



Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS FOR **COLD** IN-PLACE **COLD** RECYCLED ASPHALT PAVEMENT

Effective Date
March 18, 2003

THE **ENGLISH** STANDARD SPECIFICATIONS, SERIES OF 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Replace all of Section 2318 of the Standard Specifications with the following:

01024.01 DESCRIPTION.

This work consists of milling the existing asphalt pavement to the width and depth specified in the contract documents, mixing the milled bituminous material with an asphalt stabilizing agent and water (if required), and placing and compacting this mixture.

01024.02 MATERIALS.

A. Asphalt Stabilizing Agent.

Unless otherwise specified in the contract documents, the asphalt stabilizing agent may, at the Contractor's option, be either of the following:

1. Emulsified Asphalt (HFMS-2s) meeting the requirements of Section 4140 of the Standard Specifications.
2. Foamed Asphalt using PG 52-34 asphalt binder meeting the requirements of Section 4137 of the Standard Specifications.

Unless otherwise stated in the contract documents, an application rate of 0.2 gallon of residual asphalt per square yard per inch of compacted thickness (0.9 L of residual asphalt per m² per 25 mm of compacted thickness) shall be used to determine the estimated plan quantity of asphalt stabilizing agent.

B. Pulverized Bituminous Material.

The processed milled bituminous material is intended to conform to the following gradation. The gradation may be revised with the approval of the Engineer, but the top size of the material shall not exceed 50% of the depth of the compacted recycled mat.

<u>Sieve Size</u>	<u>% Passing</u>
1 1/2 inch (37.5 mm)	98 to 100
1 inch (25 mm)	90 to 100

C. Mix Design

Unless otherwise specified in the contract documents, the Contractor shall notify the Engineer at least 10 weeks prior to the anticipated starting date for the cold in-place cold recycling and provide the Engineer with a 5 gallon (20 L) sample of the intended asphalt stabilizing agent. The Engineer will provide the details of the mix design to the Contractor no later than 4 weeks prior to the recycling start date. The mix design will be performed by the Central Materials Laboratory and will establish the amount of residual asphalt to incorporate into the milled material and optimum laboratory compaction moisture. When foamed asphalt is used, the mix design will determine the target asphalt temperature and percent of water added to the asphalt to achieve optimum foaming.

01024.03 CONSTRUCTION REQUIREMENTS.

Except in specific cases when permitted by the Engineer, the Contractor shall perform cold In-Place cold recycling between May 1 and October 1.

The Contractor shall not perform recycling operations when the ambient temperature is below 60°F (15°C); when the weather is foggy or rainy; or when weather conditions are such that proper mixing, placing, and compacting the recycled material cannot be accomplished.

A. Equipment.

The Contractor shall furnish a self-propelled machine capable of milling the existing bituminous material to the depth shown in the contract documents in one pass. The machine shall be equipped with automatic depth control, maintain a constant cutting depth and width, uniform grade, and uniform slope. It shall also be capable of producing the properly sized milled bituminous material or additional screening and crushing will be required.

The Contractor shall furnish equipment capable of mixing the milled bituminous material and asphalt stabilizing agent into a homogeneous mixture. The equipment shall meet the requirements of Article 2001.22,F, of the Standard Specifications and provide a positive means for accurately controlling the rate of flow and total delivery of the asphalt stabilizing agent into the mixture in relation to the speed and quantity of material being recycled. The asphalt stabilizer application system shall be capable of adjusting for the width of recycling such that overlapped mixture maintains the designed residual asphalt content.

The asphalt foaming system shall accurately and uniformly add the specified percent of water to the hot asphalt. The equipment shall be fitted with a test nozzle to provide field samples of foamed asphalt. Tankers supplying the hot asphalt binder shall be equipped with a thermometer to continuously measure the temperature of the asphalt in the bottom third of the tank.

The Contractor shall use a bituminous paver meeting the requirements of Article 2001.19 of the Standard Specifications or a spreader meeting the requirements of Article 2001.13 of the Standard Specifications to place the recycled material. Heating the screed of the bituminous paver will not be permitted.

The rollers for compacting the recycled material shall meet the requirements of Article 2001.05 of the Standard Specifications. As a minimum, the Contractor shall have for use a self-propelled double drum vibratory steel roller and a self-propelled 25 ton (25 mg) or greater pneumatic tire roller. The vibratory roller may be used in the static or vibratory mode.

B. Preparation.

Prior to initiating the recycling operation, the Contractor shall clear all vegetation and debris within the width of pavement to be recycled. Removal of this vegetation and debris from the project shall be in accordance to Article 1104.08 of the Standard Specifications.

