



Steel Bridge Presentation

CENE 476

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Project Understanding

- **Purpose:** Design and build a 1:10 scale model of a pedestrian bridge. Compete in the Intermountain Southwest Student Symposium (ISWS) Steel Bridge Competition
- **Client:** Mark Lamer
- **Location:** The northern region of El Paso in Texas over the Rio Grande
- **Background:** A bridge is needed for the citizens in El Paso to cross the Rio Grande safely between communities

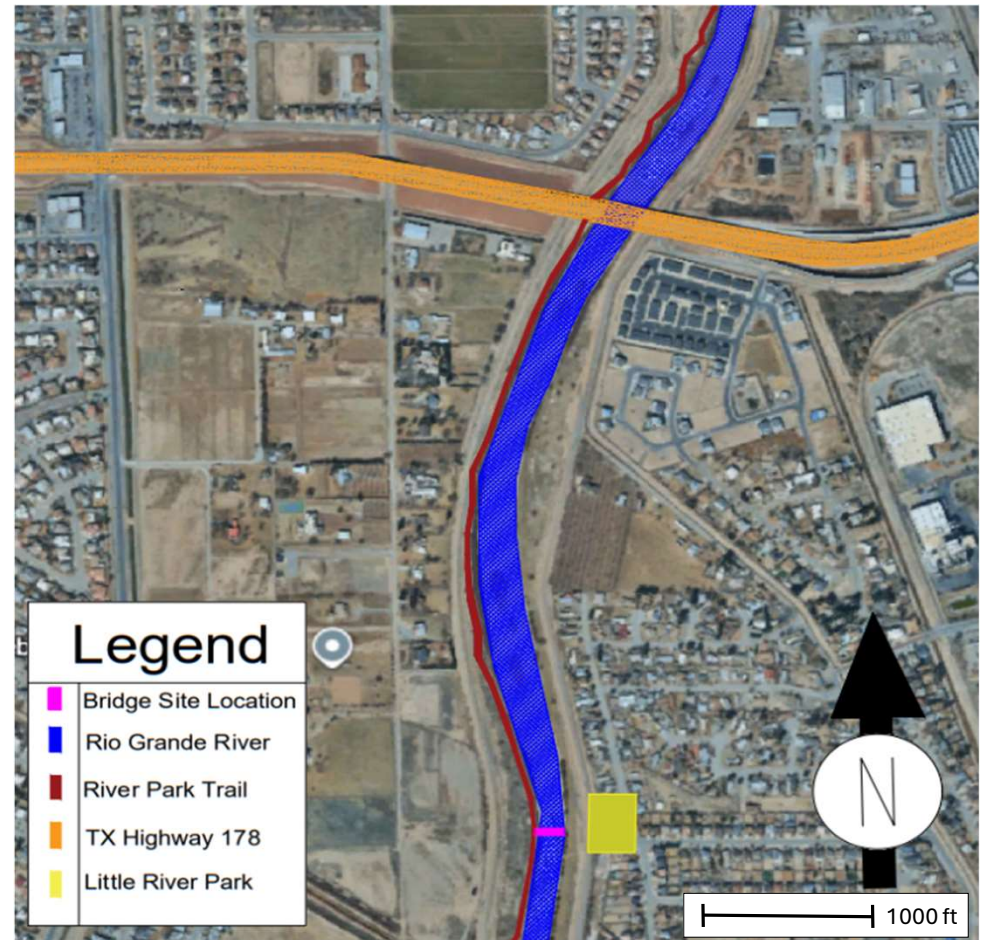


Figure 1: Vicinity Map [1]

Scope of Services

Task 1: Background Research

Task 2: Initial Design

Task 3: Final Analysis & Design

Task 4: Shop Drawings

Task 5: Coordination & Fabrication

Task 6: Competition

Task 7: Capstone Deliverables

Task 8: Project Impacts

Task 9: Project Management

Exclusions

Task 1: Background Research

- Task 1.1: Truss Type Research
- Task 1.2: Material & Member Research
- Task 1.3: Connection Research

