All Bridge and Spare Parts Not Fitting in Closed Storage Box	7.c.	Penalty	Weight of Non-Fitting Bridge Parts Added to Bridge Weight

Information on each scoring metric is detailed in the following sections.

Presentation and **Design** scores will be determined by a direct scoring system based on the judgment of the judges. Team scores will be assigned as a percentage of a maximum metrics system. The first-place team will receive the full points (e.g., maximum 10 points for Design). The remaining teams will be allocated points based on a ratio of their Design score divided by the largest Design score. e.g., if four teams compete and have Design scores of 95, 85, 80, and 70 the high score will receive 10 points, the second team will receive 8.9 points [$10 \times (85/95)$], the third team will receive 8.4 points [$10 \times (80/95)$], and the fourth team will receive 7.4 points [$10 \times (70/95)$]. The Presentation score will be calculated similarly.

Load/Weight Efficiency, **Stiffness Efficiency**, and **Assembly Time** will be based on the ratios defined below. Team scores will be assigned as a percentage of a maximum metrics system. The high score will receive the full points (e.g., maximum 30 points for Load/Weight efficiency). The remaining teams will be allocated points based on a ratio of their Load/Weight Efficiency divided by the largest Load/Weight Efficiency. e.g., if four teams compete and have Load/Weight Efficiencies of 22, 17, 12, and 9, the first team will receive 30 points, the second team will receive 23.2 points [$30 \times (17/22)$], the third team will receive 16.4 points [$30 \times (12/22)$], and, and the fourth team will receive 12.3 points [$30 \times (9/22)$]. The Stiffness Efficiency and Assembly Time scores will be calculated similarly.

a. Load/Weight Efficiency

- i. Loading will be applied vertically at center span up to a maximum load of 70 lbs.

- ii. Load/Weight Efficiency will be calculated by dividing the load supported by the weight of the bridge.
- iii. Maximum points will be awarded to the bridge with the highest Load/Weight Efficiency.
- iv. Other bridges will be awarded points based on the ratio of their Load/Weight Efficiency to the maximum Load/Weight Efficiency.

b. Stiffness Efficiency

- i. Deflection will be measured at the center of the clear span on the bottom surface of the bridge. All bridges will be measured on the same side of the bridge. Deflection will be measured when the bridge is supporting a 25-pound load.
- ii. The bridge must not fail before 25 pounds of load is applied.
- iii. Stiffness Efficiency will be calculated by dividing the 25-pound load by the deflection in inches divided by the weight in pounds of the bridge.
- iv. Maximum points will be awarded to the bridge with the highest Stiffness Efficiency.
- v. Other bridges will be awarded points based on the ratio of their Stiffness Efficiency to the maximum Stiffness Efficiency.

c. Assembly Time

- i. A team may have multiple students working together to assemble the bridge.
- ii. All bridge parts must be in the open box at the start of the assembly.
- iii. The assembly time will be multiplied by the number of constructors to calculate the total initial assembly time.
- iv. An assembly time limit of 15 minutes will be imposed. A team exceeding 15 minutes will receive a score of 22 minutes.
- v. Maximum points will be awarded to the team with the shortest total assembly time.
- vi. Other bridges will be awarded points based on the ratio of their total assembly time to the shortest total assembly time.
- vii. If a team has finished assembling their bridge but needs to go back to make repairs (adjustments) to any errors made in the assembly process, they will be given a period to do so. The time allowed to make repairs cannot exceed 5 minutes. The total time spent making repairs will be multiplied by 1.5 and added to the total initial assembly time to determine the total assembly time.
- viii. After a team has finished assembling their bridge and made any repairs, if necessary, no other changes can be made, and the bridge must be handed off to the judges until it is loaded. The team is cautioned to carefully handle their bridge during the duration of the competition since repairs or adjustments cannot be made prior to or during the load testing.

d. Presentations (Poster Board and Oral)

- i. Each team will create a poster board (24 inches x 36 inches) and highlight:
 1. Team composition,

