Beyond Bridges
Steel Bridge Team
Northern Arizona University

Steel Bridge Final Proposal

Project Proposal for Rio Grande's Pedestrian Bridge in North El Paso

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List of Abbreviations

AISC .... American Institute of Steel Construction
ASCE .... American Society of Civil Engineers
DRFT .... Drafter
EGR .... Project Engineer
EIT .... Engineer in Training
FBD .... Free Body Diagram
FE .... Fundamentals of Engineering
HRS .... Hours
ISWS .... Intermountain Southwest Student Symposium
LS .... Lump Sum
MSENG .... Managing Senior Engineer
M&IE .... Meals and Incidentals Expense
NAU .... Northern Arizona University
PE .... Professional Engineering
PPE .... Personal Protective Equipment
SE .... Structural Engineering
STAAD .... Structural Analysis and Design Software
2-D .... Two Dimensional
3-D .... Three Dimensional

1.0 <u>Project Understanding</u>

1.1 Project Purpose

The Rio Grande is an important river system in the United States that supplies water to several communities throughout its path. It starts at the San Juan Mountains in Colorado and flows down to the Gulf of Mexico. El Paso is one of the major cities that uses water from the river. There is a high volume of pedestrian traffic near the river for those who like to hike, bike, or jog. The problem is that the pedestrians on either side of the river do not have access to the other communities nearby. As of now, the only way to cross the Rio Grande is on foot by Texas Highway 178's bridge, which can be dangerous to the public.

The purpose of this project is to design a bridge that can span over the river to allow a connection between those communities. Due to the high number of pedestrians using the area, this bridge will be designed as a pedestrian crossing bridge. Even though pedestrians were the intended audience for the project, the bridge will still need to be used for emergency and maintenance vehicles [1].

Beyond Bridges proposes to design, construct, and build a 1:10 scale prototype model of the bridge. This model will then be taken to the ISWS competition in Salt Lake City, Utah to be judged against the other bridge designs submitted by different companies in the region. The objective of the prototype is to demonstrate its aesthetics, constructability, and engineering performance through vertical and lateral loading.

1.2 Project Background

The 1:10 scale prototype for the ISWS competition is required to be an approximately 24-foot-long steel model with a 4-foot cantilever. The model cannot extend past 5 feet in width, and the steel must be magnetic. This prototype should only consist of members, loose bolts, and loose nuts. The loads that will be testing the prototype include two vertical loads and two lateral loads, where the cantilever and the back span will be tested. These tests result in a total load of 2500 pounds. They will be applied to the model to observe deflection and sway. Deflection cannot exceed a maximum of 3 inches, while sway cannot exceed 0.75 inches [1]. The prototype will ultimately be judged in the following categories: aesthetics, weight, structural efficiency, construction speed, construction economy, cost estimation, and stiffness. A poster will accompany the model with the purpose of describing the final design. Visuals of the dimensional restraints, as well as the loading configurations, are provided below as Figure 1-1 through Figure 1-4.

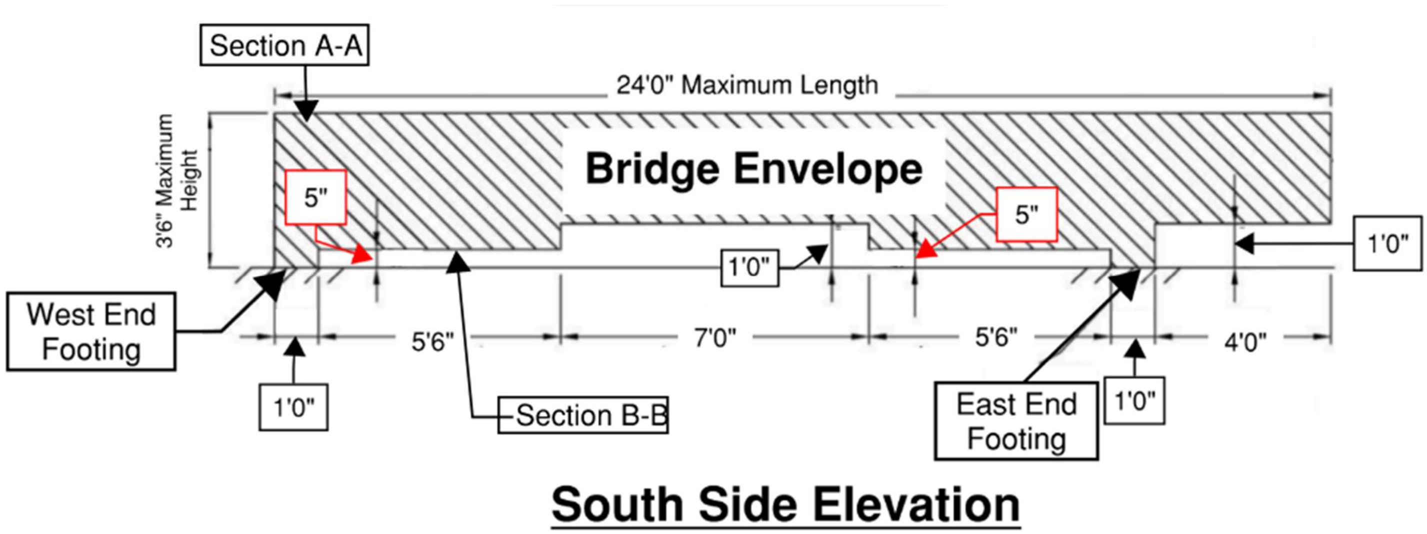

Figure 1-1 : Dimensional Restrains [1]

