

Self-Consolidating Concrete

Padgett-Thomas Barracks, Cadet Housing



Constructed in 1922, the Padgett-Thomas Barracks was the oldest building and the largest student housing facility on campus. For eighty years, it served as perhaps the best-known symbol of the military college and a model for all other barracks on the campus.

By 2000, the venerable structure, with its narrow dorm rooms, high ceilings and hardwood floors, was declared a safety hazard with collapsed ceilings, fallen concrete, backed-up sewer lines and structural instability. In the early part of 2000, the decision was made to demolish and replace the Padgett-Thomas Barracks. The goal was to design a new structure, identical in appearance to the landmark building but incorporating modern conveniences. The plan delivered was a four-story building that is a work of art and a showcase of excellence.

Project:

The Citadel Military College –
Padgett-Thomas Barracks,
cadet housing

Location:

Charleston, SC

Owners:

The Citadel Military College

Concrete Producer:

Ready Mix Concrete Company

Concrete Contractor:

Ellis Don Corporation

Architect:

Davis & Floyd, Inc.

Requirements:

Compressive Strength:
4,000 psi (28 MPa) @ 7 days
5,600 psi (39 MPa) @ 28 days

Products Used:

MasterGlenium® 3030
high-range water-reducing admixture
MasterMatrix® VMA 358
viscosity-modifying admixture
MasterPozzolith® 80
water-reducing admixture

Market Sector:

Ready-mixed concrete

Project Profile

Padgett-Thomas Barracks, Cadet Housing



Photo courtesy of Russell K. Pace, The Citadel

The Challenge

On previous campus construction projects of buildings with a similar design, contractors battled severe placement challenges and unacceptable finished appearance that required patching and ultimately led to cost overruns. Placement was another challenge. Narrow wall forms, 12 ft. (3.6 m) high and 80 ft. (24.4 m) long, and filled with reinforcement were to be filled with concrete by pumping. For this reason a higher slump concrete mixture was required.

The Solution

Master Builders Solutions introduced the concept of self-consolidating concrete (SCC) and helped develop a mixture using MasterGlenium 3030 polycarboxylate-based high-range water-reducing admixture used in combination with MasterMatrix VMA 358 viscosity-modifying admixture. These ingredients produced a highly stable 27 in. (685 mm) spread SCC mixture that was able to overcome segregation issues and create finished surfaces resembling glass, without vibration. Concrete was placed from a single point and the SCC mixture flowed into place, transporting the aggregate around reinforcement, utilities, and blockouts.

Project Facts and Benefits

- Placement time was significantly reduced
- Finished surfaces were extremely smooth and aesthetically pleasing
- No vibration was required
- Nearly half of the construction was 6 in. (152 mm) thick, 12 in. (3.6 m) high walls requiring intricate forming to create nearly 1,000 doorways, window casings, archways, and blockouts for utilities
- From September 2002 until September 2003, more than 6,500 yd³ (4,970 m³) of SCC was used to construct the 112,000 ft² (10,405 m²) Padgett-Thomas barracks facility
- Pour times for 40 – 80 yd³ (31 m³ to 61 m³) wall placements were cut in half, and labor on the wall construction was reduced by one third
- Throughout the project, strengths of nearly 4,000 psi (27.6 MPa) @ 7 days and 5,600 psi (38.6 MPa) @ 28 days were consistently achieved
- All tested mixtures met or exceeded projects specification requirements
- The project was such a success, Master Builders Solutions has been asked to participate in a second project already under construction

About Master Builders Solutions

Master Builders Solutions is a leading global manufacturer of concrete admixtures, as well as other sustainable solutions for the construction industry, focussed on delivering its vision: **Inspiring people to build better**. Master Builders Solutions provides value-added technology and market-leading R&D capabilities to improve the performance of con-

struction materials and to enable the reduction of CO₂ emissions in the production of concrete. Founded in 1909, Master Builders Solutions has ca. 1600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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