State Transportation Innovation Council (STIC)

2015 Fact Sheet

Geosynthetic Reinforced Soil Integrated Bridge System (GRS-IBS)

Affordable, easy-to-construct bridge option for low-volume roadways

Geosynthetic reinforced soil (GRS) is a very old concept that is being modernized with today's technology. Today, GRS uses alternating layers of geotextile and compacted stone to create bridge substructure units. These units can be combined with beams and a deck to create an integrated bridge system (IBS).

The concept of reinforced soil has been used throughout history, including on sections of the Great Wall of China that are still visible today. This affirms the durability of the GRS concept in the right application.

GRS-IBS is a great solution to address structurally deficient bridges on low-volume roadways and over low-velocity streams.

The State Transportation Innovation Council (STIC) has selected GRS-IBS as an innovative technology for replacing structurally deficient bridges on low-volume roadways and over low-velocity streams. The Federal Highway Administration has also included GRS-IBS as part of its Every Day Counts program, which is an initiative designed to identify and deploy innovation that shortens project delivery, enhances safety, and protects the environment.

How does it work?

GRS-IBS is a form of accelerated bridge construction that lowers costs and reduces construction time while minimizing the impact to the traveling public. The construction is simple, and the substructure and integrated bridge system can be built using local labor or maintenance forces with readily available materials. Alternating layers of geotextile and compacted stone provide the foundation of the bridge, and beams and a deck are added to create the integrated bridge system. This design concept uses less heavy equipment and does not require intricate construction concepts.

What are the benefits?

- Reduces costs by 25 to 60 percent compared to conventional construction methods.
- Uses common equipment and materials and requires fewer parts, making it easy to build and maintain.
- Uses a flexible design that is easily modified to adjust to unforeseen circumstances or weather events.
- Can withstand scour testing up to 15 feet per second.
- Provides easy, quick-to-build bridge abutments through the use of GRS.
- Shortens project delivery as documented in FHWA research studies.

GRS-IBS can be constructed quickly using local labor.

GRS-IBS in Pennsylvania

PennDOT and local governments have constructed 13 GRS-IBS bridges since 2011, and many more are in the planning or construction stages. PennDOT encourages the use of GRS-IBS technology with its inclusion in Publication 447, New Products for Low-Volume Roads. Designers will find standard drawings for developing GRS-IBS plans (BD-697M) in Publication 218M. Step-by-step instructions for constructing GRS-IBS are available in Publication 55, Bridge Maintenance Manual.

State Transportation Innovation Council (STIC)
(717) 214-8685 RA-pdPennDOTSTIC@pa.gov
www.moderndot.pa.gov

pennsylvania DEPARTMENT OF TRANSPORTATION
U.S. Department of Transportation Federal Highway Administration