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Gird Creek Geosynthetic Reinforced Soil (GRS) Retaining Wall

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Problem Description

• Gird Creek Road (NFSR 8402)
  – Fill failure in 2011 spring due to high runoff and combination of fill saturation and overland flow
  – Loss of road width and forest access

• Clayey sand with gravel
  – USCS: SC
  – PI~25-30
  – < #200: 36-44%

• Site showed signs of high in-situ moisture
Gird Creek, B-D NF Site Location
Gird Creek, B-D NF Site Location
On Site Material
Solution

• Needs
  – Regain original road width
  – Facilitate drainage to prevent future failure
  – Improve soil strength
  – On site material declared unsuitable

• Solution decided upon was GRS wall
  – Wall materials are not proprietary or costly
  – Easy construction with minimum crew
  – Drainage system easily incorporated
  – Works with a variety of material gradations
GRS Concept

-Originally developed by the Forest Service, commonly known as “Burrito Walls” in the 1970’s
-Further researched by CTI and CDoT in the 1980’s
-Refined by FHWA in 1995
-Adopted as an “Everyday Counts” initiative by FHWA in 2010 for GRS-IBS system
-A type of Mechanically Stabilized Earth (MSE) Wall
-8 inch lifts as opposed to 1.5’ to 2’ lifts
-Small lifts allow only small horizontal pressures to develop which in turn allows for
  - No connection necessary between blocks and geotextile
  - Lower strength geotextile
  - The structure to act as one discrete unit (think bedsheets)
-Can have CMU block or burrito wrap facing
  - Facing is to only prevent raveling and erosion, does not contribute to structural strength
-Imperative to keep reinforced soil dry and remove water from the system
Bedsheets?
Hyalite Canyon, Gallatin NF

- 6" compacted depth crushed aggregate surfacing
- 6" ditch 1" below CL
- Prefabricated double-sided underdrain slope 1\(\frac{4}{1}\)
- 2' high x 3' wide berm incidental to item 255(01)
- 16" x 8" x 8" CMU block meeting ASTM C19 wall batter = 1:4.8V
- Fill cores on top two courses of block with dry mix concrete and dampen the material down
- Fill bench slope 5H:1V for drainage
- Construct 5' minimum bench on natural ground
- 6" non-perforated pipe at station 0+66 outside of wall beginning (extend drain minimum 20' downslope away from wall face)
- Construct 6" x 18" crushed aggregate leveling pad under first lift of all concrete blocks incidental to item 255(01)
- Place geotextile on top of leveling course lift and on top of all succeeding lifts of blocks. Each layer of geotextile shall be no less than 15' wide

Control system conform to the compaction testing all construction provided under by the engineer unless otherwise specifications.
First and Subsequent Lifts - Compaction, Compaction, Compaction!
Highlights of Design and Construction

• Site changes during winter season due to further runoff and erosion
• CMU blocks aren’t 8”x8”x16” but are 7.5”x7.5”x15.5”
• Be careful of overcompacting edges
• Get the right roller for the right material
• Leveling in the first few lifts is critical
• Import fill when needed
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Thank you!

Questions?