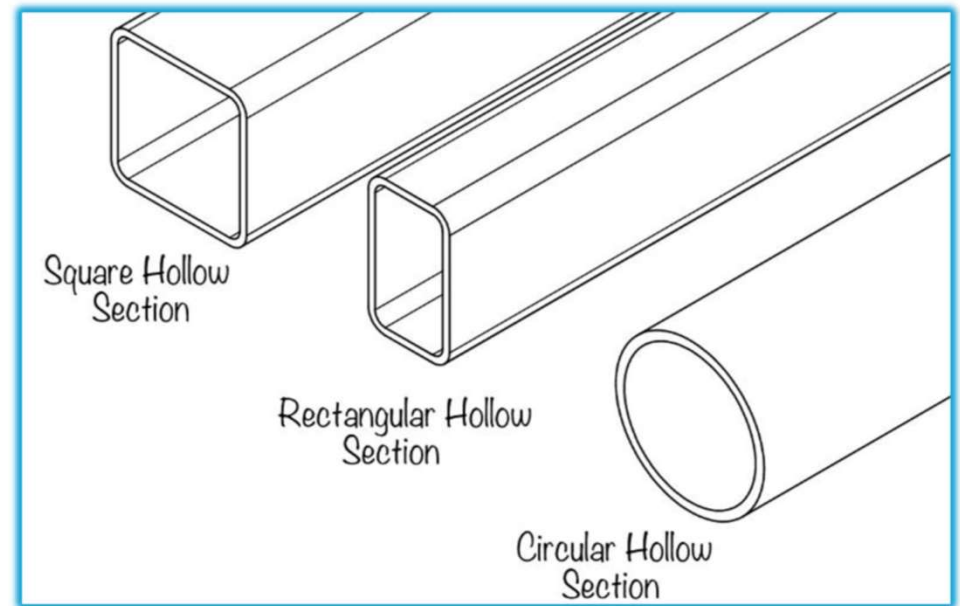


Figure 2: Beam Considerations [2]

Task 2: Initial Design

- Task 2.1: Preliminary Sketches
- Task 2.2: Member and Connection Selection
- Task 2.3: Modeling and Analysis
- Task 2.4: Design Selection

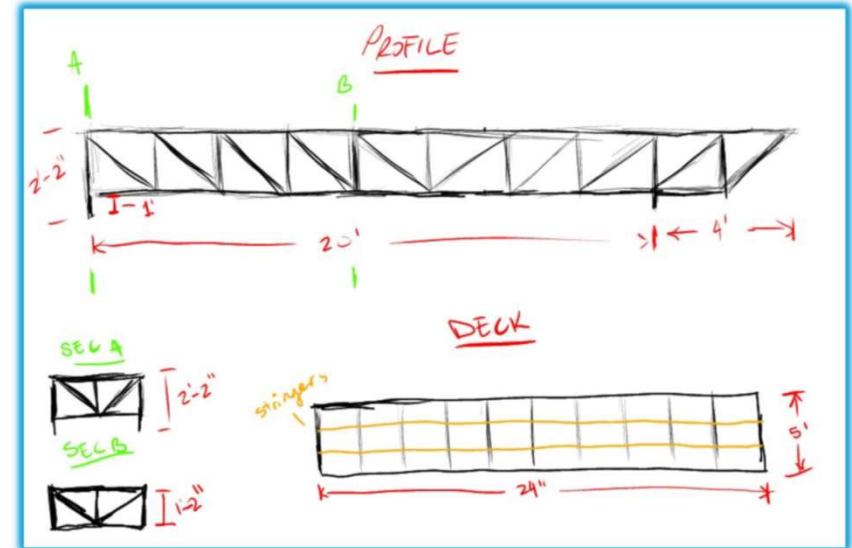


Figure 3: Preliminary Sketch Example [1]

