

SECTION 321216 – BITUMINOUS PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the Drawings and specified herein.
- B. This section includes bituminous pavement.
- C. Work Excluded: This section does not apply to bituminous pavement patching.
- D. Related sections include the following:
 - 1. Division 02 Section 024113-SITE DEMOLITION
 - 2. Division 31 Section 312300-EARTHWORK
 - 3. Division 32 Section 321218-BITUMINOUS PAVEMENT PATCHES
 - 4. Division 32 Section 321723-PAVEMENT MARKING
- E. Quality assurance
 - 1. Removal:
 - a. If the pavement density for a subplot (average of subplot cores) is less than 92.0 percent, the Contractor shall remove and replace the subplot.
 - b. The Engineer reserves the right to evaluate a subplot whose test results for asphalt binder content, Gmm, VMA, or air voids, exceed the single test tolerances indicated in Table 1 – Bituminous Quality Assurance Testing Tolerances (+ or -) from JMF, included at the end of this section. If the Engineer determines that the in-place mixture will not perform in accordance with normal standards, the Contractor shall remove and replace the subplot.
 - c. General: The cost of the mixture removed and the removal cost shall be borne by the Contractor. Removal decisions will be applied to individual sublots.

1.3 REFERENCES

- A. Except as herein specified or as indicated on the Drawings, the Work of this section shall comply with the following:
1. ASTM:
 - a. C 117 – Test Method for Materials Finer Than 75 μ -m (no. 200) Sieve in Mineral Aggregates by Washing.
 - b. C 136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D 1559-89 – Test Method for Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus (section 4.5).
 - d. D 2041 – Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
 - e. D 2172 – Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
 - f. D 2726 – Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
 - g. E 29 – Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications. All equipment requirements to perform these sampling and testing procedures shall apply.
 2. MTM (Michigan Test Method):
 - a. 110 – Determining Deleterious and Objectionable Particles in Aggregates.
 - b. 117 – Determining Percentage of Crushed Particles in Aggregates.
 - c. 118 – Measuring Fine Aggregate Angularity.
 - d. 311 – Determining Aggregate Gradation for Bituminous Mixture.
 - e. 313 – Sampling Bituminous Mixtures.
 - f. 319 – Determination of Asphalt Content from Asphalt Paving Mixtures by the Ignition Method.

1.4 DEFINITIONS

- A. Quality Control (QC): Activities that have to do with the Contractor producing a quality product as specified; including training, materials sampling and testing, project oversight and documentation.

- B. Quality Assurance (QA): Activities that have to do with the Owner ensuring a quality product, as specified; including materials sampling and testing, construction inspection, and review of Contractor quality control documentation. To perform this service, the Contractor shall notify the Engineer 2 days (see definition below) in advance so that QA activities can be properly performed.
- C. Bituminous Mix Design: The selection and proportioning of aggregate(s), mineral filler (if required), reclaimed asphalt pavement (RAP) and asphalt binder such that the specified mixture design criteria are met. Laboratory evaluation is required to determine if the stated mix design complies with specifications.
- D. Job Mix Formula (JMF): A bituminous mixture for a specific project. This may include adjustments to the mix design to optimize the field application.
- E. Target Value: A JMF parameter value that may be adjusted, if approved by the Engineer, to account for changes in the physical properties of the mixture.
- F. JMF Adjustment: The Contractor may propose an adjustment to the JMF based upon QC or QA test results; or both. The proposed JMF shall meet the requirements of MDOT 2012 Standard Specifications for Construction. When approved by the Engineer, a JMF adjustment may be applied retroactively to 1 lot, for parameters with target values. The Engineer may also require the Contractor to make adjustments to the mixture to assure that the parameters of the mix design are being met.
- G. Voids in Mineral Aggregate (VMA): The volume of void space between the aggregate particles of a compacted paving mixture that includes the air voids and the asphalt binder, including the absorbed asphalt binder, expressed as a percent of the total volume of mixture.
- H. Effective Specific Gravity (Gse): The ratio of the oven dry weight in air of a unit volume of an aggregate (excluding voids permeable to asphalt) at a stated temperature to the weight of an equal volume of water at a stated temperature.
- I. Bulk Specific Gravity of Aggregate (Gsb): The ratio of the oven dry weight in air of a unit volume of an aggregate at a stated temperature to the weight of an equal volume of water at a stated temperature.
- J. Maximum Specific Gravity of Mixture (Gmm): The ratio of the weight in air of a unit volume of an uncompacted bituminous paving mixture at a stated temperature to the weight of an equal volume of water at the same temperature.
- K. Lot: Bituminous mixtures produced and placed under this specification will be evaluated on a lot-by-lot basis. A lot is made up of a discrete tonnage of 1 mixture. Each lot consists of up to 3 sublots. These sublots shall be of approximately equal size up to a maximum of 2,000 tons. The subplot size shall be approved by the Engineer prior to the start of production. The Contractor may request a change in the subplot size during production based upon the Contractor's ability to produce a mixture that meets the specification contained within the Contract Documents, and upon approval of the Engineer. If only 1 or 2 sublots are included in a lot at the end of production, they shall be combined with the previous lot using the same mix, and this combined lot shall be evaluated based upon all subplot samples.

