

Timber-Strong Design Build 2026



Sky High Structures

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Project Introduction

Purpose: Design & Construct a two-story, small scale, light-framed wooden structure

Client: Mark Lamer, P.E.

Location: 2026 ISWSS Competition
University of Utah, Salt Lake City, UT

Background:

- 2026 Timber Strong Design Competition Rules
- Framing plan design
- Structural calculations
- BIM creation
- Construction drawing



Figure 1: Timber-Strong 2022 Winners [2]

Task 1: Research

- **Task 1.1: Research Past Competition Teams**
- **Task 1.2: Research Competition Rules**
- **Task 1.3: Research Structural Systems**
- **Task 1.4: Research Material Availability**



Figure 2: ASCE Timber-Strong Design Build 2026 Rules Cover Page [1]

Task 2: Design Selection

- Task 2.1: Brainstorm Structural Systems
- Task 2.2: Identify Viable Design Options
- Task 2.3: Select Design

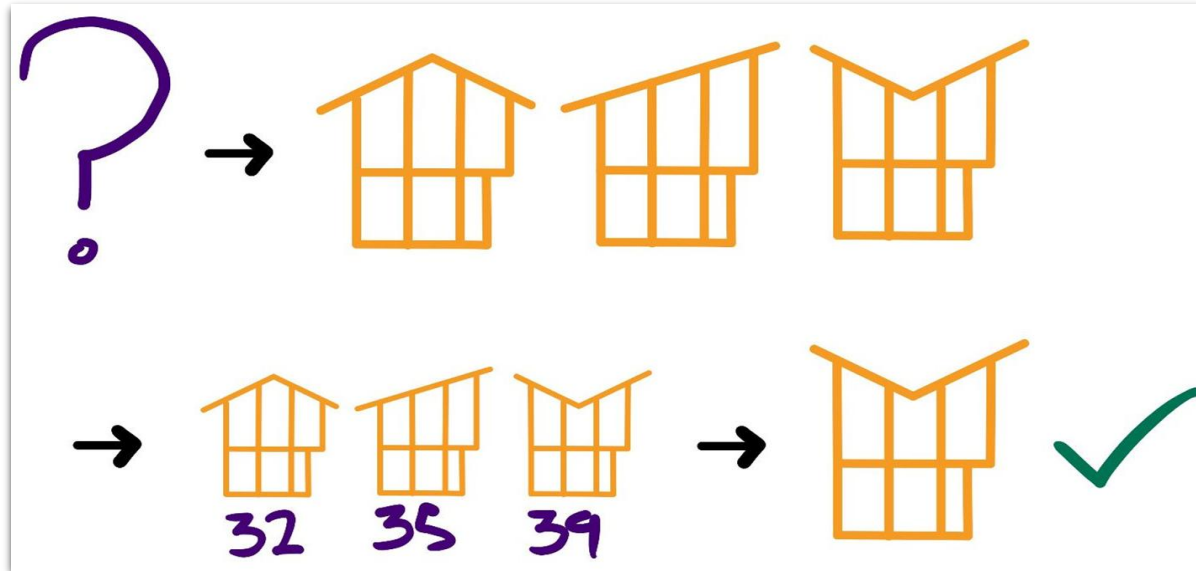


Figure 3: Conceptual Design Selection Process [3]

Task 3: Final Structural Analysis & Design

- **Task 3.1: Draft Framing Plan**
- **Task 3.2: Gravity Design**
 - Task 3.2.1 Roof Design
 - Task 3.2.2 2nd Level Bearing Wall Design
 - Task 3.2.3 2nd Level Design
 - Task 3.2.4 1st Level Bearing Wall Design
- **Task 3.3: Diaphragm Design**
 - Task 3.3.1 Calculate Diaphragm Forces
 - Task 3.3.2 Select Diaphragm Parameters
 - Task 3.3.3 Diaphragm Connection Design
- **Task 3.4: Shear Wall Design**
 - Task 3.4.1 Calculate Shear Wall Forces
 - Task 3.4.2 Select Shear Wall Parameters
 - Task 3.4.3 Shear Wall Connection Design
- **Task 3.5: Uplift Connection Design**

