405-4 Cold Central Plant Recycling (Added 10-24-19)

1. COLD CENTRAL PLANT RECYCLE [405] (ADDED 10-24-19)
	1. Description. This work is the process of milling, crushing, and screening of the in place bituminous materials to the dimensions shown on the plans and incorporating water and/or stabilizing agents and pugmill mixing at a central plant.
	2. Materials.
		1. Mix Design. Perform the mix design using the procedure in the special provision for Cold Recycling Mix Design found elsewhere in the contract. Include all costs associated with the mix design in the pay item, “Cold Central Plant Recycling”.
		2. Asphalt Emulsion. Use an asphalt emulsion with the properties listed in Table 405-1 and the mix design properties listed in Table 405-3, found elsewhere in the contract. The target asphalt emulsion content will be determined from the mix design. Adjust the asphalt emulsion or mineral filler rates, with concurrence from the Project Manager, to improve coating or to adjust breaking properties. Do not reduce asphalt emulsion content below 2% without concurrence from the Materials Bureau.

When requested by the Department, obtain samples for verification testing in accordance with Subsection 402.03.2. Obtain samples from shipping trailers before transferring emulsion into the Contractor’s storage units for verification testing.

TABLE 405-1

ASPHALT EMULSION REQUIREMENTS

|  |  |  |
| --- | --- | --- |
| Test | Minimum | Maximum |
| Residue from distillation, % | AASHTO T 59 | 63.0 |  |
| Oil distillate by distillation, % | AASHTO T 59 |  | 1.0 |
| Sieve Test, % | AASHTO T 59 |  | 0.3 |
| Penetration range (TBD1), 77ºF (25°C), in (mm) | AASHTO T 49 | -25% | +25% |

Notes:

To be determined by the mix design before manufacturing emulsion for the project. Submit penetration range to Project Manager for approval before project start.

* + 1. Milled Bituminous Material. Meet the following gradation before adding asphalt emulsion:

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 1.25-inch (31.5 mm) | 100 |

Provide equipment needed to collect a representative sample from the belt conveyer before introducing emulsion. Sample each 0.5-mile (0.8 km) and test using a 1.25-inch (31.5 mm) sieve to determine compliance. Testing will be in accordance with ASTM D979 or AASHTO T 168.

* + 1. Mineral Filler. Furnish 0.5% mineral filler by dry weight of cold recycled material. Obtain the Project Manager’s approval to increase the application rate of mineral filler prior to production changes. Furnish mineral filler as specified elsewhere in the contract.
		2. Reclaimed Asphalt Pavement (RAP). If available, RAP may be added if it meets the requirements of Table 405-2. Ensure that when RAP is added to the cold recycled material, the resulting material meets the specifications in Table 405-3.

TABLE 405-2

ADDITIONAL CRUSHED RAP

|  |  |  |
| --- | --- | --- |
| Tests | Method | Limit |
| Deleterious Materials: Clay Lumps and Friable Particles in Aggregate, % max | AASHTO T 112 | 0.2 recommended |
| Maximum size, 100% Passing | AASHTO T 27 | 1.25-inch (31.5 mm) sieve |

* + 1. Water. Furnish water in accordance with Subsection 713.01.
	1. Construction Requirements.
		1. Seasonal and Weather Limitations. Place cold recycled material between the dates of May 15 and August 1 when surface treatment will consist of seal and cover. Place cold recycled material between the dates of May 15 and October 1 when surface treatment will consist of an overlay.

If precipitation occurs during recycle operations, reprocess any areas with signs of raveling or stripping due to precipitation at Contractor expense. Suspend recycling operations when the temperature is 60 °F (15.5 °C) and falling.

The National Weather Service weather forecast will be used for the following items c) and d). Do not perform recycling operations:

* + - 1. Unless the ambient air temperature measured in the shade is 50 °F (10 °C) and rising.
			2. During foggy or rainy weather regardless of temperature.
			3. If weather conditions are such that proper mixing, placing, and compacting of the recycled material cannot be accomplished.
			4. When the weather forecast for the project site predicts the temperature will be below 35 °F (1.7 °C) within 24 hours after placement of any portion of the project.
		1. Equipment. Meet the following equipment requirements.
			1. Cold Milling Machine. Meet the requirements for cold milling in accordance with Section 411. The Contractor will be required to cold recycle the full pavement width, as shown on the plans. If the primary milling machine is unable to process one half of the road in one pass, multiple passes with a milling machine will be necessary to process the pavement remaining along shoulder. A smaller milling machine may be used to mill shoulders and miscellaneous areas.

Submit a milling plan for Project Manager’s approval 10 business days before starting the cold recycling operation.

* + - 1. Pugmill Mixing. Use a mixing unit equipped with a belt scale to continuously weigh the pulverized material. A coupled/interlocked computer controlled liquid metering device is required. Ensure the liquid metering device can automatically adjust the asphalt emulsion flow to compensate for variations in the weight and water content of milled material introduced into the mixer. Ensure the metering device delivers the asphalt emulsion to within plus or minus 0.2% of the required amount, based upon dry weight of milled material. Ensure the asphalt emulsion pump is capable of emulsion contents up to 3.5% by weight of pulverized material. Ensure automatic digital readings are displayed for both the emulsion and milled material flow rates. Use a pugmill with interlocked water metering system capable of adding water at a rate between 0.5 and 5.0% by weight of milled material.

