ITEM 402.607201 02 M - HOT IN-PLACE RECYCLING OF HOT MIX ASPHALT (HMA) PAVEMENTS
ITEM 402.617201 02 M - VIRGIN HOT MIX ASPHALT (HMA)
ITEM 402.617211 02 M - PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.61701 02 M

DESCRIPTION

This work shall consist of hot in-place recycling (HIPR) the existing hot mix asphalt (HMA) surface in a continuous multi-step process of heating, milling, adding virgin HMA and emulsified recycling agent, then remix, reshape, and compact the recycled mixture. All work under this item shall be in accordance with this specification, the Standard Specifications §401 – Plant Production and §402 – Hot Mix Asphalt (HMA) Pavements, and in substantial conformance with the limits shown on the Contract plans and documents, and as directed by the Engineer. This process requires the use of ***Recycling Agent for Heater Scarification and Hot In-Place Recycling*** as a rejuvenator.

MATERIALS

1. **Virgin HMA.** Use virgin HMA mix as specified in the Contract proposal's special note titled, "Virgin Hot Mix Asphalt (HMA)" meeting the requirements outlined in Section 402 – Hot Mix Asphalt (HMA) Pavements, of the Standard Specifications. This special note will include the performance-graded (PG) binder, mix type, mix design level, and rate of virgin HMA. Recycled asphalt pavement (RAP) is not allowed in the virgin HMA mix.

2. **Recycling Agent.** Use ***Recycling Agent for Heater Scarification and Hot In-Place Recycling***, under separate specification.

3. **Mixture Design.** The Regional Materials office will take a minimum of three cores per lane mile or a maximum of 20 cores per project from the existing HMA pavement to be analyzed by the Department. These cores will be taken from locations that will represent the entire project condition. Provided in the Contract documents is the following information:

    - Descriptive notes of the core locations along with their test results showing percent of recovered asphalt content, aggregate gradation, and original penetration value for each sample.

    - The depth of existing HMA pavement to be recycled in millimeters.

    The Contractor may request to take additional cores from the existing HMA pavement to determine the mixture design. A 2-week notice shall be given to the Regional Materials Engineer requesting permission for coring. Based on the information provided above, determine the application rate of the recycling agent such that the minimum average penetration value of the PG binder in the recycled mixture is 30% higher than the average of the original penetration values as tested in accordance with AASHTO T 49, Penetration of Bituminous Materials. The final penetration value shall not exceed 100.

EQUIPMENT

The HIPR train consists of a preheater unit, main recycling unit, and a conventional paver. Use equipment having the capability to process the existing pavement to a minimum depth of 50 millimeters. Hot in-place asphalt concrete recycling equipment approved for use will appear on the Department's Approved List. Detailed requirements and procedures for approval of the

HIPR equipment are available from the Materials Bureau. A minimum of 30 days is required for approval consideration.

Preheater Unit - Shall generate sufficient heat to soften the asphalt pavement to the depth required. Precautions must be taken not to overheat the existing pavement thereby softening the underlying asphalt pavement not to be milled. The burner assembly shall be adjustable to heat between 2.4 and 4.3 meters in width. The entire heating unit shall be enclosed and vented to contain the heat and prevent damage to adjacent properties and landscape. In cooler temperatures, an additional heating unit may be required.

Main Recycling Unit

1. Heating System – This part of the main recycling unit shall meet the same requirements for the preheater unit.

2. Hot Milling Units – Shall be capable of uniformly loosening the preheated asphalt pavement to the depth specified in the Contract documents. Each milling unit shall be equipped with separate automatic grade controls operated from skis. Milling heads must be extendable between 3.0 and 4.3 meters to accommodate various road widths and utility structures.

3. Recycling Injection System – Equip this system with electronic controls so that the required application rate for the recycling agent is maintained at a tolerance of ± 5% from the mix design target. The recycling injection system shall continuously verify and display the application rate of recycling agent and cumulative total with respect to the volume of milled material from the road surface.

   Calibration. Calibrate the electronic digital measuring system in the presence of the Regional Materials Engineer. A minimum 2-week advance notice is required when scheduling this calibration. Approved calibrations are required for each project. Work will not progress until the calibration has been completed and verified.

4. Blending Unit/Mixing Chamber – Shall be capable of blending the recycled pavement, virgin HMA and recycling agent into a homogenous, uniformly blended mixture. This equipment shall be capable of placing the recycled mixture in a windrow and conveyed into the HMA placement equipment. The Engineer may approve other methods.

Asphalt Placement Equipment

1. Pickup Conveyor – Picks up the HMA recycled mixture off the roadway and conveys it up into the paving hopper where a surge of HMA material is kept to ensure that a constant supply of asphalt material is available for the paving screed.