- L. Lot Average Test Result: The average of all subplot QA test results, for a specific parameter, for the lot. Test results for a subplot removed from the project shall not be used in calculating a lot average. However, the replacement material shall be tested and the results included in the lot average.
- M. Process Quality Control Targets: Targets established by the Contractor based upon initial production lot test results (and from an approved trial run) for air voids, VMA, asphalt binder content and Gmm. QC tolerances shall be applied to these established targets to determine the need for production changes, including stopping production, to control the quality of the product. Process quality control targets shall be reported to the Engineer prior to the end of placement of the second lot.
- N. Rounding of Numbers: Rounding of numerical data shall follow ASTM E 29-93a, as described in MDOT Bituminous QC/QA Procedures Manual of Field Testing.
- O. Random Sampling: Selection of QA samples (bituminous mixture and density) and verification samples may be by a random process managed by the Engineer. The Engineer may use a random number generating calculator to determine the locations of each density core and mixture sample. The Contractor will be given the opportunity to observe the sampling process. However, the random numbers selected and the sampling locations will not be revealed to the Contractor until the time of sampling in order to avoid bias in the random sampling process.
- P. Project Representative: An individual appointed by the Owner, Board of Trustees, Michigan State University.

Note: Designer should determine whether a testing and inspection agency allowance will be included in the base contract (add line to bid form) or as a line item within a Construction Manager project. If the testing and inspection agency allowance will not be added to the bid form, delete the second sentence below.

- Q. Engineer: Third party testing and inspection agency. The Contractor will contract directly with the Engineer for the QA services under the allowance indicated the bid form.
- R. MDOT Specification: Michigan Department of Transportation 2012 Standard Specifications for Construction.
- S. RAP: Recycled Asphalt Pavement.

1.5 SUBMITTALS

- A. Submit a 4-point mix design, including regression chart, to the Owner for review and approval. Mix design shall follow the format as indicated in the Asphalt Institute Manual MS-2 Marshall Stability Method. It is the intent of this specification for the Contractor to produce mixtures at the parameters indicated in Table 3 – Mixture Type and Table 4 – Gradations (Percent Passing), both included at the end of this section.

- B. If the Engineer believes the Contractor is producing mixture at the high or low end of any of these specification limits, the Engineer shall have the authority to make changes necessary to bring the mixture back to the specified parameters.

1.6 QUALITY CONTROL

A. Sampling and Testing:

1. Follow the sampling and testing procedures listed in Article 1.2 - References in completing this work.
- B. The Contractor shall take random samples of loose mixture at a sampling frequency agreed upon with the Engineer. The Contractor shall provide the Engineer a split Sample of QC Samples. This Sample may be taken anywhere in the production process, except behind the paver. The Contractor shall be responsible for establishing process quality control targets for air voids, asphalt binder content, aggregate gradation, Gmm, obtaining QC Samples, and conducting QC testing in accordance with the Contractor's quality control plan (QCP).
- C. Each QC Sample shall be identified to allow test reports to be linked to a specific lot or subplot within the Project.
- D. The Contractor shall maintain daily control charts and have them available for review at Infrastructure Planning and Facilities at all times. Copies of these control charts shall be provided to the Engineer, if requested. Test results shall be plotted and used in quality control decisions. When corrective action is necessary, the Contractor shall notify the Engineer in writing of the specific action taken, if it required a JMF adjustment.
- E. The Contractor shall have available a density gauge for quality control testing during the compaction process and an apparatus for determining the temperature of the hot mix asphalt. The Contractor shall also have the capability to take 6-inch cores from random locations throughout the paved area for acceptance testing. The Contractor may take up to 3 informational cores from each mixture type, to help correlate the density gauge. The average in-place density shall be not less than 95 percent of the theoretical maximum density.

