REVISION 1 – OCTOBER 4, 2024

Updates are shown in red

TIMBER-STRONG DESIGN BUILD℠
2025 RULES

TIMBER-STRONG DESIGN BUILD[SM]

Previous Competition Winners

2024 ASCE Student Symposia

Eastern Great Lakes Student Symposium

April 6th at University of Akron

1st Place: Michigan Tech
2nd Place: Cleveland State
BIM 1st Place: Cleveland State

Indiana-Kentucky Student Symposium

April 12th at Purdue NW University

1st Place: Purdue University at West Lafayette
BIM 1st Place: Purdue University at West Lafayette

Southeast Student Symposium

March 25th at University of Central Florida (Host: Florida Section)

1st Place: Florida A&M University – Florida State University
2nd Place: University of Puerto Rico, Mayaguez
3rd Place: Florida International University
BIM 1st Place: University of North Florida

Region 6 Student Symposium

April 11th at Angelo State University

1st Place: LeTourneau University
2nd Place: University of Texas, Arlington
3rd Place: University of Texas, Tyler
BIM 1st Place: LeTourneau University

Rocky Mountain Student Symposium

April 19th at University of Wyoming

1st Place: Colorado School of Mines
2nd Place: South Dakota School of Mines and Technology
BIM 1st Place: Colorado School of Mines

Intermountain Southwest Student Symposium

April 11th at Utah State University

1st Place: Utah State University
2nd Place: Northern Arizona University
3rd Place: Boise State University

BIM 1st Place: Brigham Young University

Pacific Southwest Student Symposium

April 4th at University of Hawaii, Manoa

1st Place: California Polytechnic State University, San Luis Obispo
2nd Place: University of California, Irvine
3rd Place: University of California, Los Angeles
BIM 1st Place: California State University, Long Beach

2023 ASCE Student Symposia

Gulf Coast Student Symposium

March 11th at University of South Alabama

1st Place: University of Alabama
2nd Place: Louisiana Tech University
3rd Place: University of South Alabama
BIM 1st Place: University of Alabama

Pacific Northwest Student Symposium

April 15th at Montana State University

1st Place: Montana Tech University
BIM 1st Place: Montana Tech University

Intermountain Southwest Student Symposium

April 14th at University of Nevada, Reno

1st Place: Utah State University
2nd Place: Arizona State University
3rd Place: Boise State University
BIM 1st Place: Utah State University

Pacific Southwest Student Symposium

March 25th at California State University, Northridge

1st Place: California Polytechnic State University, San Luis Obispo
2nd Place: University of California, Irvine
3rd Place: University of California, San Diego
California State University, Northridge
BIM 1st Place: University of California, Irvine

Southeast Student Symposium

March 25th at University of North Florida

1st Place: Florida A&M University – Florida State University
2nd Place: University of Florida
3rd Place: University of Central Florida

BIM 1st Place: Florida A&M University – Florida State University

Mid-Pacific Student Symposium

April 22nd at California State University, Chico

1st Place: Zhejiang University

BIM 1st Place: Tongji University

Region 6 Student Symposium

April 15th at West Texas A&M University

1st Place: LeTourneau University

2nd Place: Angelo State University

3rd Place: University of Texas, Tyler

BIM 1st Place: Texas Tech University

Indiana-Kentucky Student Symposium

April 14th at Western Kentucky University

1st Place: Purdue University at West Lafayette

2nd Place: Cleveland State University

3rd Place: Michigan Tech University

BIM 1st Place: Purdue University at West Lafayette

2022 ASCE Student Symposia

Southeast Student Symposium

March 25th at Florida State University

1st Place: Florida A&M University – Florida State University

2nd Place: University of Puerto Rico Mayaguez

3rd Place: Florida Atlantic University

Region 6 Student Symposium

April 2nd at University of Houston

1st Place: LeTourneau University

Gulf Coast Student Symposium

April 2nd at Auburn University

1st Place: Auburn University

Pacific Southwest Student Symposium

April 2nd at University of California, San Diego

1st Place: University of Hawaii Manoa

2nd Place: California State University, Long Beach

3rd Place: University of California, Los Angeles

BIM 1st Place: University of California, Los Angeles

Intermountain Southwest Student Symposium

April 14th at University of Nevada, Las Vegas

1st Place: University of Utah
2nd Place: Northern Arizona University
3rd Place: University of Arizona
BIM 1st Place: Arizona State University

2021 ASCE Pacific Southwest Student Conference (PSWC)

March 27th at University of California, Los Angeles

1st Place: University of California, Los Angeles
2nd Place: California State University, Fullerton
3rd Place: University of Hawaii, Manoa

2020 PSWC

April 4th at California State University, Fullerton

1st Place: California State University, Fullerton
2nd Place: University of California, Los Angeles
3rd Place: California Polytechnic State University, San Luis Obispo

2019 NCSEA SUMMIT

November 20th at Disneyland Hotel, Anaheim, CA

1st Place: California Polytechnic State University, San Luis Obispo
2nd Place: University of California, Los Angeles
3rd Place: University of Kentucky

2019 PSWC

April 6th at California Polytechnic State University, San Luis Obispo, CA

1st Place: California Polytechnic State University, San Luis Obispo
2nd Place: University of Arizona
3rd Place: University of California, Los Angeles

2018 PSWC

April 13th at Arizona State University, Tempe, AZ

1st Place: San Diego State University
2nd Place: Arizona State University
3rd Place: University of California, Irvine
Honorable Mention: California State University, Los Angeles

This document, which is available at Student Conferences, Symposia & Competitions page of the ASCE Website, describes the Timber-Strong Design Build[SM] Competition and states the 2025 rules for the student symposia. **Requests for Information (RFI) and Clarifications, which include any revisions to the rules, are published on the ASCE website prior to the competition and do not appear in this document although they are formal addenda to the rules.**
See SECTION 4.2.1 for details on how to submit questions.

CONTENTS

WELCOME

The American Society of Civil Engineers (ASCE) and sponsors American Wood Council (AWC), Simpson Strong-Tie Company Inc. (SST), and APA – The Engineered Wood Association (APA) support and encourage a fully inclusive culture that celebrates individual uniqueness, engenders a sense of belonging, and promotes equitable opportunity for all people to participate in the Timber-Strong Design Build℠ (TSDB℠) 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!

Examples from 2022 TSDB℠ Competition

Timber Design Resources:

LOAD PATH

Publications

Introduction to Lateral Design (APA)

Diaphragms and Shear Walls (APA)

Design Concepts for Building in High Wind and Seismic Zones (APA)

Videos

Lateral Load Path Basics: Tracing a wind load through a wood framed structure (APA)

BUILDING CODE

Publications

2018 National Design Specification (NDS) for Wood Construction (AWC)

2021 Special Design Provisions for Wind and Seismic (AWC)

ASCE/SEI 7-22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures
Force Transfer Around Opening Shear Walls (APA)

Videos

Shear Exhilaration! Wood Shear Wall and Diaphragm Design per the 2021 IBC (APA)
Shear Wall Selection for Wood-Framed Buildings (APA)

DETAILING & CONNECTIONS

Publications

APA System Report 101: Design for Combined Shear and Uplift from Wind (APA)
Data File: Lateral Load Connections for Low-Slope Roof Diaphragms (APA)
Data File: Roof Sheathing Fastening Schedules for Wind Uplift (APA)
Anchorage Requirements for Wood Frame Shear Walls (Structure Magazine)

Videos

Connection Design Solutions for Wood-Frame Structures (APA)

OTHER RESOURCES

APA Resource Library

TIMBER-STRONG DESIGN BUILD℠ COMPETITION

1.0 EVENT DESCRIPTION

The student competition is based on creating a sustainable, 2-story wood light-framed building (a.k.a. project). While other natural resources are rapidly depleting, wood is the only building material that grows naturally, is 100% renewable, and outperforms other building materials in overall carbon footprint reduction. As a result, AWC, SST, APA, and ASCE are seeking student teams to design and build an artistically creative building that is sustainable, aesthetically pleasing and structurally durable. In the interest of sustainability, the projects must be deconstructed/disassembled and a written plan for donation and/or repurposing at the end of the competition.

2.0 OBJECTIVE

The 2025 Timber-Strong Design Build℠ (TSDB) Competition enables students to gain experience in performing crucial aspects of common structural engineering design and practice. Participating students will learn about the processes involved in professionally designing and proposing a project bid, which must be unique and not a replication of a previous year's design. Students will also gain exposure to the management and building practices used in construction environments. Through the performance of analysis, production of a building information model, preparation of a project bid, production of construction documents, and management of the construction process, each team is expected to act as a design-build construction firm while competing in a friendly environment. The goal of this competition is to provide unique insights and hands-on experience for the next generation of structural engineers involved in sustainable design and construction.

3.0 AWARDS AND RECOGNITION

The winners of the Timber-Strong Design Build℠ Competition shall be determined by compiling a team's total number of points from the report, BIM model, construction, presentation, and creativity portions of the competition (see SECTION 10.0).

3.1 AWARDS AND RECOGNITION

A BIM award will be awarded to the team with the top BIM score. All teams (whether or not participating in Build Day) are eligible for this award.

A Best in Show will be awarded to the team at the Head Judge's discretion that is based on rubric score in addition to notable characteristics.
At the Head Judge's discretion, an Honorable Mention may be awarded to a team that may not have achieved the highest overall points but achieved excellence in a particular area/characteristic (ex. most accurate

deflection, best load path, best quality build, safety/site cleanliness, lowest waste/most sustainable, most likely to survive earthquake/windstorm, etc.).