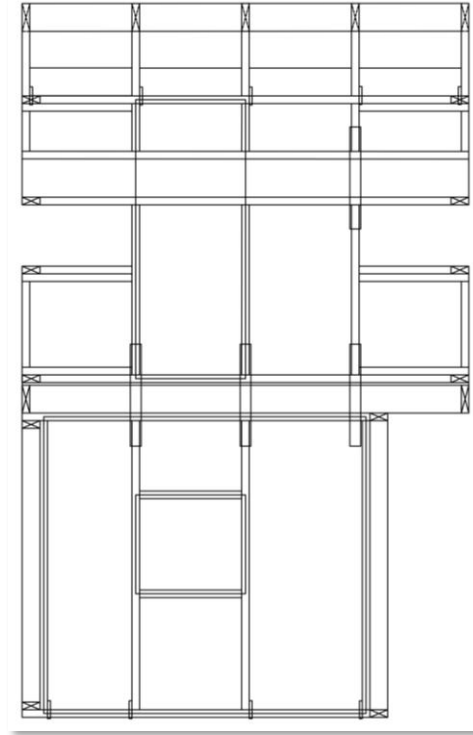


Figure 5: Sample AutoCAD Framing Plan;
Cantilever Beam Not Pictured [3]

Task 3: Final Structural Analysis & Design (Cont.)

- Task 3.6: Tiedown and Anchor Design
- Task 3.7: Cantilever Beam Design
 - Task 3.7.1: Beam Member Selection
 - Task 3.7.2: Overturning Stability
- Task 3.8: Final Calculation Packet
- Task 3.9: Final Structural Drawings
- Task 3.10: Building Information Model

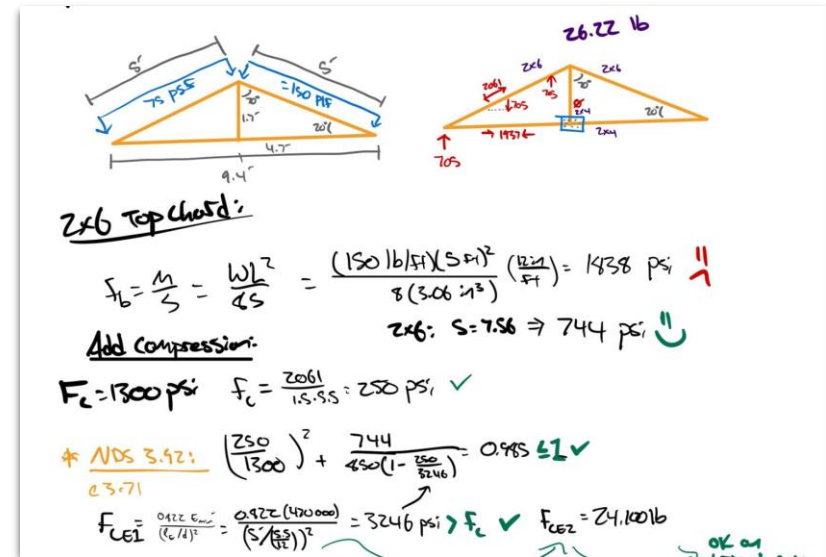


Figure 4: Sample Hand Calculations [3]

Task 4: Pre-Competition Construction Phase

- **Task 4.1: Material Procurement**
- **Task 4.2: Prefabrication**
 - **Task 4.2.1: Wall Panels**
 - **Task 4.2.2: Floor Panels**
 - **Task 4.2.3: Roof Assembly**
- **Task 4.3: Mock Assembly & Practice**
- **Task 4.4: Transportation Prep**



Figure 5: Timber-Strong 2025
Prefabrication Construction [5]

Task 5: Competition Construction Process

● Task 5.1: Competition Construction

- Pre-Build Setup
- First & Second Floor Framing
- Cantilever Beam Install
- Second-Floor Walls & Roof Framing
- Mid-Build Inspection
- Cantilever Deflection Test
- Safety Oversight

● Task 5.2: Deconstruction Phase

- Panel-by-Panel Deconstruction
- Donation/Recycling Plan
- Team Responsibility
- Liability Waiver
- Stability Oversight

Task 6: Impact Assessment

● Task 6.1: Carbon Footprint Calculation

- Determine embodied carbon in structure with WoodWorks Carbon Calculator tool
- Determine theoretical carbon footprint of structure at the scale of full-sized building

● Task 6.2: Triple Bottom Line Assessment

- Societal, Environmental & Economic impacts of the project

Task 7: Deliverables

● Task 7.1: Competition Deliverables

- Task 7.1.1: Intent and Eligibility Form
- Task 7.1.2: Ladder Safety Training
- Task 7.1.3: Phase 1A Electronic Files
- Task 7.1.4: Phase 1B Electronic Files
- Task 7.1.5: Phase 2 Presentation
- Task 7.1.6: Change Orders/Final Submittals
- Task 7.1.7: Phase 3 Electronic File

