

AGENDA ITEM FOR ADMINISTRATIVE MEETING () Discussion only
(X) Action

FROM (DEPT/ DIVISION): County Counsel

SUBJECT: Road Stabilization Product Purchase

<p>Background:</p> <p>Public Works Department is seeking Board approval to purchase road stabilization product through an alternative contracting method. The product will be used on Moorehouse and Sagebrush Roads, at a lower cost than chip sealing or paving, and more effective than dust control product.</p>	<p>Requested Action:</p> <p>Adopt Order No. BCC2023-021</p>
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ATTACHMENTS: Quotes; Proposed Order

*****For Internal Use Only*****

Checkoffs:

- () Dept. Heard (copy)
- () Human Resources (copy)
- () Fiscal
- (X) Legal (copy)
- () (Other - List:)

To be notified of Meeting:

Needed at Meeting:

Scheduled for meeting on: April 26, 2023

Action taken:

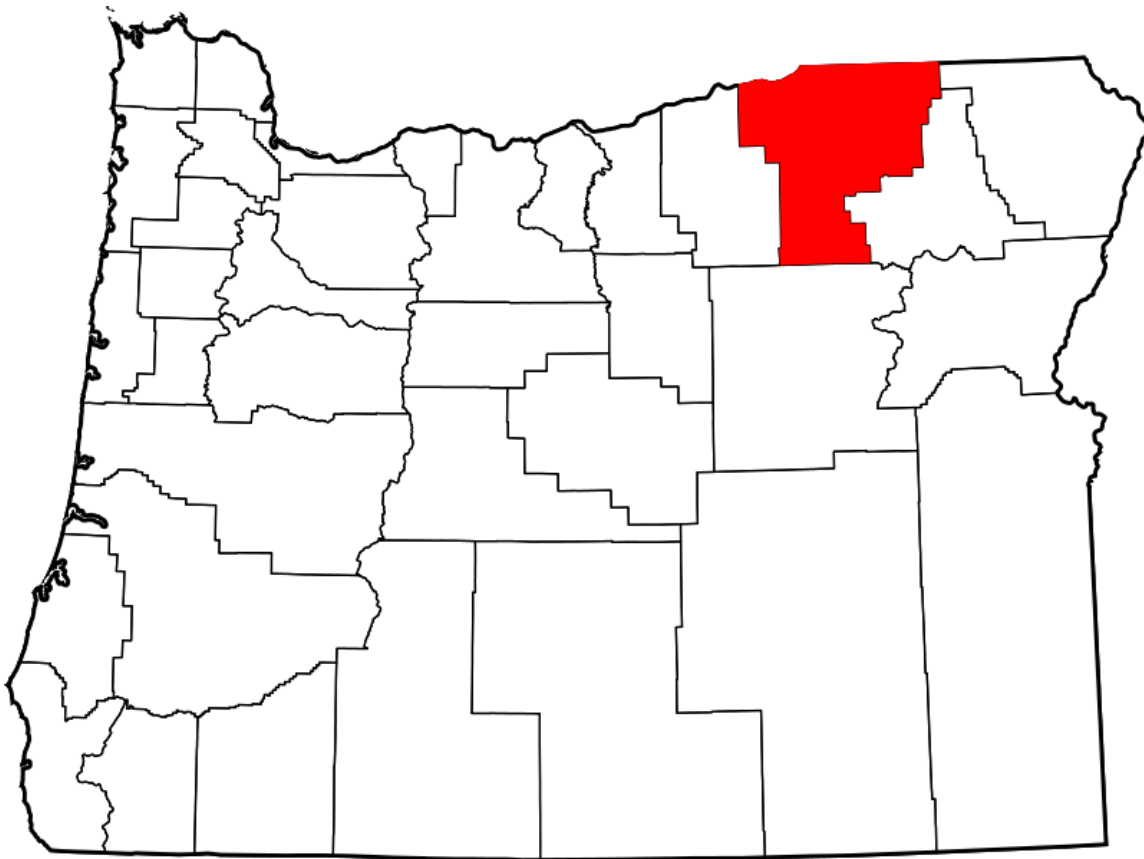
Follow-up:



Umatilla County, Oregon

NaturalPave Road Stabilization and Dust Control

A Value Proposition for Stabilizing Moorehouse Road



Presented to:
Tom Fellows
Public Works Director

Presented by:
Midwest Industrial Supply, Inc.



PROJECT BACKGROUND

Umatilla County, Oregon is seeking a solution that will preserve several select unpaved roads in their constructed state with minimal maintenance and minimized fugitive dust emissions. One of the two initially selected roads was Moorehouse Road.

Moorehouse Road is a Farm-to-Market (FM) road that is exposed to heavy crop hauling and planting traffic 8 months out of the year. From March through November the roads receive 100-250 trucks per day traveling at speeds at and above the posted speed limit of 55mph. The truck traffic is mainly comprised of 4-axel trucks with trailers that have loaded weights of 110,000lbs. In the winter, the ADT is reduced to less than 100 passenger vehicles. In addition to the fugitive dust issue, truck traffic damages roads and creates maintenance and safety concerns. Umatilla County's Public Works Department is unable to maintain the roads at the desired levels due to safety concerns associated with having grader operators on the roads with constant truck traffic.

Umatilla County's Public Works Department oversees the maintenance of all county roads and bridges in Umatilla County including approximately 1200 miles of unpaved roads. The Road Department is funded with Gas Tax, Vehicle Registration Fees, and Forest Service revenues based on timber harvested in Umatilla, Wallowa and Whitman National Forests. Timber sales have declined significantly in recent years. Due to the loss of revenues, Umatilla County is basically in a maintenance mode and is always looking for additional ways to fund road and bridge improvement projects.

