

# NC State

**2021 AISC SSBC –  
Student Steel  
Bridge  
Competition**  
**Compete from  
Campus**







# ***NC State – 2021 Steel Bridge Team Compete from Campus***



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# ***NC State – 2021 Steel Bridge Team Compete from Campus***

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***Team Captain: Connor Vaughn***

***Faculty Advisor: Steve Welton, P.E.***

***Head Judge: Greg Womack-Adams, P.E.***







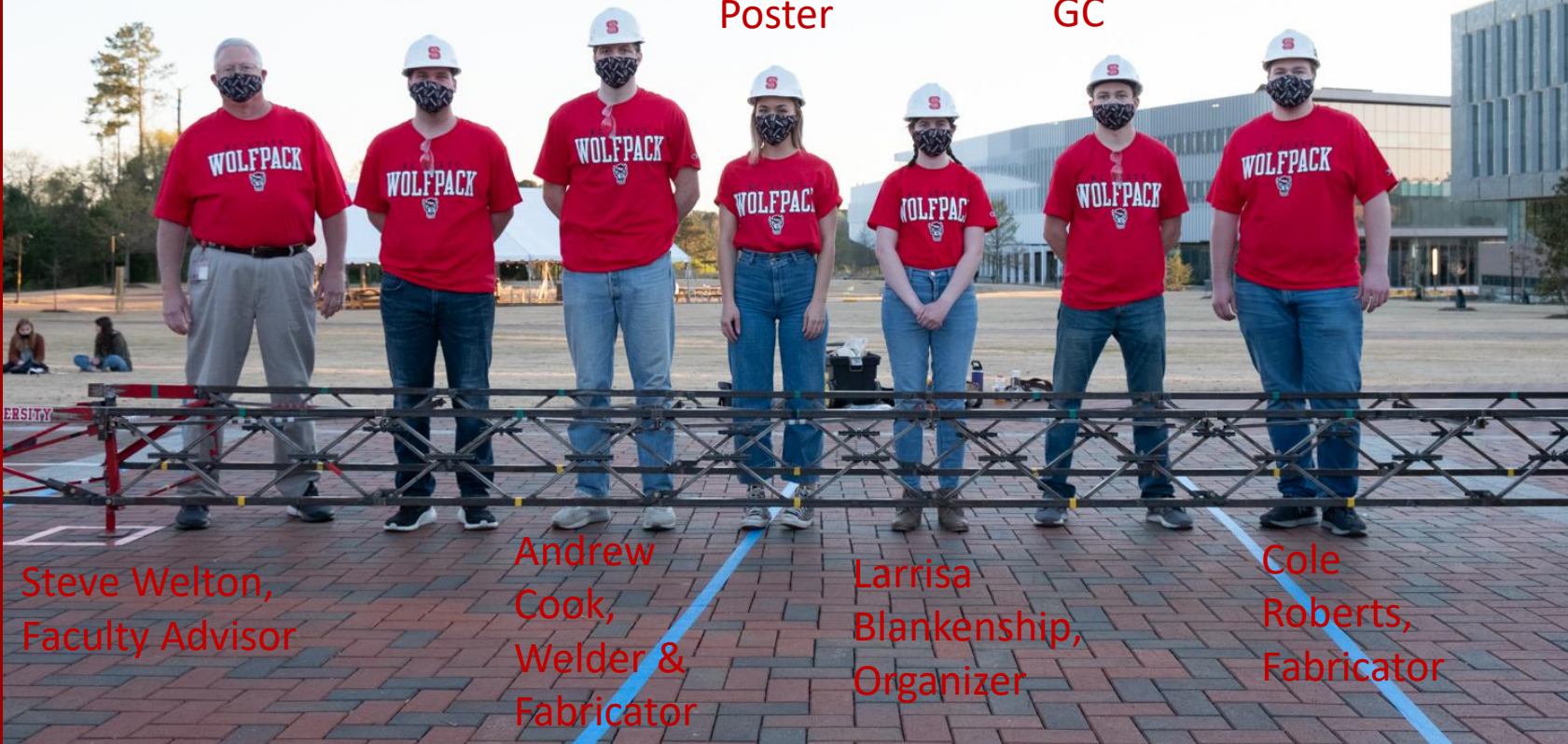
# ***NC State – 2021 Steel Bridge Team***

