

**GSI W-2 Webinar Entitled:
“MSE Wall Back Drainage Design”**

Webinar Overview

Within GSI’s data base of 171 failed mechanically stabilized earth (MSE) walls reinforced with geogrids or geotextiles, 60% have failed due to water. Furthermore, 61% have been constructed with fine grained silt and/or clay soils. Taken together, these low permeability backfill soils do not drain easily and instead build up hydrostatic pressure leading to the large number of failures.

In order to avoid such pressures, back drainage is necessary between the reinforced and retained soil zones. This webinar is focused entirely on the proper design of this back drainage zone and its outlet system beneath the reinforced soil zone. The design is applicable to sand as the back drainage material, however, its near vertical orientation lends toward geocomposite drainage systems. Ten different geocomposites will be tested for their transmissivity and illustrated in the four numeric examples that are presented. In all cases a flow rate factor-of-safety is developed and analyzed accordingly.

Learning Objectives

Participants will understand how internal and external water enters and acts upon the reinforced soil zone of MSE walls when constructed with low hydraulic conductivity silt and clay soils. The avoidance of hydrostatic pressure using geocomposite drains is the key in this regard. Technically, proper flow rate factor-of-safety calculations will be formulated by comparing allowable flow rates (using a transmissivity test) with required flow rates (using a finite difference approach). Numeric examples are presented to specifically illustrate the design process.

Webinar Benefits

- (i) Appreciate that the large number of MSE wall failures are hydraulically driven
- (ii) Understand that back drainage must accompany the use of fine grained backfill soils
- (iii) Learn “flow through porous media” concepts in the form of finite difference equations to result in a required flow rate
- (iv) Learn about the necessary transmissivity procedure to obtain an allowable flow rate
- (v) Examine how the flow rate factor-of-safety varies with the different types of geosynthetic drainage materials
- (vi) Learn about various outlet options for water collected in the wall’s back drain

Intended Audiences

Owners of MSE walls, berms and slopes in both the public and private sectors; federal, state and regional geotechnical, transportation, and environmental engineers; engineers from municipal districts and townships; private and municipal land developers, architectural and landscape

designers; general civil consulting engineers; testing laboratories servicing these organizations; manufacturers and representatives of geosynthetic materials; contractors and installers of MSE walls, berms and steep soil slopes; academic and research groups; and others desiring technically related information on this important aspect of our constructed infrastructure.

Specific Topics Covered

1. Introduction and Background
2. Seepage Forces
3. Avoiding Seepage Pressure
4. Flow Rate Factor-of-Safety Calculations
5. Back Drainage Comments

Webinar Instructor

Dr. Robert M. Koerner's (Professor Emeritus of Civil Engineering at Drexel University and Director Emeritus of the Geosynthetic Institute) interest in geosynthetics spans over thirty years of teaching, research, writing and advising. He holds his Ph.D. in Geotechnical Engineering from Duke University. He is a registered Professional Engineer in Pennsylvania, a Distinguished Member of ASCE, a Diplomate of the GeoInstitute and a member of the National Academy of Engineering. Bob has authored and co-authored about 650 papers on geosynthetics and geotechnical topics in journals and at national and international conferences. His most widely used publication is the sixth edition of the textbook entitled "*Designing with Geosynthetics*". He is the founding director of the Geosynthetic Institute which is a nonprofit research and development organization dedicated to the proper use of geosynthetics in its myriad applications. The institute also provides laboratory accreditation and inspection certification programs.