As a short-term solution, dust control products such as lignin and magnesium chloride have previously been topically applied to unpaved roads for dust suppression. These temporary solutions were inefficient and abandoned in 2022. As a long-term solution, Umatilla County installs triple chip seal surfacing to their unpaved roads which results in a 20+ year service life. This is an effective solution however the current cost is over \$200,000 per mile on a 24' wide road. On top of the already high cost, the oil alone saw a 60% increase in cost from 2021 to 2022 due to inflation.

MIDWEST'S RECOMMENDED SOLUTION

For medium-term, cost-effective solutions, Midwest recommends our NaturalPave Stabilization System utilizing our Soil Sement Engineered Formula. Midwest offers the NaturalPave System to manage virtually any problems associated with roadbed stabilization, fugitive dust, erosion, and sediment control on unpaved roadways. All of Midwest's NaturalPave products are developed to



be environmentally safe, designed for superior performance and thoroughly tested in the field, in the laboratory and through extensive industry studies. NaturalPave's stabilization technology increases the structural strength of the road while also providing a water repelling surface to protect the underlying road materials. Improved strength, durability, and moisture repellency results in longer lasting, superior roads with economic savings.

Amend existing road material with base course aggregate, stabilize the upper 4-6" of the existing road with the NaturalPave Stabilization System including annual maintenance application for 6 years to produce a 7-10 year road.

- 1) Spread 2" of base course aggregate on top of the existing road material. Blend the 2" of newly placed base course aggregate into the upper 2" of the existing road surface.
- 2) Apply and incorporate SSEF69PBc to a depth of 4" to create a stabilized roadbed.
 - a) SSEF69PBc can be blended using a reclaimer or grader.
- 3) Grade the treated material to the specified road profile and compact. The constructed road should be profiled with a sufficient crown that promotes drainage off the road.
- 4) Topically apply a seal coat of SSEF69PBc to provide additional protection and dust control to the treated surface.
- 5) Traffic shall be diverted off the road for 24 hours following the seal coat.
- 6) The total recommended application rate for the SSEF69PBc is 1 gallon per 43 square feet
 - a) 80% of the total volume is to be blended into the upper 4" of the surface.
 - b) 20% of the total volume is to be applied topically as a seal coat
- 7) Annual maintenance applications are to be applied topically to the surface at an application rate of 1 gallon of SSEF69PBc per 350 square feet.

SOIL CEMENT ENGINEERED FORMULA 69PBC

Soil Cement Engineered Formula 69PBC (SEEF69PBC) is an engineered emulsion that bonds the soil and aggregate together creating a stabilized, dust-free, stabilized surface with improved engineering properties. SEEF69PBC works with almost all soil types and is installed into the upper 4"-12" of in-situ soils, gravel, or reclaimed asphalt material. SEEF is used when the bearing strength of the aggregate alone is not sufficient for the traffic loads imparted on the surface or when a reduction in the required gravel thickness is desired.

In addition to stabilization, SEEF significantly reduces dust emissions if used as the final wear course by producing a tightly bound surface, keeping fines locked into the surface and preserving the existing runway material. SEEF69PBC does undergo a curing process and requires the treated surface to remain traffic-free for at least 24 hours after installation.



Application Rate

The recommended application rates for each option were determined through laboratory mix design testing with site specific aggregate. Unconfined Compressive Strength testing was performed to evaluate and compare the strength of the aggregate sample when treated with various stabilization solutions. Untreated samples were tested for comparison purposes. Testing was performed in two different moisture conditions to evaluate the range of expected performance:

- a.) Dry Conditions** - test specimens were tested immediately upon the completion of the curing process and provides a maximum anticipated UCS value.
- b.) 48-Hour Submersion** - test specimens were completely submerged in water for 48 hours prior to testing. This is considered worst case scenario and provides a minimum UCS value.

Below are the results of the Unconfined Compressive Strength testing performed with SSEF69PBc at the recommended application rates compared to the untreated material.

Treatment (SSEF69PBc)	Dry (unsoaked)	% Increase	48-hr Submersion	% Increase
SSEF69PBc @ 1gal/50sf (1:1 Blend of Base Course Aggregate)	302 psi	788%	43 psi	NA
Untreated Existing Soil	34 psi	NA	0 psi	NA

**Results are expressed in pounds per square inch*

Life Cycle Benefits

This is a life cycle approach to asset management with the following life cycle benefits achieved:

- Preserves the road and aggregate in its constructed state with minimal maintenance and minimized fugitive dust emissions.
- Eliminates grading events and associated safety concerns.
- Eliminates residential complaints created by fugitive dust plumes.
- Enhances overall safety to the traveling public by creating safer driving conditions and eliminating maintenance crews working on road on an on-going basis.
- Eliminates gravel replacement.
- Minimizes traffic disruptions due to routine maintenance activities.
- Improved strength and freeze/thaw durability of road surface.
- Ability to re-allocate staff and resources to other projects and maintenance needs.



APPENDIX A: PRODUCT VOLUME AND COST QUOTE



DATE: March 7, 2023

PRICE EFFECTIVE FOR 30 DAYS

SUBMITTED TO:

Umatilla County
Tom Fellows, DPW Dir.
3920 Westgate
Pendleton, OR 97801

WORK TO BE PERFORMED AT:

LOCATION: Moorehouse Road.
CITY/STATE: Umatilla, Oregon

DESCRIPTION OF SALES AND SERVICE:

Midwest is pleased to provide the following cost information for the installation our NaturalPave Road Stabilization product (Soil Sement Engineered Formula EF69PBc) to the specified 1-mile unpaved section of roadway.

