SPECIAL SPECIFICATION

3157

Cold Processed - Recycled Paving Material (RPM) for Use as Aggregate Base Course

1. Description. This Item, Cold Processed - Recycled Paving Material (RPM), shall govern the construction of base course, sub-base course or foundation course, each course being composed of a compacted mixture of emulsified asphalt cement, aggregate, which may include non-hazardous recycled materials mixed cold in a central mixing plant, or on site, in accordance with the details as shown on the plans and the requirements set forth herein.

2. Materials. The Contractor shall furnish materials to the project meeting the following requirements prior to mixing. Additional test requirements, affecting the quality of individual materials, may be required based on the plans, at the discretion of the Engineer, and in accordance with requirements established in Item 6.

(1) Coarse Aggregate. Coarse aggregate shall be composed of naturally occurring gravels, crushed stone, crushed concrete or other non-hazardous recycled materials, processed recycled asphalt pavements, bottom ash, foundry slag, glass, recycled crumb rubber so as to produce a composite mixture conforming to the grading requirements listed below or as shown on plans:

COLD PROCESSED RECYCLED PAVING MATERIALS AGGREGATE BASE GRADING REQUIREMENTS (Percent Passing by Weight)

Sieve Size	
1 3/4-inch	100
No. 4	60* maximum
No. 40	50* maximum

* These percentages may be adjusted as per the discretion of the Engineer, however, the stabilized base course must conform to the minimum strength and stability requirements of this Item or as shown on plans.

(2) Asphaltic Materials. The asphaltic material for this Item shall be of the grade shown on the plans or as approved by the Engineer and shall meet the applicable requirements of Item 300, "Asphalt, Oils and Emulsions." The Contractor shall notify the Engineer of the source of the asphaltic material prior to design of the stabilized base course. This source shall not be changed during production without the authorization of the Engineer.

(3) Pozzolans such as fly ash, bottom ash, lime or Portland cement may be added to the processed base course mixture to improve mixing and workability properties.

3. Mixture Design. The Contractor shall furnish the Engineer with a mixture design formulated to comply with the following properties prior to production:

Specified gradation or as approved by the Engineer as determined by Test Method Tex-200.

Minimum compressive strength of 35 psi for secondary roads and streets and 50 psi for primary highways, major arteries and heavy wheel load traffic areas, as defined by the project Engineer, when tested in accordance with Test Method Tex-126-E as modified in "Test Procedures" section.

Minimum Hveem stability value of 35 when tested in accordance with Test Method Tex-208-F as modified in the "Test Procedures" section.

The mixture design shall be adjusted or redesigned as necessary to accommodate changes in the materials or to ensure compliance with the specifications.

(1) Mandatory Trial Batch. To substantiate the original design and/or any changes and adjustments necessary for field production, a mandatory test production of a minimum of 100 tons shall be batched and tested using all of the proposed project materials and equipment, prior to any placement. The Engineer may waive trial mixtures if similar designs with the same materials have proven satisfactory.

(2) Tolerances. Gradation approval may be based on unstabilized stockpile samples of the processed coarse aggregate and environmentally affected recyclable materials. Other methods of proven accuracy such as cold feed belt samples may be used. The gradation of the processed unstabilized base course shall not vary from the grading established for the mix design by more than $\pm$ 10 percent for the No. 4 and No. 40 sieves as long as the strength and stability specifications are met.

The emulsified asphalt content shall not vary by more than $\pm$ 1.0 percent from the design asphalt content, unless authorized by the Engineer, when tested in accordance with Test Methods Tex-210-F, or Tex-236-F. In any event, regardless of the asphalt content tolerances, the Contractor is still responsible for producing a final product conforming to the minimum test requirements.

(3) Test Procedures. Test procedures used to develop the design mixture and evaluate the mixture quality during production will be modified as follows:

Tex-126-E. The stabilized mixture shall be molded at room temperature (77 $\pm$ 5F) and allowed to cure for 72 $\pm$ 4 hours at room temperatures prior to compressive strength testing.

Tex-208-F. The stabilized mixtures shall be molded at room temperature (77 $\pm$ 5F) and allowed to cure 72 $\pm$ 4 hours at room temperature prior to 3 1/2 to 4 hours of oven curing at 140 F for Hveem stability determination.

4. Equipment General. All equipment for the handling of all materials, mixing, placing and compacting of the mixture shall be maintained in good repair and operating condition and subject to the approval of the Engineer. Any equipment found to be defective and potentially having a negative effect on the quality of the base material mixture will not be allowed. When permitted by the Engineer, equipment other than that specified herein which will consistently produce satisfactory results may be used.

(1) Mixing Plants. Mixing plants may be the weigh-batch type, the modified weigh-batch type or continuous pug mill mixer type. All plants shall be equipped with the necessary equipment to consistently produce stabilized base course conforming to the design mixture proportions.

The Contractor is responsible for state certified accuracy verification of all weighing and metering devices utilized in the production of the product. Such certification shall be provided to the Engineer prior to commencement of production. Additional or subsequent certifications may be required during production or at the discretion of the Engineer. The accuracy of the weighing and metering devices shall conform to the tolerances established in Item 520, "Weighing and Measuring Equipment."

The Contractor shall provide safe and accurate means to enable inspection forces to take all required samples and to provide for a means of checking the accuracy of metering devices and to perform calibration and weight checks as required by the Engineer.

Recording devices to indicate the date, project identification number, vehicle identification, total weight of the load, tare weight of the vehicle, the net weight of the mixture in each load in units established by the plans, and the load number for the day will be furnished by the Contractor unless otherwise shown on the plans or waived by the Engineer.

