Northern Arizona University
2018 Steel Bridge

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Bridge Selection

An underslung Howe truss was selected based on its ability to optimize the provided building envelope below the stringers. With respect to the constraints of the 2018 NSSBC, the bridge design was selected based on strength and aesthetics. The design of the underslung truss increases the moment of inertia of the bridge along the length of the bridge, and provides greater stability at center-span where deflection would be greatest. Each of the members were designed with respect to the maximum allowable length of 36 inches to minimize the number of connections. Typical gusset plate connections were utilized to maintain simplicity in the construction process. Additionally, the team decided to add lateral bracing at each vertical member of the underslung Howe truss. These cross frames serve to increase the lateral stability of the bridge.

Accelerated Bridge Construction

Construction procedures were adjusted with respect to the construction zones on the eastern and western ends of the bridge. In order to provide proper safety for the builders in proximity of the river, the bridge will be constructed on a skewed plane and then lowered across the river to the builders on the other side. The simplistic gusset plate connections allow for members to quickly slide between the plates, ultimately decreasing the construction time.

Figure 1: Mid-Span Top and Bottom Chord Gusset Plate Connections

Furthermore, constructing the bridge on a skewed plane allows for the bridge to become balanced on two footings during the construction process. This allows for one builder to continue to travel back and forth between the tool storage and the construction zone while another builder secures the bolts at the connections, thus minimizing build time.
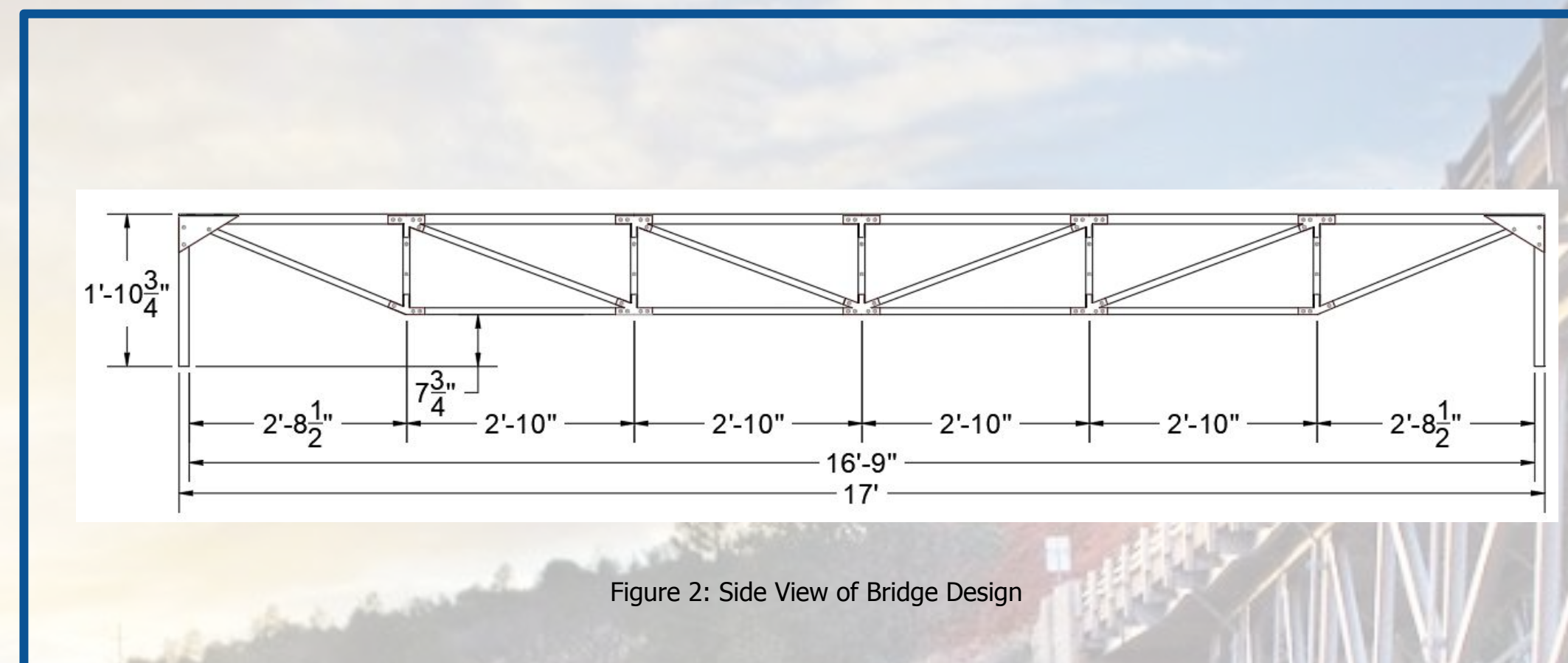
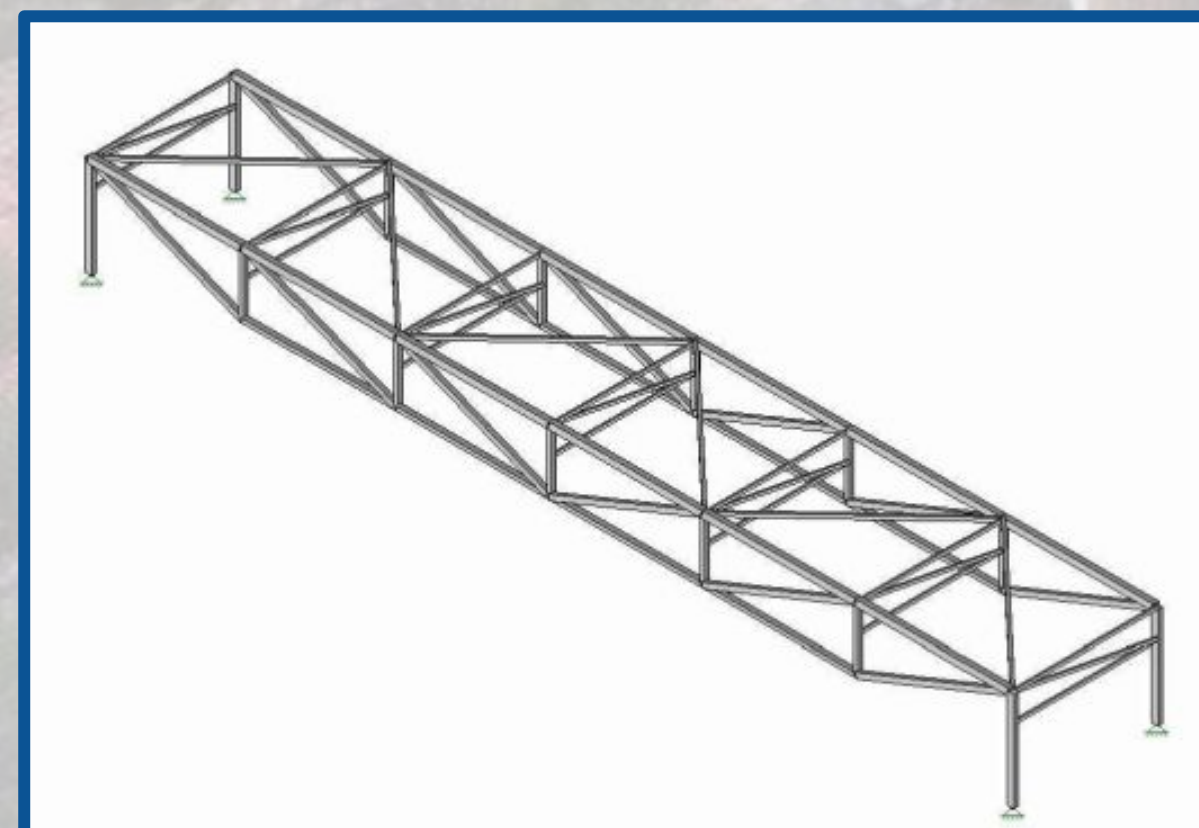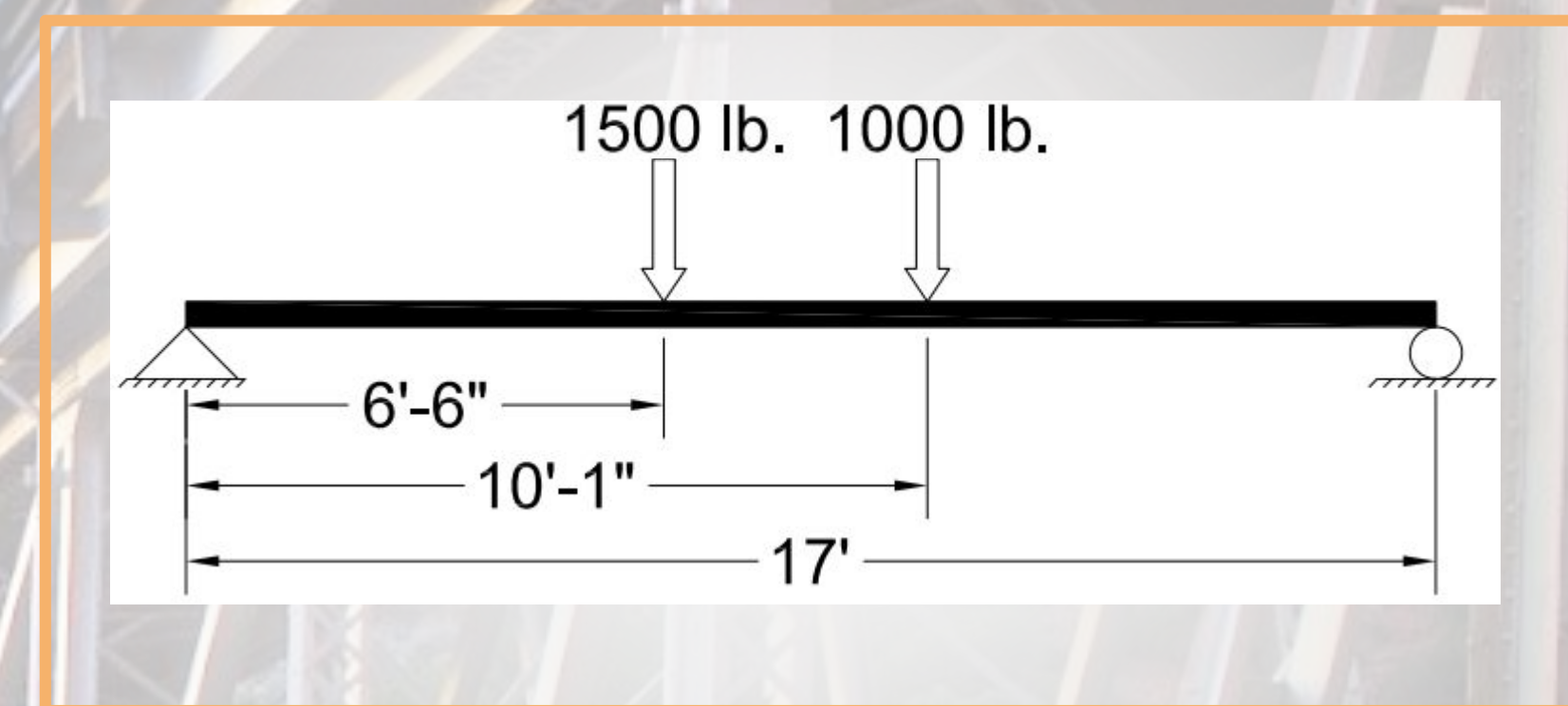## Bridge Design: Side View
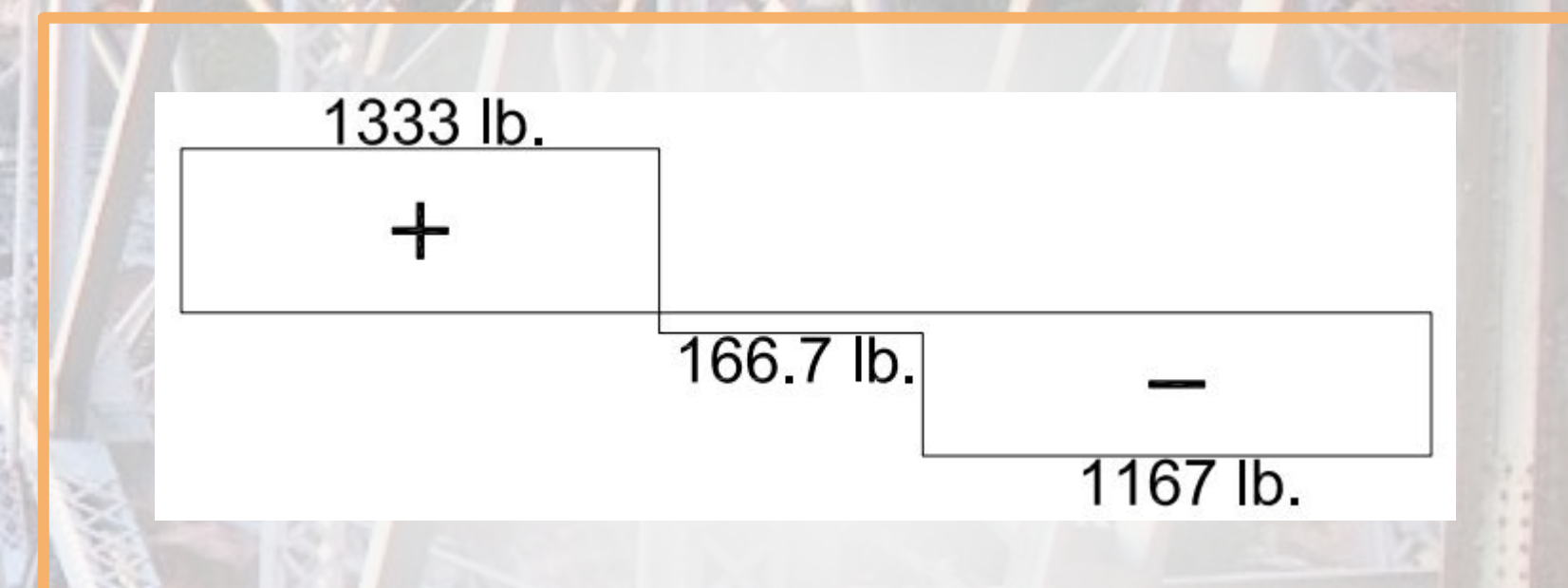