## ***Compete from Campus***

Connor  
Vaughn,  
Captain

Nina  
Long,  
Poster

Bradley  
Howard,  
GC



Steve Welton,  
Faculty Advisor

Andrew  
Cook,  
Welder &  
Fabricator

Larrisa  
Blankenship,  
Organizer

Cole  
Roberts,  
Fabricator





# ***NC State – 2021 Steel Bridge Team – Construction Competition***



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# ***NC State – 2021 Steel Bridge Team – Result Achieved***





# ***NC State – 2021 Steel Bridge Team Judging Team***



**Greg  
Womack-Adams  
Head Judge**

**Steve Welton,  
Faculty Advisor**

**Thomas  
Clunan**

**Aaron  
Stroud**

**Sanders  
Rohs**

**Johnathan  
McEntire**

**Kadin  
White**

**Daniel  
Robinson**

**Winston  
Allgood**





# ***NC State – 2021 Steel Bridge – North Elevation***



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# ***NC State – 2021 Steel Bridge – South Elevation***



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# ***NC State – 2021 Steel Bridge – East Elevation***



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# ***NC State – 2021 Steel Bridge – West Elevation***



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# ***NC State – 2021 Steel Bridge – Overhead View***



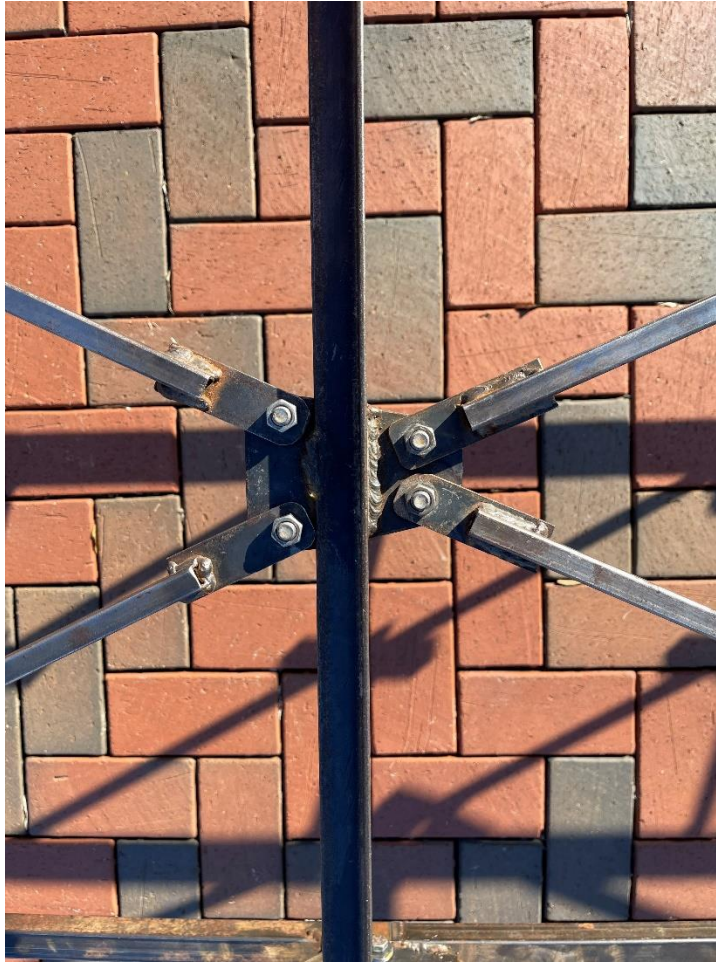


# NC State – 2021 Steel Bridge – Connections





# ***NC State – 2021 Steel Bridge – Connections***





# NC State – 2021 Steel Bridge – Poster

## FACULTY ADVISORS



Steven Welton



Jake Rhoads

## TEAM MEMBERS



Connor Vaughn  
Captain



Andrew Cook  
Lead Fabricator



Bradley Howard



Nina Long



Larissa  
Blankenship



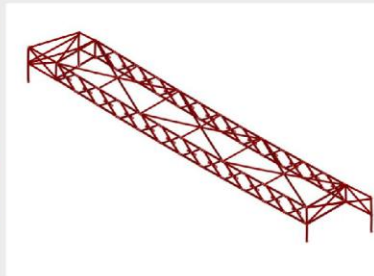
Cole Roberts



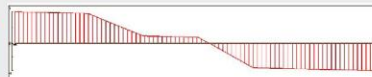
## NC STATE UNIVERSITY

The design of our bridge focuses on utilizing the reusability of steel members from previous steel bridge designs as well as the economical aspect of designing a substructure. In doing so, we are given the opportunity of a bridge that is both sustainable and cost-effective. Because of the COVID-19 pandemic, the build process was postponed until February of 2021. This gave us marginal time and required our design process and analysis to be efficient. Our analysis of the possible load cases showed our structure being in complete compression in the top chord and pure tension in the bottom chord.

