NAU Steel Bridge

Technical Advisor Meeting #4 - Meeting Minutes

Date / Time: January 23, 2017 / 6:30 PM – 7:30 PM
Meeting Called By: Ian Connair
Minutes Taken By: Isaac Block

Present Team Members: Isaac Block, Ian Connair, Taylor Erdmann, Matt Parrish
Present Advisors: Tommy Nelson, Technical Advisor

Plate cutting:

- Last year didn't have a problem with getting their material back in time from K-zell.
- Tolerances: Try for < +/- 0.010" tolerance at least.

Connection calculations:

- Tension capacity: 25 ksi steel is no bueno. Look for 36 ksi from cutting provider. See if they can provide the steel and cutting services for us.

Truss eccentricities:

- Consider the load path in the connection. Model the diagonals as attaching directly to the vertical truss member, not to the bottom chord.
- Considering the plate:
    - Weld group will transfer moment, bolts will not. Connection would be unstable if there was not a weld group to take the moment.
    - Horizontal component of force must be transferred down ~ 1" down the vertical member. This force will be resisted by the weld group and put the moment in the vertical in a tension-compression couple between the top and bottom chord.
    - We will need to design the weld group as a tension-compression couple.
- Should we add an additional bolt to the gusset plates, to make a total of two bolts for each connection between member and gusset plate?
    - Additional bolt is not needed to resist moment because the weld group will resist the moment.
    - Think about construction. Member will be loose before fully assemble due to self-weight. Think about how we will sequence construction. Putting an extra bolt at each connection might save time in construction.
    - Plate tension capacity will not change by adding another bolt hole as long as we don't do anything weird.
    - Make sure that bolt spacing will allow for wrench access for construction.

Lateral bracing design:

- The easy way to resolve this is to add in diagonal lateral bracing members.
- If we don't have diagonals, truss will go into weak axis bending. Plates and bolts will give some moment capacity, but this will be very hard to analyze.
- Tommy recommends that we design the bridge with the diagonal lateral bracing members, build the bridge, test its performance without some of the diagonal lateral bracing members, and remove some of them if they are not needed. It may be possible that we could remove the two braces in the middle of the bridge or find a similar solution.
- Use slip-type connections at center of these members by making a "sleeve" with plate so that the two members can attach together easily.
- Connections at ends can be whatever we like, whatever works. We might try welding bolt casings to the members and to their point of connection.
- Can run diagonal on plane of "cross-frames." The height of the bottom bolts of the frame connecting the footing and the frames throughout the mid-span are at almost the same height. It is likely that we can take advantage of this.

Any concerns:

- Tommy wants to see connection calculations along with the next updated drawing. Our goal is to complete these two items by the end of the week.
- On cutting and drilling: It is a pain. Use as many jigs and templates as possible.
- Band saw is more precise than chop saw (thinner blade).