

Chesterfield County Fire Training Center

PROJECT

Chesterfield County Fire Training Center

LOCATION

Chesterfield County Government Complex, Chesterfield County, VA

OWNER

County of Chesterfield, VA

ENGINEER

William J. Davis
Consulting Engineers
William J. Davis, P.E.
1641 West Broad St.
Richmond, VA 23220

CONTRACTOR

Southern Brick Contractors, Inc.
2403 Westwood Avenue
Richmond, VA. 23230

READY MIX CONCRETE SUPPLIER

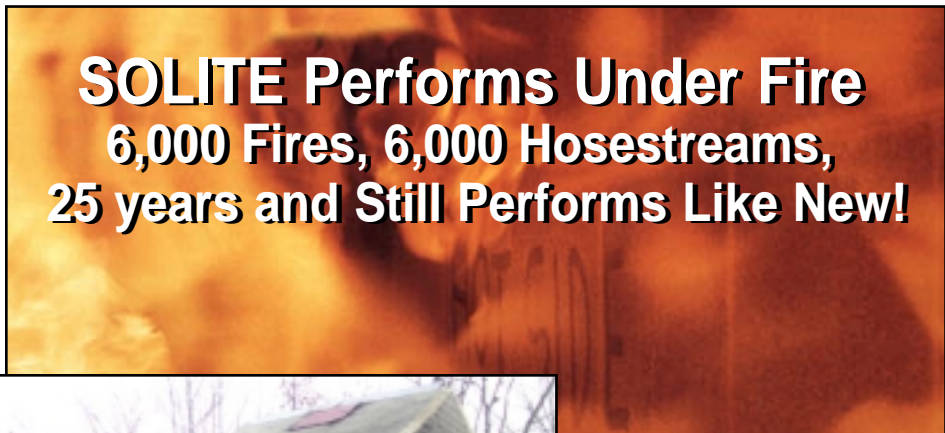
Ready Mixed Concrete Co.
Richmond, VA

LIGHTWEIGHT CERAMIC AGGREGATE PRODUCER

SOLITE Corporation
A.F. Old Plant, Arvon, VA

TESTING LABORATORY

Froehling and Robertson
Richmond, VA



**SOLITE Performs Under Fire
6,000 Fires, 6,000 Hosestreams,
25 years and Still Performs Like New!**



Chesterfield County Fire Training Center Burn Building



SOLITE SMARTWALL MASONRY UNITS AND STRUCTURAL LIGHTWEIGHT CONCRETE WITHSTAND 25 YEARS OF FIRE TESTING

The Chesterfield County Fire Training Facility was constructed in 1978 and has been in constant use since. The number of fires set in the burn building is well over 6,000. A study conducted in 1992 by William J. Davis, P.E. revealed that the structure was...”in excellent shape despite some expected spalling in the roof and floor areas....” The building was again inspected in late 2002 and was again found to be in good structural condition.

Proven Performance: SOLITE lightweight concrete and SmartWall concrete masonry units have been fire-tested in the real world since 1947. This proven performance has demonstrated that SOLITE SmartWall masonry units provide the life-safety protection, isolation and containment characteristics preferred by First Responders, fire marshals and design professionals alike.

Thermal Stability

The lower expansion coefficient of SOLITE SmartWall masonry products remains essentially constant over wide temperature ranges. Limiting strain within the wall due to thermal shock will reduce forces that could cause excessive deflection or collapse. This same stability also applies to Structural Lightweight Concrete.

Structural Strength

SOLITE SmartWall masonry units, although lighter in weight, can be manufactured to obtain net compressive strengths in excess of 4,000 psi. Because of their structural stability and high strength retention capacity, masonry walls constructed using SOLITE **SmartWall Systems®** are consistently allowed to remain in place after a major fire.

SOLITE LIGHTWEIGHT CERAMIC AGGREGATE

SOLITE lightweight ceramic aggregate is processed at temperatures approaching 2200° F and thereby eliminates all combustible matter. Flame spread and smoke contribution is zero.

SOLITE was used in every component of the fire training structure:

- **Roof panels**
- **Elevated floor slab**
- **Slab on grade**
- **Exterior and interior masonry**
- **Mortar**

DESIGN CONSIDERATIONS

Concrete masonry units and lightweight concrete mixes were designed utilizing 100% SOLITE lightweight aggregates without blending of natural aggregates. Design considerations were backed by actual ASTM E119 test results.



After 4-hour lab fire test at 2,000°F, examination of this walls shows that the CMU's are essentially unchanged except for thin surface damage.



