

Northern Arizona University

2019 Steel Bridge

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A BRIDGE OF ICE AND FIRE

Bridge Selection

An arched Warren through-truss design was selected with respect to the constraints of the 2019 NSSBC, and based on strength, and aesthetics. The design of the arched through-truss increases the moment of inertia along the length of the bridge, and provides greater stability at center-span where deflection would be greatest. Given the increased length of the span and limited member dimensions, a through-truss was determined to be more efficient than an underslung-truss. The vertical supports are spaced to minimize the required strength of the end deck members thereby minimizing weight.

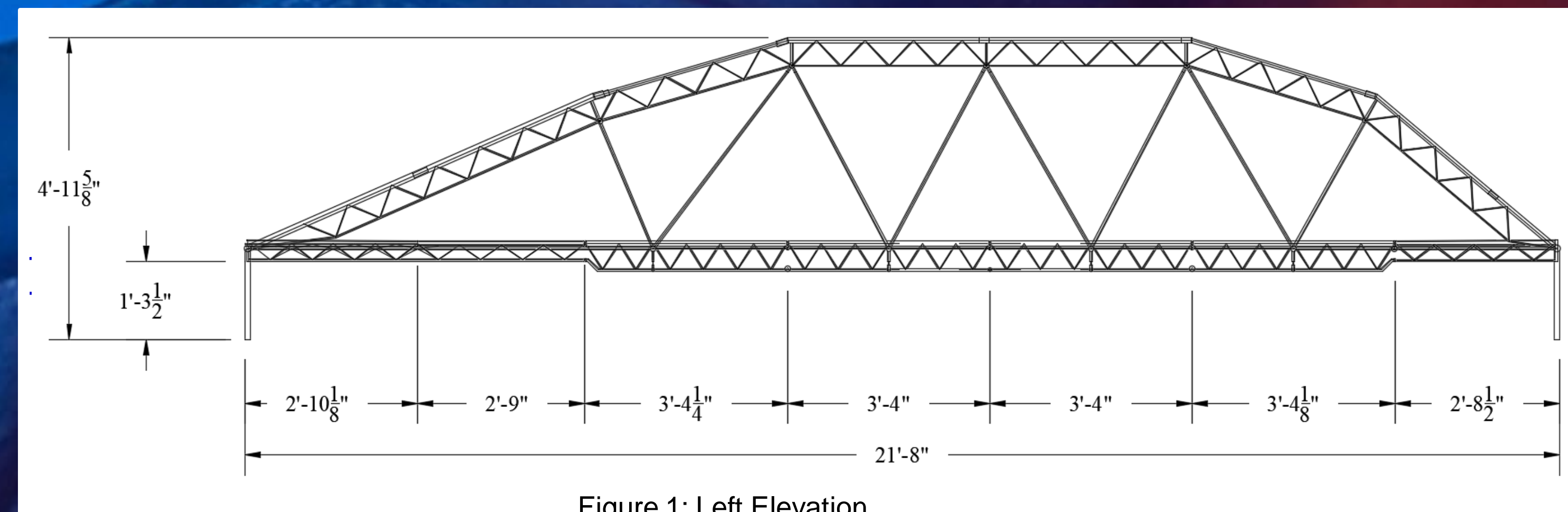
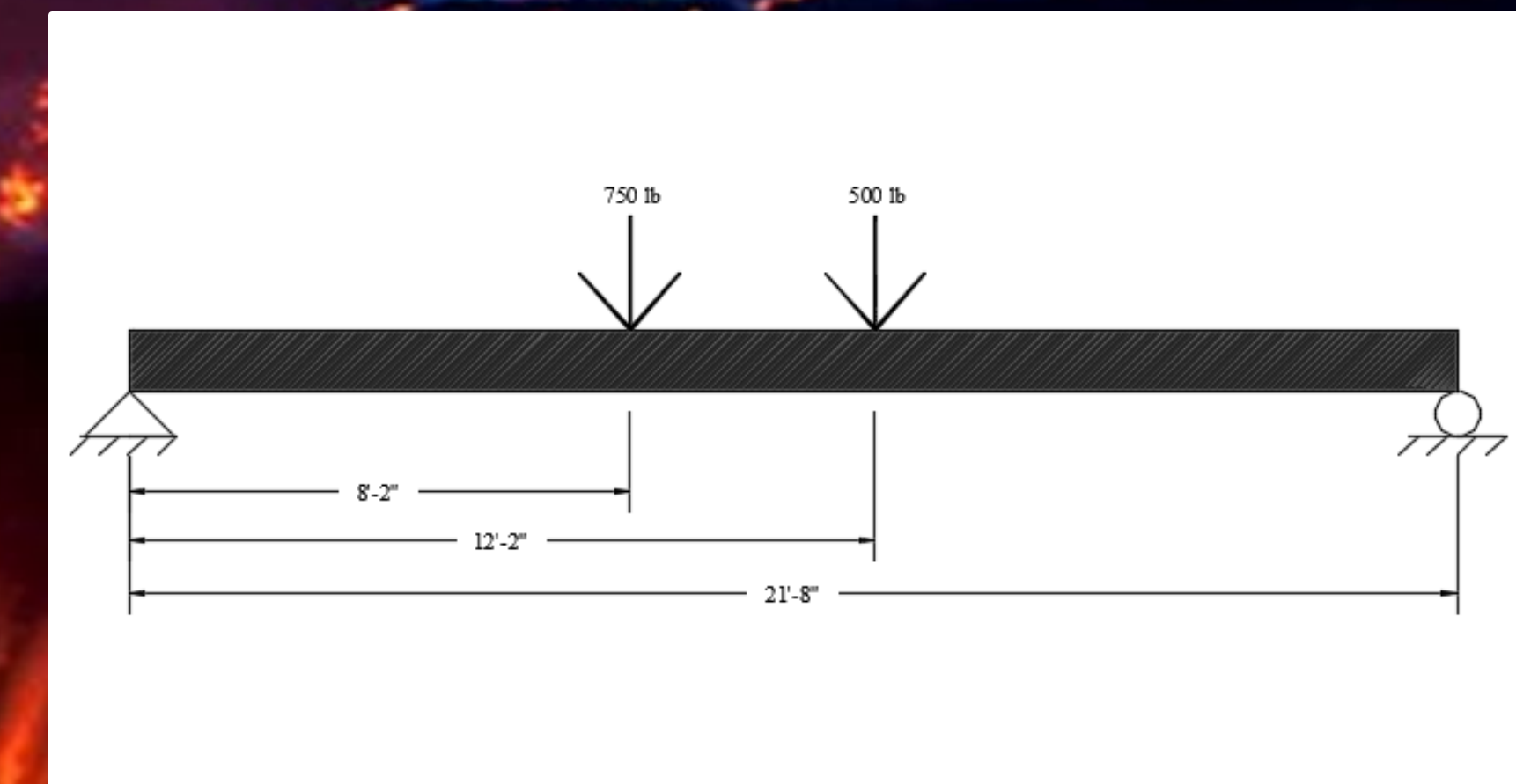
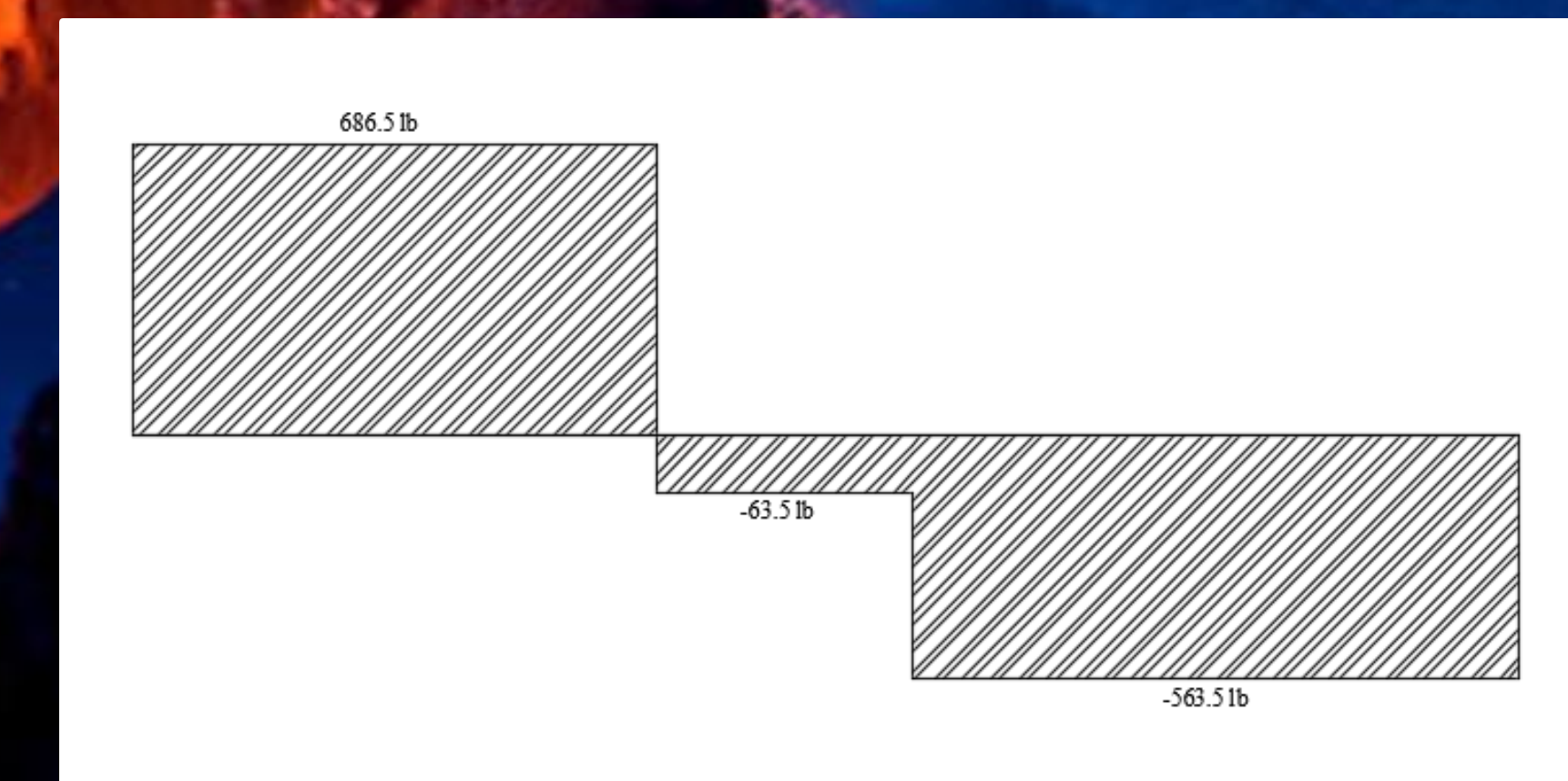


