

Primer on

Mechanically Stabilized Earth Walls

Introduction

Mechanically stabilized earth (MSE) walls are engineered earth retaining structures comprised of pre-fabricated wall facing elements and a soil mass that is reinforced with metal or geosynthetic materials. By definition, they have facing batters less than 20 degrees from vertical. The complete MSE wall relies on self-weight to resist the destabilizing earth forces acting at the back of the reinforced soil zone. Having been used in North America since the 1970s, they are now a mature technology and are used frequently in transportation-related civil engineering applications.

MSE Walls vs Reinforced Soil Slopes

In general, MSE walls are distinguished from reinforced soil slopes (RSS) by the inclination of the facing:

- MSE walls are inclined steeper than 70 degrees from horizontal.
- Reinforced soil slopes are inclined flatter than 70 degrees from horizontal.

Brief Overview of Mechanically Stabilized Earth Theory

Internal earth pressure from the reinforced soil behind the wall facing is transferred to the soil reinforcement through the connections with the facing. The tension is then transferred to the reinforced soil beyond the active soil wedge through frictional resistance and bearing against ribs or transverse members if present. In this way, the facing, soil reinforcement and the reinforced soil act as a flexible block, depending on the reinforcement type and provided the soil reinforcement spacing is regular and sufficiently close. Figure 1 schematically depicts the load transfer scenario described here. As a block, the MSE structure uses self-weight, similar to conventional masonry or cast-in-place concrete gravity walls, to resist external earth pressures that would tend to slide or overturn lighter walls.

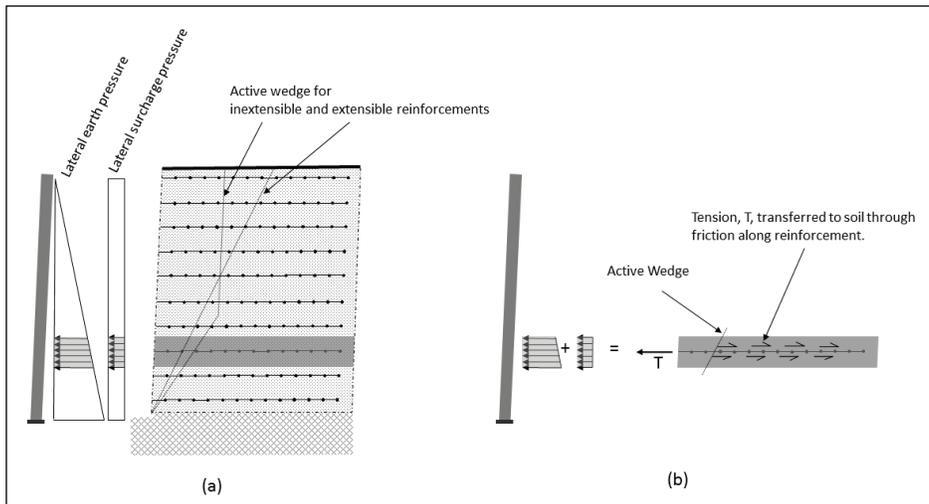


Figure 1: Free-body diagram of load transfer in an MSE wall (CFEM, 2006)

MSE Wall Types

MSE wall types can be categorized based on soil reinforcement type and facing type:

- Soil reinforcement materials can be divided into inextensible and extensible types.
- Facing types can be categorized based on element shape, material or construction staging:
 - modular or full-height elements,
 - single-stage or two-stage, and
 - concrete (wet-cast or dry-cast) or wire-frame.

Transportation related MSE applications most frequently use facing elements made from modular concrete panels or blocks.

More Information

This primer is based on the Transportation Association of Canada publication *Design, Construction, Maintenance and Inspection Guide for Mechanically Stabilized Earth Walls*, which readers can purchase from TAC's online bookstore at www.tac-atc.ca.

Disclaimer

Every effort has been made to ensure that this primer is accurate and up-to-date. The Transportation Association of Canada assumes no responsibility for errors or omissions. The primer does not reflect a technical or policy position of TAC.

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