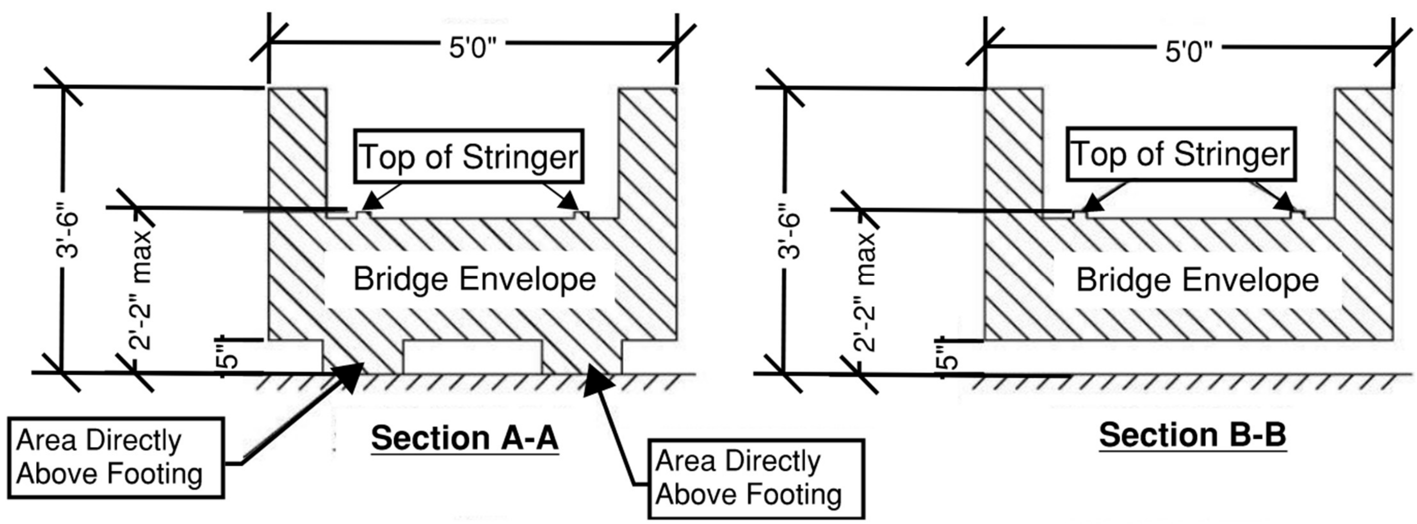

Figure 1-2: Bridge Envelope Cross-Section

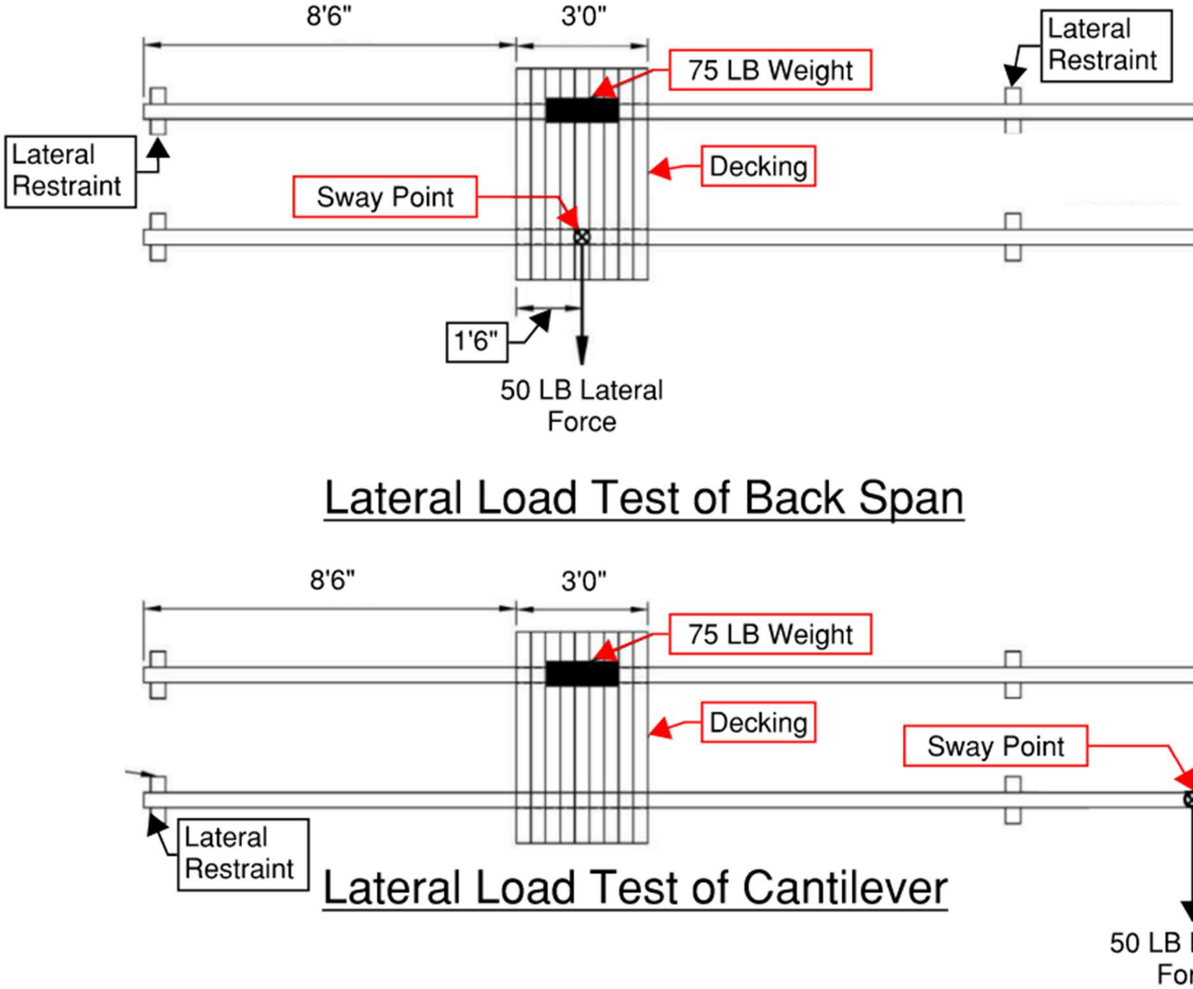

Figure 1-3 : Lateral Load Testing [1]

