

604 - COLD RECYCLED ASPHALT CONSTRUCTION (CIR)

SECTION 604

COLD RECYCLED ASPHALT CONSTRUCTION (CIR)

604.1 DESCRIPTION

Mill the asphalt pavement, mix the reclaimed asphalt pavement (RAP) material with hydrated lime slurry (use a minimum of 1% hydrated lime, based on the dry weight of the RAP) and emulsified asphalt, and spread and compact the mixture as specified in the Contract Documents.

<u>BID ITEMS</u>	<u>UNITS</u>
Cold Recycled Asphalt Material	Station
Lime (Hydrated) (Slurry)	Ton
Emulsified Asphalt (CSS) (Special)	Ton
Emulsified Asphalt (CSS-1H or SS-1H) Cure (Set Price)	Ton
Blotter Sand (Set Price)	Cubic Yard

604.2 MATERIALS

Provide materials that comply with the applicable requirements.

Emulsified Asphalt	DIVISION 1200
Lime	DIVISION 2000
Water	DIVISION 2400

Blotter sand may be any fine sand approved by the Engineer.
Provide processed RAP material that complies with **TABLE 604-1**.

TABLE 604-1: RAP MATERIAL FOR CIR	
Sieve Size	% Retained
1 1/4"	0

Manufacture the hydrated lime slurry at the jobsite by slaking pebble quicklime. Accompany each load of quicklime with a certification stating the purity for that load.

604.3 CONSTRUCTION REQUIREMENTS

a. Mix Design. Submit to the Engineer for approval a mix design complying with 5.3.4-Mix Design Procedures for CIR Material, Part V.

Provide a technical representative from the asphalt emulsion supplier on the job site at the beginning of the CIR to obtain proper asphalt emulsion performance. When required, provide a technical representative to check on the project and make adjustments to the asphalt emulsion formulation as needed.

b. Milling Operation. Mill the required depth and width in 1 or more passes. Process the RAP material to the required gradation and thoroughly mix with the specified amount of binder. Water may be added to the RAP material to facilitate mixing, provided it does not adversely affect the binder. Deposit the recycled material in a windrow, a paver or load into trucks, without segregation.

When deposited in a windrow, have equipment available to equalize the windrow as directed by the Engineer.

If RAP is to become the property of the Owner, deliver and stockpile at locations shown in the Contract Documents.

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c. Mixing Operations.

(1) Field Mixture Testing. Take all samples according to KT-1(3.1) or (3.2). Obtain a sample from each 0.6 mile before emulsion addition, and screened using a 1¼-inch sieve (or smaller sieve if required) to determine compliance with the maximum particle size requirement.

Additionally, obtain 2 gradations each day and compare to the mix design gradations using KT-4 to determine any necessary changes to the emulsion content.

(2) Asphalt Emulsion. Do not accept asphalt emulsion with a temperature greater than 120°F, **TABLE 601-1**. Sample and accept or reject from the shipping trailers prior to unloading into the Contractor's storage units.

(3) Asphalt Emulsion Content. Check and record the emulsion content for each segment in which the percentage is changed. Make emulsion content changes based upon mix design recommendations, which are based upon different mix designs for road segments of varying construction. Determine asphalt emulsion content from the belt scale totalizer and asphalt pump totalizer.

(4) Lime Slurry Content. Add the amount of hydrated lime to the RAP determined by the mix design or directed by the Engineer, based on the weight of the dry RAP.

Add pebble quicklime by weight to the required quantity of water to provide a uniformly hydrated lime slurry having a minimum dry solids content of 30%. When requested by the Engineer, determine the solids content of the hydrated lime according to "Check Percent Solids of Lime Slurry Procedure" (KT-62). Check and record the lime slurry content for each segment in which the percentage is changed. Make the lime slurry changes based upon mix design recommendations or as approved by the Engineer.

