Soil Nail Shoring
Secant Pile Shoring

City Creek Block 75
Salt Lake City, UT

MALCOLM
Retention Systems

CONSTRUCTION PERIOD
December 2007 to June 2009

CLIENT
Owner: City Creek Reserve, Inc.
General Contractor: Big-D Construction

SERVICES
96,000 SF Shoring and Underpining with height up to 90 ft including:

- 48,000 SF Soil Nail and Shotcrete Walls
- 21,000 SF Anchored Secant Pile Walls
- 10,000 LF Micropile Underpinning

Project Overview

City Creek is a 20 acre urban redevelopment with five underground levels located in downtown Salt Lake City. Excavation for Block 75, the central six acre segment of this project, required shoring and underpinning in combination with dewatering to support five adjacent high rise commercial buildings and three heavily trafficked city streets around it's perimeter. The excavation extended to 90 ft below street grade (up to 40 ft below groundwater) in soils ranging from dense cobble and gravel to fine grained lakebed deposits. Work was complicated by existing driven pile foundations abandoned in place throughout the site. Shoring was performed in two phases, maintaining operating facilities on the north side until excavation was completed across the southern half of the site.

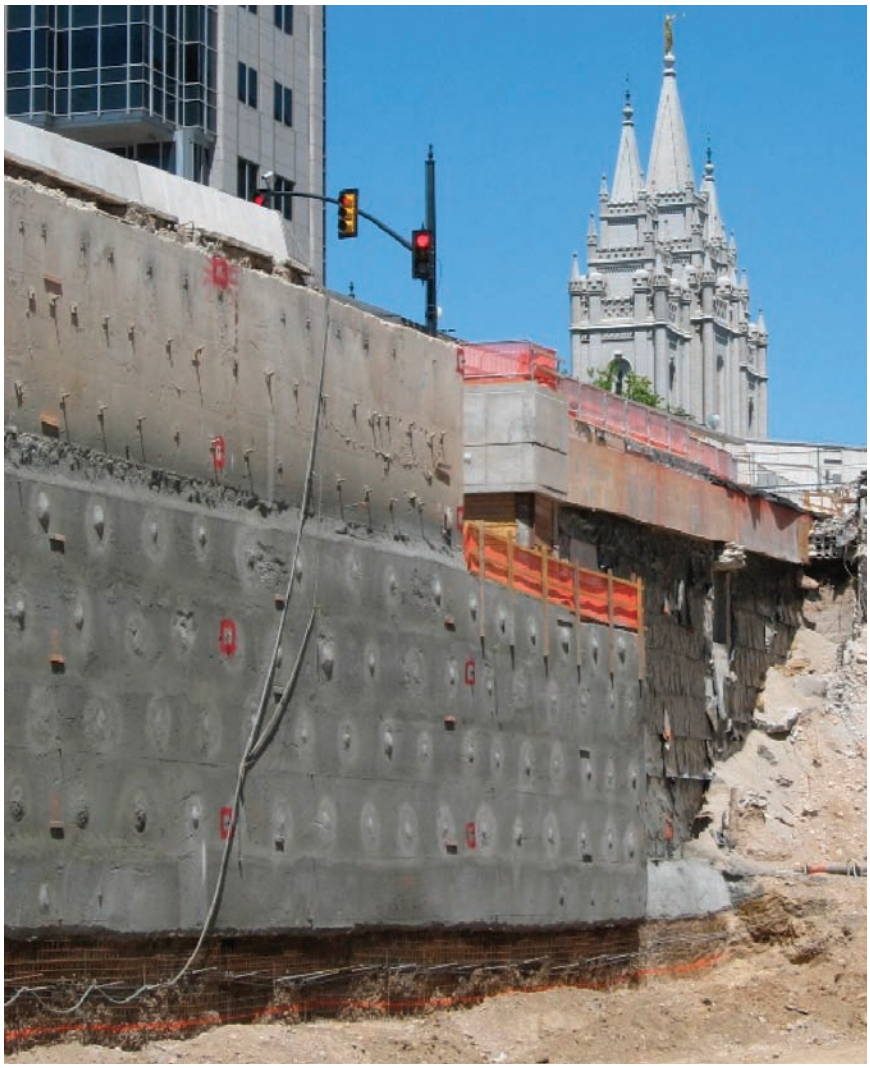
Benefits of Shoring Systems

Soil Nails, Shotcrete & Vertical Nails:

