

From: Cody Jones

Sent: Friday, September 14, 2018 3:14 PM

To: Mindy Milos-Dale <mmdale@oaklandtownship.org>

Subject: FW: Paint Creek Trail Bridge 33.7 - Follow-Up to 09/12/18 Meeting

Good Morning Mindy,

I have compiled the questions asked last night at the meeting as well as information and source material to answer the questions:

1. Construction and Maintenance Issues: Particularly concerning freeze thaw cycles, scour, and long term maintenance:
 - a. Freeze Thaw Cycles: **THE GRS ABUTMENTS WILL BE CONSTRUCTED WITH POROUS GRANULAR BACKFILL, WHICH ALLOWS THE ENTIRE STRUTURE TO DRAIN FREELY WITHOUT RETAINING AND CONFINING WATER. THIS CHARACTERISTIC ALONG WITH THE NATURAL POROUS NATURE OF THE AGGREGATE BACKFILL ELEMINATES THE POTENTIAL FOR FROST HEAVE AND FREEZE-THAW DAMAGE BECAUSE WHEN THE SATURATE BACKFILL FREEZES THE WATER CAN EXPAND WITHIN THE NATURAL VOIDS BETWEEN THE AGGREGATE. THE BOTTOM OF THE ABUTMENT WILL ALSO BE CONSTRUCTED A MINIMUM OF 42" BELOW THE NATURAL GROUND SURFACE WHICH IS THE MAXIMUM FROST DEPTH TO AVOID HEAVING POTENTIAL. AT LEAST THE TOP THREE COURSES OF BLOCK ARE PINNED TOGETHER AS WELL TO PREVENT AGAINST ANY MOVEMENT RESULTING FROM THE FREEZE-THAW CYLCE AND THERMAL EXPANSION OF THE STRUCTURE.**
 - b. Scour: **GRS ABUTMENTS ARE SUCCEPTABLE TO UNDERMINING SCOUR JUST AS CONVENTIONAL ABUTMENTS. BOTH ABUTMENT OPTIONS WILL BE INSTALLED WITH SCOUR PROTECTION, RIPRAP & SHEET PILING BURIED AT THE TOE OF THE ABUTMENT, TO PREVENT UNDERMINING OF THE ABUTMENT. THE GEOTEXTILE WRAPPED AGGREGATE WILL BE CONFINED AND WILL NOT BE AFFECTED BY THE FLOW.**
 - c. Long Term Maintenance: **THE CONCRETE MASONARY BLOCKS ARE DURABLE BUT IF ANY BLOCKS ARE DAMAGED THEY CAN BE EASILY BE REPLACED BY REMOVING THE DAMAGED BLOCK AND GROUTING INTO PLACE THE NEW BLOCK.**
 - d. Other FAQ: **FOR MORE ANSWERS ON FREQUENTLY, ASKED QUESTIONS PLEASE VISIT THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINSTRATION WEBSITE: https://www.fhwa.dot.gov/innovation/everydaycounts/edc-3/grs-ibs_faq/. IT ANSWERS A WIDE VARIETY OF QUESTIONS INCLUDING CONSTRUCTABILITY, DURABILTY, DESIGN, AND COST.**
FROM THE SITE: Q: WHAT DATA SUPPORTS THE PROJECTED 100-YEAR SERVICE LIFE? A: THE STRUCTURAL COMPONENTS (AGGREGATE AND BURIED GEOTEXTILE) HAVE EXTREMELY HIGH EXPECTED SERVICE LIVES. THE COSMETIC FACE MAY NEED COSMETIC REPAIRS OVER 100 YEARS.
2. Geosynthetic Material Information: **THE GEOSYNTHETIC FABRIC THAT WAS USED FOR THE AMERICAN CENTER FOR MOBILITY (ACM) PROJECT IN WASHTENAW COUNTY WAS TERRA-TEX HPG-57. I HAVE INCLUDED THE PRODUCT DATA SHEET.**

FOR MORE INFORMATION ON GEOTEXTILE APPLICATIONS THE FOLLOWING WEBSITE IS A GOOD SOURCE: <https://www.usfabricsinc.com/products/geotextiles>