AREA TO BE STABILIZED:

Upper 4" of the 1-mile-long section of unpaved road at 24' wide 126,720 square feet

INSTALLATION:

The costs provided is for the NaturalPave product only. Midwest will work with county personnel for the installation.

ADMIRALS PROGRAM DISCOUNTS TO BE APPLIED:

PRICING BELOW DISCOUNTED 20% (CURRENT PRICE \$18.32 / GAL) TO \$14.65 PER GALLON TO ESTABLISH PROOF OF CONCEPT IN UMATILLA OREGON.

PROJECT MANAGEMENT FEE / TRAVEL EXPENSE – WAIVED TO ESTABLISH PROOF OF CONCEPT IN UMATILLA OREGON.



TOTAL PRODUCT COST FOR PROPOSED WORK PLAN

Application Rate	1 gallon per 43 square feet
Required Volume	2,947 gallons
Cost per Gallon	\$14.65 (Landed)
Cost per square foot	\$0.34
Total Product Cost for Installation	\$43,173.55

Maintenance Application Annually @ 1 Gal / 350 sf / year if/as needed

Year 1 - \$5,274.00
Year 2- \$5,274.00
Year 3- \$5,274.00
Year 4- \$5,274.00
Year 5- \$5,274.00
Year 6- \$5,274.00

Total Maintenance IF all 6 years are needed \$31,644.00

Total Product Cost \$74,817.55



WHY SELECT MIDWEST INDUSTRIAL SUPPLY, INC.?

UNIQUE VALUE FOR UMATILLA COUNTY, OREGON

Only Midwest Industrial Supply, Inc. has the depth of experience and in-house resources to meet your stabilization needs today and tomorrow. Our goal is to be your trusted advisor in all necessary aspects of soil stabilization and the resulting surface stabilization. This encompasses lab analysis, site evaluations, and products and material development for stabilizing your in-place soils. You can count on us for state-of-the-art service, including technical, research, application, reporting, and administrative support, we are only a phone call away.

Midwest offers unmatched product performance capabilities through superior stabilization technology for the 21st century. Midwest combines special technical understanding and comprehension of chemical suppressant chemistry with unrivaled knowledge and awareness of the requirements of the intended end use – effective, efficient, and environmentally safe stabilization. We believe that Midwest Industrial Supply, Inc. offers a unique combination of experience, methodology, and professional commitment that makes us the right choice for you.

We are eager to form this joint commitment toward managing your stabilization requirements.



APPENDIX B:
Laboratory Report for
Moorehouse Road



To: Tom Fellows
From: Midwest Industrial Supply, Inc.
Date: 12/14/2022
Subject: Umatilla County, Oregon Road Stabilization Laboratory Report: Moorehouse Road

1.0) Background

In October 2022, Frank Elswick and John Leslie of Midwest traveled to Umatilla County, Oregon to meet with Tom Fellows and discuss the implementation of Midwest's NaturalPave stabilization on select unpaved roads. During their visit, Midwest assessed four potential road stabilization projects within Umatilla County and collected soil samples from each of the roads. The roadways visited and sampled were Sagebrush Road Moorehouse Rd, Colonel Jordan Rd, and Witmoore Rd. For this report, only the Moorhouse Road sample was evaluated in the lab.

2.0) Products

Midwest's NaturalPave solutions are incorporated into the native soil or imported aggregate when the bearing strength of the existing material alone is not sufficient for the traffic loads imparted on the surface or when a reduction in the required gravel thickness is desired. Based on previous experience, Soil Sement Engineered Formula 89PBc (SSEF89PBc) and Eco-Pave89 were initially selected for laboratory testing. Soil Sement Engineered Formula 69PBc (SSEF69PBc) was evaluated on two samples based on the initial UCS results.

2.1) Soil Sement Engineered Formula (SSEF89PBc and SSEF69PBc)

Midwest's Soil Sement Engineered Formula 69PBc and 89PBc are engineered emulsions that bonds the soil and aggregate together creating a dust-free, stabilized surface with improved engineering properties. SSEF does undergo a curing process and requires the treated surface to remain traffic-free for at least 48 hours after installation.

- SSEF89PBc has better freeze/thaw durability and moisture repellent properties compared to SSEF69PBc. It is specifically designed to provide exceptional strength, particularly in wet climates or areas that have poor drainage.
- SSEF69PBc is especially suited for sandy soils that lack proper fines and gravel. It's exceptional strength improvement in dry conditions makes it the ideal solution for projects located in arid environments or roads that have good drainage.

2.2) Eco-Pave89

Eco-Pave89 is a tall oil pitch modified version of SSEF89PBc that is designed to physically and chemically bond to each aggregate particle. Eco-Pave89 then bonds the soil and aggregate together creating a dust-free, stabilized surface with improved engineering properties and resistance to leaching. It's freeze/thaw durability and moisture repellent properties are



specifically designed to provide exceptional, year-round strength, particularly in wet climates or areas that have poor drainage. Eco-Pave does undergo a curing process and requires the treated surface to remain traffic-free for at least 48 hours after installation.

3.0) Phase 1: Preliminary Lab Testing

The objective of Phase 1 laboratory testing is to determine the classification and engineering properties of the road materials collected.

3.1) Material Classification Testing

Moisture content samples were immediately taken from the sample upon arrival to Midwest's laboratory. Moisture content determination testing was performed in accordance with ASTM D2216. Atterberg Limits testing was performed on the aggregate sample in accordance with ASTM D4418 to determine the plastic index of the material.

