

# Northern Arizona University

## 2017 Steel Bridge

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### Bridge Selection

The team decided to use the AB footings in order to avoid the cost penalty from moving the utility line. A beam bridge was selected based on its simplistic design, which would require less member-to-member connections. Additionally, the team decided to add a substructure at approximately the middle of the span. This was done in order to increase the moment of inertia of the bridge at the location where the bridge would deflect the most. The selection of the design of the bridge members was for both strength and aesthetics. The 1/4 inch rod for the primary bridge members was bent around jigs in order to have a unique and uniform design. The members were designed to the maximum allowed length of 36 inches to minimize the number of connections.

### Accelerated Bridge Construction

Connections were designed so that the members could quickly slide together and be self-supported before a bolt was placed (See Figure 2). This was done in order to decrease the number of bolts required and to decrease the construction time. The cantilever side of the bridge was designed to have the members balanced over the footings. This makes it so a builder will not have to hold the cantilever side up during construction. The members will be placed in the staging yard in the order that they will be used during construction which will help minimize construction time.

### Bridge Design: Side View

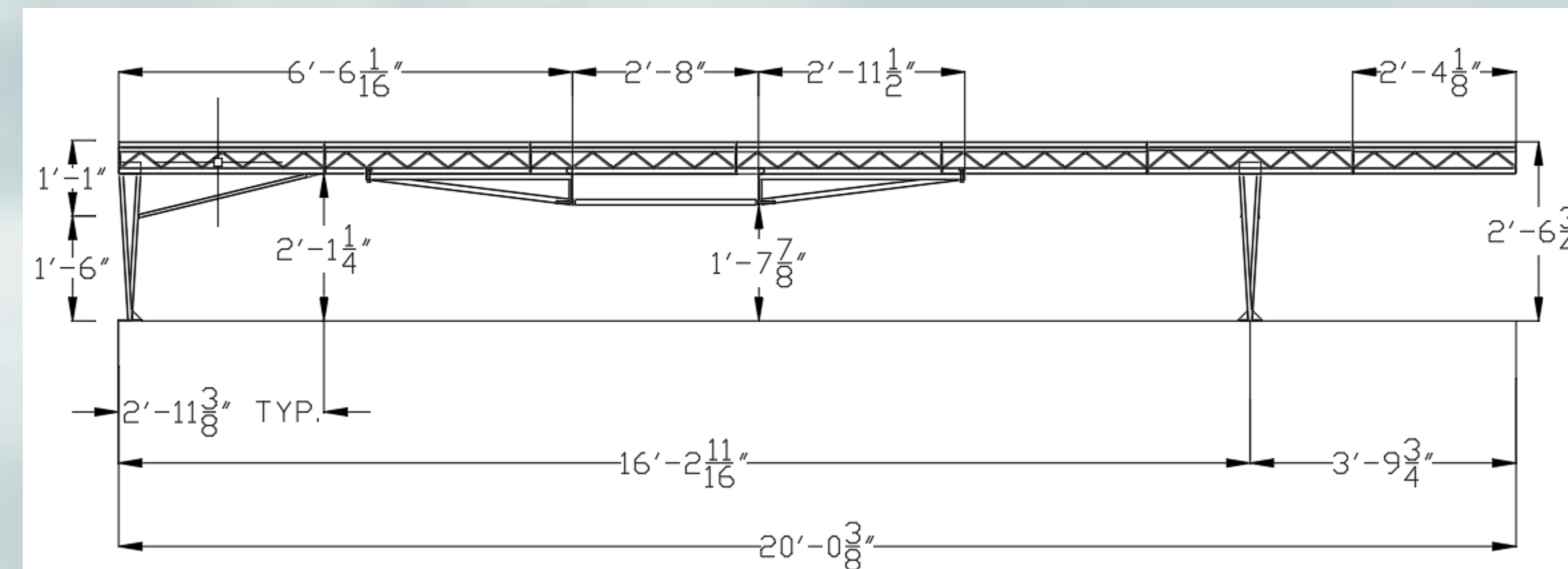


