

Gabion Basket Retaining Walls

Gabion baskets retaining walls may be used as the flexible facing (visible) component of a reinforced soils system, such as a mechanically stabilized earth (MSE) wall. Gabions, together with a filter material, may be used to prevent the soil from raveling out between rows of reinforcement. Additionally, gabions play a minor structural role in the stability of the structure. Because gabions are made primarily of natural stone, they can be used to blend into the environment. Gabions may also be used as monolithic gravity mass retaining wall structures, which are ideally suitable for erosion control, slope protection and site stability. The gabion baskets are typically made of compartmented rectangular containers (baskets) made of galvanized or PVC-coated (to prevent corrosion) steel hexagonal wire mesh filled with stone.



Relation to Adaptation and Resiliency

Addresses the increased risk of landslides, land subsidence and erosion washing away transportation infrastructure.

Benefits

Gabion walls are flexible and can deform and adapt to wall movement while maintaining stability. For this reason, gabion walls are particularly useful in seismically active areas or other areas subject to vibration, such as by trains. Gabions can be made on site using local labor and can be built without heavy lifting equipment. This is particularly beneficial for remote sites.

Limiting Factors (Constraints)

Gabion walls should be designed as either a gravity wall or as the facing for an MSE wall. Corrosion resistance of the wire mesh baskets is the most important limiting factor on the life of a gabion wall. There are a variety of coatings that are used in practice to protect wire mesh baskets from corrosion.

Design & Preliminary Costs

Proper drainage and filter materials should be included as part of the design so that smaller diameter particles, such as sand and silt, do not erode from the retained slope into the open pore spaces of the gabions. Global stability analyses should be completed by a licensed Professional Engineer for any wall installation.

The following pricing for gabions was included in the Maryland Department of Transportation State Highway Administration Price Index dated from January 2020: Temporary Gabion Outlet Structures: Median Unit price \$5,100/EA for 6 contracts. Unit prices ranged from \$2,200 to \$13,352.57.

- 12 in. Gabion: Unit Price \$200/CY for one contract of 8 units
- 36 in. Gabion: Unit Price \$98.61/CY for one contract of 82 units

Permits & Approvals

- Review/Approval by MDOT MTA Environmental Planning Division
- Maryland Department of the Environment (MDE) Permitting



Implementation

Gabions can be constructed quickly provided the stone and wire mesh basket materials are readily available. Depending on the size of the project, gabion baskets can be manufactured in a matter of days or weeks. Manual labor is required; however, it can be supplemented with backhoes and front-end loaders.

Maintenance Requirements

There are minimal maintenance requirements for gabion mattresses. Periodic inspection should document whether supplemental gabions are required or if wire mesh baskets are corroding or failing and need repair.

Useful Life

If designed properly, gabion mattresses should have a useful life of 30 to 50 years, depending on coating material on wire baskets and environmental conditions. It should be effective immediately upon construction completion.

References/Specifications

- MDE** - Guidelines to Waterway Construction – Nov. 2000, MGWC 2.3 Gabions
- MDOT** - Maryland Department of Transportation State Highway Administration Price Index (January 2020)
- MDOT** – Maryland Department of Transportation State Highway Administration Approved Proprietary Retaining Wall List, April 2018
- FHWA** - FHWA-NHI-10-024 GEC 01 I-Vol I Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I, November 2009
- FHWA** - FHWA-NHI-10-025 GEC 01 I-Vol II Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume II, November 2009
- Other** - Maccaferri Terramesh System

