

Product Information Bulletin

Slope Stabilization using GeoSpec® Lightweight Fill Material

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Geotechnical engineers recognize the validity of using expanded polystyrene (EPS) geofoam as lightweight fill to reduce mass and associated gravitational driving forces within sloped embankments. The detail below illustrates a typical slope stabilization application using GeoSpec® lightweight fill material. GeoSpec EPS geofoam with a density from 20 to 40 kg/m³ is up to 100 times lighter than in-place soil with a typical density of 2,100 kg/m³. This means that replacing in-place soil in an unstable slope with EPS geofoam can achieve a significant net reduction in driving force within the embankment.

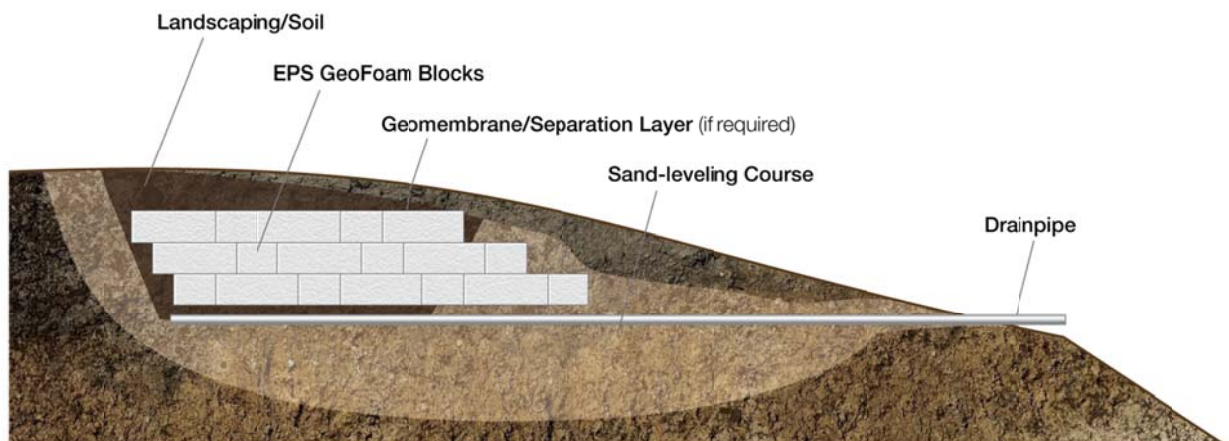


Figure 1 – EPS Geofoam Placement in Slope Stabilization Application

EPS geofoam is often the best option for lightweight fill material in embankment construction because it is up to 50 times lighter than other lightweight fill material options such as chipped bark, sawdust, dried peat, fly ash, slag, cinders, cellular concrete, lightweight aggregates or shredded tires. In addition, GeoSpec EPS geofoam is manufactured to meet ASTM D6817 (see Plasti-Fab Product Information Bulletin 1003 for additional information) so material properties are consistent.

Reference Design Document:

The Transportation Research Board of the National Academies recently published National Cooperative Highway Research Program (NCHRP) Research Results Digest 380: **Guidelines for Geofoam Applications in Slope Stability Projects** to provide assistance in design using EPS geofoam for slope stabilization projects. A copy of the research digest can be downloaded at <http://www.trb.org/Main/Blurbs/168692.aspx>.

The advantages of using GeoSpec lightweight fill material for slope stabilization may include:

1. Reduction in construction schedule and traffic impact.
2. Maximizing use of available right-of-way.
3. Reduced construction labor.
4. Reduced potential for future maintenance requirements.

When side slope failure occurs in road applications, it is often the result of subsurface soil with low load-bearing capabilities. Often in this type of situation makeshift repairs are implemented by filling and resurfacing the failed road section.



The Province of BC, Ministry of Transportation and Highways, Nanaimo Office, sought a performance solution to reconstruct a section of highway, which had been subject to reoccurring side slope failure (Figure 2). This section of highway had been repaired unsuccessfully a number of times previously by filling and resurfacing the failed road section. In this instance, the side slope had failed resulting in a portion of the road surface dropping by up to 305 mm (12").

The section of road reconstructed is in close proximity to Dougan Lake and is part of Highway #1 near Duncan, BC on Vancouver Island. The close proximity of the lake was seen to increase the likelihood of the side slope failure reoccurring.

To provide an improved slope safety factor against failure, the Ministry sought a long-term performance solution to resolve the problem. The corrective measure taken was to excavate the section of road down to hardpan. GeoSpec lightweight fill material blocks were supplied to replace a portion of the failed soil embankment (Figure 3).

The blocks were delivered to the site on flat bed trailers, unloaded using a small bobcat and then placed in their final position on the prepared roadbed by hand. The road construction crew backfilled over the GeoSpec lightweight fill material as they were placed.

GeoSpec lightweight fill material has a density of about 1 to 2% of soil or rock, yet it has sufficient strength to support typical loads encountered in highway construction applications. With construction complete, the load on the subsoil has been greatly reduced and the likelihood of future maintenance issues has been reduced.



Figure 3 - Installation of GeoSpec Lightweight fill Material