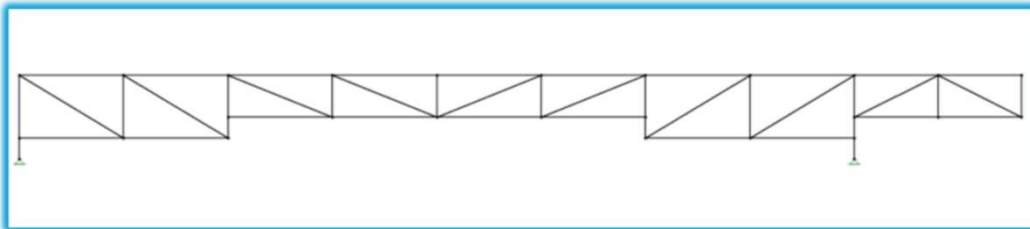


Figure 4: Example of 2D Risa Model [3]

Task 3: Final Analysis & Design

- Task 3.1: Final Analysis
- Task 3.2: Final Member and Connection Design

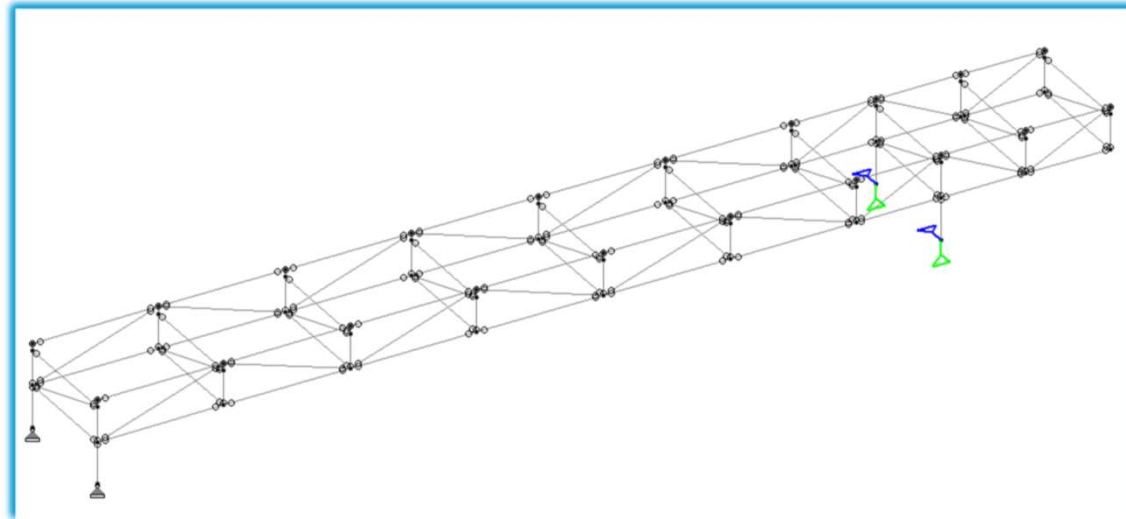


Figure 5: STAAD Model Example [3]