3.2 STUDENT CHAMPIONSHIPS EXHIBITION

TSDB will be inviting up to five teams to exhibit at the 2025 ASCE Civil Engineering Student Championships, June 27-29, 2025, at California Polytechnic State University, San Luis Obispo, giving them an opportunity to showcase their work and creativity on a larger stage. Following the last student symposium conducting the TSDB Competition, eligible teams will be notified and required to complete an application to be considered.

4.0 GENERAL RULES AND ELIGIBILITY REQUIREMENTS

4.1 RULE CHANGES AND PRECEDENCE

The Rules and Regulations (Rules) of the Timber-Strong Design Build[SM] Competition are updated each year. **Teams are strongly encouraged to read this document carefully and disregard previous editions from previous competitions.** Teams should not consider items such as rulings and interpretations made by judges in previous competitions and answers provided in previous interpretations of rules, as setting precedence for this year's competition.

Listed below is a summary of major changes from the 2024 Rules. This list may not capture all changes and teams are responsible for reading the rules.

- New RFI Process
- New Floor Plan Dimensions
- Change of Cantilevered Floor
- Use of current standards
- Updated Site Requirements
- Online Intent Form
- Team Score Final Summary
- Additional Discretionary Awards
- Updated Safety Measures
- File type restrictions and naming conventions added

4.2 GENERAL INFORMATION

To learn which Student Symposia are hosting this competition, visit the ASCE website https://www.asce.org/communities/student-members/conferences. Visit the Student Symposium hosts' websites (links are on the ASCE Student Symposia webpage) for registration information.

Each competing student chapter is invited to structurally design and model a light-framed wood structure. Through the design process, teams are required to create a preliminary design and a final bid report.

Each team is required to model the wood structure and, if participating in Build Day (see SECTION 10.10), construct the wood structure which was designed in the team report. Each team will present on their project (see SECTION 6.0).

4.2.1 REQUEST FOR INFORMATION (RFI)

Requests for information (RFI) must be submitted through the online 2025 Timber-Strong Design Build RFI Form. Clarifications will be posted on the Timber-Strong Design Build Competition Collaborate Site every other Friday starting September 27, 2024, until 14 calendar days prior to Build Day. Each post will address the questions received from the previous two weeks through the Wednesday before 11:59 PM Eastern. **The cutoff date for submitting an RFI is 14 calendar days prior to the scheduled Build Day your team is participating in, at 11:59 p.m. Eastern. It is the responsibility of each participating team to regularly check the Collaborate Site for updates. RFI response posts shall be considered part of the rules.**

4.3 PARTICIPATION AND ELIGIBILITY REQUIREMENTS

4.3.1 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.

4.3.2 TEAM REQUIREMENTS

It is an expectation that teams will reflect diversity, foster an inclusive culture, and treat everyone with dignity and respect.

Only one team per ASCE Student Chapter may compete in the competition. A student chapter may compete in only one ASCE Student Symposium. Each team must designate at least one team captain. Conference assignments and student symposium hosts are listed here.

ASCE Student Chapters hosting 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 ASCE Student Symposium host of an Official Guest team prior to the start of the student symposium via e-mail to student@asce.org.

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 a guest team. If the student symposium host grants permission, the guest team may compete. The guest team will be scored but shall not be eligible for awards at the student symposium competition.

All student chapters must be registered for the ASCE Student Symposium. There is no limit to the number of students who participate in the development of the report, building information model, and the visual aid, however, only 4-6 members should be designated as builders.
Additional team requirements:

a. If participating in the Build Day, 4-6 members shall be designated as “builders”.
b. One builder of the team must be identified as the team captain.
c. The team must have at least one freshman or sophomore student.
d. The team **MUST** have at least one faculty advisor.
e. Teams are encouraged (not required) to have a practicing structural engineer to mentor the team.

4.3.3 STUDENT CHAPTER ELIGIBILITY

Eligibility criteria for the Student Symposia Competition are shown in APPENDIX B.

4.3.4 INTENT AND ELIGIBILITY ACKNOWLEDGEMENT FORM

Teams must submit online Intent and Eligibility Acknowledgement Form, no later than **5:00 p.m. Eastern Time (ET) on November 1, 2024.**

By completing this form, a student chapter states:

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

4.4 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 can result in sanctions, disqualifications, and loss of invitations to future competitions or society-wide competitions. The inappropriate use of language, alcohol, or materials, uncooperativeness, and general unprofessional or unethical behavior will not be tolerated.

4.5 SAFETY

Safety is the highest priority; activities that risk personal injury will not be tolerated. Competition safety officials may use their own discretion on determining a hazardous condition and provide suggestions for correcting the issue. If a team member cannot compete safely, they will be disqualified. The remaining team members may continue with the competition if the number of team members does not drop below four builders. Competition safety officials may take action, including withdrawal of a team from competition, for safety violations if they are not corrected once brought to the attention of the team. Judges, student symposium hosts and Safety Officers, and competition safety officials are all empowered to halt and prohibit any activity that they deem hazardous. If the structure being built is deemed by competition safety officials to be unsafe to participants, judges, or spectators, it must be withdrawn from the competition. Judges are empowered to pause the build to verify safe constructability and process.

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

Given continually changing environments, virtual competition provisions are 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.

Students shall practice safe fabrication procedures and procure appropriate instruction and supervision (see SECTION 9.0). General construction safety standards for activities during this competition shall follow the standards set forth in OSHA Regulation Standards Number 1926. The following are the URL addresses to the OSHA Standards 1926:
https://www.osha.gov/laws-regs/regulations/standardnumber/1926
Student teams are solely responsible for following these safety standards. (See SECTION 5.4).

Builders must adjust to the site conditions and weather during the construction. At all times the structure shall be stable and self-supporting such that a builder only provides bracing stability of a member or panel until the member or panel is properly attached and secured according to the construction drawings and safe construction practices. Judges are empowered to pause the build to verify safe construction and construction process per site conditions.

Each Builder will need to take a free "Ladder Safety Training" course https://www.laddersafetytraining.org/ for all ladder types the team intends to use during construction and upload the certificate of completion to their team's unique ASCE's Cerberus ftp server submission link (see SECTION 4.6).

Judges will pause the timer and verify the structure is stable prior to using the structure as a platform for construction.

For safety gear requirements see SECTION 5.4.3.

4.6 SCHEDULE, DEADLINES, AND SUBMISSIONS

The following is a list of important dates related to the overall competition schedule, including deadlines for applicable submissions. Teams should consider this as only a partial list of dates. All dates are midnight (11:59 PM) Eastern.

ASCE is using its Cerberus ftp server as a submission platform. All competition deliverables must be submitted on this platform. (See APPENDIX C for Cerberus Upload Guidance.) Submissions outside of this platform will be considered non-responsive and will not be considered.

ASCE will provide each team captain and faculty advisor with a secure submission link for the Cerberus ftp server in December 2024. All electronic files will be uploaded here.

Mandatory Task Deadlines	Due Date
Intent and Eligibility Acknowledgement Form (See SECTION 4.3.4)	1 November 2024
All individual member ladder safety training certificates and waiver forms (to be provided by ASCE)	Prior to commencing any construction/assembly tasks
Electronic files **Phase 1** upload to ASCE's Cerberus ftp server (See SECTION 7.0)	31 January 2025
Electronic files **Phase 2** upload to ASCE's Cerberus ftp server (See SECTION 7.0)	28 February 2025
Electronic file **Phase 3** Presentation upload to ASCE's Cerberus ftp server (See SECTION 6.0)	7 calendar days prior to Build Day or 7 March 2025 (whichever is earlier)
Final RFI's uploaded to ASCE's Cerberus ftp server	14 calendar days prior to Build Day
All Change Orders and final submittals upload to ASCE's Cerberus ftp server (See SECTION 5.2.3)	7 calendar days prior to Build Day or 27 February 2025 (whichever is later)
Team Captain's meeting	Day before Build Day (or as specified by host)
Construction of Structure & Visual Aid * Does not apply in the event of a virtual competition	Build Day
Electronic file Phase Four upload to ASCE's Cerberus ftp server (See SECTION 7.0) * Does not apply in the event of a virtual competition	Build Day

All Team Captains shall attend the Team Captain's meeting where they will receive an overview of Build Day, and they will be able to ask any last-minute questions.

5.0 BUILDING PROJECT

5.1 GENERAL

All proposed and modeled BIM structures and constructed structures shall be a 2-story structure with a maximum Ground Level Floor Plan dimension of 6'-0" x 8'-0" and a maximum Second Level Floor Plan dimension of 7'-4" x 8'-0", which is measured to the outside face of the wood stud walls. Wall sheathing, roof sheathing, roof eaves, and **the cantilever floor beam shall extend outside the footprint dimension (see Figure 1. Framing Envelope**). The final deliverables shall contain the following:

1. Design and model a structurally efficient building system of 2x wood light-framed construction.
2. The two-story structure shall include the following:
    a. Roof system: The slope of the roof shall be determined by the team. The overall height of the structure shall not exceed 12 feet, measured from the highest point of the roof (ex. ridge beam) to the bottom of the structure.
    b. 2nd floor system: The floor system shall cantilever 16-inches (1'-4") in one direction. The 2nd-story wall shall be supported on the cantilevered portion of the floor framing, creating a vertical discontinuity between the 2nd-story wall and the 1st-story wall. Temporary shoring at the cantilevered floor system is required prior to completion of the 2nd floor build and during deconstruction. Temporary shoring shall be a built or mechanical free-standing system or attached system to shore the structure without a builder holding or stabilizing the structure or the shoring during its usage. A builder supporting the structure shall not qualify as shoring at any time.
    c. 2nd floor cantilevered beam: A floor beam that cantilevers 4'-1" outside of the footprint to support the applied point load. The cantilevered floor beam may not occur on the same wall as a floor system cantilever. **No counterweight other than the dead load of the structure is allowed to resist any overturning.** Prior to Build Day, exposed cantilever beam must be painted with high visibility paint or covered with high visibility wrap. The cantilever beam shall be mechanically connected to the structure during loading.
    d. 2nd floor framed opening: **one** opening in the floor measuring 2'-6" by 2'-6" clear.
    e. 2nd floor walls framed openings: minimum of **four** windows with one in each wall. The windows may be located anywhere on each wall.
    f. 1st floor walls framed openings: minimum of **three** windows with one in each wall and **one** door in a wall with no windows. The windows may be located anywhere on each wall.

