

**STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION  
FULL DEPTH RECLAMATION (FDR) CHEMICAL STABILIZATION**

**March 24, 2010**

- 01. Description**
- 02. Materials**
- 03. Submittals**
- 04. Equipment**
- 05. Construction**
- 06. Mixture Design for Full Depth Reclamation**
- 07. Method of Measurement**
- 08. Basis of Payment**

**01. Description.** Full depth reclamation (FDR) consists of constructing a stabilized, reclaimed base course by pulverizing the existing asphalt pavement and existing aggregate material, and then mixing it with the subgrade soil and either cement, lime, or lime kiln dust.

**02. Materials.** Furnish materials conforming to:

Portland cement .....	701.04
Lime (quick lime).....	712.04.B
Lime kiln dust .....	712.04.C
Aggregate.....	703.04

Furnish water conforming to 499.02.

For the curing coat, furnish rapid setting emulsified asphalt conforming to 702.04 or the curing materials specified in 451.02.

**03. Submittals.** Prepare and submit the report for mixture design for full depth reclamation as required in Supplement 1120 and modified in this special provision.

Submit, for the Engineer's acceptance, a report that lists the type of equipment to be used, speed of the intended equipment usage, rate of application of the chemical, and calculations that demonstrate how the required percentage of chemical will be applied. Submit the report to the Engineer for acceptance at least 2 workdays before the stabilization work begins.

**04. Mixture Design for Full Depth Reclamation.** Perform a mixture design according to Supplement 1120 with the following modifications.

Collect samples of the existing asphalt pavement, existing aggregate material, and subgrade soil to the specified depth. Collect one sample for every 5000 square yards (4000 m<sup>2</sup>) of

reclaimed base course, but not less than a total of four samples for a project. Record the location of all samples, and the thickness of existing pavement and aggregate layers.

Process and prepare samples to closely simulate field conditions. When performing tests on untreated samples, only determine the liquid limit and plastic limit if the subgrade soil comprises more than 20 percent of the specified depth of reclamation.

Do not perform the moisture conditioning or the expansion testing.

Determine the minimum percentage of chemical that results in an average 7-day unconfined compressive strength that meets the minimum strengths shown in the following table. Interpolate the minimum percentage between points on the graph. If the average strength for the mixture with the greatest percentage of stabilization chemical does not meet the minimum strengths, contact the Department.

**TABLE 04-1 MINIMUM UNCONFINED COMPRESSIVE STRENGTH**

Thickness of proposed asphalt pavement overlay	UCS after 7 days
Less than 3 inches (75 mm)	300 psi (2.1 MPa)
At least 3 inches (75 mm)	200 psi (1.4 MPa)

**05. Equipment.** Provide equipment that meets the following requirements:

A. Use equipment capable of automatically metering liquids with a variation of not more than two percent by weight of liquids. Calibrate before use.

B. Reclaimer. Use a self-propelled, traveling rotary reclaimer or equivalent machine capable of cutting through existing roadway material to depths of up to 16 inches (405 mm) with one pass. Provide equipment capable of pulverizing the existing pavement, aggregate base and subgrade soil in place, to a minimum width of 8 feet (2.4 meters), and mixing any added materials to the specified depth. The rotation speed of the cutting drum must be adjustable independent of the machine's forward speed.

Use a machine equipped with a computer controlled liquid proportioning system capable of regulating and monitoring the water application rate relative to depth of cut, width of cut, and speed. Connect the water pump on the machine by a hose to the supply truck, and mechanically or electronically interlock the pump with the forward movement of the machine. Mount the spray bar so that water is injected directly into the mixing chamber. Provide equipment capable of mixing water, chemicals, and the pulverized pavement materials into a homogenous mixture. Maintain the cutting drum in good condition during the work.

Do not use equipment such as road planers or cold-milling machines designed to mill or plane the existing roadway materials rather than crush or fracture them.

C. Compaction. Provide a vibratory padfoot roller with at least 52,000 pounds (23,500 kg) of centrifugal force for breakdown compaction. Provide a single or tandem smooth drum vibratory roller having a minimum effective weight of 12 tons (11 metric tons) for finish rolling.

**06. Construction.** Perform full depth reclamation work when the air temperature is 40 °F (5 °C) or above and when the soil is not frozen. Do not perform this work during wet or unsuitable weather.

**A. Pulverizing and Shaping.** Before spreading any stabilizing chemicals or aggregate, pulverize the existing roadway materials to the specified depth. Pulverize until 95 percent of the material passes through the 2 inch (50 mm) sieve. Shape to within 3/4 inch (18 mm) of the proposed grade and compact until no further densification is achieved. Add water to the pulverized material to bring it to at least optimum moisture content but not more than 3 percent above optimum moisture content.

**B. Spreading.** After pulverizing, spread the specified chemical uniformly on the surface using a mechanical spreader at the approved rate and at a constant slow rate of speed. Use a distribution bar with a maximum height of 3 feet (1 meter) above the subgrade. Use a canvas shroud that surrounds the distribution bar and extends to the surface.

Minimize dusting when spreading the chemical. Control dust according to 107.19. Do not spread the chemical when wind conditions create blowing dust that exceeds the limits in 107.19.

Do not spread the chemical on standing water.

If specified, spread aggregate at the approved rate using an auger or vane type distributor for dry materials.

