

JMN SPECIALTIES, INC.

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PRODUCT INFORMATION

Road Stabilization : Application Guidelines

Soil stabilization involves procedures in which special chemical soil additives are added to a soil material to improve one or more of its properties. The additives are mixed into the soil to improve soil strength, water resistance and compaction. The addition of chemical additives for soil stabilization is generally less costly and easier to apply when compared to the conventional methods.

The JMN Specialties, Inc. soil stabilization system involves the tandem application of two unique chemical additives depending on soil analysis. The first additive, **Clay Stabilizer**, functions as a clay stabilizer and compaction aid, the second chemical **Dust Seal** functions as a polymeric sealer. The use of these two chemical additives can produce a roadway that is stable, dust free and suitable for aggregate or asphalt overlay. Soils with less than 10% clay can benefit from using our **SSLSS** (Sub Surface Liquid Soil Stabilizer) which can be used with or without a catalyst.

Clay Stabilizer

Clay Stabilizer is an organic, clay stabilizing, chemical agent. It is mixed with water before application into a soil. Basically, it works by forming a water repelling coating directly in and on clay particles within soil. There are many different types of clay minerals present in any soil. Certain types of clay are more sensitive to water than others. It's the water sensitive clays such as smectite that can cause the most problems in road construction. **Clay Stabilizer** has demonstrated the ability to prevent the swelling of water sensitive clays. In addition to treating water sensitive clay, this product is highly surface active, also aiding in the compaction of soil by reducing surface tension and stress within the roadbed. This action allows compaction equipment to achieve higher density in the base course.

Application:

Clay Stabilizer is applied using a water distributor truck typically as a 2% by volume water solution at a rate of 1/2 gallon per square yard per 6 inch lift of soil. The **Clay Stabilizer** should be uniformly spread over the full width of the road with successive passes of the water distributor truck until the correct amount of product has been mixed evenly into the soil. If the soil becomes saturated due to the additional water, application should be halted, while mixing continues to allow evaporation.

Compaction of the roadbed should be at optimum moisture content (OMC) or slightly above. During compaction additional water might be required to overcome loss of moisture through evaporation.

After initial compaction the road surface must be cut to final levels, with final compaction using a pneumatic or flat steel-wheeled roller to achieve a smooth surface.

For soils with high plasticity index (PI) values it is recommended that following the addition of **Clay Stabilizer** the surface of the road should be sealed.

Curing:

Unlike cement, **Clay Stabilizer** does not react with water in the soil to form a rigid matrix. The **Clay Stabilizer** uses the water as a pathway to reach and treat clay particles within the soil. Excessive amounts of water entering the road shortly following the application of **Clay Stabilizer** may reduce the effective concentration in the upper section of the roadbed, limiting the performance of the product. On the other hand, too rapid drying of the road will prevent the migration of the **Clay Stabilizer**, limiting the ability of the product to reach untreated clay particles. For this reason it is recommended in dry conditions to water the road for 3 to 4 days following the application, or as necessary to prevent over drying. Complete curing periods can vary from 1 to 3 months.

Primary Action:

1. **Clay stabilizer:** water loss within the roadbed occurs due to the release of water through evaporation and repulsion by **Clay Stabilizer**. Only after adequate drying will the clay mineral particles compact closely to each other. The drying process is dependent on the type of soil and weather conditions. This period can vary from 1 week to 3 months.
2. **Compaction Aid:** reduces the surface tension between particles increasing density achieved in compaction procedure.

Special Conditions:

Slippery Road: If **Clay Stabilizer** is used to treat high PI soils some slipperiness on the surface of the unsealed roadway may be experienced following rainfall on the road. If this is unacceptable a thin layer (less than 1/2 inch) of slightly plastic sand may be applied to the surface. The material can remain on the surface, mixing into the roadbed by traffic or additional compaction.

Surface Deformation: If rutting in surface occurs after a period of time or following rainfall to an unsealed treated surface, light grading and re-compaction with a pneumatic or steel-wheeled roller will recover original surface. Surface should then be resealed to maintain roadway.

Evaluation of Performance:

Limits: Due to the fact that **Clay Stabilizer** represents a departure from a conventional soil-cement soil stabilization method, the traditional soil testing methods don't apply directly. The effectiveness of **Clay Stabilizer** can only be measured in the field, as laboratory simulations of water loss and compaction effectiveness have not been developed for this type of application.

