Midwest Industrial Supply, Inc.
Benefits, Capabilities, Systems and Products

Frank Elswick
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Midwest Industrial Supply, Inc.

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Benefits and Capabilities

The Short Story

Midwest lives in, manufactures for, and delivers Earth-conscious solutions to consumers whose success depends on overcoming dust, erosion, and soil stabilization issues.

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Different Continents; Same Needs

What Midwest can do – anywhere

- Suppress dust
- Stabilize soil; stop erosion
- Upgrade marginal soils
- Preserve fines
- Curb water damage
- Improve traction
- Stabilize roadways
- Provide natural alternative paving

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We Serve YOU . . .

Unlike other dust-control companies, Midwest:

- Has its own lab, so developing new solutions is business as usual
- Prove our concepts by extensive lab and field testing prior to releasing to market
- Manufactures its own spray systems and other equipment to ensure optimal application
- Is fully committed to safety and has awards to show for it
- Is as green as it gets in protecting the environment
- Is the real deal, with more patents and certifications to back up claims than any competitor
- Guarantees results

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Manual Stabilization Method with Soil Sement Engineered Formula

Soil Sement Engineered Formula
What it is and Does

Soil-Sement is an environmentally safe, nanotechnology polymer emulsion that:

- Creates a stabilized surface which will retain all surface material within the bound surface
- Chemically bonds and seals surfaces to prevent wind from lifting fines and creating dust
- Provides long term surface stabilization
- Improves air and water quality by eliminating dust
- Offers maximum weather ability to wind, rain, ultraviolet light and other outdoor conditions

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Soil Sement Engineered Formula Environmental Picture

- Environmentally safe, non-toxic, non-corrosive, non-flammable and non-water soluble; once cured will not re-emulsify and leach into surrounding areas
- Is backed by certified environmental test data
- Will not contaminate groundwater
- Water-resistant and resilient surface that prevents infiltration
- Dramatically reduces PM10 and PM2.5 emissions
- Adds no pollutants to storm water discharge, including BOD (Biological Oxygen Demand)
- Reduces pollutants by decreasing the amount of TSS (Total Suspended Particulates or Solids) present in runoff

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Respecting the Environment

Soil-Sement is proven to be tough on dust, gentle on the environment and certified by the following:

- U.S. Environment Protection Agency Technology Verification
- California Environmental Technology Certification
- California Air Resources Board Verification
- Canadian Environmental Technology Verification
- Midwest Research Institute
- U.S. Army Corps of Engineers
- Desert Research Institute

CalCert
Innovation Assured

Pre-certified by the California Air Resources Board

Performance Claim Verified by the ETV Program

GreenPave Engineered Stabilization System

What is GreenPave?

GreenPave at a Glance

An alternative-binder based road construction system to properly engineer sustainable flexible pavement which replaces 100% of the petroleum used in constructing flexible pavements:

- Improves long-term performance of un-surfaced and surfaced roads
- Improves aging control to reduce cracking and moisture damage
- Uses native in-place soils wherever possible
- Increases structural integrity and CBR
- Creates or restores a smooth, skid-resistant surface
- Offers a cost-effective alternative to asphalt
- Produces lighter surfaces that do not absorb heat
- Employs green products harvested on a sustainable basis
- Will not harm vegetation or wildlife

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GreenPave Stabilization

GreenPave stabilization utilizes proprietary, engineered polymer-based organic emulsion, blended into the existing base of native soils, gravel roads, or recycled roadway surface materials.

GreenPave stabilization process will:

- Increase loading capacity (CBR)
- Create a barrier to reduce harmful moisture penetration
- Deliver a stronger, longer-lasting road surface at a lower cost than conventional road design

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GREENPAVE® ECONOMICS..
Cost Effective GreenPave® Systems

GreenPave® offers significant cost savings to conventional road designs.

Road stabilization and surfacing with GreenPave systems offer significant economic alternatives to conventional road designs. Following GreenPave road options are compared to conventional road designs. Note that design strength has been maintained while costs have significantly been reduced.

