



# Case Study

Pennsylvania Aggregates and Concrete Association



## QUICKVIEW

**CONCRETE PRODUCER**  
Centre Concrete Company

**CONCRETE CONTRACTOR**  
L.S. Fiore

**LOCATION**  
State College, PA

## Strong Walls Make a Unique Solution for Penn State Facility

### THE SITUATION

The Pennsylvania State University (PSU) College of Engineering Research & Teaching Space 2 Building (West 2) is a multi-story (4-story, plus a basement) 105,000-gross square foot facility with an estimated construction value of \$63M.

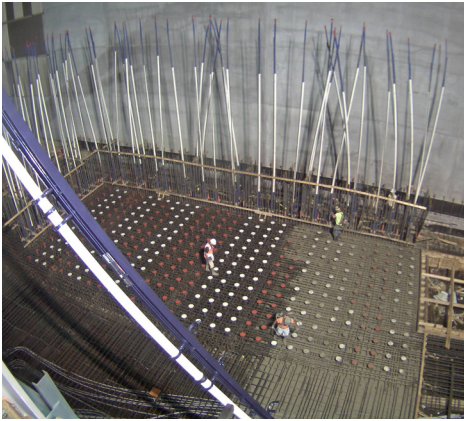
The research high-bay area, located between the main West 2 building and the West Parking Deck, will consist of a 45' x 60' reaction floor (Strong Floor) and 30' high reaction walls (Strong Walls). The system is configured in an L-shape to enable testing forces from multiple directions, utilizing over-head cranes, hydraulic actuators, and other equipment within the high-bay research facility as part of a complete structural testing system. It is one of only 8 strong wall systems in the country and the only wall that was cast monolithically, 336 cubic yards.

### THE SOLUTION

Due to the stresses that are applied to the area, a significant amount of steel reinforcement (250 tons) was required creating congested form work. Based on the amount of reinforcement and aesthetic requirements, a self-consolidating, small aggregate concrete material was utilized. The complete Strong Wall/Strong Floor System is constructed of 520 yds of cast-in-place concrete with a specified strength of 5,000 psi at 28 days.

Due to the importance of this structural element, the contractor constructed a mock-up to test placement techniques and materials in March of 2021 in preparation for a late-Fall placement. Additional testing performed by Centre Concrete Company warranted the use of a shrinkage-reducing admixture to reduce susceptibility to cracking.

## PROJECT PROFILE: PSU Strong Wall



In addition to the reaction floor, the highly-variable limestone geology on the project dictated the foundations consist of a micropile, cap and grade beam system. The foundations, as well as, the below-grade walls consisted of low carbon concrete and was placed in the Fall of 2021. This material is produced with a lower carbon footprint utilizing pozzolans and new technology to reduce cement and still obtain the required design strength. Challenges that were encountered and overcome included: lower heat of hydration, slower strength gain and modifications required with on-site testing.

In total, Centre Concrete provided approximately 6,000 yards of green, sustainable concrete on this project which was also recognized as the Pennsylvania Aggregates and Concrete Association's Commercial Project of the Year (Buildings Division) for 2022.



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