(2) Motor Grader. The motor grader, when used, shall be a self- propelled power motor grader and shall be equipped with smooth tread pneumatic tired wheels unless directed otherwise by the Engineer.

(3) In-Place Road Mixer/Pulverizers must be used for in-place mixing when required. The degree of pulverization and mixing shall be sufficient to ensure encapsulation by the emulsified asphalt of the fine and coarse aggregate to produce a final product conforming to the minimum requirements established in this specification or as shown on the plans. The environmentally affected recyclable material of the mixture shall be pulverized to the extent that a minimum of 80 percent by weight of the particles pass the 3/8-inch sieve or as approved by the Engineer.

(4) Rollers. Rollers used for the compaction of this item shall be pneumatic, vibratory steel wheeled, tandem roller or any combination of these types providing the necessary compactive effort throughout the entire depth of the lift as required in the "Compaction" section of this item or as determined by the Engineer.

5. Construction Methods. It shall be the responsibility of the Contractor to produce, procure, transport, mix, place and compact the specified base material in accordance with these requirements.

(1) Stockpiling of Base Material. Prior to stockpiling of materials, the area shall be cleaned of trash, weeds, grass and shall be relatively smooth and well drained. The stockpiling shall be done in a manner that will minimize aggregate degradation, segregation and preclude contamination by foreign materials. Feeding from a stockpile shall be done so as to avoid any contamination from underlying in-place materials not intended for use as base course.

(2) Preparation of In-Place Subgrade of Existing Road Bed. Prior to delivery of the Cold Processed - RPM, the subgrade of existing road bed shall be shaped to conform to the typical sections shown on the plans or established by the Engineer. The Contractor shall proof-roll the road bed in general accordance with Item 216, "Rolling (Proof)". Soft spots shall be corrected as directed by the Engineer.

(3) First, Succeeding or Finish Courses. Cold Processed - RPM will be spread uniformly and shaped the same day as delivered. Should inclement weather or other unforeseen circumstances render this impractical, the material shall be shaped as soon as practical. All segregated material shall be corrected as directed by the Engineer.

(4) Compaction. The Cold Processed - RPM shall be compacted to the extent necessary to provide no less than 98 percent density as determined by Test Method Tex-113-E for primary highways and a minimum of 95 percent density for secondary roadways and measured in place by Test Method Tex-115-E, Part II. A minimum of one (1) density test for each 10,000 square feet of Cold Processed - RPM placed and compacted shall be taken. In-place moisture content shall be within 2.0 percent of the optimum moisture content established by Test Method Tex-113-E. Additional tests shall be taken if directed by the Engineer. If the material fails to meet the density requirements, or it loses the required stability, density or finish before the next course is placed or the project is completed, it shall be reworked and retested until the compaction requirements are met. The Quality Control shall be performed by an independent testing firm or agency, approved by the Engineer, at the expense of the Contractor, unless otherwise directed by the Engineer.

(5) Grade and Thickness Tolerances. In areas on which surfacing is to be placed, any deviation in excess of 1/4-inch in cross section or 1/4-inch in a length of 16 feet measured longitudinally, as referenced in Item 247, shall be corrected by loosening, adding or removing material, reshaping and recompacting. Any area of base where thickness' are deficient by more than 1/16-inch per inch, the deficiency shall be corrected by scarifying, adding material as required, reshaping, recompacting and refinishing at the Contractor's expense.

(6) Plant Production Quality Control. Cold Processed - RPM mixtures produced at the plant shall be tested for the requirements established in the "Strength and Stability" section of this item for every 800 tons of stabilized base course produced for a given project. The 800 ton lot sample shall be composed of a composite of four (4) sub-samples obtained at 200 ton intervals. A minimum of one (1) compressive strength test, Tex-126-E, and one (1) set of Hveem stability specimens, Tex-208-F, shall be tested on days that production exceeds 200 tons. If production does not exceed 200 tons, that day's production will be included into the following day's production. The Quality Control shall be performed by an independent testing firm or agency, approved by the Engineer, at the expense of the Contractor, unless otherwise directed by the project specifications.

(7) Moisture Content. Moisture content of the mixture, prior to addition of the emulsified asphalt, shall be continually monitored in order to produce a uniformly mixed and stabilized final product. Moisture contents shall be performed at a minimum frequency of one (1) per 200 tons.

(8) Environmental Regulations. The Contractor is responsible to ensure that all aspects of production of Cold Processed - RPM must be managed to comply with requirements of this Special Specification, Item 6 and related Special Provision, and all environmental remediation requirements established by the Texas National Resources and Conservation Commission and/or other environmental regulatory agencies.

The Contractor should be particularly aware of the non-hazardous recyclable material (NRM) certification requirements specified in the Special Provision to Item 6, "Control of Materials".

6. Measurement. This Item will be measured by the composite weight or composite volumetric method.

(1) Composite Weight Method. This Item will be measured by the ton of 2000 pounds of the composite mixture used in the completed and accepted work in accordance with the plans and specifications for the project. The composite mixture is hereby defined as the asphalt, aggregates, recycled materials and additives as noted on the plans and/or approved by the Engineer.

(2) Composite Volumetric Method. This Item will be measured by cubic yard of materials measured by the average-end-area method in the stockpile or in haul vehicles or by the square yard in its original position.

7. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Cold Processed-Recycled Materials". This price shall be full compensation for furnishing all materials, additives, freight involved and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.