Midwest Lab #	Sample Source	As-Received Moisture Content	Liquid Limit	Plastic Limit	Plastic Index
2022-3676	Moorehouse Rd	13.1%	25	20	5

Particle Size Distribution (PSD) testing was performed on representative samples collected from the bucket of soil submitted to Midwest's lab. Representative samples were obtained using a sample splitter.

Midwest Lab #	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
2022-3676	0	8	7	8	21	56	

The gradation and plasticity results were used to classify the soil sample using the Unified Soils Classification System (USCS) and the American Association of State and Highway Transportation Officials (AASHTO) classification system.

Midwest Lab #	Classification		Material Description
	USCS	AASHTO	
2022-3676	CL-ML	A-4 (1)	Sandy Silty Clay

3.2) Predicted Material Performance

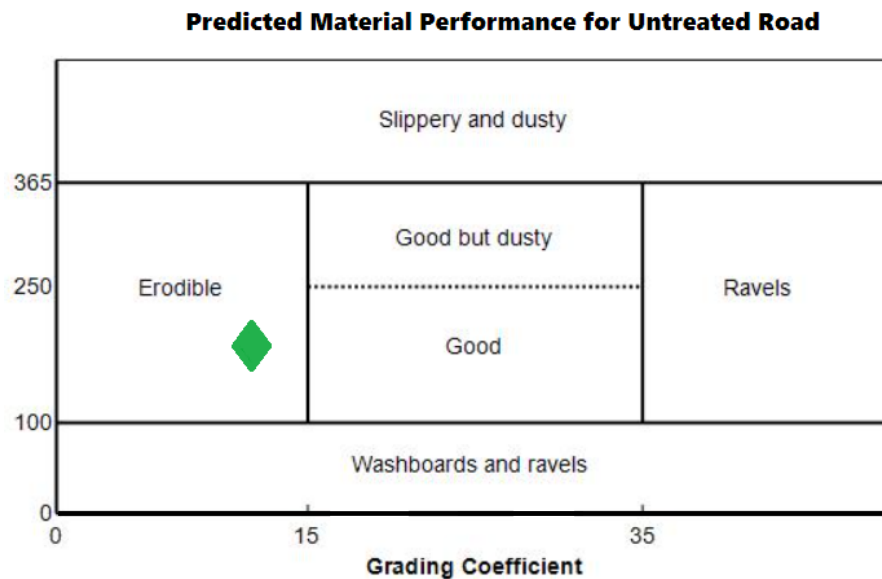
A simple procedure can be used to predict and understand how an unpaved road is likely to perform based on the grading coefficient and plasticity index/shrinkage product of the surface course aggregate using a tool developed by the University of California Pavement Research Center



(UCPRC). Optimal road performance is usually achieved when the surface course aggregate has the following properties:

1. Grading coefficient between 15 and 35
2. Shrinkage product between 100 and 250 (up to 365 if dust control is to be applied)

Although this method does not account for the strength of the aggregate, it provides a good indication of how the surface will behave and help identify the most suitable chemical surface treatments.



Based on preliminary testing and evaluation, the existing Moorehouse Road material has good plasticity; however due to the high fines content and lack of adequate gravel particles, the grading coefficient is such that the material is susceptible to erosion. Amending this soil with aggregate will improve the strength and overall performance of the road material.

4.0) Phase 2: Stabilization Mix Design Testing

In phase 2 of the testing, mix design testing was performed to evaluate the strength achieved with the incorporation of three stabilization products at different application rates.

4.1) Unconfined Compressive Strength (UCS) Testing

Unconfined Compressive Strength testing was performed in accordance with a modified ASTM D2166 to evaluate the compressive strength achieved at various mix designs.



The following four application rates were selected for testing:

- 1 gallon per 40sf blended
- 1 gallon per 30sf blended
- 1 gallon per 25sf blended
- 1 gallon per 20sf blended

The following products were evaluated at each of the above application rates:

- Soil Sement Engineered Formula 89PBc
- Eco-Pave89
- Soil Sement Engineered Formula 69PBc*

Each mix design was evaluated in two different test conditions to provide a range of expected performance. The conditions of testing were:

- **Dry Conditions** – Specimens were tested immediately upon the completion of the curing process. This is considered best case scenario and provides a maximum UCS value.
- **Soaked Conditions** – After curing, specimens were completely submerged in water for 48 hours prior to testing. This is considered worst case scenario and provides a minimum UCS value.

5.0) UCS Test Results

The results of the UCS testing are shown in the charts below.

2022-3676: Moorehouse Rd

Product	App Rate	Unconfined Compressive Strength			
		Dry	% Increase	Soaked	% Increase
SSEF89PBc	1/20	198 psi	482%	30 psi	NA
	1/25	151 psi	344%	24 psi	NA
	1/30	90 psi	165%	15 psi	NA
	1/40	73 psi	115%	11 psi	NA
Eco-Pave89	1/20	114 psi	235%	27 psi	NA
	1/25	100 psi	194%	25 psi	NA
	1/30	103 psi	203%	24 psi	NA
	1/40	91 psi	168%	7 psi	NA
SSEF69PBc	1/20	110 psi	224%	24 psi	NA
	1/25	94 psi	176%	21 psi	NA
	1/30	90 psi	165%	14 psi	NA
	1/40	81 psi	138%	5 psi	NA
Untreated	NA	34 psi	NA	0 psi	NA



After reviewing the above initial UCS results with Tom Fellows, additional samples were constructed and tested using a 1:1 blend of Moorehouse Road material and a base course aggregate to improve the engineering properties of the existing Moorehouse Road soil.

