

FREE DRAINING SEAL (FDS) REPORT

TEST SECTION

In cooperation with Florida Department of Transportation - District 5

INTRODUCTION

The Free Draining Seal (FDS) product was developed to be installed between the joints of Mechanically Stabilized Earth (MSE) concrete panels as a retrofit for MSE Walls that have a problem with vegetation growing out of the joints of the panels and/or joints that are leaking fill due to damage to the fabric glued to the back of the panel. The FDS is composed of the following two components:

1. NonWoven Filter Fabric (NWFF) 8-15 ounces.
2. Compressible Core – Polyurethane (open celled foam).

Two layers of NonWoven Filter Fabric (NWFF) are wrapped around the Compressible Core tight enough to create tension by compressing the core foam slightly. The fabric glue, sewn or heat sealed leaving a small “tail” that is used as a guide during installation of the product into the joint (installed tail first).

In a Free Draining application, the NWFF is wrapped around an open cell polyurethane foam. The NWFF serves the following purpose:

1. The NWFF provides friction between the FDS and the concrete panels and with the compression of the compressible core, this combination holds the FDS in position without any glue or fasteners requires.
2. The NWFF allows water to pass thru the filter but prevents any fine particles of soil to pass thru the fabric.
3. The NWFF protects the polyurethane core from damage due to UV rays if exposed to sunlight.

The open cell polyurethane core compresses to allow the FDS to fit in the joint and is free draining, allowing water to flow thru the compressive core and the NWFF if there is water pressure at the joints of the MSE Wall panels. The correct size FDS is selected and pushed into the joints of the panel and is designed to fit tightly into the joints approximately 1” from the face of the panel. The FDS seals the joint from sunlight preventing germination of seeds that may be in the joints or may be transported to the joint by rain water run off. In the case of ferns and vines, the FDS prevents growth of the fern or vines into the reinforced fill behind the panels that would damage the existing fabric glued across the joints.

PROJECT DESCRIPTION – TEST SECTION

MSE Construction and Materials, LLC (MSA-CM) working in conjunction with FDOT District 5 Maintenance Department set up a Test Section for the use of the Free Draining Seal (FDS) as a retrofit for Mechanically Stabilized Earth (MSE) Structures that have vegetation growing out of the joints. The test section is located along the east side of I-4 near the intersection of I-4 and SR 417 (Fig. 1). The MSE Wall chosen is a wingwall for Bridge #770078 in Seminole County, Florida. The Test Section has joints with FDS and joints without the FDS product.



Figure 1

WORK PERFORMED

JANUARY 14 AND 15, 2013

On January 14, 2013 the vegetation growing in the MSE Wall (Fig. 2) was removed from the joints in the test sections. The following are two important items that were noted when the vegetation was removed:

1. The plants were mostly ferns that had been growing in the joints for an extended period of time and the roots of the ferns were difficult to remove. It appeared that if the ferns were large, and had been growing in the joints for an extended period of time, that the roots had grown into the filter fabric and could not be completely removed.
2. There were plants that had a larger root system that had grown into the joints. If these plants were left to continue to grow, there would be a good chance the panel would spall at the joint where the plant was growing.

After the vegetation was removed, the FDS product was installed in four columns and 3 columns were left open without the FDS product. (Fig. 3). In addition, two joints that were leaking in the barrier on top of the MSE Wall were sealed with caulk.

EVALUATION

On March 18, 2014 the test sections were evaluated after more than a year in service. Present at the evaluation was Ron Meade, FDOT District 5 Structures Maintenance Engineer, Joseph E. Rodriguez, MSE-CM President, Josie Quijano MSE-CM Project Coordinator and two other members of the FDOT.

1. The test section that had the FDS product installed did not have any vegetation growing in the joints. The product performed as designed for the MSE Wall retrofit application (Fig. 5).
2. The test section that did not have the FDS product installed in the joints had some vegetation growing out of the joints.

CONCLUSION

The FDS product was easily installed using a ladder and a crew of three men (Fig. 4). On a larger retrofit project, a high lift would work better where there is sufficient access for a piece of equipment.

The FDS product prevented the regrowth of vegetation in the joints of the MSE Wall Panels while allowing water to pass thru or over the FDS product when it rained. When installed properly (3/4 of an inch to 1 inch) into the joints, the product is not noticeable in the joints.

RECOMMENDATION

The FDS product performed as designed as a retrofit for MSE Walls that have a problem with vegetation growing out of the joints. We recommend the removal of vegetation and installation of the FDS in the following applications:

1. If there is a lot of vegetation especially ferns that could damage the integrity of the fabric glued to the back of the panel joints.
2. MSE Walls that are highly visible and where aesthetics is a concern and vegetation is creating an eyesore.



Figure 2: Test Section without FDS prior to vegetation removal.



Figure 3: Test Section after the FDS has been installed.



Figure 4: Installation of the FDS product



Figure 5: Test Sections - one year later - March 2014

ADDENDUM

The test sections were again evaluated in November of 2017 and the MSE Walls with the FDS product installed remain vegetation free while the MSE Walls without the FDS product have vegetation growth (Fig. 6).



Figure 7: Test Wall November 2017