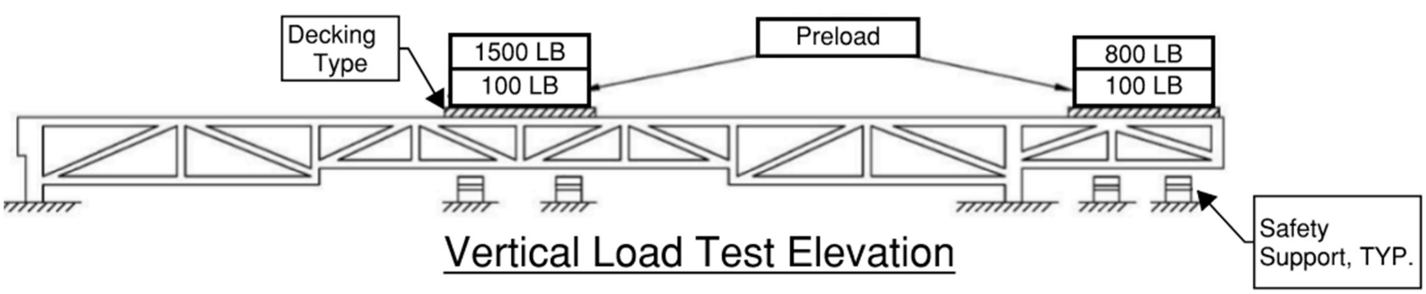

Figure 1-4 : Vertical Load Testing [1]

The actualized pedestrian bridge will be in the northern region of El Paso, Texas. The river vertically splits into two communities which are connected by Texas State Highway 178. Location and vicinity maps have been created for the purpose of providing a more detailed visual, which can be seen in Figure 1-5 and Figure 1-6, respectively.

