General Contractor Hayward Baker Inc., Alpharetta, GA, USA +++ **Anchor Installer and Precast Pad Manufacturer** Hayward Baker Inc., Alpharetta, GA, USA +++ **Retrofit Wall Engineer** D'Apollonia, Monroeville, PA, USA
DSI Unit DSI USA, BU Geotechnics, Toughkenamon, PA, USA
DSI Scope Supply of 345 Permanent DYWIDAG Strand Anchors or 125,000m of strand and rental of stressing equipment; supply of eight DYNA® Force Sensors and supervision of measurements

DYNA® Force Load Monitoring Sensor for Strand Tieback Retaining Wall

The Patton Creek shopping center was opened in 2004 in Hoover, Alabama. The center was built to satisfy the increasing demand for shopping facilities in one of the fastest growing cities in Alabama.

Patton Creek mall, with approximately 55,750m² of commercial space, has several buildings located near a very tall, steep slope that ends at the Patton Creek shoreline. The original development stabilized the slope with a 500m long crib wall that is up to 15m tall. During recent years, field inspections and consequent studies discovered that the wall was showing signs of slow movement.

The experienced contractor Hayward Baker was hired to do engineering, general construction, and subcontract work for a design-build wall retrofit. The theoretical failure plane of the slope was far behind the wall face. The contractor decided that the best method was to use very long (27m to 65m) tiebacks, anchored 13m behind the theoretical plane. 345 type 9x15.2mm strand anchors with double corrosion protection were installed at different wall heights. They were stressed to 80% of strand ultimate strength or 2,342kN and the anchor load was transferred through a bearing plate placed against very large precast concrete pads. This method allowed the load to be spread over a large area of the wall, preventing punching shear of the crib units. The anchorage was encapsulated with a galvanized cover cap and fully cement grouted after installation.

Eight DYNA® Force elasto magnetic sensors were installed at different wall locations on the stressing length of the eight anchors. The sensor is placed and taped over one strand and the leading wire protruding from it is left long enough to be easily accessible for future readings. The sensors were used as an additional load control during proof test and lock-off load transfer and will serve as the future anchor load monitoring system.

Measurements taken during the test matched the equipment pressure gauge and, 4 hours and 28 days later, showed that the anchors and the wall behaved as expected. The robust DYNA® Force Sensor can be easily installed and also provides a reliable anchor load monitoring system.

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