Earth Retaining Structures

Earth Retaining Structures (temporary and permanent) are key assets in our nation's infrastructure system. They are used by both public agencies and private entities in all 50 states. Permanent retaining structures have target design lives of 50 to 100 years but often require maintenance and preservation work to fulfill their intended purpose.

We specialize in:

Externally Stabilized Walls

- Cantilever Walls
- Secant Pile Walls
- Sheet Pile walls
- Soldier Pile-Lagging Walls
- Slurry Walls
- Braced and Anchored Walls

Chemical Walls

- Soil Mix Walls
- Jet Grout Walls

Gravity Walls

- Concrete Walls
- Crib Walls
- Bin Walls
- Gabion Walls

In-Situ Reinforced Walls

- Mechanically Stabilized Earth (MSE) Walls
- Soil Nail Walls
- Micropile Walls

Geocomp has worked on many projects across the United States which involve all types of earth retaining systems. Our clients include Federal and state agencies, including departments of transportation; contractors; A&E firms; wall suppliers; and private developers. Our services include:

- Design and review of temporary and permanent retaining walls and other earth retention systems.
- Field inspection services for construction of retaining systems.
- Independent, third-party reviews of earth retention system submittals for system suppliers.
- Site investigation and characterization.
- Analysis and design using state-of-the-art computer models.
- Forensic investigations of failed or distressed systems.
- Independent reviews, evaluations, and field assessments (design, construction, as-built conditions).
- Prediction of remaining structural service life through geostructural, reliability, and statistical analyses.
- Development and implementation of risk management and risk-based asset management programs.
- Recommendations for targeted remediation to extend service life.
- Development and implementation of real-time performance monitoring systems to warn of developing problems.

Geocomp offers a unique suite of geostructural/geotechnical services and products to assist our clients in identifying and managing risk. Our experts in design and analysis, performance monitoring, and project risk assessment help clients find innovative solutions to minimize potential impacts to cost and schedule early in the project life cycle. We pride ourselves on providing high quality products and top-notch client service with support of our talented and multifaceted staff.

Earth Retaining Structures

Representative Project Summaries

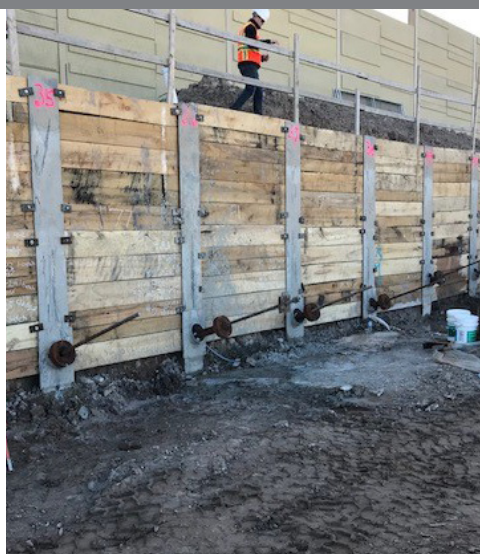
THE COLONY AT WHITE PINE CANYON, PARK CITY, UT

Geocomp was retained to determine the extent and impact of corrosion on steel reinforcements on the service life of more than 70 degrading MSE structures in a 4,400 acre mountain slope luxury residential development after some showed signs of distress. We conducted field and laboratory investigations to measure the corrosion rate of the steel reinforcements and electrochemical properties of the MSE backfill materials. Using this information, Geocomp performed advanced statistical and reliability-based analyses to estimate remaining service life of the MSE walls. We also provided viable and cost-effective rehabilitation solutions as well as design support and construction quality assurance services for wall remediation to save the developer millions of dollars. In addition, Geocomp provided expert services to our client for litigation.

NCHRP MSE WALL STUDY

Geocomp designed, built, and monitored four full scale MSE walls to demonstrate the effects of using reinforced backfill with high fines content. We developed guidelines for the selection of fill materials in reinforced soil structures as a part of the National Cooperative Highway Research Program (NCHRP) Project 24-22. These guidelines help designers make informed selections of soil parameters, testing methods, and construction specifications for MSE walls using marginal reinforced backfills. This project showcases the combined capabilities of Geocomp, including design, laboratory testing, instrumentation installation and monitoring, numerical modeling, and engineering analysis, which allowed us to analyze the behavior of the retaining wall structures. The results helped save money by using onsite materials to construct MSE walls.

