

Mechanically Stabilized Earth Wall Study

Client:

Transportation Research Board of the National Academies

Location:

MA

Services Provided:

- Synthesized current MSE wall practice from the literature
- Surveyed state transportation agencies regarding current MSE wall practice
- Designed, constructed and monitored full-scale test walls
- Prepared final research report

Value Provided:

- Our research concluded that “high fines” soils can be safely used as reinforced fill and decrease the cost of MSE wall construction.

Background & Project Challenges

The objective of National Cooperative Highway Research Program Project 24-22 was to develop selection guidelines, soil parameters, testing methods, and construction specifications that will allow the use of a wider range of reinforced fill materials within the reinforced zone of mechanically stabilized earth (MSE) walls.

A full-scale field test (4 wall sections with varying percent fines) was conducted in order to establish properties for “high fines” reinforced soils and associated design controls that give acceptable MSE wall performance. This “first of its kind” field test included provisions to demonstrate (1) the role of pore water pressure in the reinforced fill and (2) the importance of including a positive drainage system to obtaining good wall performance. The walls were designed so that they would yield acceptable performance for the normal design conditions, but experience excessive deformation when subjected to additional surcharge loading and high pore pressures.

The performance of the walls was monitored real-time 24/7 from October 2005 through August 2007. An extensive system of instruments and sensors were read multiple times daily, with real-time data relayed to Geocomp’s *iSiteCentral*™ web-based reporting service via cell phone/modem. The data was accessible via web browser and provided the project team with up-to-date process readings plotted in engineering units. One benefit of this extensive real-time monitoring program was to identify the effects of environmental changes, such as temperature and rainfall on the performance of the walls to a degree of detail not previously possible.

Geocomp Role & Accomplishments

Our survey of MSE wall practice indicated that there are records of both successful and failed walls constructed using “high fines” and/or “high plasticity” soils in the reinforced zone. Those walls with stability problems appeared to have high water pressures in the reinforced zone that led to excessive deformation or collapse.

Our survey of state transportation agencies indicated that, with only a few exceptions, they currently conform with AASHTO requirements regarding material type and properties of reinforced fill for MSE walls.

Geocomp concluded that the current AASHTO limit on maximum fines content of the reinforced fill for MSE structures can be increased from 15 to 25%, provided the properties of the materials are well defined; and controls are established to address the design issues and limit the development of positive pore water pressures in the reinforced fill. Recommendations to revise current AASHTO specifications to include use of backfill materials with “higher” fines were provided.