By incorporating dovetail connections in the joining of our main structural members, we are able to accelerate the build process of our design. Using this design philosophy allows our substructure to be self-supporting with minimal bolts. We also incorporated sliding sleeve members over the footings, allowing for the complex area of the build to go more smoothly. Because of our use of re-claimed steel, our design minimizes bolts by connecting multiple members at one bolt, as well as having welded bolts fabricated onto the member itself where possible. We added members on the extension of the bridge by providing continuity for the tension and compression of the web members.



SHEAR  
DIAGRAM



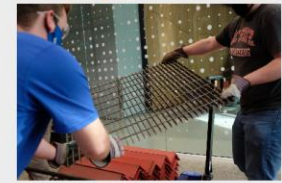
MOMENT  
DIAGRAM



DEFLECTION  
DIAGRAM



## FABRICATION



Special Thanks to  
our Sponsors::



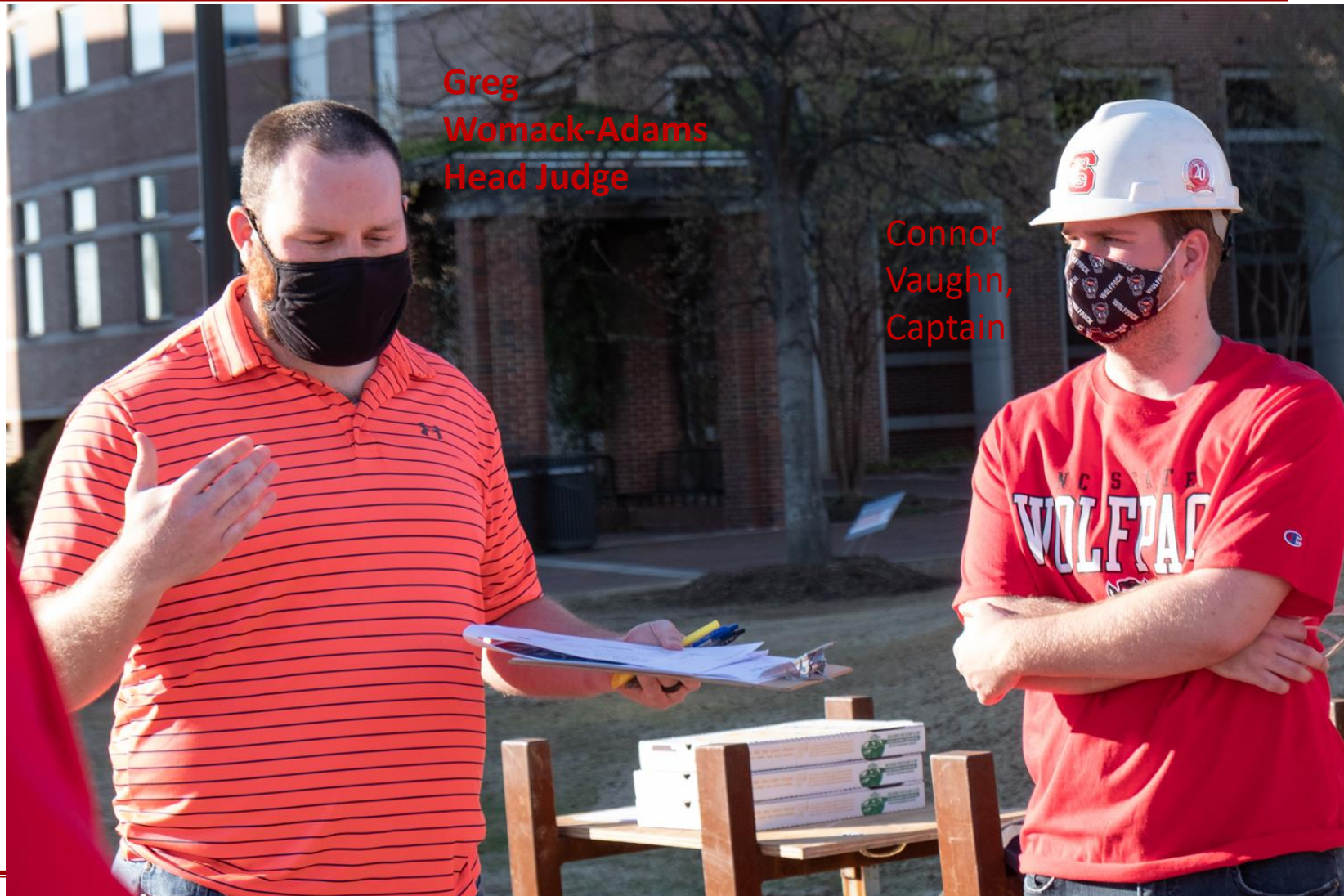
## 2021 STEEL BRIDGE TEAM



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# ***NC State – 2021 Steel Bridge Team***



