Slope and Abutment Construction using Geosynthetic Reinforced Soil

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GRS-IBS (Geosynthetic Reinforced Soil-Integrated Bridge System)

- Developed in conjunction with US Department of Transportation (US DOT) and Federal Highway Administration (FHWA)
- Championed by FHWA in 2010
- Synthesis Report Issued by FHWA in 2011
- Over 200 Bridges Constructed in over 44 States
- Part of the FHWA Every-Day Counts program
Traditional Concrete Abutment
GRS-IBS Abutment

Photo Courtesy of FHWA
Benefits of GRS Structure

- Accelerated Construction
- Reduced Cost - up to 60%
- Flexible Design
- Eliminate the bump at the bridge
- Environmental Advantages
- Can Construct in less-than ideal weather conditions
- Heights up to 30 feet
- Spans in excess of 150 feet
- Easy to Install

Typical GRS-IBS Cross-Section
Basic Design Steps

- Establish Project Requirements
- Perform a Site Evaluation
- Evaluate Project Feasibility
- Determine layout of GRS-IBS
- Calculate Loads
- Conduct External Stability Analysis
- Conduct Internal Stability Analysis
- Implement Design Details
- Finalize GRS-IBS
Fish Passage Culverts - Corrugated Metal

Fish Passage using Corrugated Metal Pipe
Photo Courtesy of Washington Department of Natural Resources

Fish Passage using Corrugate Metal Pipe and GRS
Photo Courtesy of AIL Canada
Culvert using GRS
Box Culvert

Traditional Concrete Construction

Photo Courtesy of US Forest Service

GRS-IBS Structure

Photo Courtesy of FHWA
GRS-IBS for Fish Passage
Longer Span Crossing using GRS Abutments

Photo Courtesy of FHWA
Construction

Photo Courtesy of Allen Block Corporation
Facing Element Ideas
Negative Batter

Photo Courtesy of Japan Negative Batter Research Center
Slides and Road Failures

Road Slide near Scottsburg, Oregon.

Road Slide near Blue River Reservoir
Traditional Slide Repair Methods

Slide Repair using H-Piles and Timber

Slide Repair using Boulders and Large Rock
Reinforced Soil Slope Benefits

- Environmental Advantages
- Can Construct in less-than ideal weather conditions
- Slope Heights in excess of 150 feet
- No Limit on Length of Structure
- Steeper Slope Angles
- Less Fill
- Accelerated Construction
- Flexible Design
Reinforced Soil Slopes (RSS)

- Used by most State DOTs
- US Forest Service
  - Deep Patch Road Repair
- FHWA
- Concept Developed Thousands of Years ago in Chinese Construction
- More recently in the 17th and 18th Century by French Settlers along the Bay of Fundy in Canada
- Recent History of Reinforced Earth developed by French Architect Henri Vidal in early 1960s
Design and Construction

Photo Courtesy of Strata Corp.
Construction

Reinforced Soil Slope near Agness, Oregon
Photo Courtesy of FHWA
Construction - Continued

Reinforced Soil Slope near Agness, Oregon

Photo Courtesy of FHWA
Questions?

More Information can be found at the following locations

- Call or Visit your local Alliance Geo Representative or office in Drain, Oregon
- GRS-IBS YouTube Video: https://www.youtube.com/watch?v=w_5WFoAdoUw
- www.alliancegeo.com

Thank you for your time and attention!