Task 2: Initial Design

Task 2.1: Preliminary Sketches

Task 2.2: Member and Connection Selection

Task 2.3: Modeling and Analysis

Task 2.4: Design Selection

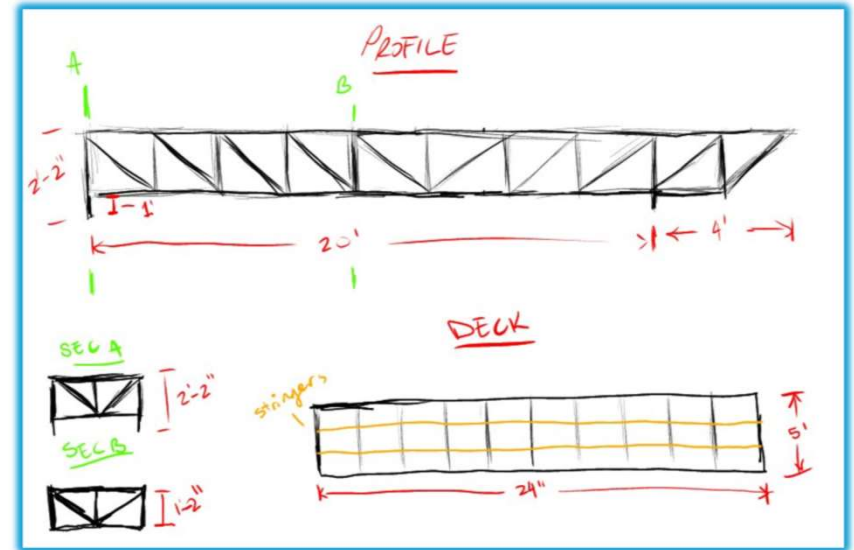


Figure 3: Preliminary Sketch [1]

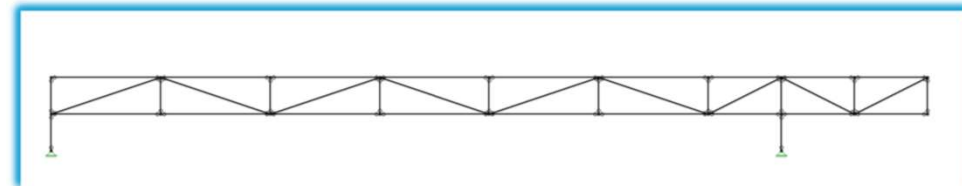


Figure 4: 2D Risa Model [6]

Task 3: Initial Design

Task 3.1: Final Analysis

Task 3.2: Final Member and Connection Design

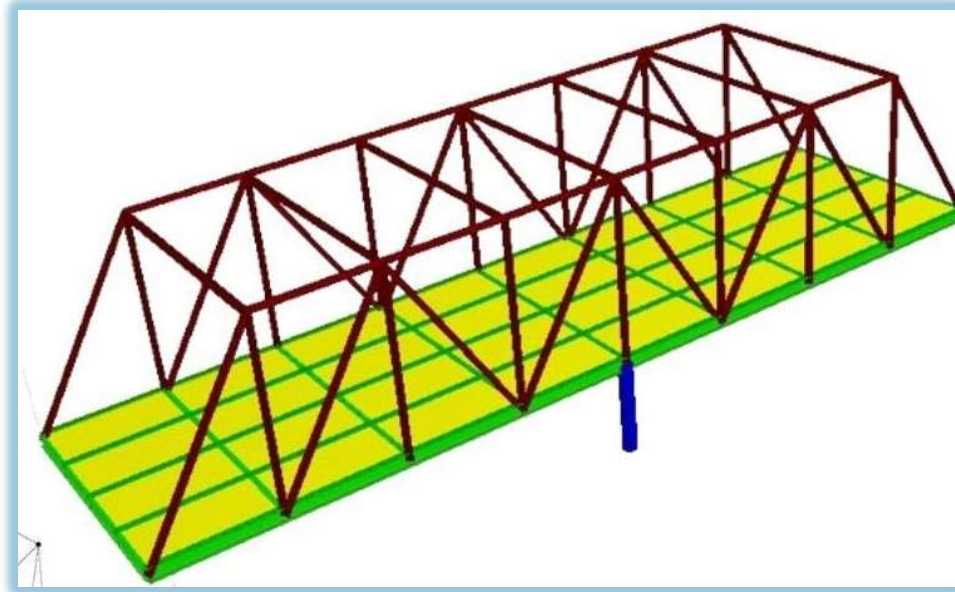


Figure 5: STAAD Model [6]

