

ASK THE EXPERT

FAQ

MECHANICALLY STABILIZED EARTH (MSE) WALLS & SLOPES



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MSE Walls & Slopes

1. QUESTION

Why are mechanically stabilized earth (MSE) walls and slopes commonly used in several industries?

ANSWER

With the constant need for property development and the rapid increases in land costs, resolving grade separation challenges has become increasingly necessary. MSE walls and slopes are cost-effective, easy-to-construct systems that can tolerate large settlements and are rugged and durable.

2. QUESTION

What materials make up an MSE wall or slope system?

ANSWER

Facing materials: These are the visible-facing materials that form the outer layer of the wall or slope. They can be made of a wide range of materials, such as concrete panels, modular blocks, welded wire forms, geocells, silt socks, geogrid, or erosion control blankets. Almost all slope applications can be vegetated to help with carbon sequestration, retain runoff, reduce carbon footprint, and provide sustainable development.



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- **Reinforcement materials:** These are the materials that provide the structural support for the wall or slope. They include geosynthetic materials such as geogrids or geotextiles, metallic strips, or soil anchors with tendons. Geogrids are highly advantageous when dealing with granular backfill with highly alkaline materials.



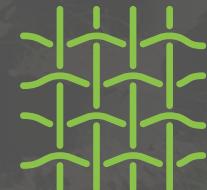
- **Fill materials:** Backfill material typically consists of free-draining granular material or select on-site soils in the reinforced zone. This material is placed in lifts and compacted into place between layers of reinforcement. Various on-site soils can be used but special consideration is required, typically adding extra drainage layers throughout the system. The functionality and project requirements determined by the engineer will typically dictate whether on-site soil or granular soil should be used.



- **Drainage materials:** Drainage material is placed within MSE systems to facilitate drainage. They are highly recommended when conditions of high water table or excessive water seepage from the backcut slope exist. These materials consist of perforated pipe, geocomposites, or clear stone wrapped in a geotextile.



- **Geogrids:** Geogrids are typically made of high-strength polymers or fibers that can provide a strong and durable reinforcement element for the MSE wall or slope. In addition to their resistance to alkaline soils and UV resistance, they are also flexible, easy to work with, and cost-effective.



3. QUESTION

What key factors affect the structural integrity of an MSE wall or slope?

ANSWER

There are several factors that can threaten the integrity of an MSE wall or slope structure. These include:

- **Soil Bearing Capacity:** The bearing capacity of the soil refers to the maximum load that the soil can support without failure. If soil bearing capacity is insufficient, soil improvement or remediation may be necessary to provide adequate strength. Some techniques can include the removal and replacement of soft soils, incorporating a matrix of geogrid and compact granular layers, or deep foundation solutions to support the weight of the MSE wall or slope.



- **Soil Drainage:** Soil drainage can affect the stability and long-term performance of the MSE wall or slope. Poorly drained soils can lead to water build-up, increasing the lateral pressure, and reducing the stability of the structure. A drainage system may need to be incorporated into the design to manage runoff and prevent water build-up.



- **Seismic Activity:** Seismic activity, such as earthquakes, can cause the ground to shift and can potentially damage the MSE wall or slope structure.



4.

QUESTION

What should be considered during the design and construction phase to mitigate the factors that can threaten the structural integrity of MSE walls and slopes?

ANSWER

- **Ensure proper site evaluation and design:** Proper design is critical for the stability of an MSE wall or slope structure. Engineers must carefully evaluate the site conditions and select appropriate reinforcement elements and construction techniques to ensure a stable and durable system. Take the settlement and bearing capacity of the foundation soils into consideration.



- **Ensure proper drainage:** Proper drainage is critical to prevent water buildup and erosion, which can weaken the structure. Engineers should incorporate appropriate drainage techniques into the design, such as drainage blankets, pipes, or French drains.



- **Ensure proper seismic design parameters:** If the project site is located in an active seismic zone, engineers must design using the proper seismic parameters for that specific region to mitigate the risk of failure during a seismic event.



5. QUESTION

What should be done after construction to ensure the long-term performance and durability of an MSE wall or slope?

ANSWER

- **Proper Construction Techniques & Quality:** Proper construction techniques and quality control can ensure the long-term performance and durability of the MSE wall or slope. Proper compaction and proper installation of geosynthetic reinforcement, such as maintaining tension throughout the geogrids and installing drainage systems, are key.
- **Performance Monitoring:** Regular monitoring can help engineers identify any potential issues with the MSE wall or slope and take corrective action. This can include monitoring for settlement, deformation, cracks, or drainage issues. Monitoring can be done through visual inspections, and instrumentation such as strain gauges or settlement plates, or through automated monitoring systems.
- **Proper Maintenance:** Proper maintenance of the MSE wall or slope can also help ensure long-term performance and durability. This can include regular inspection and cleaning of drainage systems, repair of any damage or deterioration, and replacement of any failed or damaged geosynthetic reinforcement.



6. QUESTION

How can Titan assist engineers in determining the best MSE wall or slope structure for their project?

ANSWER

Titan's in-house MSE technical team provides value-added site-specific consultation service, coupled with preliminary designs, stamped construction drawings and specifications, ensuring that the recommended system meets performance criteria and regulatory standards. As the project progresses into the construction phase, our MSE team will provide hands-on, on-site support to ensure the installation crew has a solid understanding of how the MSE system is built.



Abe Choi has a background in geotechnical engineering with over 17 years of design, sales, and project management experience focusing on Mechanically Stabilized Earth (MSE/RSS) wall and slope systems. He brings vast technical product knowledge and a keen understanding of engineering design to meet customer needs on their construction project and leads Titan's technical support team for Titan's extensive geosynthetic and civil construction product offerings.

- Technical talks on MSE systems
- Site specific consultation on system selection
- Installation support



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