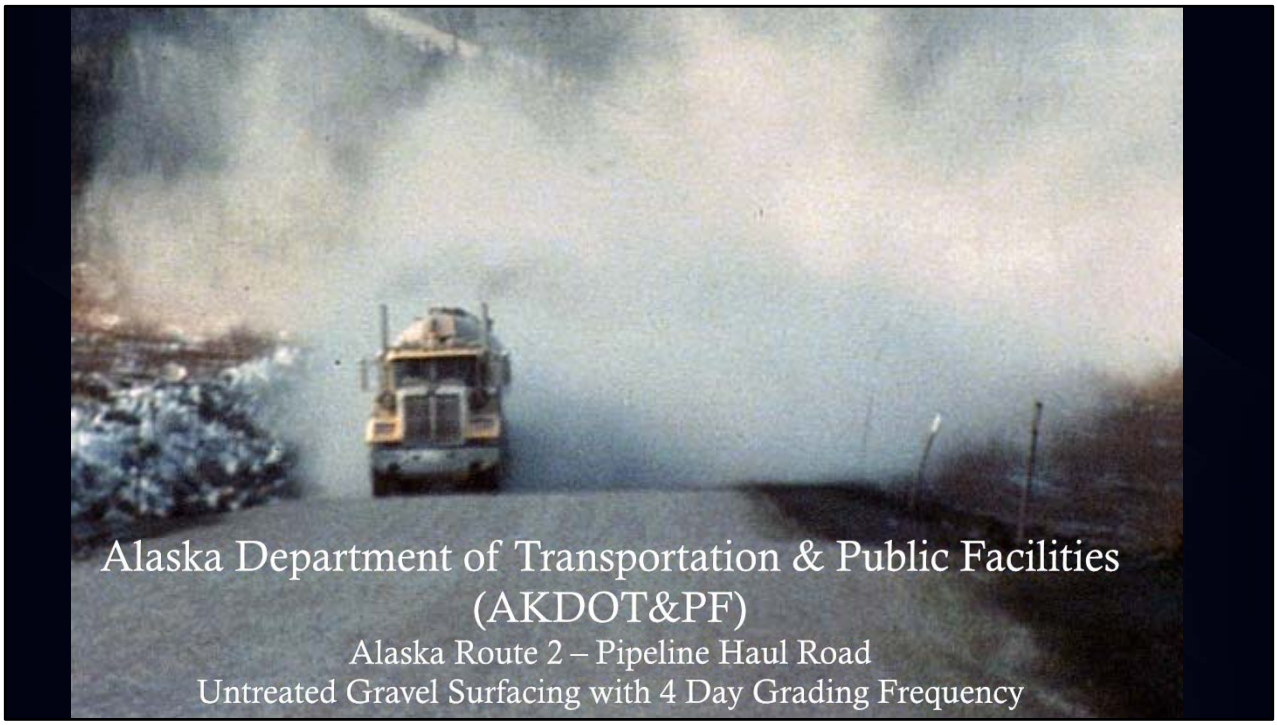

Livengood 44
Yukon River 101
Minto 94

STABILIZED AGGREGATE RUNNING SURFACES

In the mid 1980's, the FHWA funded the Coordinated Federal Lands Highway Technology Implementation Program, known as a CTIP Study, to evaluate the effectiveness of various types of stabilizer products in reducing the cost of gravel road maintenance. Fifteen of the 60 road stabilization projects included in the CTIP Study utilized stabilizer products supplied by Soil Stabilization Products Company. The projects were spread out at locations across the United States.

The biggest shortfall of this CTIP Study, in retrospect, was its failure to anticipate the extended service life that some of these stabilized gravel running surfaces would eventually exhibit. It became obvious that the monitoring period for the stabilized gravel roads should have been lengthened out to 5 or 10 years, rather than the one-year monitoring period that was typical for evaluation of dust palliative products. What we will see as this presentation progresses is a population of stabilized gravel surfaced roads that retained their original stabilized gravel surfacing and remained essentially maintenance free for many years.

Pictured here is a section of stabilized road constructed by a U.S. Forest Service road maintenance crew in the mountains of Arkansas as part of the CTIP Study. The aggregate mixture was treated with the EMC SQUARED Stabilizer, the concentrated liquid product developed by Soil Stabilization Products Company as an alternative to dust palliative products and cement and lime chemicals. Supplied as a liquid concentrate, this stabilizer product is diluted with water for application to soil, gravel and recycled pavement materials as part of standard road construction operations. The Forest Road Engineer for this CTIP Project in Arkansas provided a written report documenting the performance of the stabilized surfacing on this logging road. He confirmed that the stabilized surfacing was nearly maintenance-free after nine years in service. He later reported that the stabilized surface was still functional and low-maintenance after 20 years in service.



