

**DELAWARE COUNTY  
DELAWARE COUNTY ENGINEER'S OFFICE**

**SUPPLEMENTAL SPECIFICATION 1201**

**RECLAIMED STABILIZED BASE**

**MARCH 4, 2011**

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**1201.01 Description.** This work shall consists of constructing a Reclaimed Stabilized Base (RSB) by pulverizing, mixing, shaping, grading and sealing a combination of existing asphalt, aggregate base and soil in addition to stabilizing materials such as asphalt emulsion, aggregates and Portland cement and water to obtain a uniform, stable recycled base course for asphalt concrete or Portland cement concrete pavement.

**1201.02 Materials.** Furnish all materials required by the plans and Contract Documents.

**A. Portland cement.** Furnish dry bulk or bagged material conforming to 701.04 and in the proportion required by the Job Mix Formula (JMF).

**B. Aggregate.** Furnish washed, crushed gravel or crushed carbonate stone (CSS) [limestone] conforming to 701.01 in the proportion required by the JMF.

**C. Water.** Furnish water conforming to 499.02 in the proportion required by the JMF.

**D. Asphalt Recycling Emulsion.** Furnish an anionic type high float Cold In-Place Recycling Emulsion (HF-RE) stabilizing additive in accordance with the requirements of Table 1201.02-1

**TABLE 1201.02-1  
HF-RE (HIGH FLOAT-RECYCLING EMULSION)**

<b>Property</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Test Method</b>
Furol Viscosity @ 25° C, SFS	20	300	D-244
Sieve Test, %	<0.1	----	D-244
Residue % by Distillation	60+	----	D-244
Oil Distillation by Volume of	0	5	D-244

Emulsion, %			
Demulsibility, 35ml, 0.02N Ca/C12, %	0	35	D-244
Storage Stability	0	1	D-244
Coating Ability and Water Resistance Coating, Wet RAP	Good		D-244

*Tests on Residue by Distillation Test*

Penetration, 25°C, 100g. 5 sec.	150	300	D-5
Ductility, 25°C, 5cm/min., cm	40+		D-113
Solubility in Trichloroethylene %	97.5	--	D-2042
Float Test, 60°C, sec.	1200+	--	D-139

In order to insure proper dispersion and stability with the mix, the emulsion may need to be adapted to the needs of the pavement to be recycled and to the amount of base materials and/or aggregate to be added by changing the emulsion flux and/or recycling agents. The quantity of asphalt emulsion required per square yard shall be as specified in the JMF.

**1201.03 Equipment.** Provide sufficient equipment to perform all phases of the work.

The equipment for linear grading and excavating pavement shall be a self-propelled pavement milling machine capable of excavating, grinding and simultaneously loading the excavated pavement material into trucks.

The equipment for pulverizing existing pavement and mixing additional chemicals into the RSB shall be a self-propelled, transverse type road reclaimer machine capable of in-place pulverization of the existing pavement at a minimum width of eight (8) feet and mixing any additional aggregate to a depth of up to ten (10) inches. The cutting drum shall have the ability to operate at various speeds (RPM), independent of the machine's forward speed, in order to control chunk size and gradation. Machine shall also have a breaker bar and/or mixture retention doors on the cutting drum in order to help control mixture gradation and/or sizing.

The equipment used for grading of the RSB shall be a conventional motorized grader with automatic slope control.

Use vibratory footed rollers and smooth drum rollers weighing at least 10 tons and of sufficient design to obtain the required compaction of the RSB. Vibratory rollers shall be capable of applying a minimum of 52,000 pounds of centrifugal force.

**1201.04 Mixture Design for Reclaimed Stabilized Base.** The final, compacted RSB mixture, after adding any aggregates and after the final mixing pass, shall meet the gradation of Table 1201.04-1.

**TABLE 1201.04-1**

Sieve Size	Total Percent Passing
2 inch	100
No. 4	30 to 65
No. 200	0 to 10

For the purpose of computing the required amount of aggregate, asphalt emulsion, Portland cement and water, the compacted mixture may be assumed to have a density of 130 pounds per cubic foot.

The Department will perform nuclear density testing for compaction and will collect gradation samples of the pulverized mixture for Laboratory analysis.

**1201.05 Construction.** The contractor shall provide labor, materials and equipment necessary to pulverize, mix, place, compact and seal the RSB in accordance with the plans. The depth of cut into the existing asphalt/base shall be as specified on the plans. The actual depth of cut shall not vary by more than 1 inch less than the plan thickness to no more than 2 inches greater than the plan depth.

**A. Linear Grading.** When required in the plans, excavate longitudinal trenches in portions of the existing pavement as shown in the typical sections to remove unsuitable material or to reduce the total thickness of the RSB. Dispose of excavated material off site or at locations approved by the Engineer. Re-grade the adjacent pulverized base material and fill in the excavated trenches to achieve required profile.

**B. Aggregate Spreading.** Aggregate shall be placed ahead of the first pulverization pass by means of a pull type paver box, pull type drop spreader, or self-propelled aggregate spreader. Tailgate spreading of the aggregate is prohibited, unless smoothed to a uniform and measurable thickness by a motorized grader acceptable to the Engineer. Aggregate shall be spread at rates as required by the plans and Contract Documents.

