

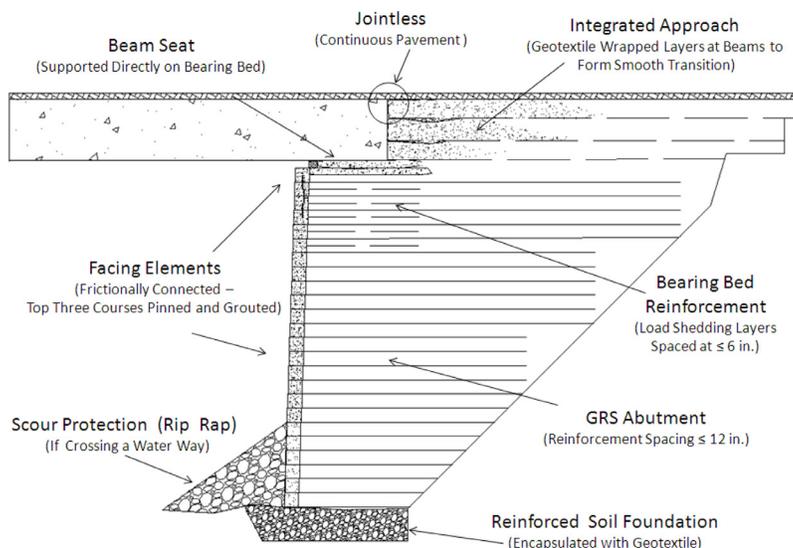
Accelerated Construction, Reduced Costs via GRS-IBS

US agencies are adopting geosynthetic reinforced soil-integrated bridge system (GRS-IBS) technology, an FHWA initiative that generally is constructed easily and quickly while eliminating the “bump at the end of the bridge.”



Above: Rustic Road GRS-IBS in Boone County, Missouri

Left: Drawing of typical GRS-IBS



Use of GRS, a stiff composite material, eliminates the need for conventional piling.

This document presents guidance on GRS-IBS construction, performance, and implementation cost savings.

Construction: Follow FHWA; find rhythm

The FHWA has published a *Geosynthetic Reinforced Soil Integrated Bridge System Interim Implementation Guide*, sample GRS-IBS drawings and specifications, and a 20-minute video on GRS-IBS construction. Resources are available via the FHWA [Every Day Counts webpage for GRS-IBS](#). Agencies and contractors with GRS-IBS experience indicate that FHWA resources, including the number of personnel and recommended equipment, are accurate.

