






PLUTO JACKS

NAU ASCE Concrete Canoe 2026 — Infographic | Northern Arizona University

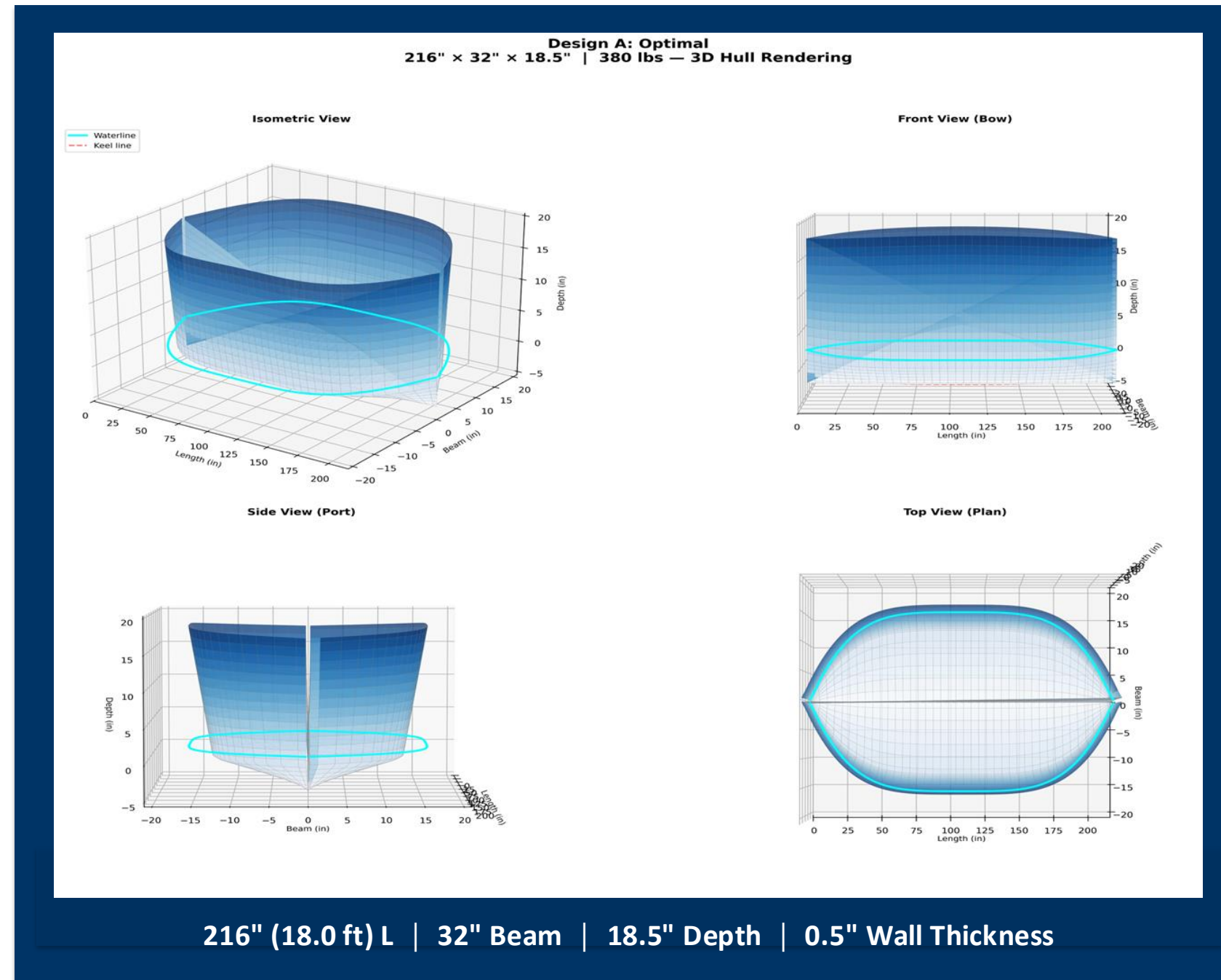
TEAM INOVATIONS

- Pluto Jacks unique approach to the problem statement was accomplished primarily by using recycled materials from previous NAU canoe teams to reduce wasted material and optimize sustainability.

ASCE COMPLIANCE/CLIENT REQUIREMENTS

-  Freeboard $\geq 6.0''$ **8.0''**
-  Metacentric Height $\geq 6.0''$ **8.68''**
-  Safety Factor ≥ 2.0 **2.30**
-  Cement Ratio ≤ 0.40 **0.36 max**
-  Reinforcement POA $\geq 40\%$ **92%**

5 / 5 CHECKS PASS



WEIGHT BREAKDOWN



Concrete Shell 370.4 lbs (97%)

PVA Mesh 8.2 lbs (2.1%)

Finish/Sealant 3.0 lbs (0.7%)

381.6 b
lbs total

Mix 1 Properties	
Property	Value
Compressive Strength (28-day)	1910 psi
Tensile Strength (28-day)	240 psi
Density (hardened concrete)	67 pcf
Density (fresh concrete)	68.2 pcf
Slump, Spread	2 in
Weight	4 lb
Air Content	4.5%

Mix 2 Properties	
Property	Value
Compressive Strength (28-day)	2630 psi
Tensile Strength (28-day)	440 psi
Density (hardened concrete)	84 pcf
Density (fresh concrete)	84.3 pcf
Slump, Spread	2 in
Weight	5 lb
Air Content	2.0%

Mix 3 Properties	
Property	Value
Compressive Strength (28-day)	310 psi
Tensile Strength (28-day)	70 psi
Density (hardened concrete)	59 pcf
Density (fresh concrete)	60.5 pcf
Slump, Spread	6 in
Weight	3 lb
Air Content	5.0%

*Mix 1 was chosen as the final mix

PROTOTYPE SPECIFICATION GOALS

Wet Density	< 62.4PCF
Dry Density	60 PCF
Slump	4 - 6 in.
Air Content	3 - 5%
Compressive	1,500 psi
Flexural	200 lb-in
w/cm Ratio	0.35 max

PHOTOS



HULL REINFORCEMENT & FLOATATION

- Primary Reinforcement: Simpson Strong-Tie CSS Bidirectional Carbon Grid (sheet mesh)
- Secondary Reinforcement: Propex Fibermesh 150 (micro-reinforcement fibers)
- Floatation: Owens Corning FOAMULAR NGX 250 (moisture resistant foam)

CONSTRUCTION SEQUENCE

