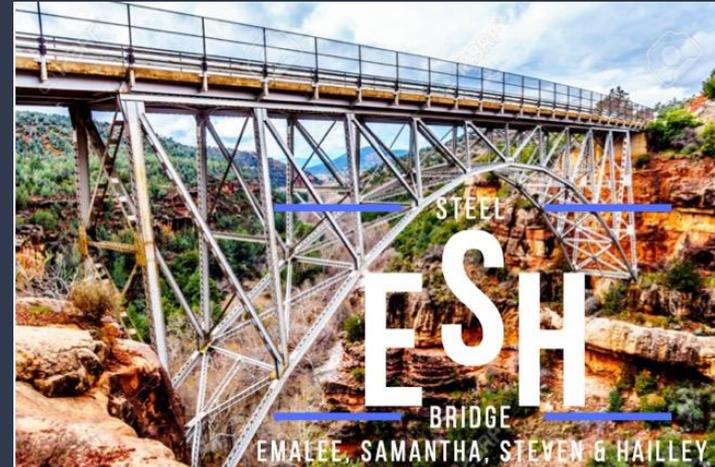


# Steel Bridge Competition Team

Project Proposal  
CENE 476C  
December 6, 2019

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# Introduction

**Purpose** Design and build a 1:10 scale steel bridge

**Client** Mark Lamer

**Case Study Location** Katy Trail State Park, Missouri; over the Missouri River

## **Background**

- ❖ The AISC 2020 Steel Bridge Competition Rules describe a Case Study at Katy Trail State Park.

# Project Background

## Categories of Competition

- Aesthetics
- Construction Economy
- Structural Efficiency
- Overall Performance

## Past Teams Performance

- 2019 Disqualified
- 2018 8th Overall
- 2017 9th Overall

# Task 1: Research



Smarter.  
Stronger.  
Steel.

[1]

## 1.1 Analysis methods

### 1.2 RISA

### 1.3 Bridge Types

### 1.4 Connections

### 1.5 Materials

# Task 2: Analysis

## 2.1 Bridge Type

- ❖ Truss
- ❖ Beam

## 2.2 Material Analysis

- ❖ Cold- vs. Hot- rolled, metal composition

## 2.3 Connection Design

- ❖ Assess different types and their deflection

## 2.4 Member Analysis

- ❖ Dimension, weight, and strength

# Task 3: Shop Drawings

## Shop Drawings

- ❖ Create plan set in AutoCAD
- ❖ Send to K-Zell Metals and Mingus Welding

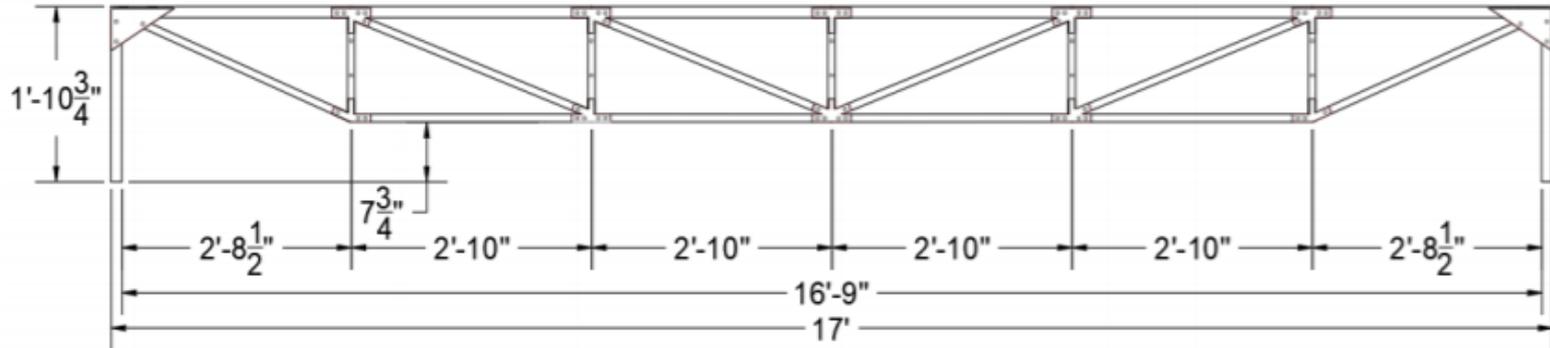


Figure 1: Elevation View from Shop Drawing from 2018 Steel Bridge Team [2]

# Task 4: Fabrication Management



## 4.1 K-Zell

## 4.2 Mingus Welding



[2]