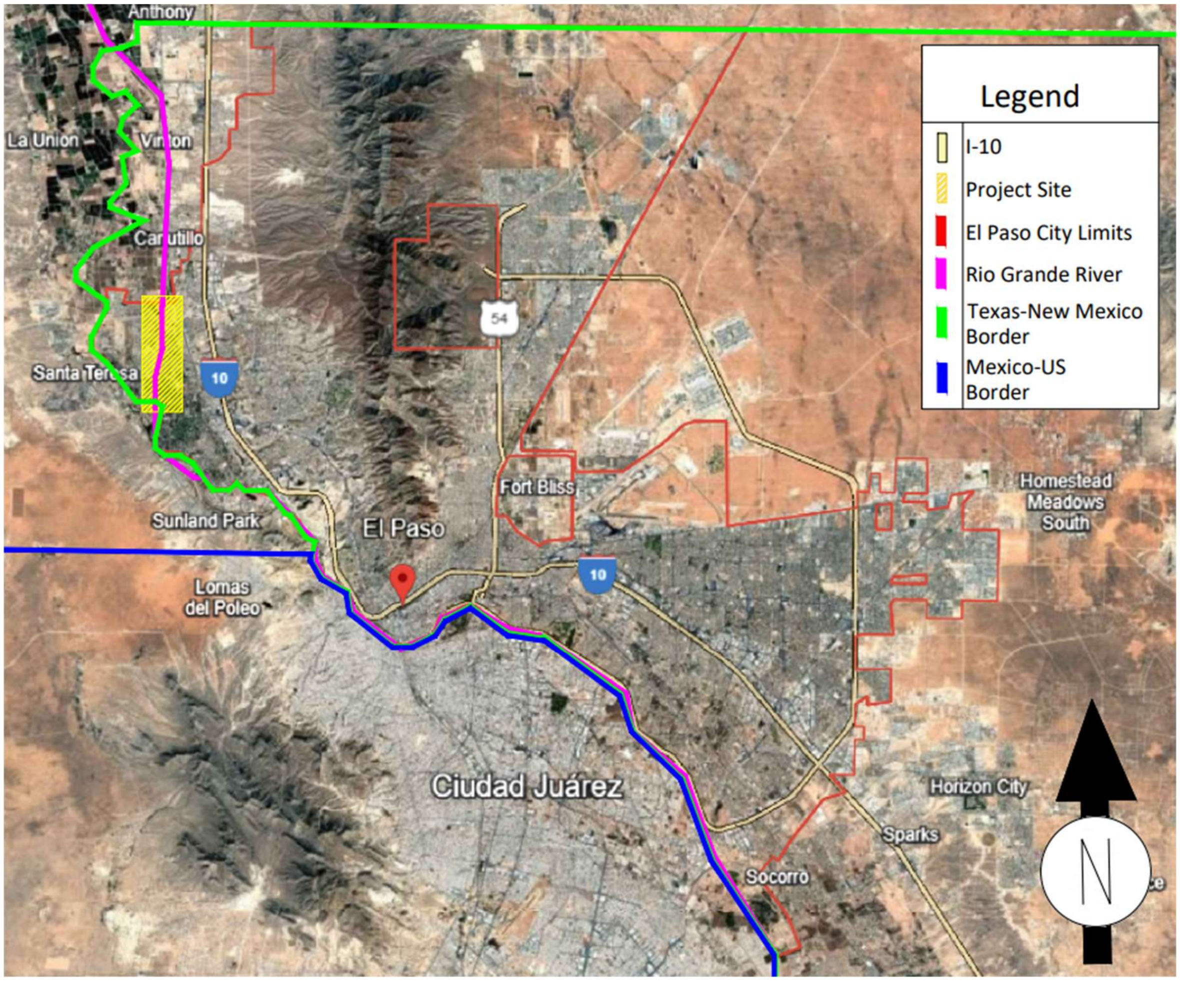

Figure 1-5 : Location Map

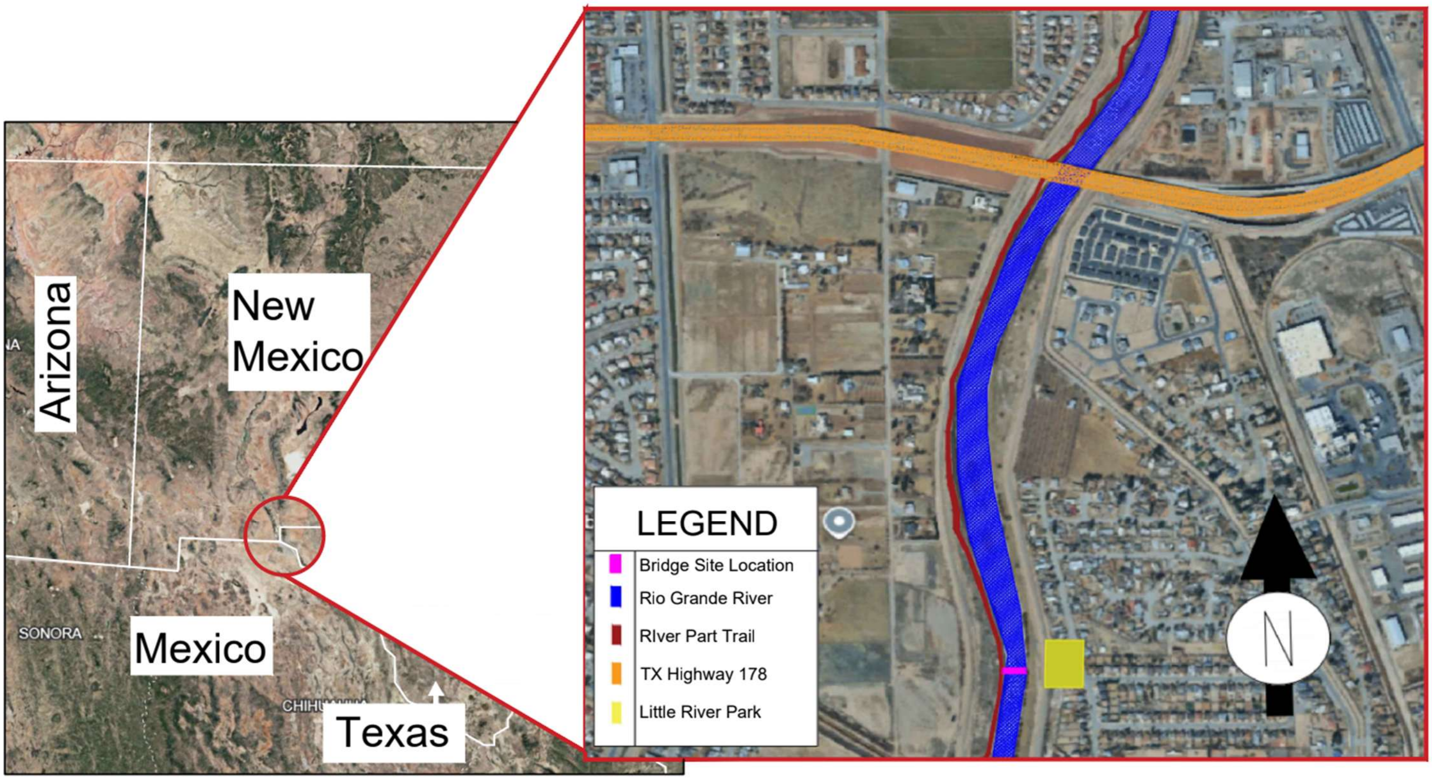

Figure 1-6 : Vicinity Map

The paved River Park Trail, seen parallel to the Rio Grande in the vicinity map, is trafficked by pedestrians along the prominent river. The riverbank consists of dirt and gravel, with trees sparsely growing along the riverbanks on both the West and East sides. The river's width ranges from an estimated 150 to 250 feet. The vicinity map displays that the 240-foot bridge will be constructed between Valley Creek and West Green perpendicular to West Green's Little River Park. The bridge will connect Little River Park to Valley Creek's River Park Trail.

1.3 Technical Considerations

The technical work required for this project will be a sequential process. The first step would be to conduct structural analysis based on the loading that will be randomly placed on the prototype deck, as seen in Figure 1-3 and Figure 1-4. The members will then be designed by their calculated internal compression and tension forces in accordance with AISC standards and competition rules. Continuing from the designing of each member, the connections will then be calculated to consider the worst-case scenarios of the connections. AISC failure modes and competition restrictions will have to be applied to the connection considerations, just as the steel members did. Modeling software will be used alongside the calculations with Risa2D and STAAD. With all calculations and modeling complete, shop drawings will be completed through AutoCAD. Fabrication done with the shop drawings will be constantly inspected to ensure that the design is being created as intended. The last technical step would be to construct the bridge during the competition.

1.4 Constraints

Project constraints include specific requirements for the prototype dimensions and construction restrictions. Among the many dimensional specifications, the clearance of the bridge is a restraint that must be especially considered. The river is used for kayaking and other recreational activities, so the bridge must be high enough to not interfere [1]. Further details of these constricting dimensions can be seen in Section 1.4, Project Background in Figure 1-1 and 1-2. Another challenge is the construction parameters. To prevent erosion or disturbances to the area, construction cannot take place around the riverbanks and temporary piers cannot be used due to soil conditions [1]. In addition to this, construction will also be timed for the purpose of testing construction efficiency. The speed at which the bridge can be constructed will ultimately affect how many steel members can be used and how many bolted connections will be in the final design. These variables increase the time necessary to construct, as they increase the number of items that must be handled.

1.5 Stakeholders

This project has multiple stakeholders, which includes the client, NAU, ASCE, and AISC. As the client, Mark Lamer is the main stakeholder as he is the person who decided on the budget and timeline for the bridge design and construction of the 1:10 scale model. NAU and the ASCE student chapter at NAU are both stakeholders in the outcome of this project, as part of this project involves traveling out of state and testing the bridge model, which will be a reflection on NAU and NAU's student chapter of ASCE. Lastly, ASCE and AISC are the companies that partner to make the parameters for the project and ASCE will be the ultimate judge of which bridge design best meets the goals of the project with respect to the numerous designs submitted by schools around the country.

2.0 Scope of Services

2.1 Task 1: Background Research

2.1.1 Task 1.1: Truss Type Research

The purpose of this task is to research different types of bridges, specifically types of underslung truss bridges. This will be accomplished by reading articles and documents discussing truss bridges with a focus on Warren trusses, Howe trusses, and Pratt trusses.