3. Use of GRS-IBS around the country specifically in northern states with similar weather conditions: **GRS ABUTMENTS HAVE BEEN USED IN 43 STATES INCLUDING MICHIGAN, OHIO, INDIANA, WISCONSIN, AND MINNESOTA. THE PDF ILLUSTRATES THE USE OF GRS ABUTMENTS AS OF SEPTEMBER 2014.**

4. Possibility and potential benefits from installing a concrete spread footing underneath GRS abutment: **INSTALLING A CONCRETE SPREAD FOOTING UNDER THE GRS ABUTMENT IS POSSIBLE. THIS WILL INCREASE THE TIME AND COST OF CONSTRUCTION WHILE PROVIDING THE SAME STRUCTURAL BENEFIT AS THE REINFORCED AGGREGATE BASE.**

5. Structure pricing including installation prices for original Keystone Style Bridge for 75' and 60' spans utilizing both weathering steel and galvanized steel materials. The Continental Style tubular steel bridge option for the 60' span is also being included for price comparison. **I HAVE TALKED TO OUR PREFABRICATED BRIDGE CONTACT TO GET UP-TO-DATE BUDGETARY NUMBERS FOR THE 4 BRIDGE OPTIONS DISCUSSED LAST NIGHT:**

**75' SPAN 14' WIDE CLEAR (WEATHERING STEEL): \$222,000 +
INSTALLATION \$75,000 = TOTAL \$297,000**

**75' SPAN 14' WIDE CLEAR (GALVANIZED STEEL): \$162,000 +
INSTALLATION \$75,000 = TOTAL \$237,000**

**60' SPAN 14' WIDE CLEAR (WEATHERING STEEL): \$185,000 +
INSTALLATION \$70,000 = TOTAL \$255,000**

**60' SPAN 14' WIDE CLEAR (GALVANIZED STEEL): \$141,000 +
INSTALLATION \$70,000 = TOTAL \$211,000**

ESTIMATED SPREAD FOOTING PRICE = \$532,650

ESTIMATED GRS ABUTMENT PRICE = \$486,450

6. MDEQ permit clarification: **THE PERMIT STATES THAT A 17.1 FOOT WIDE (ALONG THE STREAM) BY 51.0 FOOT SPAN (FACE TO FACE OF ABUTMENT – BRIDGE SPAN WILL BE A MINIMUM OF 60 FEET) AND 6.7 FOOT RISE (THE MINIMUM HEIGHT ABOVE THE STREAM BOTTOM) HAS BEEN APPROVED.**

If you have any questions or comments please contact me any time.

Thank You,
Cody Jones
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GRS IBS – Implementation Progress