Figure 1: Side View of Bridge Design

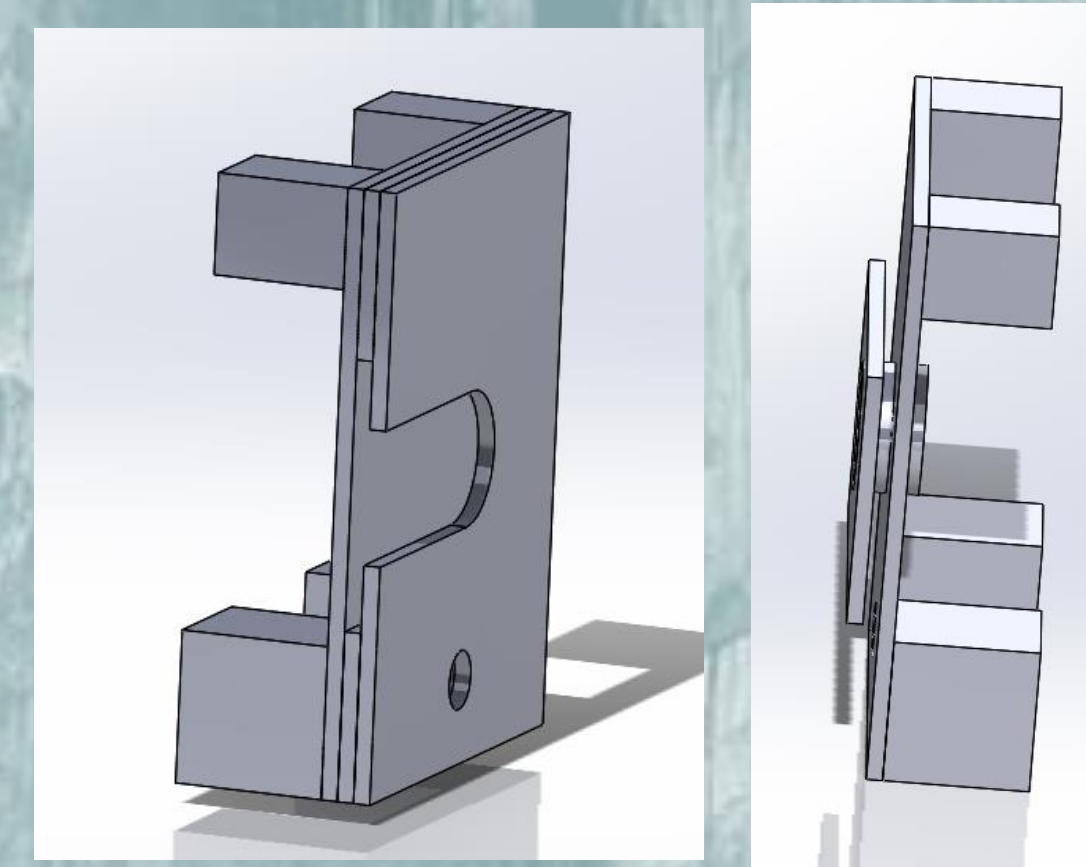


Figure 2: Solid Works Model of Joint Configuration

### Free Body Diagram

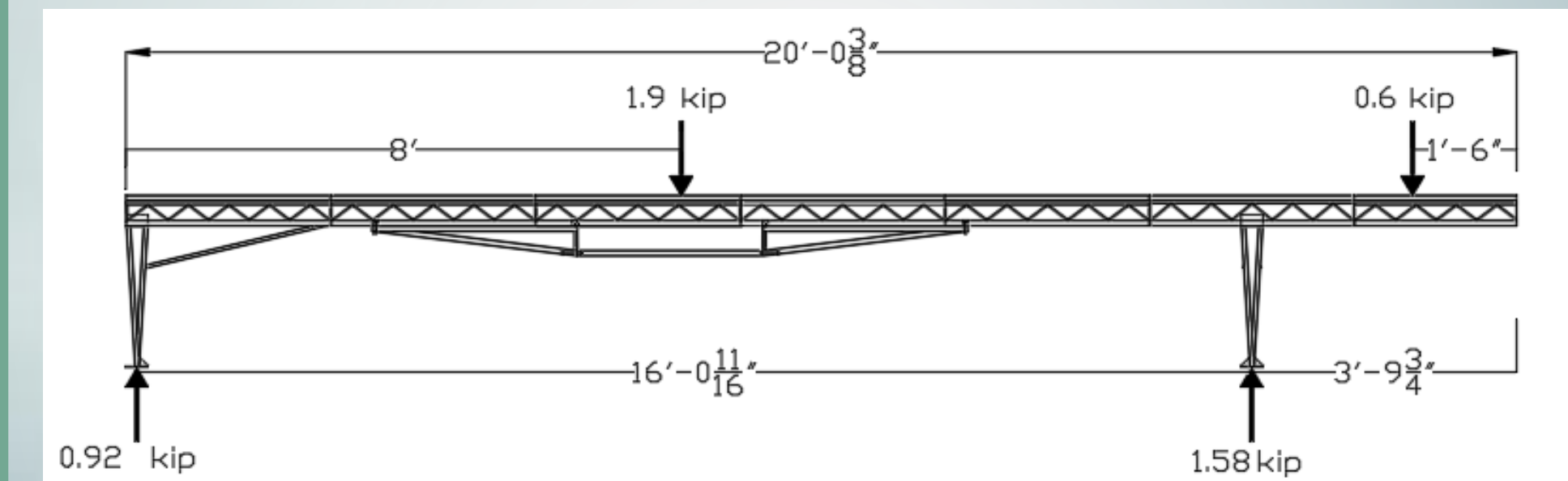


Figure 3: Free Body Diagram of Bridge

### Shear Force Diagram

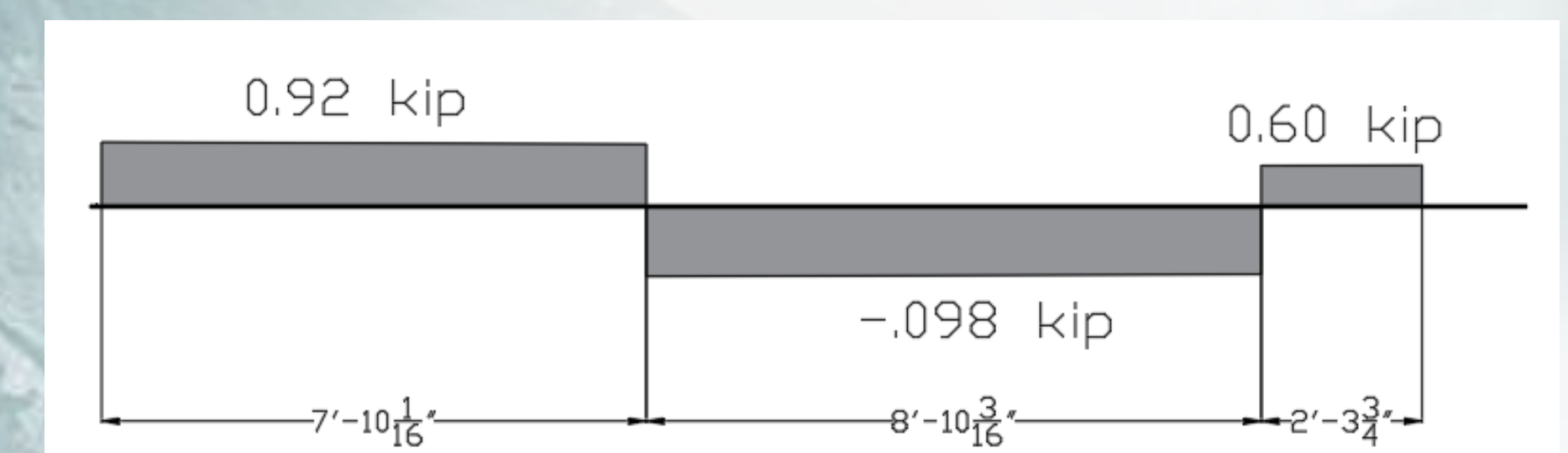


Figure 4: Shear Force Diagram of Bridge

### Bending Moment Diagram

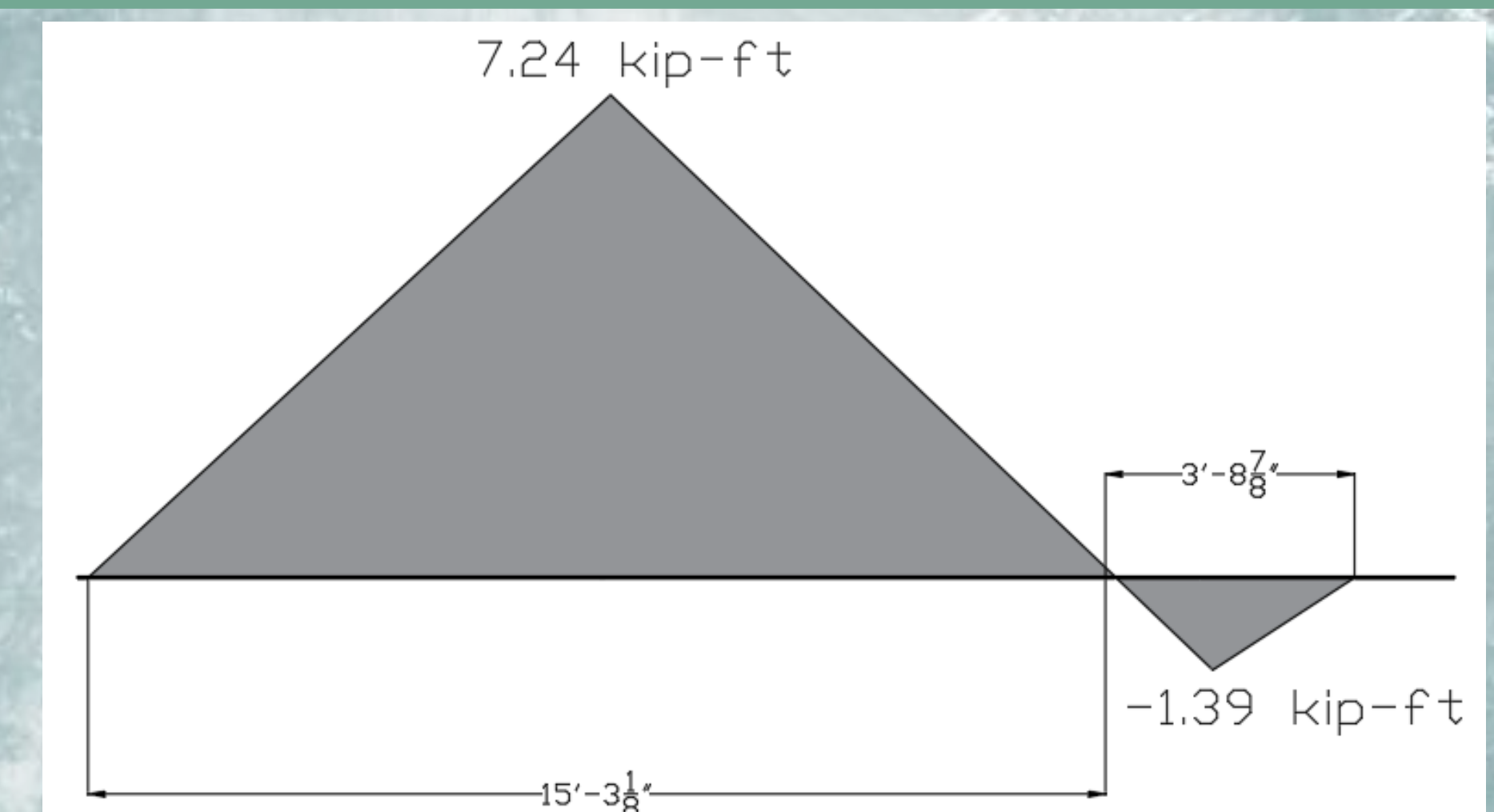


Figure 5: Bending Moment Diagram of Bridge

### Acknowledgements

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