

SECTION 404

HOT PLANTMIX RECYCLED BITUMINOUS PAVEMENT

DESCRIPTION

404.01.01 GENERAL

- A. This work shall consist of recycling a bituminous pavement in a central plant and re-laying the reprocessed bituminous mixture on a prepared surface in accordance with the line, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.
- B. Recycled hot plantmix bituminous pavement, conforming to the requirements specified herein, may be substituted at the Contractor's option for conventional base course or surface course mixtures (**Section 303, "Plantmix Bituminous Base,"** and **Section 402, "Plantmix Bituminous Surface"**). Comply with **Section 401, "Plantmix Bituminous Pavements - General,"** except as herein specified.

MATERIALS

404.02.01 COMPOSITION OF MIXTURES

- A. The recycled bituminous plantmix shall be composed of a mixture of reclaimed bituminous pavements, additional virgin aggregate, mineral filler, if required, recycling agent, and/or additional bituminous material.
 - 1. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the job-mix formula.
 - 2. Unless otherwise specified in the Special Provisions, the proportion of reclaimed bituminous pavement used in the mix shall not exceed 15 percent.
 - 3. A greater percentage (more than 15 percent) of the reclaimed bituminous pavement material may be used in the recycling process if the Engineer determines that the resultant mixture satisfies the requirements specified for the mix design.
 - 4. A new job-mix formula shall be established should there be a change in source of materials or a change in the percentage of reclaimed material used in the mix.
- B. Before starting work, the Contractor shall submit a proposed job-mix formula in writing, for use by the Engineer in setting the job-mix formula to be used. The proposed job-mix formula shall be determined by a testing laboratory under the direction and control of a registered professional engineer, in accordance with **Subsection 401.02.01, "Composition of Mixtures."**
- C. The formula submitted for the combined mix shall also indicate the recommended grade and amount of recycling agent and/or additional bituminous material to be used in the mix.
 - 1. This shall be determined by recovering the asphalt cement from representative samples of the pavement to be recycled and testing the properties of the asphalt cement after adding various amounts of the recycling agent and/or additional bituminous material.
 - 2. The test report shall show the curves for the following properties of the recycled asphalt cement after adding various amounts of recycling agent and/or bituminous material:

- a. Penetration at 77 degrees F (before and after RTFC test).
 - b. Absolute Viscosity at 140 degrees F (before and after RTFC test).
- D. The grade and amount of recycling agent and/or additional bituminous material to be used will be that which will produce paving grade asphalt cement conforming to **Section 401, "Plantmix Bituminous Pavements – General"** and **Section 703, "Bituminous Materials."**
1. For Traffic Category I pavements, the combined bituminous materials shall meet all of the requirements of **Section 401, "Plantmix Bituminous Pavements – General"** and **Section 703, "Bituminous Materials."**
 2. For Traffic Category II pavements, the combined bituminous material shall meet all the requirements of **Section 401, "Plantmix Bituminous Pavements – General"** and **Section 703, "Bituminous Materials."**
 3. All properties specified for a paving grade asphalt cement shall be tested on the combined bituminous material, and the results shall be submitted with the proposed job-mix formula.

404.02.02 AGGREGATES

- A. **Reclaimed Bituminous Pavement Aggregate.** The aggregate shall be the product of crushed, milled, or planed bituminous pavement.
- B. **Virgin Aggregates.** Virgin aggregates shall meet the requirements of **Section 705, "Aggregates for Bituminous Courses."**

404.02.03 BITUMINOUS MATERIAL

- A. The bituminous material shall be an asphalt cement and shall comply with **Section 703, "Bituminous Materials."**
- B. The grade shall be determined by the job-mix formula.

404.02.04 RECYCLING AGENT

- A. The recycling agent shall conform to the requirements in the following table.
- B. The grade shall be determined by the job-mix formula.

SPECIFICATIONS FOR HOT-MIX RECYCLING AGENT¹

TEST	ASTM Test Method	RA-5		RA-25		RA-75		RA-250		RA-500	
		min	max	min	max	min	max	min	max	min	max
Viscosity @ (140°F), cSt	D2170	200	800	1,000	4,000	5,000	10,000	15,000	35,000	40,000	60,000
Flash Point COC, °F	D92	400	--	425	--	450	--	450	--	450	--
Saturates, wt. %	D2007	--	30	--	30	--	30	--	30	--	30
Viscosity Ratio ³	--	--	3	--	3	--	3	--	3	--	3
RTFC Oven Weight Change ±%	D2872 ²	--	4	--	3	--	2	--	2	--	2

SPECIFICATIONS FOR HOT-MIX RECYCLING AGENT¹

TEST	ASTM Test Method	RA-5		RA-25		RA-75		RA-250		RA-500	
		min	max	min	max	min	max	min	max	min	max
Specific Gravity	D70 or D1298	Report		Report		Report		Report		Report	

¹ The final acceptance of recycling agents meeting this specification is subject to the compliance of the reconstituted asphalt blends with current asphalt specifications.