190 Bridges nationally in 43 states including PR and DC - September 2014

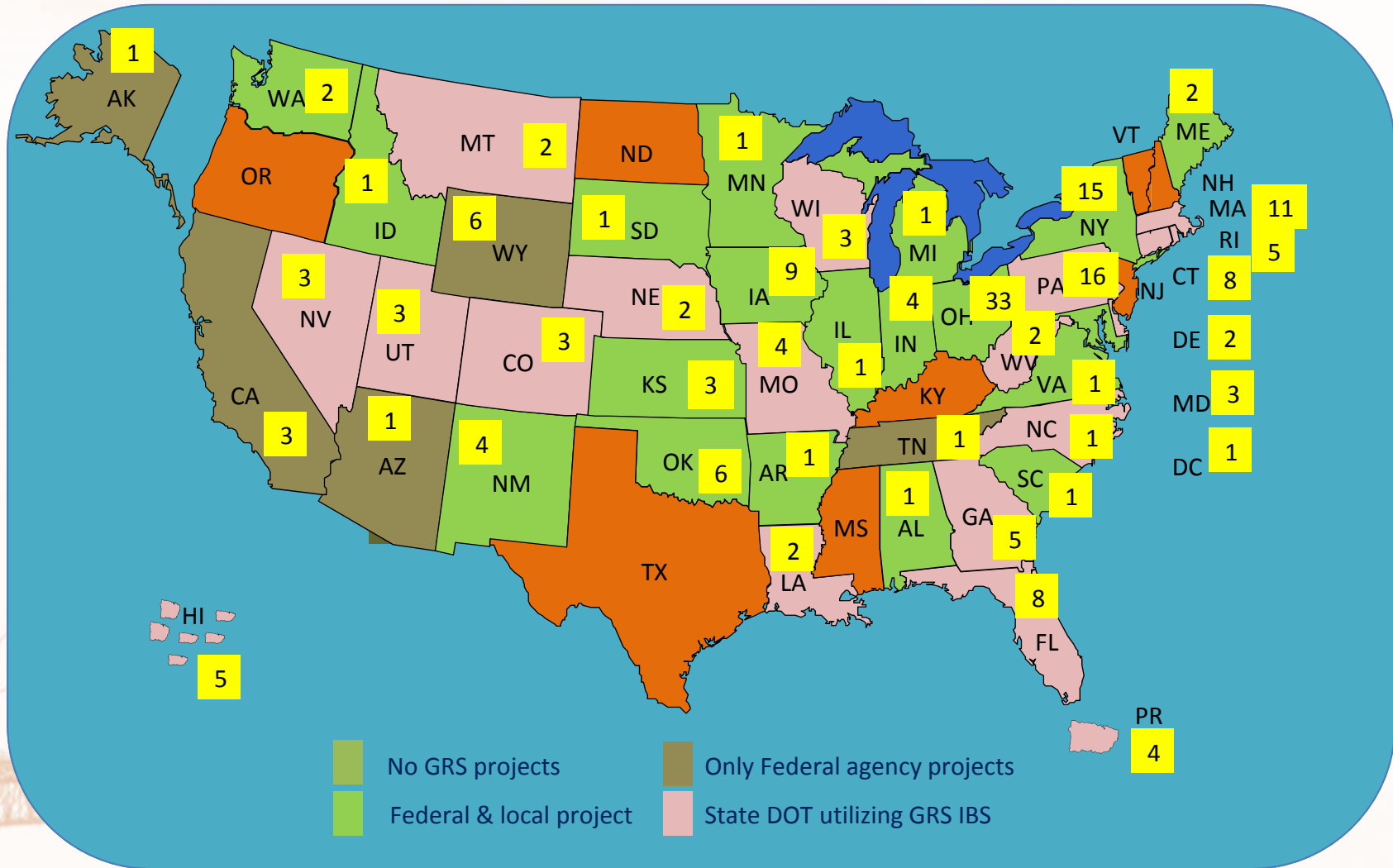


Image source: FHWA

TerraTex® HPG-57

TerraTex® HPG-57 is a polypropylene woven fabric. This engineered geotextile is stabilized to resist degradation due to ultraviolet exposure. It is resistant to commonly encountered soil chemicals, mildew and insects, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13, making it one of the most stable polymers available for geotextiles today. TerraTex® HPG-57 is manufactured to meet the following minimum average roll values:

PROPERTY	TEST METHOD	ENGLISH	METRIC
Wide Width Tensile (Ultimate)	ASTM D4595	4,800 x 4,800 lbs/ft	70.0 x 70.0 kN/m
Wide Width Tensile (2% Strain)	ASTM D4595	960 x 1,320 lbs/ft	14.0 x 19.3 kN/m
Wide Width Tensile (5% Strain)	ASTM D4595	2,400 x 2,700 lbs/ft	35.0 x 39.4 kN/m
Permittivity ¹	ASTM D4491	0.400 sec ⁻¹	0.400 sec ⁻¹
Water Flow Rate ¹	ASTM D4491	30 gpm/ft ²	1,222 Lpm/m ²
AOS ^{1, 2}	ASTM D4751	30 US Std. Sieve	0.600 mm
UV Resistance	ASTM D4355	80 % @ 500 hrs	80 % @ 500 hrs

¹ At the time of manufacturing. Handling, storage, and shipping may change these properties.

² Value represents maximum average roll value.

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