



Where Science Meets the Earth



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## Milled Applied Products

### Investigation, Design and Specification

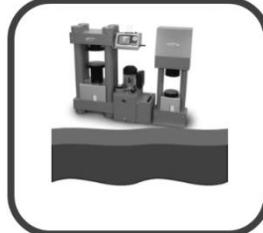
#### Step 1

Primary works  
Investigation and  
Testing

Investigate the pavement for subgrade strength, pavement condition, drainage, shape of road, traffic numbers and load weights

Site inspection. Ensure the required minimum metal depth is in place. Top up with metal if necessary. Collect samples.

Test Samples. Recommended tests: CBR and a Soaked CBR or UCR



#### Step 2

Product selection &  
Design

Evaluate the needs of the client and use product selection guide to select product to achieve maximum performance and desired outcomes.

Create pavement design scope of works document and quality control for installation. Specify dose rates and application method.



# Pre Works and site conditions

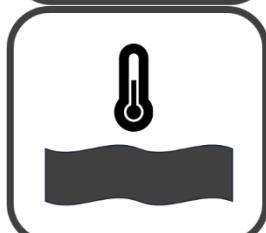
## Step 3

Pre works for application days

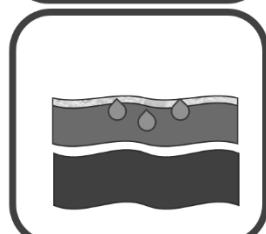
Check weather– ideally no rain forecast within 3 days ( 72 hours ) of the application of the products



Do not carry out application if the temperature is less than 10 degrees C or will drop below within 24 hours of application



Confirm that soil is slightly below optimum moisture content before application. The optimum water content (OWC) of the stabilised materials shall be determined by NZS 4402, test 4.1.3, *New Zealand vibrating hammer compaction test.*



## Equipment required -

(\*portable pump), Spreader Truck

(alternative is manual application), Mill, Pulverizer or Grader with rippers CAT 120g or larger Water Cart 8000ltrs or more, Steel Drum Roller 8ton, Sheep Foot Roller, Pneumatic Roller and Drag Broom.



## Step 4

Grader applied

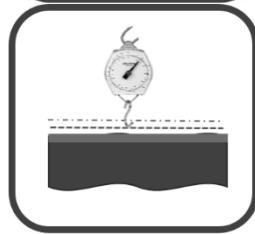
Ensure that the road is shaped correctly and has adequate aggregate as per the design specification.



The stabilizing agent (dry powder) shall be uniformly spread at the specified application rate across the pavement



Weigh the dry powder and matt test with a 1sqm canvass every 400sqm. Tolerance allowable within +/- 0.5 kgs per sqm of the specified rate. Compare tons used from delivery document with the measured area.



## Step 5

Mixing Blending

Slaking and wetting of product. Slaking of the products shall be carried out using a purpose fitted offset spray bar on the water cart to ensure thorough liquid penetration through the product.



An alternative method is where the liquid is injected into the bowl of the mill/pulverizer at a metered rate to bring the material up to the OMC.

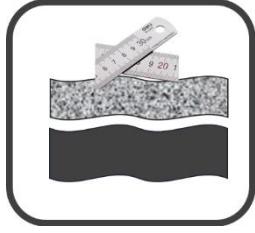


Mill or pulverizer. The pulverizer must be capable of pulverizing the material to a set size and uniformly blending the product with the material being treated.



Cut depth The actual depth of the cut shall be physically measured at both ends of the stabilising drum at least once every 200 m along the cut length.

Maximum variation from the specified depth of cut is -5 mm and +15 mm



## Step 6

Shaping and  
finishing

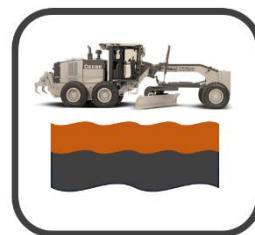
Initial compaction process should ensure that the stabilized layer is compacted to a uniform, dense, stable condition. And the material should not be taken over the OMC



Applicate \*liquid with water cart bringing the treated material to just below the OMC



Grade the pavement to final design shape and remove large material debris.



Roll the pavement to final compaction until tightly bound. The large aggregate is held in place with a matrix of smaller aggregates and the smaller aggregate is held firmly in place by fine material.



## Step 7

Shaping and  
finishing

Applicate liquid, flooding the pavement to avoid the roller picking up fine material.  
Roll the pavement to a slurry



Roll with sufficient Liquid to achieve a slurry.

## Step

# 8

### Surface finishing

The slurry through compaction, watering and drag booming shall provide a smooth uniform surface. The final surface must be uniform, smooth and dense, free from voids and holes



While slurring a drag broom should be towed behind either the Roller or the Water Cart. This will move distribute the fines into the voids in the road.



Identify \*boney areas and sweep the slurry into the voids, with a yard broom, so a uniform matrix is created, holding the larger stones in place with the fines.



## Notes

### Topically applied

When applying FCM Co-Polymer, apply 50% of the FCM Co-Polymer at Initial Step 6G and then apply the remaining 50% in the process of point 7G slurring.