Prior to beginning work, provide Project Manager with documentation of calibration and certification of flow meters and internal scales required to achieve the required control of mixing rates.

* + - 1. Roadway equipment. Use equipment to handle, place, and compact the material in accordance with Subsection 401.03.15.
		1. Construction Methods and Procedures. Remove dirt, vegetation, standing water, combustible materials, oils, and thermoplastic markings from the entire roadway width. Mill to required depth and width as shown in the contract. Remove oversized crack filler and fabric within the milled material from the crusher screens. Oversized crack filler is crack filler not passing the 1.25-inch (31.5 mm) screen. Waste oversized crack sealer as directed by the Project Manager.

Begin rolling within 30 minutes after paving. Use double drum steel rollers for final rolling to remove pneumatic tire marks. Complete finish rolling within 1 hour after paving is completed. Do not start, stop or park rollers on the un-compacted mat. Discontinue rolling if cracking is observed or if material is being displaced.

After compaction, do not permit traffic, including that of the Contractor, on the cold recycled material for 2 hours. Do not allow stopped or standing traffic, including that of the Contractor, on the cold recycled material for 36 hours after placement. Place traffic control at the beginning of the previous day’s work so vehicles waiting in queue park on cold recycled material more than 36 hours old. After compaction and before placing the overlay or seal and cover, maintain the recycled pavement surface in a condition suitable for the safe movement of traffic.

* + - 1. Moisture Content. The method for determining the moisture content is to divide each paver pass into 3000-foot (915 m) sections. At one location selected and witnessed by Department personnel, remove a 2.2 lb. (1000 g) sample withdrawn from a uniform section representing the full depth of the compacted cold recycled material. Extract using a dry method such as a pick or a diamond saw. Immediately place samples in a previously weighed moisture proof container. Fill sample hole by placing and compacting cold recycled, hot, or cold mix asphalt pavement in 2-inch (50 mm) lifts to the finished surface. Furnish samples to the Department. The Department will determine moisture content using MT 312. Each location must have moisture contents less than 2.0% before an overlay or seal and cover is placed on the section.

When the surface treatment consists of an overlay, begin placing overlay between 12 and 15 calendar days after the completion of cold recycling. When the surface treatment consists of a seal and cover, begin placing seal and cover between 25 and 30 calendar days after the completion of cold recycling. An overlay or seal and cover can be placed earlier provided the cold recycle meets the water content specifications.

* + 1. Mixture Testing. When instructed by the Project Manager, submit representative samples of loose cold recycled material from windrow for testing and review. Samples may be tested by the Department to verify the material meets the properties in Table 405-3, found elsewhere in the proposal. Take samples from the windrow following MT 303. Seal samples in a waterproof bag.

If mixture properties do not meet the properties in Table 405-3, work may be suspended until proper corrective actions or adjustments can be made. This may include but not be limited to changing production rate and the amount or type of recycling agent or other additives.

* + 1. Compaction and Density Requirements. Compaction and Density requirements will be determined using the test strip method. Compact cold recycled material to a minimum of 97% of the target density obtained from test strip.

Construct test strip, establish target density, and monitor density during construction in accordance with MT 219, *Control-Strip B – Plant Mix Paving* with the following exceptions:

* + - 1. Construct test strip when pavement temperature is 68 °F (20 °C) or higher;
			2. Construct test strip at a depth representative of the project; and
			3. Construct test strip using rollers specified in Construction Requirements, part 2) f).

If mix proportions, weather conditions or other controlling factors change, the Department may require construction of additional test strip(s) to establish a new target density.

* + 1. Cold Recycled Surface Cross Slope / Smoothness. Use a level to check the cold recycled surface cross slope regularly during placement. Ensure the smoothness varies less than 0.25-inch (6 mm) from the lower edge of a 10-foot (3 m) straight edge placed on the surface parallel and transversely to the centerline after rolling is completed.
		2. Conditions of Acceptance and Corrective Actions for Cold Recycled Material. Acceptance for payment of the cold recycled material will be determined by visual inspection of the mixture on the roadway. Before proceeding to other work or surfacing treatments, correct deficient cold recycled material to the satisfaction of the Project Manager as follows:
			1. Reprocess or repair any area showing an excess or deficiency of asphalt emulsion.
			2. Reprocess or repair any area that ravels.
			3. If rutting occurs before the surface treatment is placed, re-compact to remove ruts.
			4. Reprocess or repair areas not meeting smoothness criteria.
	1. Method of Measurement. Work as described will be measured by the square yard of the completed sections for the depth specified. Asphalt emulsion will be measured by the ton (metric ton). Mineral Filler will be measured by the ton (metric ton). Water used in this operation will not be measured for payment.
	2. Basis of Payment. Payment for completed and accepted quantities is made under the following:

|  |  |
| --- | --- |
| Pay Item | Pay Unit |
| Cold Recycled Plant Mix | Square Yard (square meter) |
| Recycling Agent CIR - EE | Ton (metric ton) |
| Mineral Filler – CIR | Ton (metric ton) |

Reprocess and/or repair Cold Recycled Material not meeting specifications at no cost to the Department.

Payment at the contract unit price is full compensation for all necessary resources necessary to complete the contract work items.