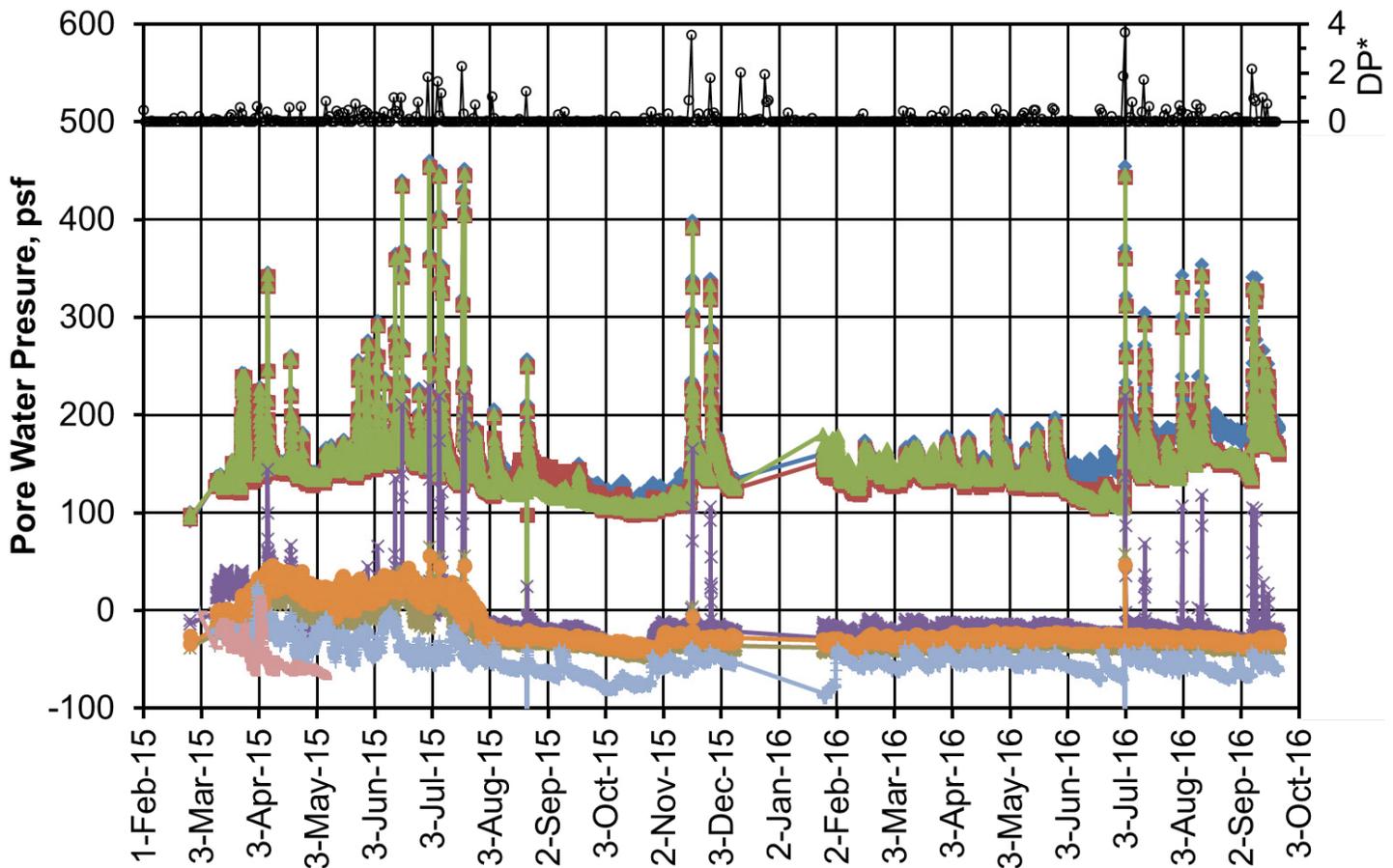
Experienced contractors and agencies have emphasized the importance of finding a “rhythm” to the GRS-IBS construction procedure. The rhythm is associated with the repetitive nature of constructing bridge abutments with thin (typically 8-in.) lifts.

Contractors and agencies with significant GRS-IBS experience also reported:

- Success using open-graded backfill and method specifications requiring a certain number of passes with a vibratory compactor
- Congested project sites may be poor candidates for GRS-IBS, which require space for a large volume of backfill and facing material
- A learning curve associated with becoming familiar with GRS-IBS construction, especially leveling and aligning modular wall facing blocks



Ensuring level facing blocks was important, especially for the first row of blocks, on the Rustic Road GRS-IBS, and red blocks were used for scour indicators



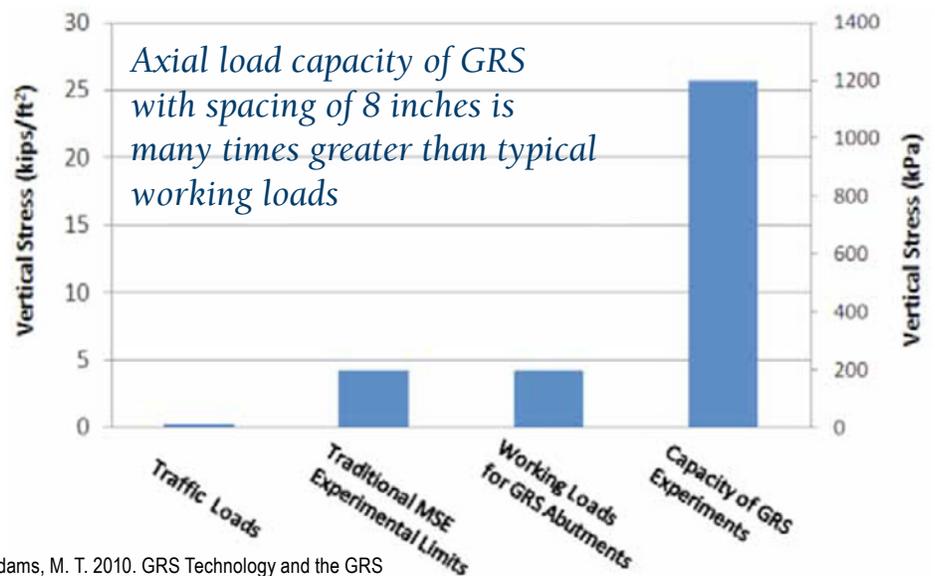
*DP = Daily Precipitation, in.

