

Other Stabilized Surfacing

5.0



Traffic Range:

Typical AADT < 200 or 400. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

3 months to 1 year for dust palliative applications. 2 to 10 years for soil stabilization applications.

Unit Price:

Material and installation costs vary widely based on the product and application rate.

Appearance:

Chlorides do not significantly alter the appearance of soil/aggregate materials.

Pros:

Reduces dust generation by 50% or more;
May reduce surface erosion and required maintenance intervals.

Cons:

Many stabilizers are proprietary in nature and performance varies among products;
Performance may vary with soil type and climate.

Product Description: Soil stabilizers and dust palliatives are often used to increase the strength of unbound materials, extend the life expectancy, reduce maintenance requirements, and/or reduce dust generation. Many of the products are proprietary in nature and the exact composition and stabilization mechanisms are not publicly available. Performance and applicability can vary from product to product.



Gravel surfacing treated with CaCl.

Photo Source: Golder Associates Inc.

Traffic Range:

Typical AADT < 200. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

3 months to 1 year before an additional topical treatment is required.

Unit Price:

Material & Installation: \$0.30 to \$0.60/m² (\$0.25 to \$0.50/yd²) for surface treatment. Unit price does not include aggregate.

Appearance:

Chlorides do not significantly alter the appearance of soil/aggregate materials.

Pros:

Reduces dust generation by 50% or more;
Widely available.

Cons:

Not effective in very arid or very wet climates; Slippery when wet; Can impact water and plant quality.

Product Description: Chlorides are commonly used for dust suppression in unbound road surfacings. Chlorides draw moisture from the air to keep the road surface moist (i.e. hygroscopic) and help resist evaporation of road surface moisture (i.e. deliquescent). By keeping the road surface moist, chlorides reduce the amount of dust generated.



Gravel surfacing treated with MgCl.

Photo Source: FHWA-CFLHD



Application of chloride treatment.

Photo Source: U.S. Forest Service

Clay Additives

5.2



Gravel road stabilized with clay additives.

Photo Source: FHWA-WFLHD

Traffic Range:

Typical AADT < 250. When used for higher traffic volumes, more frequent mixing and grading are required.

Life Expectancy:

2 to 4 years before additional clay additives treatments are needed on the roadway surface.

Unit Price:

Material & Installation: \$10.60 to \$14.10/m³ (\$8.10 to \$10.80/yd³) for an aggregate stabilized with clay additives.

Appearance:

Clay additives do not significantly alter the appearance of soil/aggregate materials.

Pros:

Helps stabilize non-plastic aggregates;
Reduces surface erosion and aggregate loss.

Cons:

Susceptible to wet weather; Not as effective as a dust suppressant as some other products.

Product Description: Clay additives are naturally occurring soils composed of the mineral montmorillonite. Clay additives are typically used to stabilize nonplastic crushed aggregates; they help to bind the aggregate particles and prevent raveling and washboarding. The clay additives will also attach to fines in the aggregate mix to reduce fugitive dust.

Electrolyte Emulsions

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Electrolyte emulsion stabilized surfacing.

Photo Source: CBR Plus Inc.

Traffic Range:

Typical AADT < 250 AADT. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

Typically 3 to 5 years between treatments for stabilization applications, with some stabilized surfaces in service after 15 years.

Unit Price:

Material & Installation: \$0.40 to \$0.80/m² (\$0.35 to \$0.70/yd²) for surface treatment. Unit price does not include aggregate/soil price.

Appearance:

Electrolyte emulsions do not significantly alter the appearance of soil/aggregate materials.

Pros:

Does not leach from soil; Increases soil strength; effective on clay soils.

Cons:

Softened by heavy rains; Requires clay particles in soil/aggregate.

Product Description: Electrolyte emulsions contain chemicals that affect the electro-chemical bonding characteristics of soils and replace water molecules within the soil structure. At low application rates, electrolyte emulsions are used for dust suppression. At higher application rates, electrolyte emulsions can be used to stabilize soils.

Enzymatic Emulsions

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Enzymatic emulsion stabilized
surfacing.

Photo Source: FHWA-CFLHD

Traffic Range:

Typical AADT < 250. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

Typically 5 to 7 years before additional stabilization treatments are needed, for stabilization applications. Some stabilized surfaces are in service after 12 years.

Unit Price:

Material & Installation: \$2.40 to \$4.80/m² (\$2.00 to \$4.00/yd²) for mixing depth of 150 mm (6 in.). Unit price does not include aggregate/soil price.

Appearance:

Enzymatic emulsions do not significantly alter the appearance of soil/aggregate materials.