C. Milling the Existing Pavement.

The Contractor shall mill the existing pavement to the specified constant depth and width in one pass. The pulverized bituminous material shall be processed to the required gradation. When specified in the contract documents or when approved by the Engineer, the pavement surface may be pre-milled to a uniform 2% cross slope. RAP from pre-milling shall be removed from the project.

D. Mixing the Recycled Material.

During recycling operations, the Contractor shall apply the asphalt stabilizing agent to the pulverized bituminous material at a rate that will achieve the residual asphalt content established by the mix design. The Engineer may vary the application rate of asphalt stabilizing agent as required by existing pavement conditions. The Contractor shall determine the amount of additional water needed to facilitate uniform mixing with the asphalt stabilizing agent and to achieve a stable pavement layer above the minimum specified density. The water may be added prior to or concurrently with the asphalt stabilizing agent. Adding water to facilitate uniform mixing shall not adversely affect the asphalt stabilizing agent.

E. Placement of the Recycled Material.

The Contractor shall deposit the recycled material in a windrow, spreader, paver, or loaded into trucks, without segregation.

The Contractor shall place and finish the recycled material in one continuous pass, without segregation to a thickness that will provide a uniform cross slope of 2%, unless otherwise noted in the contract documents. When a pick-up machine is used to feed the windrow into the paver hopper, the pick-up machine shall be capable of picking up the entire windrow to the underlying material.

F. Compaction and Density.

The field density for Interstate and Primary Roads shall be a minimum of 94% of laboratory density based on the dry weight of compacted material in accordance with Materials I.M. 504. The field density for all other roads shall be a minimum of 92%.

The Contractor shall perform initial rolling with a pneumatic tired roller. The Contractor shall perform final rolling to eliminate pneumatic tire marks by using steel wheel rollers, either in static or vibratory mode.

The Contractor shall discontinue any type of rolling that results in cracking, movement, or other types of pavement distress until such time that the problem can be resolved.

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

01024.04 QUALITY CONTROL

The residual asphalt content shall be controlled within $\pm 0.5\%$ of the target established by the design.

When foamed asphalt is used, the asphalt binder shall be maintained at a temperature within $\pm 20^{\circ}\text{F}$ (10°C) of the optimum temperature established by the design. The foaming characteristics of each new tanker load will be verified by measuring a sample from the equipment's test nozzle.

Unless otherwise noted in the contract documents, the Contractor shall measure the profile of the center of each lane of the compacted mat with a profilograph. Bumps and dips greater than 1 inch (25 mm) shall be corrected. Cross-slope of the compacted mat shall be within 1/2 inch (12 mm) of the desired slope. Acceptable corrective measures include profile milling or blading and recompaction within 24 hours of the initial placement or HMA leveling course. Corrective measures shall be at the Contractor's expenses.

The Contractor shall perform ten nuclear gauge moisture and density tests per day's run at locations determined by the Engineer in accordance with Materials I.M. 504. The Quality Index for density does not apply. Sublots that do not achieve the minimum required density shall be recompacted within 2 calendar days after the initial recycling to meet the target density.

Any subsequent surface treatment or overlay will not be allowed until the moisture content of the recycled mixture is no more than 0.3% above the residual moisture content or 1.5%, which ever is greater. The Engineer may adjust this curing period depending on field conditions.

01024.05 METHOD OF MEASUREMENT.

A. Cold In-Place Cold Recycled Asphalt Pavement.

The Engineer will compute the area in square yards (square meters) from the measured longitudinal length of pavement and the width of pavement specified in the contract documents.

B. Asphalt Stabilizing Agent.

The Engineer will measure the Asphalt Stabilizing Agent in gallons (liters) at 60°F (15°C) for emulsion, or tons (megagrams) for asphalt binder, through a calibrated pump used for metering the total delivery of the agent or through delivery ticket quantity.

01024.06 BASIS OF PAYMENT.

A. Cold In-Place Cold Recycled Asphalt Pavement.

The Contractor will be paid the contract unit price per square yard (square meter) for Cold In-Place Cold Recycled Asphalt Pavement. This payment shall be full compensation for all labor, material including mixing water, and equipment necessary for milling, mixing, spreading, placing, shaping, and compaction of the completed Cold In-Place Cold Recycled Asphalt Pavement.

B. Asphalt Stabilizing Agent.

The Contractor will be paid the contract unit price per gallon (liter) or ton (megagram) for Asphalt Stabilizing Agent. This payment shall be full compensation for all labor, materials, and equipment necessary for furnishing the agent and application of the agent into the milled bituminous material.