2.1.2 Task 1.2: Material and Member Research

The purpose of this task is to research material types, which is fundamental to determine how different steels impact a bridge's load capacity. This will be accomplished by looking into the type of steel and different members offered by Page Steel, who will be providing the materials for this project.

2.1.3 Task 1.3: Connection Research

The purpose of this task is to research the types of connections that will best suit the needs of this project. This will be accomplished by researching bolts and welds, focusing on the advantages and disadvantages of each, to determine which type of connection should be used and how.

2.2 Task 2: Initial Design

2.2.1 Task 2.1: Preliminary Sketches

The purpose of this task is to get a rough idea on aesthetics, truss designs, and overall bridge layout. This will be accomplished by sketching initial ideas based on dimensions called for in the competition rules and research completed in Task 1.1.

2.2.2 Task 2.2: Member and Connection Selection

The purpose of this task is to consider what type of members and connections will work for different designs. This will be accomplished by considering the research completed in Task 1, along with the sketches done in the previous task, to consider the feasibility of each sketch with regards to the limitations placed on bridge connections. This will also be to begin to plan how members will connect in order to allow for easier modeling analysis in the following task.

2.2.3 Task 2.3: Modeling & Analysis

The purpose of this task is to model each preliminary design, to gain a rudimentary understanding of how each model handles the necessary loads. This will be accomplished by using Risa-2D, a 2D analysis software, to identify which truss design is stronger. Approximately three designs will be modeled and then considered in the next task.

2.2.4 Task 2.4: Design Selection

The purpose of this task is to select one of the three initial designs using a design matrix. This will be accomplished by creating the decision matrix utilizing the competition criteria. The weight of each category will be assigned with the input of the competition's rules and the team's judgement. Once the decision matrix is done, the three initial designs will be scored. The highest scoring design will move forward for further analysis.

2.3 Task 3: Final Analysis and Design

2.3.1 Task 3.1: Final Analysis

The purpose of this task is to determine how each member of the bridge handles load and evaluate how much the bridge will deflect. This will be accomplished by using STAAD, a 3D analysis software, to model and analyze the bridge's capacity to handle load.

2.3.2 Task 3.2: Final Member & Connection Design

The purpose of this task is to make final choices about the member types and sizes as well as determine what type and size connections need to be used at each location. This will be accomplished by taking the forces from the STAAD model, creating FBDs for each connection, and analyzing the forces, while considering all AISC failure modes.

2.4 Task 4: Shop Drawings

The purpose of this task is to create shop drawings that will include multiple views to show all details of the bridge necessary for proper fabrication. This will be accomplished by using AutoCAD to draft these details, based on final design dimensions and connections. These details will include the bolt and weld specifications, member dimensions, member angles, and the resulting bridge specifications.

2.5 Task 5: Coordination & Fabrication

2.5.1 Task 5.1: Page Steel

The purpose of this task is to contact Page Steel to establish available materials and to request the finalized prototype members. This will be accomplished by communicating with Page Steel to narrow down the member options, followed by sending them a list of confirmed prototype members.

2.5.2 Task 5.2: Copper State

The purpose of this task is to confirm Copper State's available inventory and request the required items. This will be accomplished by contacting Copper State before sending a list of final member connection materials.

2.5.3 Task 5.3: Flagstaff High School

The purpose of this task is for Flagstaff High School to fabricate the prototype. This will be accomplished by providing Flagstaff High School with the shop drawings completed in Task 4 and the materials provided by Page Steel and Copper State.

2.5.4 Task 5.4: Inspections and Corrections

The purpose of this task is to expose any weak welds, incorrect bolt placements, or incorrect bolt sizes. If there are any issues, the team could either redo the member or remodel the prototype with the new dimensions to ensure that the bridge can still hold the required capacity. This will be accomplished by inspecting each member during and after Flagstaff High School has completed the bridge fabrication.

2.6 Task 6: Competition

2.6.1 Task 6.1: Practice Construction

The purpose of this task is to ascertain how quickly and accurately the team can assemble the bridge, as it is a part of the competition scoring. This will be accomplished by hosting approximately 5 practice sessions of assembly that will be conducted before the actual competition. This would allow the team to assign roles to each member and improve efficiency based on the strengths of each individual. In this process, if there is a need for mentees in the competition, they will be included in the practice to support the team and get additional experience.

2.6.2 Task 6.2: Poster Design

The purpose of this task is to create a poster describing the bridge design that satisfies the competition requirements. This will be accomplished by creating a one sided 2’ x 3’ poster that presents the configuration and decision of connections, dimensions, sustainability considerations, and visual diagrams [1].

2.6.3 Task 6.3: Competition Day

The purpose of this task is to compete in the in-person, timed construction aspect of the competition. This will be accomplished by transporting the finished prototype with the members and bolts disassembled to the competition site during the week of the ISWS conference. Firstly, the poster and bridge will be presented and judged on aesthetics. After this, the team and mentees will perform the assembly of the bridge, which will then be judged on accuracy and time. The bridge will then be loaded and will be judged on weight, stiffness, sway, and deflection based on the competition rules.

2.7 Task 7: Project Impacts

The purpose of this task is to evaluate the project's impacts. This will be accomplished by determining the environmental, economic, social, and global impacts of the final bridge design.

2.8 Task 8: Capstone Deliverables

2.8.1 Task 8.1 30% Deliverables

The purpose of this task is to complete the necessary work associated with the 30% submittal. This will be accomplished by creating a report that consists of all the work done in Task 1 and Task 2. The 30% deliverable, which will be due in the second week of February, allows for feedback from the reviewers to be taken into consideration for further submittals. This gives the team guidance to stay on track to meet the client's needs.

2.8.2 Task 8.2: 60% Deliverables

The purpose of this task is to complete the necessary work associated with the 60% submittal, which will be submitted during the third week of March. This will be accomplished by creating a report that consists of all the work done in Task 3 and Task 4, as well as any necessary adjustments or updates based on feedback on the 30%.