Provide a one square yard (square meter) canvas sheet and scale to check the spreading rate of the chemical and aggregate.

**C. Mixing.** Mix according to 206.05.B. Mix cement or lime kiln dust according to 206.05.B.1. Mix lime according to 206.05.B.2. Check the depth of the mixture according to 206.05.B.3.

**D. Compacting.** Start compaction no more than 30 minutes after the final mixing. Begin rolling at the low side of the reclaimed base course. Initially, do not compact within 3 to 6 inches (80 to 150 mm) of an unsupported edge to prevent distortion.

Compact the reclaimed base course to the requirements in 204.03, except the Engineer will use 98 percent of the maximum dry density for acceptance. The Engineer will determine the maximum dry density for acceptance using the test section method.

Use the moisture controls according to 203.07.A, except ensure that the moisture content at time of compaction is at or above optimum but not greater than 3 percent above optimum moisture content.

Perform the final rolling using a steel-wheeled roller. Do not use vibration during the final rolling.

The Contractor may either shape and fine grade the reclaimed base course before the curing period, or shape the reclaimed base course before the curing period and fine grade after the curing period. If fine grading before the curing period, fine grade the same day as mixing, compacting, and shaping. If fine grading after the curing period, shape the reclaimed base course approximately 1/2 inch (13 mm) above the profile grade and typical sections. In either case, fine

grade the reclaimed base course to the profile grade and typical sections within the tolerances in 203.08.

**E. Curing.** Immediately after the compaction and shaping of the reclaimed base course, cover the surface with curing coat for curing the reclaimed base course. Use a rate of 1 gallon per 30 square feet (1.36 liters per square meter) for emulsions or a rate of 1 gallon per 150 square feet (0.27 liters per square meter) when the curing materials in 451.02 are used.

Apply the curing coat prior to the surface drying out. If the curing coat is delayed or the surface starts to dry out apply water for temporary curing until the curing coat can be applied. Do not apply the curing coat unless the curing coat can set up before it rains. When the application of curing coat must be delayed, keep the reclaimed base course wet by using water until the curing coat can be applied.

Cure the reclaimed base course for at least five days before placement of the overlying course.

**F. Proof Rolling.** After the cure period, proof roll the reclaimed base course according to Item 204.

**G. Protection.** Protect any finished portion of the reclaimed base course upon which any construction equipment is required to travel to prevent marring, distortion or damage of any kind. Immediately and satisfactorily correct any such damage.

Drain and maintain the work according to 203.04.A. Do not operate any equipment on the reclaimed base course during the curing period. Do not allow the reclaimed base course to freeze during the cure period. Cover the completed reclaimed base course with asphalt concrete pavement within 14 calendar days.

**07. Method of Measurement.** The Department will measure Full Depth Reclaimed Base Course by the number of square yards (square meters) computed from the profile grade and typical sections accepted in place.

The Department will measure cement, lime, and lime kiln dust by the number of tons (metric tons) incorporated in the complete and accepted work.

The Department will measure aggregate by the number of tons (metric tons) incorporated in the complete and accepted work.

The Department will measure Curing Coat by the number of square yards (square meters) computed from the profile grade and typical sections accepted in place.

**08. Basis of Payment.** The Department will pay lump sum for all work, labor, and equipment described in 04. Mixture Design for Full Depth Reclamation. The Department will pay one-half of the lump sum amount when the soil sampling and testing is complete and the report is accepted by the Department. The Department will pay one-half of the lump sum amount bid when the reclaimed base course is completed and accepted by the Department.

The Department will pay for accepted quantities at the contract prices as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
Special	Square Yard (Square Meter)	Chemically Stabilized Subgrade, Misc.: Full Depth Reclaimed Base Course, ___ inches deep
206	Ton (Metric Ton)	Cement
206	Ton (Metric Ton)	Lime
206	Ton (Metric Ton)	Lime Kiln Dust
Special	Ton (Metric Ton)	Chemically Stabilized Subgrade, Misc.: Aggregate for FDR Base
206	Square Yard (Square Meter)	Curing Coat
204	Hour	Proof Rolling
Special	Lump Sum	Chemically Stabilized Subgrade, Misc.: Mixture Design for Full Depth Reclamation

**Designer Note:** This special provision for full depth reclamation is designed to be used with the 2010 Construction and Material Specifications.

Include the following pay items in the plans. Include only one chemical: cement, lime, or lime kiln dust. Include a pay item for aggregate only if appropriate for the specific project.

<b>Item</b>	<b>Item Ext.</b>	<b>Unit</b>	<b>Description</b>
Special	206E98300	SQ YD	Chemically Stabilized Subgrade, Misc.: Full Depth Reclaimed Base Course, __ inches deep
206	10500	TON	Cement
206	10300	TON	Lime
206	25100	TON	Lime Kiln Dust
Special	206E98800	TON	Chemically Stabilized Subgrade, Misc.: Aggregate for FDR Base
206	11000	SQ YD	Curing Coat
204	45000	HOUR	Proof Rolling
Special	206E98400	LUMP	Chemically Stabilized Subgrade, Misc.: Mixture Design for Full Depth Reclamation

Specify the depth of the full depth reclamation in the pay item description and on the typical sections. Depths can vary from 5 to 16 inches, with 12, 14, and 16 being typical.

If you change the special provision for the project, also change the date at the top. Remove this designer note from the document before including this special provision in the Contract Documents.