1.7 QUALITY ASSURANCE

- A. The Engineer may collect bituminous mixture quality assurance Samples and provide the Contractor with splits of these Samples. If the criteria for the verification procedure are satisfied, the Contractor's test results may be incorporated into the acceptance and payment decisions for the mixture. During the course of production, the Engineer may acquire random Samples at any point in the production process. These Samples may be tested to determine if the mixture, the aggregate and the binder meet the specification requirements contained in the Contract Documents. As the Samples are collected, the Engineer will assign an alphanumeric identifier to the sample and split, which can be used to trace the test results to the lot and subplot. This alphanumeric identifier must be included on Engineer test reports associated with that Sample. An example is 4-2-A, which would designate the Engineer's split (A) of the Sample from subplot 2 of lot 4 on a Project.

- B. A minimum 16,000 gram Sample may be taken. The Sample will be divided equally for Contractor and Engineer testing. The following tests may be conducted by the Engineer on the QA Sample splits.
1. Maximum Specific Gravity, Gmm (ASTM D 2041).
 2. Bulk Compacted Density (ASTM D 1559, paragraph 4.5).
 3. Air Voids (calculated).
 4. Voids in Mineral Aggregate, VMA (calculated).
 5. Composition of the Mixture: Asphalt binder content based on calculated value using subplot maximum specific gravity (Gmm) and current JMF effective specific gravity (Gse). The retained Gmm sample may be used for gradation (ASTM C 117 and C 136) and crushed particle content (MTM 117) from extracted (ASTM D 2172) or incinerated (MTM 319) aggregate, or from MTM 311.
- C. In-Place Density: The Engineer may identify random core sample locations for each subplot based on longitudinal and transverse measurements. The Engineer will mark each core location with a paint dot, which represents the center of the core. The Contractor shall drill a 6-inch core sample at each core location. The Contractor shall notify the Engineer sufficiently in advance of coring to ensure that a representative can be present to witness the coring. The core Samples shall be taken after final rolling.
1. As an option, when mutually agreed to by the Engineer and Contractor, the core Samples may be waived and the density gauge will be used for acceptance testing.
 2. Core Samples shall not be damaged during removal from the roadway. If, for any reason, a core is damaged or determined not to be representative at the time of coring, the Engineer will evaluate and document the problem and determine whether re-coring is necessary.
 3. All previous pavement, base aggregate or bond coat material shall be sawed off the bottom of the core Samples before the core density is calculated.
 4. The core holes shall be filled with hot mixture and thoroughly compacted as part of the coring operation. The method of filling holes and obtaining compaction shall be agreed upon prior to production. Pavement density acceptance testing will be completed within 1 work day after the cores were taken. Testing will be in accordance with ASTM D 2726. The test results on the compacted bituminous mixture may be used as a basis of acceptance and payment.
- D. Verification of Quality Control Test:
1. The Engineer will review the Contractor's sampling and testing procedures, test results and Engineer QA test results. If, in the opinion of the Engineer, sampling and testing procedures are proper, the Contractor's quality control test data may be used for acceptance decisions.

2. The Contractor's QC test results may be considered verified if the following criteria are satisfied:
 - a. The difference between the Contractor's QC test results and the JMF fall within the single test tolerance indicated in Table 1 – Bituminous Quality Assurance Testing Tolerances (+ or -) from JMF, included at the end of this section, **or**
 - b. The difference between the Engineer's test results and the Contractor's test results fall within the single test tolerance indicated in Table 1 – Bituminous Quality Assurance Testing Tolerances (+ or -) from JMF, included at the end of this section.
3. If the difference between the Contractor's QC test results, compared to the JMF, exceed the single test tolerances indicated in Table 1 – Bituminous Quality Assurance Testing Tolerances (+ or -) from JMF, included at the end of this section, the Engineer's test results will be used as the acceptance test. If the subplot is not verified, the Contractor shall be notified and given a copy of the test results. Both the Contractor and the Engineer will verify that testing equipment is calibrated and operating properly, and correct testing procedures have been followed. Unless it is documented that the difference resulted from equipment or procedural problems, the Engineer's test results will remain as the acceptance test of record.