● Task 7.2: Capstone Deliverables

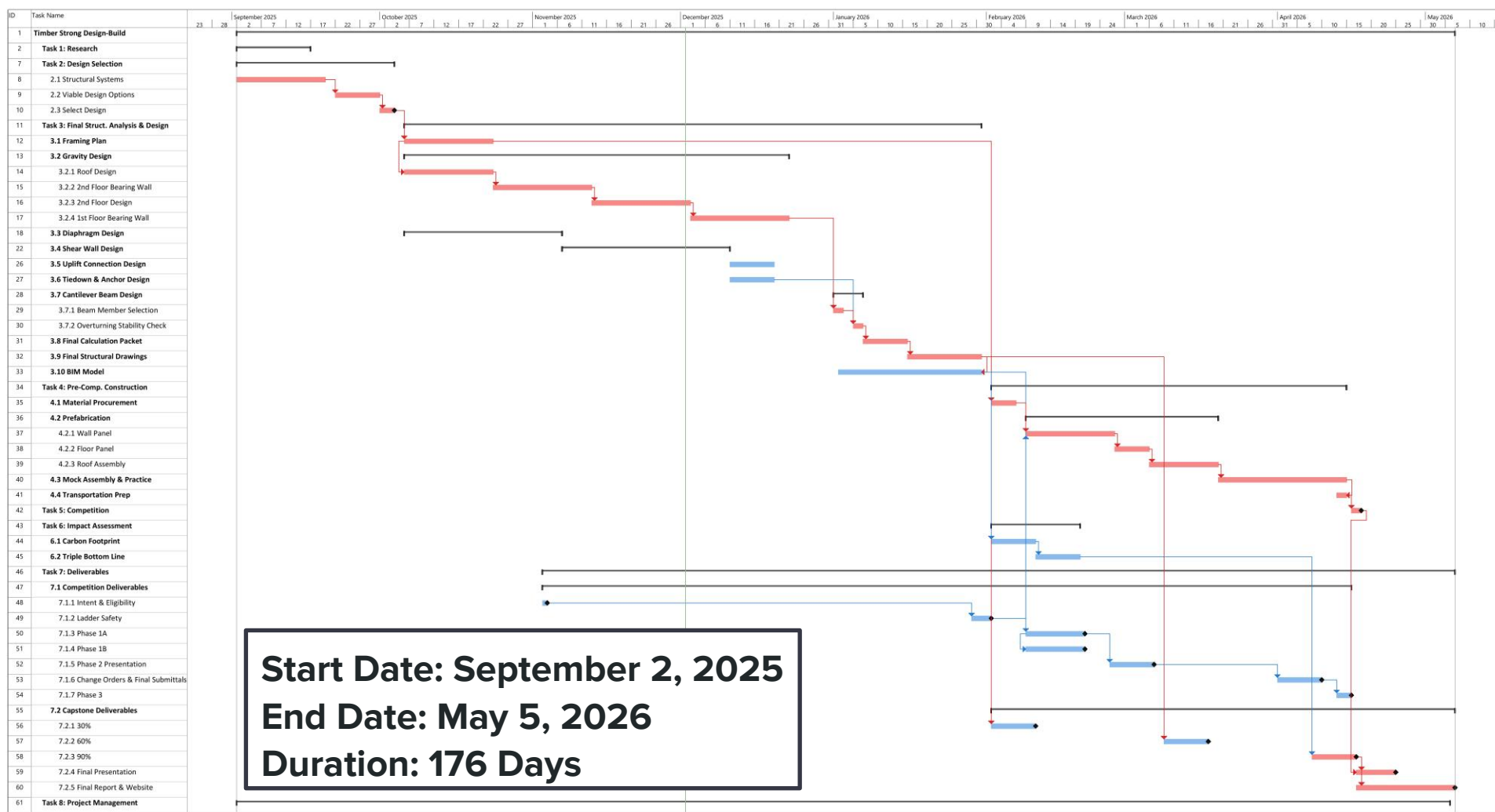
- Task 7.2.1: 30% Submission
 - Includes Tasks 1-3.2
- Task 7.2.2: 60% Submission
 - Includes Tasks 1-3.9
- Task 7.2.3: 90% Submission
 - Includes Tasks 1-6.2
- Task 7.2.4: Final Presentation
- Task 7.2.5: Final Report
- Task 7.2.6: Final Website

