SOIL~SEMENT® STABILIZATION OF DECOMPOSED GRANITE PATHS, TRAILS, ROADS, AND PARKING AREAS

As per our conversation, here is more information regarding the use of our product Soil~Sement® for in the stabilization of decomposed granite trails, roads , and parking areas. I have included the latest specification for stabilizing Decomposed Granite. This is the same basic specification we have been using for the past six (6) years with our product Soil~Sement®. It does have more stringent environmental and performance requirements than most specifications that have been utilized for other products. The application rates and methods are the same that we use on unpaved roads, alleys, and parking lots throughout Arizona and the same that the manufacturer utilizes nationally.

The last City of Phoenix project I remember doing was the "Lincoln Trail" adjacent to Lincoln drive from 24th street to 32nd street. That was done 1/2002. for Valley Rain Construction Corp. and was 21,800 square feet.

We have performed the same path/trail stabilization services at Arrow Head Meadows Park – 10/2000, Avondale Regional Park – 11/2001, Mountain Vista Park Phase II – 4/2001, Parkwood Ranch Park 10/2000, and Tempe Town Lake – 6/2002 here in Maricopa, County. We have over 300,000 square feet of trails/paths we have treated this method, state wide, the oldest being Dove Mountain Trail in Tucson. That trail was along a mountain side and very susceptible to erosion due to the runoff down the mountain. The project was 118,750 square feet and was completed 10/97. The trail is still intact and used daily. In conclusion, to date, we have never been required or requested to return to a project to do maintenance or warrantee work on any trails/paths we have stabilized with Soil~Sement®.

Finally, it should be noted that we have treated alleys (50 miles) for the City of Mesa utilizing the same process during the past two years. We have alleys that are still stable and dust free after 18 months from the application. Garbage Trucks run up and down those always twice a week for trash collection. We stabilize parking lots and roads utilizing the same process with a perfect track record of success. We have stabilized over 1.5 million square yards for the City of Phoenix Aviation Department at all three of their airports. We have been under contract since 1999 with the City of Phoenix to take care of all Aviation Department's stabilization and dust control needs with a flawless track record. I have attached references to this correspondence. Since product is successful on roads and parking areas receiving vehicular traffic, I can assure you, it works very well on trails.

Due to the concern that our stabilization product and method may not be recognized in your area as the method of choice for cost effective results, I had Rose Svedberg from our Tucson office, perform a photographic, onsite inspection of the work that was done in Tucson in 1997 at Dove Mountain (formally known as Red Hawk). There have never been any maintenance applications on this trail since it was completed in 1997. The following photos represent her site visit.

SECTION 02698

STABILIZATION, EROSION AND DUST CONTROL FOR DECOMPOSED GRANITE TRAILS, PATHS, DRIVES, AND PARKING AREAS

PART 1 GENERAL

1.1 DESCRIPTION

Provide "Stabilized Surface" as defined in Federal Regulation 40 CFR Part 52, FRL6511-3, 12/21/99 FIP, and Maricopa County Environmental Services Department, Air Quality Division, Rules 310 and 310.01. All proposed work is in Maricopa County.

1.2 SYSTEMS REQUIREMENTS

Prepare areas for soil stabilizer / erosion and dust control application as indicated. The soil stabilizer / erosion and dust control application shall penetrate to a minimum depth of two (2) inches. The application process shall result in a uniformly treated mixture that contains the required amount of soil stabilizer / erosion and erosion control product, as recommended by the manufacturer or as approved by the Engineer. The total application rate to stabilize the surface of the decomposed granite material shall be a minimum of 50 square feet per gallon of undiluted liquid soil stabilizer / erosion and dust control product per manufacturer's recommendation. After multiple applications of the stabilizer, the area treated may need to be compacted with a mechanical roller. Upon final compaction, if needed, area treated will receive a final top seal with the soil stabilizer.

The soil stabilization / erosion and dust control product shall be applied on the decomposed granite that is in-place. Placing, Grading, compacting, of the decomposed granite materials will be performed prior to the application of the soil stabilizer product in accordance with the plans and specifications over the compacted subgrade. **The soil stabilization / erosion and dust control product application shall provide 100% control efficiency of PM_{10} , and control erosion for a minimum of 24 months from date of application.** The contractor shall provide and install the soil stabilization / erosion and dust control product free of charge if the finished project fails to meet the performance requirement of these specifications. The contractor shall provide additional applications when they are required, and within two weeks from a performance failure when notified.

