

# Deep Soil Mixing CFA Piles

Brickell City Centre  
Miami, FL



# MALCOLM

Ground Improvement

## CONSTRUCTION PERIOD

August 2012 to February 2014

## CLIENT

Owner: Swire Properties

General Contractor: Turner Construction

## SERVICES

125,000 CY Deep Soil Mixing  
(DSM) For Bottom Seal Plug

3,200 LF Permanent Sheet-Pile / DSM Wall

2,406 CFA Piles from 1.5 to 3 FT in Diameter

## Benefits of DSM

- Allows for dry, deep excavations where dewatering is not possible.
- Does not require a native impermeable soil layer.

Reliable and repeatable system key for cost and schedule dependability and project performance.

## CONTACT MALCOLM

This job was managed by the South-East Regional Office in Miami, FL. For a complete list of office locations and technologies, visit [Malcolmdrilling.com](http://Malcolmdrilling.com)

## Project Overview

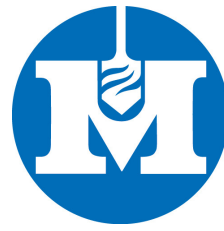
The Brickell City Centre is a large mixed use facility which includes a 5 star hotel, luxury condominiums, and high end retail and office space located in Miami, Florida. The project occupies 3 city blocks (8 acres) and includes 2 levels of below grade parking; a rarity in South Florida. Additionally, two tunnels were constructed below city streets to expand underground parking and allow for traffic to travel below grade across the entire footprint of the property.





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### Construction Details

After evaluating competing options of ground freezing and tremie seal to create a dry excavation, the owner accepted Malcolm's proposed Deep Soil Mixing system (DSM) solution for the project. The DSM bottom seal, or "plug," is comprised of overlapping soil mix columns extending to depths below the bottom of the planned building excavation. In constructing this plug, every square inch of the site was treated with DSM. A sheet pile wall was installed in wet DSM columns to act as both, the support of excavation and permanent foundation wall. Continuous Flight Auger (CFA) piles, one-third of which extended to depths beyond 100 feet were installed with Malcolm's BG50 hydraulic drill rig, the largest and strongest fix mast drill of its type in the world. Top down construction was used to build the larger of the two tunnels on the project which extended the full width of South Miami Avenue; a major Miami transportation artery. The second tunnel was constructed in cut and cover fashion using temporary bridges to maintain traffic flow.

### Ground Conditions

The project site, approximately one half mile from Biscayne Bay, is low lying with a preliminary grading of approximately +5 feet NGVD. Porous limestone layered with sand is present from the surface. Groundwater exists immediately below the surface and flows horizontally through the vuggy limestone and sand.

### Quality Control

The tools used for soil mixing ensure that the entire diameter of the soil mix column is broken up and mixed with grout creating excellent homogeneity of the soil-cement below the site. Electronic monitoring data is provided in real time to operators of both the DSM drill rigs and the grout plants. This data is recorded and analyzed by Malcolm's engineering team to check for conformance with the installation criteria. Core samples are extracted once the soil mix has cured on both random and specifically targeted DSM columns to ensure a high quality DSM plug has been installed well in advance of the excavation.

