U.S. Department of Transportation
Federal Highway Administration

Priority, Market-Ready Technologies and Innovations

Expanded Polystyrene (EPS) Geofoam

Problem: Highway capacity is insufficient to meet growing demand

Every year in the United States, traffic congestion results in 5.7 billion person-hours of delay; for each person, that delay averages 36 hours per year. In 1997, the individual cost of congestion exceeded $900 per driver, and total estimated costs were more than $72 billion in lost wages and wasted fuel. Highway congestion continues to grow as vehicle travel increases and the Nation's bridges and roads deteriorate.

To help alleviate this growing congestion, capacity on the Nation's highways and major roads must be expanded. In many circumstances, however, roadway embankment widening or new alignments may require construction over soft or loose soils that are incapable of supporting increased loads. Embankment construction projects must identify innovative materials and construction techniques to accelerate project schedules by reducing vertical stress on the underlying soil.

Putting It in Perspective

- One in every five highway projects is considered "traffic sensitive."
- Two out of every five urban interstate miles are considered congested.
- Traffic delays have more than tripled in the past 20 years.
- By 2020, the Nation's population is expected to grow by 16 percent, and vehicle travel is expected to increase by 42 percent.

Solution: Get in, get out, and stay out with EPS Geofoam

What is EPS Geofoam?
EPS Geofoam is a lightweight, rigid foam plastic that has been used around the world as a fill for more than 30 years. EPS Geofoam is as much as 100 times less dense than soil, while alternate lightweight fills are approximately 2–3 times less dense. This extreme difference in density, compared to other materials, makes EPS Geofoam an attractive fill. Because it is a soil alternative, EPS Geofoam embankments can be covered to look like normal sloped embankments or finished to look like a wall.

What are the advantages of EPS Geofoam for highway construction?
EPS Geofoam can be used as an embankment fill to reduce loads on underlying soils, or to build highways quickly without staged construction. EPS Geofoam has been used to repair slope failures, reduce lateral load as fill behind retaining structures, accelerate construction on fill for approach embankments, and minimize differential settlement at bridge abutments.

Because EPS Geofoam only weighs 16 to 32 kilograms per cubic meter (1–2 pounds per cubic foot), large earthmoving equipment is not required for construction. After the material is delivered to the site, blocks easily can be trimmed to size and placed by hand. In areas where right-of-way is limited, EPS Geofoam can be constructed vertically and faced, unlike most other lightweight fill alternatives. It also can be constructed in adverse weather conditions.

Successful Applications: States' results demonstrate EPS Geofoam advantages

Many States have used EPS Geofoam in large and small highway projects:

The Texas Department of Transportation (DOT) is about to widen U.S. Interstate 10 (I-10) as it passes over an existing culvert in San Antonio, TX. In lieu of the previously designed solution to span the culvert with a drilled shaft supported by reinforced concrete slab, engineers will look to EPS Geofoam to reduce the load on the culvert. By using EPS Geofoam, engineers estimate significant time savings and a cost savings of approximately one-half the original designed solution.

After years of searching for a permanent solution to a failing slope problem on State Route 23A, the New York State DOT turned to EPS Geofoam. By replacing upper sections of the slide area, the State significantly reduced the driving forces that were causing the slide and successfully rehabilitated the roadway section.

Two large and high-profile jobs—I-15 in Utah and the Big Dig in Massachusetts—turned to EPS Geofoam to construct large embankment sections. EPS Geofoam helped the projects maintain extremely tight construction schedules that would not have allowed enough time for conventional embankment construction. Both projects illustrated the ease and speed with which EPS Geofoam can be constructed for highway embankments.

Benefits

- Accelerates foundation construction, which reduces project schedules.
- Saves money.
- Requires limited labor for construction.
- Exerts little to no lateral load on retaining structures.
- Can be constructed easily in limited right-of-way areas and in adverse weather conditions.

Additional Resources

To learn more, visit
www.fhwa.dot.gov/resourcecenter/index.htm.

For more information, contact:

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