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Accessible Trail Surfaced With Resin-Based Pavement: A Case Study

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In 2010, the U.S. Department of Agriculture, Forest Service, Trails Unlimited enterprise team constructed a 1,300-linear-foot accessible trail for the U.S. Department of the Interior, Fish and Wildlife Service at the Okefenokee National Wildlife Refuge in Georgia (figures 1 and 2). The trail is adjacent to the Folkston Visitor Center and runs parallel to the main canal visitors use to boat into the Okefenokee Swamp on the east side of the refuge.

The trail is surfaced with NaturalPAVE XL Resin Pavement instead of standard bituminous hot mix asphalt. NaturalPAVE XL Resin Pavement was used successfully for accessible trails on more arid national forests in the Western United States, but this is the first installation in the humid Southeast. This tech tip documents the construction process and application of this product.

Highlights...

- NaturalPAVE XL Resin Pavement is an alternative to bituminous hot mix asphalt.
- The finished product blends with the natural environment and provides a smooth, accessible surface.
- Trails Unlimited used NaturalPAVE XL Resin Pavement to construct an accessible trail at the Okefenokee National Wildlife Refuge in Georgia.



Figure 1—An accessible trail surfaced with NaturalPAVE XL Resin Pavement, immediately after construction.



Figure 2—The same trail, 1 year after construction.



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NaturalPAVE XL Resin Pavement is produced by Soil Stabilization Products Company, Inc., in Merced, CA. Depending on the project location, the delivered product costs about \$475 to \$650 per ton. One ton covers 80 square feet of surface area to a compacted depth of 2 inches.

Comparable in hardness to bituminous hot mix asphalt, NaturalPAVE XL Resin Pavement is a cold mix of homogeneous soil particles with a resin glue binder. It is mixed at a batch plant. The product is spread in a 2½-inch layer over a compacted stone base. A heavy drum roller compacts the layer to 2 inches. The finished surface is a light brown soil color that is cool to the touch. It cures by drying and hardening.

Advantages and Disadvantages

NaturalPAVE XL Resin Pavement has some advantages and disadvantages to consider when comparing it with other products and construction techniques.

Advantages

- NaturalPAVE XL Resin Pavement is as hard as asphalt, but does not absorb as much surface heat.
- No heat is required for installation.
- The finished surface color blends with the natural environment.
- It provides a smooth, accessible surface.
- Installation per linear foot may be less expensive than an elevated timber boardwalk.

Disadvantages

- NaturalPAVE XL Resin Pavement is more expensive than most accessible trail surfaces, such as bituminous hot mix asphalt.
- Because the product is relatively new, longevity and durability are unknown.
- Trail turnpike construction is not suitable for areas with overland waterflow or with standing water that has no proper drainage crossings figured into the design. For sensitive areas, elevated boardwalks are a better choice.
- The product must be applied during dry weather and periods of rising temperatures (to facilitate the drying cycle).
- The packaged product must be protected from moisture.
- The packaged product must be protected from exposure to the sun before placement.

Construction Process

The following steps illustrate the construction process.



Step 1—Grade the existing ground to the desired width and grade. Remove organic material down to mineral soil.



Step 2—Haul in local borrow sand-clay material to spread over poor soils or to increase elevations as desired. Spread, level, and mechanically compact until no signs of displacement are visible.



Step 4—Install 5½-inch plastic wood boards on both sides of the elevated portions of a trail where materials and surfacing must be contained in the confined treadway. The boards are secured with three ½- by 24-inch acrylonitrile butadiene styrene (ABS) stakes and will not rot.



Step 3—Compact all materials with a roller.



Step 5—Splice the boards together with metal sleeves to minimize movement.



Step 6—Biobarrier geotextile is added next.



Step 8—Fill the geocells with ¾-inch-minus crushed gravel and spread it evenly throughout the grid.