E. Project Documentation:

1. The format of test reports and QC charts to be submitted by the Contractor shall be approved by the Engineer before mixture production is allowed to commence. Suggested formats of reports and charts are available from the Engineer. Project documentation to be provided by the Contractor shall include, but may not be limited to, the following:
 - a. Lot Basis:
 - 1) A complete report of QA tests shall be submitted to the Engineer within 24 hours of the time the last tests were completed.
 - 2) Control charts of test data must be current (data should be plotted as soon as the test is complete) and available for review by the Engineer.
 - b. Project Summation:
 - 1) Control charts for test data indicating individual test values, lot averages and the running average of 5.
 - 2) A tabulation of test data including subplot data, lot averages, Project average, Project standard deviation and a projection of which lots are subject to a price adjustment.
2. Provide documentation to confirm that the material used on the Project meets or exceeds minimum specified requirements in accordance with MDOT 2012 specifications.

3. The Contractor shall provide a letter to the Owner certifying that materials approved in the mix design were, in fact, used in the production of the mixture installed on this Project.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Provide to the Engineer the asphalt delivery tickets showing asphalt cement grade, date of delivery, and quantity delivered.

1.9 PROJECT CONDITIONS

- A. Weather and seasonal limitations shall not exceed those specified in MDOT 2012
- B. MSU will reject loads with a temperature either below 250 deg F or greater than +/- 20 deg F from the recommended maximum mixing temperature selected by the binder producer at the time of discharge from behind the screed.

1.10 WARRANTY

- A. Furnish and sign 5 year written warranty (last page of this section) which shall cover the following conditions:
 1. Cracking: A crack caused by improper joints in the pavement, either a construction joint, a butt joint, or cracking caused by expansion or contraction of the pavement, or by any settlement of the pavement.
 2. Delamination: An instance where the surface course de-bonds from the underlying layer of asphalt pavement, causing slippage or complete separation.
 3. Raveling: An area where the aggregate or matrix becomes loose, or separates from the asphalt pavement. This condition will generally be caused by poor density or segregation.
- B. Remedies for the conditions described above shall be as follows:
 1. Cracking: Cracks over 3-inch length or wider than 1/8-inch, or both, shall be corrected by routing/sawing and sealing or overband sealing, as directed by the Engineer, with a sealer approved by the Engineer.
 2. Delamination: Areas that exhibit delamination shall be repaired by removing the surface course and cleaning the leveling course, installing a bond coat, and furnishing and installing a new surface course of a like hot mix asphalt.
 3. Raveling: Areas that exhibit raveling, or a loss of aggregate or matrix, shall be repaired by removing the distressed area, cleaning the leveling course, applying a bond coat, and furnishing and installing a new surface course of a like hot mix asphalt.

- C. At least once a year, for the duration of the warranty period, Project Representative will inspect the pavement to determine if warranty work is necessary. If deficiencies are found, the Project Representative shall notify the Contractor in writing as to the extent of the repairs needed. The Contractor shall perform the repairs within 30 calendar days or other period as approved by the Project Representative. Should the Contractor not perform the required repairs, the Owner may make the repairs at the Contractor's expense. The Contractor may also inspect the lot from time to time to determine if warranty work is necessary. The Contractor will be allowed, with approval of the Project Representative, to perform warranty work that will retard any further deterioration of the warranted conditions. Any and all costs to repair deficiencies in the asphalt shall be paid for by the Contractor.

PART 2 - PRODUCTS

2.1 SUBBASE COURSE

- A. See Division 31 Section 312300-EARTHWORK.

2.2 BASE COURSE

- A. Not used.

2.3 BITUMINOUS MIXTURES

- A. See Table 3 – Mixture Type and Table 4 – Gradations, both included at the end of this section.

2.4 ASPHALT EMULSION

- A. The bond/tack coat shall conform to MDOT 2012 Specification for Asphalt Emulsion SS-1h.

2.5 ASPHALT CEMENT

- A. Final binder properties shall meet asphalt PG 58-28. The asphalt cement shall conform to MDOT 2012 Specification for Asphalt Cement and conform to the Project Specifications. If the binder obtained from the recycled asphalt pavement exceeds 17 percent of the total binder in the mixture, the Contractor shall furnish documentation (i.e., blending chart) in order to determine the proper grade of virgin binder required to achieve the desired final binder properties.

