Secant Pile Wall

The Palazzo Resort Hotel & Casino at the Venetian. Las Vegas, NV

MALCOLM
Retention Systems

CONSTRUCTION PERIOD
November 2004 to December 2005

CLIENT
Owner: Venetian Casino Resort, LLC
Construction Manager: Taylor International

SERVICES
1,134 EA Secant Piles
523 EA Permanent Tiebacks
900 EA Temporary Tiebacks
145,000 SF exposed shotcrete face
769 EA Drilled Shafts – 3 to 8 FT Dia.

Benefits of a Secant Pile Wall Design

- Provide stable excavation support
- Allow dewatering of the interior
- Avoid dewatering inducted settlements to adjacent structures

Project Overview

In 2004, Malcolm Drilling Company, Inc. was awarded a design build Secant Pile Wall excavation support system which encompassed an 11-acre site that would accommodate a 52-story Hotel/Casino/Resort (Venetian's 2nd Tower, "The Palazzo") over a 3-level underground parking garage. Shortly after the Secant Pile Wall award, Malcolm was awarded the drilled shaft foundations which would eventually support the massive structure.

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

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Construction Details

Due to the compressed schedule, Malcolm Drilling Company, Inc. utilized three of the largest and most modern top drive drill rigs, Bauer BG-40s, for the installation of the Secant Pile Wall working 3 shifts around the clock. At its peak production, Malcolm averaged 7 secant piles per drill rig per shift.

Klemm drill rigs were used to install the tiebacks for the Secant Pile Wall. Depending on the site logistics and availability, MDCI had 1, 2 or 3 crews installing the tiebacks. MDCI installed up to 25 tiebacks per drill rig at its production peak. MDCI used two Bauer BG 40's to install the Drilled Shaft Foundations, working night shifts for the majority of the drilled shaft work to avoid a multiple-contractor congested jobsite and extreme weather conditions during the hot summer days. MDCI managed to drill and place approximately 1,300 cubic yards of concrete per shift at its peak production, averaging about 500 cubic yards per drill rig per shift.

Ground Conditions

The soils beneath the site generally consisted of deep geologically unconsolidated sediment profiles, and weak, coarse-grained/fine-grained compressible soils such as clayey sand, silty sand, sandy clay, silty clay and clayey gravel and with a shallow groundwater table (20-25 feet). Thin to thick lenses of weakly to strongly cemented soil (caliche) was also encountered throughout the soil profile; however, the caliche lenses were variable in thickness, discontinuous and less frequent at depths greater than approximately 30 to 50 feet.

Quality Control

In order to keep the secant piles within the required stringent tolerances and to ensure proper pile overlap, MDCI applied the following procedures:

- Accurately surveyed and installed a "Secant Pile Guidewall" using pre-fabricated steel forms;
- Employed a full-time surveyor to locate the piles to be installed on a daily basis;
- Installed the piles using temporary sectional casings to maintain a rigid and straight guide down the hole;
- Continuously checked the casing's verticality as the hole advanced;
- Checked and verified pile verticality using an inclinometer instrument that was lowered down into the drilled hole to measure the pile's actual deviation.

Tieback pockets were accurately located and pre-fabricated into the secant pile structural steel beams. Once the excavation proceeded, the tieback pockets were located using survey and the tiebacks were installed. MDCI employed a full time quality control field engineers to keep detailed construction records and ensure the above procedures were implemented throughout the project.

Look to the blue at Malcolmdrilling.com