2.8.3 Task 8.3: 90% Deliverables

The purpose of this task is to complete the necessary work associated with the 90% submittal, which will be completed by the fourth week of April. This will be accomplished by creating a report that consists of all the work done in Task 5 and Task 6; this will also involve fixing any feedback that was given on the 60% deliverable.

2.8.4 Task 8.4: Final Deliverables

The purpose of this task is to complete the final report, presentation, poster, and website. This will be accomplished by correcting any comments from the 90% and fixing the report accordingly. The website will have all the information and documents from the project included and published to the public, and the poster and presentation will provide overviews of the work completed throughout the entire project.

*2.9 **Task 9: Project Management***

2.9.1 Task 9.1: Schedule Management

The purpose of this task is to keep the team organized. This will be accomplished by the team coordinating personal schedules for collaboration purposes and time management concerning when tasks will be completed will be considered here as well.

2.9.2 Task 9.2: Resource Management

The purpose of this task is to ensure that the team is responsible with project resources. This will be accomplished by being mindful of people’s time and computer or software usage necessary to complete tasks and make progress on the project.

2.9.3 Task 9.3: Meetings

2.9.3.1 Client

The team will meet with the client approximately three times; at the start of the project, halfway through the modeling and analysis phase, and near the end of the project. The meetings will involve discussion of project details, clarification on the project, answering any major concerns the team has, and ensuring the project is on track to meeting the client's needs.

2.9.3.2 Technical Advisor

Meetings with the technical advisor, Sabrina Gibson, consist of gaining help with the bridge design and feedback on the project deliverables. There will be at least four meetings, probably more as the team will need feedback on all deliverables, help with software, and opinions on the design.

2.9.3.3 Grading Instructor

Meetings with the grading instructor, Dr. Tuchscherer, will typically coincide with delivery deadlines. These meetings are beneficial as they provide an opportunity for the team to better understand what is expected for each deliverable and get answers to questions when needed.

2.9.3.4 Team Meetings

The Beyond Bridges team will meet at least twice a week. During these meetings, the team will split time between working on project deliverables, and working on bridge design, modeling, analysis, and calculations.

2.10 Exclusions

Exclusions from the purview of this project include drawings and construction for the full-scale bridge, anchored footings, and a life-cycle cost analysis. The purpose of this project is to test a 1:10 scale model of the bridge, which means that full-scale drawings are not needed. In accordance with the ASCE competition rules, the bridge model shall not have anchored footings or ties. Lastly, as construction of the full-scale bridge will not be part of this project, a life-cycle cost analysis is not required at this time.

3.0 Schedule

3.1 Overview of Schedule

Beyond Bridges has concluded that nine main tasks, with their respective subtasks, will be needed to complete the project. These tasks would begin on September 25th, 2025, and end on May 5th, 2026, which has a cumulative 159 workdays. Table 3-1 displays the start and end dates of each major task. For further insight, a Gantt Chart was created to lay out the dates and number of days needed for each established task and their subtasks as well as highlight the critical path; this can be seen in Appendix item A-1.

Table 3-1: Schedule Overview

Task Name	Start Date	End Date
Task 1: Background Research	09/25/25	09/29/25
Task 2: Initial Design	10/02/25	10/23/25
Task 3: Final Analysis and Design	10/24/25	12/17/25
Task 4: Shop Drawings	12/10/25	12/23/25
Task 5: Fabrication	12/03/25	04/06/26
Task 6: Competition	04/07/26	04/17/26
Task 7: Capstone Deliverables	01/14/26	05/05/26
Task 8: Project Impacts	03/18/26	03/25/26
Task 9: Project Management	09/25/25	05/04/26

3.2 Critical Path

Creating the major tasks and inputting them into the Gantt Chart aided in finding the team's critical path. A critical path identifies which tasks must be completed on time and in sequential order for the project to be completed without delay. The critical path for this project begins with Task 1.1, truss type research. Without information on which trusses would best suit this pedestrian bridge, the design process could not proceed. Task 2, initial design, is the next step on the path. This task allows the team to roughly model preliminary sketches and come to a decision on the main bridge type. Final analysis and design, Task 3, would not be possible without a solid and unanimous decision by the team on what type of bridge should be further analyzed. Task 5 is where fabrication begins. This cannot be done without the final analysis. Beyond Bridges must coordinate with Page Steel and Copper State to collect materials before Flag High can begin welding and drilling bolt holes. Then, Task 6, which includes practicing construction followed by competition day. This is to prepare for when the final product will be judged. Lastly, the final report on the results and the process of the bridge will be submitted to the client once the competition is concluded. The 90% deliverable is included in the critical path because, while all other deliverables meld into other tasks, the 90% continues after the competition. It must also be stated that the final report cannot be submitted before checks on the 90% deliverables are done.

4.0 Staffing Plan

4.1 Staffing Positions

Beyond Bridges has determined that four positions will be necessary to complete the project. Table 4-1 displays the positions with their associated code.

Table 4-1: Staffing Positions

Position	Code
Managing Senior Engineer	MSENG
Project Engineer	ENG
Engineer in Training	EIT
Drafter	DRFT

4.2 Qualifications

4.2.1 Managing Senior Engineer (MSENG)

The managing senior engineer has a bachelor's degree in the science of engineering, specifically in Civil Engineering. The team's managing senior engineer has hands-on experience in the company for 9 years after obtaining their Professional Engineering (PE) license and Structural Engineering (SE) license [2]. They will be overseeing the project's technical work, as well as managing the team to improve proficiency and quality.

4.2.2 Project Engineer (ENG)

The project engineer has a Civil Engineering bachelor's degree, along with their PE license [3]. Experience participating in projects is a total of 3 years after their PE. The project engineer would aid the EIT in the background research, initial design, final analysis and design, shop drawings, coordination and fabrication, competition, capstone deliverables, and project impacts.

4.2.3 Engineer in Training (EIT)

Beyond Bridges' engineer in training is an employee who has completed their Civil Engineering bachelor's degree. They have completed their Fundamentals of Engineering (FE) exam to obtain their FE license [4]. The EIT would be working on the background research, initial design, final analysis and design, shop drawings, coordination and fabrication, competition, capstone deliverables, and project impacts. Their work will be overseen by the project engineer and the managing senior engineer when needed.