REMEDY FOR DUST EMISSIONS AND GRAVEL LOSS ON ALASKA ROUTE 2

Pictured here is a haul truck southbound from Prudhoe Bay driving on a section of Alaska Route 2, also known as the Dalton Highway and the Pipeline Haul Road, that was not stabilized or recently treated with a dust palliative. Grading of untreated gravel surfacing by the State maintenance crews was required once every four days, and almost immediately, following any significant amount of rainfall. The State Maintenance Superintendent had been observing the outstanding results of a liquid stabilizer product supplied by Soil Stabilization Products Company to ARCO and SOHIO, the companies originally operating the Prudhoe Bay oil fields. The State received funding from FHWA to conduct an Experimental Feature Project focusing on alternatives to the use of dust palliative products. The State then evaluated the performance of the EMC SQUARED Stabilizer product in comparison with a calcium chloride dust palliative application. The State of Alaska reported that the cost to stabilize six-inches of aggregate was less than the cost for their annual calcium chloride application.

https://stabilizationproducts.net/docs/18595.pdf

HAUL TRUCK DRIVING ON STRAIGHTAWAY SURFACED WITH EMC SQUARED STABILIZED AGGREGATE MATERIAL

View of haul truck driving on section of stabilized surfacing

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HAUL TRUCK CORNERING THROUGH SUPERELEVATED CURVE SURFACED WITH EMC SQUARED STABILIZED AGGREGATE MATERIAL

View of haul truck cornering through superelevated curve with minimal dusting from stabilized gravel surfacing

https://stabilizationproducts.net/docs/18595.pdf

STABILIZED AGGREGATE SURFACING AFTER TWO SUMMERS IN SERVICE

Keeping in mind that this road remains frozen and often covered by snow for half of the year, state engineers noted that the stabilized gravel surfacing provided dust control as effectively as the calcium chloride dust palliative for two full summers as well as excellent road surface stability. The stabilization treatment produced an impermeable, water-shedding running surface that remained virtually maintenance-free for several years.

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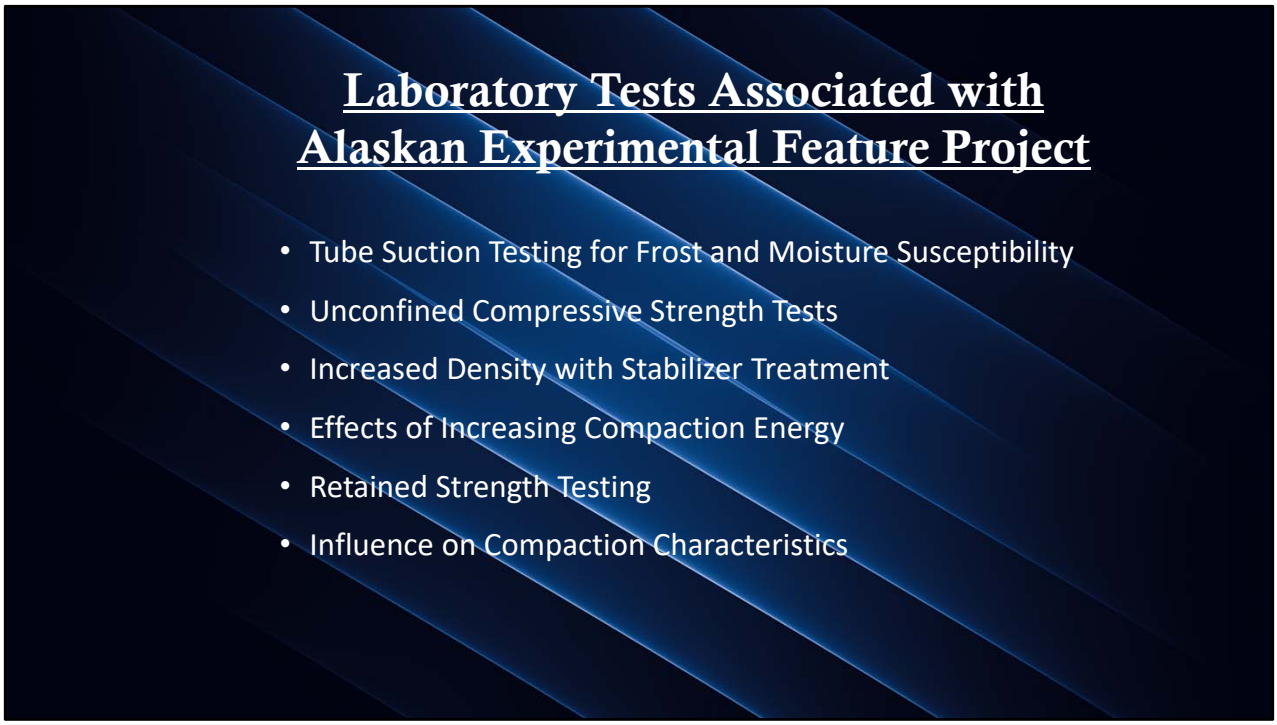


