

BITUMINOUS CONCRETE PAVEMENT, BRIDGE DECK RESURFACING

****From Berlin-Waterbury IM SURF(20)/Montpelier IM MEMB(23)**

xx. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 406 or Section 490 of the Standard Specifications.

xx. APPLICABILITY. This specification applies to Contracts where the total quantity of bituminous concrete pavement to be paid for under this item is less than or equal to 2000 metric tons (tons) or the total roadway length, including approaches, is 0.80 kilometers (0.50 miles) or less.

xx. MATERIALS. Materials shall meet the requirements of the following Subsections:

- Performance-Graded Asphalt Binder.....702.02
- Emulsified Asphalt, RS-1.....702.04
- Aggregate for Marshall Bituminous Concrete Pavement...704.10(a)
- Aggregate for Superpave Bituminous Concrete Pavement..704.10(b)

Aggregate shall meet requirements relating to Section 490 or 406, where so specified.

The grade of PG asphalt binder used to produce bituminous concrete pavement shall be 58-28. Substitutions will be accepted based on availability where the upper end temperature value is greater than 58°C (136°F) and/or the lower end is less than -28°C (-18°F).

xx. DESIGN MIX TYPES. Design mix types may be substituted based on mix availability. Allowable mix type substitutions will be accepted on a one to one thickness relationship, except as listed in Tables A and B below.

TABLE A - ALLOWABLE 40 MM (1½") MIX TYPE IVS SUBSTITUTIONS

Design ESALs (millions)	Design	Allowable Substitution	
	490.30 Superpave Bituminous Concrete Pavement	406.25 Bituminous Concrete Pavement*	406.27 Med. Duty Bituminous Concrete Pavement*
< 0.3	TYPE IVS	TYPE III	TYPE III
0.3 to < 10	TYPE IVS	TYPE III	-
> 10	TYPE IVS	-	-

*Per Section 406.

TABLE B - ALLOWABLE 90 MM (3½") MIX TYPE IIS SUBSTITUTIONS

Design ESALs (millions)	Design	Allowable Substitution	
		490.30 Superpave Bituminous Concrete Pavement	406.25 Bituminous Concrete Pavement*
< 0.3	TYPE IIS	TYPE I	TYPE I
0.3 to < 10	TYPE IIS	TYPE I	-
> 10	TYPE IIS	-	-

*Per Section 406

xx. COMPOSITION OF MIXTURE.

(a) Gradation. Gradation shall meet the requirements of Section 406 or 490, as appropriate.

(b) Design Criteria. Design Criteria shall meet the requirements of Section 406 or 490, as appropriate.

I Mix Design. Standard mix design will be in accordance with Subsection 490.03 with an n value of 65 gyrations. Allowable substitutions based on pre-existing approved mix designs and/or n values for intended Contract suppliers are listed in Table C below. A request for substitutions must be submitted in writing to the Engineer a minimum of 10 working days prior to production. Any substitutions from the standard mix design or mix types as detailed in the Plans shall not result in any increase in cost to the Agency.

TABLE C - ALLOWABLE SPECIFICATION SUBSTITUTIONS

Design ESALs (millions)	Acceptable Specification Substitution		
	Superpave Bituminous Concrete Pavement (Gyrations)	Bituminous Concrete Pavement* (75 Blow)	Med. Duty Bituminous Concrete Pavement* (50 Blow)
< 0.3	50	✓	✓
0.3 to < 10	65 ⁽¹⁾	✓	-
10 to < 30	80	-	-
> 30	125	-	-

⁽¹⁾Standard mix design specification.

*Per Section 406

(d) Control of Mixtures.

The plant shall be operated so that no intentional deviations are made from the job-mix formula. The gradation of the actual mixture shall not vary from the job-mix formula by more than the following tolerances:

TABLE D - PRODUCTION TESTING TOLERANCES AND SPECIFICATION LIMITS

PRODUCTION TESTING TOLERANCES			SPECIFICATION LIMITS
Aggregate larger than 2.36 mm (No. 8) sieve	±	6.0 %	9.0 %
Aggregate passing the 2.36 mm (No. 8) sieve and larger than the 75 µm (No. 200) sieve	±	4.0 %	6.0 %
Aggregate passing 75 µm (No. 200) sieve	±	1.0 %	1.5 %
Temperature of Mixture ⁽³⁾	±	11°C (20°F)	15°C (30°F)
Air Voids	=	4.0 ± 1.0%	4.0 ± 1.5%
VMA	=	JMF ⁽¹⁾ ± 1.0%	JMF ⁽¹⁾ ± 1.5%
VFA ⁽⁴⁾	=	JMF ⁽¹⁾ ± 5.0% ⁽²⁾	JMF ⁽¹⁾ ± 7.0% ⁽²⁾

⁽¹⁾ JMF stands for the most current Job-Mix Formula value as approved by the Engineer or the Engineer's designee.

⁽²⁾ The VFA value shall not be allowed to exceed 80.0% at any time.

⁽³⁾ Mix temperatures shall not exceed 180°C (355°F).