2. Design inspiration for the bridge,
 3. 3D images of the bridge, and
 4. Relevant print details.
- ii. Each team will give an oral presentation on their poster board. If a team has fewer than 5 members, all team members must participate in the oral presentation. If a team has 5 or more members only four of the team members need to participate in the oral presentation. Judges will rank the presentations based on:
 1. Readability of poster
 2. Aesthetics of poster
 3. Adherence to a 5-minute time limit. Presentations longer than 5 minutes will have 10 percent deducted from the presentation score for each increment of 30 seconds over 5 minutes. Additional time will be provided for questions and answers.
 4. Presentation mechanics (speech projection, pace of delivery, eye contact with judges, flow of information, responses to questions, etc.).
 - iii. Maximum points will be awarded to the team with the highest presentation score.
 - iv. Other teams will be awarded points based on the ratio of their presentation score to the highest presentation score.

e. Design

- i. The design theme for this competition is **Accelerated Bridge Construction (ABC)**. Designs should reflect some aspects of the ABC mindset and keep ABC ideologies in mind throughout the design process and assembly of the bridge.
- ii. The design inspiration for a bridge should be highlighted on their poster and in their presentation. The design score will reflect how a team used their inspiration to design their bridge.
- iii. The design score will consider any innovations in the structural design process and 3D printing techniques (quality, resolution, and tolerances).
- iv. The design score will be downgraded if the inclusion of the name of the team's organization is NOT legibly printed on a bridge part or adjacent parts.
- v. Maximum points will be awarded to the team with the highest Design score.
- vi. Other bridges will be awarded points based on the ratio of their Design score to the highest Design score.

10. Requests for Information (RFIs)

Requests for information (RFI) must be submitted through the online [2025 ASCE 3D Printing Competition RFI Form](#). Clarifications will be posted on the [ASCE 3D Printing Competition Collaborate Site](#) approximately one week after being received starting September 26, 2025 until February 13, 2026. The cutoff date for submitting an RFI is Wednesday, February 4, 2026, at 11:59 p.m. Eastern Standard Time (EST). Those received after this date will not be acknowledged or addressed. **Teams are strongly encouraged to submit RFIs to avoid misinterpretation of the rules and project tasks. All RFIs will be made public.** All teams are

responsible for all information provided in the Rules and Regulations and RFI responses posted to the Collaborate site.

11. Key Dates

- a. Release of 3D Printing Competition Rules and Regulations – September 2, 2025.
- b. Intent and Eligibility Acknowledgement Form - due by November 3, 2025 at 5:00 p.m. EST.
- c. Last day to submit an RFI – February 4, 2026 at 11:59 p.m. EST.

12. Awards

- a. Awards for 1st, 2nd and 3rd places will be awarded for the highest overall scores.
- b. Awards for 1st place will be awarded for the following metrics:
 - i. Highest Load/Weight Efficiency,
 - ii. Highest Stiffness Efficiency Bridge,
 - iii. Fastest Assembly Time,
 - iv. Best Presentation, and
 - v. Best Design.

13. Judging

The student symposium host shall recruit judges. The judging panel, consisting of a minimum of three judges, shall be composed of industry professionals or educators familiar with bridge design, structural testing, and/or 3D printing.

Judges should be well versed in the rules and RFI responses posted on the [Collaborate site](#). The Head Judge is required to attend the Head Judge Webinar hosted by ASCE in February 2026.

Scoring data shall be recorded for each team that competes. Official judging forms can be used and will be provided by the competition rules committee prior to the symposia. The information from the judges' data sheets is entered into an official scoring spreadsheet which tabulates the official results of the competition. A summary report will be provided to each symposium host for their records and distribution.

At the end of the student symposium competition, the Head Judge shall promptly upload the completed official scoring spreadsheet for a student symposium competition to ASCE's Cerberus ftp server. ASCE will provide the Head Judge with a secure submission link for ASCE's Cerberus ftp server in February 2026.