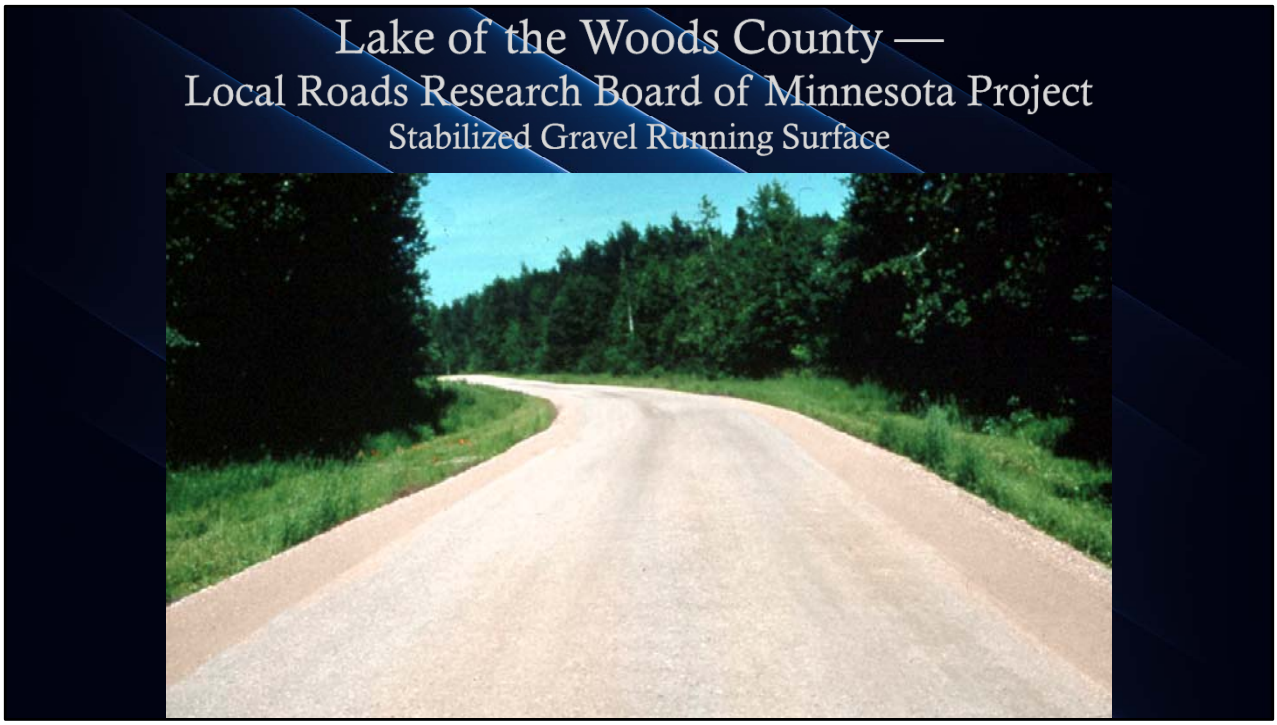
LIST OF TESTS CONDUCTED IN MATERIALS TESTING LABORATORY

Since the stabilized roads of the CTIP Study and the Alaska Experimental Feature Project demonstrated such outstanding potential for greater use of stabilized gravel surfacing, it is unfortunate that years have now passed without more widespread implementation of stabilized aggregate surfacing. Fortunately, there has been significant progress since that time in state-of-the-art field and laboratory testing programs that have greatly expanded knowledge regarding the performance of stabilized aggregate materials. These advanced tests have confirmed that highly moisture and frost susceptible aggregate materials can be effectively treated and their performance improved by a factor of five times or greater when evaluated by modern repetitive loading tests such as these:

- Dynamic Modulus
- Resilient Modulus
- Repeated Load Triaxial (RLT)
- Falling Weight Deflectometer (FWD)

We now have an engineering basis available for Road Engineers interested in designing stabilized aggregate roads as well as stabilized base courses for paved roads and highways. Links to these test reports are available on the website shown at the bottom.

https://stabilizationproducts.net/docs/18595.pdf



LAKE OF THE WOODS COUNTY, MINNESOTA

With a reported 8.6–day grading frequency being experienced on the gravel surfaced road systems throughout the State of Minnesota, the Local Roads Research Board of Minnesota used FHWA funding to upgrade over six miles of road as part of a research project, working in cooperation with Lake of the Wood County. The road improvement contract for North Angle Road included application of EMC SQUARED stabilizer treatment to three inches of newly placed pit-run gravel followed by an application of calcium chloride dust palliative treatment. The calcium chloride dust palliative was then continued on an annual basis each summer. At last report from the County Engineer, 13 Years after construction, the stabilized gravel running surface treated with the dust palliative remained essentially maintenance free and no longer subject to the freeze-thaw boils that were wide-spread each spring thaw season prior to the road upgrade project. Click on the link below for more information about this road improvement project and the unique area where it is located.

INTERESTING FACTOID: As of midwinter in Year 2023, a private firm is operating an ice road known as the Northwest Angle Ice Road, allowing people to access remote resorts and seasonal ice fishing via a 37-mile-long drive across Lake of the Woods that remains within the territorial United States and avoids the complications of multiple border crossings. The ice road is expensive to maintain with an estimated winter maintenance cost of approximately $1,500.00 per mile, and its availability is dictated by the ice conditions. Drivers are highly reliant on the ice road operators for using sound judgement as to when to open or close the road to travel. Round-trip fee for using the Ice Road is $250.00 per vehicle. The operators suggest filling your car with friends when making the trip to share the cost of the fee.

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BUREAU OF LAND MANAGEMENT - QUAIL HILL ROAD, NORTHERN ARIZONA

The Bureau of Land Management solved a maintenance problem on a section of aggregate surfaced road that was remote from their District Office and equipment yard. With winding roads and grades as steep as 10%, they used EMC SQUARED Stabilizer products to armor the stabilized aggregate running surface. The BLM Road Engineer reported 14 years later that the stabilized surfacing on this road accessing the North Rim of the Grand Canyon was still providing all-weather service, even on the steep grades and through low water crossings. The same BLM maintenance crew also used EMC SQUARED stabilization treatment to upgrade dirt roads and a dirt runway accessed by the roads with the stabilized aggregate surfacing.

https://stabilizationproducts.net/docs/18649.pdf

PORT OF LOS ANGELES – ENVIRONMENTALLY FRIENDLY PRODUCTS REQUIRED

This EMC SQUARED Stabilizer was approved by the US Fish & Wildlife Service as environmentally acceptable for construction of a haul road accessing a huge new man-made island that was temporarily being used as a nesting ground by a colony of Least Terns, which are an Endangered Species. The EMC SQUARED Stabilizer products have been tested and approved for use in environmentally sensitive riparian and coastal estuary locations as part of a field-testing program conducted by the U.S. EPA's National Estuary Program.

The maintenance-free performance of this EMC SQUARED application under high frequency haul truck traffic is noteworthy as it functioned as the running surface for two full years before being overlaid with asphalt pavement.