Field-Testing: The most practical method of measuring the performance of any **Clay Stabilizer** application in the field is using a Dynamic Cone Penetrometer (DCP). It provides an efficient test method for evaluating the performance of roadways. It determines the in-situ strength and density of the base course. Either a manual or automated system may be used. Comparing results of treated versus untreated sections provides a measure to determine the level of improvement in compaction.

Dust Seal

Dust Seal is an organic polymer chemical agent. The polymer is designed to form a membrane within the soil, holding particles together in a semi-rigid yet flexible matrix. The product is used for sealing roadways, controlling dust and increasing overall soil stability in road construction. It is also used for soil erosion control on angle embankments. **Dust Seal** is applied as a liquid that quickly dries into a hardened membrane and will not re-disperse in water, remaining resistant to degradation from alkaline materials and sunlight. The product can be mixed into the soil roadbeds, both as a subsurface sealer for asphalt or concrete surfaces, or as a primary sealer.

Application - Base Preparation:

Generally there is little or no requirement for extensive base preparation or scarification if the lower base of the area is relatively stable and compacted. If the base is rutted and "washboarded", then some surface blading may be required to produce a smooth surface prior to applying **Dust Seal**. After initial compaction the road surface must be cut to final levels, with final compaction using a pneumatic or flat steel-wheeled roller to achieve a smooth surface.

Application - Base Reconstruction:

Dust Seal is applied using a water distributor truck as a 15 to 20% by volume water solution at a rate of 1/2 gallon per square yard per 3 inch lift of soil. Due to the fluctuating absorption rates associated with different soils, the amount required may vary from one application to another. The **Dust Seal** should be uniformly spread over the full width of the road with successive passes of the water distributor truck until the correct amount of product has been mixed evenly into the soil.

In base reconstruction projects, it is important to note that the base must be partially compacted prior to using **Dust Seal**. If the base is not compacted, or if it remains in a "fluffed" condition, the **Dust Seal** may be absorbed too deeply into the lower base thereby leaving too little concentration for upper base hardening.

Dust Seal should not be applied into a roadway under wet conditions or during a period of time when rainfall might occur immediately following its application prior to the product setting up into a cohesive membrane. **Dust Seal** should be stored above freezing. Freezing **Dust Seal** can trigger polymerization and render the product un-useable. **Dust Seal** cannot be applied when ground temperatures are below freezing. **Dust Seal** can be frozen AFTER curing with no problems.

The application volume should be divided into two application steps.

First Application: Will penetrate into the top 3 inches of the soil, functioning as a primer for the second application which will settle closer to the surface. The first application should be completely distributed throughout the area of coverage, and allowed to soak thoroughly into the soil for at least one hour before beginning the second application step.

Second Application: Generally considered the sealing application, will soak into the soil at a much slower rate and will bind the first application. Most of the product will be concentrated near the surface and will form a hardened membrane, trapping dust and aggregate, resisting invasion of moisture.

Curing:

Setting time for **Dust Seal** will vary with soil and weather conditions. Typically a cohesive membrane forms within 4 hours following the second application. Road traffic should be avoided and kept at a minimum for at least that period of time. A visual inspection of the road surface will generally provide construction personnel with indications of whether the surface is suitable for traffic. Once the **Dust Seal** is set it will not re-dissolve in water.

Product Action:

Surface and Subsurface Sealing: The **Dust Seal** sets up into a water sealing membrane over road surface.

Special Conditions:

Surface Deformation: If rutting in surface occurs after a short period of time or following rainfall to treated surface, it generally indicates an inadequate length of setting time occurred prior to traffic over roadway or rainfall. Light grading and re-compaction with a pneumatic or steel-wheeled roller will recover original surface. A follow-up light application of **Dust Seal** at typically 1/4-gallon per square yard of a 10% solution will re-establish a sealed surface.

Evaluation of Performance:

Limits: Due to the unique polymer membrane forming action created by **Dust Seal** within soil, it is not possible at this time to correlate field performance with laboratory data. It has been found that **Dust Seal** increases overall compaction and density in base construction applications.

Typical Road Base Course Application

The JMN Specialties, Inc. system includes the blending of both **Clay Stabilizer** and **Dust Seal** to produce a proper mixture to effectively stabilize the base course of a roadway.

Clay Stabilizer is applied as a 0.5 to 2% dilution in water, along with **Dust Seal** at a 15 to 20% dilution. This mixture is applied at a rate of 1/4 to 3/4 gallons per square yard, depending on the depth of the base course.