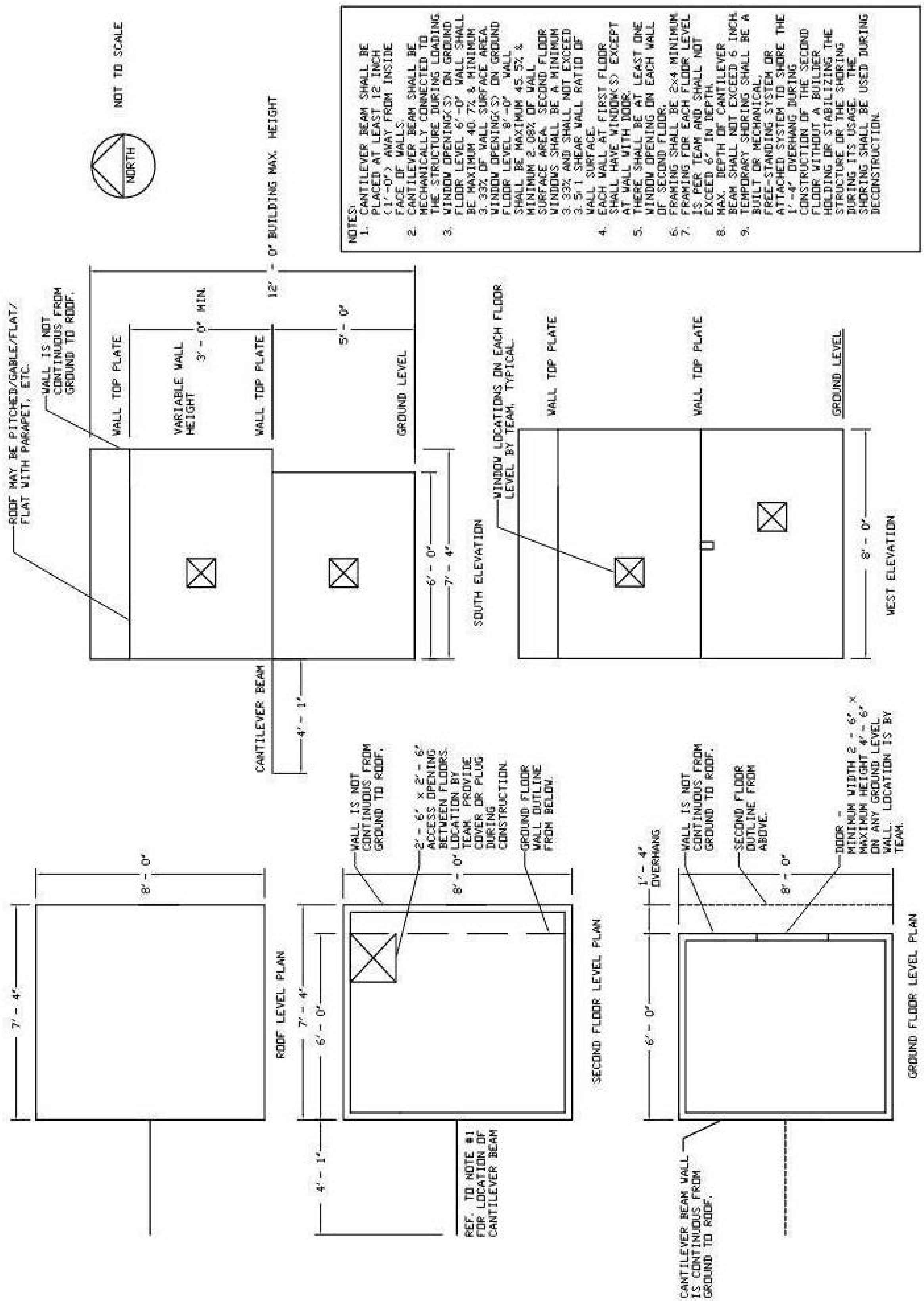


Figure 1. Framing Envelope

5.2 STRUCTURAL DESIGN

Wood has been successfully used as a structural material for over 1300 years and the construction industry is on the verge of expanding the use of wood to high-rise under the 2021 International Building Code to up to 18 stories using mass timber construction. As a structural material that provides sustainability, strength, and resilience, each team will design the building per this section using wood products. The structural calculations shall be legible HAND calculations (non-computer analyzed or automated) on the structure in **Figure 1. Framing Envelope**. Examples of computer-generated calculations NOT accepted are those created in MathCAD, Enercalc, RISA, Excel, etc. Calculations written by hand in a digital note taking software like GoodNotes or OneNote are acceptable. All structural design will be done using the Allowable Stress Design (ASD) Method using the loading listed in this section (no additional factors need be applied) and load combinations per ASCE/SEI 7-22. All calculations for the design of all members and systems must be shown even for repetitive members and systems. The design must include the following:

5.2.1 STRUCTURAL DURABILITY-GRAVITY DESIGN

1. Vertical design loads
   Roof Dead Load = calculated self-weight
   Roof Live Load L_r= 20 psf
   Floor Dead Load = calculated self-weight
   Floor Live Load L= 50 psf
   Point load at the end of the cantilever floor beam 150 lbs. (Load Test Video)
2. Design cantilever floor beam for shear and bending.
3. Deflection of cantilever floor beam
   a. Calculate the predicted deflection assuming all applicable adjustment factors are equal to 1.0. Predicted deflection shall be calculate to the 1/100th decimal place assuming the beam is loaded at a distance of 3’-6”, 3’-9” and 4’-0” from the exterior wall.
   b. The designed beam predicted deflection, when the point load is applied at 3’-6” from the exterior wall, must be at least 0.5 inches and not greater than 1 inch.
   c. Calculate the entire self-weight of the structure.
   d. Demonstrate cantilever floor beam may be safely loaded between 3’-6” from the exterior wall and the end of the cantilevered end without anchors or hold-downs attaching the structure to the ground.

5.2.2 STRUCTURAL DURABILITY-SEISMIC AND WIND DESIGN

1. Lateral Design Loads - the structure shall be designed and analyzed to resist seismic and wind loads based on allowable stress design (ASD) as follows:

a. Lateral seismic load of E = 275 plf at the roof diaphragm and 225 plf at the floor diaphragm in both directions (not simultaneously).
b. Roof wind uplift pressure of 30 psf shall be applied to the bottom surface of roof overhangs and combined with the same top surface wind uplift pressure of 30 psf applied to the entire area of the roof. For this competition, no dead load is allowed to resist uplift pressures.

2. Lateral Design – the design shall include the following:
    a. Seismic:
        i. Roof diaphragm design (in-plane shear only) both directions including sheathing, chords, and collectors.
        ii. Floor diaphragm design (in-plane shear only) both directions including sheathing, chords, and collectors.
        iii. Shear wall design (in-plane shear and overturning)
        iv. Anchorage to the foundation that includes anchor bolt and SST hold-downs to resist in-plane shear and overturning.
        v. Factor of Safety (F.S.) for the diaphragm and shear walls (ratios of ASD unit shear capacity/ASD demand). Teams shall provide calculations to the 1/100th decimal place. Calculations shall include F.S. for each of the diaphragms and the shear walls. The calculations shall provide the average F.S. for the combined diaphragms and average F.S. for combined shear walls.
    b. Wind Design:
        i. Roof joist anchorage for the uplift wind load.
3. The ASD capacities for the diaphragm and shear walls shall be based on the 2021 Special Design Provisions for Wind and Seismic (SDPWS) standard (https://awc.org/publications/2021-sdpws/). All diaphragm and shear wall designs shall adhere to limitations listed in SDPWS.
4. Assume that the structure will be connected to a foundation with 1/2" diameter anchor bolts and SST hold-downs.

In all cases, the demand (load) on the structure shall not exceed the capacity (resistance) of the structure.

'Continuous Load Path' is another focus of this competition. A structure must resist uplift, overturning, and sliding from the foundation as a system. The members must resist the out-of-plane (bending), in-plane (shear) and axial forces imparted from the loads as individual members, a diaphragm system or component, and a structure. How well a house or building can absorb effects from wind and seismic loading has much to do with 'Continuous Load Path'. A building absorbs seismic effects by connecting the horizontal roof and floor diaphragms to the walls. When ground motion produces inertial forces, these forces push on the roof (and floor) diaphragm in one direction and the walls hold back the roof in the opposite direction. This behavior is similar in a building absorbing wind effects. For the effects to be properly absorbed, the roof and floor diaphragms must be connected to the walls and the upper story walls are connected to the lower story walls. The lowest level walls are connected to the foundation. The ro

of connection to the walls must also account for the uplift forces due to wind. As an analogy, if the wind or seismic forces were electricity, it's the engineer's job to design a continuous path for that electricity to flow to the ground.