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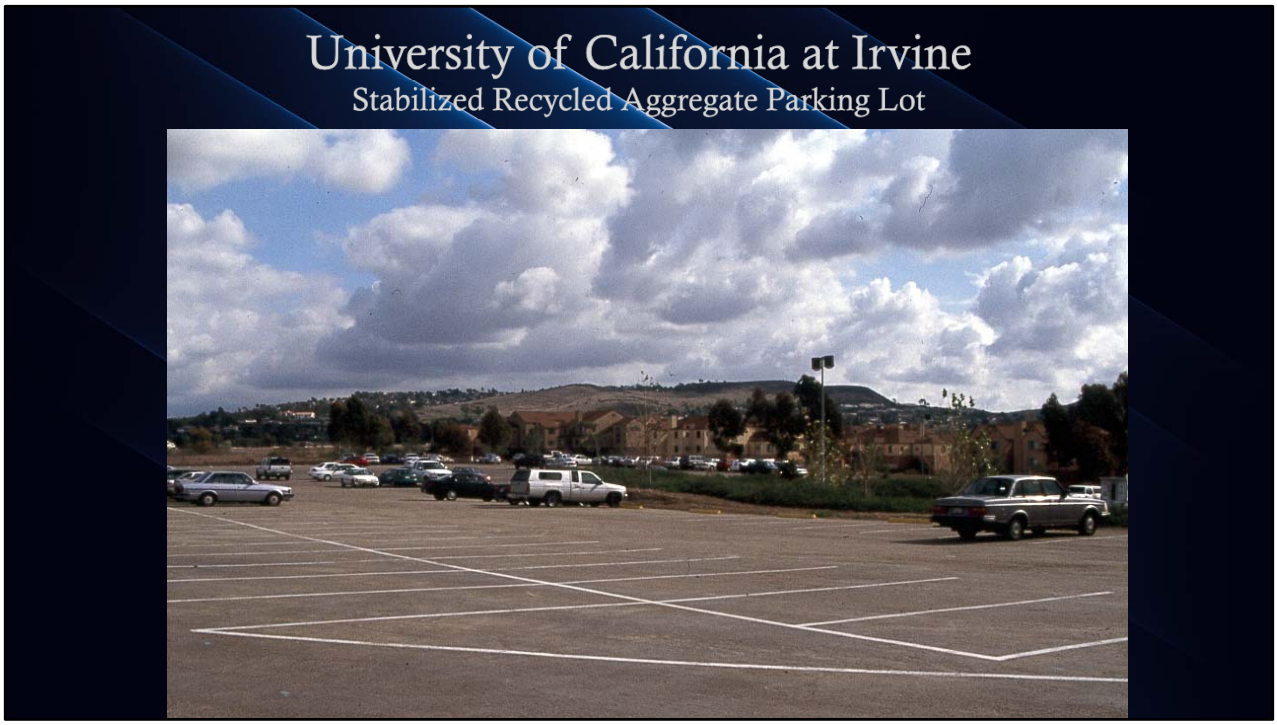

UNIVERSITY OF CALIFORNIA AT IRVINE –
ENVIRONMENTALLY FRIENDLY PRODUCTS REQUIRED

The facility engineering staff at the University of California built a 5-acre student parking lot using a recycled aggregate treated with EMC SQUARED stabilizer. To provide effective dust control and a finished surface that would be appropriate for painting parking stall lines, the surface of the EMC SQUARED Stabilized Aggregate layer was treated with a spray-applied polymer emulsion. This temporary pavement pictured here provided five years of maintenance-free service before being swept and overlaid with a hot mix asphalt pavement surface course. The stabilizer products in this case met State of California approval for a project with natural drainage into a protected area of the Upper Newport Bay coastal estuary.

https://stabilizationproducts.net/docs/18638.pdf

CITY OF GALLUP, NEW MEXICO – STABILIZED AGGREGATE STREET SURFACING

The City of Gallup needed a low budget street surfacing for five miles of rural subdivision streets that had been recently annexed from the county. The EMC SQUARED Stabilized Aggregate running surfaces provided two years of maintenance-free and dust-free service before being upgraded with a three-inch thick layer of asphalt millings that were once again stabilized with the EMC SQUARED product. After 5 years of excellent service as a running surface, the EMC SQUARED Stabilized Asphalt running surface was repurposed as a base layer when funds became available for placement of a conventional hot mix asphalt pavement.