- Flexible shoring geometry
- Small agile equipment
- Stabilized face in raveling ground
- Combined with wellpoints for construction dewatering

Anchored Secant Piles:

- Ground water cutoff system.
- Very stiff shoring limits movement.
- Pile locations can be adjusted around obstructions.
- Jet grouting seal between secant system and existing driven pipe piles.
- Fully stabilized face before excavation.



CONTACT MALCOLM
This job was managed by our Northern California Division in Hayward, California. For a complete list of office locations and technologies, visit **Malcolmdrilling.com**

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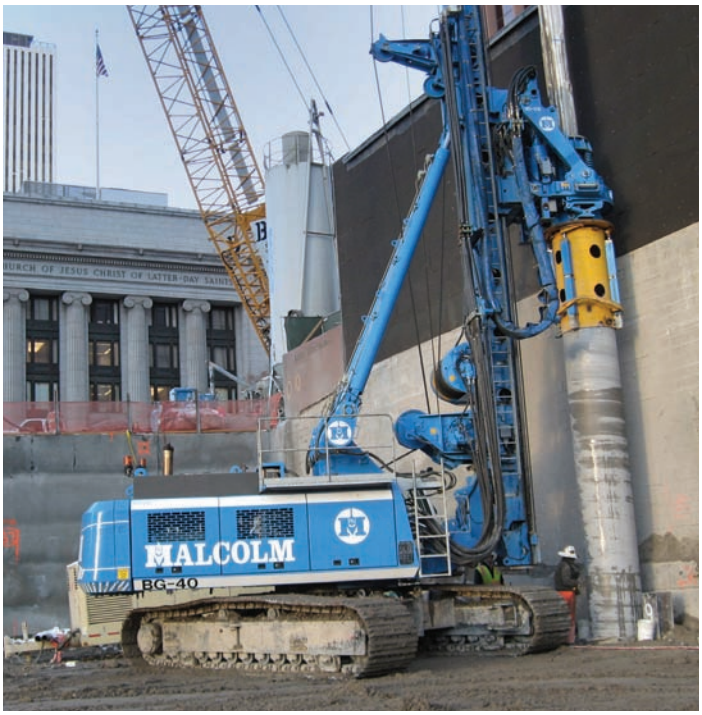
Construction Details

Malcolm Drilling employed a diverse range of shoring techniques on the project. Geometry, soil and groundwater conditions and sensitivity of adjacent structures were evaluated to select the most suitable system for each wall. Soil nails and shotcrete, combined with vertical nailing for face stabilization, were employed along the walls with street frontage. Anchored secant pile walls provided a combined groundwater cut-off system and extremely stiff earth retention system to support the adjacent high rise structures on the northeastern perimeter. Closely spaced micropile underpinning and A-frames were employed to support adjacent structures in limited access areas of west, south and east walls. Where existing subgrade walls were located outside new building footprint they were nailed in-situ. Around the balance of the site perimeter, cantilever, anchored and internally braced soldier pile shoring was applied to match a range of geometric and loading conditions. The shoring was combined with multi-level wellpoint systems for construction dewatering.



Ground Conditions

Variable fill materials extend down to historic foundation level around 25 ft below street grade. Below the fill native sand, gravel and cobbles soils in turn underlain by silty sand and interlayered silt and sand was present throughout the site. The base of excavation extended down into underlying lean interlayered clay and silt. Groundwater was typically encountered at the interface beween sand and gravel and the underlying silty sand.

Quality Control

Extensive instrumentation was installed to verify shoring system performance. Inclinometers, piezometers, strain gages and tiltmeter data, incombination was evaluated throughout the excavation process. In addition, an automated survey system was installed by the owner to continuously monitor deformation of walls and adjacent structures throughout the construction work.

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