

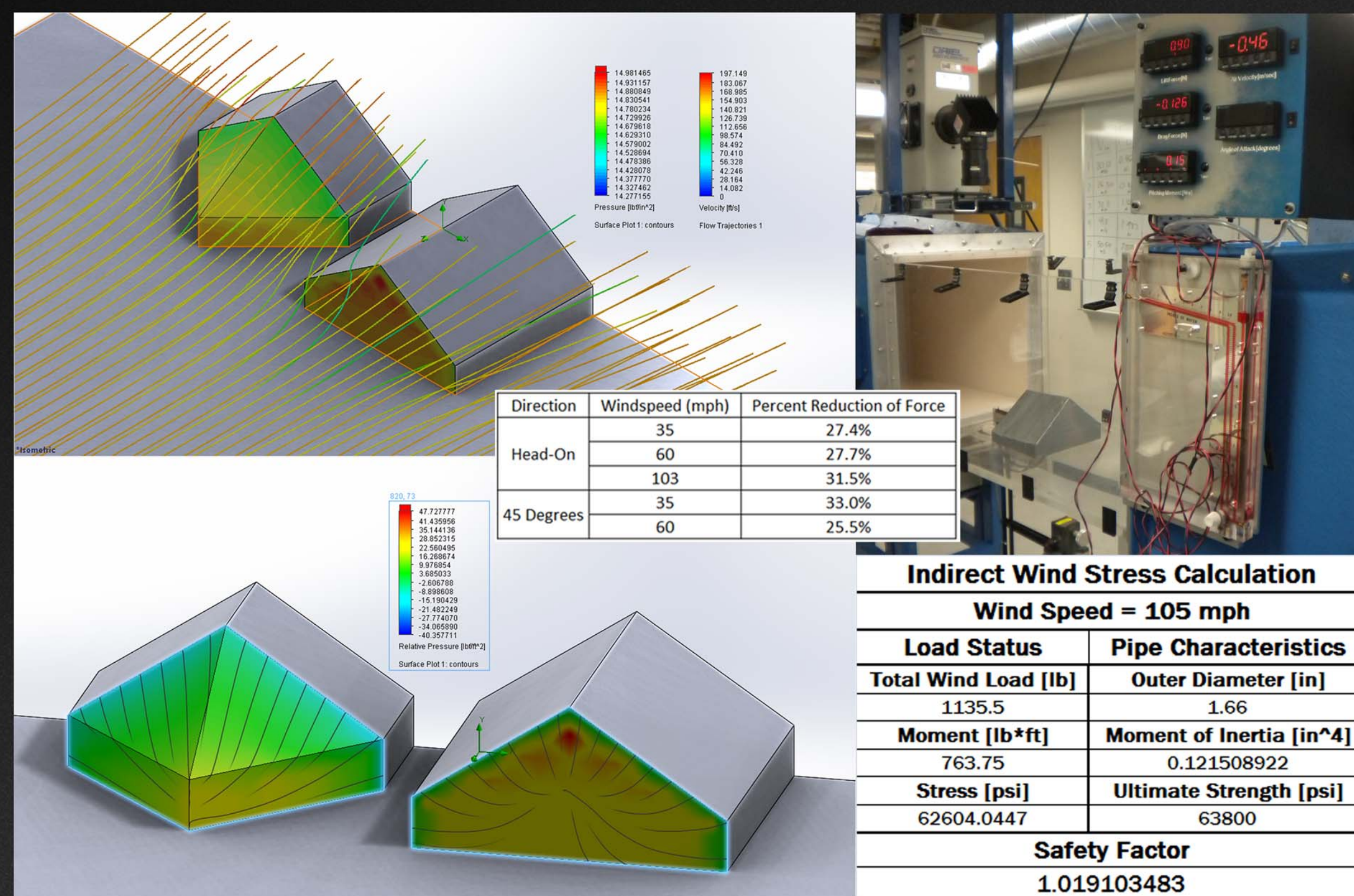
Problem:

Given the high wind speeds and average snow loads in the Buhl, Idaho area, the University of Idaho extension's high tunnel greenhouses have been failing. The greenhouses have mainly failed due to their end walls blowing in. The high tunnel will face into the wind due to the specific plot of land allocated for the project.