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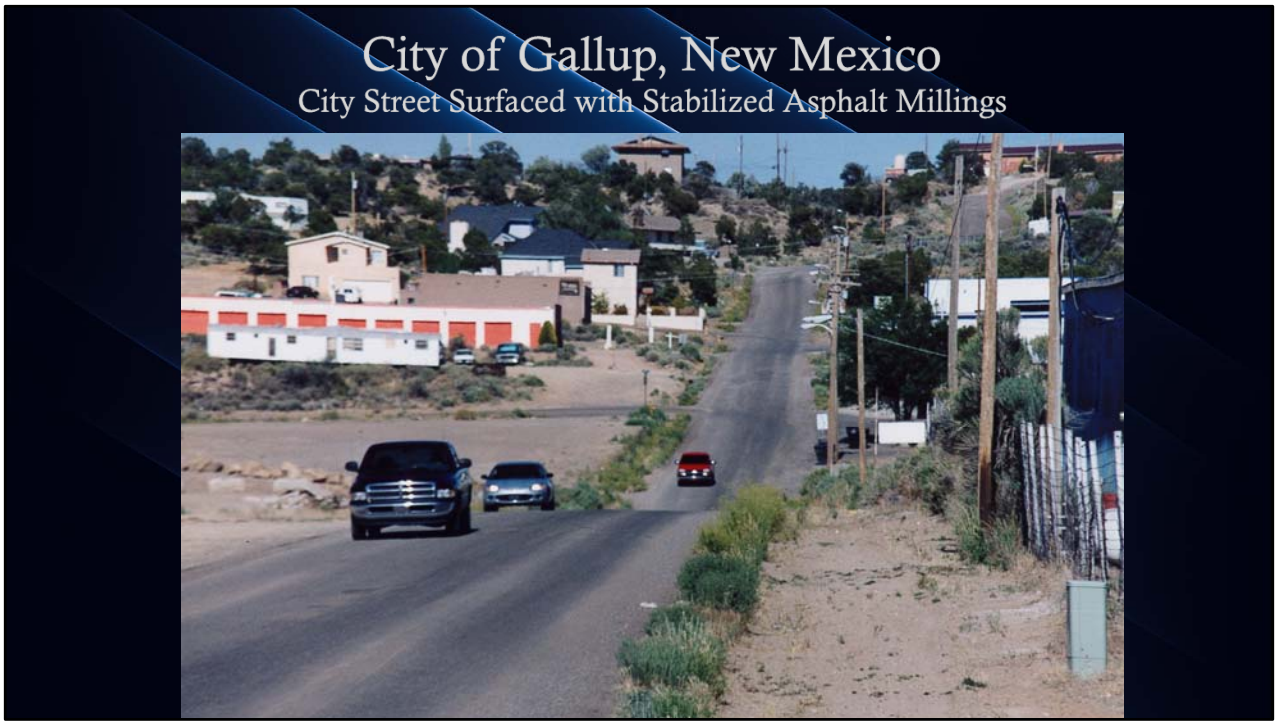

CITY OF GALLUP, NEW MEXICO – STABILIZED ASPHALT MILLINGS STREET SURFACING

Maintenance-free for five years, these streets paved with EMC SQUARED Stabilized Asphalt were then broomed and overlayed with hot mix asphalt pavement when the funds finally became available.

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https://stabilizationproducts.net/docs/18636.pdf

FORT BLISS ARMY BASE - PAVING MACHINE PLACEMENT OF STABILIZED AGGREGATE SURFACING

Fort Bliss spans the states of New Mexico and Texas. 116 miles of Main Supply Routes (MSR's) were upgraded with a running surface constructed with EMC SQUARED Stabilized Aggregate. Over a decade later the stabilized aggregate surfacing produces only a minimal amount of dusting under the traffic of military tactical equipment while the network of untreated gravel roads at Fort Bliss still suffer high rates of gravel loss and large billowing clouds of dust emissions. The aggregate materials were treated with the EMC SQUARED stabilizer at a stationary pugmill mixing plant located near the gravel pit and rock crushing plant, trucked in bottom dump trucks and placed by a combination of pick up machines and asphalt paving machines.

https://stabilizationproducts.net/docs/18676.pdf

FORT BLISS ARMY BASE – FALLING WEIGHT DEFLECTOMETER (FWD) TESTING IN PROGRESS

Pictured here is a trailer-mounted Falling Weight Deflectometer being used to test one section of the stabilized road after the completion of construction. This testing equipment can evaluate the modulus of the constructed surface course and base course layers without coring the road structural section. The design engineers eliminated a requirement for over 1 million tons of crushed aggregate material by instead stabilizing the native soils to perform as a base course layer and covering the stabilized soil base course with just eight inches of stabilized crushed aggregate. This was a cost-saving alternative to the conventional Army Corps of Engineers design that required 16-inches of untreated crushed aggregate to support the weight of transporter trucks running at over 120 tons.

The results of the FWD testing indicate that the stabilized soils provided load carrying capacity equivalent or better than typical crushed aggregate materials. The thickness requirements for the aggregate surfacing layer can be reduced by stabilizing the native soils and as well as stabilizing the aggregate surfacing material itself. This can result in huge reduction in road construction costs and environmental impacts.