The following diagrams illustrates continuous load path through wood members, fasteners, and connectors:

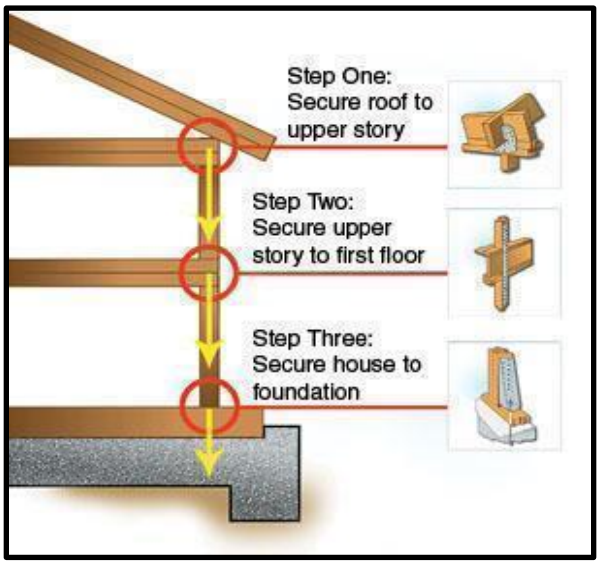


Figure 2: Continuous Load Path

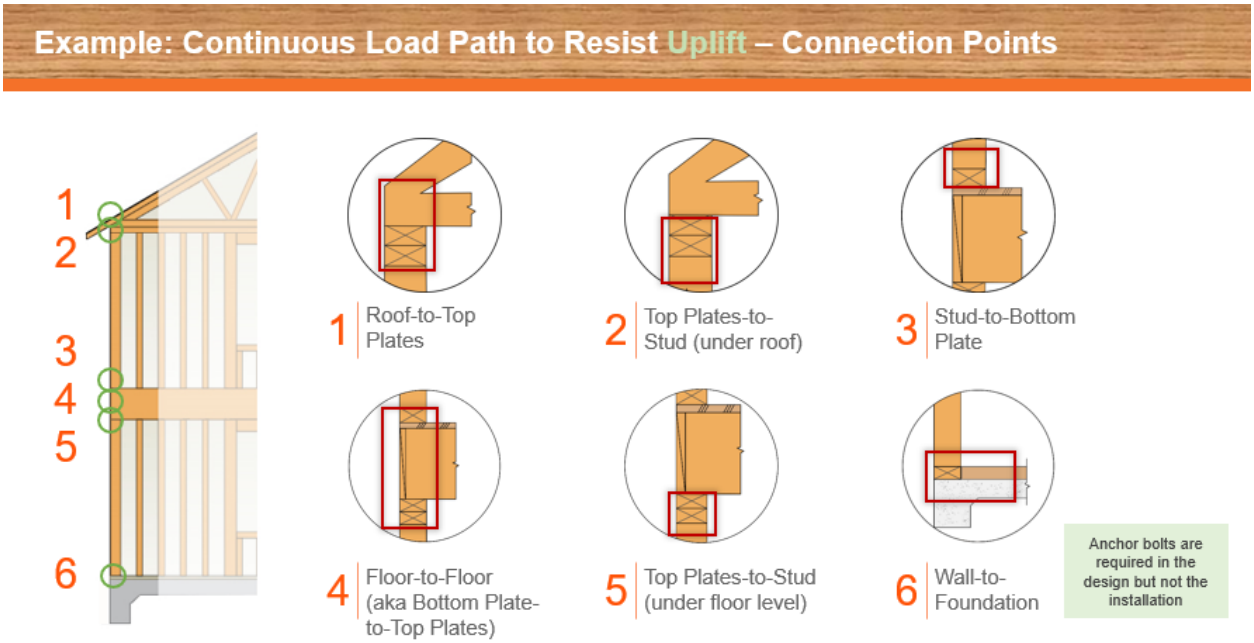


Figure 3: Continuous Load Path Resisting Uplift Forces

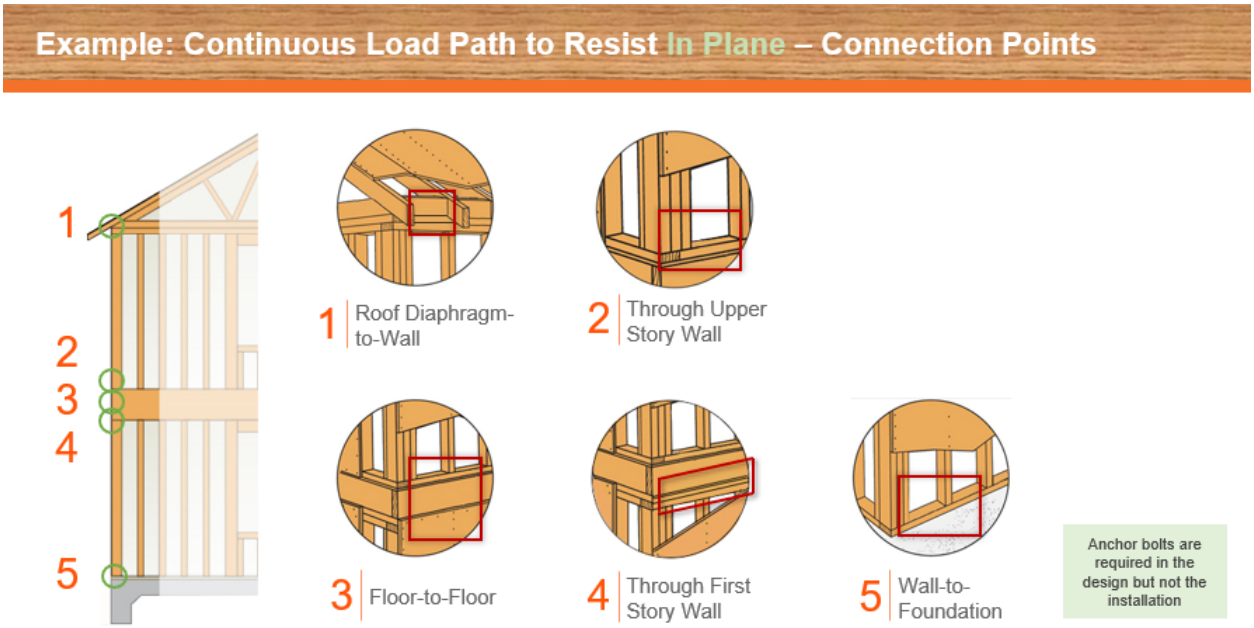


Figure 4: Continuous Load Path Resisting In-Plane Forces

Implementation of a continuous load path in the design and modeling of the structure in this competition will be a major focus. A Revit library of Simpson 2D & 3D connectors and fasteners is available for use. The following link is for downloading the 'Drawing Finder for Revit Plugin' from the Simpson Strong-Tie website:
https://www.strongtie.com/drawing/drawing-finder-for-revit
This plugin allows the Revit user to insert Simpson products directly into the Revit model and drawings by pulling the most recent content from the Strongtie.com website. Note that there is also an "Installation Instructions and Best Practices Tutorial" pdf file on the web page.

A wind unit uplift force has been provided for calculation (See SECTION 5.2.2). Teams will calculate the total uplift and appropriately connect the roof to the second level walls. Teams will be responsible for resisting uplift and overturning forces to the foundation with fasteners, connectors, structure dead load, or a combination of the three. Hold-downs are to be designed and installed to anchor the structure to the foundation, although the structure will not be anchored to the foundation during the competition.

5.2.3 CHANGE ORDERS

Change Orders are NOT intended to be used to redesign or resubmit a complete drawing set. Change Orders should include any changes made to any portion of a previous submission (including Phase 1, Phase 2, Phase 3, or Phase 4 submissions) that are stated in the rules. Examples of changes include, but are not limited to: change of species or wood or grade of material, corrections to errors in deflection calculation, change to carbon footprint calculation, or change of connector due to availability. Any change made to any portion of a previous submission shall be documented in a Change Order.

Plans and specifications should be reviewed prior to each submittal. Any ambiguity in the drawings or errors or omissions in the scope should be addressed with the TSDB Head Judge or TSDB Committee to get these corrected and to mitigate the need for Change Orders further along in the project. Failing to review and identify any issues with the scope of work, plans and specifications will lead to unnecessary Change Orders down the line. Not performing due diligence can have large cost and schedule ramifications in the field. This due diligence includes understanding the current site conditions and anticipating and addressing any issues that might arise along the way, such as material shortages or the removal or addition of builders, which is an important step in the preconstruction phase and in your Change Order process.

Conditions of Acceptance:

1. Submitted electronically using the completed Change Order form (see APPENDIX A) **a minimum of 7 days prior to Build Day**, no later.
2. Approval by the Head Judge is required. If no Head Judge is assigned, the TSDB Committee will approve or reject Change Order request.
3. All Change Orders must show the original plan/detail/calculation and newly altered plan/detail/calculation submitted with initial request.
4. Newly altered plan/details/calculation must show area that will be changed with a cloud area for reference (see **Figure 5**).

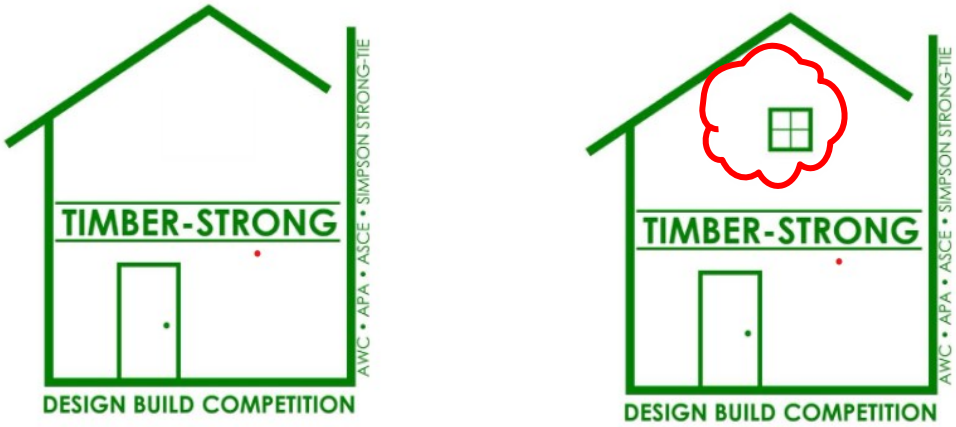


Figure 5: Example of clouded change

DO NOT IGNORE OR DELAY CHANGE ORDERS! All change orders need to be handled as expeditiously as possible. Putting off a change order until late in the project can result in huge point deductions. **All Change Orders will be subject to point deductions as follows:**

- submitted after the Phase 1 deadline: 1/4pt per Change Order
- submitted after the Phase 2 deadline: up to 1pt per Change Order (depending on significance/magnitude)
- submitted after the Phase 3 deadline: up to 2pt per Change Order (depending on significance/magnitude)

5.2.4 STRUCTURAL DRAWINGS

22” x 34” drawings accurately depicting the structure that is designed, including but not limited to:

- Framing plans
- Shear wall connection details
- Panelized diaphragm and shear wall sheathing type and fastening schedule
- Connectors, blocking, and fasteners for continuous load path
- Plan views, elevations, and cross-sectional details demonstrating continuous load path
- Anchorage to the foundation

5.3 SUSTAINABLE DESIGN

Wood is a superior sustainable building material.

