NAU ASCE CONCRETE CANOE 2026

PLUTO JACKS — Design A | Northern Arizona University

NAU CHAPTER PROFILE

Northern Arizona University ASCE Student Chapter, Flagstaff AZ. Active in regional and national competitions. Committed to sustainable infrastructure and hands-on engineering education.

PROTOTYPE SPECIFICATIONS

DIMENSIONS

Length	192" (16.0 ft)
Beam	32" (2.67 ft)
Depth	17" (1.42 ft)
Wall Thickness	0.5"

WEIGHT

Total	**174.3 lbs**
Shell	163.1 lbs
PVA Mesh	8.2 lbs
Finish	3.0 lbs

STRUCTURAL

Flexural	1,500 psi
Compressive	2,000 psi
Safety Factor	**2.30**
Reinforcement	PVA 42% POA

ASCE COMPLIANCE

Requirement	Actual	Required	Status
Freeboard	**11.4"**	≥ 6.0"	✓ **PASS**
Metacentric Height	**8.68"**	≥ 6.0"	✓ **PASS**
Safety Factor	**2.30**	≥ 2.0	✓ **PASS**
Canoe Weight	**174.3 lb**	≤ 237 lb	✓ **PASS**
Cement Ratio	**0.35**	≤ 0.40	✓ **PASS**
Reinforcement POA	**42%**	≥ 40%	✓ **PASS**

CYLINDER TEST

Insert split cylinder photo

CONSTRUCTION PHOTO

Insert layup / mold photo

CANOE ON WATER

Insert float test photo

TEAM PHOTO

Insert team photo

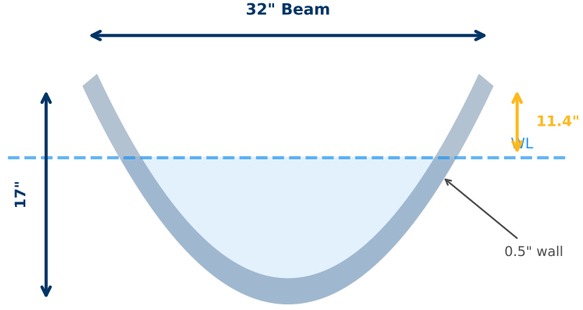
INNOVATIVE FEATURES

- Lightweight concrete with Poraver expanded glass aggregate
- Computational hull optimization exploring 3 candidate designs
- AI-assisted structural analysis and verification
- CO_2-cured mix design for improved sustainability
- PVA fiber mesh reinforcement (42% POA)

MIX DESIGN SPECIFICATIONS

Wet Density	~80 PCF
Oven-Dried Density	60 PCF
Slump	4 - 6 in.
Air Content	8 - 12%
Compressive Strength	2,000 psi
Flexural Strength	1,500 psi

Hull Cross-Section



Weight Breakdown