The FWD test results showed that the stabilized soil base course layer had a higher modulus than the eight-inch-thick layer of crushed aggregate that it replaced. The stabilized aggregate surface course outperformed the untreated aggregate by a factor of 5-1/2 times.

https://stabilizationproducts.net/docs/18676.pdf

FORT BLISS ARMY BASE – CONVOY OF TRANSPORT TRUCKS ON EMC SQUARED STABILIZED AGGREGATE ROAD

Pictured here is a fleet of the transport trucks moving battle tanks on a lane of recently placed stabilized aggregate. Next to this lane of cured stabilized aggregate is a lane of stabilized aggregate that was placed the previous day. EMC SQUARED Stabilized Aggregate surfacing can typically support heavy truck traffic with minimal curing time required.

More than ten years after the placement of this stabilized aggregate surface course it is still functioning as a low-dust running surface. This is in direct contrast to the aggregate roads that have not been stabilized and roads that were once treated with a dust palliative. The difference between the short lifespan of a dust palliative application and the extended service life of an EMC SQUARED Stabilized Aggregate surface course being the fact that the stabilizer improves the full depth of the treated aggregate layer. The wearing action of traffic is resisted through the full depth of the uniformly stabilized layer.

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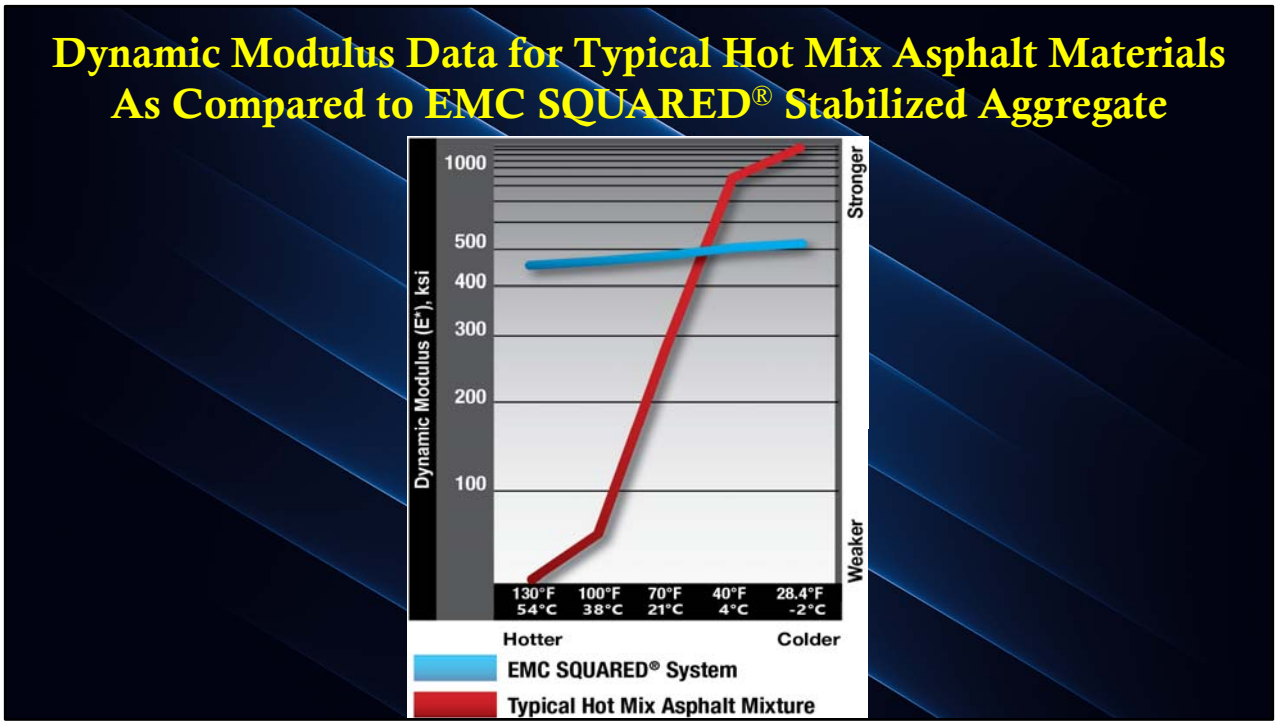

TEST RESULTS FROM THE ASPHALT PAVEMENT MATERIALS TESTING LAB AT THE WESTERN REGIONAL SUPERPAVE CENTER (WRSC) WHERE FHWA RESEARCH STUDIES ARE CONDUCTED – DYNAMIC MODULUS TEST RESULTS SHOWN HERE

This comparison with Hot Mix Asphalt (HMA) materials is highly favorable to the EMC SQUARED Stabilized Aggregate Material. For a report on this Dynamic Modulus testing, click on the link below.