# Task 5: Final Product Improvements

## **Ensuring that the product:**

- ❖ Is ready to be competitive at competition
- ❖ Is cohesive and constructible

## **Can include:**

- ❖ Redesigning Connections
  - ❖ Pre Welding Plates
  - ❖ Drilling holes for bolts
  - ❖ Redesign Bracing

# Task 6: Competition Preparation

## 6.1 Construction Practice

## 6.2 Poster and Display



Figure 2: 2018 NAU Steel Bridge Team during competition constructing [2]

# Task 7: AISC Competition

Where: Cal State  
Fullerton

When: April 1 and 2,  
2020

Competition includes:

- ❖ Display
- ❖ Construction
- ❖ Testing

# Task 8: Project Management

## 8.1 Schedule

## 8.2 Sponsor Communication

- K-Zell Metals
- Mingus Welding Team
- Page Steel
- Copper State Bolt and Nut Co.



## 8.3 Meetings

## 8.4 Deliverables

- ❖ 30%, 60%, 90% Design Report and drawings
- ❖ Final presentation and Final Design Report
- ❖ Competing at AISC
- ❖ Website

## 8.5 Fundraising

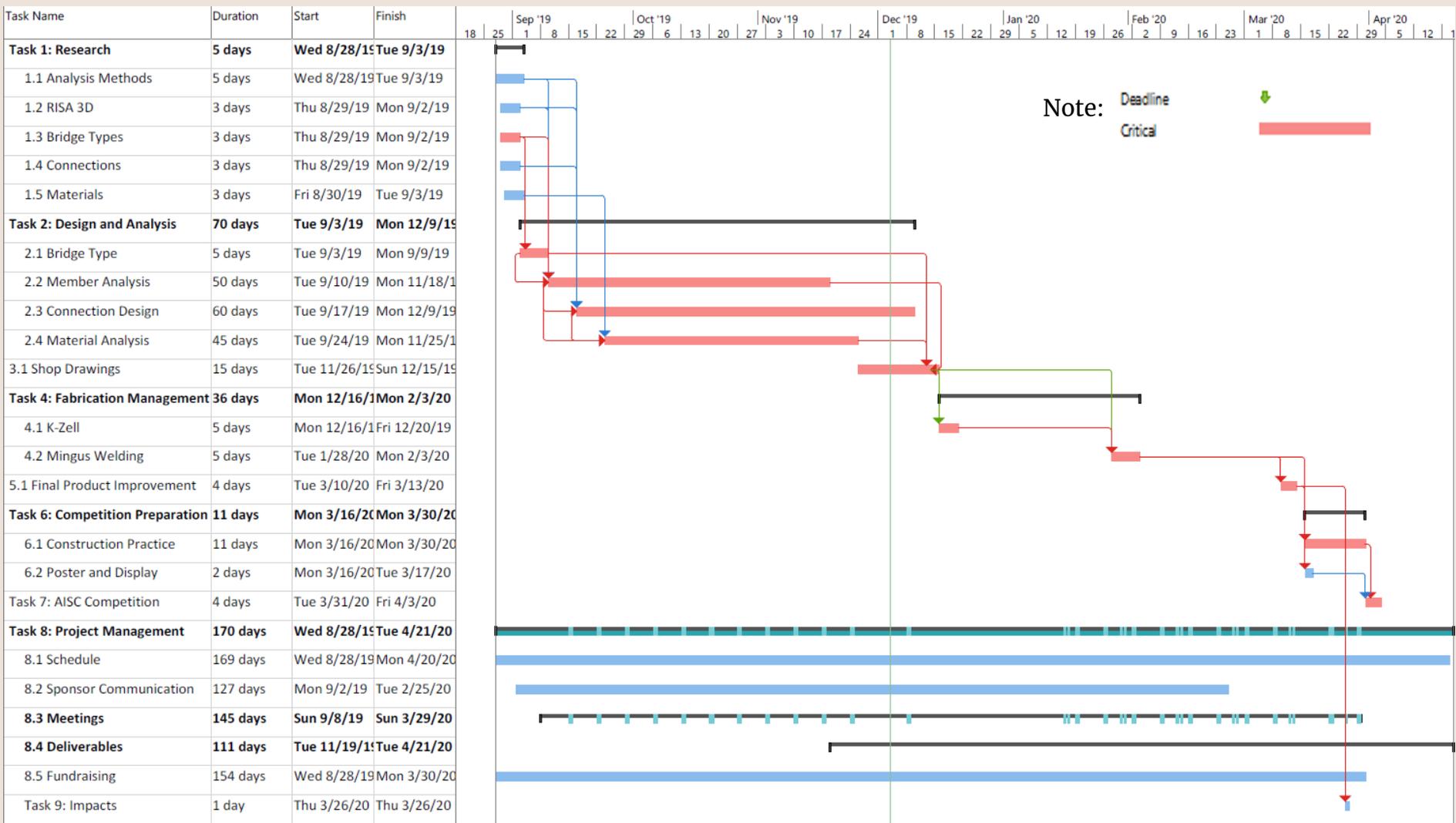


# Task 9: Impacts

- ❖ Social
- ❖ Economical
- ❖ Environmental

# Exclusions

- ❖ Geotechnical work
- ❖ Surveying
- ❖ Traffic planning
- ❖ Designing footings



# Critical Path

1. Task 1.3 Bridge Type Research
2. Task 2.1 Bridge Type Analysis
3. Task 2.2 Member Analysis
4. Task 2.3 Connection Design
5. Task 2.4 Material Analysis
6. Task 3.1 Shop Drawings
7. Task 4.1 K-Zell Metals
8. Task 4.2 Mingus Welding
9. Task 5 Final Product Improvement
- 10.Task 6 Competition Preparation
- 11.Task 7 AISC Competition

# Project Staffing

**Table 1: Project Staffing Table**

Task	Personnel					Sum
	SENG	ENG	EIT	Lab	AA	
<b>Task 1: Research</b>	8	16	90	8	0	122
1.1 Analysis Methods	1	2	16	0	0	19
1.2 RISA 3D	2	4	12	0	0	18
1.3 Bridge Types	2	4	24	4	0	34
1.4 Connections	1.5	3	14	4	0	22.5