² The use of ASTM D1754 has not been studied in the context of this specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D2872.

³ Viscosity Ratio = $\frac{\text{RTFC Viscosity at } 140^{\circ}\text{F cSt}}{\text{Original Viscosity at } 140^{\circ}\text{F cSt}}$

CONSTRUCTION**404.03.01 GENERAL**

- A. Construction shall conform to the **Subsection 401.03.01, "Bituminous Mixing Plant,"** through **Subsection 401.03.15, "Surface Tolerances,"** with the exceptions below.

404.03.02 BITUMINOUS MIXING PLANT

- A. The plant shall comply with **Subsection 401.03.01, "Bituminous Mixing Plant."** In addition, the control and handling of the recycling agent shall be in a manner similar to that specified for the bituminous material.
- B. If a batch plant is used, the plant shall be modified so that:
1. Virgin aggregate can be superheated to a temperature required to produce a resultant mix temperature as specified in **Subsection 401.02.01, "Composition of Mixtures,"** after adding the ambient temperature reclaimed bituminous pavement aggregate.
 2. Reclaimed aggregate shall be fed to the aggregate weigh hopper in a manner to ensure uniform proportioning.
- C. If a drier drum plant is used, the plant shall be modified so that:
1. Either the virgin aggregate can be superheated to a temperature required to produce the required resultant mix temperature, or the combination of reclaimed bituminous pavement aggregate and virgin aggregate can be heated to a temperature needed for a resultant mix temperature as specified in **Subsection 401.02.01, "Composition of Mixtures."**
 2. The reclaimed aggregate shall be introduced into the plant in such a manner to ensure uniform proportioning and to protect the material from direct contact with the burner flame.
- D. Regardless of the type of bituminous mixing plant used, the air pollution requirements as set forth by the Clark County Air Pollution Control Division and state law shall apply to the manufacture of recycled bituminous pavement.

404.03.03 PREPARATION OF AGGREGATES

- A. Virgin aggregates shall be prepared as specified in **Subsection 401.03.08, "Preparation of Aggregates."**

- B. Reclaimed bituminous pavement aggregates shall be prepared so that 100 percent will pass a 1-1/2-inch sieve. The moisture content of the reclaimed bituminous pavement aggregate at the time of introduction into the mixer shall not exceed 3 percent as determined by Test Method ASTM D2216.
- C. The stockpiling area for the reclaimed bituminous pavement aggregate shall be graded and compacted so a firm level base can be maintained at all times.
 - 1. Layer placing or alternate approved methods shall be used to prevent coning or segregation of component sizes.
 - 2. The stockpile will be limited to 10 feet in height and no equipment of any type will be allowed on top of the stockpile.
 - 3. The stockpile shall be maintained in a loose and uncompacted state.
 - 4. To prevent premature consolidation, reclaimed bituminous pavement aggregate shall not be stored in confined metal bins or hoppers unless slated for immediate processing.
- D. Immediately prior to feeding the reclaimed bituminous pavement aggregate into the mixing plant, the material shall first pass through a grizzly with bars spaced 2 inches apart.

METHOD OF MEASUREMENT

404.04.01 MEASUREMENT

- A. Hot plantmix recycled bituminous pavement shall be measured as specified in ***Subsection [401.04.01](#), "Measurement."***

BASIS OF PAYMENT

404.05.01 PAYMENT

- A. The accepted quantity of hot plantmix recycled bituminous pavement will be paid for at the contract unit price bid per ton, which shall include all asphalt cement and recycling agent.
- B. The above price shall be full compensation for furnishing all the material, mixing, loading, hauling, placing, compacting, and incidentals necessary for doing the work involved in constructing hot plantmix recycled bituminous pavement as shown on the plans or established by the Engineer.
- C. All payments will be made in accordance with ***Subsection [109.02](#), "Scope of Payment."***
- D. Partial payments for hot plantmix recycled bituminous pavement may be made as set forth under ***Subsection [109.06](#), "Partial Payment."***
- E. Payment will be made under:

PAY ITEM	PAY UNIT
Hot Plantmix Recycled Bituminous Pavement	Ton