\*portable pump – when transferring liquid product into the water cart and diluting them, smaller pumps may struggle with the viscosity of the product.



To lessen the viscosity of the product can be diluted with 50% water in the ICB by decanting half of the product into an empty tote and filling with portable water.



\*boney area – An area defined as an area that shows voids below the surface area.

Grade and shape pavement	Spread product	Matt test every 400 sqm
		

Slake product	Allow product to react 10-15 min	Mill or pulverize (check depth)
		

Ensure product is well blended	Initial compaction – sheep foot roller	Final trim and shape of pavement
		

Dry roll to 95% compaction	Wet roll and slurry	Ensure drum of roller is kept wet
		

Continue to slurry and drag broom	Slurry to finish	Ensure there are no boney areas
		

# Glossary

Term	Description
Applicate	To apply the product to the ground.
Blade Mixing	Using a grader blade or similar to uniformly blend and mix the product to the aggregate. No streaks, clumps or uneven colouring

	of blended material.
<b>Boney Area</b>	A piece of the pavement which lacks in fines or small aggregate that hold the larger stones in place.
<b>Clay Content</b>	The percentage of clay in the material.
<b>CSC</b>	Co-Polymer Soil Cement
<b>Cut depth/Design depth</b>	Thickness of the stabilization layer and should be measured ever 200mtrs along the cut length.
<b>Decanting</b>	To remove liquid from one container to another.
<b>Drag Broom</b>	A towing mechanism made from coarse bristles brooms that are set on 90 and 45 degree angles. Its purpose is to move the slurry around and fill all boney areas and small voids in the pavement.
<b>Equipment</b>	What machinery you will need to applicate products correctly
<b>FCM</b>	Flexi-C-Ment: Gravel Locks Co-Polymer additive
<b>Final Design</b>	Scope of works and specification and design of pavement.
<b>Fines</b>	Small particles of less than 5mm.
<b>Flooding Pavement</b>	Use enough water to saturate the pavement, creating a slurry but not enough to run off into the water tables.
<b>HSC</b>	Hygroscopic Soil Cement
<b>IBC Totes</b>	Intermediate bulk container. A reusable industrial container. Designed for the transport and storage of bulk liquids.
<b>Initial Compaction</b>	Primary compaction to form a uniform, dense layer.
<b>Injection</b>	Where the pre-mixed liquid products are injected into the mill of the pulverizer.
<b>Insitu</b>	Existing material
<b>Loose Material</b>	Unbound stones or asphalt.
<b>Matt Test/Weigh Product</b>	To weigh the product applied with a canvass and scales.
<b>Maximum Life Depth</b>	Maximum depth that effective compaction can be applied to in a single layer.

<b>Methodology</b>	Written instructions.
<b>Mill/Pulverizer</b>	
<b>OWC or OMC</b>	Optimum Water Content. Adding water to the
<b>Optimum Water Content</b>	Material so that it becomes self-compacting. OMC of the Material shall be determined by NZS 4402 test 4.1.3 NZ vibrating hammer compaction test.
<b>Percentage (%)</b>	By weight measurement: for example – if 2kgs is added to 20kgs this = 10%
<b>Portable Pump</b>	A pump with sufficient capacity to transfer 1700UPM viscosity fluid (very thick liquid – FCM).
<b>Pothole</b>	Surface deterioration of the pavement that holds water causing further deterioration.
<b>Pre-Grade</b>	Shape the road, removing corrugations and potholes.
<b>Product Selection Guide</b>	Gravel Lock Product Guide for selection of suitable product for treatment of your pavement.
<b>Quarry</b>	Source of aggregate.
<b>RDC</b>	Road Dust Control
<b>Scarify</b>	To rip the road longitudinally using rippers or picks on the grader.
<b>Slaking</b>	Wetting the product to ensure thorough penetration of the product.
<b>Slurry/Slurrying</b>	To create a paste out of the fine particles of the material being treated to the point where it is free flowing.
<b>Specified Depth</b>	The depth measured in cm or mm of the stabilized, treated pavement.
<b>Stabilizing Agent/Dry Powder</b>	A powdered product: HSC, RDC and Portland Cement (shall be tested in accordance with as 2350.2 or appendix B of NZS3122, it must have less than 3% of loss of ignition).
<b>Stock Pile</b>	A large pile of pre-sized aggregate.
<b>Sufficient Liquid</b>	To bring the material up to the optimum water

	content.
<b>Tolerance</b>	Allowable variance either side of the set measurement.
<b>Traffic Control</b>	Road traffic management.
<b>Uniformly Mixed</b>	Where the product has been blended sufficiently to create homogeneous (uniform) mix.
<b>Untreated Material</b>	Material without any product in it.
<b>Viscosity</b>	Measurement of fluid thickness and flow rate.
<b>Wacker Packer</b>	An engine driven plate compactor used for the compaction of materials.
<b>Weather Forecast</b>	A guide to determine upcoming weather in your region
<b>Winrow</b>	When the gravel is mounded in a longitudinal inverted "V" shape by the grader.