1.5 Materials	1.5	3	24	0	0	28.5
<b>Task 2: Design and Analysis</b>	20	41	102	32	0	195
2.1 Bridge Type	2	6	14	0	0	22
2.2 Member Analysis	8	18	38	0	0	64
2.3 Connection Design	8	12	32	12	0	64
2.4 Material Analysis	2	5	18	20	0	45
<b>Task 3: Shop Drawings</b>	4	4	40	4	2	54
3.1 Shop Drawings	4	4	40	4	2	54
<b>Task 4: Fabrication Management</b>	4	8	62	40	8	122
4.1 K-Zell	1	2	6	0	4	13
4.2 Member Cutting	2	4	32	24	0	62
4.3 Mingus Welding	1	2	24	16	4	47
<b>Task 5: Final Product Improvement</b>	2	4	24	16	0	46
5.1 Final Product Improvement	2	4	24	16	0	46
<b>Task 6: Competition Preparation</b>	3	6	24	2	9	44
6.1 Competition Preparation	2	4	20	2	6	34
6.2 Poster and Display	1	2	4	0	3	10
<b>Task 7: AISC Competition</b>	6	12	24	2	2	46
<b>Task 8: Project Management</b>	35	88	216	38	112	489
8.1 Schedule Management	6	3	4	0	6	19
8.2 Sponsor Communication	4	6	5	0	6	21
8.3 Meetings	12	62	140	30	70	314
8.4 30% Deliverables	2	3	12	2	3	22
8.5 60% Deliverables	2	4	12	2	3	23
8.6 90% Deliverables	3	6	16	1	6	32
8.7 Final Deliverables	4	2	13	1	6	26
8.8 Fundraising	2	2	14	2	12	32
<b>Personnel Hours</b>	82	179	582	142	133	1118

# Total Cost of Project

**Table 2: Total Projected Cost**

	Classification	Units	Rate	Cost
Personnel	SENG	82	\$200	\$16,400.00
	ENG	179	\$137	\$24,523.00
	EIT	582	\$72	\$41,904.00
	LAB	142	\$90	\$12,780.00
	AA	133	\$67	\$8,911.00
	<b>Total Personnel</b>		1118	
Travel	Competition	5 nights and 2 rooms	\$220/room	\$2,200
		Vehicle Rental for 6 days	\$60/day	\$360
		900 mi	\$.58/mi	\$522
	Fabrication Management	450 mi	\$.58/mi	\$261
Supplies	Materials			\$2,000
	Tools			\$500
Subcontracting	Mingus Welding			\$100
<b>Total</b>	<b>Total Cost</b>			\$110,461.00

# References

[1] AISC website, *AISC Steel Bridge Competition*. 2019

[2] NAU, 2018 *Steel Bridge Competition Team Website*. 2018