Wood is renewable, like any crop. Engineered wood products can use smaller trees from well-managed forests, saving old growth for future generations to enjoy. Forest land comprises about 33 percent of the total U.S. land area. Demand for more wood products encourages forest landowners to maintain healthy forest regeneration, which in turn helps absorb more greenhouse gases.

Manufacturing wood uses less energy than producing steel or concrete, reducing greenhouse gas and other air-polluting emissions related to construction. Wood sequesters carbon. By trapping the carbon removed from the environment during the trees’ growth, buildings made with wood can continue to have a net benefit on the environment when compared to their steel and concrete counterparts.

To show how much the structure is sequestering, provide carbon footprint calculations which include:

Analyze the carbon footprint for 100x the building’s structural framing volume to simulate an actual full-size building. Determine the amount of carbon stored in the two-story structure and the total potential carbon benefit using the WoodWorks Carbon Calculator tool found at http://www.woodworks.org/carbon-calculator-download-form/

All input and output shall be provided in the report.

5.4 BUILDING MATERIALS AND SAFETY GEAR

5.4.1 MATERIALS

All materials specified and used in the structure’s construction shall be as follows.

- All structural framing shall be a nominal sawn lumber size 2 x 4 (actual size 1.5” x 3.5”) or larger. Materials shall be limited to Douglas Fir (DF), Southern Pine (SP), Douglas Fir-Larch (DF-L), Hem-Fir

(HF) or Spruce-Pine-Fir (SPF) species groups or engineered wood products. All solid sawn lumber products must include an ALSC compliant grade stamp (or approved equivalent).

- Wood structural panels (plywood or oriented strand board (OSB)) are permitted to be used for the diaphragm and shear walls. Structural insulated panels (SIPS) are not permitted. All wood structural panels shall conform to either PS 1 or PS 2 (or approved equivalent) and shall have an approved grade stamp.
- Roof systems cannot be prefabricated panels with sheathing attached. Individual constructed roof structural elements not weighing over 30 lbs may be pre-assembled. Roof sheathing shall be attached to structural elements on site and in place during the build.

Connections shall be made with nails, screws, bolts, and steel connectors. Simpson Strong-Tie connectors and fasteners can be requested from Simpson Strong-Tie using the MATERIALS REQUEST form in APPENDIX A.

5.4.2 CONSTRUCTION

All supplies (materials, connectors, tools, etc.) to construct the structure shall be provided by each team. The construction supplies shall correspond to materials specified in the design and construction documents. A team may be disqualified from participating in Build Day if minimum requirements are not met (see SECTION 10.11)

5.4.3 SAFETY GEAR

Each team is responsible for bringing their own tools, safety gear, and personal protective equipment (PPE) including but not limited to construction hard hats, safety glasses, gloves (tips of gloves may not be cut off), closed toed shoes, long pants, and safety vests or high-visibility shirts. Long hair needs to be tied back at the construction site. See SECTION 4.5 for additional information.

NOTE: Power tools using compressed air, powder actuation or rotating blades such as pneumatic nailers, palm nailers, power saws, cordless saws, reciprocating saws, oscillating saws, etc. are not permitted to be used at the competition. However, battery operated tools such as drills or screwdrivers are permitted. Teams shall provide their own ladders. NOTE: SST will donate connectors and fasteners (see APPENDIX C). Additionally, SST will ship the connectors and fasteners to the teams prior to the competition.

5.5 BUDGET

A primary consideration with any project is the budget and making sure the costs are tracked. Each team will provide a budget which includes an itemized list of the cost of materials based on estimates for the materials used to design their structure and document how the costs were estimated. The budget shall be itemized and included in the report using a spreadsheet. See APPENDIX A for example. All materials shall be priced based on distributor pricing local to the build site, regardless of how/where the material was obtained, donated or purchased.

5.6 REPORT

5.6.1 REPORT CONTENTS

Each team's report must include:

a. Table of Contents
b. All team members' names, cell phone numbers and email addresses including the faculty advisor and any practicing engineers serving as mentors. Additionally, identify the team "Captain" and the 4-6 members who are designated as the "Builders" if competing in the construction portion of the event.
c. Team History including photos of previous TSDB structures and lessons learned from each school's previous year of participation in TSDB.
d. Structural design calculations (SECTION 5.2)
e. Sustainable design calculations (SECTION 5.3)
f. The budget (SECTION 5.5) including references for the estimated material costs - unit price.
g. Statement of how the team will remove the structure from the site and method of recycling or donating the structure after the competition (SECTION 9.5).
h. Statement that all team members have read and understand the rules including SECTION 4.5 in addition to the referenced OSHA documents.
i. Certificate of completion for the Ladder Safety Training (see SECTION 4.5)
j. All the host and sponsor logos (ASCE, AWC, APA & SST)
k. The report shall be signed and dated by at least one (1) team captain and one (1) faculty advisor certifying that the information is valid.

6.0 PRESENTATION

Presentation:

1. Using the items listed for the visual aid (see SECTION 9.2), each team will record a presentation about their project and provide it at Phase 3 as listed in SECTION 4.6 . Each team is responsible for video recording their presentation which shall be uploaded into the team's ASCE Cerberus ftp server folder.
2. All members of the builder team must participate in the presentation.
3. Each team will have 10 minutes maximum for the presentation.

7.0 ELECTRONIC FILES

Each team shall upload their electronic files into the ASCE Cerberus ftp server folder provided by ASCE. The team folder shall have **separate** folders for each submittal phase shown below. The files will be uploaded in phases per SECTION 4.6 into the team folder as follows:

Phase One:

1. Project report (Submit in PDF format. Uploaded file shall be named "School-Name_Ph1-Report.pdf")

Phase Two:

2. Structural drawings (Submit in PDF format on 22" x 34" sheet size. PDF should include all drawing sheets. AutoCAD files in DWG format will not be accepted. Uploaded file shall be named "School-Name_Ph2-CDs.pdf")
3. BIM Model and associated 3D graphics (i.e. perspectives, renderings, etc.) as needed to appropriately convey the finished structure with a complete load path. Uploaded BIM models shall be Revit files named "School-Name_Ph2-BIM.rvt". Uploaded additional 3D graphics shall be on 22" x 34" sheets in PDF format named "School-Name_Ph2-Graphics.pdf".
4. Photos and/or videos files of any pre-fabrication, etc. shall be named "School-Name_Ph2-Fabrication", numbered and use either a .jpeg or a .mp4 file format.

Phase Three:

5. Presentation materials, photos and/or videos of the team presentation. Uploaded files shall be named "School-Name_Ph3-Presentation", numbered and using either a .jpeg or a .mp4 file format.

Phase Four:

6. Each team shall have physical copies of their visual aid, construction drawings, and report at the Build Day.

All teams must have all materials in their ASCE Cerberus ftp server folder by the deadline or the team will have points deducted from their score.

8.0 BUILDING INFORMATION MODEL (BIM)

The team members will model the entire building superstructure per the design shown in their submitted report, structural drawings, and visual aid using a 3D modeling software (i.e. Revit). Teams that do not model the structure to the specifications outlined within the report, structural drawings and visual aid will be subject to a scoring deduction (see SECTION 10.0). The structure shall be modeled using only wood members (see SECTION 5.4.1).

8.1 GENERAL

The completed model must provide a complete load path for gravity, wind, and seismic loads, and all loads shall be resolved into the foundation.

The BIM will be judged based on completeness of the model (including all structural framing materials and connectors), visually demonstrating the continuous load path, accurately calculating the materials cost, and accuracy of the model according to the team report. To be considered complete, all structural members must be modeled in three dimensions (see SECTION 10.9).

Please refer to SECTION 10.0 for any other scoring concerns.

9.0 CONSTRUCTION & VISUAL AID

The team members designated as "builders" (see SECTION 4.3) will construct the entire project per the design shown in their submitted report, structural drawings, and visual aid. The team's faculty advisor is expected to be present during the construction of the project. Teams that do not construct the structures to the specifications outlined within the report, structural drawings and visual aid will be subject to a scoring deduction (see SECTION 10.0). The structure shall be constructed using only wood members (see SECTION 5.4.1).

9.1 GENERAL

In wood light frame construction, it is a common practice to construct walls, floors, and roofs offsite and deliver these fabricated panels (also referred to as "components") to the jobsite for erection. This process is referred to as 'panelization.' It is the intent of this competition for teams to construct the wall and floor panel components offsite and deliver them to the competition site for erection. Roof framing shall be done onsite, so builders are not lifting large and heavy panel components from ladders overhead. Judges will observe the construction.