**Greg  
Womack-Adams  
Head Judge**

**Connor  
Vaughn,  
Captain**





# ***NC State – 2021 Steel Bridge Team***





# ***NC State – 2021 Steel Bridge Team***



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# ***NC State – 2021 Steel Bridge Team***

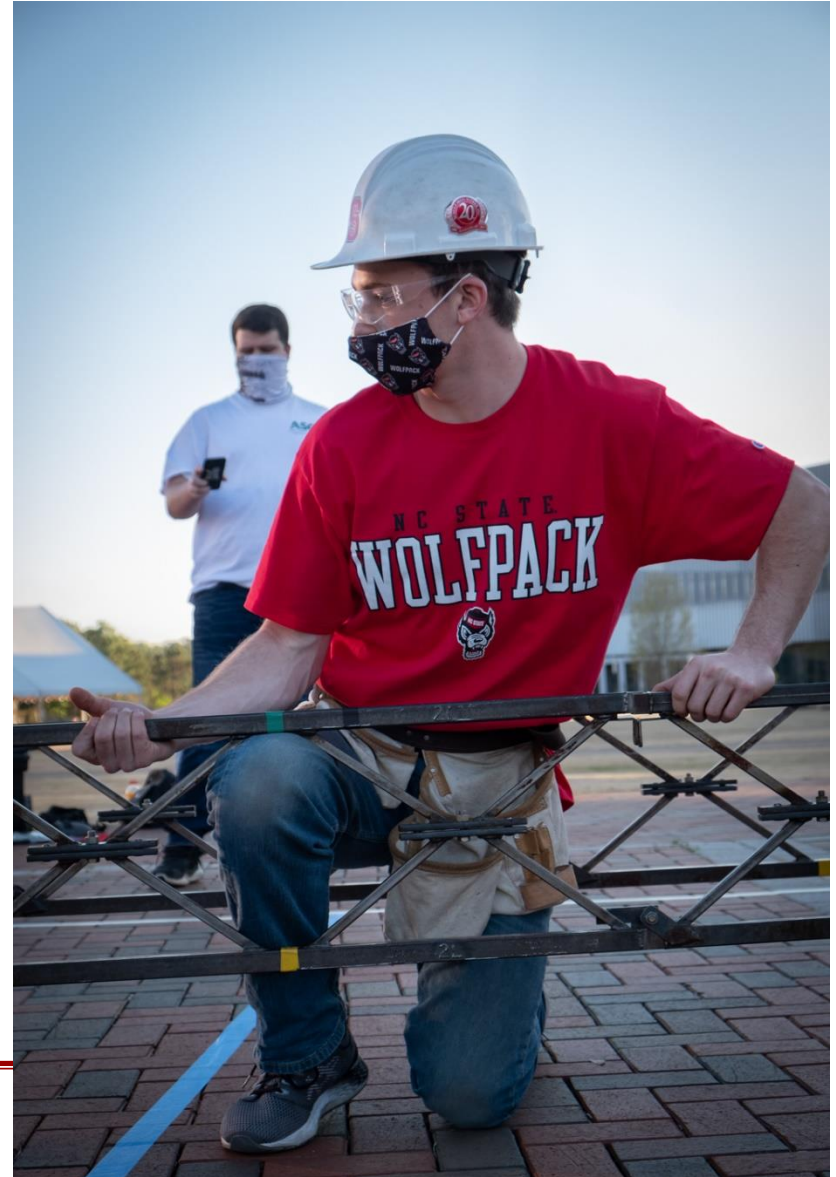


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# ***NC State – 2021 Steel Bridge Team***

Spanning  
the river



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# ***NC State – 2021 Steel Bridge Team***



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# ***NC State – 2021 Steel Bridge Team***



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# ***NC State – 2021 Steel Bridge Team***



## Inspection





# ***NC State – 2021 Steel Bridge Team***

## Inspection







# ***NC State – 2021 Steel Bridge Team***

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***Time Line for Bridge Team  
Journey during challenging  
conditions.***







