ITEM 402.9901 02 - HEATER SCARIFICATION OF HOT MIX ASPHALT (HMA) PAVEMENT

DESCRIPTION

This work shall consist of recycling the existing hot mix asphalt (HMA) pavement surface. This process requires the use of ***Recycling Agent for Heater Scarification and Hot In-Place Recycling*** as a rejuvenator. The HMA pavement surface is heated using specialized equipment causing the asphalt to soften. In a continuous process, the softened HMA surface is scarified to a specified depth as detailed in the Contract documents. The scarified asphalt pavement is then mixed with a recycling agent that rejuvenates the asphalt. This mix is then placed and compacted back onto the roadway. All work under this item shall be in accordance with the Standard Specifications and as detailed in this specification.

MATERIALS

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

2. **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 required depth, in millimeters, of the loose heater scarified HMA behind the screed unit.

   Based on the information provided above, determine the application rate of the recycling agent such that the penetration value of the recovered performance-graded (PG) binder from the recycled mix samples is at least 30% of the average penetration value of the existing pavement cores. Testing of all samples for the penetration values required using this specification will be performed in accordance with AASHTO T 49, Penetration of Bituminous Materials.

   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.

EQUIPMENT

- Heating Unit – This unit shall generate sufficient heat to soften the asphalt pavement to the depth required. Care shall be taken not to overheat the existing pavement thereby softening the underlying asphalt pavement not to be scarified. The burner assembly shall be adjustable to heat between 2.4 and 4.3 m 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.

- Heater Scarification Train – This equipment shall be a self-contained machine designed to reprocess only the upper layers of the existing HMA pavement. The heater scarification train shall be self-propelled and capable of operating at speeds of 2.5 to 8.0 m per minute while uniformly heating and scarifying the existing HMA pavement to the minimum loose mix depth specified in the Contract documents. Listed below are the various units that are part of the heater scarification train.

  1. Scarifying Unit – The scarifying unit shall contain at least 2 rows of spring-loaded tines that are adjustable to scarify 2.5 to 4.4 m wide. The tines in row shall be no more than 25 mm apart. This unit shall also be able to conform to the pavement contours to insure a uniform penetration from the tines and prevent damage to utility structures.

  2. Spray Unit – This unit shall be immediately behind the scarifying unit and capable of applying the recycling agent to the reclaimed asphalt pavement at the approved rate. The size of the nozzles located on the spray bar and pump shall be selected based upon the rate of application and the forward speed of the heater scarification unit. This unit shall be equipped with a measuring system, which shall be capable of maintaining the required application rate of the recycling agent with a tolerance of ± 5% for the mix design. The measuring system shall continuously verify and display the application rate of recycling agent and cumulative total with respect to the volume of scarified material for the road surface.

     Calibration. Calibrate the measuring system in the presence of the Regional Materials Engineer or designee. A minimum 2-week notice is required when scheduling this calibration. Approved calibrations shall be done for each project. Work shall not progress until the calibration has been completed and verified.

  3. Mill/Remixer Unit – Immediately following the application of the recycling agent, a dual-drum enclosed milling unit shall mill the asphalt pavement to the loose mix depth specified in the Contract documents, thoroughly mixing the recycling agent with the scarified and milled pavement. The mill/remixer unit shall be an integral part of the scarifying machine and shall be located between the spray unit, which applies the recycling agent, and the screed. This unit shall be operated hydraulically, able to work at variable speeds up to 120 rpm, and shall be retractable from 4.45 to 2.62 m wide. In addition, this unit shall be able to break in the center to allow for quarter point and crown control.

  4. Screed Unit – The hot scarified material shall be uniformly distributed to the desired longitudinal and transverse section by the use of an attached heated, augured vibratory screed. The screed shall be equipped with an adjustable crown control and

each end of the screed shall have hand wheel adjusting screws for providing the desired longitudinal grade and transverse slope.

- Rollers – Shall meet §402-3.04, Rollers in the Standard Specifications.

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

1. **Weather and Seasonal Limitations:** Heater scarification is allowed only when the surface temperature is 10ºC or above.

2. **Cleaning:** Clean the existing pavement and shoulder to be scarified by using mechanical sweepers, hand brooms, or other effective means until the surface is free of all material, which might interfere with the scarification process.