Design Requirements:

Variable	Design Goals	
Wind Speed	Customer: 65 mph	Worst Case: 105 mph
Snow Load	Avg. Snowfall=31.3"	Loading up to 20 lb/ft ²
Foundation Dimensions	Length=40ft	Width=24ft
Door Dimensions	Height=8ft (min)	Width=6ft (min)
Ventilation	Passive Roll-up Sides	
Orientation	Facing Wind	
Life Expectancy	10+ Years	
Cost	Budget=\$16,000	

Testing:



Wind tunnel and CFD tests show a significant reduction in force by adding a windbreaker. Although the ASCE 7-10 building code is not required in Idaho, it was used as a safety guideline for our design. This required using a wind speed of 105 mph to assess the stresses in several key members. Using the highest stress state, our greenhouse achieved a safety factor in excess of one.

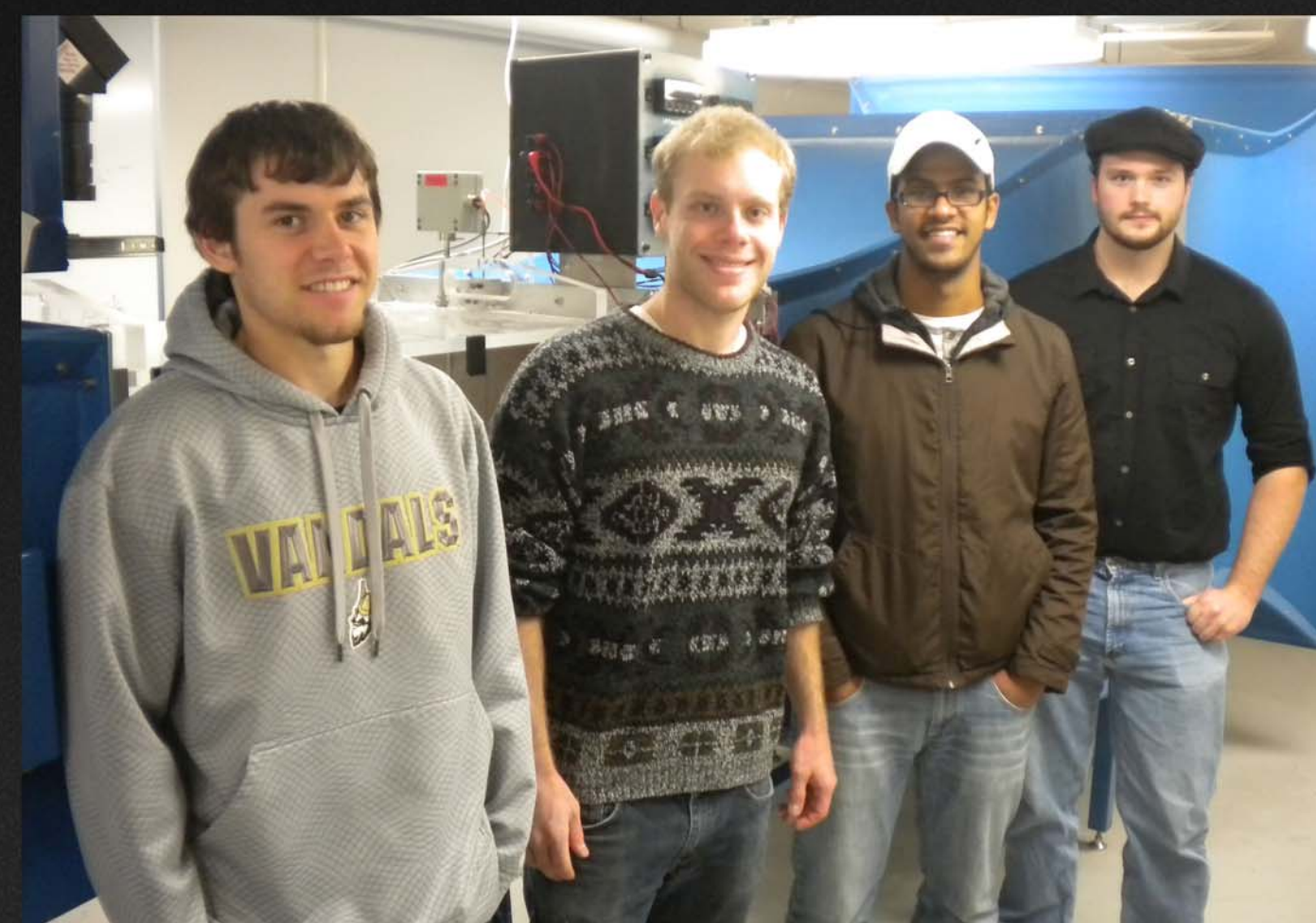
Advisor: Dr. Thomas Hess
Mentor: Jeremy Cuddihy