# ***NC State – 2021 Steel Bridge Team***

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***Fall Semester – Remote  
Instruction for All Undergraduate  
Students after first 2 weeks of  
the start of semester -  
Bridge Team efforts were on hold***







# ***NC State – 2021 Steel Bridge Team***

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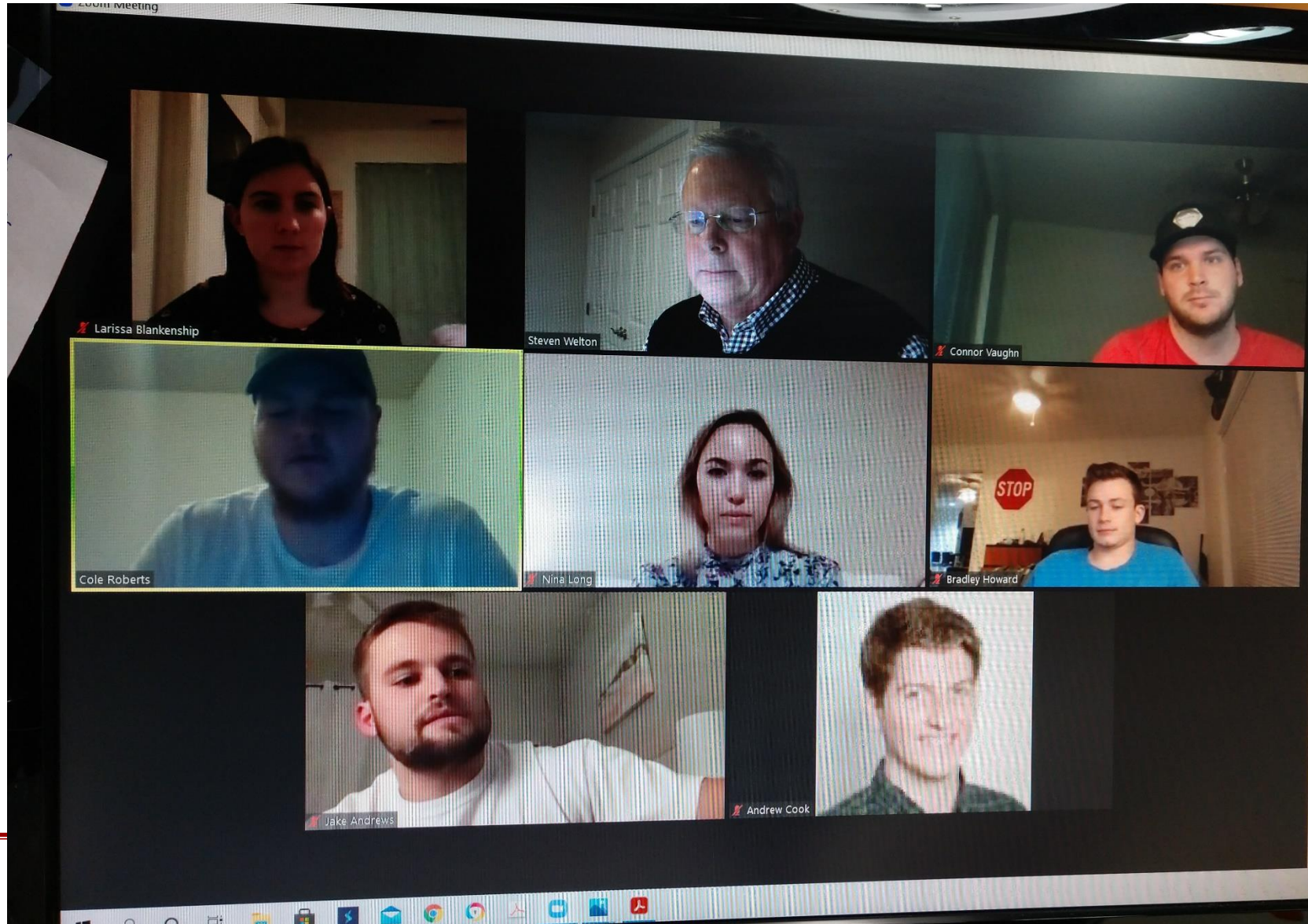
***Spring Semester – Delayed start  
of Jan. 19<sup>th</sup> with most  
undergraduate classes online.***