1.3 SUBMITTALS

The following information shall be provided:

A. Manufacturer's standard literature for soil stabilizer / erosion and dust control product.

B. Manufacturer's installation recommendations.

C. Manufacturer's Material Safety Data Sheets

D. Applicator qualifications.

PART 2 PRODUCTS

2.1 MATERIAL REQUIREMENTS AND SPECIFICATIONS

2.1.2 The dust control product shall be acceptable to the Engineer. Petroleum base products, pine tar resins, magnesium chlorides, calcium chlorides, and lignin sulfonates are not acceptable.

2.1.3 The dust control product shall be an acrylic, acrylate and acetate liquid polymer consisting of the following properties in its undiluted state as it is to be delivered to the job site:

Composition	**Acrylic, Acrylates, and Acetate Liquid Polymer**
Appearance	**Milky White Liquid**
Odor	**Characteristic Acrylic Odor**
Specific Gravity	**1.01-1.15**
Density	**8.4-9.5 lbs/gal**
pH	**4.0-9.5**
Solubility in Water	**Dilutable**
Solids	**Minimum of 40%**

2.1.5 Soil stabilizer / erosion and dust control product shall be **Soil~Sement® by EarthCare Consultants, LLC., Tucson, Arizona or approved equal.**

2.1.6 A Certificate of Compliance shall be submitted to the Engineer for the soil stabilizer / erosion and dust control product brought to the job site.

2.1.7 When bid, contractor shall submit test results (report) from an independent AASHTO accredited lab, signed and sealed by a Professional Engineer, registered in the State of Arizona, showing the CBR value of untreated A-7 soil from Maricopa County and CBR values of that same soil at the optimum stabilizer content. Results of treated soil should show a minimum 25% increase in CBR value over the untreated. The test method used shall be a modified version of ASTM D 1883 Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Samples. The following curing modification shall be used:

Curing - CBR specimens, after molding, shall be left in their mold, on their sides and cured in laboratory air for 7 days prior to being immersed in water for 96 hours and then tested for CBR.

Moisture Content - CBR samples shall be compacted at the optimum moisture content, both treated and untreated (ASTM D698, method C.) Three specimen average required. Surcharge weight shall be 10 lbs.

Report - shall include all the information required by ASTM D1883, Section 10.0 for both treated and untreated CBR samples. In addition, the penetration vs. stress plots for each test shall be included (ASTM D 1883, Fig. 2)

2.2.8 ENVIRONMENTAL CRITERIA:

Environmental Criteria: Products shall not contain or emit chlorinated fluorocarbons (CFS's, Freons) or volatile organic compounds (VOCs). Products shall not contain detectable levels of polycyclic organic matter which includes aromatic hydrocarbons as defined by the Federal Clean Air Act section 112(b); nor contain detectable levels of fluorinated or brominated compounds that could be expected to contribute to ozone depletion or global warming.

HMIS rating shall be equal to or less than for each category: H=1; F=l; R=1; PPE=X.

Contractor shall provide a copy of the current Material Safety Data Sheet (MSDS) for each product proposed for use. The MSDS must include all chemical compounds present in concentrations greater than 0.1 % .

Contractor shall provide certification that storm water runoff from treated will not contain concentrations that exceed water quality benchmark values of the parameters designated in Table 1 below (Source: Table 5 of the National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit for Industrial Activities or the Arizona surface water quality standards as defined in the Arizona Administrative Code, Title 18, Chapter 11). This certification can be documented by all of the following methods:

1. Conduct aquatic toxicity testing and provide full test data results.

2. Conduct specific surface water testing (runoff over treated area) or specific soil testing of treated soil.

3. Provide complete and accurate listing of chemical constituents (by percentage and quantity) which make up the product. This must include all proprietary chemical information.

TABLE 1
Parameter Benchmark Values

Parameter Name	Benchmark Level		Source
Biochemical Oxygen Demand (5)	30.0	mg/L	4
Chemical Oxygen Demand	120.0	mg/L	5
Total Suspended Solids	100.0	mg/L	7
Oil and Grease	15.0	mg/L	8
Nitrate + Nitrite Nitrogen	0.68	mg/L	7
Total Phosphorous	2.0	mg/L	6
pH	6.0 - 9.0	s.u.	4
Acrylonitrile (c)	7.55	mg/L	2
Aluminum, Total (pH 6.5-9)	0.75	mg/L	1
Ammonia	19.0	mg/L	1
Arsenic, Total (c)	0.16854	mg/L	9
Benzene	0.01	mg/L	10
Beryllium, Total (c)	0.13	mg/L	2
Butyibenzyl Phthalate	*3*.0	mg/L	3
Cadmium Total (H)	0.0159	mg/L	9
Chloride	860.0	mg/L	1
Copper, Total (H)	0.0636	mg/L	9
Dimethyl Phthalate	1.0	mg/L	11

