

EMC

S Q U A R E D[®]

Advanced Stabilization Technology



**Fort Carson Tank Trail
and Heavy Haul Road**

U.S. Army
Fort Carson, Colorado

Fort Carson Tank Trail & Heavy

Fort Carson is located near Colorado Springs, Colorado, and shares the view of nearby Pikes Peak and the adjacent Rocky Mountain peaks. Dirt roads on base are subject to year round traffic by equipment with gross vehicle weights well in excess of those permitted on the nearby interstate freeway. The combination of severe Rocky Mountain weather and heavy equipment traffic (such as M1 Abrams Battle Tanks and heavy trucks, including giant lowbed haulers which can transport tanks, bulldozers and other large equipment) leaves untreated roads subject to rutting in wet weather conditions and requiring constant grading maintenance. The fine particle silty clay soils create a constant dust control problem in dry weather.



In summer of 1994, the tank trail running parallel to the Fort Carson motor pool area was treated with **EMC SQUARED**® stabilizer to a thirty foot width and a minimum depth of six inches. Soil testing reports classified the materials to be treated as moderate expansive clay, AASHTO A-7-6, with a Liquid Limit of 47 and a Plasticity Index of 25, with 100 percent passing a #100 sieve and 95.5 percent passing a #200 sieve. While some sections of the haul road had some rock content in the clay soil, the overall road project was notable for its extremely high percentage of minus #200 sieve fine particle soil. In the AASHTO Soil Classification System for Highway Subgrade Materials, this soil is classified as an extremely poor subgrade. Unconfined Compression Tests results with the stabilized soil provided an average strength of 566 PSI.

A crew from the base O&M Contractor, PAE, Inc., utilized a water truck to apply the stabilizer solution, a motor grader for mixing and grading and a vibratory smooth drum roller for compaction. Heavy rains set in the day after construction and the stabilized section was already able to support traffic while tanks rutted an adjacent control section to a six inch depth.

An onsite inspection in May of the following year by local civil and geotechnical engineering firm, Entech Engineering, Inc., observed that both tank and armored troop transport equipment utilizing the treated road and reported that the tank trail was in extremely good condition and had performed without maintenance since treatment the previous year and that, in fact, its condition was superior to that of adjacent sections which were being “maintained” by monthly grading. Grading crews reported that the treated section of road was so highly cemented that they were unable to cut into it with their grader blades.



The performance of the **EMC SQUARED** treatment was even more impressive considering the area had been subjected to record rainfall in months prior to the inspection. The engineering firm additionally noted that tanks were clearly turning on top of the treated material and then creating ruts as deep as two feet in the untreated shoulder areas as they maneuvered off the tank trail. Maintenance crews at Fort Carson at last report in March 1996, confirmed that this low cost **EMC SQUARED** treatment continued to support all forms of heavy traffic without damage to the road structure.

Heavy Haul Road Soil Stabilization



FIELD OBSERVATIONS TANK TRAIL

Fort Carson

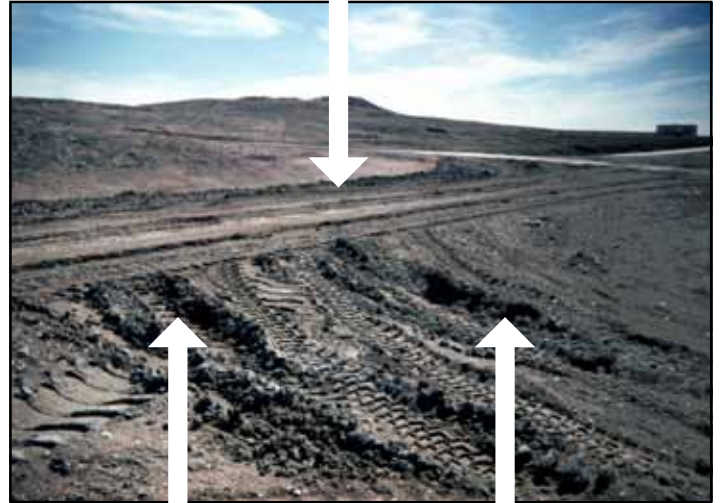
ENTECH
ENGINEERING, INC.

4720 FORGE ROAD, SUITE 100
COLORADO SPRINGS, CO 80907
(719) 531-5599
FAX (719) 531-5238

Met with Sandy Whyte, site inspection on May 16, 1995. Tank and Bradley Transport Traffic observed on the road.

- Test section has not had any road maintenance since installed in July 1994. Other sections required monthly maintenance.
- The treated section with no maintenance appeared to be in superior condition than the areas that have been "maintained".
- Severe ruts were noted in the shoulders which were not treated where the tanks turn. Some rutting 2 feet deep was observed.
- Treated areas adjacent to the rutted areas which experienced the same tank maneuvers were in good condition with not ruts.
- Treated soil was field cored with a concrete coring machine.
- Test section was noted to be in extremely good condition, especially in consideration of the lack of any maintenance on the test section.