4.2.4 Drafter (DRFT)

The team's drafter has an associate's degree in applied science in drafting and as well as two years of drafting experience outside of schooling [5]. Beyond Bridges' drafter is able to accurately convert an engineer's design into technical drawings. They will be completing the team's shop drawings and aiding in the competition during construction.

4.3 Staffing Hours Estimate

The hours needed for each position in Beyond Bridges' team have been tabulated and summarized in Table 4-2. The specific hours that have been assigned to each task and subtask can be seen in Appendix A-2's Staffing Table.

Table 4-2: Staffing Breakdown

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

5.0 Cost of Engineering Services

5.1 Cost Determination

5.1.1 Staffing Cost

The staffing costs for each position were determined by using various sources providing average salary and hourly rates across the country. Depending on the importance and experience needed for each position, the rates were distributed. For example, in Table 5-1, the senior engineer has the highest hourly rate based on the expertise and qualifications needed for the position as compared to the other positions.

Table 5-1: Staff Billing Rates

Classification	Billing Rate
Managing Senior Engineer [6]	$208
Project Engineer [7]	$113
Engineer in Training [8]	$68
Drafter [9]	$54

5.1.2 Supply Cost

The supply costs were determined by considering the average costs of equipment from multiple sources. The cost of various tools for fabrication and assembly along with personal protective equipment was quantified by a lump sum based on average sale prices. Other supply costs, such as the use of computer labs, were taken at a daily rate based on an NAU professor's input [10].

5.1.3 Materials Cost

The cost of materials was quantified using lump sum units. The steel member costs were based off common sizes for carbon steel rectangular HSS shapes using 3-foot lengths as an average. The estimated cost for steel members was taken to be roughly $50 [11]. The cost of fasteners was taken conservatively by estimating the number of nuts and bolts needed per member of the design, based on the costs of buying in them in packs [12].

5.1.4 Subcontracting Cost

Subcontracting within this project will need to consider welding during the fabrication process. The estimated cost of welding is $100 per hour with approximately 88 hours of work total [13]. The $100 an hour was derived from the common range of a welder's hourly wage, which is $65 to $125.

5.1.5 Travel Cost

The Steel Bridge competition will require the team to travel to Salt Lake City, Utah. This requires renting a Sedan and paying for mileage; these costs were determined using the

NAU webpage [14]. The hotel and Meals and Incidentals Expenses (M&IE) costs were found using the State of Arizona Accounting Manual based on how many days the trip is and how many nights we will be staying in a hotel [15].

5.2 *Cost Summary*

The cost of service for the project was made by estimating the cost for staffing, supplies, materials, subcontracting, and travel. The total cost for the project is $88,000; the table below shows the cost breakdown.

Table 5-2: Cost Estimate

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
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	8	Room-Night	$142	$1,136
M&IE	20	Person-Day	$75	$1,500
			Subtotal	$3,225
			Project Total	$88,000

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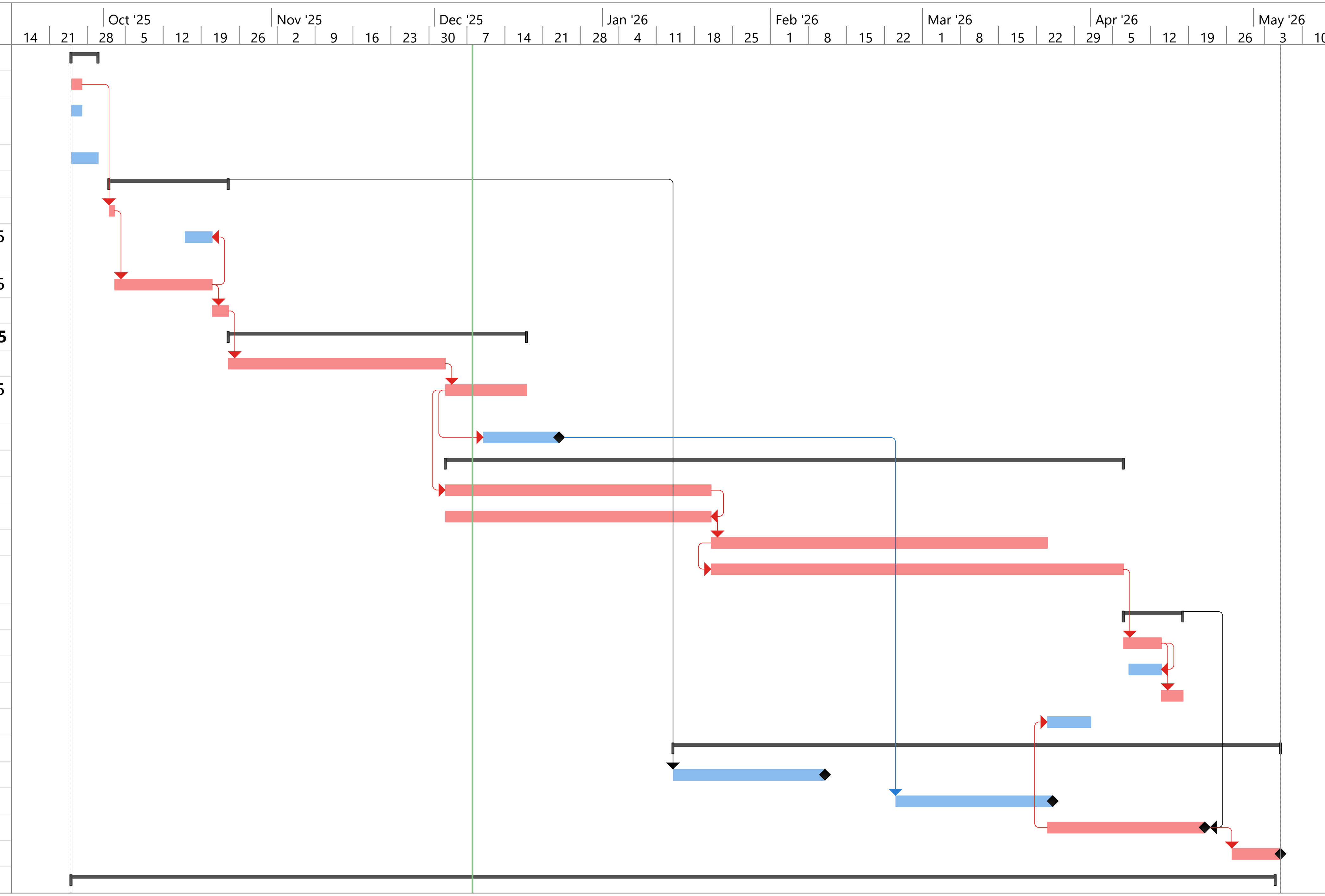
[15] "State of Arizona Accounting Manual," Arizona Department of Administation, 2025.