Task 4: Shop Drawings

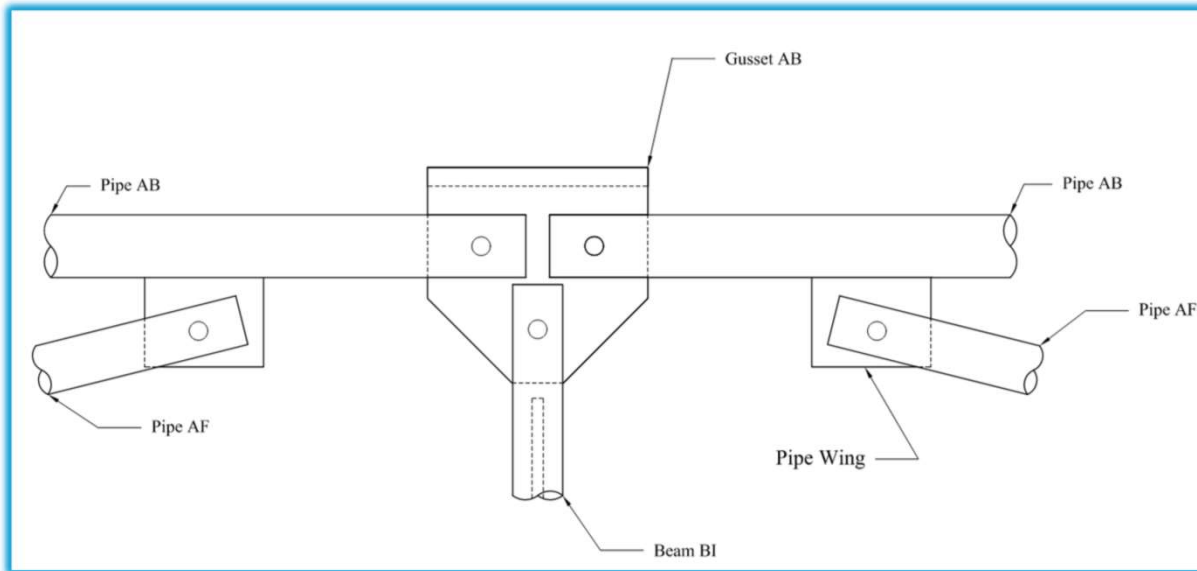


Figure 6: Connection Detail Example 1 [4]

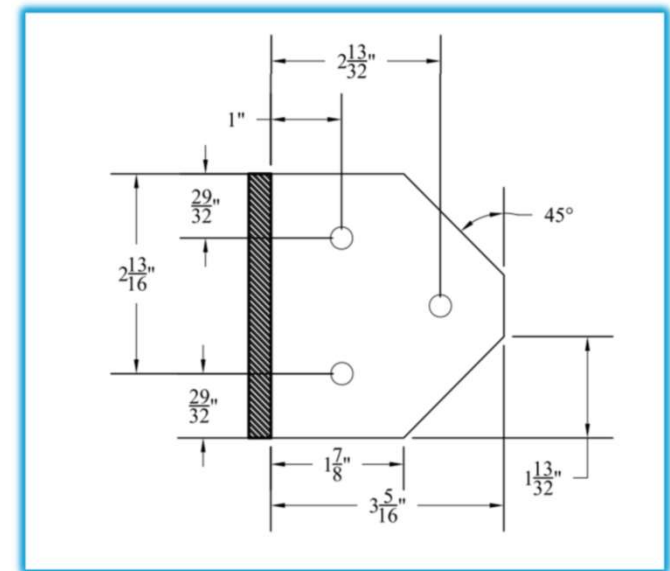


Figure 7: Connection Detail Example 2 [4]

Task 5: Coordination & Fabrication

- Task 5.1: Page Steel
- Task 5.2: Copper State
- Task 5.3: Flagstaff High School
- Task 5.4: Inspections and Corrections



Figure 8: Welding [5]

Task 6: Competition

- Task 6.1: Practice Construction
- Task 6.2: Poster Design
- Task 6.3: Competition Day



Figure 9: NAU 2016 Steel Bridge Construction Practice [6]

Task 7: Project Impacts

- Environmental, economic, social, & global impacts



Figure 10: 2025 ISWS Steel Competition [7]

Task 8: Capstone Deliverables

- Task 8.1: 30% Deliverables
 - Task 1 & 2
- Task 8.2: 60% Deliverables
 - Task 3 & 4
- Task 8.3: 90% Deliverables
 - All tasks
- Task 8.4: Final Deliverables
 - Corrections to 90% are made



Figure 11: Deliverables [8]