2.6 TRAFFIC PAINT

- A. See Division 32 Section 321723-PAVEMENT MARKING.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare subbase according to MDOT 2012 Specifications and Project requirements.

- B. Where entire pavement thickness is to be completely removed, cut existing pavement neatly with a saw. Otherwise, edges shall be cut straight and smooth allowing for a full depth pavement throughout.
- C. Proof roll subgrade and subbase to check for unstable areas and areas requiring additional compaction. Perform proof rolling as directed by the Engineer.
- D. Notify Project Representative of unsatisfactory conditions. Do not begin paving work until deficient subgrade areas have been corrected, tested, and approved by the Project Representative.
- E. Required Grades for Barrier Free Parking Areas:
 - 1. In areas designated on the Drawings as a barrier free parking space, either so noted or with a uniform barrier free graphic symbol, the slope of the parking space and adjacent access aisle shall not exceed 2 percent (1/4-inch per foot) in any direction.
 - 2. Should this provision conflict with the Drawings, inform the Project Representative so that the necessary revision(s) can be made.

3.2 INSTALLATION OF PAVEMENT

- A. General: Place bituminous pavement and bond coats over approved subbase or existing pavement according to MDOT 2012 Specifications, Division 5.
- B. Pavement Thickness and Type: Over the subbase, place bituminous pavement as indicated on the Drawings. For courses exceeding 3-inch, place bituminous pavement in 2 lifts with a bond coat between each layer. For patching, provide 4-inch leveling course and 2-inch surface course over compacted subbase.
 - 1. Mix Type:
 - a. Surface Course – Roadway and Dock Areas:
 - 1) Thickness: 1.5-inch.
 - 2) Yield: 165 lbs/syd.
 - b. Surface Course – Parking:
 - 1) Thickness: 1.5-inch.
 - 2) Yield: 165 lbs/syd.
 - c. Leveling Course – Roadway and Dock Areas:
 - 1) Thickness: 3.5-inch.
 - 2) Yield: 385 lbs/syd.

- d. Leveling Course – Parking:
 - 1) Thickness: 2.5-inch.
 - 2) Yield: 275 lbs/syd.

- C. Bond Coat: Uniformly apply a coat of SS-1h at a rate of 0.10 to 0.15 gallon per square yard over the entire surface of each bituminous course, except the last.

- D. Protection: After final rolling, protect pavement from vehicular traffic until the surface has cooled sufficiently to eliminate surface abrasion.

3.3 TABLES

TABLE 1 – BITUMINOUS QUALITY ASSURANCE TESTING TOLERANCES (+ OR -) FROM JMF		
Parameter	Single Test	Lot Average
Air Voids	1.00%	0.60%
Voids in Mineral Aggregate (VMA)*	1.20%	0.75%**
Maximum Specific Gravity (Gmm)*	0.019	0.012
Asphalt Binder Content*	0.50%	0.35%
* Parameters with Target Values		
** Or less, determined by VMA Value from MDOT 2012 Standard Specifications for Construction.		

TABLE 2 – BITUMINOUS MIXTURE PAY ADJUSTMENTS		
Parameter (Lot Average)	Deviation (d)	Negative Unit Price Adjustment (%)
Asphalt Binder Content (deviation from JMF)	0.35 < d ≤ 0.55	10
	d > 0.55	25
Air Voids (deviation from JMF)	0.6 < d ≤ 0.7	2
	0.7 < d ≤ 0.8	4
	0.8 < d ≤ 1.0	6
	1.0 < d ≤ 1.1	8
	1.1 < d ≤ 1.2	10
	d > 1.2	25
Maximum Specific Gravity (Gmm) (deviation from JMF)	0.012 < d ≤ 0.014	2
	0.014 < d ≤ 0.015	4
	0.015 < d ≤ 0.017	6
	0.017 < d ≤ 0.019	8
	0.019 < d ≤ 0.021	10
	d > 0.021	25
Voids in Mineral Aggregate (VMA) (deviation below minimum value in the MDOT 2012-1996 Standard Specifications for Construction)	0.0 < d ≤ 0.1	2
	0.1 < d ≤ 0.3	4
	0.3 < d ≤ 0.4	6
	0.4 < d ≤ 0.5	8
	0.5 < d ≤ 0.6	10
	d > 0.6	25

TABLE 3 – MIXTURE TYPE				
	Surface Course		Leveling Course	
	Roadway & Dock Area	Parking Only	Roadway & Dock Area	Parking Only
Mixture Number	5C Modified	36A Modified	3C Modified	13A Modified
VMA % (Eff. Spec. Gravity)	16.0	16.5	15.0	15.5
Air Voids % *	3.0	2.5	3.0	2.5
Fines to Binder Ratio (Max.)	1.2	1.2	1.2	1.2
Fine Angularity (Min.) MTM 118	4.0	3.0	4.0	2.5
* Modified from MDOT specifications. No more than 50% of the material passing the #4 sieve shall pass the #30 sieve for Parking mixtures.				