⁽⁴⁾ The VFA requirements only apply to Superpave Bituminous Concrete Pavement.

(e) Quality Acceptance.

(1) General. Acceptance sampling and testing will be conducted in accordance with the Agency's Quality Assurance Program as approved by FHWA. Bituminous concrete mixtures designated under these specifications will be sampled a minimum of once per day of production or 500 metric tons (tons) and evaluated by the Agency for each mix type (each mix design) in accordance with the following acceptance guidelines.

(2) Acceptance Guidelines. Temperature of the bituminous mixture shall be tested using the Verified Thermometer test method and PG Asphalt Binder content determined from the batch slip. Gradation shall be tested in accordance with AASHTO T 30. Mixture volumetric properties (air voids, VMA, and VFA) shall be calculated in accordance with Subsections 406.03(b) or 490.03(b), as appropriate.

(3) Non-Compliant Material.

- a. Rejection by Contractor. The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material at no expense to the Agency. Any such new material will be sampled, tested, and evaluated for acceptance.
 - b. For any non-compliant material outside the production testing tolerances but within the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.10).
 - c. For any non-compliant material outside the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.50), or can be removed and replaced at no cost to the Agency.
- (f) Boxed Samples. If Agency plant inspectors are not available for daily testing and inspection functions, then box samples will be taken by the Engineer at the project site to afford verification of mixture volumetrics/properties. Boxed samples will be processed and results reported to the Engineer within ten working days of being received at the Agency Central Laboratory in Berlin, Vermont. Gradation shall be tested in accordance with AASHTO T 30. Maximum Specific Gravity shall be tested in accordance with AASHTO T 209.
- xx. COMPACTION. The density of the compacted pavement shall be at least 92.0%, but not more than 97.0%, of the corresponding daily average maximum specific gravity for each mix type (each mix design) of bituminous mix placed during each day. For material that falls outside of this range, payment will be made by adjusting the daily production totals in accordance with the following Table E:

TABLE E - DENSITY PAY FACTORS

AVERAGE DENSITY	DENSITY PAY FACTOR, PF(d)
90.5% - 91.9%	- 0.100
92.0% - 93.4%	0.000
93.5% - 95.4%	0.100
95.5% - 97.0%	0.000
97.1% - 98.5%	- 0.100

For material with an average density that is less than 90.5% or in excess of 98.5%, the material will be removed and replaced by the Contractor at no expense to the Agency.

When the Contract allows for a pay adjustment for mat density and the Agency elects to not take cores of any pavement course, the Density Pay Factor (PF(d)) will be considered equal to 0.000.

Bridges with a length equal to or greater than 6 meters (20 feet) will be cored for analyzing density of the bridge deck pavement. The

minimum number of cores taken shall be 5, or as directed by the Engineer. Bridges with a length less than 6 meters (20 feet) will not be cored.

Bridge deck core areas shall be repaired to the satisfaction of the Engineer at no additional cost to the Agency.

The cores taken for acceptance testing will be the final cores taken for determination of densities.

When the Contract does not allow for a pay adjustment for mat density the Contractor shall, prior to performing any construction operations, submit to the Engineer for approval the proposed rolling pattern and compaction equipment to be used on the project. Random investigative cores will be taken by Agency personnel on the first day's production of any pavement course, with the exception of leveling course, to verify effectiveness of the proposed rolling pattern and equipment.

Pending results of the investigative cores, necessary adjustments to the proposed rolling pattern and/or equipment shall be made by the Contractor to achieve densities as directed by the Engineer.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) to be measured for payment will be the number of metric tons (tons) for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

When applicable, and when the mixture pay factor, PF(mix), for a lot of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) placed will be multiplied by such pay factor to determine a Mixture Pay Adjustment, (PA(mix)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(mix) = PF(mix) \times Q \times B$$

When boxed samples are taken to determine mix properties, test results will determine PF(mix) as outlined in COMPOSITION OF MIXTURE, Quality Acceptance, Non-Compliant Material of this Section.

When applicable, and when the density pay factor, PF(d), for a lot of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) placed that day will be multiplied by such pay factor to determine a Mat Density Pay Adjustment, (PA(d)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(d) = PF(d) \times Q \times B$$

- xx. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) will be paid

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for at the Contract unit price per metric ton (ton). Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Pay Adjustments shall be debited against the Contract prices (Lump Units) bid for the Pay Adjustment items.

The cost of repairing bridge deck core areas will not be paid for separately, but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing).

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 406.16 or Subsection 490.16, as appropriate, will be paid for under the appropriate Section 631 pay item included in the Contract.

The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing).

When not specified as items in the Contract, the costs of cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing).

Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) mixture approved by the Engineer for use in correcting deficiencies in the base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.650 Special Provision (Mat Density Pay Adjustment, Bridge Deck Resurfacing) (N.A.B.I.)	Lump Unit
900.650 Special Provision (Mixture Pay Adjustment, Bridge Deck Resurfacing)(N.A.B.I.)	Lump Unit
900.680 Special Provision (Bituminous Concrete Pavement, Bridge Deck Resurfacing)	Metric Ton (Ton)