2022-3676: Moorehouse Rd + Base Course Aggregate (1:1 Blend)

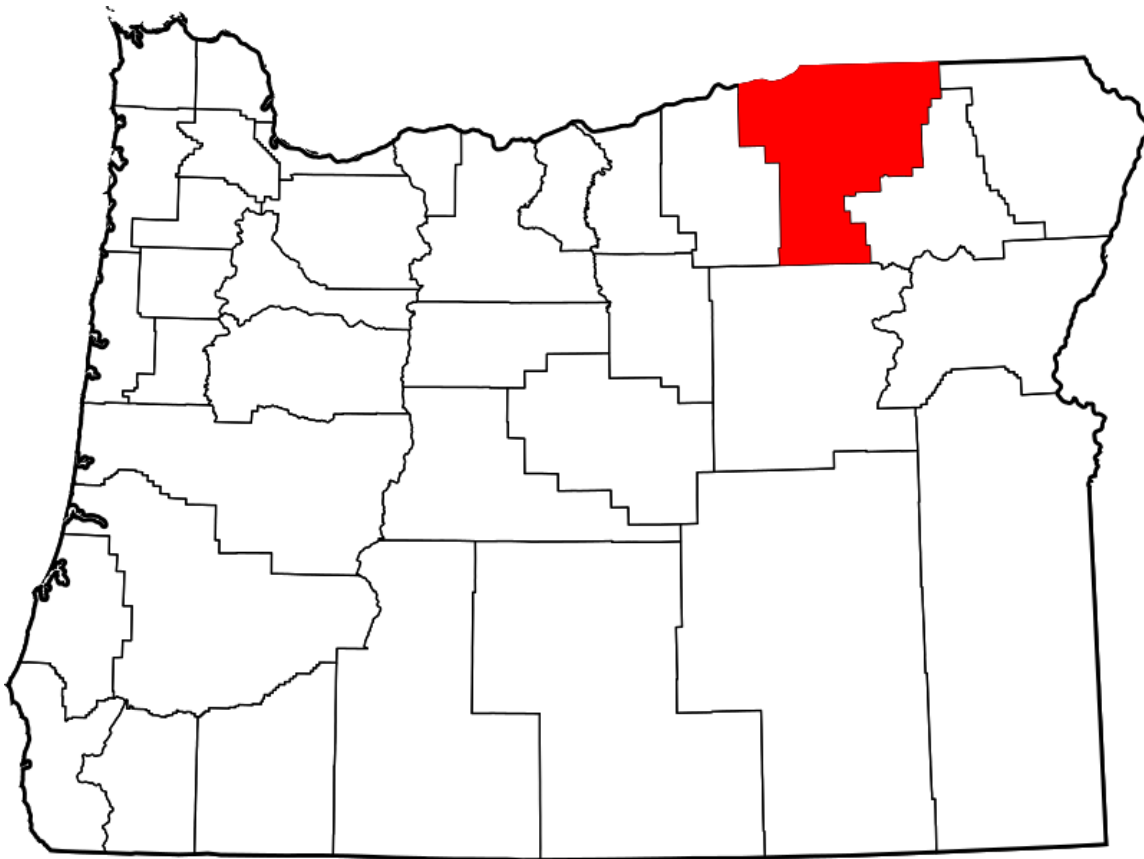
Product	App Rate	Unconfined Compressive Strength, psi	
		Dry	Soaked
SSEF69PBc	1/25	324 psi	74 psi
	1/30	215 psi	54 psi



Umatilla County, Oregon

NaturalPave Road Stabilization and Dust Control

A Value Proposition for Stabilizing Sagebrush Road



Presented to:
Tom Fellows
Public Works Director

Presented by:
Midwest Industrial Supply, Inc.



PROJECT BACKGROUND

Umatilla County, Oregon is seeking a solution that will preserve several select unpaved roads in their constructed state with minimal maintenance and minimized fugitive dust emissions. One of the two initially selected roads was Sagebrush Road. Sagebrush Road is a low volume residential road that primarily serves passenger cars and pickup trucks. Umatilla County Department of Public Works experiences a high volume of complaints from residents regarding the dust emissions generated from traffic on Sagebrush Road.

Umatilla County's Public Works Department oversees the maintenance of all county roads and bridges in Umatilla County including approximately 1200 miles of unpaved roads. The Road Department is funded with Gas Tax, Vehicle Registration Fees, and Forest Service revenues based on timber harvested in Umatilla, Wallowa and Whitman National Forests. Timber sales have declined significantly in recent years. Due to the loss of revenues, Umatilla County is basically in a maintenance mode and is always looking for additional ways to fund road and bridge improvement projects.

As a short-term solution, dust control products such as lignin and magnesium chloride have previously been topically applied to unpaved roads for dust suppression. These temporary solutions were inefficient and abandoned in 2022. As a long-term solution, Umatilla County installs triple chip seal surfacing to their unpaved roads which results in a 20+ year service life. This is an effective solution however the current cost is over \$200,000 per mile on a 24' wide road. On top of the already high cost, the oil alone saw a 60% increase in cost from 2021 to 2022 due to inflation.