***Students allowed on campus  
following strict requirements for  
testing and safety protocols.***





# ***NC State – 2021 Steel Bridge Team Kickoff Meeting – Feb. 2, 2021***



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# ***Designing Modifications to adapt old bridge to new requirements***



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February 18, 2021

# ***Learning how to weld from Jake Rhoads, Shop Manager – 2-23-2021***



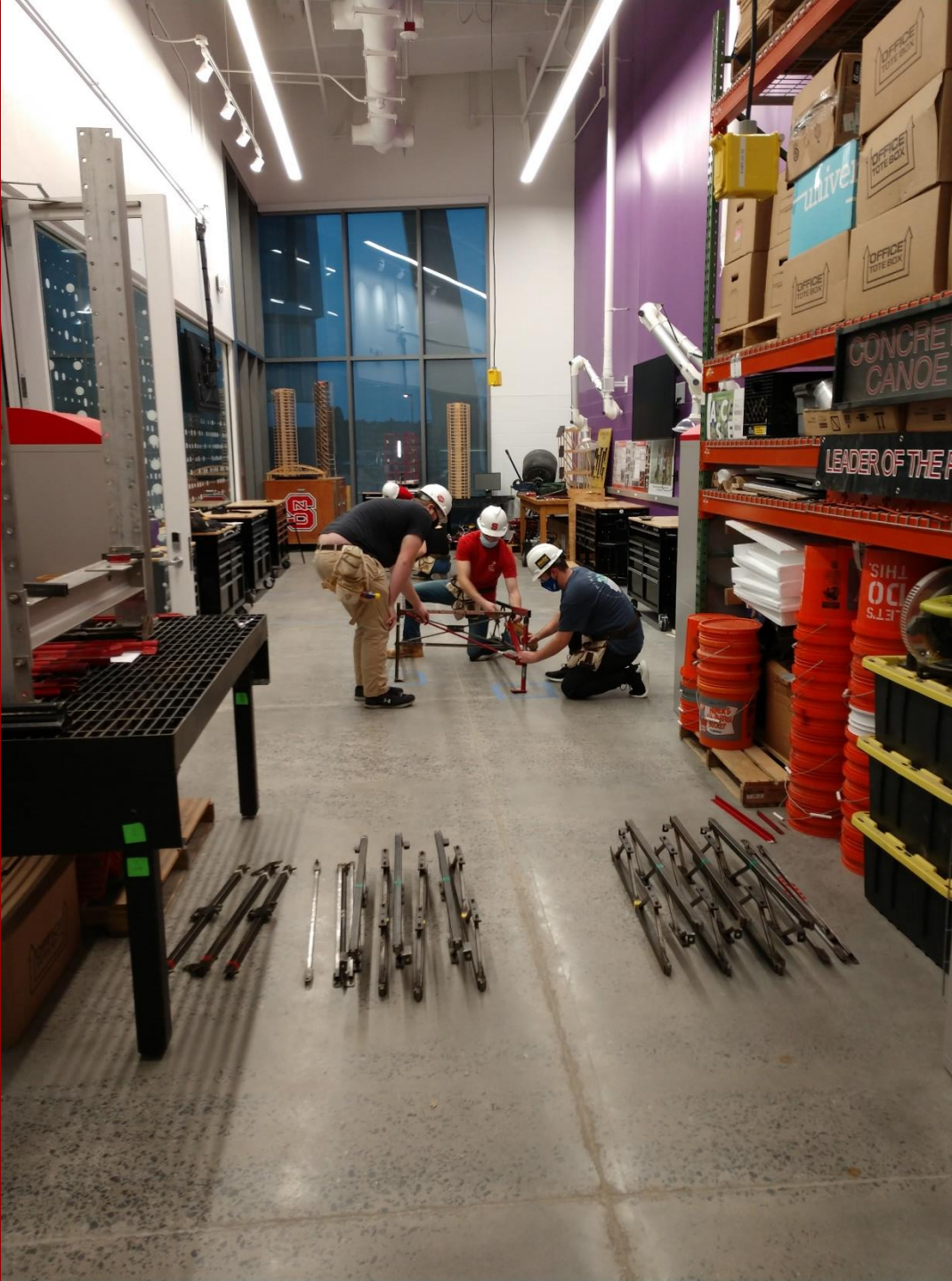


# ***Fabricating Modifications to reach new footings – 3-21-2021***



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# ***Practicing Build 3-23-2021***



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# ***Pre-Load Test to confirm performance – 3-24-2021***



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# *Successful Teamwork*



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# ***Special Thanks to Everyone that helped make this a non-virtual event***



***GO PACK!***