Appendix A - Figures and Drawings

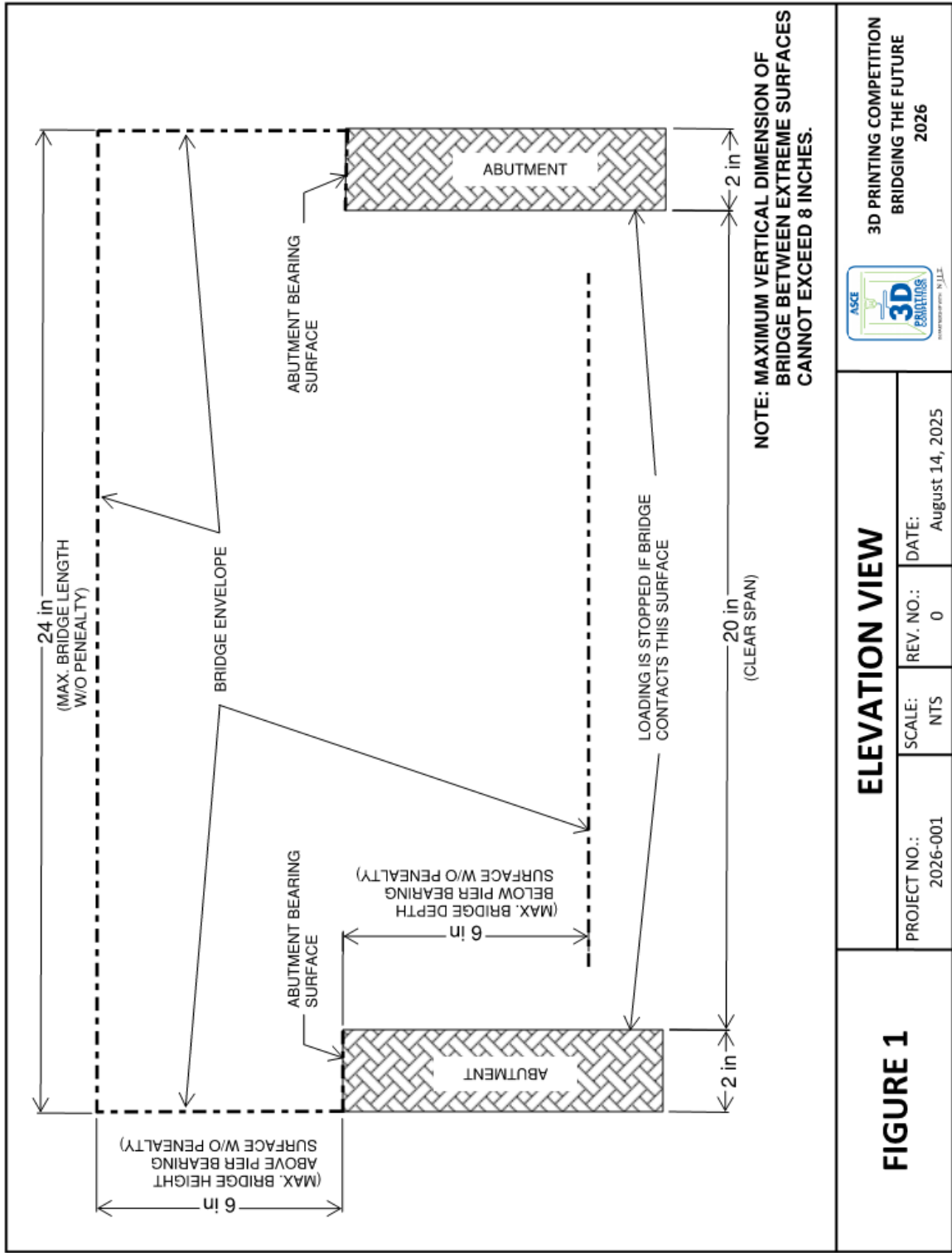

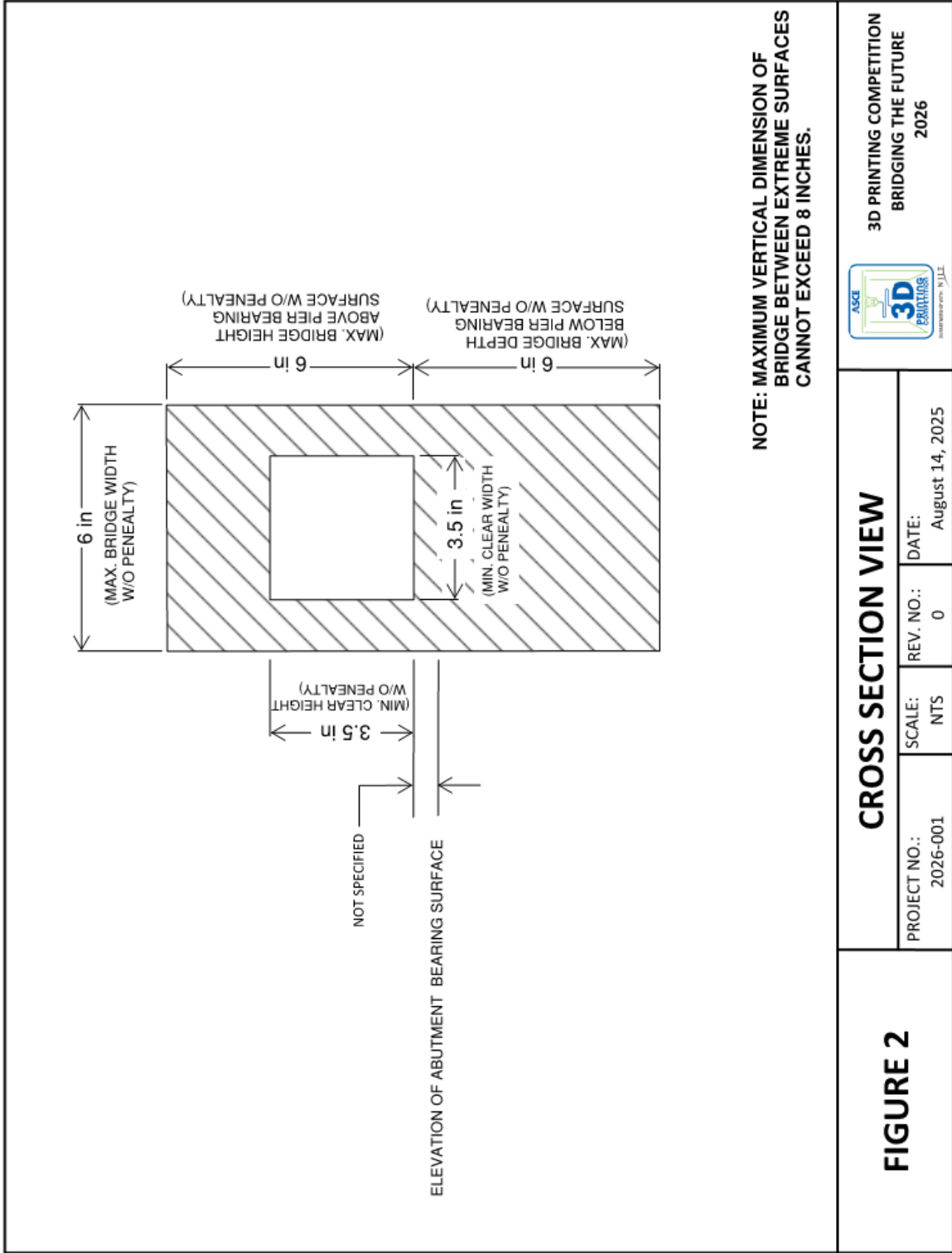


FIGURE 1	ELEVATION VIEW			
	PROJECT NO.: 2026-001	SCALE: NTS	REV. NO.: 0	DATE: August 14, 2025
				3D PRINTING COMPETITION BRIDGING THE FUTURE 2026