The structure is to be constructed such that it can be easily disassembled in larger pieces to place on a shipping pallet. Similarly, the roof shall not be disassembled as a single component for safety purposes. This panelization process not only replicates real-world construction, but also makes it easy for disassembly and reassembly by recipient of the donated project. For this reason, we require the use of screws or bolts for connecting the components (i.e., wall components, floor components) together. However, this is not to be confused with the general wood nailing and sheathing nailing (using code prescribed nail sizes) in the assembly of the panels and sheathing done offsite. The screws or bolts make the deconstruction of the structure into stacks of panels on pallets much easier. The structural drawings must identify and specify the screw size and location for erecting and connecting the panels together. This adds an extra bit of planning and design to the structure in considering erection and disassembly of the panelized components. Disassembly and building removal are an important part of construction in this competition.

Example of panelized walls at 2022 TSDB

The roof structural framing members are allowed to be pre-cut prior to the competition date. Due to safety concerns, any preassembled roof segments intended to be lifted into place overhead may not exceed 30lbs or exceed 12-inches in its narrowest dimension (Ex. Two 2x6 rafters and a rafter tie may be preassembled with a weight of approx. 23lb. and a narrow dimension of 1-1/2-inches). Prefabricated portions of the roof not meeting these limitations will either need to be dismantled prior to build or eliminated from the build. All prefabrication must be done prior to arriving at the building site on Build Day. No partial hardware installations are permitted prior to Build Day (ex. pre-installation of joist hangers or hurricane ties not allowed).

The walls and floor may use fabricated panels. For safety due to lifting and ladders, the roof must be constructed on-site (non-panelized).

The sheathing connections shall be identifiable through any decoration of the panel components. The ability to identify the type and spacing of sheathing connections to the framing shall be maintained.

The structure is not allowed to be anchored to the construction site area and it is the team's responsibility to provide adequate measures to resist overturning loads as a result of the applied cantilever loading. **No counterweight other than the dead load of the structure is allowed to resist any overturning.** The completed structure must provide a complete load path for gravity, wind, and seismic loads. Hardware omitted due to the anchoring restriction shall be partially installed or otherwise indicated on the structure for full points. NOTE: The wind load does not need to be considered beyond the anchorage of the roof rafter into the walls.

Construction on-site during the competition will be judged based on the time of construction, completeness of construction, continuous load path, materials cost, and accuracy of construction according to the structural drawings.

Please refer to SECTION 10.0 for any other scoring concerns.

9.2 VISUAL AID

Each team shall display a visual aid at their build site. Each team's visual aid shall be 30" tall x 40" wide with a foam-core base and include the following items:

Visual Aid:

1. Drawings, graphics, text, photos, etc. that summarize and illustrate the significant aspects of the project. The visual aid must at least contain:
    a. Student chapter and team member names
    b. Graphics and snapshots of the structure
    c. Factor of Safety for the diaphragm and the shear walls
    d. A table indicating the calculated cantilever beam deflections and bearing force per linear foot of the sill plate of the wall opposite the cantilever beam for each of the three possible point load locations
    e. Design features
    f. Total calculated carbon stored in structure and the total potential carbon benefit
    g. Total material cost of the structure
    h. Total calculated weight of the structure
    i. Logos of all the host and sponsors (ASCE, AWC, APA & SST)

2. Ensure the text and graphics on the visual aid are large enough to be read from a distance of 3ft. Use high-contrast colors and clear fonts. Laminate the visual aid or use weather-resistant materials to protect it from the elements. The visual aid fonts, data and graphics should be large enough to be easily read by observers and judges without them needing to enter the construction site.
3. The visual aid shall be shown on a easel (construct or provide your own 60" or taller easel) near the structure at the building site or an area designated by the host. The visual aid and easel shall be displayed at the start and during construction and until removal of the structure. The visual aid and easel shall be secured or constructed in a way that can withstand site and outdoor conditions such as wind and construction activity.

9.3 SITE REQUIREMENTS AND CONSTRAINTS

All teams will be provided with a 18' x 18' area known as the "construction site" as defined by clearly marked lines on the ground to construct their structure. The construction site limits will be measured from the inside edge of the boundary. All sites will be located on relatively level surfaces; however, it may not be completely flat.

A hard copy of the report printed on 8 1/2x11 inch paper and structural drawings printed on minimum 11x17 inch paper and incorporating any Change Orders submitted by the Change Order deadline (see SECTION 5.2.3) must be on the construction site and available for the judges to view during the build. The visual aid must be shown near the construction site while the building is being constructed (see SECTION 9.2).

9.4 BUILDING CONSTRAINTS

The construction process will be timed for each team. A maximum of **90 minutes** of construction time will be allotted for each team's construction.

1. All team members must always be wearing all the safety gear while in the construction site (see SECTION 5.4).
2. All construction materials (including framing members, fasteners, connectors, tools, etc.) must remain in the construction site during the entire construction process. Point reductions shall apply for violations (see SECTION 10.0).
3. All team members and their building materials and tools shall be set up within the construction site prior to the start time.
4. No construction shall start within the construction site prior to the start time.
5. The team is not allowed to start constructing their project on the construction site until the time starts recording by the judge/timer.
6. Time will begin being recorded after all builders hold their hands above their heads and the captain states to the judge/timer that they are ready to begin.
7. No additional building materials and tools may be added to the construction site after the start time. However, builders are allowed to be provided with water for nourishment.
8. Prior to erection of the second-floor walls and roof framing, the first-floor walls and second floor framing shall be completely constructed.
9. The team will tell the judge when they are ready for review of the structure. The judges shall be allowed time to review the structure, prior to application of any finish materials (veneer, siding, etc.) that would impede or hide observation of the nailing, connections, details, or overall load path of the structure. The timer will stop the clock while the judges are reviewing the structure and during this time, builders are not allowed to step out of the construction site. Once the judge has finished, the timer will restart the clock using the same process when it was originally started.
10. Upon completion of the assembly of a team's structure, all team members will set down all their tools, materials, etc. and the team captain will signal to the timer/judge that the team has completed the building and the timer will stop the clock. Once the clock is stopped all team builders must exit the construction site.
11. Team builders will receive a penalty for exiting the construction site prior to completion of the structure (see SECTION 10.0).
12. Once the team has completed the construction, the judges will measure the deflection before the load is applied and after the load is applied. (Load Test Video) The test load location for all builds will be determined by the single roll of a standard 6-sided dice performed by the Head Judge prior to the beginning of construction. The roll of the dice will determine the location of the 150 lb. test load and apparatus on the cantilever floor beam. The locations are measured from the exterior face of the wall from which the cantilever extends.

Dice Value	Location Of Test Load From Wall
1	3’-6”
2	3’-9”
3	4’-0”
4	4’-0”
5	3’-9”
6	3’-6”

13. Only the judges are allowed in the construction site during the measurement of the deflection aside from builders assisting the judges with loading the cantilever floor beam with the provided weights.
14. Each team is responsible for taking pictures of the completed structure which shall be uploaded into the team’s ASCE Cerberus ftp server folder as soon as possible after the TSDB^{SM} Competition.

9.5 BUILDING REMOVAL AND CLEAN UP

Once the competition has ended, the completed structures shall be deconstructed, panel by panel, and the panels stacked on pallets. Each team is responsible for removing their pallets and materials to be donated for charity. After building the structure, each team is responsible for removal of **ALL** materials used for the project including but not limited to scrap wood, tools, fasteners (nails, screws, bolts, etc.) etc. in a safe and responsible manner. Each team shall designate a person in charge of the structural stability during construction. It is very important that each team make a clean sweep of the site and surrounding areas to make sure that **ALL** materials are removed immediately following deconstruction. Points will be deducted from the team’s score if the construction site is not completely clean and/or if any building materials are left after the structure is removed.

Each team shall define in the report the plans for removal of the building and all materials. Potential reuse or recycling of the project materials should be determined prior to the competition. Possible solutions include donating to the Childhood Cancer Foundation (CCF) http://ccfsocal.org/ or other charitable organizations or researching other options at: http://reusewood.org/. For liability reasons, it is preferred that you donate the materials individually and not for the purpose of reassembling the structure. Anyone seeking reuse of the structure should contact ASCE’s Legal Department (email student@asce.org with subject line “TSDB donation waiver request”) for a liability waiver. Each team is responsible for removing the building and all materials from the site. The host has the option to remove any remaining structural debris from the site and bill the responsible school.

10.0 SCORING

Scoring will be based on the team’s report, BIM, presentation, and construction of their building. In the instance of a tie, the teams involved will receive the same place and score. For example, if two teams tie for second place in Sustainability in Report, both will receive 18 points.

Scoring is as follows:

	Maximum Points
PHASE 1: REPORT	
Design Strength and Durability Analysis	82
Sustainable Design	18
Budget	20
Report Requirements	10
PHASE 2: DRAWINGS, BIM, VISUAL AID, GRAPHICS	
Visual Aid	10
Creativity & Aesthetics	20
BIM	70
Construction Drawings	50
PHASE 3: PRESENTATION	
Presentation	10
Design Points Possible	**290**
BUILD DAY: CONSTRUCTION	
Accuracy and Demonstration of Load Path	50
Quality, Aesthetics and Speed	60
Structure Requirements	20
Build Time (BONUS)	5
Construction Points Possible	**130 (+5 bonus points)**
TOTAL POINTS POSSIBLE	**420 (+5 bonus points)**

10.1 DESIGN STRENGTH AND DURABILITY ANALYSIS: 82 POINTS

Points will be awarded for the most durable structure based on the performance to withstand the wind lateral and vertical loads, as well as the structural efficiency of the overall structure.

Design Factor of Safety: 6 points each, 12 points possible
Points will be rewarded based on the design factor of safety (F.S.) for the design of the diaphragms and the shear walls.