STABILIZED ROAD SURFACE



RUTS LEFT IN UNSTABILIZED SHOULDER BY TANKS TURNING OFF OF THE STABILIZED ROAD SURFACE



FIELD CORES



Fort Carson Colorado - Tank Trail & Heavy Haul Road Laboratory Testing



UNCONFINED COMPRESSION TEST

Job No.

Fig. No.

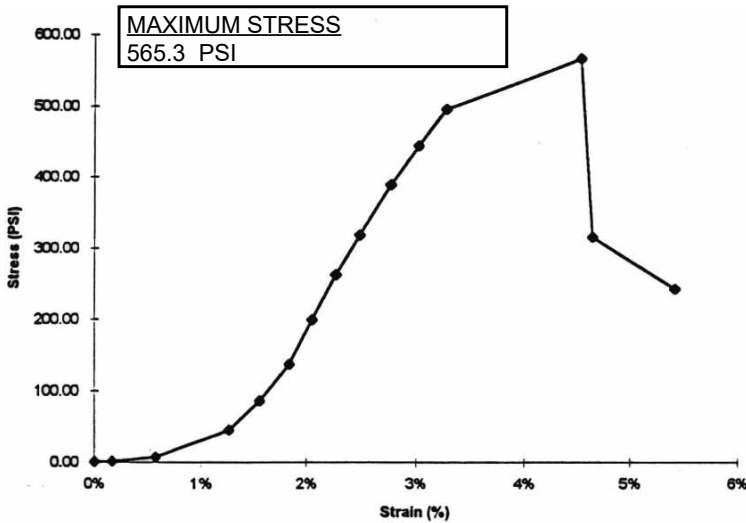
Drawn

Date

Checked

Date

EMC SQUARED Treated, No.1



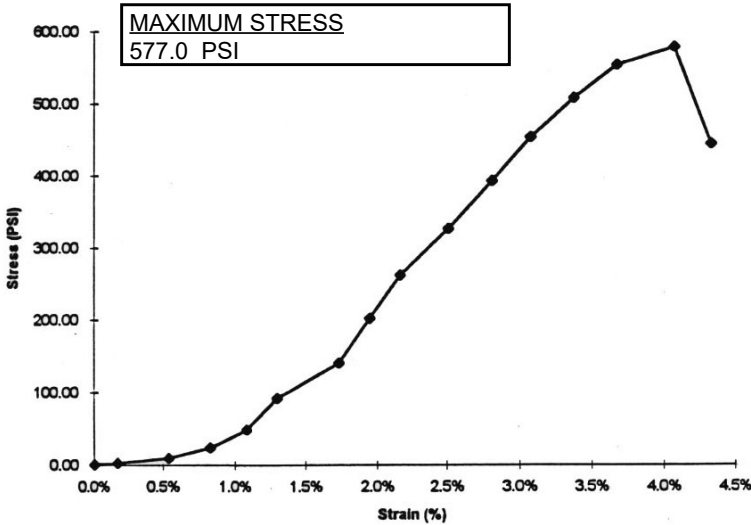
U.S. Sieve # Percent Finer

3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	
40	
100	100.0%
200	95.5%

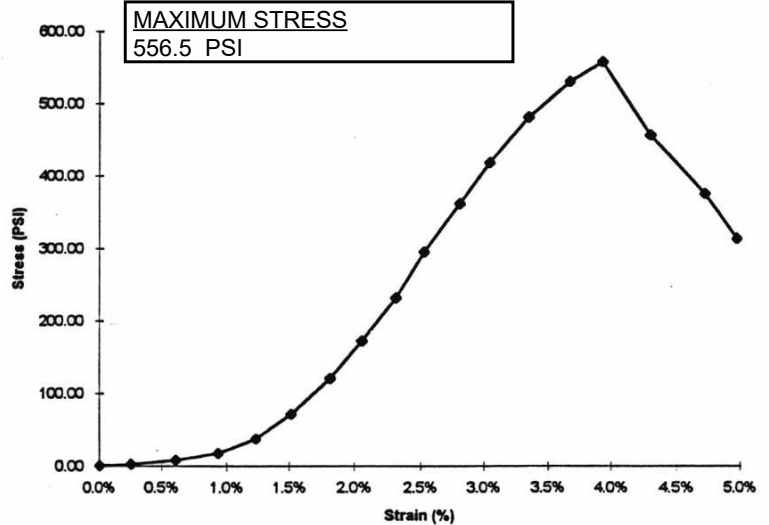
Atterberg Limits

Liquid Limit	47
Plastic Limit	23
Plastic Index	24

EMC SQUARED Treated, No.2



EMC SQUARED Treated, No.3



Stabilization Products LLC

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