Geotextile

For general information on geotextile, refer to the tech report, “Geosynthetics for Trails in Wet Areas: 2008 edition” (0823–2813P–MTDC), <<http://www.fs.fed.us/eng/pubs/htmlpubs/htm08232813/>>. Because intruding vegetation is a major concern on this project, a product called Biobarrier is used. Biobarrier contains a growth inhibitor to help protect trails if tree roots or other vegetation grow beneath the trail and sprout through the surface. Biobarrier also helps spread the load of material placed on top of it. It is about \$800 per 100 linear feet. Another geotextile fabric should be used if Biobarrier is not used.



Step 9—Mechanically compact and level the material to the designed depth or cell height.



Step 7—Lay 3-inch thick geocell over the Biobarrier or geotextile fabric. The geocell is held to the border with metal clips and keeps the gravel aggregate in place.



Step 10—Plastic wood borders are not needed for flatter areas.



Step 11—Construct any necessary turnouts in a similar manner.



Step 14—Level the surface with a wooden screed, sloping slightly to one side for water runoff.



Step 12—Build adjacent trail structures, such as viewing/fishing platforms, so the platform deck height is flush with the adjoining finished trail tread.



Step 15—Form up the edges with handtools.



Step 13—Place NaturalPAVE XL Resin Pavement with a small mechanical paver (or by other means) to spread the material.



Step 16—Place 2½ inches of NaturalPAVE XL Resin Pavement to acquire a 2-inch thick compacted pavement.



Step 17—Compact the trail edges with a plate compactor. The edges extrude too much if a steel drum roller is used.



Step 18—Compact the center of the trail with a steel drum roller.



Step 19—NaturalPAVE XL Resin Pavement must be applied during dry weather. Allow the surface to cure for 24 hours, then spray a fog coat sealant over the entire surface using the manufacturer's recommended application rate.

Product Sources

The Forest Service does not endorse products to the exclusion of other products that may be suitable. The list below provides a place to begin comparing similar products.

NaturalPAVE XL Resin Pavement
Soil Stabilization Products Company, Inc.
P.O. Box 2779
Merced, CA 95344
Phone: 800-523-9992
<http://www.sspco.com>

Biobarrier
Fiberweb Geosynthetics
1611 County Road, B West
Roseville, MN 55113
Phone: 877-642-9929
<http://www.biobarrier.com>

Do It Alone Concrete and Safety Stakes
Moblo Enterprises, LLC
2147 Wildwood Trail
East Jordan, MI 49727
Phone: 231-881-4777

References

Groenier, James Scott; Monlux, Stephen; Vachowski, Brian. Geosynthetics for trails in wet areas: 2008 edition. Tech. Rep. 0823-2813P-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 31 p. Available at <<http://www.fhwa.dot.gov/environment/fspubs/08232813/index.htm>>.



About the Authors

Jerry D. Barrow joined the Trails Unlimited enterprise team in 2007 as a civil engineer specializing in trail bridge construction. Barrow began his career with the Forest Service in 1985 after 8 years in the private sector and the U.S. Army Corps of Engineers. He earned degrees in forestry and civil engineering from Virginia Tech and the University of Tennessee. He has worked on the Cherokee, Chattahoochee-Oconee, and George Washington National Forests. He served as the project construction engineer for the 1996 Olympic Venue at the Cherokee National Forest.

James Scott Groenier began working for MTDC in 2003 as a civil engineer. Groenier earned a bachelor's degree from the University of Wisconsin at Madison and a master's degree from Montana State University. He worked for the Wisconsin and Illinois State Departments of Transportation before starting his career with the Forest Service. He worked as the east zone structural engineer for the Eastern Region and as a civil engineer for the Ashley and Tongass National Forests.



Library Card

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The Forest Service Trails Unlimited enterprise team constructed an accessible trail at the Okefenokee National Wildlife Refuge (NWR) using NaturalPAVE XL Resin Pavement. The resin pavement blends with the natural environment and provides a smooth, accessible surface. This tech tip explains some of the advantages and disadvantages of using resin pavement instead of bituminous hot mix asphalt and provides a step-by-step description of the construction project at the Okefenokee NWR.

Keywords: accessibility, accessible trails, asphalt, boardwalks, elevated boardwalks, geotextile, NaturalPAVE XL Resin Pavement, Trails Unlimited



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