Conventional Road Design :

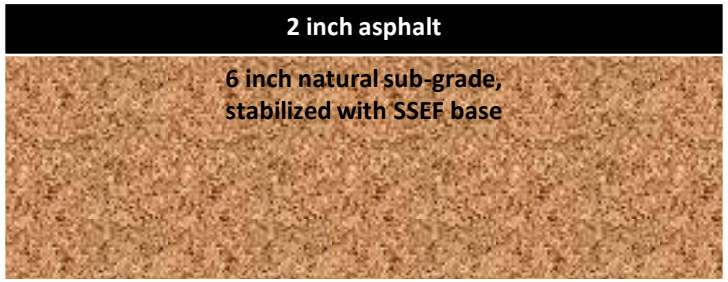
Structural strength = 100%
Construction cost = 100%

AASHTO Structural Number modeling is supported by lab and field tests of stabilized materials to verify strength comparisons between design options. Using published correlations standard test measurements are related to CBR values and structural coefficients, allowing cost comparison between design of similar strength.

GREENPAVE® ECONOMICS..
Cost Effective GreenPave® Systems

This GreenPave design can save up to 40% compared to conventional road design.

GreenPave Alternative #1:



Structure strength = 100%

Construction cost = 60%

Improves conventional design through stabilization of available materials blended to optimize gradation and plasticity. The result is a maximum increase in stabilized strength. **Savings of 40%** are possible by thinking outside the box of conventional design and road materials.

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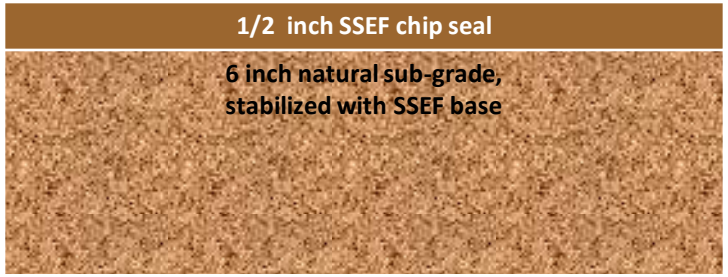
GREENPAVE® ECONOMICS..
Cost Effective GreenPave® Systems

This GreenPave design can save up to 60% compared to conventional road design.

GreenPave Alternative #2:



- **Structural strength = 100%**
- **Construction cost = 40%**
- **Savings up to 60%**

Provides an effective, earth friendly process of Road Design. GreenPave construction systems use in place soils and GREEN products to produce roadways that perform as well as conventional asphalt surfaces.

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GreenPave Engineered Stabilization System Process

GreenPave Stabilization Process

- Areas to receive Soil-Sement Engineered Formula® stabilization emulsion shall be graded and scarified to at least 10 cm, the minimum depth and width of intended placement area
- The soil shall be scarified by tilling, disking, or ripping to achieve uniform preparation of the soil to the planned minimum depth
- The soil should be damp at the time of scarification to reduce dust and aid in pulverization
- Surface gravel and stones are to be removed or if possible thoroughly mixed with surrounding soils to obtain a homogenous blend

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GreenPave Stabilization Process: Blade Mix or Mix in Place

- Soil-Sement Engineered Formula® shall be applied to the desired area at the instructed rate with a motorized spray system and thoroughly blended into the soil until the homogenous mixture is obtained to the full depth of 10 cm
- Mixing shall be done with commercialized mixing equipment or motor grader (blade mixing)
- The blending method utilized shall result in a uniformly treated mixture of soil and Soil-Sement Engineered Formula® solution at optimum moisture content
- The amount of area mixed each day shall be limited to that which the contractor can thoroughly mix and compact within that work day

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GreenPave Stabilization Process: Compaction

- Begin initial compaction as soon as installation will bear roller without undue displacement; to be conducted with pneumatic roller or soil compactor
- If lift will not support compaction equipment due to excess moisture, delay initial compaction until lift achieves adequate stability to support compaction equipment
- Generally, no more than two passes are required for initial compaction. If the lift begins to develop stress cracks the pavement is being over compacted and further compaction should be halted

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GreenPave Stabilization Process: Compaction

- Suggested equipment for final compaction is a 5 to 10 ton double drum roller
- Begin final compaction as soon as possible following initial compaction
- Roll surface in final compaction as required to eliminate roller marks and remove any surface marks from the initial compaction
- Make number of passes necessary to achieve an aesthetically pleasing unyielding surface and 95% optimum compaction

