





MICHIGAN  
DEPARTMENT OF TRANSPORTATION  
  
SPECIAL PROVISION  
FOR  
**RECYCLED HOT MIX ASPHALT MIXTURE**

C&amp;T:GMM

1 of 1

C&T:APPR:JAR:MF:12-19-01  
FHWA:APPR:08-06-02

**Add the following subsection to Section 501.02.A.2 of the standard specifications.**

**c. Reclaimed Asphalt Pavement (RAP) Percentages and Binder Grade Selection.** The method for determining the binder grade in hot mix asphalt (HMA) mixtures incorporating RAP is divided into three categories designated Tier 1, Tier 2 and Tier 3. Each tier has a range of percentages that represent the contribution of the RAP binder toward the total binder, by weight. The tiers identified below apply to both Superpave and Marshall mixtures with the following exception: **Superpave mixture types E3, E3 High Stress and E10 used as leveling or top course shall be limited to a maximum of 17% RAP binder by weight of the total binder in the mixture. Superpave Mixture types E10 High Stress, and all E30 and E50 mixtures used as leveling or top course shall be limited to a maximum of 14% RAP binder by weight of the total binder in the mixture.**

**Tier 1 ( 0% to 17% RAP binder by weight of the total binder in the mixture)**

No binder grade adjustment is made to compensate for the stiffness of the asphalt binder in the RAP.

**Tier 2 (18% to 27% RAP binder by weight of the total binder in the mixture)**

The selected binder grade for the asphalt binder is one grade lower for the high temperature than the binder grade required for the specified project mixture type. For example, if the specified binder grade for the mixture type is PG58-28, the required grade for the binder in the recycled mixture would be a PG52-28.

The asphalt binder grade can also be selected using a blending chart for high and low temperatures. The Contractor shall supply the blending chart and the RAP test data used in determining the binder selection.

**Tier 3 ( ≥ 28% RAP binder by weight of the total binder in the mixture)**

The binder grade for the asphalt binder is selected using a blending chart for high and low temperatures. The Contractor shall supply the blending chart and the RAP test data used in determining the binder selection.

MICHIGAN  
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FOR  
**MARSHALL HOT MIX ASPHALT MIXTURE**

C&amp;T:JWB

1 of 2

C&T:APPR:EHR:CJB:09-25-06  
FHWA:APPR:10-02-06

**a. Description.** Furnish hot mix asphalt (HMA) mixture, designed using Marshall Mixture Design Methods, according to the requirements of the Standard Specifications for Construction except as modified by this special provision.

**b. Mix Design.** Submit the mix design for evaluation according to the Department's Hot Mix Asphalt Procedures Manual. Use a 50 blow Marshall hammer when compacting mixtures for developing Marshall mix designs.

**c. Recycled Mixtures.** Substituting reclaimed asphalt pavement (RAP) for a portion of the new material required to produce HMA mixture is allowed provided that the mixture is designed and produced to meet all criteria specified herein. RAP materials must conform to the Standard Specifications for Construction.

**d. Materials.** Table 1 provides the mix design criteria and volumetric properties. Table 2 provides the required aggregate properties. Use aggregates of the highest quality available to meet the minimum specifications. Use the mixture designation number shown in the contract item name when determining mix design properties from Tables 1 and 2.

**e. Measurement and Payment.** The completed work as described will be paid for at the contract unit price for the following contract item (pay item):

**Contract Item (Pay Item)****Pay Unit**

HMA, (type) ..... Ton

**Table 1: Mix Design Criteria and Volumetric Properties**

	Mixture No.				
	2C	3C	4C	13A	36A
Target Air Void, % (a)	3.00	4.00	4.00	4.00	4.00
VMA (min) (b)	11.00	13.00	14.00	14.00	15.00
VFA	65-78	65-78	65-78	65-78	65-78
Fines to Binder Ratio (max) (c)	1.2	1.2	1.2	1.2	1.2
Flow (0.01 inch)	8 -16	8 -16	8 -16	8 -16	8 -16
Stability (min), lbs	1200	1200	1200	900	900

a. Lower target air voids by 1.00% if used in a separate shoulder paving operation. Consider reducing air void targets to 3.00% for lower traffic volume roadways when designing 13A and 36A mixtures for local agency use.

b. VMA calculated using Gsb of the combined aggregates.

c. Ratio of the weight of aggregate passing the No. 200 sieve to total asphalt binder content by weight; including fines and binder contributed by RAP.

**Table 2: Aggregate Properties**

	Mixture No.				
	2C	3C	4C	13A	36A
	Percent Passing Indicated Sieve or Property Limit				
1 ½ inch	100				
1 inch	91-100	100			
¾ inch	90 max.	91-100	100	100	
½ inch	78 max.	90 max.	91-100	75-95	100
⅜ inch	70 max.	77 max.	90 max.	60-90	92-100
No. 4	52 max.	57 max.	67 max.	45-80	65-90
No. 8	15-40	15-45	15-52	30-65	55-75
No. 16	30 max.	33 max.	37 max.	20-50	
No. 30	22 max.	25 max.	27 max.	15-40	25-45
No. 50	17 max.	19 max.	20 max.	10-25	
No. 100	15 max.	15 max.	15 max.	5-15	
No. 200	3-6	3-6	3-6	3-6	3-10
Crushed (min), % (MTM 117)	90	90	90	25	60
Soft Particle (max), % (a)	12.0	12.0	8.0	8.0	8.0
Angularity Index (min) (b)	4.0	4.0	4.0	2.5	3.0
L.A. Abrasion (max), % loss (c)	40	40	40	40	40
Sand Ratio (max) (d)	-	-	-	50	50
<p>a. The sum of the shale, siltstone, structurally weak, and clay-ironstone particles must not exceed 8.0 percent for aggregates used in top course. The sum of the shale, siltstone, structurally weak, and clay-ironstone particles must not exceed 12.0 percent for aggregates used in base and leveling courses.</p> <p>b. The fine aggregate angularity of blended aggregates, determined by MTM 118, must meet the minimum requirement. In mixtures containing RAP, the required minimum fine aggregate angularity must be met by the virgin material. NAA fine aggregate angularity must be reported for information only and must include the fine material contributed by RAP if present in the mixture.</p> <p>c. Los Angeles abrasion maximum loss must be met for the composite mixture, however, each individual aggregate must be less than 50</p> <p>d. Sand ratio for 13A and 36A no more than 50% of the material passing the No. 4 sieve is allowed to pass the No. 30 Sieve.</p>					