



Case Study:

SH105 Grimes County

Mechanical and Hydraulic Stabilization with Mirafi H2Ri



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Project Date:

Engineer/Architect:

Contractor:

December 2019

TxDOT and CP&Y, Inc.

Knife River

Project Goals and Specs:

Provide a cost-effective solution to stabilize soft soils below a highway lane widening area

Problem

The widening of State highway 105 at the FM1774 crossing in Plantersville, TX presented construction and long-term performance challenges. The project consisted of widening the east-west, one-by-one lane, to a two-by-two lane roadway. During the earthwork cuts into the natural hillside, several springs were encountered in the westbound portion of the project which made working the already less than ideal subgrade conditions more challenging, by increasing the moisture content to a near saturated state.

This portion of the highway, was historically known to have significant longitudinal cracking, interfering with both driver comfort and cutting into the DOT's repair and maintenance budget. The cracking was likely caused by construction of the roadway over moisture sensitive soils (expansive clays) and the presence of fluctuating groundwater levels and capillary action.

Identified Issues and Constraints

The original project pavement design consisted of cement stabilized subgrade to treat the existing subgrade with CBR=1.5%. In addition, the section included 7 inches of flexbase and 8 inches of asphalt. The project team wanted to consider alternate stabilization for the project since the constructability of the cement stabilized base during saturated conditions would be problematic.

★ Solutions / Final Application / Results

The project team was able to eliminate the need to cement stabilize the subgrade and installed a geosynthetic reinforced pavement with Mirafi H2Ri, a high strength, moisture-management geotextile, without adding any additional thickness to the original section which included 7" of flex base and 8" of asphalt. The DOT had used Mirafi H2Ri in the past on a test installation and was able to implement the same solution for this project using the H2Ri to provide both mechanical and hydraulic stabilization.

Mirafi H2Ri provides the following functions to satisfy both strength and soil interaction requirements:

Moisture Management / Enhanced Lateral Drainage

Wicking nylons are incorporated into the geotextile during the manufacturing process, which adds the unique ability to laterally remove water from both saturated and unsaturated subgrades.

Separation

To maintain integrity of the existing soils and the crushed aggregate fill which will be used above the geosynthetic to prevent migration of fines from the subgrade soils into the fill section. A small percent migration of fines can have an enormous negative impact on overall strength.

Filtration

To allow movement of water through the geosynthetic while retaining soil on upstream side. The unique double layer construction provides a wide range of pore sizes for an excellent separation factor, superior filtration, and flow characteristics of a fine to coarse sand layer.

Confinement

To prevent lateral movement (spread) of the aggregate fill. RSi-Series has excellent soil and base course confinement resulting in greater load distribution.

Reinforcement

To include a tensile element to improve bearing capacity of the section. RSi-Series has higher tensile modulus properties than the leading stabilization products.

Durability:

Robust damage resistance for moderate to severe stress installations.

The stabilized section using Mirafi H2Ri passed the 95% compaction requirement in all areas.

Optimization Highlights

This solution eliminated the need to cement stabilize the subgrade and allowed the DOT to keep the same design section thicknesses while implementing a solution to address long-term moisture concerns.

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