Pros:

Increases soil strength; effective on clay soils.

Cons:

Softened by heavy rains; Requires clay particles in soil/aggregate; Relatively new technology.

Product Description: Enzymatic emulsions contain enzymes (protein molecules) that react with soil molecules to form a cementing bond that stabilizes the soil structure and reduces the soil's affinity for water. At low application rates, enzymatic emulsions are used for dust suppression. At higher application rates, enzymatic emulsions can be used to stabilize soils.

Lignosulfonates

5.5



Gravel surfacing treated with lignosulfonates.

Photo Source: FHWA-CFLHD

Traffic Range:

Typical AADT < 250. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

3 months to 1 year before additional treatments are needed for dust suppression. 3 to 5 years for soil stabilization applications.

Unit Price:

Material & Installation: \$0.30 to \$0.60/m² (\$0.25 to \$0.50/yd²) for surface application. Unit price does not include aggregate/soil price.

Appearance:

Lignosulfonates do not significantly alter the appearance of aggregate/soil price.

Pros:

Increases soil strength; Effective on clay soils.

Cons:

Slippery when wet; Leaches from soil, especially during heavy or sustained periods of rain; Leaches more quickly from sandy soils.

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Product Description: Lignosulfonates are derived from the lignin that naturally binds cellulose fibers together to give trees firmness. At low application rates, lignosulfonates are used for dust suppression. At higher application rates, lignosulfonates can be used to stabilize soils.

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Organic Petroleum Emulsions

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Organic petroleum emulsion stabilized surfacing.

Photo Source: Tricor Refining LLC

Traffic Range:

Typical AADT < 400.

Life Expectancy:

6 to 9 months before additional treatments are needed for dust suppression. 5 to 9 years for soil stabilization applications.

Unit Price:

Material & Installation: \$3.00 to \$4.00/m² (\$2.50 to \$3.30/yd²) for mixing depth of 150 mm (6 in.). Unit price does not include aggregate/soil price.

Appearance:

Turns the aggregate material black.

Pros:

Widely available.

Cons:

Hydrocarbon emissions for cutback asphalts; Increased potential for potholes; Regrading is more difficult than with some other soil stabilization products.

Product Description: Organic petroleum products include cutback asphalts, asphalt emulsions, modified asphalt emulsions, and emulsified oils. These products can be used for dust suppression or to stabilize soils. These products bind soil particles together due to the adhesive properties of the asphalt component of the products .

Synthetic Polymer Emulsions

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Synthetic polymer emulsion stabilized roadway.

Photo Source: Golder Associates Inc.

Traffic Range:

Typical AADT < 250. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

6 months to 1 year between treatments for dust suppression. 5 to 10 years for soil stabilization applications.

Unit Price:

Material & Installation: \$2.40 to \$14.30/m² (\$2.00 to \$12.00/yd²) for mixing depth of 150 mm (6 in.). Unit price varies widely between different products. Unit price does not include aggregate/soil price.

Appearance:

Synthetic polymer emulsions do not significantly alter the appearance of soil/aggregate materials.

Pros:

Significantly reduces dust generation;
Increases soil/aggregate strength.

Cons:

High initial cost; Softens under extended wet weather conditions.

Product Description: Synthetic polymer emulsions primarily consist of acrylic or acetate polymers. The polymers cause a chemical bond to form between soil particles. At low application rates, synthetic polymer emulsions are used for dust suppression. At higher application rates, synthetic polymer emulsions can be used to stabilize soils.

Tree Resin Emulsions

5.8



Tree resin emulsion stabilized gravel.

Photo Source: Golder Associates Inc.

Traffic Range:

Typical AADT < 250. When used for higher traffic volumes, more frequent applications are required.

Life Expectancy:

6 months between treatments for dust suppression. 5 to 10 years for soil stabilization applications.

Unit Price:

Material & Installation: \$21.40 to \$53.60/m² (\$18.00 to \$45.00/yd²) for 50 mm (2 in.) thick stabilized layer. Unit price does not include aggregate/soil price.

Appearance:

Tree resin emulsions do not significantly alter the appearance of soil/aggregate materials.

Pros:

Reduces dust generation and surface material loss; Increases soil/aggregate strength.

Cons:

High initial cost; Softens under extended wet weather conditions; Slippery when wet.

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Product Description: Tree resin emulsions are derived from tree resins (mainly pine, fir, and spruce) combined with other additives to produce an emulsion. At low application rates, tree resin emulsions are used for dust suppression. At higher application rates, tree resin emulsions can be used to stabilize soils.

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