Task 9: Project Management

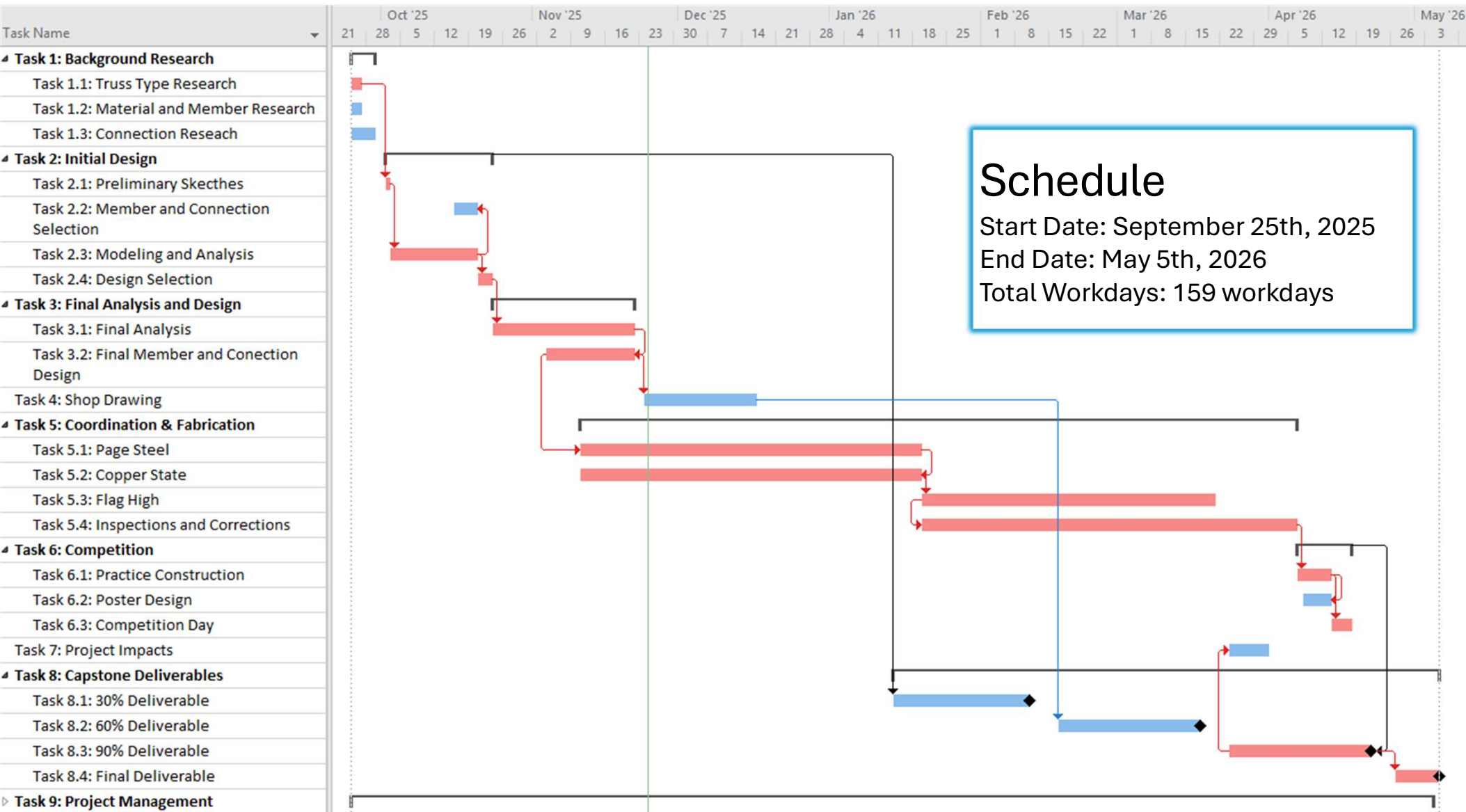
- Task 9.1: Schedule Management
- Task 9.2: Resource Management
- Task 9.3: Meetings
 - Client, Technical Advisor, Grading Instructor, & Team Meetings