MIDWEST'S RECOMMENDED SOLUTION

For medium-term, cost-effective solutions, Midwest recommends our NaturalPave Stabilization System utilizing our Soil Sement Engineered Formula. Midwest offers the NaturalPave System to manage virtually any problems associated with roadbed stabilization, fugitive dust, erosion, and sediment control on unpaved roadways. All of Midwest's NaturalPave products are developed to be environmentally safe, designed for superior performance and thoroughly tested in the field, in the laboratory and through extensive industry studies. NaturalPave's stabilization technology increases the structural strength of the road while also providing a water repelling surface to protect the underlying road materials. Improved strength, durability, and moisture repellency results in longer lasting, superior roads with economic savings.



Recommendation: Stabilize the upper 1.5-2" of the existing road with the NaturalPave Stabilization System including annual maintenance application to produce a 5-7 year road.

- 1) Moisture condition and grade the road material to the specified profile and compact. The constructed road should be profiled with a sufficient crown that promotes drainage off the road.
 - a) Any identified weak areas should be addressed and remediated prior to the application of SSEF69PBc.
- 2) Topically apply SSEF69PBc to the compacted and damp surface at an application rate of 1 gallon per 60 square feet of concentrate. The SSEF69PBc should be diluted 3:1 to 5:1 (parts water : parts SSEF69PBc concentrate).
 - a) The application should be performed in at least 2 passes for best penetration and results.
- 3) Traffic shall be diverted off the road for at least 24 hours following the application.
- 4) Annual maintenance applications are to be applied topically to the surface at an application rate of 1 gallon of SSEF69PBc per 350 square feet.

SOIL SEMENT ENGINEERED FORMULA 69PBC

Soil Sement Engineered Formula 69PBc (SSEF69PBc) is an engineered emulsion that bonds the soil and aggregate together creating a stabilized, dust-free, stabilized surface with improved engineering properties. SSEF69PBc works with almost all soil types and is installed into the upper 4"-12" of in-situ soils, gravel, or reclaimed asphalt material. SSEF can also be topically applied to the surface to create a 1-2" bound wear course layer. SSEF is used when the bearing strength of the aggregate alone is not sufficient for the traffic loads imparted on the surface or when a reduction in the required gravel thickness is desired.

In addition to stabilization, SSEF significantly reduces dust emissions if used as the final wear course by producing a tightly bound surface, keeping fines locked into the surface and preserving the existing runway material. SSEF69PBc does undergo a curing process and requires the treated surface to remain traffic-free for at least 24 hours after installation.

Application Rate

The recommended application rate was determined via topical application testing in Midwest's lab. SSEF69PBc was topically applied to a compacted road surface and allowed to cure overnight.



The samples were then evaluated based on strength and thickness. Samples treated at 1 gallon per 60 square feet produced the best combination of strength and thickness and is the recommended solution for Sagebrush Rd. based on conversations with the Department of Public Works. This solution represents a lower cost 5-7 year surface preservation alternative to chip seal.



Life Cycle Benefits

This is a life cycle approach to asset management with the following life cycle benefits achieved:

- Preserves the road and aggregate in its constructed state with minimal maintenance and minimized fugitive dust emissions.
- Eliminates grading events and associated safety concerns.
- Eliminates residential complaints created by fugitive dust plumes.
- Enhances overall safety to the traveling public by creating safer driving conditions and eliminating maintenance crews working on road on an on-going basis.
- Eliminates gravel replacement.
- Minimizes traffic disruptions due to routine maintenance activities.
- Improved strength and freeze/thaw durability of road surface.
- Ability to re-allocate staff and resources to other projects and maintenance needs.



APPENDIX A: PRODUCT VOLUME AND COST QUOTE



DATE: March 7, 2023

SUBMITTED TO:

PRICE EFFECTIVE FOR 30 DAYS

Umatilla County
Tom Fellows, DPW Dir.
3920 Westgate
Pendleton, OR 97801

WORK TO BE PERFORMED AT:

LOCATION: Sagebrush Road.
CITY/STATE: Umatilla, Oregon

DESCRIPTION OF SALES AND SERVICE:

Midwest is pleased to provide the following cost information for the application of our NaturalPave Road Stabilization product (Soil Sement Engineered Formula EF69PBc) to the specified 1-mile unpaved section of roadway.

AREA TO BE STABILIZED:

Upper 4 to 6" of the 1-mile-long section of unpaved road at 24' wide 126,720 square feet

INSTALLATION:

The costs provided is for the NaturalPave product only. Midwest will work with county personnel for the installation.

ADMIRALS PROGRAM DISCOUNTS TO BE APPLIED:

PRICING BELOW DISCOUNTED 20% (CURRENT PRICE \$18.32 / GAL) TO \$14.65 PER GALLON TO ESTABLISH PROOF OF CONCEPT IN UMATILLA OREGON.

PROJECT MANAGEMENT FEE / TRAVEL EXPENSE – WAIVED TO ESTABLISH PROOF OF CONCEPT IN UMATILLA OREGON.



TOTAL PRODUCT COST FOR PROPOSED WORK PLAN

Application Rate	1 gallon per 60 square feet
Required Volume	2,112 gallons
Cost per Gallon	\$14.65 (Landed)
Cost per square foot	\$0.24
Total Product Cost for Installation	\$30,940.80

Maintenance Application Annually @ 1 Gal / 350 sf / year if/as needed

Year 1 - \$5,274.00	
Year 2- \$5,274.00	
Year 3- \$5,274.00	
Year 4- \$5,274.00	
Year 5- \$5,274.00	
Year 6- \$5,274.00	
Total Maintenance IF all 6 years are needed	\$31,644.00
Total Product Cost	\$62,584.80



WHY SELECT MIDWEST INDUSTRIAL SUPPLY, INC.?