After 25 years and 6,000 fires, the "burn building" looks damaged, but is actually as structurally sound as when it was new.



Concrete Masonry Units: The SOLITE SmartWall Concrete Masonry Units were manufactured by Lightweight Block-Lynchburg (VA).

Concrete Roof Panels: Concrete roof panels, elevated slab and slab on grade were designed with 100% Solite aggregates:

- SOLITE coarse aggregate size: 3/4" - #4, and size 3/8" - #8
- SOLITE Fine Aggregate (Natural sand was prohibited)
- Design strength: 5200 PSI @28 days
- Unit weight: 105 PCF @28 days
- Mortar: 100% SOLITE aggregate size 1/8" - #0

PROVEN PERFORMANCE IN LIFE SAFETY LEADS THE WAY TO A SAFER FUTURE

SmartWall Systems is the first choice of First Responders to any emergency. It is no coincidence that the Chesterfield County Fire Training Center was built with SOLITE High Performance Concrete Masonry Units. The purpose of any structure should allow for the safe egress of the building by its occupants in the event of a fire. Secondly it must provide structural stability to permit the initial First Responders time to evacuate injured occupants and permit the firefighters to begin containment. Because we do live in a highly volatile world, choose the High Performance Concrete Masonry Units of SmartWall Systems®. Fire resistance and thermal stability are Inherent to every SmartWall CMU.

SmartWall Systems® Guide Specifications

Guide Specification (Short Form): Sec 04810 - Unit Masonry Assemblies:

SmartWall Systems walls shall be constructed using high performance concrete masonry units manufactured by a SmartWall systems producer certified by the Expanded Shale Clay and Slate Institute, Salt Lake City, Utah. The concrete masonry units shall meet the requirements of ASTM C 90 Standard Specification for Load Bearing Concrete Masonry Units and the following additional requirements:

- The concrete masonry unit shall have a minimum net compressive strength of 2500 psi (17 Mpa) and a density not exceeding 93 lb/cu ft (1500 kg/m³), determined in accordance with ASTM C 140 Sampling and Testing Concrete Masonry Units.
- The lightweight aggregate used in the manufacture of the concrete masonry units shall be structural grade expanded shale, clay or slate manufactured by the rotary kiln process, and shall meet the requirements of ASTM C 331 Standard Specification for Lightweight Aggregate for Concrete Masonry Units.

SmartWall Units, Maximum Jobsite Weight (Mass) of SmartWall Units (1)

Size	Not To Exceed	Size	Not To Exceed
4" x 8" x 16"	18 lbs. (8.0 kg)	10" x 8" x 16"	33 lbs. (14.5 kg)
6" x 8" x 16"	23 lbs. (10.5 kg)	12" x 8" x 16"	36 lbs. (15.5 kg)
8" x 8" x 16"	26 lbs. (11.5 kg)	8" x 8" x 24"	38 lbs. (17.0 kg)

The maximum job weight of SmartWall units is based on typical net volumes and may vary depending on the block mold configuration

General Information on SmartWall high performance concrete masonry units: The information below is for general use only. For exact shapes and physical properties, contact your supplier.

Unit Size (Inches)	Maximum Jobsite Weight lbs. (1)	Minimum Weight Savings Percent (2)	Concrete Unit Weight Oven Dry lbs/ft ³ (93 Max)	Wall R-Values (3)		Wall HC Value (4)
				No Insulation	UF Foam Insulation	
12x8x16	36	37	80-93	2.7	10.1	8.7
10x8x16	33	28	80-93	2.6	8.3	7.8
8x8x16	26	27	80-93	2.5	7.0	6.7
6x8x16	23	23	80-93	2.4	NA	5.6
4x8x16	18	31	80-93	2.1	NA	4.3
8x8x24	38	38	80-93	2.5	7.0	6.4

- (1) Oven dry weights will be less than jobsite weights and will depend on unit shape and the concrete unit weight used. The maximum jobsite weights are given just for field control to help insure SmartWall units are being used. For maximum oven dry weights of SmartWall units, contact your supplier.
- (2) When compared to heavy concrete masonry at 135 lbs/ft³
- (3) R-Values are based on ASTM minimum required block dimensions and 90 lbs/ft³ concrete unit weight using series parallel method (air film included). R in (h • ft² • °F)/BTU.
- (4) Wall HC (Heat Capacity) is based on ASTM minimum required block dimensions, 90 lbs/ft³ concrete unit weight and mortar. HC in BTU/(ft² • °F)



For Additional Information About the Fire Resistance Advantages of ESCS, or other ESCS application, Contact

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Visit our website – www.SOLITECORP.COM**

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