Points will be awarded to the teams that get each individual diaphragm and shear wall F.S. closest to 1.50 (i.e. full points if all are within 10%, half points if all are within 20% of 1.50 F.S.). If any individual diaphragm or shear wall F.S. is less than 1.20, zero points will be awarded.

Maximum scores are as follows:

- Roof and Floor Diaphragms 6 points
- Shear Walls 6 points

Structural Design Completeness and Accuracy: 55 points
Points will be awarded based on the structural analysis, completeness, and correctness.

Deflection: 15 points
Points will be awarded based on the ratio of calculated predicted deflection from the report to actual deflection measured in competition. In order to qualify for these points, the cantilever deflection must meet the requirements of SECTION 5.2.1.

10.2 SUSTAINABLE DESIGN: 18 POINTS

Points will be awarded for the most sustainable structure based on the calculated carbon sequestration and potential carbon benefit in the report.

Input Included	5
Carbon Footprint x100 correctly	5
Total Carbon Footprint (see below 8 pts. max)	8
8 pts. Total Carbon Footprint < 200 Metric Tons of CO2	
7 pts. 200 Metric Tons of CO2 < Total Carbon Footprint < 300 Metric Tons of CO2	
6 pts. 300 Metric Tons of CO2 < Total Carbon Footprint < 400 Metric Tons of CO2	
5 pts. 400 Metric Tons of CO2 < Total Carbon Footprint < 500 Metric Tons of CO2	
4 pts. Total Carbon Footprint > 500 Metric Tons of CO2	

10.3 BUDGET: 20 POINTS POSSIBLE

Up to 10 points will be awarded based on the completeness and accuracy of the budget and associated documentation. The remaining 10 points will be awarded based on the total cost relative to the average cost among all participating teams. Note: teams are only eligible for the remaining 10 points if their budget is determined to be complete and accurate.

Cost impacts due to Change Orders will be factored into the final material cost. (see SECTION 5.2.3)

10.4 REPORT REQUIREMENTS: 10 POINTS

Points will be awarded for including all required report sections (see SECTION 5.6.1)

10.5 CREATIVITY/AESTHETICS: 20 POINTS

Points will be awarded by the judges for creativity and aesthetically pleasing structure. Judges will award 1-20 points.

Bonus points for top 3

- 5 points for first place
- 4 points for second place
- 3 points for third place

10.6 PRESENTATION: 11 POINTS

10.7 SUBMISSION REQUIREMENTS: 19 POINTS

Points will be awarded for:

Visual aid: 9 points
Report requirements: 10 points in total

10.8 STRUCTURAL DRAWINGS: 50 POINTS

Points will be awarded based on the completeness and accuracy of the drawings.

10.9 BIM: 70 POINTS

Points will be awarded based on the BIM as follows:

Accuracy of model: 30 points

Load path: 20 points

Complete Structure: 20 points
Overall structure completion according to the drawings, connectors, anchors, holdowns placement, cladding etc.

10.10 CONSTRUCTION: 130 POINTS

Safe, accurate, quality and timely construction, meeting the project parameters and demonstrating a complete load path.

10.10.1 CONSTRUCTION BUILD TIME BONUS

Top five teams that have built the structure accurately and have the fastest construction time:

Bonus points for top 5

- 5 points for first place
- 4 points for second place
- 3 points for third place
- 2 points for fourth place
- 1 point for fifth place

10.11 ADDITIONAL POSSIBLE POINTS DEDUCTED AND/OR DISQUALIFICATION

SECTION 5.1 GENERAL

- 5 points will be deducted for structures, excluding the cantilever, that are larger than 6' w x 8' w x 12' h dimensions as measured in SECTION 5.1 .
- 30 points will be deducted for structural calculations that are electronically generated. If only a portion of the structural calculations are electronically generated, the deduction shall be reduced proportionate to the number of calculations electronically generated, not less than 10 points.

SECTION 4.5 SAFETY

- If there are any safety violations as identified by Safety Officials or Judges, the team must correct the issue(s) or they will be disqualified.

SECTION 4.6 SCHEDULE, DEADLINES, AND SUBMISSIONS AND SECTION 7.0 ELECTRONIC FILES

- Teams will have 10 points deducted if the team folder does not contain the required files for Phase One by the submission deadline.
- Teams will have 8 points deducted if the folder does not contain the required electronic files for Phase Two by the submission deadline.
- Teams will have 2 points deducted if the folder does not contain the required files for Phase Three by the submission deadline.

SECTION 5.4.2 CONSTRUCTION

- Teams will be disqualified from participating in Build Day if the following have not been submitted **a minimum of 7 days prior to Build Day (or March 1st, whichever is later)**:
  - Calculations demonstrating:
    - Continuous load path for uplift for individual members, components, and the system.
    - Continuous load path for gravity for individual members, components, and the system.
    - Diaphragm design for out-of-plane bending and in-plane shear.
    - Member design for forces and serviceability (i.e. axial, bending, shear, and deflection)
    - Structure weight with required stability for shear and overturning anchorage requirements.
  - Construction Documents:
    - Dimensioned plans with member sizes.
    - Panel plan for each preassembled panel.
    - Type, size, and number of connectors at each member connection.
    - Connection pattern of sheathing to dimensional frame members.

SECTION 9.4 BUILDING CONSTRAINTS

- 5 points will be deducted for each instance that materials, tools, or builders are out of bounds.

SECTION 9.5 BUILDING REMOVAL AND CLEAN UP

- 5 points will be deducted if anything is left in the construction site after the structure has been removed (including debris or markings).
- Points will be deducted if a practical plan to donate or recycle project is not laid out in the report.

- Points will be deducted if the team does not designate a person in charge of the structural stability during deconstruction.

OTHER GROUNDS FOR DISQUALIFICATION

- Structure failure
- Plagiarism
- Any attempt to build without a hard copy of the construction drawings on-site
- Significant safety violations
- Conduct in violation of SECTION 4.4 .

The Head Judge has final say over deductions. The Head Judge may consult with the TSDB Rules Committee regarding deductions, but the TSDB Rules Committee will not overturn their decision.

11.0 ADDITIONAL INFORMATION

- Teams may submit questions as explained in SECTION 4.2.1.
- The Head Judge shall be present at the Team Captain's meeting. All Judges are welcome to attend the Team Captain's meeting.
- All electronic entries/pictures and videos entries shall become the sole property of the host, American Society of Civil Engineers, and the sponsors: American Wood Council, Simpson Strong-Tie and APA-The Engineered Wood Association. Host, ASCE and sponsors reserve the right to use or publish all entry material in publications, social media, etc. By entering, the entrants grant a royalty-free license to the American Society of Civil Engineers, American Wood Council, Simpson Strong-Tie, and APA – The Engineered Wood Association to use any material submitted. Such a right includes publication of photographs and names of award recipients without compensation to Entrants.
- Final judging shall be completed on Build Day.
- 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. (See APPENDIX C for Cerberus Upload Guidance.) ASCE will provide the Head Judge a secure submission link for ASCE's Cerberus ftp server in February 2025.

APPENDIX A TEAM FORMS

MATERIALS REQUEST (FOR COST ESTIMATING PURPOSES)

45 days prior to Build Day for respective symposium

Connectors/ Fasteners

Please return to: Angel Leon, ALeon@strongtie.com (951) 538-6529

www.strongtie.com

Quantity	Model #	Description /Product Name
	Student Name	
	Advisor Contact Info:	
	Delivery Address:	
	Phone Number	
	Tax ID #	

BUDGET FORM (EXAMPLE NOT A TEMPLATE)

TIMBER-STRONG DESIGN BUILD

MATERIAL COST ESTIMATE (EXAMPLE ONLY)

Description	Qty	Unit	Unit	Purchased	Donated	Total
Wall Framing (1st Floor)						
2x4-8ft Wall Studs	10	pcs	$ 5.85	2 $ 11.70	8 $ 46.80	$ 58.50
2x4-8ft Corner Posts	15	pcs	$ 5.85	0 $ -	15 $ 87.75	$ 87.75
2x4 Top/Sill Plates	50	LF	$ 0.85	2 $ 1.70	48 $ 40.80	$ 42.50
4x8 1/2 Cat. WSP	8	pcs	$ 22.85	8 $182.80	0 $ -	$ 182.80
Floor System						
2x4 Rim Joist	30	LF	$ 0.85	0 $ -	30 $ 25.50	$ 25.50
2x4-8ft Floor Joists	12	pcs	$ 5.85	0 $ -	12 $ 70.20	$ 70.20
2x4-14ft Cantilever Beam	1	pcs	$ 10.47	1 $ 10.47	$ -	$ 10.47
4x8 5/8 Cat. WSP	5	pcs	$ 30.96	5 $154.80	0 $ -	$ 154.80
Wall Framing (2nd Floor)						
2x4-8ft Wall Studs	30	pcs	$ 5.85	4 $ 23.40	26 $ 152.10	$ 175.50
2x4-8ft Corner Posts	12	pcs	$ 5.85	2 $ 11.70	10 $ 58.50	$ 70.20
2x4 Top/Sill Plates	60	LF	$ 0.85	12 $ 10.20	48 $ 40.80	$ 51.00
4x8-1/2 Cat. WSP	10	pcs	$ 22.85	10 $228.50	0 $ -	$ 228.50
Roof Framing						
2x4-8ft Roof Rafters	8	pcs	$ 5.85	0 $ -	8 $ 46.80	$ 46.80
2x6-10ft Ridge Beam	1	pcs	$ 8.56	1 $ 8.56	0 $ -	$ 8.56
2x4 Blocking and Roof Fascia	40	LF	$ 0.85	0 $ -	40 $ 34.00	$ 34.00
4x8-1/2 Cat. WSP	10	pcs	$ 22.85	6 $137.10	4 $ 91.40	$ 228.50
Lumber Subtotal				**$780.93**	**$ 694.65**	**$ 1,475.58**
Fasteners						
8d Common Nails	1	box	$ 27.44	1 $ 27.44	0 $ -	$ 27.44
10d Common Nails	1	box	$ 30.66	1 $ 30.66	0 $ -	$ 30.66
SD8x1.25 Screws	6	box	$ 5.23	1 $ 5.23	5 $ 26.15	$ 31.38
SDWS 22300 Screws	2	box	$ 12.74	0 $ -	2 $ 25.48	$ 25.48
Fastener Subtotal				**$ 63.33**	**$ 51.63**	**$ 114.96**
Simpson Connectors						
A35 Framing Angles	30	pcs	$ 0.47	10 $ 4.70	20 $ 9.40	$ 14.10
RTC2Z Ridge Plates	20	pcs	$ 3.57	2 $ 7.14	18 $ 64.26	$ 71.40
LSSJ26JZ/LSSJ26RZ Jack Hanger	10	pcs	$ 3.26	0 $ -	10 $ 32.60	$ 32.60
CS22-R (25' length)	1	pcs	$ 52.30	0 $ -	1 $ 52.30	$ 52.30
Connector Subtotal				**$ 11.84**	**$ 158.56**	**$ 170.40**
Total Cost of Materials				**$856.10**	**$ 904.84**	**$ 1,760.94**