UNIQUE VALUE FOR UMATILLA COUNTY, OREGON

Only Midwest Industrial Supply, Inc. has the depth of experience and in-house resources to meet your stabilization needs today and tomorrow. Our goal is to be your trusted advisor in all necessary aspects of soil stabilization and the resulting surface stabilization. This encompasses lab analysis, site evaluations, and products and material development for stabilizing you in-place soils. You can count on us for state-of-the-art service, including technical, research, application, reporting, and administrative support, we are only a phone call away.

Midwest offers unmatched product performance capabilities through superior stabilization technology for the 21st century. Midwest combines special technical understanding and comprehension of chemical suppressant chemistry with unrivaled knowledge and awareness of the requirements of the intended end use – effective, efficient, and environmentally safe stabilization. We believe that Midwest Industrial Supply, Inc. offers a unique combination of experience, methodology, and professional commitment that makes us the right choice for you.

We are eager to form this joint commitment toward managing your stabilization requirements.



APPENDIX B:
Laboratory Report for
Sagebrush and Moorehouse
Road



To: Tom Fellows
From: Midwest Industrial Supply, Inc.
Date: 12/14/2022
Subject: Umatilla County, Oregon Road Stabilization Laboratory Report: Sagebrush Road

1.0) Background

In October 2022, Frank Elswick and John Leslie of Midwest traveled to Umatilla County, Oregon to meet with Tom Fellows and discuss the implementation of Midwest's NaturalPave stabilization on select unpaved roads. During their visit, Midwest assessed four potential road stabilization projects within Umatilla County and collected soil samples from each of the roads. The roadways visited and sampled were Sagebrush Road Moorehouse Rd, Colonel Jordan Rd, and Witmoore Rd. For this report, only the Sagebrush Road sample was evaluated in the lab.

2.0) Products

Midwest's NaturalPave solutions are incorporated into the native soil or imported aggregate when the bearing strength of the existing material alone is not sufficient for the traffic loads imparted on the surface or when a reduction in the required gravel thickness is desired. Based on previous experience, Soil Sement Engineered Formula 89PBc (SSEF89PBc) and Eco-Pave89 were initially selected for laboratory testing. Soil Sement Engineered Formula 69PBc (SSEF69PBc) was evaluated on two samples based on the initial UCS results.

2.1) Soil Sement Engineered Formula (SSEF89PBc and SSEF69PBc)

Soil Sement Engineered Formula) is an engineered emulsion that bonds the soil and aggregate together creating a dust-free, stabilized surface with improved engineering properties. SSEF does undergo a curing process and requires the treated surface to remain traffic-free for at least 48 hours after installation.

- SSEF89PBc has better freeze/thaw durability and moisture repellent properties compared to SSEF69PBc. It is specifically designed to provide exceptional strength, particularly in wet climates or areas that have poor drainage.
- SSEF69PBc is especially suited for sandy soils that lack proper fines and gravel. It's exceptional strength improvement in dry conditions makes it the ideal solution for projects located in arid environments or roads that have good drainage.

2.2) Eco-Pave89

Eco-Pave89 is a tall oil pitch modified version of SSEF89PBc that is designed to physically and chemically bond to each aggregate particle. Eco-Pave89 then bonds the soil and aggregate together creating a dust-free, stabilized surface with improved engineering properties and resistance to leaching. It's freeze/thaw durability and moisture repellent properties are



specifically designed to provide exceptional, year-round strength, particularly in wet climates or areas that have poor drainage. Eco-Pave does undergo a curing process and requires the treated surface to remain traffic-free for at least 48 hours after installation.

3.0) Phase 1: Preliminary Lab Testing

The objective of Phase 1 laboratory testing is to determine the classification and engineering properties of the road materials collected.

3.1) Material Classification Testing

Moisture content samples were immediately taken from the sample upon arrival to Midwest's laboratory. Moisture content determination testing was performed in accordance with ASTM D2216. Atterberg Limits testing was performed on the aggregate sample in accordance with ASTM D4418 to determine the plastic index of the material.

Midwest Lab #	Sample Source	As-Received Moisture Content	Liquid Limit	Plastic Limit	Plastic Index
2022-3678	Sagebrush Rd	2.2%	NA	NA	NA

Particle Size Distribution (PSD) testing was performed on representative samples collected from the bucket of soil submitted to Midwest's lab. Representative samples were obtained using a sample splitter.

Midwest Lab #	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
2022-3678	0	18	5	42	32	3	

The gradation and plasticity results were used to classify the soil sample using the Unified Soils Classification System (USCS) and the American Association of State and Highway Transportation Officials (AASHTO) classification system.

Midwest Lab #	Classification		Material Description
	USCS	AASHTO	
2022-3678	SP	A-1-b	Poorly Graded Sand with Gravel

