

SUCCESSFUL TREATMENT OF FROST AND MOISTURE SUSCEPTIBLE AGGREGATE IN ARKANSAS

National Forest Service Project

20+
YEARS

A forest road improvement project was completed in 1988, upgrading a heavily traveled surfaced road with a new aggregate surface course material which was treated at the time of placement with EMC SQUARED® Stabilizer. A copy of the letter from Gary McElroy, Road Engineer for the

Ozark-St. Francis National Forest, summarizes the construction and performance of the stabilized road is provided on the following page. In review of this EMC SQUARED case study, the permanency of this stabilization treatment throughout a monitoring period of more than twenty years has been obvious and impressive. Moisture and frost susceptibility have been effectively addressed and the shale/aggregate blend has been strengthened to provide an all-weather running surface for truck and vehicular traffic. These service conditions are far more severe than would be appropriate for conventional stabilization treatments such as cement and lime; products which are rarely, if ever, used for stabilization of unpaved roads (much less a gravel surfaced road with grades in excess of 12%). Given the challenging conditions, as Road Engineer Gary McElroy commented during a review of the project, it is not likely that a six inch thick asphalt pavement would have survived a similar length of time with so few repair requirements on this winding road running through steep terrain.

According to a January, 2010, update from Gary McElroy, the original stabilized aggregate running surface was still intact more than twenty years after installation, with only a few localized repairs needed. Significant surface wear began only after twenty years following a major flood event in spring of 2008, and then an abnormally wet 2009 year when the area received approximately 32 inches of rainfall above normal annual rainfall. Other than accumulated surface wear and minor localized repairs, the stabilized road continued to support traffic loadings for over two decades.

These improvements have been achieved as the result of a single treatment with the economical and environmentally friendly EMC SQUARED Stabilizer product. The investment in application of stabilization treatment has been repaid many times over, just by the reduction in grading maintenance. The savings to road users in auto and truck operating costs and the safety benefits of the smooth running surface have been significant. The initial investment in construction costs and in gravel surfacing materials has been retained. Nearby streams have been protected from road generated sedimentation. This well designed and well constructed Forest Service project certainly deserves the title the USFS engineer gave it in his summary letter on the following page: Arkansas Success Story.

Quotes below from a summary letter written by
Road Engineer Gary McElroy in 1995

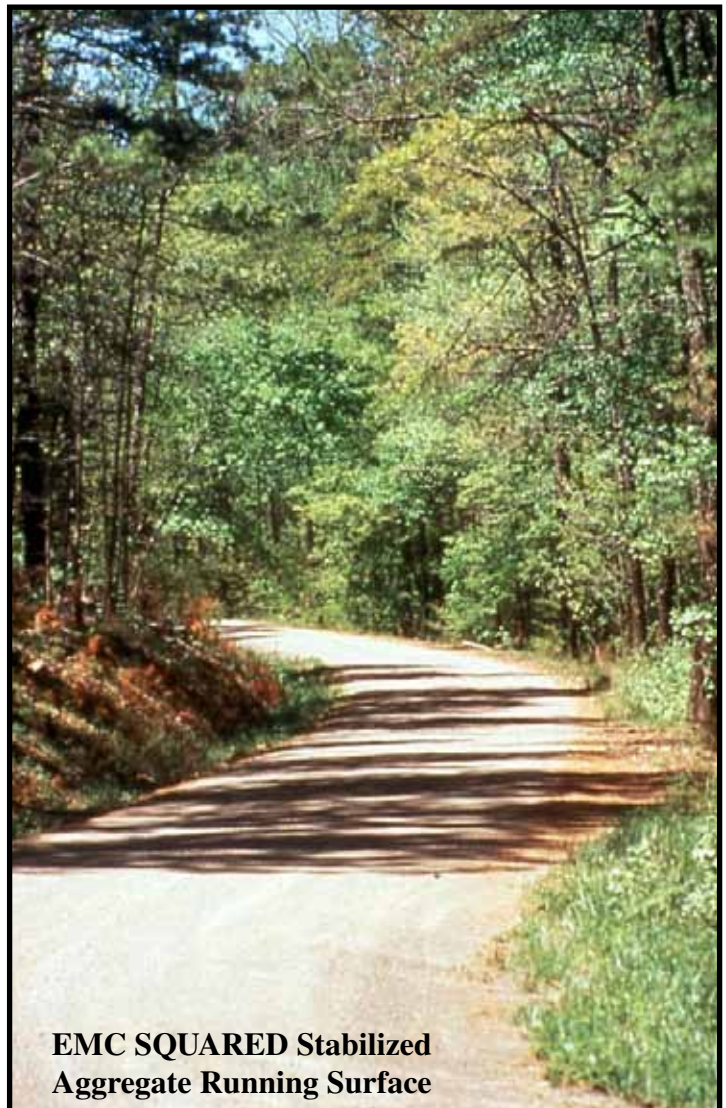
Prior to Stabilization

"During the winter months, freezing and thawing, shrinking and swelling of the clay soils and the steep grade would make the road almost impassible."

