GP3®

# MSE Walls BR-1 and BR-2 Support at the Mall of San Juan

## San Juan, Puerto Rico

**The Geopier system was installed at the Mall of San Juan to improve soft, compressible backfill materials beneath two MSE walls. The piers improved the bearing capacity and settlement response of the backfill soils and increased the factor of safety against global stability.**

**Description:** The new Mall of San Juan project required improvements to the existing state road PR-8 east bound by including an overpass bridge with two Mechanically Stabilized Earth walls at each abutment (identified as BR-1 and BR-2). The MSE walls have a maximum height of 23 feet and width of 61 feet. The main geotechnical concerns were performance of the MSE walls built over soft foundation soils encountered along the bridge alignment and over-stressing of the piles supporting the bridge foundations.

**Subsurface Conditions:** The wall alignment partially passed over a wide trench for a 42-inch diameter sanitary pipe line. The backfill for the pipe was described as soft silty clay fill with an undrained shear strength of 500 pounds per square foot. The backfill extends to depths of 15 to 20 feet and is underlain by stiff to very stiff native clay. Groundwater table was observed from 10 to 11 feet below existing grade.

**Geopier Solution:** A grid of Geopier elements was installed beneath the footprint of the wall in the areas where the soft backfill was encountered, fully penetrating through the compressible soil. The pier spacing was selected by modeling the soil geometry and soil strata with a limit equilibrium approach until obtaining minimum factors of safety 1.5 against global instability for the static condition, and 1.2 for the pseudo-static condition.

Fig. 1 Constructed MSE Walls

The spacing of the piers depended heavily on the wall height. The closest pier spacing was 4 feet center-to-center at the abutments and around the driven piles, to stiffen the matrix soil and prevent downdrag. Two field modulus tests were performed to confirm pier stiffness and both tests results were favorable.

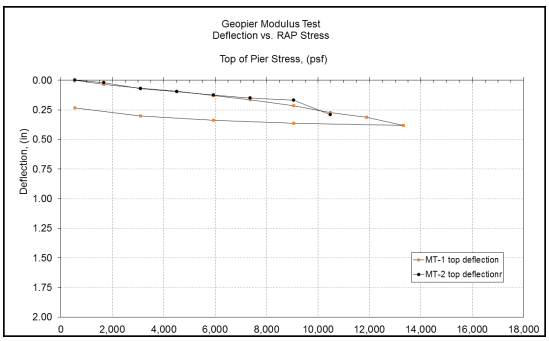


Fig. 2 Modulus Test Results

## PROJECT TEAM

**Geotechnical Consultant:** Geo Cim, Inc. (PSC)

**Designer:** Atkins Caribe

**Contractor:** Constructora Santiago II, Corp.

**Geopier Installer:** MR Drilling

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