3. **Heater Scarification:** Operate the heating unit in a manner to prevent damage to adjacent property and vegetation. Repair all heat-damaged areas immediately, at no additional cost to the Department.

   Control the heater scarification equipment to insure the temperature of the scarified mixture is maintained between 135ºC and 165ºC. Verify this temperature within 1.5 m behind the screed unit.

   Control the speed of the equipment 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. Take extra care in controlling heater scarification equipment to prevent segregation of the recycled mix at the start and end of paving production as well as any points where the heater scarification train needs to stop and restart.

   Construct the pavement so that it conforms to the requirements of Sections 402-3.10, Surface Tolerance and 402-3.11, Thickness Tolerance, of the Standard Specifications. Measure the depth of the loose scarified mix behind the screed unit prior to rolling operation. Adjust the paving equipment if the loose mix depth does not meet the depth specified in the Contract documents.

   Control the width of each pass to provide proper placement of longitudinal joints including a 75 mm overlap onto adjacent lane passes.

   Add recycling agent uniformly to the scarified HMA pavement at the predetermined application rate to produce a homogenous HMA recycled mix.

   In areas such as catch basins or manholes not accessible to scarifying equipment, the Engineer will determine if they require repair. Pavement surfaces that are in good condition and are less than one square meter in size do not require repair. Areas with cracks or spalls

that are greater than one square meter in size shall be repaired as approved by the Engineer at no additional cost to the State.

4. **Compaction:** Compact the recycled mixture in accordance with §402-3.07, D., 80 Series Compaction Method.

5. **Scarified Mixture Verification**

   a. **First day:** The Engineer will select four core locations on the existing pavement. These locations will be within a lane mile or fraction thereof if production is less than one mile. Drill two cores at each location and test one from each location for penetration of the existing PG binder from the surface layer only. Provide the companion core from each location to the Engineer.

   During the scarification process, the Engineer will request the Contractor take two sets of four loose mix samples prior to compaction. These samples will be representative of the day's production. Take samples either behind the screed or any place after the spraying and mixing units. Identify all samples by their locations at the project site. Test one set for penetration and provide the other set to the Engineer, which may be evaluated by the Department's Lab to verify test results.

   All the required core and loose mix samples must be taken after the first 500 feet of the day's production.

   Submit penetration test results to the Engineer by the end of the next day's production. If test results are not provided, the Engineer may shutdown the paving operation until the results are submitted. The average penetration value of the loose mix samples must be 30% or higher than the average penetration of the core samples from the existing pavement.

   If the average penetration values of the loose mix samples fail to meet this requirement, adjust the application rate and submit the new adjusted application rate to the Engineer. Repeat the procedure described above of taking and testing samples. Submit the penetration test results to the Engineer by end of the next day's production. Continue taking these samples until average penetration values meet the specification requirement of 30% or higher.

   b. If the specification requirements are met after the first day's production, take samples as described above every three days of production for quality control and quality assurance purposes. When sample results do not meet the specification requirements, make adjustment to the application rate and take samples as described above.

If, at anytime, the average penetration value of the loose mix samples is greater than 90, the Engineer may evaluate the pavement section and request the scarified pavement be removed

and replaced at no additional cost to the State. The evaluation may include, but not limited to, testing penetration of the core sample, location of the section, etc. If samples are required, the Contractor will take them at no additional cost to the State and will submit them to the Department for testing. Also, if the recycled pavement is not satisfactory to the Engineer, additional tests may be performed at no cost to the State.

6. **Overlay.** The heater scarified HMA pavement can be overlaid once work is completed to the satisfaction of the Engineer. The overlay shall be placed prior to the end of the paving season. This work shall be done under a separate pay item in the Contract documents.

METHOD OF MEASUREMENT

This work will be measured as the number of square meters of pavement surface recycled as detailed in this specification.

BASIS OF PAYMENT

The unit price bid per square meter for this item shall include the cost of all labor, tools, equipment, and incidentals necessary to satisfactorily complete the work including cleaning debris from the existing pavement, heating and scarifying, mixing, paving, compaction, and coring and testing of the recycled materials. No deduction will be made in areas such as catch basins or manholes where the scarifying equipment cannot be used.

Payment will be made under:

Item No.		Item	Pay Unit
402.9901	02	Heater Scarification of Hot Mix Asphalt (HMA) Pavement	Square Meter