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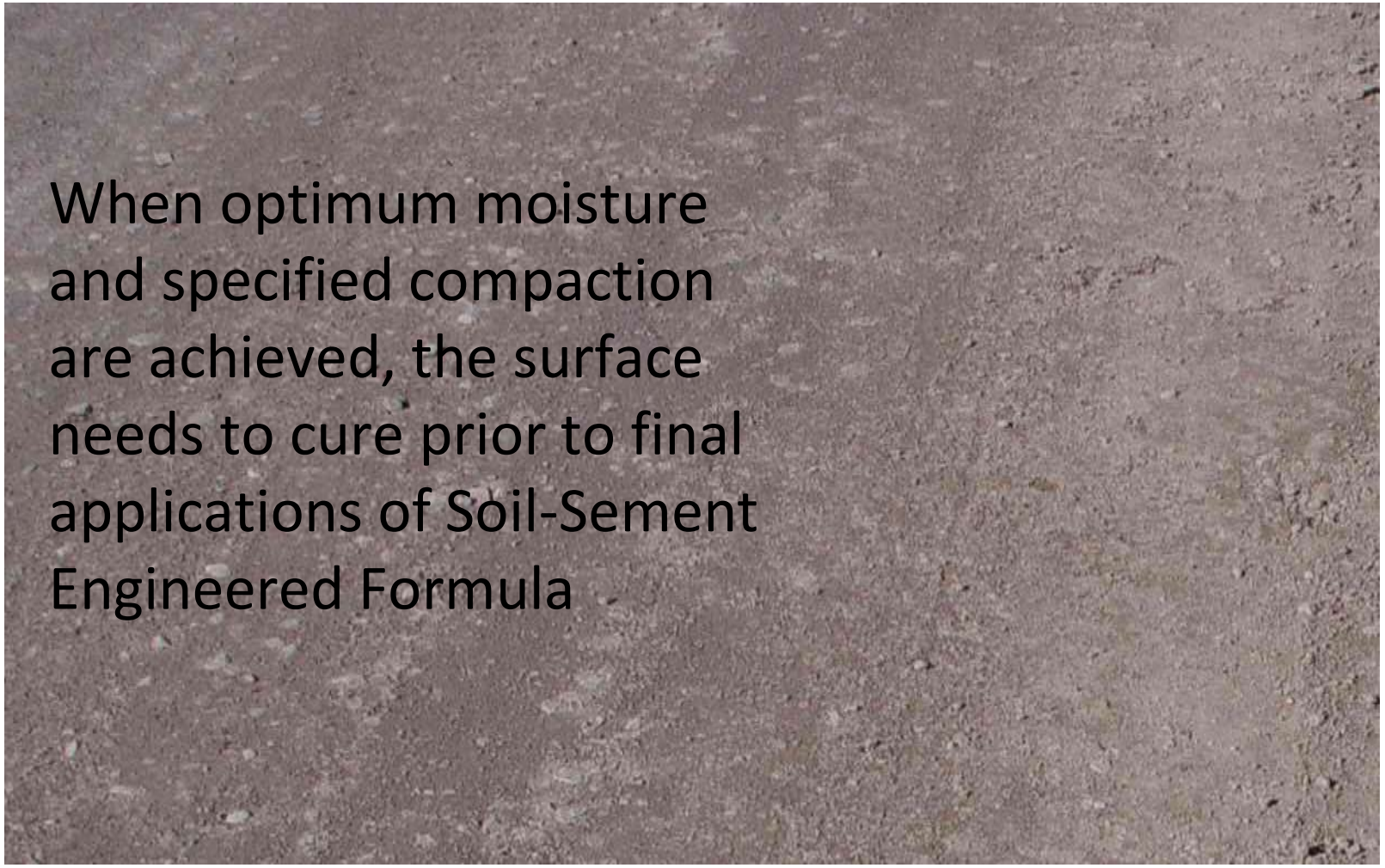
GreenPave® Stabilization Process



Top Coating

- When surface has dried , typically 24 - 48 hours after final compaction, apply seal coats at specified application rate of concentrate per square meter of surface area diluted at recommended dilution rate
- Seal coats may be applied in multiple coats to prevent running and to insure uniform coverage. Allow surface to dry between seal coat applications

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GreenPave Engineered System
Application Specifications Summary

- Application Rate: The application rate is based upon the recommended concentrated gallons per square meter recommended from manufacturer

- Dilution Rate: Dilution rate will vary depending on soils condition, weather, existing moisture, and specified optimum moisture for compaction

- During the application process 80% of the total Soil-Sement Engineered Formula® concentrate shall be blended into the loosened soil. Remaining 20% shall be utilized for the final top coat applications following compaction

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GreenPave Engineered System Stabilized Road

GreenPave Engineered System Stabilized Road

GreenPave Engineered System Stabilized Road

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GREEN PAVING CASE STUDIES

Case Study: County in Western U.S.

