



*Fig. 1: The completed, sculpted, and stained shotcrete wall provides permanent support for the roadway above while creating an architectural finish for the redeveloped site. The finished retaining wall combines soil nail stabilization with sculpted concrete facing, preserving usable site area while supporting Northern Avenue above.*

# Sculpted Shotcrete Solution Supports Retail Redevelopment in Maryland

*By Michael Close, P.E.*

The redevelopment of a former Sears building in Hagerstown, Maryland presented an unusual stabilization challenge: Engineers had determined that the building's exterior wall had effectively become a retaining structure, supporting the roadway above it.

The building along Northern Avenue had been in place since the early 1960s. As plans moved forward to redevelop the site into a new Sheetz convenience store, the structure was scheduled for demolition. During design evaluation, however, Langan Engineering determined the building's exterior wall was helping retain the slope supporting Northern Avenue. Removing the structure through conventional demolition methods could have compromised the roadway above the site.

GeoStabilization International (GSI) was brought into the design phase to evaluate stabilization alternatives before demolition activities could begin. The project included soil nail stabilization and the refacing of two walls with sculpted and stained shotcrete, creating both structural support and an architectural finish for the completed site.

## EXISTING STRUCTURE SUPPORTING ROADWAY

When the Sears building was originally constructed, the grade of Northern Avenue sat approximately 15 to 20 ft (4.6 to 6.1 m) above the building floor elevation. Over several decades, the exterior wall became a load-bearing element for the roadway embankment. As such, before demolition could start, the wall had to be stabilized. The work was particularly unusual, though, because the exterior wall of the

fully standing building had to be stabilized from inside the building before demolition could proceed.

Several site constraints complicated the work:

- Available working space was limited to approximately 20 ft (6.1 m) between the building wall and roadway.
- Active utilities along Northern Avenue required coordination during design and construction.
- Soil nails extending into the roadway embankment required right-of-way permitting and review.
- An adjacent form-and-pour retaining wall also required rehabilitation and aesthetic improvement as part of the redevelopment effort.

The team ultimately expanded the scope to stabilize and reface that adjacent wall as well, addressing both walls under one coordinated effort. The project did not impact Northern Avenue traffic throughout construction.

### DESIGN-PHASE COLLABORATION

GSI participated during design development to help evaluate stabilization options and construction sequencing before demolition began. The project team reviewed multiple approaches intended to balance retained wall height, nail geometry, utility conflicts, permitting considerations, and constructability. The design prioritized maximizing usable land area to minimize land consumed by unusable slopes.

Alternatives considered during design included stabilizing the exposed wall with longer soil nails (with full height backfill behind the wall), using berm configurations to reduce retained wall height, removing soil behind portions of the wall to shorten the wall height (thus shortening the soil nail lengths), and adjusting nail layouts to minimize right-of-way impacts beneath Northern Avenue.

Early coordination allowed the project team to address utility locations and permitting requirements before



*Fig. 2: Crew members sculpt the shotcreted facing to create a natural rock appearance integrated into the retaining wall system.*

mobilization to reduce potential conflicts during construction.

### SCULPTED SHOTCRETE FACING

The sculpted and stained shotcrete scope was not part of the original project plan. During design, the team proposed sculpted and stained shotcrete facing as an alternative to constructing a separate architectural wall or earth berm in front of the stabilization system. The shotcrete finish allowed the structural wall and architectural finish to function as a single system.

Shotcrete was well suited for the site conditions because of its ability to conform to complex geometries without the need for traditional formwork. This flexibility allowed the team to create a finished wall surface while addressing the structural requirements of the soil nail wall system. The ability to place shotcrete directly against the wall face also helped simplify construction sequencing (as compared to approaches that would have required separate forming or additional wall construction).

This approach eliminated the need for a secondary retaining or screen wall, reduced site footprint requirements, increased usable site area for circulation and operations, and produced a finished surface designed to resemble natural rock consistent with the new site design.

The sculpted finish was part of the shotcrete facing, not just a veneer applied after construction. By sculpting and staining the shotcreted concrete surface, the team



*Fig. 3: Crews shotcreted over a reinforced soil nail wall facing during construction.*

created the appearance of natural rock while maintaining the functionality and durability of the retaining system. The final surface also improved the appearance of an adjacent retaining wall that previously had a standard form-and-pour concrete finish.

### CONSTRUCTION AND PROJECT OUTCOMES

By the end of the project, the team stabilized the wall system supporting Northern Avenue, refaced retaining walls with sculpted and stained shotcrete, and created an architectural finish that became part of the redevelopment of the final site design. The completed stabilization system allowed demolition and redevelopment activities to proceed while maintaining full support for the roadway above the site.

The project demonstrated how early collaboration between the engineer of record and specialty contractor influenced both constructability and final site use. Involving the specialty contractor during design also allowed engineering tradeoff analysis to occur before mobilization, rather than during active construction.

The finished wall system combined structural stabilization and architectural treatment within a single installation, eliminating the need for additional retaining or screening walls elsewhere on the site.

### LESSONS LEARNED

The Long Meadow Shopping Center project reinforced the value of early coordination when addressing complex site constraints and eliminating any impacts to Northern Avenue. By bringing GSI into the design phase, the team was able to evaluate stabilization options, permitting considerations, and sequencing challenges before demolition of the former Sears Building, allowing for the site construction to begin safely and smoothly.

The project also showed how soil nail walls with sculpted

shotcrete facing can combine structural stabilization and architectural treatment within a single system. Instead of constructing a separate retaining wall, the finished shotcrete face became part of the final site design while preserving usable space within the development footprint.

Early coordination of utilities, right-of-way considerations, and wall geometry helped the team identify and address potential conflicts before crews mobilized. For constrained redevelopment projects, assessing these factors early helped identify options before work began in the field.



**Mike Close, P.E.**, is a Project Development Engineer at GeoStabilization International with 38 years of experience in civil and geotechnical engineering. He holds both a Bachelor of Science and a Master of Science in Civil Engineering from Michigan State University, with graduate-level specialization in structural and

geotechnical engineering. Mike began his career with the Michigan Department of Transportation, where he focused on bridge design and construction. He later moved into consulting, where he launched a bridge design unit for URS Greiner (now part of AECOM) before spending several years with manufacturers specializing in bridges, retaining walls, and geosynthetic systems — giving him a uniquely broad perspective that spans design, manufacturing, and field application. A licensed professional engineer in Michigan, North Carolina, South Carolina, Virginia, and Maryland, Mike is based in Clayton, North Carolina, where he is an active member of the American Society of Civil Engineers and has served as past president of the Eastern Branch of the North Carolina Section.