**C. Pulverizing.** The equipment for pulverizing existing pavement material shall be a self-propelled, transverse type road reclaimer machine capable of in-place pulverization of the existing pavement at a minimum width of eight (8) feet and mixing any additional aggregate to a depth of up to ten (10) inches. The cutting drum shall have the ability to operate at various speeds (RPM), independent of the machine's forward speed, in order to control chunk size and gradation. Machine shall also have a breaker bar and/or mixture retention doors on the cutting drum in order to help control mixture gradation and/or sizing.

**D. Grading.** Grade the surface of the RSB to the lines and grades established in the plans. Surface deviations shall be no more than 5/8-inch when measured with a 6-foot straightedge. The Contractor shall re-grade areas that are not approved by the Engineer at no additional cost. Any obstructions within the roadway that would interfere with establishing a uniform width shall be removed prior to pulverization, at no additional cost.

**E. Cement Spreading and Mixing.** Spread Portland cement after the first pulverization pass and after initial grading is performed. Cement shall be uniformly spread across the surface

If the application rate for cement is not provided in the Contract Documents, apply cement at a rate of 6 percent by weight based on a dry density of the compacted RSB of 130 pounds per cubic foot. Apply additional cement in areas requiring additional stabilization as directed by the Engineer.

**F. Compaction.** Roll and compact the graded RSB while in a workable condition. When the depth of cut exceeds 6-inches, breakdown rolling shall be performed with a pad-foot vibratory roller.

Compact the RSB to the requirements in 204.03 except the Engineer will use 98 percent of the maximum dry density for acceptance. The Engineer will obtain the maximum dry density for acceptance by the maximum dry density obtained by test section method.

Intermediate and final compaction shall be performed with a smooth drum vibratory compactor, operating in vibratory and static mode as necessary to reach the required compaction.

Water shall be uniformly applied over the RSB in the amount necessary to obtain proper compaction. If, during production rolling, the RSB material becomes unstable due to excessive moisture, the material shall be aerated and allowed to dry to the point stability can be attained. If stability cannot be obtained through aeration, cement shall be added.

Rollers shall not be stopped and left to sit on uncompacted RSB. Rolling shall be performed such that starting and stopping is on previously compacted recycled material or on the existing bituminous roadway, unless otherwise directed by the Engineer.

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

Stop rolling if rolling causes cracking, shoving, or other pavement distress, and notify the Engineer.

**G. Field Adjustments.** In the event that organic, clay or silt or poorly drained material is present in isolated areas after the first pulverization pass, notify the Engineer immediately. The Engineer may direct the Contractor to mix additional Portland Cement with the recycled mixture increase the stability and/or dry the recycled material.

Make field adjustments to the mix proportions under the direction of the Engineer by adding Asphalt Emulsion, Aggregate and/or Portland Cement in proportions ordered by the Engineer to any areas that require additional stabilization.

**1201.06 Proof Rolling.** The Contractor shall proof roll the finish graded RSB according to 204.06 prior to applying any surface treatment. The cost for this work shall be included in the contract unit price for Item 1201, Reclaimed Stabilized Base.

**1201.07 Weather Limitations.** No work shall be performed between October 15 and April 15. The weather and temperature limitations for this work shall be 50°F and rising with no standing water on the existing surface. No work shall be performed if there is a forecast of an atmospheric temperature below 0°C (32°F) within 24 hours from the time the RSB is constructed. All work shall be performed and open to local traffic during daylight hours.

**1201.08 Maintenance of Traffic.** Traffic shall be maintained as specified in the plans. Payment for maintenance of traffic shall be paid for separately under Item 614.

**1201.09 Curing.** Allow the recycled base course to cure and dry for at least 48 hours but not more than 7 days prior to placement of any asphalt or concrete pavement.

**1201.10 Surface Sealing.** The surface of the RSB shall have a Single Chip Seal applied according to the requirements of Item 422, except that the Contractor shall use an RS-2 emulsified bind regardless of ADT, and that chip sealing shall be allowed between May 1 and October 1 provided the other requirements of 422.04 are met. A test strip is not required.

**1201.11 Method of Measurement and Basis of Payment.** Payment for Reclaimed Stabilized Base will be made for the number of square yards completed and accepted by the Department, and includes all labor, equipment and materials required to pulverize the existing asphalt/base, grading, compacting, proof rolling and correcting surface irregularities of the pulverized base material, and any other incidental work required to construct the Reclaimed Stabilized Base except where paid for separately as described below.

Payment for Cement shall be based on the number of accepted tons of Portland Cement added to the mixture, as shown on plant tickets for bulk cement or other forms of documentation acceptable to the Engineer for the number of bags of cement added.

Payment for Asphalt Emulsion shall be based on the number of accepted gallons measured according to 109, incorporated into the Reclaimed Stabilized Base mixture.

Payment for Aggregate shall be based on the number of tons of accepted aggregate, placed and incorporated into the Reclaimed Stabilized Base mixture.

Measurement and payment for Single Chip Seal shall be as specified in 422.12 and 422.13.

Payment for Linear Grading shall be as specified in 209 and shall include excavation of areas shown in the plan, removal and off-site disposal of excavated material and re-grading of pulverized base material in conformance with plan lines.

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

<b>Item</b>	<b>Unit</b>	<b>Description</b>
1201	Square Yard	Reclaimed Stabilized Base, ___”
1201	Gallon	Asphalt Emulsion
1201	Ton	Aggregate, No. ___

1201	Ton	Cement
1201	Square Yard	Single Chip Seal
1201	Station	Linear Grading