Objective:

Demonstrate Cost Effective Stabilization Methodology for Unpaved County Roads in Western United States by:

- Utilizing chemical subgrade stabilization
- Applying a traditional chip seal surface to the stabilized subgrade

Green Paving Selection Process Criteria:

- Environmental Impact
- Performance
- Independent Studies
- Use By Other Government Agencies
- Ease of Application
- Availability
- Proven Track Record of Product, Manufacturer and Applicator
- Life Cycle Cost

Case Study: County in Western U.S.

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Case Study : County in Western U.S.

Outcomes Realized:

- An Increase the Durability of the Road
- Reduced Long Term Maintenance Expenditures
- Cost Effective County Roads

Case Study: U.S. Military Base

Objective:

Immediately improve an eight mile stretch of road leading to the construction area of CAMount (Combined Arms Military Operations in Urbanized Terrain) training area:

- Utilizing chemical subgrade stabilization
- Applying an organic chip seal surface to the stabilized subgrade

Background:

- The road experiences heavy traffic from contractor and service vehicles due to construction activity, which is expected to continue for the next three years minimally. This road required constant maintenance in the form of watering and re-grading. Because the Combat Center was unable to meet the heavy maintenance tempo of the road they had to contract the service out at a cost of $1,000,000.00 annually.
- The cost/benefit analysis of this project indicates that the Military would realize a $250,000.00 cost savings benefit the first year

Case Study: U.S. Military Base

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Case Study: U.S. Military Base

Outcomes Realized:

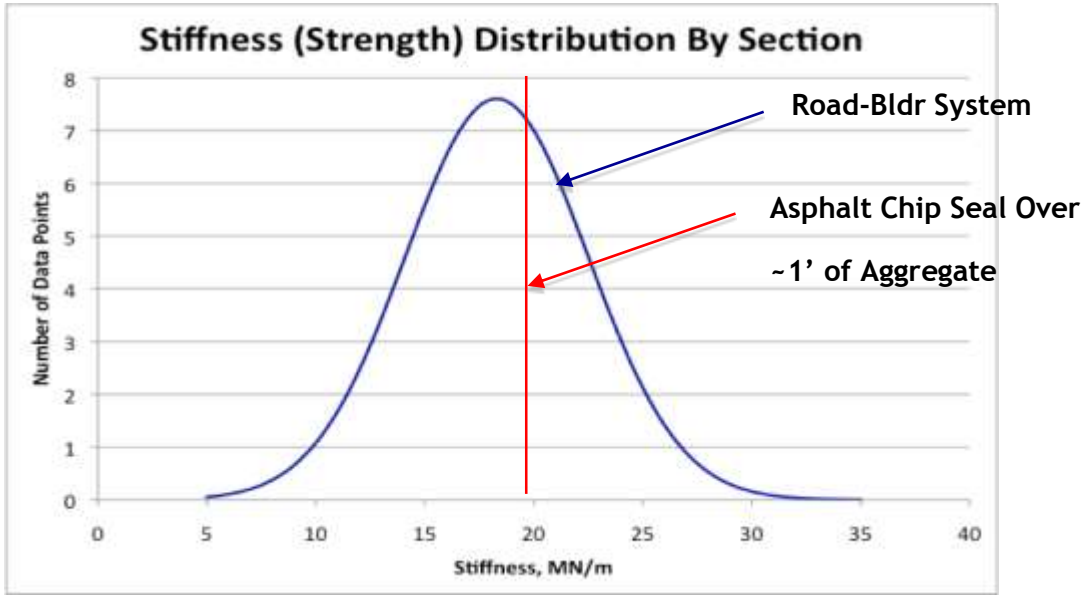
- Cost Savings: As a result of the capability to utilize native roadbed materials to create an improved stabilized sub-base a tremendous amount of savings were realized in lieu of importing road base materials to a remote location

- Offering an organic alternative to asphalt based chip seal binders solved environmental challenges posed to the military working close to environmentally sensitive areas

- Long term solution to road stability issues created less disruptions than the weekly maintenance activity

Case Study: U.S. Military Base

Overall Performance of U.S. Military Base Road Stiffness of Completed Road Chip Seal Over Stabilized Soil (Mean Stiffness Corresponds to a CBR of ~90)



Data taken with the cooperation of the Maryland State Highway Administration, Texas DOT, Minnesota DOT and Main Associates in 2002.