Pore pressures within Rustic Road GRS-IBS backfill

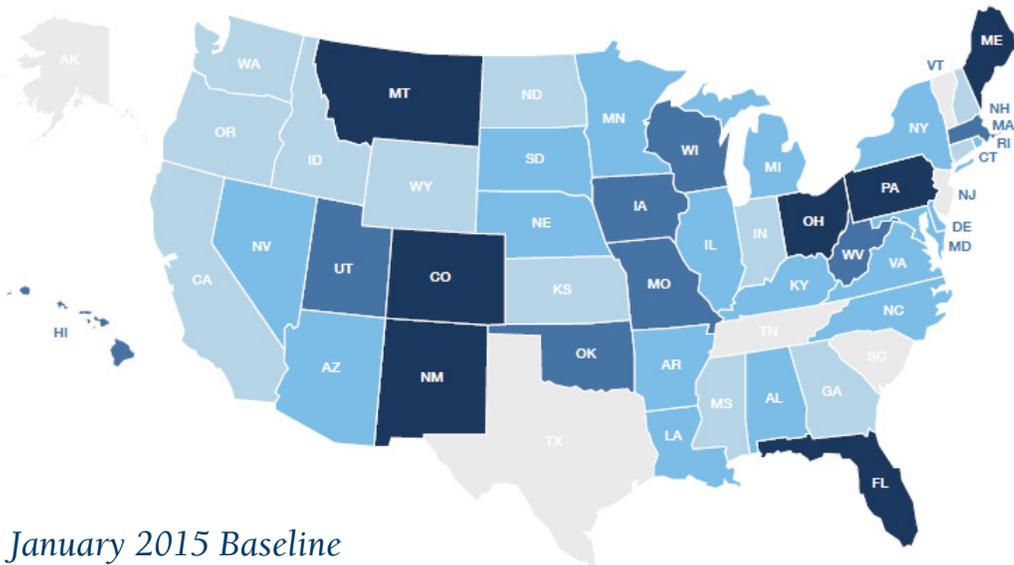
Demonstrated Performance

No major problems were reported for any of the GRS-IBS case histories reviewed. Reported values of settlement were all negligible, and the “bump at the end of the bridge” was prevented on all. Reports of good performance also included three bridges subjected to inundation. Cracking of the wall facing blocks was the only problem reported, and the cracks were minor.

Performance of the Rustic Road GRS-IBS in Boone County, Missouri was monitored closely for 19 months after construction. The GRS-IBS is performing as intended: external and internal displacements are negligible, and the backfill drains quickly after precipitation events, as shown in the plot above.



Adams, M. T. 2010. GRS Technology and the GRS Integrated Bridge System. Presented at Eugene Local Technical Assistance Program workshop, Eugene, OR.



In just five years since the FHWA introduced GRS-IBS as an Every Day Counts initiative, many state and local agencies had institutionalized the technology

January 2015 Baseline

FHWA. 2015. *EDC-3 Summit Summary and Baseline Report*. Turner-Fairbank Highway Research Center, McLean, VA.



Tips for Implementation Cost Savings

Agencies that have institutionalized GRS-IBS report the technology is a useful tool for achieving cost savings and schedule efficiency, especially for bridge replacements on low-volume roads. The following advice follows from the experience of leading agencies:

- The cost for a GRS-IBS decreases with the number of applications as engineers and contractors became more familiar with the technology.
- Actively educating contractors about GRS-IBS construction procedures through pre-bid meetings and showcase events can improve bid competition and lower prices.
- The cost savings and simplicity of GRS-IBS construction operations make the technology particularly well suited for local agencies. Promotion by state transportation agencies can accelerate implementation by local agencies.
- Specifying GRS-IBS backfill that is readily available locally was reported to be important for achieving cost savings.
- Allowing a flexible construction calendar can improve bid competition.

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Advancing Implementation of GRS-IBS: Implementation Aid

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MORE INFORMATION: www.intrans.iastate.edu/

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the project sponsors.



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