Ethylbenzene	3.1	mg/L	3
luoranthene	0.42	mg/L	3
Fluoride	1.8	mg/L	6
Iron, Total	1.0	mg/L	12
Lead, Total (H)	0.0816	mg/L	1
Manganese	1.0	mg/L	13
Mercury, Total	10.0024	mg/L	1
Nickel, Total (H)	1.417	mg/L	1
PCB-1016 (c)	0.000127	mg/L	9
PCB-1221 (c)	0.010	mg/L	10
PCB-1232 (c)	0.000318	mg/L	9
PCB-1242 (c)	0.00020	mg/L	10
PCB-1248 (c)	0.002544	mg/L	9
PCB-1254 (c)	0.10	mg/L	10
PCB-1260 (c)	0.000477	mg/L	9
Phenols, Total	1.0	mg/L	11
Pyrene (PAH, c)	0.01	mg/L	10
Sadznium, Total (*)	0.02385	mg/L	9
Silver, Total (H)	0.0318	mg/L	9
Toluene	10.0	mg/L	3
Trichloroethylene	0.0027	mg/L	3
Zinc, total (H)	0.065	mg/L	1

Sources:

1. "EPA Recommended Ambient Water Quality Criteria." Acute Aquatic Life Freshwater.
2. "EPA Recommended Ambient Water Quality Criteria." LOEL Acute Freshwater.
3. "EPA Recommended Ambient Water Quality Criteria." Human Health Criteria for Consumption of Water and Organisms.
4. Secondary Treatment Regulations (40 CFR 133).
5. Factor of 4 times BOD5 concentration - North Carolina benchmark.
6. North Carolina storm water benchmark derived from NC Water Quality Standards.
7. National Urban Runoff Program (NURP) median concentration.
8. Median concentration of Storm Water Effluent Limitations Guideline (40 CFR Part 419).
9. Minimum Level (ML) based upon highest Method Detection Limit (MDL) times a factor of 3.18.
10. Laboratory derived Minimum Level (ML).
11 .Discharge limitations and compliance data.
12. "EPA Recommended Ambient Water Quality Criteria." Chronic Aquatic Life Freshwater.
Colorado Chronic Aquatic
Life Freshwater -Water. Quality Criteria

Notes:

(*) Limit established for oil and gas exploration and production facilities only. (c) carcinogen, (H) hardness dependent.
(PAH) Polynuclear Aromatic Hydrocarbon.
Assumptions: Receiving water temperature - 20 C. Receiving water hardness - CaC03 100 mg/L. Receiving water salinity - 20 g/kg. Acute to Chronic Ratio (ACR) - 10.

Dust palliative/stabilizers and their degradation products shall not be composed of any element, compound, mixture, or produce runoff with the characteristics identified under 36-2822 of the Arizona Hazardous Waste Management Act, emit or off gas during placement, use, or degradation of any hazardous chemical substance or mixture pursuant to Section 7 of the Federal Toxic Substances Control Act [15 U.S.C. §2606], be designated by rule an extremely hazardous chemical substance pursuant to the Arizona Environmental Quality Act, be prohibited for use by the Arizona Department of Environmental Quality, the Environmental Protection Agency, or any applicable law, rule or regulation.

Dust palliatives/stabilizers, or their components and degradation products shall not be substances or composed of substances known to be, or reasonably anticipated to be, carcinogenic by the U.S. Department of Health and Human Services.

Manufacturer shall provide independent verification and certification of performance and environmental claims by a recognized agency of the United States or Canadian **Environmental Technology Verification** programs for chemical dust suppressants.

Failure to provide adequate proof of conformance to the criteria shall be considered grounds for rejection.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES

3.1.1 Prior to the soil stabilizer / erosion and dust control product application, mask or otherwise protect buildings, concrete, roads, sidewalks, etc..

3.1.2 Care will be taken to avoid excess over spray that may affect any adjacent areas.

3.2 DILUTION OF SOIL STABILIZER / EROSION AND DUST CONTROL PRODUCT

3.2.1 As required by the manufacturer, the soil stabilizer / erosion and dust control product shall be diluted with potable water in accordance with the manufacturer's recommendations and as approved by the engineer prior to the application.

3.3 SPECIAL REQUIREMENTS

3.3.1 Curing: No equipment or traffic will be permitted on the stabilized area for 48 hours unless approved by the product Manufacturer's representative.

3.3.2 Product representative: A representative from the product manufacturer or a manufacturer trained technician shall be present on the job.

END [SECTION 02689]

Trail Head

Bridge Over Main Wash

Bridge Over Main Wash

Note Flagstone Embedded In Trail

Transition From Concrete To Soil~Sement®

Stabilized Decomposed Granite Trail

Views From Various Locations Coming Down Off The Mountain Side

Close-Up Of Stabilized Surface

Same Area From Distance

Erosion Free Box Culvert Area