Exclusions

- Full-scale bridge
- Anchored footings
- Life-cycle cost analysis



Figure 12: Team Collaboration [9]



Staffing Plan

- Positions & Qualifications
 - Managing Senior Engineer (MSENG)
 - Professional Engineering (PE) License
 - Structural Engineering (SE) License
 - 9 years of experience
 - Project Engineer (ENG)
 - Professional Engineering (PE) License
 - 3 years of experience
 - Engineer in Training (EIT)
 - Bachelor's degree in engineering
 - Drafter (DRFT)
 - Associate's degree in applied science
 - 2 years drafting experience

Task #	Task Name	MSENG	ENG	EIT	DRFT
1.0	Background Research	-	6	15	-
2.0	Initial Design	6	33	42	10
3.0	Final Analysis & Design	15	40	40	-
4.0	Shop Drawings	5	5	10	85
5.0	Coordination & Fabrication	16	35	7	-
6.0	Competition	29	31	37	29
7.0	Project Impacts	-	3	5	-
8.0	Capstone Deliverables	4	12	48	-
9.0	Project Management	31	19	16	16
Position Totals		106	183	217	140
Project Total					650

Table 1: Staffing Hour Estimate

- Estimated Time: 650 hours

Cost

Description	Quantity	Units	Unit Cost	Cost
Staffing				
MSENG	106	HRS	\$208	\$22,048
ENG	184	HRS	\$113	\$20,792
EIT	220	HRS	\$68	\$14,960
DRFT	140	HRS	\$54	\$7,560
Subtotal				\$65,360
Supplies				
Computer Lab	38	Day	\$100	\$3,800
PPE	1	LS	\$560	\$560
Tools	1	LS	\$120	\$120
Subtotal				\$4,480

Description	Quantity	Units	Unit Cost	Cost
Materials				
Steel	1	LS	\$6,000	\$6,000
Bolts	1	LS	\$100	\$100
Nuts	1	LS	\$35	\$35
Subtotal				\$6,135
Subcontracting				
Welding	88	HRS	\$100	\$8,800
Subtotal				\$8,800
Travel				
Conference Registration	1	LS	\$310	\$310
Rental Vehicle	5	Days	\$40	\$200
Fuel	526	Miles	\$0.15	\$79
Hotel (2 rooms)	8	Room-Night	\$142	\$1,136
M&IE (4 people)	20	Person-Day	\$75	\$1,500
Subtotal				\$2,225
Project Total				\$88,000

Table 2: Cost Estimate



References

- [1] K. Jacob, Artist, *Drawings*. [Art]. Northern Arizona University.
- [2] "What are Different Steel Sections Used for Construction?," Eigenplus, [Online]. Available: <https://www.eigenplus.com/what-are-different-steel-sections-used-for-construction/>. [Accessed 25 November 2025].
- [3] K. Froyd, Artist, *Warren Truss Model*. [Art]. Northern Arizona University, 2025.
- [4] "2014-2015 Steel Bridge Capstone," Northern Arizona University, 4th May 2015. [Online]. Available: <https://ceias.nau.edu/capstone/projects/CENE/2015/SteelBridge/Documents.html>.
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- [6] "2015-2016 Steel Bridge Capstone," Northern Arizona University, 11 May 2016. [Online]. Available: <https://www.ceias.nau.edu/capstone/projects/CENE/2016/SteelBridge/photo%20gallery.html>.
- [7] M. Alexander, Artist, 2025 Steel Bridge Competition. [Art]. Northern Arizona University, 2025.
- [8] "Deliverables Project Photo," Shutterstock, 2019. [Online]. Available: https://www.shutterstock.com/image-illustration/deliverables-project-dos-responsibilities-tracking-chart-1339945220?dd_referrer=https%3A%2F%2Fwww.google.com%2F. [Accessed 4 December 2025].
- [9] "How do teams meetings work," NYCKDA, 2nd February 2023. [Online]. Available: <https://nyckda.amebaownd.com/posts/45452509/>. [Accessed 2nd October 2025].