CHANGE ORDER REQUEST FORM (SAMPLE TEMPLATE)

Change Order Request Form		
Date and Time:		
Team/School:		
Team Captain:	**Name:**	**Email Address:**
	Signature:	
Description/ Reason:		
Budget Impact:		
Schedule Impact:		
Document(s) Changed:	**(include page numbers, sheet numbers, and location of change)**	
Original (or portion of Original) Document(s)		
New (or portion of New) Document(s)		
FOR TSDB JUDGE OR RULES COMMITTEE ONLY		
Approval:	☐ **Approved** ☐ **Revision Required** **Description:** ☐ **Rejected** **Reason:**	
	Signature:	

APPENDIX B ELIGIBILITY FOR STUDENT SYMPOSIUM COMPETITION

The purpose for 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:

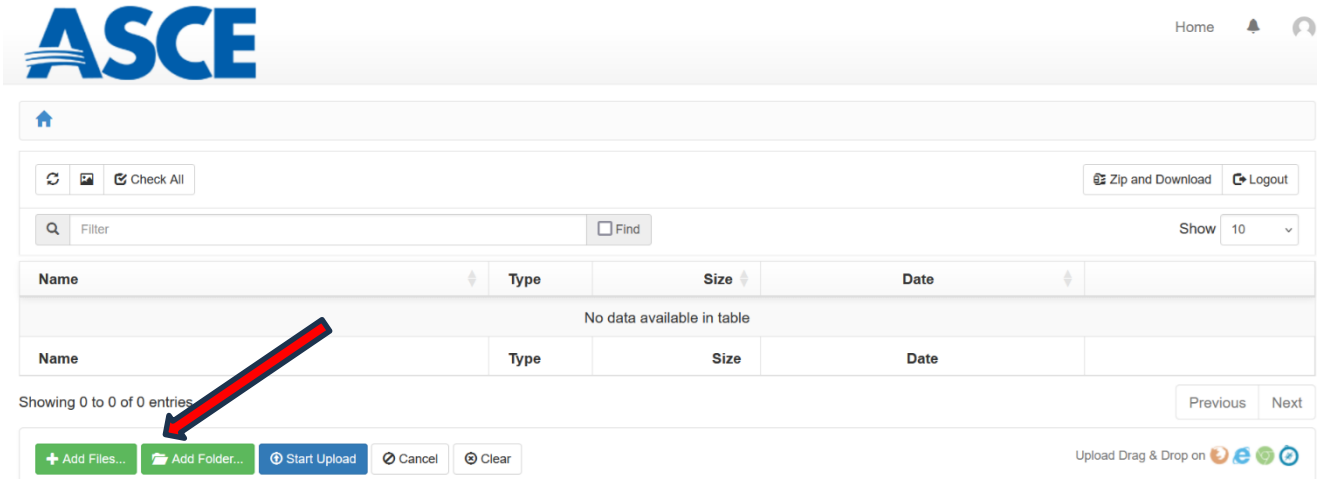
An ASCE Student Chapter must:

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. EST.**

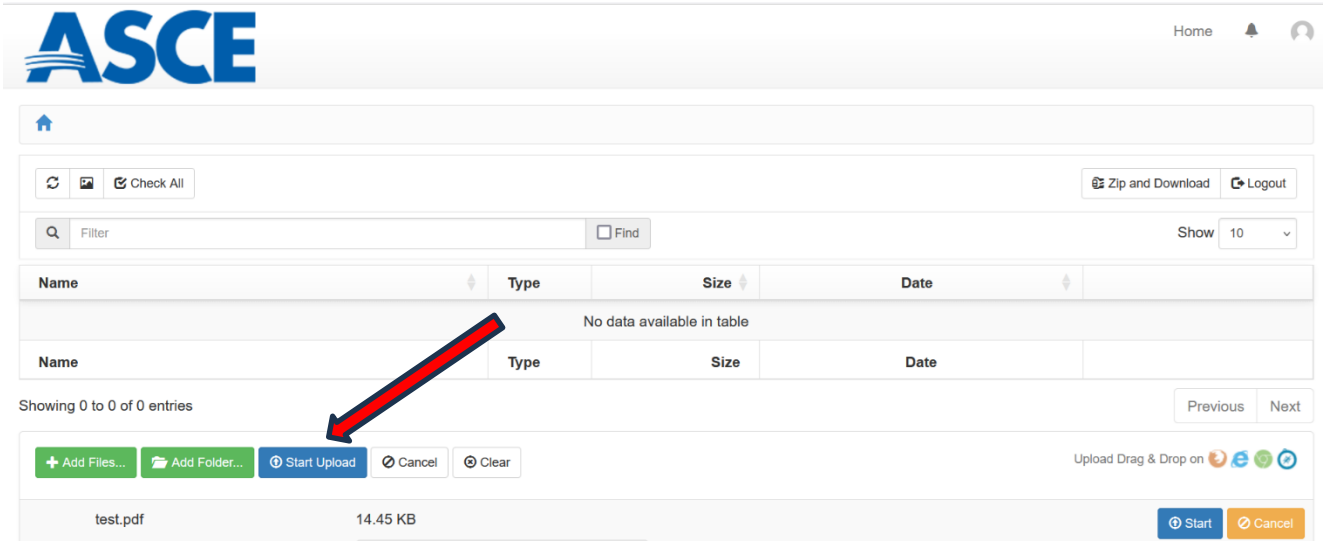
Questions regarding eligibility should be directed to student@asce.org.

APPENDIX C CERBERUS UPLOAD GUIDANCE

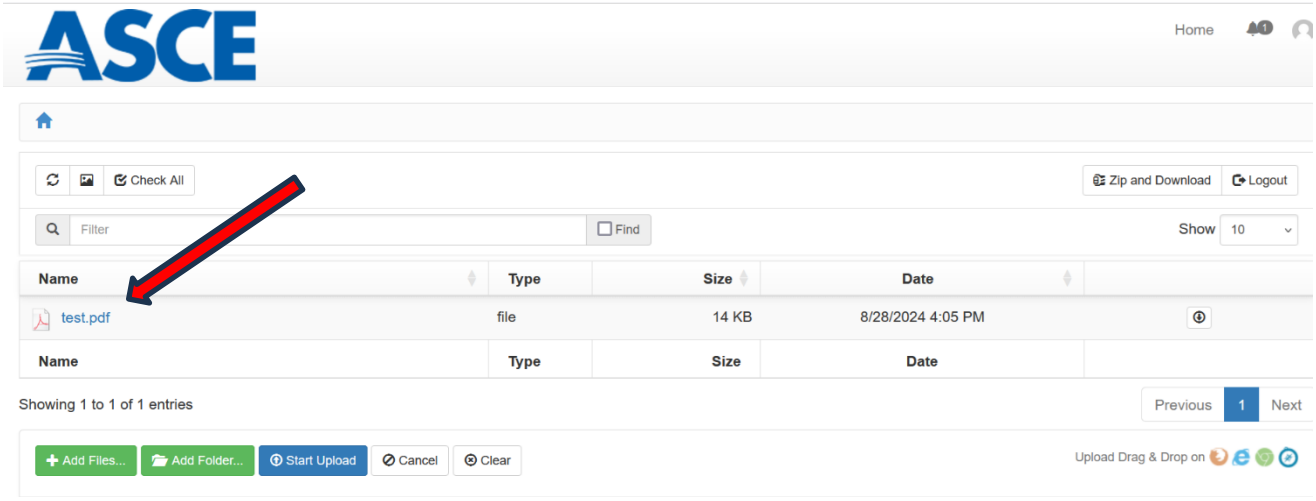
To add files to your Cerberus folder (secure link provided by ASCE), you can either click the **+Add Files** button and then browse to find the files to upload or drag and drop files to the area directly below the **+Add Files** button.



The selected (or dragged and dropped) files will appear in the upload area. To upload the file into the folder, click **Start Upload. (**To delete the uploaded file from the upload area, click **Cancel.**)



When the file has been successfully uploaded, the name of the file will appear under “name”.



Need help?

If you uploaded a file to the wrong folder or want to replace an uploaded file with a corrected version, send an email to jupmeyer@asce.org and ask that the incorrect file be deleted. Include both the location (folder path) and the **exact name** of the file you want deleted. (Files cannot be moved – you will have to upload the correct file to the folder after the incorrect version has been deleted).