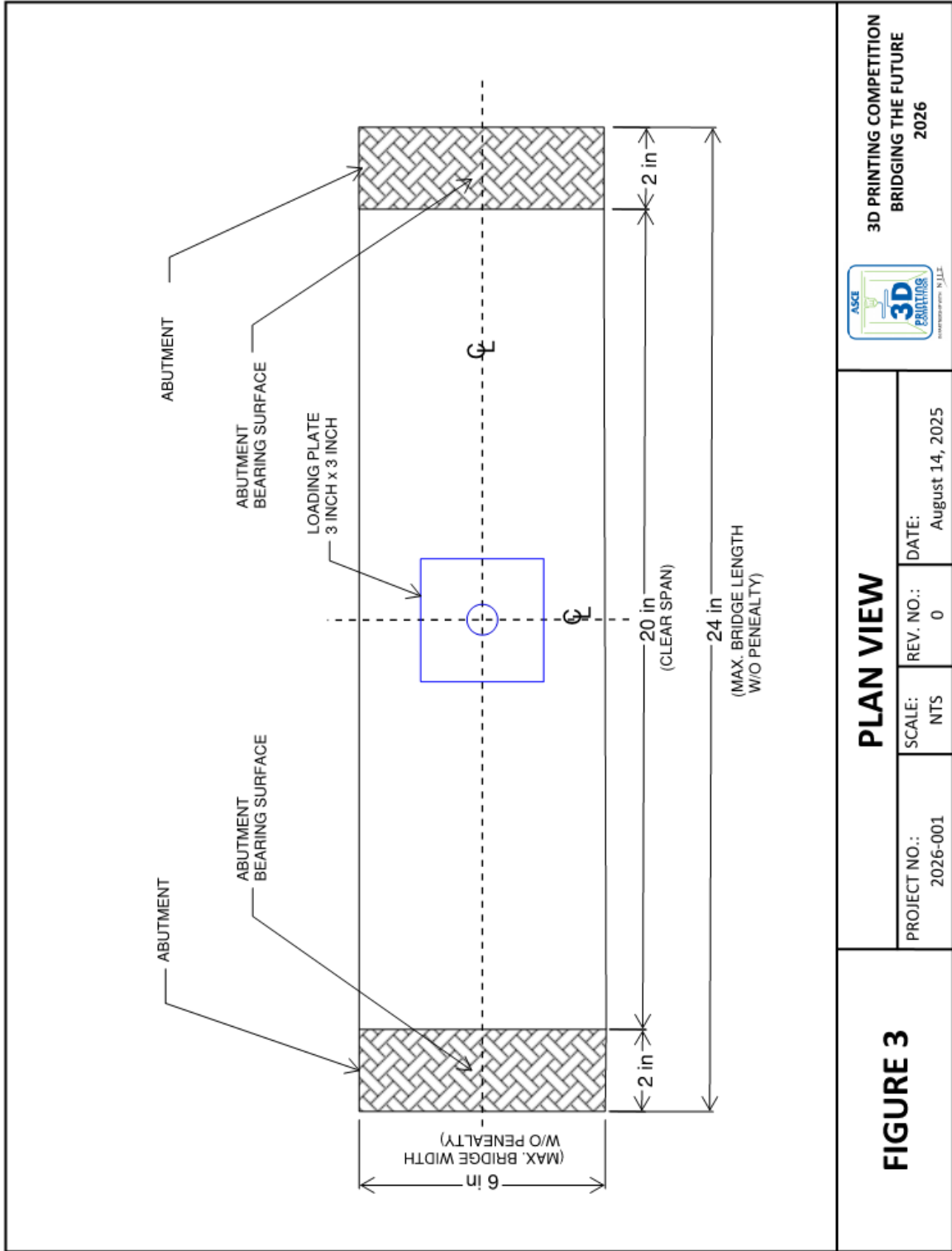


FIGURE 3	PLAN VIEW					3D PRINTING COMPETITION BRIDGING THE FUTURE 2026
	PROJECT NO.: 2026-001	SCALE: NTS	REV. NO.: 0	DATE: August 14, 2025		

Appendix B - Eligibility for Student Symposium Competition

The purpose of student competitions is to provide student members career-enrichment opportunities to gain hands-on, practical experience and leadership skills. Society Competitions are an important and special opportunity to showcase the engineering and professional skills of student teams. As such, mutual respect is required for all stakeholders, including competitors, judges, hosts, and guests. Participation in the Student Symposia competitions is a privilege, not a right. Failure to act professionally can result in sanctions, disqualifications, and loss of invitations.

Student Chapter Eligibility for Student Symposium Competition

The following qualifications are required of all ASCE Student Chapters to compete at the Student Symposia Competitions:

An ASCE Student Chapter must:

1. Be in good standing with ASCE:

- a. Have paid their annual dues, as received by ASCE, no later than the start of their Student Symposium.**
- b. Have submitted their student chapter's full Annual Report or EZ Annual Reporting Form no later than February 1, 11:59 p.m. Eastern Standard Time (EST).**

Questions regarding eligibility should be directed to student@asce.org.