2. HMA Paver – Shall meet the requirements of §402-3.02, HMA Pavers, of the Standard Specifications or as approved by the Engineer.

Rollers – Shall meet the requirement of §402-3.04, Rollers, of the Standard Specifications except the operation of the rollers during the placement of this item including the speed, amplitude settings, vibration frequency, and weight of the rollers will be controlled by the Contractor.

CONSTRUCTION DETAILS

§402-3, Construction Details, applies except as modified below:

1. Weather and Seasonal Limitations: HIPR shall continue only when the surface temperature is 10ºC or above.

2. Cleaning: Clean the existing pavement and shoulder to be hot in-placed recycled by using mechanical sweepers, hand brooms, or other effective means until the surface is free of all material which might interfere with the milling process.

3. Hot In-Place Recycling: Operate the preheater and heater units in a manner to prevent damage to adjacent property and vegetation. The heating system shall be regulated so that excessive heating and burning of the existing asphalt cement does not occur. The existing surface shall be radiantly heated and no open flame will be permitted. Repair any heat-damaged areas immediately at no additional cost to the Department.

   Control the speed of the HIPR train to ensure that the recycled pavement is properly milled, mixed, and uniformly distributed to the proper thickness, slope, and crown shown on the Contract plans. Control the width of each pass to provide proper placement of longitudinal joints including a 75 mm overlap onto adjacent lane passes.

   Blend the milled asphalt pavement, rejuvenating agent, and virgin HMA, if required, to produce a homogenous HMA recycled mix. Use the application rates of the rejuvenator and virgin HMA as determined by the mix design. If virgin HMA is required, the addition into the recycling process must be within ± 1.0 kg/m^2, of the mix design target.

   Maintain the temperature of the recycled mixture between 115ºC and 165ºC prior to initial compaction.

4. Compaction: Compact the recycled mixture in accordance with §402.307, C., 70 Series Compaction Method.

5. *Daily Quality Control (QC) Testing.* All tests must be performed by a certified Quality Control Technician in accordance with §401-3.01, Quality Control and §401-3.02, Production Facility Laboratory of the Standard Specifications.

Take a minimum of four loose mix samples per lane mile of the recycled pavement per day. Randomly select two samples and make 150 mm specimens using a Superpave gyratory compactor in accordance with Material Method (MM) 5.16, Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures. Unless the Contract documents specify a different gyration level, compact these specimens by applying 75 gyrations and determine the bulk specific gravity in accordance with AASHTO T 166, Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens. Take the remaining two samples and determine the maximum theoretical specific gravity using AASHTO T 209, Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures. Calculate the air voids of the recycled mixture using AASHTO T 269, Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures. The air voids must be within 3 to 5 percent range. Determine the gradation and the asphalt content of the final recycled mixture in accordance with Materials Method 5, Plant Inspector's Manual for Bituminous Concrete Production and Test Method NY 400-13 C, Determination of Asphalt Content by Ignition.

Determine the penetration of the PG binder recovered from the recycled mixture in accordance with AASHTO T 49 to assure the test value is at least 30% or more than the average original penetration values specified in the Contract documents.

Submit results of all the daily QC tests to the Engineer by end of the next day's production. If test results are not provided in a timely manner, the Engineer may shutdown the paving operations until all the previous day's results are submitted.

If the existing pavement condition changes or the recycled pavement is not satisfactory, the Engineer may require additional tests performed at no cost to the State.

METHOD OF MEASUREMENT

Hot In-Place Recycling of HMA Pavements – The quantity to be paid shall be measured by the number of square meters of pavement hot in-place recycled as described in this specification.

Virgin HMA – The provisions of §401-4 and §402-4, Method of Measurement of the Standard Specifications, shall apply accept the Quality Adjustment Factor (QAF) is equal to 1.00.

BASIS OF PAYMENT

Hot In-Place Recycling of HMA Pavements – The unit price bid per square meter for this item shall include the cost of furnishing all labor, tools, equipment, and other incidentals necessary to complete the work including the cleaning of existing pavement of debris, heating and milling, mixing, paving, compaction, and coring and testing of the recycled materials.

Virgin HMA – The provisions of §402-5, Basis of Payment of the Standard Specifications shall apply.

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Item No.	Item Description	Pay Unit
402.607201 02 M	Hot In-Place Recycling of Hot Mix Asphalt Pavements	Square Meter
402.617201 02 M	Virgin Hot Mix Asphalt (HMA)	Metric Ton
402.617211 02 M	Plant Production Quality Adjustment to 402.617201 02 M	Quality Units