After Stabilization

"The freezing and thawing of the clay soils are no longer a problem with the road."

**This letter and another written 10 years later
reprinted in their entirety on the following pages.**



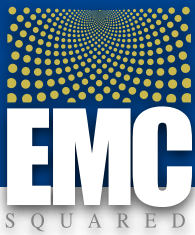
**EMC SQUARED Stabilized
Aggregate Running Surface**

Stabilization Products LLC

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LETTER FROM A USDA FOREST SERVICE ROAD ENGINEER

USDA

United States Department of
Agriculture

Forest
Service

Ozark-St. Francis
National Forests

605 West Main Street
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Soil Stabilization Products, Inc.
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Attn: Bob Randolph,

Arkansas Success Story
Ozark - St. Francis National Forest, Magazine Ranger District, Paris, Arkansas

In 1987 we decided to reconstruct approx. 2.0 miles of the New Blaine Road - No. 1600 in the Ozark National Forest on the Magazine Ranger District near Paris, Ar. This road is a main arterial / collector road through the Magazine Ranger District; During the peak season the weekly traffic count will be around 500 ADT. This road is also used for timber harvest and heavy trucks used to support the poultry industry. The problems which were encountered prior to the reconstruction were poor drainage, clay soils and steep grade in excess of 20%. During the winter months freezing and thawing, shrinking and swelling of the clay soils and the steep grade would make the road almost impassable. This is when the decision was made to use the EMC SQUARED (EMC) soil stabilizer and the project was completed in the spring of 1988.

After the completion of the drainage and grade work we began the stabilization work. The base consisted of 6 inches of compacted shale material. We decided in the design phase to go with a crushed aggregate and shale mix for the finished travelway. The finished travelway is 18 feet wide and 6 inches compacted depth. The aggregate selected was 3/4 inch mixed 50 to 50 with the shale and treated with EMC. We began by mixing all of the aggregates together with a Cat 12G motor grader. The contractor selected a 2,000 gal. water truck for application of the stabilizer. Quality control testing was done by the Forest Service to determine optimum moisture and maximum density that could be obtained. The process consisted of diluting the EMC, at a dilution ratio figured by calculating the amount of water required to adjust the cubic volume of the aggregate mixture from in site moisture content to optimum moisture content, and then blade mixing the EMC uniformly into the materials. After optimum moisture had been reached we achieved compaction with a vibratory steel drum roller.

The stabilized surface shows little wear after 7 years of normal use. There has been no maintenance on the surface since completion of the project with the exception of one area on the 13% grade and this only consisted of blading of one cross rut due to erosion. The EMC has greatly increased the support of the road. The freezing and thawing of the clay soils are no longer a problem with the road. The road is now stable and providing maximum support for our traffic load along with reduced maintenance costs. Since results of this project we have completed several more projects using the EMC as our choice of soil stabilizers and have success stories similar to the one above.

Gary D. McElroy
Ozark - St. Francis N.F.
P.O. Box 1008
Russellville, Ar. 72811

RECEIVED JUL 20 1995



Caring for the Land and Serving People

Stabilization Products LLC

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LETTER FROM A USDA FOREST SERVICE ROAD ENGINEER



United States Department of
Agriculture

Forest
Service

Ozark-St. Francis
National Forests

605 West Main Street
Russellville, AR 72801-3614
(479) 964-7200

September, 2005

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Re: Arkansas Success Story
Ozark-St. Francis National Forests - Mount Magazine Ranger District, Paris, Arkansas

This is an update on the reconstruction of the 2.0 miles of New Blaine Road No. 1600, which was completed in spring of 1988. This road was reconstructed by constructing a 6-inch compacted base using shale material. The surface course was created by mixing 6 inches of shale plus a 6-inch depth of 1" minus aggregate with the fines within the 12% range. EMC Squared was incorporated with the surface course materials, mixed, brought to optimum moisture, and compacted with a steel wheel drum roller.

In 2001, we had some minor rutting and erosion due to poor maintenance practices. We addressed this problem by adding additional aggregate and scarifying the existing damaged area to a depth of 12 inches. Again, we added the EMC Squared soil stabilizer, mixed, and compacted the surface course.

This road receives maintenance only twice a year. At this time, the road continues to service the forests with outstanding performance. The original surfacing is still intact. The 12% plus grades remain free of corrugations and we continue to maintain a smooth running surface to support an arterial transportation system, which supports management of national forest resources. Since seeing the early success with the New Blaine Road, we have continued to use these products with the same results. At this time, we have approximately 20 miles of roads in our inventory with soil-stabilized surfaces.

I do wonder why more folks are not on board with these products. The savings in surface replacement and reduced maintenance in addition to increased road strength far exceed the additional cost incurred during reconstruction.

For comparison, I am attaching an updated picture taken near the area of your original photo.

Sincerely,
/s/Gary Mc Elroy

Road Engineer
Ozark-St. Francis National Forests
Supervisors Office
Russellville, AR 72801



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