Task 8: Project Management

- **Task 8.1: Team Coordination**
- **Task 8.2: Outreach & Volunteers**
- **Task 8.3: Safety Oversight & Training**
- **Task 8.4: Quality Control & Compliance**
 - **Task 8.4.1: Mock Inspections**
 - **Task 8.4.2: Drawing & Rules Review**
 - **Task 8.4.3: Pre-Competition Structural Audit**

Exclusions

- Snow and seismic design
- Not liable for installation of the structure during repurposing



Staffing Plan

- **Senior Project Manager (SPM)**

- PE License; 13 years total experience

Design Positions:

- **Project Engineer (PrE)**

- Structural PE License; 8 years total experience

- **Engineer in Training (EIT)**

- EIT Certification; 4 years total experience

Construction Positions:

- **Superintendent (SUP)**

- Extensive background in framing / contracting

- **Health & Safety Specialist (HSS)**

- Ensure all safety codes & training are followed

- **Construction Intern (INT)**

- Basic knowledge of construction process and terminology



Task /Subtasks	Position / Title						Total Hours
	SPM	SUP	PrE	HSS	EIT	INT	
Task 1: Research	2	0	4	3	8	0	17
Task 2: Design Selection	2	3	6	0	8	0	19
Task 3: Final Structural Analysis & Design	5	0	54	0	76	0	135
Task 4: Pre-Competition Construction Phase	0	39	12	33	36	36	156
Task 5: Competition Construction Process	0	5	5	5	5	5	25
Task 6: Impact Assessment	2	0	4	0	6	0	12
Task 7: Deliverables	11	10	32	6	30	3	92
Task 8: Project Management	34	26	52	26	42	42	222
Total Hours	56	83	169	73	211	86	678

Cost of Engineering Services

Table 6: Cost of Engineering Services [4]

Category	Description	Quantity	Unit	Price Per	Cost
Personnel	Senior Project Manager	56	Hr	\$ 220	\$12,320
	Project Engineer	169	Hr	\$ 165	\$27,885
	Superintendent	83	Hr	\$ 200	\$16,600
	Safety Officer	73	Hr	\$ 80	\$5,840
	Engineer in Training	211	Hr	\$ 85	\$17,935
	Construction Intern	86	Hr	\$ 60	\$5,160
	Subtotal Personnel				\$85,740
Travel	Rental Van	5	Days	\$ 74	\$368
	Driving Mileage	500	Miles	\$ 0.41	\$205
	Per Diem	20	People-Day	\$ 60	\$1,200
	Hotel Room	16	Room-Night	\$ 300	\$4,800
	Subtotal Travel				\$6,573
Lab Use	"The Farm" Field Station	14	Days	\$ 100	\$1,400
	Subtotal Lab Use				\$1,400
Materials	Lumber	400	Linear Feet	\$ 0.75	\$300
	4x8 OSB Sheet	30	EA	\$ 15	\$460
	Fasteners and Hardware	1	Lump Sum	\$ 300	\$300
	Paint	10	Gal	\$ 10	\$100
	Primer	10	Gal	\$ 20	\$200
	Subtotal Material Cost				\$1,360
Total Cost of Engineering Services					\$ 95,072

References

- [1] ASCE, *Timber-Strong Design Build Rules*. American Society of Civil Engineers, Washington, DC. [Online]. Available: <https://www.asce.org/-/media/asce-images-and-files/communities/students-and-younger-members/documents/asce-timber-strong-design-build-rules.pdf>. [Accessed: Oct. 6, 2025].
- [2] J. Cipollini, “Timber-Strong Design Build Competition — Utah Winners,” *SE Blog*, Jun. 2022. [Online]. Available: <https://seblog.strongtie.com/2022/06/timber-strong-design-build-competition-utah-winners/>. [Accessed: Oct. 6, 2025].
- [3] Z. Timmons, *Personal Sketches*, 2025.
- [4] H. Seria, R. De Conto, S. Gibson, Z. Timmons, *Timber-Strong Design Build Competition Proposal*, 2025.
- [5] “TimberStrong Design Build – Gallery,” 2025 ASCE Intermountain Southwest Student Symposium, 2025. [Online]. Available: <https://sce.nau.edu/capstone/projects/CENE/2025/TimberStrong/Gallery.html>