Appendices

A-1 – Gantt Chart

See Gantt Chart on the following page.

ID	Task Name	Duration	Start	Finish
1	**Task 1: Background Research**	**3 days**	**Thu 9/25/25**	**Mon 9/29/25**
2	Task 1.1: Truss Type Researcl	2 days	Thu 9/25/25	Fri 9/26/25
3	Task 1.2: Material and Member Research	2 days	Thu 9/25/25	Fri 9/26/25
4	Task 1.3: Connection Reseacl	3 days	Thu 9/25/25	Mon 9/29/25
5	**Task 2: Initial Design**	**16 days**	**Thu 10/2/25**	**Thu 10/23/25**
6	Task 2.1: Preliminary Skecthe	1 day	Thu 10/2/25	Thu 10/2/25
7	Task 2.2: Member and Connection Selection	3 days	Thu 10/16/25	Mon 10/20/25
8	Task 2.3: Modeling and Analy	12 days	Fri 10/3/25	Mon 10/20/25
9	Task 2.4: Design Selection	3 days	Tue 10/21/25	Thu 10/23/25
10	**Task 3: Final Analysis and Desi**	**39 days**	**Fri 10/24/25**	**Wed 12/17/25**
11	Task 3.1: Final Analysis	28 days	Fri 10/24/25	Tue 12/2/25
12	Task 3.2: Final Member and Conection Design	11 days	Wed 12/3/25	Wed 12/17/25
13	Task 4: Shop Drawing	10 days	Wed 12/10/25	Tue 12/23/25
14	**Task 5: Coordination & Fabrica**	**89 days**	**Wed 12/3/25**	**Mon 4/6/26**
15	Task 5.1: Page Steel	35 days	Wed 12/3/25	Tue 1/20/26
16	Task 5.2: Copper State	35 days	Wed 12/3/25	Tue 1/20/26
17	Task 5.3: Flag High	44 days	Wed 1/21/26	Mon 3/23/26
18	Task 5.4: Inspections and Corrections	54 days	Wed 1/21/26	Mon 4/6/26
19	**Task 6: Competition**	**9 days**	**Tue 4/7/26**	**Fri 4/17/26**
20	Task 6.1: Practice Constructi	5 days	Tue 4/7/26	Mon 4/13/26
21	Task 6.2: Poster Design	4 days	Wed 4/8/26	Mon 4/13/26
22	Task 6.3: Competition Day	4 days	Tue 4/14/26	Fri 4/17/26
23	Task 7: Project Impacts	6 days	Tue 3/24/26	Tue 3/31/26
24	**Task 8: Capstone Deliverables**	**80 days**	**Wed 1/14/26**	**Tue 5/5/26**
25	Task 8.1: 30% Deliverable	20 days	Wed 1/14/26	Tue 2/10/26
26	Task 8.2: 60% Deliverable	21 days	Tue 2/24/26	Tue 3/24/26
27	Task 8.3: 90% Deliverable	21 days	Tue 3/24/26	Tue 4/21/26
28	Task 8.4: Final Deliverable	7 days	Mon 4/27/26	Tue 5/5/26
29	**Task 9: Project Management**	**158 days**	**Thu 9/25/25**	**Mon 5/4/26**



Project: Project Schedule
Date: Mon 12/8/25

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Critical
Critical Split
Progress
Manual Progress

A-2 – Staffing Table

Task #	Task Name	MSENG	ENG	EIT	DRFT
1.0	Background Research	-	6	15	-
1.1	Truss Type Research	-	2	5	-
1.2	Material and Member Research	-	2	5	-
1.3	Connection Research	-	2	5	-
2.0	Initial Design	6	33	42	10
2.1	Preliminary Sketches	-	5	7	10
2.2	Member and Connection Selection	2	13	18	-
2.3	Modeling and Analysis	2	10	12	-
2.4	Design Selection	2	5	5	-
3.0	Final Analysis and Design	15	40	40	-
3.1	Final Analysis	5	25	25	-
3.2	Final Member & Connection Design	10	15	15	-
4.0	Shop Drawings	5	5	10	85
5.0	Coordination & Fabrication	16	35	7	-
5.1	Page Steel	-	5	-	-
5.2	Copper State	-	5	-	-
5.3	Flag High	8	15	5	-
5.4	Inspection and Corrections	8	10	2	-
6.0	Competition	29	31	37	29
6.1	Practice Construction	20	20	20	20
6.2	Poster Design	-	2	8	-
6.3	Competition Day	9	9	9	9
7.0	Project Impacts	-	3	5	-
8.0	Capstone Deliverables	4	12	48	-
8.1	30% Deliverables	1	3	12	-
8.2	60% Deliverables	1	3	12	-
8.3	90% Deliverables	1	3	12	-
8.4	Final Deliverables	1	3	12	-
9.0	Project Management	31	19	16	16
9.1	Schedule Management	8	-	-	-
9.2	Resource Management	4	-	-	-
9.3	Meetings	19	19	16	16
9.3.1	Client	3	3	-	-
9.3.2	Technical Advisor	-	-	-	-
9.3.3	Grading Instructor	-	-	-	-
9.3.4	Team Meetings	16	16	16	16
	Total Hours (Each)	226	378	438	211
	Overall Total	650			