3.2) Predicted Material Performance

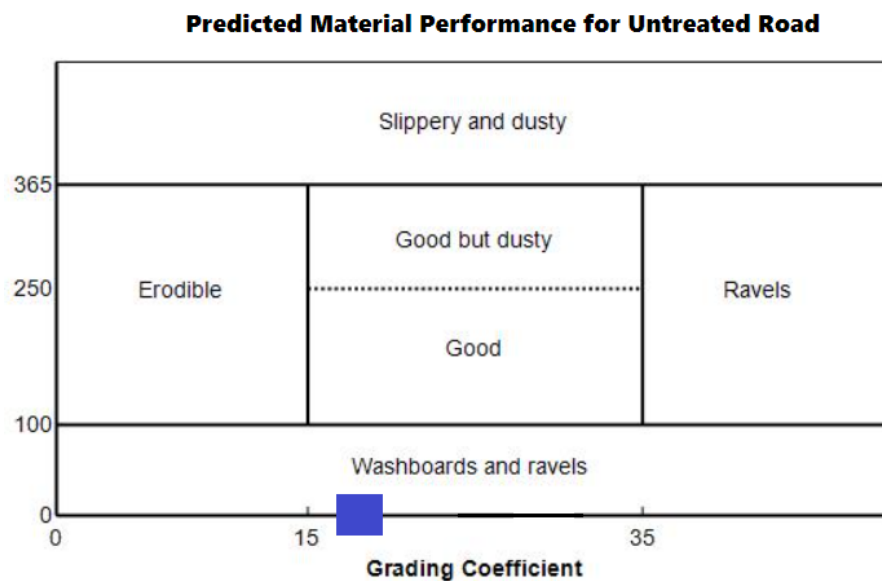
A simple procedure can be used to predict and understand how an unpaved road is likely to perform based on the grading coefficient and plasticity index/shrinkage product of the surface



course aggregate using a tool developed by the University of California Pavement Research Center (UCPRC). Optimal road performance is usually achieved when the surface course aggregate has the following properties:

1. Grading coefficient between 15 and 35
2. Shrinkage product between 100 and 250 (up to 365 if dust control is to be applied)

Although this method does not account for the strength of the aggregate, it provides a good indication of how the surface will behave and help identify the most suitable chemical surface treatments.



Based on preliminary testing and evaluation, the existing Sagebrush Road material is prone to washboarding and raveling. Aggregates prone to washboarding and raveling typically lack fines with proper plasticity. As a result of the lack of plasticity, the soil particles do not naturally bind to each other, leading to washboarding, raveling, gravel loss, and an overall poor ride quality if left unmaintained.

4.0) Phase 2: Stabilization Mix Design Testing

In phase 2 of the testing, mix design testing was performed to evaluate the strength achieved with the incorporation of three stabilization products at different application rates.

4.1) Unconfined Compressive Strength (UCS) Testing

Unconfined Compressive Strength testing was performed in accordance with a modified ASTM D2166 to evaluate the compressive strength achieved at various mix designs.



The following four application rates were selected for testing:

- 1 gallon per 40sf blended
- 1 gallon per 30sf blended
- 1 gallon per 25sf blended
- 1 gallon per 20sf blended

The following products were evaluated at each of the above application rates:

- Soil Sement Engineered Formula 89PBc
- Eco-Pave89
- Soil Sement Engineered Formula 69PBc*

**Due to lack of material, SSEF69PBc was only tested at 1gal/25sf and 1gal/30sf on the Sagebrush Rd. soil.*

Each mix design was evaluated in two different test conditions to provide a range of expected performance. The conditions of testing were:

- **Dry Conditions** – Specimens were tested immediately upon the completion of the curing process. This is considered best case scenario and provides a maximum UCS value.
- **Soaked Conditions** – After curing, specimens were completely submerged in water for 48 hours prior to testing. This is considered worst case scenario and provides a minimum UCS value.

5.0) UCS Test Results

The results of the UCS testing are shown in the charts below.

2022-3678: Sagebrush Rd

Product	App Rate	Unconfined Compressive Strength			
		Dry	% Increase	Soaked	% Increase
SSEF89PBc	1/20	170 psi	1,114%	49 psi	NA
	1/25	164 psi	1,071%	49 psi	NA
	1/30	149 psi	964%	44 psi	NA
	1/40	86 psi	514%	31 psi	NA
Eco-Pave89	1/20	74 psi	428%	17 psi	NA
	1/25	68 psi	386%	17 psi	NA
	1/30	66 psi	371%	14 psi	NA
	1/40	46 psi	229%	10 psi	NA
SSEF69PBc	1/25	517 psi	3,593%	76 psi	NA
	1/30	405 psi	2,793%	66 psi	NA
Untreated	NA	14 psi	NA	0 psi	NA

THE BOARD OF COMMISSIONERS OF UMATILLA COUNTY

STATE OF OREGON

In the Matter of Authorizing)
Contract for Services and) Order No. BCC2023-021
Materials from Midwest)
Industrial Supply Inc. by)
Alternative Contracting Method -)
Single Seller - for Road)
Stabilization and Dust Control)

WHEREAS the county needs to purchase material for dust abatement and road stabilization of County Roads as an alternative to more expensive processes and products such as chip sealing or paving for Umatilla County Public Works projects;

WHEREAS under Umatilla County Code of Ordinances Section 36.06(B)4), an alternative to procurement by competitive bids is the purchase of goods or services where there is only one seller or product of the quality available;

WHEREAS the Public Works Department has researched potential vendors of the needed product, and have been unable to locate any additional sellers;

WHEREAS Midwest Industrial Supply Inc. has submitted quotes in the total amount of \$74,114.35 for Moorehouse and Sagebrush Roads, copies of which are attached to this order.

NOW THEREFORE, the Board of Commissioners orders that:

1. Due to the lack of vendors in this area for this product, there is only one seller of the quality required available.
2. The procurement of the road stabilization product from Midwest Industrial Supply Inc. is exempt from the competitive bidding process under the Umatilla County Code of Ordinances.
3. Umatilla County is authorized to purchase the product from Midwest Industrial Supply Inc. for \$74,114.35, plus any required for annual maintenance.

DATED this 26th day of April, 2023.

UMATILLA COUNTY BOARD OF COMMISSIONERS

Daniel N. Dorran, Chair

John M. Shafer, Commissioner

Celinda A. Timmons, Commissioner

ATTEST:
OFFICE OF COUNTY RECORDS

Records Officer