TABLE 4 – GRADATIONS (PERCENT PASSING)				
	Surface Course		Leveling Course	
	Roadway & Dock Area	Parking Only	Roadway & Dock Area	Parking Only
Mixture Number	5C Modified	36A Modified	3C Modified	13A Modified
1-inch	100	100	100	100
3/4-inch	100	100	99-100	100
1/2-inch	100	100	90 Max.	75-95
3/8-inch	99-100	92-100	77 Max.	60-90
#4	90 Max.	65-90	57 Max.	45-80
#8	55-70	55-75	15-45	30-65
#16	30-55		33 Max.	20-50
#30	20-30	25-45	25 Max.	15-40
#50	15-25		19 Max.	10-25
#100	15 Max.		15 Max.	5-15
#200	3-6	3-7	3-6	3-6
Crush (Min.) MTM 117*	90	60	90	50
* Modified from MDOT specifications. No more than 50% of the material passing the #4 sieve shall pass the #30 sieve for Parking mixtures.				

(BITUMINOUS PAVEMENT WARRANTY ON THE FOLLOWING PAGE.)

BITUMINOUS PAVEMENT WARRANTY

PROJECT:

CONTRACTOR:

**OWNER: BOARD OF TRUSTEES
MICHIGAN STATE UNIVERSITY**

We, the undersigned, hereby provides a five (5) year warranty to Owner against defects caused by deficiencies in the materials and/or workmanship of the bituminous pavement in accordance with the requirements set forth in the Drawings and Specifications for the above named project.

The warranty covers the following conditions:

1. Cracking as defined shall be any cracked caused by improper joints in the pavement, either a construction joint, a butt joint, or any cracking caused by expansion or contraction of the pavement, or by any settlement of the pavement, i.e., thermal cracking. Cracks caused by fatigue or settlement will not be covered by this Warranty.
2. Delamination as defined shall be any instance where the surface course de-bonds from the underlying layer of bituminous pavement, causing slippage or complete separation.
3. Raveling, as defined shall be any area where the aggregate or matrix becomes loose, or separates from the asphalt pavement. This condition is generally caused by poor density or segregation.

Remedies for the conditions described above will be as follows:

1. Cracking. Any cracks over 3" in length and/or wider than 1/8" shall be corrected by routing/sawing and sealing or band sealing, as directed by the Owner's Representative, with a sealer approved by the Owner's Representative.
2. Delamination. Any area that exhibits delamination will be repaired by removing the surface course and cleaning the leveling course, installing a bond coat and furnishing/installing a new surface course of a like hot mix asphalt.
3. Raveling. Any area that exhibits raveling, or a loss of aggregate or matrix, will be repaired by removing the distressed are, cleaning and leveling course, applying a bond coat and furnishing and installing a new surface course of a like hot mix asphalt.

At least once a year, for the duration of the Warranty period, Owner's Representative will inspect the pavement to determine if any warranty work is necessary. If deficiencies are found, the Owner's Representative will notify the Contractor, in writing, as the extent of the repairs needed. The Contractor will perform the repairs within 30 calendar days, or within period as approved by the Owner's Representative. Should the Contractor not perform the required repairs, the Owner may make the repairs at the Contractor's expense. The Contractor may also inspect the lot from time to time to determine if any warranty work is necessary. The Contractor will be allowed, with approval of the Owner's Representative, to perform any warranty work that it appears will retard any further deterioration of any of the warranted conditions. Any and all costs to repair any deficiencies in the pavement shall be paid by this Contractor.

CONTRACTOR: _____ DATE _____

ADDRESS: _____

AUTHORIZED REPRESENTATIVE: _____
(Print) (Signature)

SUBSCRIBED AND SWORN TO BEFORE ME,
THIS ____ DAY OF _____
A.D. ____
NAME
MY COMMISSION EXPIRES

END OF SECTION 321216