Figure 1: Left Elevation

Free Body Diagram



Shear Force Diagram



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. 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. The slip connections allow for members to quickly slide into one another, ultimately decreasing the construction time. Furthermore, members were designed to optimize the number of bolted connections by connecting several members in one location.

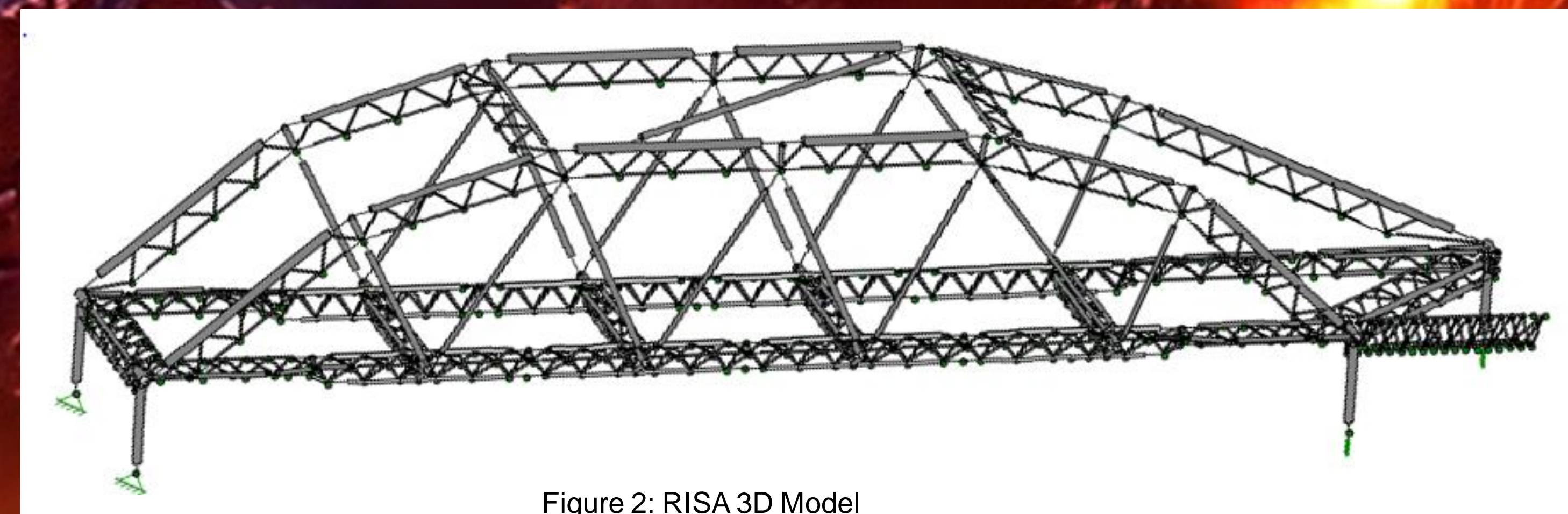
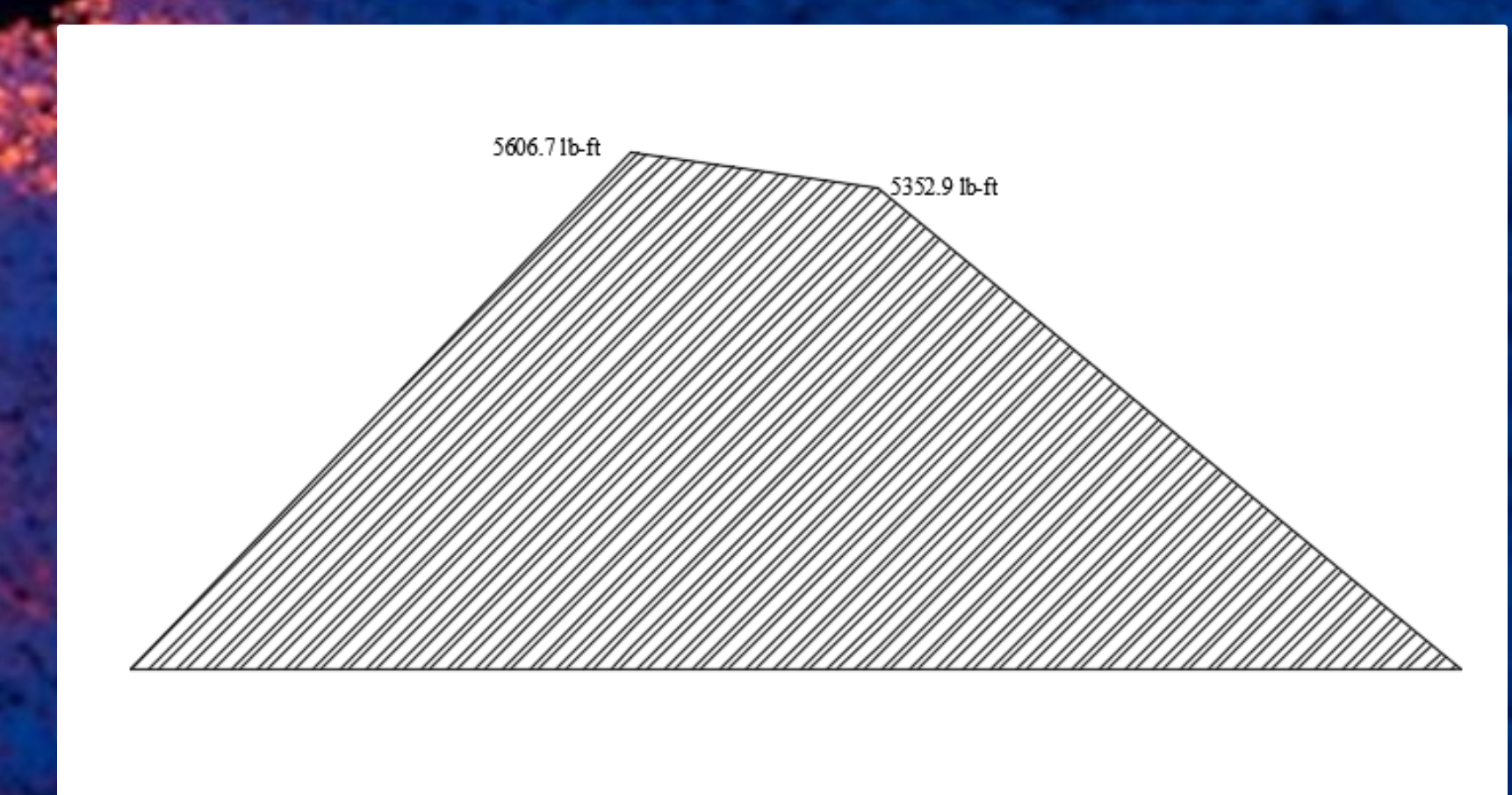
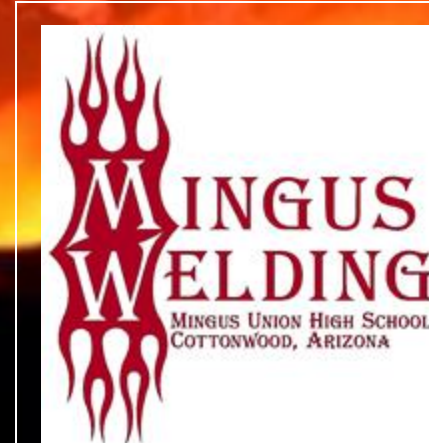


Figure 2: RISA 3D Model

Bending Moment Diagram



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