The Samitron stiffness measurements of the Midwest Road-Bldr represent primarily the stabilized soil as the chip seal is ~ ½" thick and the Samitron depth of measurement is ~ 9". This performance is comparable to that of the best quality aggregate bases used for interstate highway construction (see "TYPICAL STIFFNESS VALUES AS MEASURED WITH THE HUMBOLDT GEOGAUGE", Humboldt Mfg. Co, 2003). This strongly suggests that the Road-Bldr system will perform well as moderate volume road and excellent as a parking lot.

Case Study: U.S. Military Base

Test Data Outcome:

- The data strongly suggests that the performance (stiffness and strength) of the Green Paving System at the U.S. Military Base (Road-Bldr chip seal over ~ 4” of Road-Bldr stabilized sandy soil) is comparable to that of conventional asphalt chip seal over one foot of quality aggregate base. So employing Green Paving with the available, native materials will provide the same performance as conventional medium volume road construction at a fraction of the cost.

RESULTS

The results are strong!

- Longer-term road performance
- Greater structural integrity
- Increased roadway loading capacity
- Smooth, dust-free running surface
- Superior traction
- Unstable, unpaved roads rehabilitated
- Cost-effective alternative to asphalt
- Green, sustainable components safe for vegetation and wildlife
- Uses in-place soils
- Produces light color, highly-reflective surfaces
- Can be installed below 50°F
- Washed aggregate not required
- No post-installation sweeping

Recommended Equipment

Road Grader: For scarifying roadbed, blade mixing and achieving final grade

Tractor with attached tiller for alternate method of mixing in place

Compaction Equipment

- Pneumatic Tired Roller

- Sheep Foot Roller

- Tandem Vibratory Roller

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GreenPave and Sustainability

Sustainability

Environment:

- Use of organic emulsions with existing base of native soil, gravel roadways or recycled roadway materials
- Creating lighter surface thereby eliminating the “heat island” effect
- No environmental impact during installation compared to conventional asphaltic binders which must be heated during application
- Limit greenhouse gas emissions

Social:

- Desirable aspect of maintaining natural aesthetics
- Providing a higher level of comfort and durability with light color, highly-reflective surfaces
- Emergence of “green” communities
- Fulfill increasing interest in energy independence

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Sustainability

Economic:

- Use of native, in place base materials instead of costly imported aggregate materials
- Reduced construction costs
- Improved aging control resulting in improvement in pavement resistance to all types of cracking and moisture damage
- Lower long term maintenance e.g. manpower, grading, etc.

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Results

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For Further Information

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Thank you!

Road Projects in Southern Africa

CNM-YBJ Associates

(Projects with traditional cement/lime stabilization & asphalt surfacing)

Upgrading of Nsanje-Bangula Road, Malawi

Class 1 Bitumen Standard (50km) - Design review and project management

Sebina-Nata Road Reconstruction (134km)

CNM-YBJ Responsibilities

- Topographical survey
- Engineering design
- environmental impact assessment
- Bills of Quantities and cost estimates
- contract documents
- construction supervision

Ruya Bridge and Approaches, Zimbabwe

Rural bridge and road with gravel finish..

CNM-YBJ Responsibilities

- Engineering design
- Bills of Quantities and cost estimates
- contract documents
- construction supervision

Harare - Beitbridge Road, Zimbabwe

BOT Project (140km)

Feasibility Study of the Upgrading, Construction and Tolling

In partnership with RHDHV South Africa) and other Zimbabwean companies..

- Visual Condition Survey (140km of Road)
- Condition Segmentation for the 140km
- Rehabilitation Proposals for the 140km

CABS Budiriro Housing Project, Harare

35km of township roads

CNM-YBJ Responsibilities

- Topographical survey
- Engineering design
- environmental impact assessment
- Bills of Quantities and cost estimates
- contract documents
- construction supervision