In contrast to cement treated aggregate materials that exhibit slab-like, or rigid behavior, EMC SQUARED Stabilized Aggregate materials retain elastic, or flexible behavior, more similar to asphalt pavement mixtures. HMA pavement mixtures happen to be viscoelastic in nature, meaning that they weaken as temperatures get hotter and/or as loads get heavier. Their behavior is constantly changing in response to variations in temperature and loading conditions. Therefore, a direct comparison of EMC SQUARED Stabilized Aggregate with asphalt mixtures requires use of the Dynamic Modulus test method, since it is capable of evaluating performance under different temperature and loading conditions. As illustrated here, the EMC SQUARED Stabilized Aggregate has consistent high modulus value while the asphalt pavement mixture is dramatically weakened as temperatures or load weights are increased.

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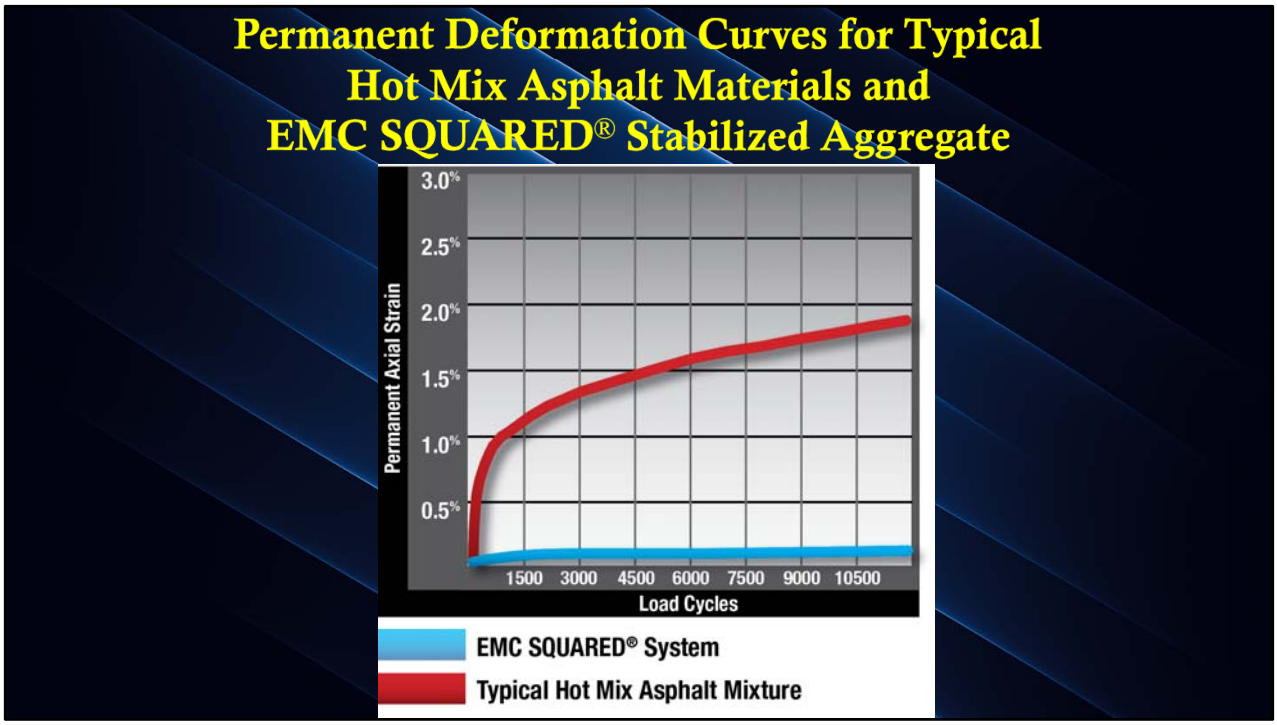

TEST RESULTS FROM THE ASPHALT PAVEMENT MATERIALS TESTING LAB AT THE WESTERN REGIONAL SUPERPAVE CENTER (WRSC) WHERE FHWA RESEARCH STUDIES ARE CONDUCTED – REPEATED LOAD TRIAXIAL (RLT) TEST RESULTS SHOWN HERE

This test illustrates the fact that the EMC SQUARED Stabilized Aggregate material is capable of supporting heavy loads that would permanently deform asphalt pavement. Full report on this Repeated Load Triaxial testing is provided. Take a few minutes and go down this revealing Rabbit Hole.

https://stabilizationproducts.net/docs/18828.pdf