WISDOT SOLDIER PILE-LAGGING WALLS, WI



Geocomp investigated the short-term and long-term performance of several soldier pile and lagging walls most commonly built by the Wisconsin Department of Transportation (WisDOT). This investigation included instrumentation and monitoring (both during and after construction) to measure lateral wall deflection profiles, lateral earth pressure profiles, and ground settlement. In addition, Geocomp established a comparison of measured retaining wall movement versus estimated wall movements generated from commonly used analytical methods and computer programs. Geocomp is developing recommendations for modifying existing design methodologies at WisDOT to yield better field performance and cost savings.

Earth Retaining Structures

Representative Project Summaries

COX TOWER, ATLANTA, GA

Geocomp helped finalize the support of excavation design using soil-structure-water interaction analysis for a 2.2 million-square foot employment hub in Atlanta with a 20 story tower and seven levels of underground parking. Construction required an 81 ft deep excavation and dewatering system to lower the water table by 40 ft. Finite element analyses performed by Geocomp on selected wall sections helped validate the Contractor's design and provided predicted movements to help establish alert levels for all monitoring points. Our work helped save the project from delays and cost overruns.

STATE FARM CENTER, ATLANTA, GA

Geocomp performed soil-structure-water interaction finite element analyses for a 50 ft deep solider pile and concrete lagging wall. Wall movement tolerances were controlled by the close proximity of an active, elevated MARTA commuter rail line located within 15 ft of the excavation. The excavation support wall was temporarily supported by tiebacks and wall loads were transferred to interior basement floor slabs for the permanent condition. Geocomp also monitored lateral movements, rotation, settlement, vibrations, and air overpressure during construction. Our work helped keep the impacts of the new construction on the existing MARTA structure to a minimum.

HARVARD UNIVERSITY ALLSTON SCIENCE COMPLEX, MA

Geocomp designed and installed an extensive instrumentation system to monitor wall, ground, and structure movements for a nearly 6 acre area with a 48 ft deep excavation into clay in an urban environment in Boston, MA. Construction began with the installation of deep, reinforced slurry walls to provide retaining support to the excavation. Geocomp also monitored the construction of the slurry wall support-of-excavation system, provided recommendations for controlling wall movements during excavation, and interpreted monitoring data. Our work helped keep the project construction on schedule and reduced the risk of negative impacts to adjacent structures.

Earth Retaining Structures

Representative Project Summaries

EAST SIDE ACCESS–TUNNELS, QUEENS, NY

Geocomp designed temporary soldier pile and lagging walls for several new bridge abutments. The walls supported active train lines and highway traffic lanes and were braced with a combination of rakers and struts bolted to adjacent structures. Geocomp developed three-dimensional finite element models to predict wall, ground, and adjacent structure displacements so effects on the existing structures could be minimized. Our work helped to ensure that impacts to nearby critical structures would be minimalized, saving the contractor time and money.

ELLIS SQUARE PARKING GARAGE, GA

Geocomp was retained to investigate the cause of damage to adjacent structures during excavation for a deep basement next to several structurally sensitive, historical buildings. Geocomp designed and installed an instrumentation monitoring system to determine wall deflections and assess the associated ground movements. The cause of the deflections was identified and Geocomp assisted with the design of a remediation technique, involving the installation of deep soil anchors and a soil-mix buttress to minimize additional displacements of the sensitive adjacent structures. Excavation was completed and the project was built without any further damage to the surrounding structures. Geocomp also assisted with the client claim for differing site conditions. Our work allowed the project construction to proceed with minimal delays, saving the client from additional delays and cost over-runs.

EAST SIDE ACCESS–SUNNYSIDE YARD JACKING AND RETAININGS WALLS, QUEENS, NY

Geocomp designed several jacking and receiving pits for the relocation of utility pipes under the Sunnyside railroad in Queens, NY. The relocated 4 ft diameter pipes were installed using pipe jacking from several deep pits. Geocomp designed sheet pile support of excavation and reinforced concrete thrust blocks for the construction of the pipe jacking pits. The pipe segments were jacked 300 ft to a receiving pit below active train rail lines. Geocomp used finite element models to optimize the designs and minimize the impacts on the above ground running rail tracks, allowing trains to keep running while progressing the construction.