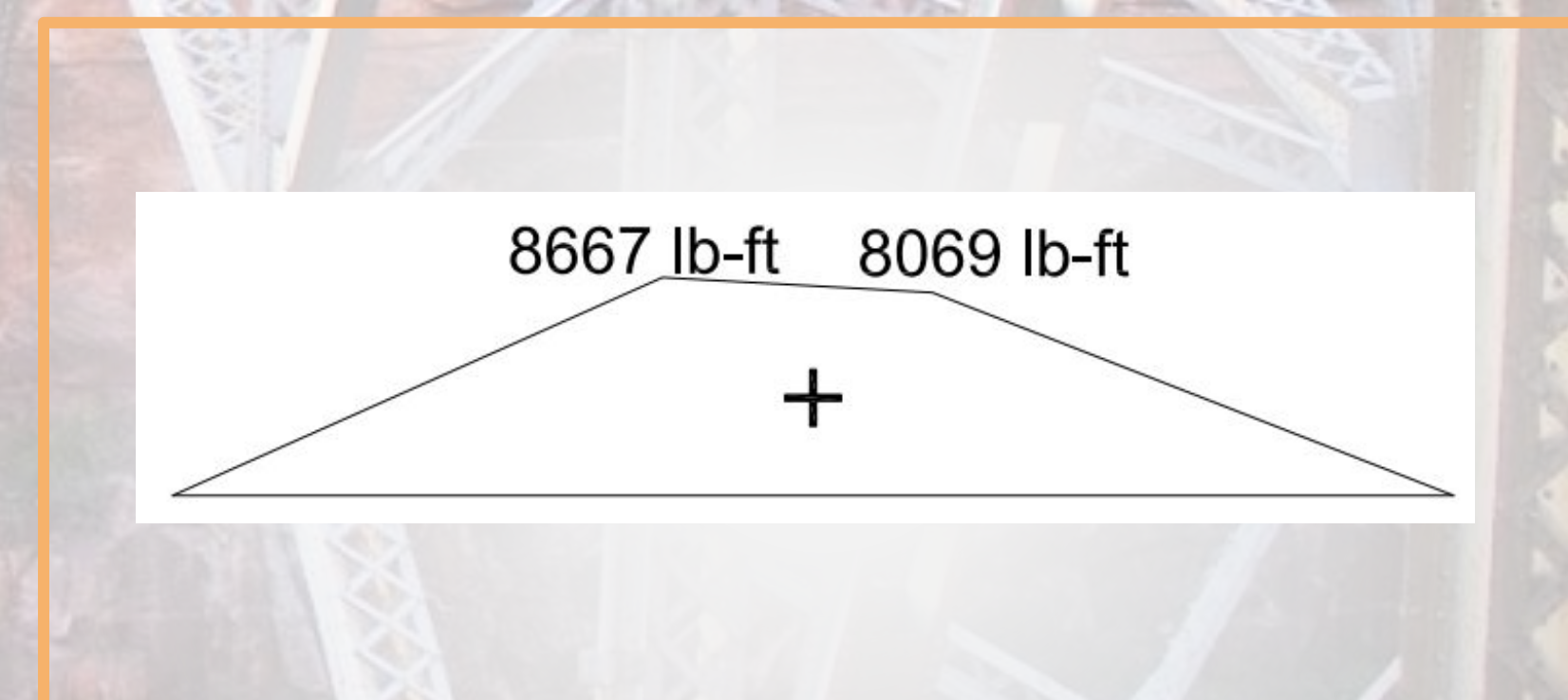Figure 2: Side View of Bridge Design

Figure 3: RISA Model of Bridge Design

Acknowledgements

Free Body Diagram

1500 lb. 1000 lb.

6'-6"
10'-1"
17'

Shear Force Diagram

1333 lb.
+
166.7 lb.
−
1167 lb.

Bending Moment Diagram

8667 lb-ft   8069 lb-ft
+