Secant Pile Walls

Mitchell Interchange
Milwaukee, WI

MALCOLM
Retention Systems

CONSTRUCTION PERIOD
November 2010 to October 2011

CLIENT
Owner: Wisconsin Department of Transportation
General Contractor: Lunda Construction

SERVICES
1,500 EA 4 ft in diameter Cased Secant Piles for 3 cut and cover tunnels

40 EA Secant Piles installed in low overhead condition

Benefits of Secant Pile Shoring System

- Fully-cased drilling methods provide stable excavation support and control ground water infiltration
- Powerful Rotary Drilling equipment allows construction in difficult and variable geotechnical conditions
- Rigid Shoring System with reinforced piles does not require internal bracing

Project Overview

As part of the I-94 North-South Corridor reconstruction program, the Wisconsin Department of Transportation redesigned and enlarged the Mitchell Interchange in Milwaukee, Wisconsin. Located on the south side of Milwaukee near Mitchell International Airport, the Mitchell Interchange interconnects I-94, I-43 and I-894. The main contract involving reconstruction of the core of the Mitchell Interchange was awarded in the summer of 2010, and was completed in 2012. The core contract included construction of three cut and cover tunnels along two system interchange ramps. Construction of the three tunnel structures was on the critical construction path. The contract schedule required the tunnels to be open to traffic by the end of 2011, approximately 1 year after notice to proceed.

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

Secant Pile Walls

Mitchell Interchange
Milwaukee, WI

MALCOLM
Retention Systems

Construction Details

All three tunnel structures consisted of two opposing walls constructed in a top down manner utilizing 4 foot diameter secant piles installed on 3.5 foot spacing. In order to eliminate the requirement for tiebacks, each shaft of the secant pile wall included one reinforcing cage. Rectangular rebar cages were utilized for the “Primary” secant piles to allow enough clearance for the overlapping “Secondary” secant piles which were reinforced with a typical, circular rebar cage. Powerful Bauer BG40 drill rigs were utilized to install sectional drill casing ahead of the shaft excavation ensuring shaft stability. The majority of the secant shafts were installed within close proximity to active freeway traffic and in one location a series of secant piles were constructed below high voltage transmission lines. At this location a casing oscillator was used in conjunction with a LoDril machine (low clearance and extended reach), to accomplish the fully cased secant pile installation.

Ground Conditions

The subsoil conditions within the project area are referred to as the “Oak Creek” formation typically consisting of a fine-grained silt and clay till with a variable mixture of sand, gravel, cobbles, and boulders. Interbedded lacustrine, outwash, and ice-margin deposits were also encountered. Design phase pump tests confirmed that groundwater, located as high as 20 feet above the tunnel invert slabs could not effectively be dewatered. The area is underlain by dolomite bedrock which was unexpectedly encountered in some of the lowest secant pile installations.

Quality Control

Tight installation tolerances were maintained by continuously monitoring the verticality of the temporary casing as it was installed. A concrete guide-wall was installed prior to secant pile installation to ensure that construction tolerances were met and that the proper overlap of adjacent shafts was maintained thus preventing groundwater from entering the excavation. Approximately 10% of all piles were tested using Crosshole Sonic Logging which confirmed that no mitigation of the secant piles was required.

Look to the Blue at Malcolmdrilling.com