(5) Water Content. Verify and record the water content at the milling head for each segment in which the percentage is changed. Determine water quantities from the water metering device, and compare with the belt scale totalizer to determine daily quantities used. Make the water content adjustments based on mixture consistency, coating and dispersion of the recycled materials.

d. Paving Operations. Deliver the RAP, lime and/or water and emulsion mixture to the paver immediately after mixing. The minimum temperature of the mixed material when placed is 50°F. Pave in 1 continuous pass, utilizing an asphalt paver complying with **SECTION 155** or other equipment approved by the Engineer. Without tearing the surface, spread and finish the recycled material, to the lines and grades in the Contract Documents or established by the Engineer so it is smooth, free of segregation, uniform in density, texture and free from surface irregularities. Do not heat the paver screed. A pick-up machine may be used to transfer the windrowed material into the paver hopper. Maintain the asphalt paver within 150 feet of the mixing unit. If the process does not comply with these requirements, the Engineer will suspend paving until the deficiency is corrected.

e. Compaction and Density Requirements. Compaction and density requirements for each project shall be a minimum of 97% of the target density obtained on a test strip compacted under the following conditions:

- The minimum mix temperature of the test strip is 50°F;
- Complete a minimum of 2 test strips to determine the target density and optimum sequence of rollers. These test strips shall remain in place as part of the completed work; and
- The depth of the lift shall be representative of the requirements of the Contract Documents.

Target density shall be the highest density achieved on the test strip using the rolling procedure approved by the Engineer. The rolling procedure used on the test strip shall have a minimum of 6 roller coverages. The Engineer will use a nuclear density gauge to establish a density growth curve for each procedure. Discontinue rolling when 4 consecutive coverages of the rollers fail to increase the density 1 pound per cubic foot.

As a minimum, provide the following self-propelled rollers for use on the test strips: a double drum vibratory steel roller and a pneumatic tired roller. Provide a vibratory roller complying with the requirements for hot asphalt pavement in **subsection 151.5** and having a minimum operating weight of 10 tons and a minimum drum width of 6½ feet. The vibratory roller may be used in the static mode. Use a pneumatic tired roller with a minimum weight of 30 tons and a minimum tire pressure of 90 psi. The air pressure in each of the pneumatic tires shall be within 5 psi of each other. Supply a suitable tire pressure gauge.

Change rolling or roller patterns when major displacement and/or cracking of the recycled material occur. Start rolling a maximum of 30 minutes after paving. Complete finish rolling a maximum of 1 hour after milling is completed. When possible, begin and end rolling sequences on previously compacted material or the existing pavement.

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Before and after opening to traffic, maintain the surface of the recycled pavement in a condition suitable for the safe movement of the traffic. Remove all loose particles that develop on the pavement surface by power brooming.

When there is a significant change in mix proportions, weather conditions or other controlling factors, the Engineer may require construction of a new test strip to check target density.

f. Surface Treatment or Overlay. When required by the Engineer, apply a light application of asphalt material (smoke coat) on the recycled surface, and blot with fine sand, as necessary.

Before placing a HMA surface course, or other applicable surface treatment, allow the CIR asphalt material to cure until the moisture of the material is a maximum of 2.0%, or approved by the Engineer. Under dry conditions, the CIR should comply with the moisture requirements within 48 hours.

Cover each day's production of CIR material with any subsequent treatment or overlay, as designated in the Contract Documents, within 21 calendar days. If the CIR material requires patching before the 21 days have expired, and damage is not the result of the Contractor's operations, KDOT will pay for the patching. If the Contractor has not covered the CIR material by the end of the 21-day period and the material requires patching, the Contractor shall be responsible for the patching. Begin patching within 3 days of being notified by the Engineer of required patching.

g. Maintenance of Traffic. Perform traffic control according to **DIVISION 800**.

h. Weather and Seasonal Limitations. Complete milling, adding the liquid binder and laydown between May 1 and September 30, when the ambient air temperature is greater than 50°F and rising, the weather is not rainy or foggy and the weather forecast does not call for freezing temperature within 48 hours after placement. The above requirement may be waived, when approved in writing by the Engineer.

i. Pavement Smoothness. Evaluate pavement smoothness according to **SECTION 603**.

604.4 MEASUREMENT AND PAYMENT

The Engineer will measure cold recycled asphalt material by the Station, along the centerline. On divided highways, the Engineer will measure cold recycled asphalt material by the Station, along the centerline of each divided direction. This includes all widened and irregular areas and irregular variations in depth.

The Engineer will measure lime (hydrated) (slurry) and the various types of emulsified asphalt by the ton.

The Engineer will measure blotter sand by the cubic yard in the truck at the point of usage.

The Engineer will not measure water for separate payment.

Payment for "Cold Recycled Asphalt Material", "Lime (Hydrated) (Slurry)" and "Emulsified Asphalt (CSS) (Special)" at the contract unit prices and "Blotter Sand (Set Price)" and "Emulsified Asphalt (CSS-1H or SS-1H) Cure (Set Price)" at the contract set unit prices is full compensation for the specified work.