Sponsor: **University of Idaho Extension**

Poster Design by Christopher Kreps

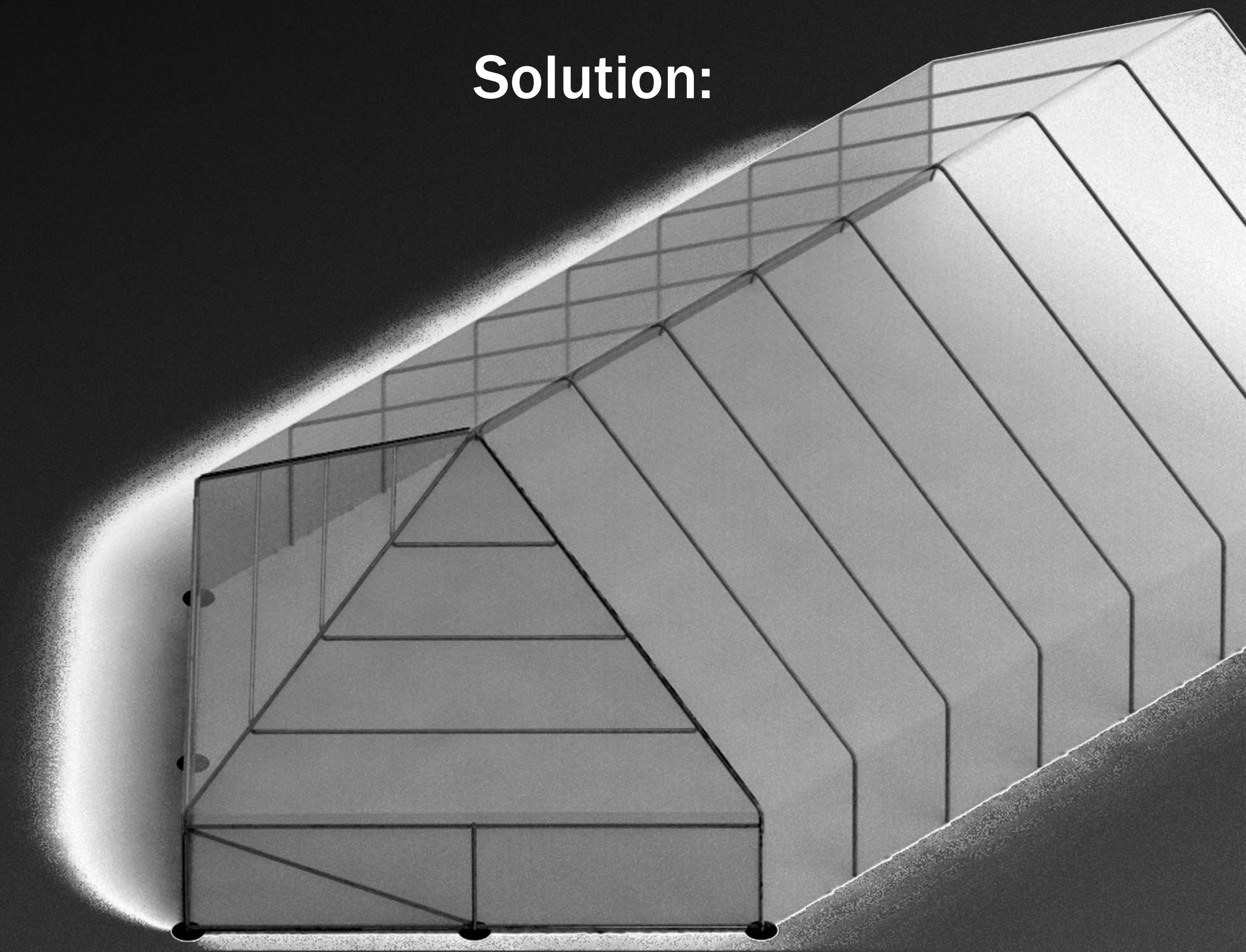


STAND YOUR GROUND



Stephen VanPatten, Kyle MacLean
Faisal Alahmadi, Christopher Kreps

Solution:



Solution includes an added windbreak to the end of the greenhouse facing the wind, allowing for the deflection of wind and greater support for the structure. The other side of the greenhouse will retain a large door to allow for a skid-steer. The frame has also been upgraded to galvanized steel with roll up sides to meet the ten year life span and allow for passive air ventilation.

Budget Analysis:

Cost Analysis Overview	
Kit Cost	\$5,500.00
Windbreak Poly	\$115.00
Windbreak steel	\$270.00
Windbreak frame fittings	\$500.00
Lumber	\$205.00
Concrete	\$115.00
Total Cost	\$6,705.00

Design:

