

STATE OF DELAWARE

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YOU MUST PURCHASE  
THE PROPOSAL IN ORDER  
TO SUBMIT A BID.



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201206701.01

MICRO-SURFACING, CANAL, FY 2012

NEW CASTLE COUNTY

Completion Date 180 Calendar Days

SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
DELAWARE DEPARTMENT OF TRANSPORTATION  
AUGUST 2001

Bids will be received in the Bidder's Room (B1.11.01), Transportation Administration Center, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time June 21, 2011



**Contract No.T201206701.01**

**MICRO-SURFACING, CANAL, FY 2012  
NEW CASTLE COUNTY**

**LOCATION**

These improvements are located in NEW CASTLE County more specifically shown on the Location Map(s) of the enclosed Plans.

**DESCRIPTION**

The improvements consist of furnishing all materials for MICRO-SURFACING, CANAL, FY 2012, and other incidental construction in accordance with the location, notes and details shown on the plans and as directed by the Engineer.

**COMPLETION DATE**

All work on this contract must be complete within 180 Calendar Days .

**ELECTRONIC BIDDING**

This project incorporates the electronic bidding system Expedite 5.2b. Bidder wishing to use the electronic bidding option should request a bid file disk and installation CD.

**PROSPECTIVE BIDDERS NOTE:**

No retainage will be withheld on this contract.

The Department has adopted an External Complaint Procedure. The procedure can be viewed on our website at; <http://www.deldot.gov/information/business/>, or you may request a copy by calling (302) 760-2555.

**STATE OF DELAWARE  
CONSTRUCTION ITEMS UNITS OF MEASURE**

<b>English Code</b>	<b>English Description</b>	<b>Multiply By</b>	<b>Metric Code</b>	<b>Metric Description</b>	<b>Suggested CEC Metric Code</b>
ACRE	Acre	0.4047	ha	Hectare	HECTARE
BAG	Bag	N/A	Bag	Bag	BAG
C.F.	Cubic Foot	0.02832	m <sup>3</sup>	Cubic Meter	M3
C.Y.	Cubic Yard	0.7646	m <sup>3</sup>	Cubic Meter	M3
EA-DY	Each Day	N/A	EA-DY	Each Day	EA-DY
EA-MO	Each Month	N/A	EA-MO	Each Month	EA-MO
EA/NT	Each Night	N/A	EA-NT	Each Night	EA/NT
EACH	Each	N/A	EA	Each	EACH
GAL	Gallon	3.785	L	Liter	L
HOUR	Hour	N/A	h	Hour	HOUR
INCH	Inch	25.4	mm	Millimeter	MM
L.F.	Linear Foot	0.3048	m	Linear Meter	L.M.
L.S.	Lump Sum	N/A	L.S.	Lump Sum	L.S.
LA-MI	Lane Mile	1.609	LA-km	Lane-Kilometer	LA-KM
LB	Pound	0.4536	kg	Kilogram	KG
MFBM	Thousand Feet of Board Measure	2.3597	m <sup>3</sup>	Cubic Meter	M3
MGAL	Thousand Gallons	3.785	kL	Kiloliter	KL
MILE	Mile	1.609	km	Kilometer	KM
S.F.	Square Foot	0.0929	m <sup>2</sup>	Square Meter	M2
S.Y.	Square Yard	0.8361	m <sup>2</sup>	Square Meter	M2
SY-IN	Square Yard-Inch	0.8495	m <sup>2</sup> -25 mm	Square Meter-25 Millimeter	M2-25 MM
TON	Ton	.9072	t	Metric Ton (1000kg)	TON
N.A.*	Kip	4.448	kN	Kilonewton	N.A.*
N.A.*	Thousand Pounds per Square Inch	6.895	MPa	Megapascal	N.A.*

\*Not used for units of measurement for payment.

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## GENERAL NOTICES

### SPECIFICATIONS:

The specifications entitled "Delaware Standard Specifications, for Road and Bridge Construction, August, 2001", hereinafter referred to as the Standard Specifications, Supplemental Specifications issued as of the advertisement date of this proposal, the Special Provisions, notes on the Plans, this Bid Proposal, and any addenda thereto shall govern the work to be performed under this contract.

### CLARIFICATIONS:

Under any Section or Item included in the Contract, the Contractor shall be aware that when requirements, responsibilities, and furnishing of materials are outlined in the details and notes on the Plans and in the paragraphs preceding the "Basis of Payment" paragraph in the Standard Specifications or Special Provisions, no interpretation shall be made that such stipulations are excluded because reiteration is not made in the "Basis of Payment" paragraph.

### ATTESTING TO NON-COLLUSION:

The Department requires as a condition precedent to acceptance of bids a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract. The form for this sworn statement is included in the proposal and must be properly executed in order to have the bid considered.

### QUANTITIES:

The quantities shown are for comparison of bids only. The Department may increase or decrease any quantity or quantities without penalty or change in the bid price. Under no circumstances will the total value of the contract exceed **150%** of the awarded value.

### REQUIREMENT BY DEPARTMENT OF LABOR FOR SWORN PAYROLL INFORMATION

Delaware Code, Title 29, Chapter 69, Section 6960, Paragraph (c)

"(c) Every contract based upon these specifications shall contain a stipulation that certified sworn payroll reports be maintained by every contractor and subcontractor performing work upon the site of construction. The contractor and subcontractor shall keep and maintain the sworn payroll information for a period of two (2) years from the last day of the work week covered by the payroll. A certified copy of these payroll reports shall be made available:

1. For inspection or furnished upon request to a representative of the Department of Labor;
2. Upon request by the public or for copies thereof. However, a request by the public must be made through the Department of Labor. The requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Department of Labor in accordance with the Department's copying fee policy. The public shall not be given access to the records at the principal office of the contractor or subcontractor; and
3. The certified payroll records shall be on a form provided by the Department of Labor or shall contain the same information as the form provided by the Department and shall be provided within ten (10) days from receipt of notice requesting the records from the Department of Labor."

Contractor may contact:

Department of Labor  
Division of Industrial Affairs  
4425 No. Market Street

Wilmington, DE 19802  
Telephone (302) 761-8200

PREFERENCE FOR DELAWARE LABOR:

Delaware Code, Title 29, Chapter 69, Section 6962, Paragraph (d), Subsection (4)b

"In the construction of all public works for the State or any political subdivision thereof, or by firms contracting with the State or any political subdivision thereof, preference in employment of laborers, workmen or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State. Each public works contract for the construction of public works for the State or any political subdivision thereof shall contain a stipulation that any person, company or corporation who violates this section shall pay a penalty to the Secretary of Finance equal to the amount of compensation paid to any person in violation of this section."

EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS:

Delaware Code, Title 29, Chapter 69, Section 6962, Paragraph (d), Subsection (7)

"a. As a condition of the awarding of any contract for public works financed in whole or in part by State appropriation, such contracts shall include the following provisions:

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex or national origin. The contractor will take positive steps to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex or national origin.'

TAX CLEARANCE:

As payments to each vendor or contractor aggregate \$2,000, the Division of Accounting will report such vendor or contractor to the Division of Revenue, who will then check the vendor or contractor's compliance with tax requirements and take such further action as may be necessary to insure compliance.

LICENSE:

A person desiring to engage in business in this State as a contractor shall obtain a license upon making application to the Division of Revenue. Proof of said license compliance to be made prior to, or in conjunction with, the execution of a contract to which he has been named.

DIFFERING SITE CONDITIONS,

SUSPENSIONS OF WORK and SIGNIFICANT CHANGES IN THE CHARACTER OF WORK:

Differing site conditions: During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.



Upon written notification, the engineer will investigate the conditions, and if he/she determines that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The engineer will notify the contractor of his/her determination whether or not an adjustment of the contract is warranted.

No contract adjustment which results in a benefit to the contractor will be allowed unless the contractor has provided the required written notice.

No contract adjustment will be allowed under their clause for any effects caused on unchanged work.

Suspensions of work ordered by the engineer: If the performance of all or any portion of the work is suspended or delayed by the engineer in writing for an unreasonable period of time (not originally anticipated, customary or inherent to the construction industry) and the contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the contractor shall submit to the engineer in writing a request for adjustment within 7 calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.

Upon receipt, the engineer will evaluate the contractor's request. If the engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The engineer will notify the contractor of his/her determination whether or not an adjustment of the contract is warranted.

No contract adjustment will be allowed unless the contractor has submitted the request for adjustment within the time prescribed.

No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

Significant changes in the character of work: The engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the contractor agrees to perform the work as altered.

If the alterations or changes in quantities significantly change the character of the work under the contract, whether or not changed by any such different quantities or alterations, an adjustment, excluding loss of anticipated profits, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the contractor in such amount as the engineer may determine to be fair and equitable.

The term "significant change" shall be construed to apply only to the following circumstances:

- (A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction or
- (B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

#### PREVAILING WAGES

Included in this proposal are the minimum wages to be paid various classes of laborers and mechanics as determined by the Department of Labor of the State of Delaware in accordance with Title 29 Del.C. §6960, relating to wages and the regulations implementing that Section.

Title 29 Del.C. §6960 relating to wages further stipulates "that the employer shall pay all mechanics and laborers employed directly upon the site of the work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics", and ... "that the scale of wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work, and that there may be withheld from the employer so much of accrued payments as may be considered necessary by the Department of Labor to pay to laborers and mechanics employed by the employer the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and rates of wages received by such laborers and mechanics to be remitted to the Department of Labor for distribution upon resolution of any claims."

Bidders are specifically directed to note the Department of Labor's regulations implementing §6960 relating to the effective date of the wage rates, at Part VI., Section C., which in relevant part states:

"Public agencies (covered by the provisions of 29 Del.C. §6960) are required to use the rates which are in effect on the date of the publication of specifications for a given project. In the event that a contract is not executed within one hundred twenty (120) days from the date the specifications were published, the rates in effect at the time of the execution of the contract shall be the applicable rates for the project."

STATE OF DELAWARE  
DEPARTMENT OF LABOR  
DIVISION OF INDUSTRIAL AFFAIRS  
OFFICE OF LABOR LAW ENFORCEMENT  
PHONE: (302) 451-3423

Mailing Address:  
225 CORPORATE BOULEVARD  
SUITE 104  
NEWARK, DE 19702

Located at:  
225 CORPORATE BOULEVARD  
SUITE 104  
NEWARK, DE 19702

PREVAILING WAGES FOR HIGHWAY CONSTRUCTION EFFECTIVE MARCH 15, 2011

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
BRICKLAYERS	44.98	44.98	14.51
CARPENTERS	40.86	48.31	38.62
CEMENT FINISHERS	28.11	24.68	23.29
ELECTRICAL LINE WORKERS	22.50	54.05	54.05
ELECTRICIANS	57.10	57.10	57.10
IRON WORKERS	42.20	22.98	25.35
LABORERS	25.44	23.33	24.00
MILLWRIGHTS	16.11	15.63	13.49
PAINTERS	41.42	41.42	41.42
PILEDRIERS	59.23	23.75	26.95
POWER EQUIPMENT OPERATORS	31.46	26.00	26.31
SHEET METAL WORKERS	22.75	20.31	18.40
TRUCK DRIVERS	26.54	21.68	19.96

CERTIFIED: 5/10/11

BY:   
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

**NOTE:** THESE RATES ARE PROMULGATED AND ENFORCED PURSUANT TO THE PREVAILING WAGE REGULATIONS ADOPTED BY THE DEPARTMENT OF LABOR ON APRIL 3, 1992.

CLASSIFICATIONS OF WORKERS ARE DETERMINED BY THE DEPARTMENT OF LABOR. FOR ASSISTANCE IN CLASSIFYING WORKERS, OR FOR A COPY OF THE REGULATIONS OR CLASSIFICATIONS, PHONE (302) 451-3423.

NON-REGISTERED APPRENTICES MUST BE PAID THE MECHANIC'S RATE.

PROJECT: T201206701.01 Microsurfacing, Canal, FY 2012, New Castle County



# **SUPPLEMENTAL SPECIFICATIONS TO THE AUGUST 2001 STANDARD SPECIFICATIONS**

**EFFECTIVE AS OF THE ADVERTISEMENT  
DATE OF THIS PROPOSAL  
AND INCLUDED BY REFERENCE**

**The Supplemental Specifications can be viewed and printed from  
the Department's Website.**

To access the Website;

- in your internet browser, enter; <http://www.deldot.gov>
- on the left side of the page under 'INFORMATION', Click; 'Publications'
- scroll down under 'MANUALS' and Click; "Standard Specifications 2001"

The full Website Link is;

[http://www.deldot.gov/information/pubs\\_forms/manuals/standard\\_specifications/index.shtml](http://www.deldot.gov/information/pubs_forms/manuals/standard_specifications/index.shtml)

Printed copies of the Supplemental Specifications are available upon request. A printed copy of the above referenced Supplemental Specifications will be included in the final contract documents upon award.

**The Contractor shall make himself aware of these revisions and corrections (Supplemental Specifications), and apply them to the applicable item(s) of this contract.**



## **SPECIAL PROVISIONS**





**CONSTRUCTION ITEM NUMBERS**

All construction pay items are assigned a six (6) digit number, shown as Item Number on the Plans and/or in the Special Provisions, and shall be interpreted in accordance with the following:

**Standard Item Number:**

The first three digits of the construction item numbers indicates the Section number as described in the Standard Specifications, and all applicable requirements of the Section shall remain effective unless otherwise modified by the Special Provisions. The last three digits of the construction item identifies the item by sequential number under that Section. Sequential numbers for all items covered under Standard Specifications range from 000 to 499. A comprehensive list of construction item numbers begins on page 421 of the Standard Specifications. Additions to this list will be made as required.

**Special Provisions Item Number:**

The first three digits of the construction items, covered under Special Provisions, indicates the applicable Section number of the Standard Specifications, and shall be governed fully by the requirements of the Special Provisions. The last three digit of the items covered under Special Provisions identifies the item by sequential number. Sequential numbers for Special Provision items, range from 500 to 999.

**Examples**

**Standard Item Number - 202000 Excavation and Embankment**

202 Indicates Section Number

000 Indicates Sequential Number

**Special Provision Item Number - 202500 Grading and Reshaping Roadway**

202 Indicates Section Number

500 Indicates Sequential Number

**401502 - ASPHALT CEMENT COST ADJUSTMENT**

For Sections 304, 401, 402, 403, 404, and 405, payments to the Contractor shall be adjusted to reflect increases or decreases in the Delaware Posted Asphalt Cement Price when compared to the Project Asphalt Cement Base Price, as defined in these Special Provisions.

The Delaware Posted Asphalt Cement Price will be issued monthly by the Department and will be the industry posted price for Asphalt Cement, F.O.B. Philadelphia, Pennsylvania.

The Project Asphalt Cement Base Price will be the anticipated Delaware Posted Asphalt Cement Price expected to be in effect at the time of receipt of bids.

All deviations of the Delaware Posted Asphalt Cement Price from the Project Asphalt Cement Base Price are eligible for cost adjustment. No minimum increases or decreases or corresponding percentages are required to qualify for cost adjustment.

Actual quantity of asphalt cement qualifying for any Asphalt Cement Cost Adjustment will be computed on the basis of weight tickets and asphalt percentage from the approved job mix formula.

For Recycled Hot-Mix the asphalt percentage eligible for cost adjustment shall be only the new asphalt cement added to the mix.

There shall be no separate payment per ton (metric ton) cost of asphalt cement. That cost shall be included in the various unit prices bid per ton (metric ton) for those bid items that contain asphalt cement (mentioned above).

The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price for the project will be \$636.67 per ton (\$701.81 per metric ton).

If the Contractor exceeds the authorized allotted completion time, the price of asphalt cement on the last authorized allotted work day, shall be the prices used for cost adjustment during the time liquidated damages are assessed. However, if the industry posted price for asphalt cement goes down, the asphalt-cement cost shall be adjusted downward accordingly.

**NOTE**

Application of Asphalt Cement Cost Adjustment requirements as indicated above shall apply only to those contracts involving items related to bituminous base and pavements, and with bitumen, having a total of 1,000 tons (1,000 metric tons) or more of hot-mix bid quantity in case of Sections 401, 402 and 403; and 15,000 gallons (60 000 liters) or more in case of Sections 304, 404 and 405.

401644 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 64-22 (CARBONATE STONE)  
401645 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22 (CARBONATE STONE)  
401646 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 64-22 (CARBONATE STONE)

401647 - SUPERPAVE, TYPE B HOT-MIX, 115 GYRATIONS, PG 64-22  
401648 - SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 64-22  
401649 - SUPERPAVE, TYPE B HOT-MIX, 205 GYRATIONS, PG 64-22

401650 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 70-22 (CARBONATE STONE)  
401651 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 70-22 (CARBONATE STONE)  
401652 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 70-22 (CARBONATE STONE)

401653 - SUPERPAVE, TYPE B HOT-MIX, 115 GYRATIONS, PG 70-22  
401654 - SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 70-22  
401655 - SUPERPAVE, TYPE B HOT-MIX, 205 GYRATIONS, PG 70-22

401656 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 76-22 (CARBONATE STONE)  
401657 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 76-22 (CARBONATE STONE)  
401658 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 76-22 (CARBONATE STONE)

401659 - SUPERPAVE, TYPE B HOT-MIX, 115 GYRATIONS, PG 76-22  
401660 - SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 76-22  
401661 - SUPERPAVE, TYPE B HOT-MIX, 205 GYRATIONS, PG 76-22

401662 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 115 GYRATIONS, PG 64-22

401663 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22

401664 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 205 GYRATIONS, PG 64-22

401665 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22, PATCHING  
401666 - SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 64-22, PATCHING  
401667 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG-64-22, PATCHING

401668 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG-64-22, WEDGE  
401669 - SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG-64-22, WEDGE

401704 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)

401705 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)

401706 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)

401707 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)

401708 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)

401709 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)

401710 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)

401711 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)

401712 - SUPERPAVE, TYPE C HOT-MIX, 205 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)

**Description:**

The following Subsections of the Standard Specifications shall be applicable: 401.01, 401.03 - 401.10, 401.12, and 401.13. All other subsections have been modified herein.

The Contractor shall read and thoroughly understand the requirements of the QA/QC specification as defined in item 401699. It is the responsibility of the Contractor to determine all costs associated with meeting these requirements and to include them in the per ton bids for the various Superpave bituminous concrete items. The Contractor shall also be aware that the pay adjustment factors in item 401699 will be applied to the Superpave bituminous concrete payments to determine the bonus or penalty for the item.

**Materials:**

Materials for hot-mix, hot-laid bituminous concrete shall conform to the requirements of Subsections 823.01, 823.05- 823.17, and 823.25 - 823.28 of the Standard Specifications and the following.

**Asphalt Binder:**

The asphalt binder shall meet the requirements of Superpave PG 64-22, PG 70-22, or PG 76-22 performance grade asphalt, as referenced in the Plans, according to M-320, Table 1 and tested according to AASHTO PP6 with the following test ranges:

TEST PROCEDURE	AASHTO REFERENCE	SPECIFICATION LIMITS
Temperature, C	M-320	Per Grade
Original DSR, $G^*/\sin(\delta)$	T-315	1.00 - 2.00 kPa
RTFO DSR, $G^*/\sin(\delta)$	T-315	2.20 - 5.00 kPa
PAV DSR, $G^*/\sin(\delta)$	T-315	1400 - 5000 kPa
BBR Creep Stiffness	T-313	90.0 - 300.0 kPa
BBR — value	T-313	0.300 - 0.440

Substitution of a higher temperature grade will require prior approval by the Engineer.

**Recycled Materials:**

The percentage allowance of recycled materials (recycled asphalt pavement and/or shingles) shall be controlled through the use of the Materials & Research recycled mixture program available through the Materials & Research Section. The program can be used by the Contractor to determine which materials and combinations of materials can be used to meet the specified material on the contract.

If the Contractor proposes to use a combination of materials that are not covered by this program, the mix design shall be submitted and reviewed by the Engineer.

**Shingles:**

Only shingles reclaimed from shingle manufacturers such as tabs, punch-outs, and damaged new shingles shall be allowed in the mixture. Post-consumer shingles or used shingles shall not be permitted in the mixture and all shingles shall be free of all foreign material and moisture. Fiberglass-backed and organic felt-backed shingles shall be kept separately and both materials shall not be used in the same mixture at the same time. The shingles shall be broken down in the mixing process with 100% passing the ½ in (12.5 mm) sieve. Shipping, handling, and shredding costs are incidental to the price of Superpave item.

**Mineral Aggregate:**

The mineral aggregate employed in the target gradation of the job mix formula (JMF) shall conform to Section 805 and the following criteria. These criteria apply to the combined aggregate blend.

DESIGN ESAL'S (MILLIONS)	COARSE AGGREGATE ANGULARITY <sup>1</sup> (% MIN)		FINE AGGREGATE ANGULARITY <sup>2</sup> (% MIN)		CLAY CONTENT <sup>3</sup> (% - MIN)	FLAT AND ELONGATED <sup>4</sup> (% - MAX)
	≤ 100 MM	> 100 MM	≤ 100 MM	> 100 MM		
< 0.3	55/-	-/-	-	-	40	-
0.3 to < 3	75/-	50/-	40	40	40	10
3 to < 10	85/80 <sup>5</sup>	60/-	45	40	45	
10 < 30	95/90	80/75	45	40	45	
30	100/100	100/100	45	45	50	

<sup>1</sup>Coarse Aggregate Angularity is tested according to ASTM D5821.

<sup>2</sup>Fine Aggregate Angularity is tested according to AASHTO TP-33.

<sup>3</sup>Clay Content is tested according to AASHTO T176.

<sup>4</sup>Flat and Elongated is tested according to ASTM 4791 with a 5:1 aspect ratio.

<sup>5</sup> 85/80 denotes that 85% of the coarse aggregate has one fractured face and 80% has two or more fractured faces.

The following source properties apply to the individual aggregates in the aggregate blend for the proposed JMF.

TEST METHOD	SPECIFICATION LIMITS
<b>Toughness, AASHTO T96</b> Percent Loss, Maximum	40
<b>Soundness, AASHTO T104</b> Percent Loss, Maximum for five cycles	20
<b>Deleterious Materials, AASHTO T112</b> Percent, Maximum	10
<b>Moisture Sensitivity, AASHTO T283</b> Percent, Minimum	80

For any roadway with a minimum average daily traffic volume (ADT) of 8000 vehicles and a posted speed of 35 mph (60 kph) or greater, the polish value of the composite aggregate blend shall be greater than 8.0 when tested according to Maryland State Highway Administration MSMT 411 – “Laboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.” RAP shall be assigned a value of 4.0. The Contractor shall supply all polish values to the Engineer upon request.

#### **Mineral Filler:**

The mineral filler shall conform to AASHTO M17.

#### **Mixture Requirements:**

**Mix Design.** Develop and submit a job mix formula for each mixture according to AASHTO R35. Each mix design shall be capable of being produced, placed, and compacted as specified.

**Gradation:** The FHWA Superpave 0.45 Power Chart with the recommended restricted zone shall be used to define permissible gradations for the specified mixture. Type C shall be either a No.4 (4.75 mm), 3/8” (9.5 mm), or 1/2” (12.5 mm) Nominal Maximum Aggregate Size Hot-Mix. Unless otherwise noted in the Plans, the Type C shall meet the 3/8” (9.5 mm) Nominal Maximum Aggregate Size. Type B Hot-Mix shall be the 3/4” (19.0 mm) Nominal Maximum Aggregate Size and the Bituminous Concrete Base Course (BCBC) shall be the 1” (25.0 mm) Nominal Maximum Aggregate Size. Target values for percent passing each standard sieve for the design aggregate structure shall comply with the Superpave control points and should avoid the

restricted zone. Percentages shall be based on the washed gradation of the aggregate according to AASHTO T11.

In addition to the results of the material requirements specified above, the following material properties shall be provided by the contractor: bulk specific gravity  $G_{sb}$ , apparent specific gravity  $G_{sa}$ , and the absorption of the individual aggregate stockpiles to be used, tested according to AASHTO T84 and AASHTO T85 and reported to three decimal places along with the specific gravity of the mineral filler to be used, tested according to AASHTO T100 and reported to three decimal places.

#### **Superpave Gyratory Compactive (SGC) Effort:**

The Superpave Gyratory Compaction effort employed throughout mixture design, field quality control, or field quality assurance shall be as indicated below. All mixture specimens tested in the SGC shall be compacted to  $N_M$ . Height data provided by the SGC shall be employed to calculate volumetric properties at  $N_I$ ,  $N_D$ , and  $N_M$ .

#### **Superpave Gyratory Compactive (SGC) Effort:**

DESIGN TRAFFIC LEVEL (MILLION ESAL'S)	$N_{INITIAL}$	$N_{DESIGN}$	$N_{MAXIMUM}$
0.3 to < 3	7	75	115
3 to < 30	8	100	160
30	9	125	205

**Volumetric Design Parameters.** The design aggregate structure at the target asphalt cement content shall satisfy the volumetric criteria below:

DESIGN ESAL'S (MILLION)	REQUIRED DENSITY (% OF THEORETICAL MAXIMUM SPECIFIC GRAVITY)			VOIDS-IN-MINERAL AGGREGATE (% - MINIMUM) NOMINAL MAX. AGGREGATE (MM)					VOIDS FILLED WITH ASPHALT (% - MINIMUM)
	N <sub>INITIAL</sub>	N <sub>DESIGN</sub>	N <sub>MAX</sub>	25.0	19.0	9.5	12.5	4.75	
0.3 to < 3	≤ 90.5	96.0	98.0	12.5	13.5	15.5	14.5	16.5	65.0 - 78.0
3 to < 10	89.0								65.0 - 75.0 <sup>1</sup>
10 < 30									
30									

Air voids ( $V_a$ ) at  $N_{design}$  shall be 4.0% for all ESAL designs. Air voids ( $V_a$ ) at  $N_{max}$  shall be a minimum of 2.0% for all ESAL designs.

The dust to binder ratio for the mix having aggregate gradations above the Primary Control Sieve (PCS) Control Points shall be 0.6-1.2. For aggregate gradations below the PCS Control Points, the dust to binder ratio shall be 0.8-1.6. For the No. 4 (4.75 mm) mix, the dust to binder ratio shall be 0.9-2.0 whether above or below the PCS Control Points.

For 3/8" (9.5 mm) Nominal Maximum Aggregate Size mixtures, the specified VFA range shall be 73.0% to 76.0% and for 4.75 mm Nominal Maximum Size mixtures, the range shall be 75 % to 78% for design traffic levels  $\geq 3$  million ESALs.

#### **Gradation Control Points:**

The combined aggregates shall conform to the gradation requirement specified in the following table when tested according to T-11 and T-27.

Nominal Maximum Aggregates Size Control Points, Percent Passing										
	25.0 MM		19.0 MM		12.5 MM		9.5 MM		4.75 MM	
SIEVE SIZE	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
37.5 MM	100	-	-	-	-	-	-	-	-	-
25.0 MM	90	100	100	-	-	-	-	-	-	-
19.0 MM	-	90	90	100	100	-	-	-	-	-
12.5 MM	-	-	-	90	90	100	100	-	100	-
9.5 MM	-	-	-	-	-	90	90	100	95	100
4.75 MM	-	-	-	-	-	-	-	90	90	100
2.36 MM	19	45	23	49	28	58	32	67	-	-
1.18 MM	-	-	-	-	-	-	-	-	30	60
0.075 MM	1	7	2	8	2	10	2	10	6	12

Note: The aggregate's gradation for each sieve must fall within the minimum and maximum limits.

#### **Gradation Classification:**

The Primary Control Sieve (PCS) defines the break point of fine and coarse mixtures. The combined aggregates shall be classified as coarse graded when it passes below the Primary Control Sieve (PCS) control point as defined below. All other gradations shall be classified as fine graded.

PCS CONTROL POINT FOR MIXTURE NOMINAL MAXIMUM AGGREGATES SIZE (% PASSING)					
Nominal maximum Aggregates Size	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.5 mm
Primary Control Sieve	4.75 mm	4.75 mm	2.36 mm	2.36 mm	1.18 mm
PCS Control Point	40	47	39	47	30-60

#### **Plant Production Tolerances:**

Volumetric Property	Superpave Criteria
Air Voids ( $V_a$ ) at (%) $N_m$ Air Voids ( $V_a$ ) at $N_{design}$ (%)	2.0 (min) 5.5 (max)
Voids in Mineral Aggregate (VMA) at $N_{design}$ 25.0 mm Bituminous Concrete Base Course 19.0 mm Type B Hot-Mix 12.5 mm Type C Hot-Mix 9.5 mm Type C Hot-Mix 4.5 mm Type C Hot-Mix	-1.2 +2.0

#### **Design Evaluation:**

The contractor shall furnish a Job Mix Formula (JMF) for review and approval. The Engineer may elect to evaluate the proposed JMF and suitability of all materials. All materials requested by the Engineer shall be provided at the contractor's expense to the Central Laboratory in Dover in a timely manner upon request. To verify the complete mixture design and evaluate the suitability of all materials, the following approximate quantities are required:

5.25 gal (20 liters) of the asphalt binder;

0.13 gal (0.5 liters) sample of liquid heat-stable anti-strip additive;  
254 lb. (115 kg) of each coarse aggregate;  
154 lb. (70 kg) of each intermediate and fine aggregate;  
22 lb. (10 kg) of mineral filler; and  
254 lb. (115 kg) of RAP, when applicable.

**The proposed JMF shall include the following:**

Plot of the design aggregate structure on the FHWA Superpave 0.45 power chart showing the maximum density line, Superpave control points, and recommended restricted zone.

Plot of the three trial asphalt binder contents at  $\pm 0.5\%$  gyratory compaction curves where the percent of maximum specific gravity ( $\% \text{ of } G_{mm}$ ) is plotted against the log base ten of the number of gyrations ( $\log(N)$ ) showing the applicable criteria for  $N_i$ ,  $N_d$ , and  $N_m$ .

Plot of the percent asphalt binder by total weight of the mix ( $P_b$ ) versus the following:

$\% \text{ of } G_{mm}$  at  $N_d$ , VMA at  $N_d$ , VFA at  $N_d$ , Fines to effective asphalt binder ( $P_{be}$ ) ratio, and unit weight ( $\text{kg/m}^3$ ) at both  $N_d$  and  $N_m$ .

Summary of the consensus property standards test results for the design aggregate structure, summary of the source property standards test results for the individual aggregates in the design aggregate structure, target value of the asphalt binder content, and a table of  $G_{mm}$  of the asphalt mixture for the four trial asphalt binder contents determined according to AASHTO T209.

The JMF shall also include the NCAT Ignition Oven calibration for the specific materials utilized for this mix.

**Construction.**

**Weather Limitations.** Place mix only on dry, unfrozen surfaces and only when weather conditions allow for proper production, placement, handling, and compacting.

**Compaction:**

Compaction shall be tested and paid per Item 401699 - Quality Control/Quality Assurance of Bituminous Concrete .05 (b) Pavement Construction - Tests and Evaluations.

**Method of Measurement and Basis of Payment:**

Method of Measurement and Basis of Payment will be in accordance with Subsections 401.14 and 401.15 of the Standard Specifications.

The item 401699, will define adjustment factor to be applied to the bituminous concrete payments for bonus or penalty.

1/06/2010



## **401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE**

### **.01 Description.**

This item shall govern the Quality Control/Quality Assurance Testing for supplying hot-mix asphalt plant materials and constructing hot-mix asphalt pavements.

The Contractor shall be responsible for providing the quality level of materials and construction incorporated into the Contract that will meet the requirements of the Contract. The Contractor shall perform all necessary quality control inspection, sampling, and testing. The Engineer will evaluate all materials and construction for acceptance. The procedures for Quality Control and Acceptance are described in this Section.

### **.02 Definitions.**

**Acceptable Quality Level (AQL):** That level of percent within limits (PWL) to which the Engineer will consider the work completely acceptable.

**Acceptance Plan:** Factors that comprise the Engineer's determination of the degree of compliance with contract requirements and value of the product. These factors include the Engineer's sampling, testing, and inspection.

**Delaware Asphalt Pavement Association (DAPA):** The organization representing the interests of hot-mix asphalt producers and Contractors. The Engineer has a copy of the DAPA officers' names and point(s) of contact.

**Dispute Resolution:** The procedure used to resolve conflicts resulting from discrepancies between the Engineer's and the Contractor's results of sufficient magnitude to impact payment. The testing will take place at a location and time mutually agreeable by both the Engineer and the Contractor.

**Full Depth Construction** – Construction of an adequate pavement box on a subgrade and subbase prepared by the contractor

**Independent Assurance:** An unbiased and independent verification of the Quality Assurance system used, and the reliability of the test results obtained in regular sampling and testing activities. The results of Independent Assurance are not to be directly used as a basis of material acceptance.

**Job Mix Formula (JMF)/Mixture Identification (ID):** The target values for individual aggregate size gradation percentages and the asphalt percentage, the sources of each of the component materials, the proposed proportions of component materials to be used to meet those target values, the asphalt proportion, and the mixing temperature. The Engineer will assign uniquely individual mixture identification for each JMF submitted and approved.

**Lower Quality Index (QL):** The index reflecting the statistic related to the lower boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.

**Mean:** A statistical measure of the central tendency – the average value.

**Operational Day:** A day in which the Engineer has approved a lane closure for the Contractor to perform work within an approved MOT plan.

**Percent Within Limits (PWL):** That amount of material or workmanship that has been determined, by statistical method, to be within the pre-established characteristic boundary(ies).

**Qualified Laboratory:** A laboratory mutually agreed upon by both DAPA and the Engineer as having proper test equipment that has been calibrated in accordance to AASHTO.

**Qualified Technician:** Personnel mutually agreed upon by both DAPA and the Engineer as having adequate training, experience, and abilities to perform the necessary testing. The minimum qualifications are either a recognized nationally accredited or certified Superpave testing certificate or been working in hot-mix asphalt testing for at least one year.

**Quality Assurance (QA):** All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.

**Quality Control (QC):** The sum total of the activities performed by the Contractor in order to assure that the product meets contract requirements.

**Quality Control (QC) Plan:** The detailed description of the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties governed by the Specifications. The QC Plan must address the actions needed to keep the process in control, detect when the process is going out of control, and responses to correct the situation(s).

**Quality Level Analysis:** A statistical procedure that provides a method for estimating the percentage of each lot or subplot of material, product, item of construction, or completed construction that may be expected to be within specified tolerances.

**Standard Deviation:** A term used in statistics to indicate the value calculated from the square root of the difference between the individual measurements in a group and their average. Standard deviation is calculated by taking the square root of the sum of the squares of the differences of each of n values and the mean value, this sum first divided by (n-1).

**Target Value:** The acceptable value for a controlling characteristic of a product. The JMF will establish each of these values for the material.

**Test Methods:** Shall be AASHTO test methods. Copies of these test methods shall be available at each qualified laboratory.

**Upper Quality Index (QU):** The index reflecting the statistic related to the upper boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.

**Volumetric Properties:** Air voids, voids in mineral aggregates (VMA), voids filled with asphalt (VFA), and dust to effective asphalt.

### **.03 Equipment.**

#### **(a) Material Production Test Equipment.**

The Contractor shall establish, maintain, and operate a qualified testing laboratory at the production plant site of sufficient size and layout that will accommodate the testing operations of both the Contractor and the Engineer. The Contractor shall maintain all the equipment used for handling, preparing, and testing materials in proper operating condition. For any laboratory equipment malfunction, the Contractor shall remedy the situation within one working day or the Engineer may reject production. In the case of an equipment malfunction, and while waiting for repairs to equipment, the Engineer may elect to test the material at either another production facility or the Engineer's laboratory to obtain payment factors.

The following shall be the minimum calibrations for the referenced equipment:

- SUPERPAVE<sup>R</sup> Gyratory Compactor: once every year; verified once every month by the Engineer.
- Ovens: once every three months, verified once every month.
- Vacuum Container and Gauge (Rice Bowls): once every three months, verified once every month.
- Balances and Scales: once every year, verified once every month.
- Thermometers: once a year; verified once every month.
- Gyratory Compactor molds and base plates: once every year
- Mechanical Shakers: once every year
- Sieve Verifications: once every year

All calibrations shall be documented and on file for review by the Engineer at any time.

#### **(b) Pavement Construction Test Equipment.**

The Contractor shall furnish and use in-place density gauges, or coring equipment, or both, as necessary to meet the requirements of these Specifications.

### **.04 Quality Control (QC) Plan.**

#### **(a) Material Production QC.**

##### **(1) Job Mix Formula – Material Production.**

The Contractor shall submit for approval to the Engineer the job mix formula (JMF) design of the component materials and target characteristic values for each mixture proposed for use. Once the JMF is submitted to the Engineer, the Engineer will have up to three weeks to review the submitted information. However, a provision for a more timely approval is available to the Contractor; first, the Contractor shall submit the proper documentation on Pinepave mixture design software for the Engineer's approval. After that approval from the Engineer, the Contractor shall produce the new mixture for a non-Department project. The Engineer will test the material, by taking three series per the specifications. If the Engineer's test results are within the specifications, then the mixture will be approved by the Engineer for Department projects.

The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components, and within 0.1 percent for the other components) of each component to be used in order to produce workable hot-mix asphalt having the specified properties. For plant component feed adjustments, RAP can be considered in the same manner as an individual aggregate component. The JMF target characteristic values include the mixing temperature range, core temperature range for gyration, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.

The Contractor shall provide an ignition oven correction number for each JMF. The Contractor shall also supply to the Engineer weighed material of each JMF so correction numbers can be established for the Engineer's equipment for Dispute Resolution samples.

Prior to starting production of a new mixture, the Contractor shall submit a JMF. For any mixture that has a 20% or greater failure rate on any combined volumetric criteria, the JMF will not be approved for use on Department contracts. In order to be approved, a re-design of the mixture will have to be completed by the Contractor for review and approval by the Engineer. The Contractor shall uniquely title each JMF. The Contractor shall submit test data with each JMF and tests performed by a Qualified Laboratory on representative materials, verifying the adequacy of the design. Refer to the specifications for each mix type in order to determine the design requirements. The JMF sieve percentage values shall conform to the ranges shown in Table 1.

If there is a change in the source of any of the component materials, other than asphalt, if there is a change in the proportions of the aggregate components or the percent passing for each sieve by more than 5 percent from the submitted JMF, or if there is a change in the percentage of the asphalt cement component by 0.2 percent or more, which causes the volumetrics to change from the originally submitted JMF, a new JMF is required. Also, if the asphalt cement target percentage is lowered, all volumetric criteria must still be achieved.

According to the Contractor's QC Plan, the Contractor shall inform the Engineer of any proposed changes to an existing JMF. The Contractor shall notify the Engineer by electronic mail of the proposed changes. The Engineer will reply to the proposed changes within one operational day and notify the Contractor of the effective date of the changes.

Although a new JMF is not required, the Contractor must notify the Engineer of any change in the proportions of the components. This notification shall include the total change made from the approved JMF proportions, and the effective time of the change.

All submitted JMF's shall correspond to the Pinepave mixture design software. The Engineer, for evaluation of the submitted JMF, will use the first three test samples. These test results acquired during production shall be within the following range compared to the submitted JMF on the Pinepave mixture design software:  $G_{mm}$ : + / - 0.030 and  $G_{mb}$ : + / - 0.040

<b>Table 1 - Aggregate Gradation - JMF and Control Point Information</b>										
<b>Sieves to be addressed by JMF/Range values are percentages passing by weight</b>										
<b>Sieve Size mm (inch)</b>	<b>4.75 mm</b>	<b>4.75mm Range</b>	<b>9.5 mm</b>	<b>9.5mm Range</b>	<b>12.5 mm</b>	<b>12.5mm Range</b>	<b>19.0 mm</b>	<b>19.0mm Range</b>	<b>25.0 mm</b>	<b>25.0mm Range</b>
37.5(1.5)	No		No		No		No		Yes	100
25.0(1.0)	No		No		No		Yes	100	Yes	90-100
19.0 (3/4)	No		No		Yes	100	Yes	90-100	Yes	20-90
12.5(1/2)	Yes	100	Yes	100	Yes	90-100	Yes	23-90	Yes	
9.5 (3/8)	Yes	95-100	Yes	90-100	Yes	28-90	Yes		Yes	
4.75(#4)	Yes	90-100	Yes	32-90	Yes		Yes		Yes	
2.36(#8)	Yes		Yes	32-67	Yes	28-58	Yes	23-49	Yes	19-45

<b>Table 1 - Aggregate Gradation - JMF and Control Point Information</b>										
<b>Sieves to be addressed by JMF/Range values are percentages passing by weight</b>										
<b>Sieve Size mm (inch)</b>	<b>4.75 mm</b>	<b>4.75mm Range</b>	<b>9.5 mm</b>	<b>9.5mm Range</b>	<b>12.5 mm</b>	<b>12.5mm Range</b>	<b>19.0 mm</b>	<b>19.0mm Range</b>	<b>25.0 mm</b>	<b>25.0mm Range</b>
(#16)	Yes	30-60	Yes		Yes		Yes		Yes	
(#30)	Yes		Yes		Yes		Yes		Yes	
(#50)	Yes		Yes		Yes		Yes		Yes	
(#100)	Yes		Yes		Yes		Yes		Yes	
.075(#200)	Yes	6-12	Yes	2-10	Yes	2-10	Yes	2-8	Yes	1-7

## **(2) Process Control – Material Production.**

The Contractor shall submit in writing (letter or electronic mail) a QC Plan from each proposed production plant to the Engineer; no hot-mix asphalt material will be accepted until the Engineer approves the QC Plan. This plan must be submitted to the Engineer on an annual basis for review and approval prior to material production. The Engineer will send a signed copy back to the Contractor stating that it is approved. The approved QC Plan shall govern contractor operations.

The following are considered significant violations to the Contractor's QC Plan:

Using testing equipment that is knowingly out of calibration or is not working properly.

Reporting false information such as test data, JMF information, or any info requested by DelDOT

When the Contractor fails to comply to their approved QC Plan in reference to materials testing

Substantial deviations to AASHTO or DelDOT procedures when running tests, sampling stockpiles, or testing hot mix.

The use of any material not listed in the JMF.

The use of the wrong PG graded asphalt.

If samples fall within the Contractors action points in the QC Plan but the Contractor fails to take the corrective action in the approved QC Plan

If a Contractor is found in violation of any of these items, they will receive a written warning for their first violation. If the Contractor is found in violation a second time on any of the criteria, they will forfeit any bonus from that day's production. If the Contractor is found in violation a third time on any of the criteria, they will receive a five percent (5%) deduction for that day's production. If the Contractor is found in violation a fourth time, the plant will not be approved for production until such time that the Contractor addresses the violation of the QC plan to the satisfaction of the Engineer. If the Engineer approves the changes in advance, the Contractor may make changes to the QC Plan. All changes shall be submitted and approved in writing by the Engineer.

The QC Plan shall include actions that will assure all materials and products will conform to the specifications, whether manufactured or processed by the Contractor, or procured from suppliers, subcontractors, or vendors. The Contractor shall perform the inspection and tests required to substantiate product conformance to contract requirements. The Contractor shall document QC inspections and tests, and provide copies to the Engineer when requested. The Contractor shall maintain records of all inspections and tests for at least one year. The records shall include the date, time, and nature of deficiency or deficiencies found; the quantities of material involved until the deficiency was corrected; and the date, time, and nature of corrective actions taken.

In the QC Plan, the Contractor shall detail the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties of material and construction governed by the Specifications. The QC Plan shall include the following elements as a minimum:

Production Plant – make, type, capacity, and location.

Production Plant Calibration – components and schedule; address documentation.

Personnel – include name and telephone number for the following individuals:

Person responsible for quality control.

Qualified technician(s) responsible for performing the inspection, sampling, and testing.

Person who has the authority to make corrective actions on behalf of the Contractor.

Testing Laboratory – state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.

Locations where samples will be obtained and the sampling techniques for each test

Load number of QC samples (1-10 if QA sample is not within trucks 1-10)

Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:

Mixture Temperature: each of the first five trucks, and each load that is sampled for QC or acceptance testing.

Gradation analysis of aggregate (and RAP) stockpiles – one washed gradations per week for each aggregate stockpile; RAP: five gradations and asphalt cement contents for dedicated stockpiles where new material is not being added; one gradation and asphalt cement content test per week for stockpiles where material is continually being added to the stockpile.

Gradation analysis of non-payment sieves

Dust to effective asphalt calculation

Moisture content analysis of aggregates – daily.

Gradation analysis of the combined aggregate cold feed – one per year per mixture.

Bulk specific gravity and absorption of blended material – one per year per mixture.

Ignition Oven calibration – one per year per mixture.

Hot-Bins: one per year per mixture.

Others, as appropriate.

Procedures for reporting the results of inspection and tests (include schedule).

Procedures for dealing with non-compliant material or work.

Presentation of control charts. The Contractor shall plot the results of testing on individual control charts for each characteristic. The control charts shall be updated within one working day as test results for each subplot become available. The control charts shall be easily and readily accessible at the plant laboratory. The following parameters shall be plotted from the testing:

Asphalt cement content.

Volumetrics (air voids, voids in mineral aggregates [VMA])

Gradation values for the following sieves:

- 4.75 mm (#4).
- 2.36 mm (#8).
- 0.075 mm (#200).

Operational guidelines (trigger points) to address times when the following actions would be considered:

Increased frequency of sampling and testing.

Plant control/settings/operations change.

JMF adjustment.

JMF change (See Section .04(a)(1)).

Change in the source of the component materials.

Calibration of material production equipment (asphalt pump, belt feeders, etc.).

Rejection of material.

When any point of non-compliance with the QC plan, or material not meeting the Specifications, comes to the attention of either the Contractor or the Engineer, the other party shall be notified immediately, and the Contractor shall take appropriate corrective actions. Failure to take corrective actions immediately shall be cause for rejection of material or work by the Engineer.

#### **(b) Pavement Construction – Process Control.**

The Contractor shall perform Quality Control of pavement compaction by testing in-place pavement with a density gauge or by testing cores extracted from the pavement. The use of the nuclear density gauge

shall conform to ASTM D2950; the use of other density gauges shall be as per the manufacturer's recommendations and approved by the Engineer. The Contractor may use any method to select locations for the Quality Control.

## **.05 Acceptance Plan.**

### **(a) Material Production – Tests and Evaluations.**

The Engineer will conduct acceptance tests. The Engineer will directly base acceptance on the acceptance test results, the asphalt cement quality, the Contractor's QC Plan work, and the comparisons of the acceptance test results to the QC test results. The Engineer may elect to utilize test results of the Contractor in some situations toward judging acceptance. All acceptance tests shall be performed by qualified technicians at qualified laboratories following AASHTO or DelDOT procedures, and shall be evaluated using Quality Level Analysis.

The Contractor shall supply, capture, and mark samples, as directed, from delivery trucks before the trucks leave the production plant. The sample shall represent the material produced by the Contractor, and shall be of sufficient size to allow the Engineer to complete all required acceptance tests. The Engineer will direct the Contractor when to capture these samples, on a statistically random, unbiased basis, established before production begins each day based upon the anticipated production tonnage. The captured sample shall be from the Engineer specified delivery truck; if the Contractor visually observes the specified delivery truck sample and does not want this sample to be sampled and tested for acceptance, that delivery truck will not be sent to a Department project. The next visually acceptable delivery truck to the Contractor shall be sampled for acceptance testing.

The first sample of the production day will be randomly generated by the Engineer between loads 0 and 12 (0-250 tons). Subsequent samples will be randomly generated by the Engineer on 500-ton sub-lots for the production day. Unacceptable samples may be a basis for rejection of material if the QC plan is not followed as approved for sample retrieval. If the Contractor wishes to perform parallel tests with the Engineer, or to capture samples to be retained for possible Dispute Resolution, each of the samples for these purposes shall be obtained at the same time and location as the acceptance test sample. Either splitting a large sample or getting multiple samples that equally represent the material is acceptable. The Engineer will perform all splitting and handling of samples after they are obtained by the Contractor.

The Engineer will evaluate and accept the material on a lot basis. All the material within a lot shall have the same JMF (mixture ID). The lot size shall be targeted for 2000 tons or a maximum period of three days, whichever is reached first. If the 2000<sup>th</sup> ton target lot size is achieved during a production day, the lot size shall extend to the end of that production day. The Contractor may interrupt the production of one JMF in order to produce different material; this type of interruption will not alter the determination of the size or limits of material represented by a lot. The Engineer will evaluate each lot on a subplot basis. The size for each subplot shall be 100 to 500 tons and testing for the sub lots will be completed on a daily basis. For each subplot, the Engineer will evaluate one sample.

The target size of sub-lots within each lot, except for the first sample of the production day, is equal-sized 500 ton sub lots and will be based upon anticipated production, however, more or fewer sublots, with differing sizes, may result due to the production schedule and conditions. If the actual production is less than anticipated, and it's determined a sample will not be obtained (based upon the anticipated tonnage), a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. If the actual production is going to be 50 tons or greater over the anticipated sub lot production, a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. The Engineer will combine the evaluation and test results for all of the applicable sublots in order to evaluate each individual lot.

If the Engineer is present, and the quantity exceeds 25 tons, a statistically random sample will be used for analysis. When the anticipated production is less than 100 tons and greater than 25 tons, and the Engineer is not present, the contractor shall randomly select a sample using the Engineer's random location program. The captured sample shall be placed in a suitable box, marked to the attention of the Engineer, and submitted to the Engineer for testing. A box sample shall also be obtained by the contractor at the same time and will be used as the Dispute Resolution sample if requested by the Engineer. The contractor shall also obtain one liquid asphalt sample (1 pint) per grade of asphalt used per day and properly label it with all pertinent information.

The Engineer will conduct the following tests in order to characterize the material for the pavement compaction quality, and to judge acceptance and the pay adjustment for the material:

AASHTO T312 – Preparing a mixture samples using a gyratory compactor.  
AASHTO T166, Method C (Rapid Method) – Bulk specific gravity of compacted samples.  
AASHTO T308 – Asphalt cement content.  
AASHTO T30 – Aggregate gradations, using samples from the asphalt cement content test.  
AASHTO T209 – Theoretical maximum specific gravity.  
ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method

**(b) Pavement Construction – Tests and Evaluations.**

The Engineer will directly base acceptance on the compaction acceptance test results, and on the inspection of the construction, the Contractor's QC Plan work, ride smoothness as referenced in the contract documents, lift thickness as referenced in the contract documents, joint quality as referenced in the contract documents, surface texture as referenced in the contract documents, and possibly the comparisons of the acceptance test results to the independent test results. For the compaction acceptance testing, the Engineer will sample the work on a statistically random basis, and will test and evaluate the work using lots.

Prior to paving a road segment, the Contractor shall notify the Engineer of any locations within that road segment that may not be suitable to achieve minimum (93%) compaction due to existing conditions. The Contractor shall schedule and hold a meeting in the field with the Engineer in order to discuss all areas that may potentially be applicable to Table 5a before paving starts. Areas that will be considered for Table 5a will be investigated in accordance to the method described in Appendix B. If this meeting is not held prior to paving, no areas will be considered for Table 5a. Areas of allowable exemptions that will not be cored include the following: partial-depth patch areas, driveway entrances, paving locations of less than 100 tons, areas around manholes and driveway entrances, and areas of paving that are under 400 feet in continuous total length and/or 5 feet in width.

The exempt areas around manholes will be a maximum of 4 feet transversely on either side from the center of the manhole, and 20 feet longitudinally on either side from the center of the manhole. The exempt areas around driveway entrances shall be the entire width of the driveway, and 3 feet from the edge of the longitudinal joint next to the driveway. Areas of exemption that will be cored for informational purposes only shall include: areas where the mat thickness is less than three times the nominal maximum aggregate size as directed by the Engineer, violations of Section 401.08 in the Standard Specifications as directed by the Engineer, and areas shown to contain questionable subgrade properties as proven by substantial yielding under a fully legally loaded truck. Failure to obtain core samples in these areas will result in zero payment for compaction regardless of the exempt status.

The Engineer will evaluate and accept the compaction work on a daily basis. Payment for the compaction will be calculated by using the material production lots as referenced in **.05 Acceptance Plan (a) Material Production – Tests and Evaluation** and analyzing the compaction results over the individual days covered in the material production lot. The compaction results will be combined with the material results to obtain a payment for this item.

The minimum size of a compaction lot shall be 100 tons. If the compaction lot is between 101 and 1000 tons, the Engineer shall randomly determine four compaction acceptance test locations. If the compaction lot is between 1001 and 1500 tons, the Engineer shall randomly determine six compaction acceptance test locations. If the compaction lot is between 1501 and 2000 tons, the Engineer shall randomly determine eight compaction acceptance test locations. If the compaction lot is greater than 2000 tons, the Engineer shall randomly determine two compaction acceptance test locations per 500 tons.

If a randomly selected area falls within an Engineer approved exemption area, the Engineer will select one more randomly generated location to be tested per the requirements of this Specification. If that cannot be accomplished, or if an entire location has been declared exempt, the compaction testing shall be performed as per these Specifications but a note will be added to the results that the location was an Engineer approved exempt location.

Testing locations will be a minimum of 1.5 feet from the newly placed longitudinal joint and 50 feet from a new transverse joint. If the Contractor chooses to cut companion cores, they shall be located within

one foot of the Engineers cores along the longitudinal direction and in-line with the Engineers cores in the longitudinal plane.

Exactly at the locations marked by the Engineer, the Contractor shall cut a core, 6 inches in diameter, through the full lift depth. Cores submitted that are not from the location designated by the Engineer will not be tested and will be paid at zero pay.

The Contractor shall notify the Engineer prior to starting paving operations with approximations of the tonnage to be placed. The Contractor is then responsible for notifying the appropriate Engineer test personnel within 12 hours of material placement. The Engineer will then have 24 hours to mark the core locations. After determination of locations, the Contractor shall complete testing within two operational days of the locations being marked. If the cores are not cut within two operational days, the area in question will be paid at zero pay for compaction testing.

The Contractor shall provide any traffic control required for the structural number investigation, sampling, and testing work at no additional cost to the Department.

The Contractor shall cut each core with care in order to prevent damaging the core. The pavement shall have a maximum temperature of 140 °F when cores are cut from it. Immediately upon removal of a core from the roadway, the Contractor shall adequately label it. The Contractor shall protect the core by supplying a 6-inch plastic concrete cylinder mold, or an approved substitute, and placing the core in it. If more than one core is in the same mold, the Contractor shall place paper between them. The Contractor shall attach a completed QC test record for the representative area to the corresponding core. The Engineer will also complete a test record for areas tested for the QA report and provide to Materials & Research. At the end of every production day, the Contractor shall deliver the cores to the Engineer for testing, processing, and report distribution.

The Contractor shall repair the core hole per Appendix A, Repairing Core Holes in Hot-Mix Asphalt Pavements. Core holes shall be filled immediately. Failure to repair core holes at the time of coring will result in zero pay for compaction testing for the area in question.

The Engineer will conduct the following tests on the applicable portion of the cores in order to evaluate their quality:

AASHTO T166, Method C (Rapid Method) – to determine the bulk specific gravity of the cores.

AASHTO T209 – to calculate the theoretical maximum specific gravity and the density of the non-compacted mixtures.

ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method.

The Engineer will use the average of the last five test values of the same JMF (mixture ID) material at the production plant in order to calculate the average theoretical maximum specific gravity of the cores. The average will be based on the production days test results and as many test results needed from previous days production to have an average of five samples. If there are less than five values available, the Engineer will use the JMF design value in addition to the available values to calculate the average theoretical maximum specific gravity.

#### **.06 Payment and Pay Adjustment Factors.**

The Contractor shall include the costs for all materials, labor, equipment, tools, and incidentals necessary to meet the requirements of this specification in the bid price per ton for the hot-mix asphalt. Payment to the Contractor for the hot-mix asphalt item(s) will be based on the Contract price per ton and the pay adjustments described in this specification. The Engineer will determine pay adjustments for the hot-mix asphalt item(s) based on the Acceptance Plan. The Engineer will determine both a pay adjustment for the material and a pay adjustment for the pavement construction. Note that the material portion of the total pay adjustment is 70 percent and the pavement construction portion is 30 percent. For replaced material or work, the Engineer will not apply the Pay Adjustment applicable to the material or work replaced; a new Pay Adjustment will be calculated based on the qualities of the new material. Even if one portion of the pay adjustment (material or construction) is not applied, the Engineer may apply the pay adjustment to the other portion. All adjustments (bonus or penalty) shall be paid under this item number in the contract.



**(a) Material Production – Pay Adjustment.**

The Engineer will determine the material pay adjustment by evaluating the production material based on the following parameters:

Gradation of the 2.36 mm (#8) sieve.  
 Gradation of the 0.075 mm (#200) sieve.  
 Asphalt cement content.  
 Air void content

Using the JMF target value, the single test tolerance (from Table 3), and the test values, the Engineer will use the following steps to determine the material pay adjustment factor for each lot of material:

1. For each parameter, calculate the mean value and the standard deviation of the test values for the lot to the nearest 0.1 unit.
2. For each parameter, calculate the Upper Quality Index (QU):  

$$QU = ((\text{JMF target}) + (\text{single test tolerance}) - (\text{mean value})) / (\text{standard deviation}).$$
3. For each parameter, calculate the Lower Quality Index (QL):  

$$QL = ((\text{mean value}) - (\text{JMF target}) + (\text{single test tolerance})) / (\text{standard deviation}).$$
4. For each parameter, locate the values for the Upper Payment Limit (PU) and the Lower Payment Limit (PL) from Table 2 – Quality Level Analysis by the Standard Deviation Method. (Use the column for “n” representing the number of sublots in the lot. Use the closest value on the table when the exact value is not listed).
5. Calculate the PWL for each parameter from the values located in the previous step:  

$$PWL = PU + PL - 100.$$
6. Calculate each parameter’s contribution to the payment adjustment by multiplying its PWL by the weight factor shown in Table 3 for that parameter.
7. Add the calculated adjustments of all the parameters together to determine the Composite PWL for the lot.
8. From Table 4, locate the value of the Pay Adjustment Factor corresponding to the calculated PWL.
9. For each lot, determine the final material price adjustment:

Final Pay Adjustment =

(Lot Quantity) x (Item Bid Price) x (Pay Adjustment Factor) x 70%. This final pay calculation will be paid to the tenth of a percent.

In lieu of being assessed a pay adjustment penalty, the Contractor may choose to remove and replace the material at no additional cost to the Department. If the PWL of any single material characteristic is below 60, the Engineer may require the removal and replacement of the material at no additional cost to the Department.

The test results from the Engineer on production that is less than 100 tons will be combined with the two most recently completed Engineer tests with the same Mixture ID to calculate payment for the lot encompassing the single test. If that cannot be accomplished, the approved JMF will be used to calculate payment for the lot encompassing the single test. Payment for previously closed lots will not be affected by the analysis.

When a sample is out of the acceptable tolerance for any Materials pay criteria, that sample will be isolated. For payment purposes, the test result of the out of acceptable tolerance sample will be combined with the two previous acceptable samples of the same JMF and analyzed per this specification. The material that is considered out of the acceptable tolerance will only include the material within the represented sub-lot (i.e., a maximum of 500 tons). If the previous acceptable test result is from the previous production day, only the material produced on the second production day will be considered out of tolerance. All future sub lots will not include the isolated test.

If, during production, a QA sample test result does not meet the acceptable tolerances and the Contractors QC sample duplicates the QA sample test result, the Contractor can make an appropriate change to the mixture (within the JMF boundaries), and request to have that sample further isolated. If this request is approved, and the Contractor has made a change, the third load after the change will be tested. If that sample test result shows compliance with the specifications, the material that is considered out of the

acceptable tolerance will include the material from the previous acceptable test result to the third load after the initially sampled and tested sample. If the sample does not meet the specification requirements, the Engineer will no longer accept material. Production may resume when changes have been made and an acceptable sample and test result is obtained.

<b>Table 2 – Quality Level Analysis by the Standard Deviation Method</b>							
<b>PU or PL</b>	<b>QU and QL for “n” Samples</b>						
	<b>n = 3</b>	<b>n = 4</b>	<b>n = 5</b>	<b>n = 6</b>	<b>n = 7</b>	<b>n = 8</b>	<b>n = 9</b>
100	1.16	1.50	1.79	2.03	2.23	2.39	2.53
99		1.47	1.67	1.80	1.89	1.95	2.00
98	1.15	1.44	1.60	1.70	1.76	1.81	1.84
97		1.41	1.54	1.62	1.67	1.70	1.72
96	1.14	1.38	1.49	1.55	1.59	1.61	1.63
95		1.35	1.44	1.49	1.52	1.54	1.55
94	1.13	1.32	1.39	1.43	1.46	1.47	1.48
93		1.29	1.35	1.38	1.40	1.41	1.42
92	1.12	1.26	1.31	1.33	1.35	1.36	1.36
91	1.11	1.23	1.27	1.29	1.30	1.30	1.31
90	1.10	1.20	1.23	1.24	1.25	1.25	1.26
89	1.09	1.17	1.19	1.20	1.20	1.21	1.21
88	1.07	1.14	1.15	1.16	1.16	1.16	1.17
87	1.06	1.11	1.12	1.12	1.12	1.12	1.12
86	1.04	1.08	1.08	1.08	1.08	1.08	1.08
85	1.03	1.05	1.05	1.04	1.04	1.04	1.04
84	1.01	1.02	1.01	1.01	1.00	1.00	1.00
83	1.00	0.99	0.98	0.97	0.97	0.96	0.96
82	0.97	0.96	0.95	0.94	0.93	0.93	0.93
81	0.96	0.93	0.91	0.90	0.90	0.89	0.89
80	0.93	0.90	0.88	0.87	0.86	0.86	0.86
79	0.91	0.87	0.85	0.84	0.83	0.82	0.82
78	0.89	0.84	0.82	0.80	0.80	0.79	0.79
77	0.87	0.81	0.78	0.77	0.76	0.76	0.76
76	0.84	0.78	0.75	0.74	0.73	0.73	0.72
75	0.82	0.75	0.72	0.71	0.70	0.70	0.69
74	0.79	0.72	0.69	0.68	0.67	0.66	0.66
73	0.75	0.69	0.66	0.65	0.64	0.63	0.63
72	0.74	0.66	0.63	0.62	0.61	0.60	0.60
71	0.71	0.63	0.60	0.59	0.58	0.57	0.57
70	0.68	0.60	0.57	0.56	0.55	0.55	0.54

<b>Table 2 – Quality Level Analysis by the Standard Deviation Method</b>							
<b>PU or PL</b>	<b>QU and QL for “n” Samples</b>						
	<b>n = 3</b>	<b>n = 4</b>	<b>n = 5</b>	<b>n = 6</b>	<b>n = 7</b>	<b>n = 8</b>	<b>n = 9</b>
69	0.65	0.57	0.54	0.53	0.52	0.52	0.51
68	0.62	0.54	0.51	0.50	0.49	0.49	0.48
67	0.59	0.51	0.47	0.47	0.46	0.46	0.46
66	0.56	0.48	0.45	0.44	0.44	0.43	0.43
65	0.52	0.45	0.43	0.41	0.41	0.40	0.40
64	0.49	0.42	0.40	0.39	0.38	0.38	0.37
63	0.46	0.39	0.37	0.36	0.35	0.35	0.35
62	0.43	0.36	0.34	0.33	0.32	0.32	0.32
61	0.39	0.33	0.31	0.30	0.30	0.29	0.29
60	0.36	0.30	0.28	0.27	0.27	0.27	0.26
59	0.32	0.27	0.25	0.25	0.24	0.24	0.24

<b>Table 3 - Material Parameter Weight Factors</b>		
<b>Material Parameter</b>	<b>Single Test Tolerance (+/-)</b>	<b>Weight Factor</b>
Asphalt Content	0.4	0.30
#8 Sive (19 mm or >)	7.0	0.30
#8 Sieve (12.5 mm or <)	5.0	0.30
#200 Sieve (0.075 mm) Sieve	2.0	0.30
Air Voids (4.0% Target)	1.5	0.10

<b>Table 4 - PWL Pay Adjustment Factors</b>	
<b>PWL</b>	<b>Pay Adjustment Factor (%)</b>
100	+5
99	+4
98	+3
97	+2
96	+1
95	0
94	(-1)
93	(-2)
92	(-3)
91	(-4)
PWL (when <91)	(PWL - 100)

**(b) Pavement Construction – Pay Adjustments.**

The Engineer will determine the pavement construction pay adjustment by evaluating the construction of the pavement, based on the following parameter:

Degree of compaction of the in-place material

Using the test values for the cores, the Engineer will use the following steps to determine the pavement construction pay adjustment for each lot of work. Note that the material portion of the total pay adjustment is 70 percent and the pavement construction portion is 30 percent.

1. Calculate the average density values from the subplot tests values, to the nearest 0.1 unit.
2. Calculate the Degree of Compaction:  
Degree of Compaction =  
 $((\text{Core Bulk Specific Gravity}) / (\text{Theoretical Maximum Specific Gravity})) \times 100\%$ .
3. The average compaction for the sublots shall be averaged together for the compaction level of the lot. The lots compaction test level shall be averaged to the whole percent.
4. Locate the value of the Payment Adjustment Factor corresponding to the calculated degree of compaction from Table 5 or Table 5a.
5. Determine the pavement construction price adjustment by using the following formula:  
Pay adjustment = (Lot Quantity) x (Bid Price) x (Pay Adjustment Factor) x 30%.

<b>Table 5: Compaction Price Adjustment Highway Locations</b>	
<b>Degree of Compaction (%)</b>	<b>Pay Adjustment Factor (%)</b>
>97	-100*
96	-3
95	0
94	0
93	+5
92	0
91	-15
90	-25
89	-30
≤88	-100*

\* or remove and replace it at Engineer's discretion

<b>Table 5a: Compaction Price Adjustment Other<sup>1</sup> Locations</b>	
<b>Degree of Compaction (%)</b>	<b>Pay Adjustment Factor (%)</b>
>96	-100*
95	-2
94	0
93	+3
92	0
91	0
90	0
89	-1

<b>Table 5a: Compaction Price Adjustment Other<sup>1</sup> Locations</b>	
<b>Degree of Compaction (%)</b>	<b>Pay Adjustment Factor (%)</b>
88	-5
87	-15
86	-25
85	-30
84	-100*

\* or remove and replace at Engineer's discretion

<sup>1</sup> This chart is to be used for areas where the structural value of the area to be paved is less than 1.75 as determined by the Engineer. See Appendix B – Method for Obtaining Cores for Determination of Roadway Structure. This chart is applicable to rehabilitation work only; full depth construction will not be considered for Table 5a.

### **.07 Dispute Resolution.**

Disputes or questions about any test result shall be immediately brought to the attention of the Contractor and the Engineer. When there is a significant alleged discrepancy regarding the Engineer's acceptance test results, the Contractor must claim a dispute within two operational days of the test date. The following dispute resolution procedures will be used.

The Engineer and the Contractor will review the sample quality, the test method, the laboratory equipment, and the laboratory technician. If these factors are not the cause of the dispute, a third party dispute resolution will be used.

For third party resolution testing, it can be either at another Contractor's laboratory, the Engineer's laboratory, or an independent accredited laboratory. Unless otherwise mutually agreed upon by DAPA and the Engineer, the Engineer's qualified laboratory in Dover and qualified personnel shall conduct the necessary testing for third party Dispute Resolution after the Engineer has provided reasonable notice to allow the Contractor to witness this testing.

When disputes over production testing occur, the samples used for Dispute Resolution testing will be those samples the Contractor properly captured, labeled, and stored, as described in the second paragraph of the section of these specifications titled **.05 Acceptance Plan, (a) Material Production – Tests and Evaluations**. If no samples are available, the original testing results will be used for payment calculations.

Dispute Resolution samples for air void content will be heated by a microwave oven.

If there is a discrepancy between the Engineer's acceptance test result and the Contractor's test result, the Contractor may ask for the Dispute Resolution sample to be tested. If the Dispute Resolution sample substantiates the original acceptance test result, the Contractor, after two such Dispute Resolution samples, will be charged a fee of \$125 for all further Dispute Resolution cores that substantiate the acceptance test result. If the Dispute Resolution sample substantiates the Contractor's test result, the Contractor will not be charged a fee.

When disputes over compaction core test results occur, the Engineer's acceptance core will be used for the dispute resolution sample. The Contractor will be advised on when the testing will occur as referenced above to witness the testing.

The results of the dispute resolution testing shall replace all of the applicable disputed test results for payment purposes.

02/28/09

**Appendix A - Repairing Core Holes in Hot-Mix Asphalt Pavement**

**Description.**

This appendix describes the procedure required to acceptably repair core holes in a bituminous concrete pavement.

**Materials and Equipment.**

The following material shall be available to complete this work:

Patch Material – A DelDOT approved High Performance Cold Patch material shall be used.

The following equipment shall be available to complete this work:

Sponge or other absorbent material – Used to extract water from the hole.

Compaction Hammer – Shall be mechanical, with a flat, circular tamping face smaller than 6 inches in diameter. The tamping head shall be connected to an electrical, pneumatic, or gasoline driven tamping device.

**Construction Method.**

After core removal from the hole, remove all excess water from within the hole, and prevent water from re-entering the hole.

Place the patch material in lifts no greater than 3 inches. If the hole is deeper than 3 inches, use two lifts of approximately equal depths so that optimum compaction is achieved. Make sure that the patch surface matches the grade of the existing roadway. Make every effort to achieve the greatest possible compaction

**Performance Requirements.**

The Engineer will judge the patch on the following basis:

The patch shall be well compacted

The patch surface shall match the grade of the surrounding roadway surface.

**Basis of Payment.**

No measurement or payment will be made for the patching work. The Contractor must gain the Engineer's acceptance of the patching work before the Engineer will accept the material represented by the core.

### **Appendix B - Method for Obtaining Cores for Determination of Roadway Structure**

The Contractor is responsible for obtaining cores in areas that they propose are eligible for compaction price adjustments according to Table 5a in this specification. Table 5a is not applicable for new full-depth pavement box construction. Cores submitted for this process shall be obtained according to the following process.

1. Contact Materials & Research (M&R) personnel to determine if information about the area is already available. If M&R has already obtained cores in the location that is being investigated, the contractor may opt to use the laboratory information for the investigation and not core the area on their own.
2. If M&R does not have information concerning the section of the roadway, the contractor needs to contact M&R to arrange for verification of coring operations. Arrangements shall be made to allow for an individual from M&R to be on the site when the cores are obtained. Cores will be turned over to M&R for evaluation.
3. The contractor is responsible for providing all traffic control and repairing core holes in accordance to 401699 Appendix A – Repairing Core Holes in Hot-Mix Asphalt Pavements.
4. Cores are to be taken throughout the entire project for the area in question. Cores will be spaced, from the start of the project in increments determined based on field and project specifics. Cores will be evenly distributed throughout the project location. The cores will be taken in the center of the lane in question.
5. Additional cores may be taken at other locations, if surface conditions indicate that there may be a substantial difference in the underlying section. The location of these cores should be documented and submitted to M&R.
6. Cores shall be full depth and include underlying materials. If there is a stone base included in the pavement section, at a minimum 1 core must have information concerning the thickness of the base. This is determined by augering to the subgrade surface.
7. The calculations used to determine the structural capacity of the roadway is as follows. If the contractor finds, upon starting the coring process, that the areas are of greater thickness than applicable to Table 5a, they may terminate the coring process on their own and retract the request.

### **Structural Number Calculations**

Each pavement box material is assigned a structural coefficient based upon AASHTO design guides. The structural coefficient is used to determine the total strength of the pavement section.

Materials used in older pavement sections are assigned lower structural coefficients to compensate for aging of the materials. The coefficients used to determine the structural number of an existing pavement are:

<b>Existing Material</b>	<b>Structural Coefficient</b>
HMA	0.32
Asphalt Treated Base	0.26
Soil Cement	0.16
Surface Treatment (Tar & Chip)	0.10
GABC	0.14
Concrete	0 - 0.7*

- \* The Structural Coefficient of Concrete is dependent upon the condition of the concrete. Compressive strengths & ASR analysis are used to determine condition – contact the Engineer if this situation arises.

Newly placed materials use a different set of structural coefficients. They are as follows:

New Material	Structural Coefficient
HMA	0.40
Asphalt Treated Base (BCBC)	0.32
Soil Cement	0.20
GABC	0.14

**Example:**

Location includes placement of a 1.25" Type C overlay on 2.25" Type B. Existing roadway is cored and is shown to consist of 2" HMA on 7" GABC.

Calculation:

For the Type B lift the calculation would be:

$$\begin{array}{rclcl}
 \text{Existing HMA} & 2 * 0.32 & = & 0.64 \\
 \text{GABC} & 7 * 0.14 & = & \underline{0.98} \\
 & & & 1.62
 \end{array}$$

For the Type C lift the calculation would be:

$$\begin{array}{rclcl}
 \text{Newly Placed B} & 2.25 * 0.4 & = & 0.90 \\
 \text{Existing HMA} & 2 * 0.32 & = & 0.64 \\
 \text{GABC} & 7 * 0.14 & = & \underline{0.98} \\
 & & & 2.52
 \end{array}$$



**403510 - POLYMER-MODIFIED EMULSION MICRO-SURFACING (SQUARE YARDS)**  
**403511 - POLYMER-MODIFIED EMULSION MICRO-SURFACING (TON)**  
**403512 - POLYMER-MODIFIED EMULSION MICRO-SURFACING, ROLLED (SQUARE YARDS)**

**Description:**

This work consists of furnishing and constructing a polymer-modified emulsion paving system on a properly prepared foundation to create a durable, smooth-riding, skid-resistant, free-draining roadway surface.

In general, item 403511 is used where a variable thickness of material is required such as a leveling course; and item 403510 and 403512 is used where a uniform thickness of material is to be placed.

**Materials:**

Coarse Aggregate. Coarse aggregate shall conform to Section 805. The use of gravel or crushed gravel will not be permitted.

Fine Aggregate. Fine aggregate shall conform to Section 804 except for the gradation requirements.

Mineral Filler. Mineral filler shall be used by the Contractor. It shall be non-air-entrained Portland cement or hydrated lime conforming to AASHTO M17, Mineral Filler for Bituminous Paving Mixtures.

Bituminous Material. Bituminous material shall be polymer-modified, cationic, emulsified asphalt. The polymer modifier shall be milled into the asphalt or blended into the emulsifier prior to the emulsification process. The type and percentage of modifier shall be identified (such as natural latex rubber, styrene-butadiene rubber, styrene-butadiene-styrene, or ethylene-butadiene-styrene) on the certificate of analysis. The modifier shall make an emulsion mix which accelerates curing in order to allow traffic to be placed on the material within one hour, without damage occurring to the surface.

The minimum amount and type of polymer modifier shall be determined by the laboratory performing the mix design. The minimum amount required will be based on asphalt weight content and will be certified by the emulsion supplier. In general, a three percent (3%) polymer solids, based on asphalt weight, is considered minimum.

The emulsion modifier shall be adjusted at the emulsion manufacturer's facility.

The Contractor shall certify that the bituminous material (with the polymer) conforms to AASHTO M208 CSS-1h, with the following modifications:

**AASHTO Test Specifications**

T49	@ 77° F; 40-90
T59	62 % (minimum)
T53	140° F (minimum)

Each shipment of emulsified asphalt shall be accompanied with a certificate of analysis/ compliance from the manufacturer.

The emulsified asphalt shall be homogeneous, show no signs of separation, and at no time shall the temperature of the material exceed 120°F.

The specific gravity of each shipment of bituminous material shall be determined by the Contractor and provided with each shipment.

Field Control Additive. At the option of the Contractor, an additive may be added to the mixture in order to provide an altered set time. The additive must be identified (such as the emulsifier type) and be included as part of the mix design submission. The Contractor shall certify that the additive was tested and demonstrated compatibility with all the other components of the mixture.

Water. Water shall conform to Section 803 of the Standard Specifications.

**Mixture Properties:**

Each Contractor-proposed mix design (percentages of each aggregate type, mineral filler, emulsion, water, and field control additive; target combination gradations; and the design cure time) shall be approved by the Engineer prior to placement. The exact proportions used in the preparation of the micro-surfacing shall be determined by a testing laboratory, experienced in micro-surfacing mix design procedures, and approved by the Engineer. The proportions and gradations of all component materials for the target mix design shall be identified with a single percentage. When tested in accordance with AASHTO T27 (ASTM C136) and AASHTO T11 (ASTM C117), the target (mix design) aggregate gradation (including the mineral filler) shall be within one of the following bands:

Sieve	Type II	Type III	STOCKPILE TOLERANCE
3/8"	100	100	
#4	90 - 100	70 - 90	± 5%
#8	65 - 90	45 - 70	± 5%
#16	45 - 70	28 - 50	± 5%
#30	30 - 50	19 - 34	± 5%
#50	18 - 30	12 - 25	± 4%
#100	10 - 21	7 - 18	± 3%
#200	5 - 15	5 - 15	± 2%

The job mix (target) gradation shall be within the gradation band for the desired type. After the target gradation has been submitted (this should be the gradation that the mix design is based on), then the percent passing each sieve shall not vary by more than the stockpile tolerance shown in the above table for each individual sieve, and still remain within the gradation band. It is recommended that the percent passing shall not go from the high end to the low end of the range for any two consecutive screens.

Screening shall be required at the stockpile prior to delivery to the paving machine if there are any problems created by having oversize material in the mix. Type II gradations shall be screened through a 3/8-inch screen. Type III gradation shall be screened through a 1/2-inch screen.

The target mix design quantity of the bituminous material shall be identified with a single percentage value which shall be within the range of 6.5 to 8.0 percent of the total weight of the aggregate. The allowable production tolerance for the bituminous material asphalt residue shall be 0.4 percent of the total weight of the aggregate.

The amount of field control additive, when used, shall be identified with a single percentage value. If the amount is expected to change to another value for specific conditions anticipated on the project site, the mix proportions and the auxiliary value shall be considered a separate mix design. The specific conditions that will cause a change to the auxiliary mix design shall be identified with the submission of the proposed mix design. The allowable production tolerance for the amount of field control additive shall be based on acceptable performance in the field.

Water shall be added during the material mixing to produce the needed mix consistency. The optimum amount of water can be determined during mix design, however, it is understood that this value may be changed in the field due to ambient humidity, wind, air temperature, moisture absorbed by the pavement, etc. The mixture shall be homogeneous, free of excess water or emulsion, free of segregation of emulsion, and free of segregation of aggregate sizes.

Laboratory test results shall be provided by the Contractor that show that the proposed mixture conforms to the following requirements when testing according to the following referenced International Slurry Surfacing Association standard test methods:

Test Method	Property	Requirements
TB100	Wet Track Abrasion Loss - 1 hour soak	50 g/ft <sup>2</sup> max
	Wet Track Abrasion Loss - 6 day soak	75 g/ft <sup>2</sup> max
TB102	Mixing, Setting, and Water Resistance	10 minute, maximum, clear water set time
TB113	Mix Time 77°F (25°C)	Controllable to 120 seconds, minimum
TB114	Wet Stripping	Pass, 90% minimum
TB139	Wet Cohesion - 30 Minutes	12 kg-cm, minimum
	Wet Cohesion - 60 Minutes	20 kg-cm, minimum
TB144	Classification Compatibility	11 grade points, minimum
TB147A	Loaded Wheel Test	5% lateral displacement, maximum 2.10 compacted specific gravity

The mixture shall also have satisfactory workability and performance when placed in a test strip. Requirements for the test strip construction are in the Preparations and Limitations section of this specification. If a change occurs in the source or the qualities of the component materials, a revised target mix design shall be submitted. When unsatisfactory results or other conditions make it necessary, a revised mix design shall be developed and submitted by the Contractor.

#### **Equipment:**

The mixing and placement equipment must be approved prior to use. The material shall be mixed by an automatically sequenced, self-propelled machine; it shall be capable of accurately proportioning and delivering all component materials to a revolving multi-blade twin shaft pug mill type mixer; thoroughly mixing the component materials; and it shall be capable of discharging the mixture on a continuous flow basis.

The rate of water and field control additive shall be easily adjusted. Sufficient storage capacity shall be provided on the equipment for aggregates, bituminous material, mineral filler, field control additive, and water of adequate supply to the proportioning devices to maintain a continuous operation.

The mixing equipment shall also have an attached spreader box which is equipped with augers that agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact point. A rear seal shall act as final strike-off and shall be height-adjustable. The spreader box and rear strike-off shall be designed so that a uniform pavement surface consistency is achieved; these shall be clean and not excessively worn. The spreader box shall be kept clean and buildup of asphalt and aggregate on the box shall not be permitted.

A secondary strike-off shall be provided to improve surface texture. The secondary strike-off shall have the same adjustments as the spreader box.

#### **Preparations and Limitations:**

The mixing machine shall be calibrated, at a DelDOT approved location; to the job mix proportion targets in the presence and to the satisfaction of the Engineer prior to the start of the work, and shall be checked whenever there is a question about the accuracy of the proportioning. Documentation is to be generated for the Engineer, including individual calibrations of each material at various settings. A minimum of 3 runs for each material shall be performed. During calibration of the aggregate and the asphalt emulsion a minimum of 250 pounds of each material shall be dispensed continuously for each of the calibration runs. The controls for proportioning the mixture, including the components of water and field control additive, shall be readily visible to the Engineer in order evaluate whether a change to the calibrated settings has occurred.

For each combination of equipment and mixture design, prior to performing work measured for payment, an approved test strip shall be constructed. To be approved the test strip shall be of minimum size and shall demonstrate the required performance. The minimum size of the test strip for each combination

must be of 100' long, and 12' wide. It shall be placed in the same number of passes and at a minimum spread rate specified for each location. The test section shall be placed using the same equipment, methods, and mixes as scheduled for use on the Contract. If a test section proves to be unsatisfactory, the necessary adjustments to the mix design, equipment, and placement methods shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. The maximum clear water set time shall be 10 minutes. Traffic shall be able to be on it, without material pickup, within one hour after its placement.

The surface shall be cleared of vegetation, dirt, mud, free water, and any other loose or detrimental materials prior to placing the mixture. Vegetation and debris shall also be cleared from the edges of the road. Areas impregnated with grease, oil, or fuel shall be cleaned by grinding. Traffic paint not tightly bonded to the surface or has excessive build up, and any thermoplastic markings shall be removed by grinding or other method approved by the Engineer.

Paving shall not be performed if either the pavement or air temperature is below 50°F, if rain is imminent within 12 hours, or if the temperature is expected to drop below 40°F within 24 hours after application.

The bituminous material shall be less than 120°F and gently agitated before use.

### **Construction Methods:**

The mixture shall be uniformly spread at a final total mix application rate of a minimum of 30 lbs/yd<sup>2</sup>. This may be accomplished by placing two separate layers of material with each layer being placed on the same or successive days at the sole discretion of the Engineer. When necessary, the materials shall be spread in variable thick cross sections, to fill in ruts and minor deformations, and to create a smooth-riding, high skid-resistant, roadway surface having a well-draining cross-slope.

Any area of the constructed surface which has a deviation, higher or lower, that is greater than 3/16" from a 10' straightedge placed on the surface is unacceptable. No streaks, scratch marks, drag marks, tears, rippling, streaks, lumps, segregation, or other surface irregularities will be acceptable.

Handwork will be permitted only for those areas that cannot be reached with the mixing machine. Handwork must produce a surface finish and appearance similar to that produced by the spreader box.

Longitudinal joints shall be tight without gaps or excessive buildups. Transverse joints shall appear neat and uniform. The edge lines shall be straight, no more than 2 inch variance in any 100' length.

The mix shall be placed to allow traffic on the constructed pavement surface within one hour without any pick up of material by the traffic. At intersections, or other points requiring earlier opening, the Contractor shall shorten the road closure time to a maximum of 15 minutes; a different amount of field control additive in the mixture may be used by the Contractor to meet this requirement.

The Contractor shall submit the following signed, written reports to the Engineer for each staging location:

1. A report indicating the amount of aggregate and emulsion delivered, aggregate and emulsion used on the project, and the amount of area in square yards completed.
2. A report indicating the percentage of emulsion used to aggregate used and the application rate in pounds of aggregate applied per square yard of area covered. This report will verify compliance with the mixture of materials to the mix design and the specified aggregate application rate.

The Contractor shall submit to the Engineer from the aggregate and emulsion suppliers an original copy of the bill of lading weekly for each delivery of material to be used on the project. The Contractor shall submit with each emulsion bill of lading a certificate of analysis from the emulsion supplier verifying that each delivery of emulsion is in compliance with the contract requirements. Micro-surfacing placed using item 403512 – Polymer-Modified Micro-Surfacing, Rolled shall be compacted with a smooth pneumatic tire roller with a minimum weight of 4 tons. Rolling shall start when the micro-surfacing has set sufficiently to prevent any pickup of material and rolled a minimum of 3 coverages by the roller or until a uniform surface is obtained.

**Method of Measurement:**

The quantity of item 403510 - Polymer-Modified Emulsion Micro-Surfacing and 403512 - Polymer-Modified Emulsion Micro-Surfacing, Rolled will be measured as the actual number of square yards of polymer-modified emulsion micro-surfacing placed and accepted. The quantity will be determined by computations based on field measurements taken on and along the completed finished surfaces and verified by items 1 and 2 in the construction methods section. Multiple layers will not be measured separately.

The quantity of item 403511 - Polymer-Modified Emulsion Micro-Surfacing will be measured as the actual number of tons of polymer-modified emulsion micro-surfacing placed and accepted. The quantity will be based on the combined tonnage of aggregate, mineral filler, and emulsion used and accepted in place. The quantities will be computed as follows:

1. Aggregate. Measure the quantity of aggregate using the calibrated, dry weight of aggregate control device.
2. Mineral Filler. Compute this quantity from a count off the calibrated metering device for mineral filler.
3. Emulsion. Compute the quantity of polymer-modified asphalt emulsion by weight used, as determined by the calibrated metering device.

The amount of field control additive will not be measured separately. Materials and work for the test strip will not be measured for payment. Required repairs will not be measured for payment.

**Basis of Payment:**

The quantity of item 403510 - Polymer-Modified Emulsion Micro-Surfacing and 403512 - Polymer-Modified Emulsion Micro-Surfacing, Rolled will be paid for at the Contract unit price per square yard. The quantity of item 403511 - Polymer-Modified Emulsion Micro-Surfacing will be paid for at the Contract unit price per ton. Price and payment will constitute full compensation for designing the mixture; mobilizing and furnishing all equipment, materials, and labor; preparing the foundation (removing traffic striping, cleaning the roadway surface, and clearing the debris from the edge of the road); placing the materials; protecting and repairing damage to the surface; and for all labor, equipment, tools and incidentals necessary to complete the work.

**NOTE:**

The Asphalt Cement Cost Adjustment for this item will be applied when the total emulsified asphalt used exceeds 15,850 gal. This note supersedes the Note with item 401502 - Asphalt Cement Cost Adjustment.

12/1/09

**503501 - CRACK AND JOINT SEALING LESS THAN 3/4" WIDE**  
**503502 - CRACK AND JOINT SEALING 3/4" to 1 3/4" WIDE**

**Description:**

The item shall consist of cleaning and sealing the existing P.C.C. pavement transverse and longitudinal joints, and pavement cracks in accordance with these specifications, plans, and as directed by the Engineer.

**Materials:**

**Pourable Sealant:** The Sealant shall meet the requirements of ASTM D 3405, Hot-Poured Joint Sealants. The Appendix of that specification shall be considered as part of this specification. Application for approval of joint sealant material by the manufacturer shall be submitted to the Department's Materials and Research Section.

**Backup Material/Bondbreaker:** The backup material/bondbreaker shall be stitched cotton piping cord, polyethylene backer rod, or approved equal material that is compatible with the sealant to be used and capable of withstanding the required sealant application temperature without melting. Back-up material shall be 25% wider than the nominal width of the joints.

The diameter of the backup material/bondbreaker shall be such that when placed in the joint it will support the sealant at its design depth, allowing the sealant to achieve the design shape, prevent the sealant from leaking around and underneath it, and allow the sealant to deform freely when the joint expands and contracts.

The backer rod shall not be stretched during insertion in the joint. When the bottom of the joint opening to be sealed is formed by previously installed expansion joint material (such as at concrete patch locations), a nonreactive adhesive-backed tape shall be inserted in lieu of the backer rod. The tape shall be 1/8 inch (3 mm) wider than the nominal width of the joints.

**Sealant Equipment:** Proper sealing equipment shall be used for the specific material listed in accordance with the manufacturers recommendations. The equipment for hot applied sealing compounds shall be a melting kettle of a double boiler, indirect heating type, using oil as a heat-transfer medium. The kettle shall have an effective mechanically operated agitator and shall be equipped with a positive thermostatic temperature control which shall be checked for calibration before commencing. Overheating shall not be permitted. The hoses and applicator wand shall be insulated. The nozzle of the mechanical device shall be shaped to fit inside the joint and introduce the sealant between the joint faces.

**Construction Methods:**

Removal of existing joint sealant, sawing and/or refacing of joints, cleaning, shape factor dimensions, backup material and sealant installation shall be in accordance with these specifications.

**Existing Sealant Removal:** Any in-place sealant shall be removed from the joint using a vertical cutting edge tool; however, V-shape plow tools will not be permitted. A power driven concrete high pressure water blasting will be permitted.

The sealant shall be removed to the depth required to accommodate any separating and/or backup material used, and to provide the specified depth for the new sealant material to be installed.

**Refacing of Joints:** Joints shall be sawed or refaced using a power driven concrete saw with diamond or abrasive blades to remove all old sealant from the joint faces to expose new clean concrete and, if required, to cut the joint to the width and depth necessary to provide for an effective shape factor in the joint sealant.

**Cleaning Prior to Resealing:** Following all sawing, resawing, or refacing operations, the joint faces and opening shall be thoroughly cleaned by sandblasting followed by an oil-free air jet to remove all cuttings or debris remaining on the faces or in the joint opening. The newly exposed joint faces shall be cleaned by sandblasting. The sandblast joint cleaning operation shall be such that when completed the

concrete joint surface which is to receive the new joint sealant shall be free of all tar and asphalt, all old sealant, all discoloration and stain, as well as any and all other forms of contamination of the pore structure--leaving a clean, dry, newly exposed concrete surface.

Immediately prior to the placement of the backup material and the sealant, the joints shall be cleaned with a compressed air stream of at least 100 psi (690 kPa) measured at the source.

The air compressors used for the purpose described above must be equipped with traps capable of removing moisture and oil from the air. Work shall be stopped when there is oil or moisture in the compressed air. Work shall not resume until suitable adjustments are made and the air stream is found to be free of such contaminants.

Under no conditions will the Contractor be permitted to place the sealant if there is dust, moisture, oil, or any other contaminants on that portion of the concrete which is to receive the joint sealant.

The Contractor shall be responsible for protecting the public from hazard or damage during the sandblasting and joint cleaning operations. Rigidly supported plywood sheeting or other suitable material and method used for this purpose shall be subject to the approval of the Engineer.

During all operations, care shall be taken not to damage the subbase, curbs, shoulders, load transfer devices, or pavement. In the event that such damage occurs, it shall be repaired to the satisfaction of the Engineer at no expense to the State.

**Limits of Joint Preparation:** The work required for the removal of existing joint sealant, widening and/or deepening of the joint openings, if required, refacing of joint faces, and sandblasting of the joint faces should proceed at reasonable production rates. The final stages of joint preparation which includes air pressure cleaning of joints, and placement of separating and/or backup material shall be limited to only that length of joint that can be resealed during a day's production.

**Installation of Pourable Sealant:** A copy of the manufacturer's recommendations pertaining to the heating and application of the sealant shall be submitted to the Engineer prior to the commencement of work and these recommendations shall be adhered to and followed by the Contractor, with such exceptions as this specification may require.

At the start of the day's operations special procedures may be necessary in order to achieve a sealant temperature consistent with this specification. The Contractor shall ascertain from the manufacturer of the apparatus he is using, the procedures necessary and be able to so execute these procedures prior to his commencement of joint sealing operations.

The recommended pouring temperature shall be 10 degrees (5.5 degrees) below the manufacturer's designated Safe Heating Temperature. The allowable variance from the recommended pouring temperature shall be  $\pm 10$  degrees ( $\pm 5$  degrees).

The first gallon (4 liters) of material to flow out of the applicator wand at the beginning of the day shall be considered spoil and as such be discarded into a container for proper disposal.

The applicator wand shall be returned to the machine and the material recirculated immediately upon the completion of each joint sealing.

Sealant compound shall not be placed unless the face of the joint is completely dry, clean and free of dust, and backup material installed at the required depth to provide a uniform, specified sealant thickness. Manufacturer's recommendations for application temperature shall be followed, however, the atmospheric and pavement temperature shall both be at least 50 degrees F (10 degrees C) but not greater than 90 degrees F (32 degrees C). at the time of application of the sealant. Installation of the sealant shall be such that the in-place sealant shall be well bonded to the concrete and free of voids or entrapped air. The joints shall be uniformly sealed in a neat and workmanlike manner, so that upon completion of the work, the surface of the sealant material shall be  $1/4$  in.  $\pm 1/16$  in (6 mm  $\pm 1.5$  mm) below the adjacent pavement surface. The Contractor shall "spot up" or refill all low joints before final acceptance. Any excess material on the surface of the pavement shall be removed and the pavement surface shall be left in a clean condition. Unless otherwise specified, the period of cure shall be in accordance with the manufacturer's recommendations.

Vehicular or heavy equipment traffic shall not be permitted on the pavement in the area of the joints during the curing period.

The sealant shall be placed to conform with the dimensions and shape shown on the Plans and as specified herein. Any failure of the sealed joint due to lack of adhesion or cohesion of joint material; improper or unsatisfactory workmanship by the Contractor; or damage by the Contractor's operations or traffic will be cause for rejection. The joint(s) shall be repaired to the Engineer's satisfaction at no additional cost to the Department.

After a joint has been sealed, all excess sealant or other residue on the pavement surface shall be removed. Traffic shall not be permitted over sealed joints until the sealant is tackfree and until debris from traffic does not imbed into the sealant.

**Method of Measurement:**

The quantity of crack and joint sealing will be measured as the actual number of linear feet (meters) of cracks and joints sealed and accepted measured along the crack and/or joint, end to end.

**Basis of Payment:**

The quantity of transverse and longitudinal cracks and joints cleaned and resealed, measured from end-to-end shall be paid for at the Contract unit price per linear foot (meter) for "Crack and Joint Sealing Less than 3/4 in. (19 mm) Wide, and "Crack and Joint Sealing, 3/4 in. to 1 3/4 in. (19 mm to 44 mm) Wide. Price and payment will constitute full compensation for furnishing and placing hot poured joint sealer as specified on the Plans or as directed, backup material, for removal and disposal of existing joint sealer, for all joint resawing and refacing, for sandblast cleaning, airblast cleaning, for all labor, tools, equipment, and incidentals necessary to complete the item.

11/8/01



**748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"**  
**748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"**  
**748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"**  
**748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"**  
**748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT**  
**748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"**  
**748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"**  
**748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"**  
**748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"**  
**748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"**  
**748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"**  
**748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"**  
**748549 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"**  
**748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"**

### **Description:**

This work consists of furnishing and applying white or yellow, epoxy reflectorized pavement markings or black epoxy contrast pavement markings at the locations and in accordance with the patterns indicated on the Plans, or as directed by the Engineer, and in accordance with these specifications.

The white/yellow epoxy marking material shall be hot-applied by spray methods onto bituminous and/or Portland cement concrete pavement surfaces as required by the Plans. Following an application of double drop glass beads of two sizes and upon curing, the resultant epoxy marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic. All marking materials shall be certified lead free and free of cadmium, mercury, hexvalent chromium, and other toxic heavy metals.

The black epoxy marking shall be a two-component, hot-spray applied epoxy resin pavement marking material to be used for pavement marking on Portland cement concrete pavement surfaces. Following an aggregate drop, and upon curing, it shall produce an adherent stripe of specified thickness and width capable of resisting wear from traffic. Black contrast pavement markings will be required on all Portland cement concrete pavements.

### **Materials Requirements:**

#### **A. White and Yellow Reflectorized Epoxy**

##### **1. Epoxy Composition Requirements:**

The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

The epoxy marking material shall be a two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g. two volumes of Part A to one volume of Part B).

Component A of both white and yellow shall conform to the following requirements:

	<b>% BY WEIGHT</b>	
	<b>WHITE:</b>	<b>YELLOW:</b>
Pigments	Titanium Dioxide - 18% Min. (ASTM D476, Type II)	Organic Yellow - 6%-10%
Epoxy Resin	75% Min., 82% Max.	70% Min., 77% Max.

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO<sub>2</sub> (100% purity).

Epoxy Content-WPE (Component A) - The epoxy content of the epoxy resin will be tested in accordance with ASTM D1652 and calculated as the weight per epoxy equivalent (WPE) for both white and yellow. The epoxy content will be determined on a pigment free basis. The epoxy content (WPE) shall meet a target value provided by the manufacturer and approved by the Department's Material and Research Section (from now on will be addressed as Department). A  $\pm 50$  tolerance will be applied to the target value to establish the acceptance range.

Amine Value (Component B) - The amine value of the curing agent shall be tested in accordance with ASTM D2074-66 to determine its total amine value. The total amine value shall meet a target value provided by the manufacturer and approved by the Department. A  $\pm 50$  tolerance will be applied to the target value to establish the acceptance range.

Toxicity - Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property.

Viscosity - Formulations of each component shall be such that the viscosity of both components shall coincide (within 10%) at a recommended spray application.

2. Physical Properties of Mixed Composition:

Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of  $73 \pm 5$  F. ( $23 \pm 3$  C).

- a. Color. The white epoxy composition when applied at a minimum wet film thickness of  $20 \pm 1$  mils (500  $\mu$ m) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

The yellow epoxy composition when applied at a minimum wet film thickness of  $20 \pm 1$  mils (500  $\mu$ m) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

- b. Directional Reflectance. The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

- c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a  $20 \pm 1$  mils (500  $\mu$ m) minimum wet film thickness, and immediately dressed with large reflective glass spheres (Federal Spec. Type 4) at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

- d. Drying Time (Field). When installed at a minimum wet film thickness of  $20 \pm 1$  mils (500 or 625  $\mu\text{m}$ ) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:
- |             |            |
|-------------|------------|
| 80 F (27 C) | 10 minutes |
| 70 F (21 C) | 10 minutes |
| 60 F (16 C) | 15 minutes |
| 50 F (10 C) | 25 minutes |
| 40 F (4 C)  | 45 minutes |
| 35 F (2 C)  | 60 minutes |

The composition shall dry to no-tracking in approximately 10 minutes, and after thirty (30) minutes shall show no damaging effect from traffic. Dry to no-tracking shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 100 feet (30 meters), after a passenger car is passed over the line. Regardless of the temperature at the time of installation, the installation contractor shall be responsible for protection of the markings material until dry to a non-tracking state.

- e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.
- f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [ $0.125 \pm 0.010$  ( $3.18 \pm 0.25$  mm) thick]. Tests shall be conducted at an ambient temperature of  $75 \pm 5$  F ( $24 \pm 3$  C). The testing machine shall operate at a speed of 0.20 (5.1 mm) per minute.

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing, shall not be less than 24 hours nor more than 96 hours.

Test specimens for tensile strength determination will be prepared as follows:

A 1/8 inch (3 mm) thick sheet of epoxy material is cast from a reservoir-type mold, fabricated from polytetrafluorethylene (PTFE), 1/8 deep x 10 x 10 (3 mm deep x 250 mm x 250 mm).

Prior to casting, the mold is sprayed with a suitable release agent. A sufficient amount of epoxy composition is mixed in the proper proportions (A:B) and poured level with the top of the mold. Care should be taken so as not to decrease or exceed the 1/8 (3 mm) thickness.

After a period of 1 to 4 hours, the material will have set into a semi-rigid sheet that is flexible enough to die-cut yet rigid enough to retain its shape. While the material is in this plastic state, five (5) specimens shall be die-cut and then placed on a flat, smooth, PTFE surface for the completion of the specified conditioning period.

- g. Compressive Strength. The compressive strength of the epoxy composition shall not be less than 12,000 psi (83 MPa) when tested in accordance with ASTM D695 except that a compression tool shall not be necessary. The test specimen shall be a right cylinder [0.50 inch diameter by 1.0 inch length (12 mm diameter by 25 mm length)]. Tests shall be conducted at an ambient temperature of  $75 \pm 5$  F ( $24 \pm 3$  C).

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing shall not be less than 24 hours nor more than 96 hours.

Test specimens for compressive strength determinations will be prepared as follows:

Five molds will be prepared from 1/2 (12 mm) I.D., 1/16 (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2 (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,<sup>(1)</sup> the cylindrical tubes are placed in a vertical position

on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly mixed in the proper proportions (A:B) and poured into the mold to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1"  $\pm$  0.002" (25 mm  $\pm$  0.05 mm).

- h. Hardness. The epoxy composition when tested in accordance with ASTM D2240 shall have a Shore D hardness of between 75 and 100. Samples shall be allowed to dry for not less than 24 hours nor more than 96 hours prior to testing.

B. Reflective Glass Spheres/Beads

Reflective glass spheres for drop-on application shall conform to the following requirements:

The glass spheres shall be colorless; clean; transparent; free from milkyiness or excessive air bubbles; and essentially clean from-surface scarring or scratching. They shall be spherical in shape and at least 80% of the glass beads shall be true spheres when tested in accordance with ASTM D1155. At least 80% of the Type IV beads shall be true spheres as measured by the visual method.

The refractive index of the spheres shall be a minimum of 1.50 as determined by the liquid immersion method at 77° F (25° C).

The silica content of the glass spheres shall not be less than 60%.

The crushing resistance of the spheres shall be as follows: A 40 lb. (18 kg) dead weight, for 20 to 30 (850  $\mu$ m to 600  $\mu$ m) mesh spheres shall be the average resistance when tested in accordance with ASTM D1213.

The glass spheres shall have the following grading when tested in accordance with ASTM D1214.

M247 AASHTO Type 1 Glass Spheres

<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#20 (850 $\mu$ m)	0	100
#30 (600 $\mu$ m)	5-25	75-95
#50 (300 $\mu$ m)	40-65	15-35
#100 (150 $\mu$ m)	15-35	0-5
Pan	0-5	

Type 4 Large Spheres

<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#10 (2000 $\mu$ m)	0	100
#12 (1680 $\mu$ m)	0-5	95-100
#14 (1410 $\mu$ m)	5-20	80-95
#16 (1190 $\mu$ m)	40-80	10-40
#18 (1000 $\mu$ m)	10-40	0-5
#20 (850 $\mu$ m)	0-5	0-2
Pan	0-2	

The AASHTO M247 Type 1 glass spheres shall be treated with a moisture-proof coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The moisture-resistance of the glass spheres shall be determined in accordance with AASHTO M247 test method 4.4.1.

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for

marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansyl-chloride test.

C. Black Epoxy Contrast Markings

Epoxy Resin Requirements: The two-component, 100% solids, paint shall be formulated and designed to provide a simple volumetric mixing ratio (e.g. 2 part component A to 1 part component B) specifically for service as a hot-spray applied binder for black aggregate in such a manner as to produce maximum adhesion. The material shall be composed of epoxy resins and pigments only.

The paint shall be well mixed in the manufacturing process and shall be free from defects and imperfections that may adversely affect the serviceability of the finished product. The paint shall not thicken, curdle, gel, settle excessively, or otherwise display any objectionable properties after storage. Individual components shall not require mixing prior to use when stored for a maximum of 6 months.

The overall paint composition shall be left to the discretion of the manufacturer, but shall meet the following requirements:

Composition:	<u>Component</u>	<u>Percent By Weight</u>
	Carbon Black (ASTM D476 Type III)	7±2 percent, by weight
	Talc	14±2 percent, by weight
	Epoxy Resin	79±4 percent, by weight

D. Black Aggregate

The moisture resistant aggregate shall meet the gradation requirements (AASHTO T27) as follows:

<u>Sieve Size</u>	<u>Percent Retained</u>
#30	18-28%
#40	60-80%
#50	2-14%

The moisture resistant aggregate shall have a ceramic coating. The aggregate shall be angular with no dry dispensement pigment allowed.

<u>Hardness:</u>	The black aggregate hardness shall be 6.5-7 on Moh's Mineral Scale.
<u>Porosity:</u>	The black aggregate porosity shall be less than two (2) percent.
<u>Moisture Content:</u>	The black aggregate moisture content shall be less than a half (.5) percent.

E. Packaging and Shipment

Epoxy pavement marking materials shall be shipped to the job site in strong substantial containers. Individual containers shall be plainly marked with the following information:

- a. Name of Product
- b. Lot Number
- c. Batch Number
- d. Test Number
- e. Date of Manufacture
- f. Date of expiration of acceptance (12 months from date of manufacture)
- g. The statement (as appropriate)  
Part A - Contains Pigment & Epoxy Resin  
Part B - Contains Catalyst
- h. Quantity
- i. Mixing proportions, Application Temperature and Instructions

- j. Safety Information
- k. Manufacturer's Name and Address

Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer and the name and net weight of the material.

F. The Department reserves the right to randomly take a one-quart sample of white, yellow and hardener, of the epoxy material or glass spheres without prior notice for testing to ensure the epoxy material meets specifications.

Epoxy Application Equipment:

Application equipment for the placement of epoxy reflectorized pavement markings shall be approved by the Department, prior to the start of work.

At any time throughout the duration of the project, the Contractor shall provide free access to his epoxy application equipment for inspection by the Engineer or his authorized representative.

In general, the application equipment shall be a mobile, truck mounted and self contained pavement marking machine, specifically designed to apply epoxy resin materials and reflective glass spheres in continuous and skip-line patterns. The application equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of legends, symbols, crosswalks, and other special patterns.

The Engineer may approve the use of a portable applicator in lieu of truck mounted accessories, for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

The applicator shall be capable of installing up to 20,000 lineal feet (6,100 lineal meters) of epoxy reflectorized pavement markings in an 8-hour day and shall include the following features:

1. The applicator shall provide individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy resin composition; for the storage of water; and for the storage of reflective glass spheres.
2. The applicator shall be equipped with heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application and for heating water to a temperature of approximately 140 F (60 C).
3. The glass spheres shall be gravity dropped upon 20 mils (500 um) of epoxy pavement markings to produce a wet-night-reflective pavement marking. The large spheres (Federal Spec. Type 4) shall be applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. This application rate and the following gradation shall conform to FHWA's FP-96: Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (pages 757-761 Type 3 and Type 4 Beads).
4. The applicator shall be equipped with metering devices or pressure gauges, on the proportioning pumps. Metering devices or pressure gauges shall be visible to the Engineer.
5. The applicator shall be equipped with all the necessary spray equipment, mixers, compressors, and other appurtenances to allow for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

**Construction Details.**

- A. General: All pavement marking and patterns shall be placed as shown on the Plans or as directed by the Engineer.

Before any pavement markings work is begun, a schedule of operations shall be submitted for the approval of the Engineer. This schedule shall be submitted 2 weeks prior to the application of the striping.

At least five (5) days prior to starting striping the Contractor shall provide the Engineer with the epoxy manufacturer's written instructions for use. These instructions shall include but not be limited to: mixing ratios, application temperatures, and recommendations for use of water spray.

The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow shall not be allowed.

The Contractor shall be responsible for removing, to the satisfaction of the Engineer, tracking marks, spilled epoxy or epoxy markings applied in unauthorized areas.

The hot water spray shall not be used in conjunction with markings applications on any pavement surface, or on any existing durable type marking, unless specifically recommended by the manufacturer of the epoxy material.

- B. Atmospheric Conditions: Epoxy pavement markings shall only be applied during conditions of dry weather and on substantially dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 35 F (2 C) and the ambient temperature shall be a minimum of 35 F (2 C) and rising. The Engineer shall be the sole determiner as to when atmospheric conditions and pavement surface conditions are such to produce satisfactory results.

- C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the satisfaction of the Engineer.

Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

At the time of application all pavement surfaces and existing durable markings shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item. Also, the item shall include the cost of removal of the curing component in the area of the epoxy markings application, if concrete curing compounds on new portland cement concrete surfaces have been used. Waterblasting will not be permitted for removal.

- D. Application of White/Yellow Epoxy Reflectorized Pavement Markings: White/yellow epoxy reflectorized pavement markings shall be placed at the widths and patterns designated on the Contract Plans.

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Engineer.

White/yellow epoxy pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 µm) on all Portland cement concrete and bituminous concrete pavement, including Stone Matrix Asphalt.

Large reflective glass spheres (Federal Spec. Type 4) shall be applied at the rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. Glass spheres shall uniformly cover the length and width of the pavement marking.

- E. Application of Black Epoxy Contrast Pavement Markings: Black epoxy contrast pavement markings shall be placed at the widths designated on the Contract Plans.

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Engineer.

Black epoxy contrast pavement markings shall be applied at a minimum uniform thickness of 20 mils (500  $\mu\text{m}$ ) on all Portland cement concrete surfaces followed by a single drop of graded black aggregate.

The width of black epoxy line shall be applied for the following situations:

Center Skip Line - On Portland cement concrete pavements a black contrast skip line shall be 10 feet (3 m) in length of the same width as the white epoxy reflectorized skip. It is to lead the white skip and stop at the beginning of the white skip. The black contrast skip is to have a single application of graded black aggregate.

Edge Lines - All edge lines on Portland cement concrete pavements shall have a base of black contrast markings which is 4 inches (100 mm) wider than the reflective white or yellow marking. The black contrast marking is to be applied first with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white or yellow line is to be applied on top of it. The reflective line is to be centered along the black contrast line such that a minimum of 2 inches (50 mm) of black contrast marking is visible on either side of the reflective marking.

F. Defective Epoxy Pavement Markings: Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient film thickness [(less than 20 $\pm$ 1 mils (500  $\mu\text{m}$ ) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

Repair Method: Prepare the surface of the defective epoxy marking by shot blasting, sand blasting, or water blasting. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full 20 $\pm$ 1 mils (500  $\mu\text{m}$ ) minimum line thickness as applicable.

2. Uncured or discolored epoxy (brown patches); insufficient bond to pavement surface (or existing durable marking).

Uncured epoxy shall be defined as applied material that fails to cure (dry) in accordance with the requirements of this specification under MATERIALS, A, 2d. DRYING TIME (FIELD); or applied material that fails to cure (dry) within a reasonable time period under actual field conditions, as defined by the Engineer.

Discoloration (brown patches) shall be defined as localized areas or patches of brown or grayish colored epoxy marking material. These areas often occur in a cyclic pattern and also, often are not visible until several days or weeks after markings are applied.

Repair Method: The defective epoxy marking shall be completely removed and cleaned to the underlying pavement surface to the satisfaction of the Engineer.

The extent of removal shall be the defective area plus any adjacent epoxy pavement marking material extending one foot (300 mm) any direction.

After surface preparation work is complete, repair shall be made by re-applying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.



3. Reflectivity for epoxy resin paint.

After satisfactory completion of all striping work and written notification from the Contractor, the Department shall test the striping to ensure it has the minimum reflectivity. The testing will be completed within 30 calendar days from notification. The Contractor may request that tests be conducted on completed phases or portions of the work. Approval of such a request will be at the discretion of the Engineer. Testing will be done using a Delta LTL 2000 Retrometer (30 meter geometry). Five readings will be taken per line per mile (1.6 km). Projects less than 1 mile (1.6 km) in length will have a minimum of 5 readings per line. These readings will then be averaged for the overall project average.

The required average minimum initial reflectivity reading in millicandellas shall be:

White 450  
Yellow 325

Any single reading shall not be less than 350 millicandellas for white and 250 millicandellas for yellow. Without exception, any pavement markings installed that does not meet the above average minimum initial reflectivity numbers shall be removed and replaced, at the installation contractor's expense.

Other defects not noted above, but determined by the Engineer to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Engineer.

All work in conjunction with the repair or replacement of defective epoxy reflectorized pavement markings shall be performed by the Contractor at no additional cost to the State.

**Method of Measurement:**

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) will be measured by the number of linear feet (meters) of pavement striping line and number of square feet (meter) of symbol installed on the pavement and accepted in accordance with the Plans.

**Basis of Payment:**

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 4 , 6 , 8 , 10 , 12 , 16 (100 mm, 150 mm, 200 mm, 250 mm, 300 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

**NOTE:**

For information only:

The following manufacturers are known to us which manufacturer Epoxy Resin Paint for Pavement Striping. The Department does not endorse or require the use of any of the manufacturers listed below. However, a bidder wishes to use another manufacturer's product, it shall be submitted for review and approval prior to submitting a bid proposal. Should the product be deemed unacceptable by the Department, the successful bidder will be required to use only an approved product.

1. POLY CARB, Inc.  
33095 Bainbridge Road  
Solon, Ohio 44139  
Tel. 1-800-CALLMIX

2.     IPS - Ennis Paint  
       P.O. Box 13582  
       Research Triangle Park, North Carolina 27709  
       Tel. 1-877-477-7623
3.     Epoplex  
       One Park Avenue  
       Maple Shade, NJ 08052  
       Tel. 1-800-822-6920
4.     Or an approved equal.

4/22/2010

## **763643 - MAINTENANCE OF TRAFFIC – ALL INCLUSIVE**

### **Description:**

This item shall consist of furnishing, installing, maintaining and/or relocating the necessary temporary traffic control devices used to maintain vehicular, bicycle and pedestrian traffic, including persons with disabilities in accordance with the Americans with Disabilities Act, as amended. All work shall be performed in a manner that will provide reasonably safe passage with the least practicable obstruction to all users, including vehicular, bicycle and pedestrian traffic.

All requirements of the Delaware Manual on Uniform Traffic Control Devices (MUTCD), Part 6, herein referred to as the Delaware MUTCD. (latest edition with all revisions made up to the date of Advertisement of this project) shall apply for all temporary traffic control devices. Any, and all, control, direction, management and maintenance of traffic shall be performed in accordance with the requirements of the Delaware MUTCD, notes on the Plans, this specification, and as directed by the Engineer.

The Contractor shall be aware that the Case Diagrams and safety measures outlined in the Delaware MUTCD are for common construction situations and modifications may be warranted based on the complexity of the job. The Contractor shall submit justification for modifications to the Temporary Traffic Control Plan (TTCP) to the Engineer for approval prior to implementation.

The Department reserves the right to impose additional restrictions, as needed, for the operational movement and safety of the traveling public. The Department reserves the right to suspend the Contractor's operations until compliance with the Engineer's directive for remedial action, based on but not limited to the following reasons:

1. The Contractor's operations are not in compliance with the Delaware MUTCD, the specifications or the Plans.
2. The Contractor's operations have been deemed unsafe by the Traffic Safety Engineer or District Safety Officer.

### **Materials and Construction Methods:**

The Contractor shall submit a Temporary Traffic Control Plan (TTCP) or a Letter of Intent to use the Plan recommended Delaware MUTCD Case Diagram(s) at or prior to the pre-construction meeting. The Contractor shall submit the TTCP for all Contractor and subcontractor work to be performed on the project for the Department's approval before the start of work.

When specified by a note in the Plans, the Contractor shall be required to have an American Traffic Safety Services Association (ATSSA) certified Traffic Control Supervisor on the project. The authorized designee must be assigned adequate authority, by the Contractor, to ensure compliance with the requirements of the Delaware MUTCD and provide remedial action when deemed necessary by the Traffic Safety Engineer or the District Safety Officer. The ATSSA certified Traffic Control Supervisor's sole responsibility shall be the maintenance of traffic throughout the project. This responsibility shall include, but is not limited to, the installation, operations, maintenance and service of temporary traffic control devices. Also required is the daily maintenance of a log to record maintenance of traffic activities, i.e., number and location of temporary traffic control devices; and times of installation, changes and repairs to temporary traffic control devices. The ATSSA Traffic Control Supervisor shall serve as the liaison with the Engineer concerning the Contractor's maintenance of traffic. The name, contact number and certification for the designated Traffic Control Supervisor shall be submitted at or prior to the pre-construction meeting. The cost of the ATSSA certified Traffic Control Supervisor shall be incidental to this item.

Temporary traffic control devices shall be maintained in good condition in accordance with the brochure entitled "Quality Guidelines for Temporary Traffic Control Devices", published by the American Traffic Safety Services Association (ATSSA). Any temporary traffic control devices that do not meet the quality guidelines shall be removed and replaced with acceptable devices. Failure to comply will result in work stoppage with time charges continuing to be assessed.

Any existing signs that conflict with any temporary or permanent construction signs shall be covered as needed or as directed by the Engineer. The cost for temporarily covering conflicting signs shall be incidental to this item.

Access to all transit stops located within the project limits shall be maintained unless otherwise directed by the Plans or the Engineer. Maintaining access shall include maintaining an area for the transit vehicle and also an accessible path for pedestrians to safely access the transit stop.

The Contractor shall notify the Engineer, in writing, no less than fourteen (14) calendar days prior to the start of any detour(s) and road closures. The Engineer will notify the following entities:

- Local 911 Center
- Local School Districts
- Local Post Offices
- DelDOT's Transportation Management Center (TMC)
- Town Managers
- Local Police
- DelDOT's Public Relations
- Delaware Transit Corporation (DTC)

Immediately prior to the implementation of any lane or road closures, the Engineer shall notify the DelDOT TMC at (302) 659-4600. Notifications shall also be provided when the closures are lifted. The Engineer shall notify TMC and the District Safety Officer if any lane closures cannot be removed prior to the end of the allowable work hours.

The Contractor shall notify the local 911 center if access to a fire hydrant is temporarily restricted. The Contractor shall provide written confirmation to the Engineer that the local 911 center has been notified.

If a detour is required during any part or the entire period of this Contract, an approved detour plan shall be obtained from the Department's Traffic Safety Section. All signs, barricades and other temporary traffic control devices required as part of the approved detour plan shall be installed and maintained by the Contractor on the route that is closed and on the detour route. Road closures without an approved detour plan shall not be allowed. If a road is closed without an approved detour plan, the Contractor's operations shall be stopped immediately.

The Contractor shall provide and maintain ingress and egress for each property abutting the construction area and each property located between the diversion points of any detour and the actual construction site. Construction activities which may temporarily or otherwise interfere with property access shall be coordinated in advance with the affected property owners.

The Contractor shall conduct construction operations in a manner which will minimize delays to traffic, and shall meet the following requirements:

1. If work is being performed within 200 feet in any direction of an intersection that is controlled by a traffic signal, the flagger(s) shall direct the flow of traffic in concert with the traffic signals in construction areas to avoid queuing, unless active work prohibits such action. The flagger shall direct traffic to prevent traffic from queuing through an intersection (i.e., blocking an intersection). Only a Traffic Officer may direct traffic against the operation of a traffic signal and only until the operation occurring within the intersection is completed.
2. When a lane adjacent to an open lane is closed to travel, the temporary traffic control devices shall be set 2 feet (0.61 m) into the closed lane from the edge of the open lane, unless an uncured patch exists or actual work is being performed closer to the open lane with minimum restriction to traffic.
3. Except for "buffer lanes" on high volume and/or high speed roadways, lanes shall not be closed unless construction activity requiring lane closure is taking place, or will take place within the next hour. Lanes shall be reopened immediately upon completion of the work. Moving operations will require the lane closures be shortened as the work progresses and as traffic conditions warrant to minimize the length of the closure. The Contractor shall conduct construction operations in a manner so as to minimize disruption to traffic during

peak hours and periods of heavy flow. The Department reserves the right to stop or change the Contractor's operations, if in the opinion of the Engineer, such operations are unnecessary at that time or the operations are unnecessarily impeding traffic.

4. Work in the vicinity of traffic signals, shall be scheduled to minimize the time during which the signal is operated without detectors, and prior approval from the Engineer shall be required. TMC shall be notified in advance of cutting a loop detector, and be immediately notified once the loop detector has been reinstalled. The Contractor shall provide sufficient advance notice of the loop detector work with the Engineer to ensure the aforementioned requirements are met.

It is required that all temporary traffic control work and related items shall either be performed entirely by the Contractor's own organization, or totally subcontracted. Maintenance of equipment shall not be subject to this requirement.

Any deficiencies related to temporary traffic control that are reported to the Contractor in writing shall be corrected within 24 hours or as directed by the Engineer. Failure to comply will result in non-payment for those devices that are found to be deficient for the duration of the deficiency. Serious deficiencies that are not corrected immediately shall result in suspension of work until items identified are brought back into compliance.

At the end of each day's work, the Contractor shall correct all pavement edge drop-offs in accordance with Table 6G-1 in the Delaware MUTCD. This corrective work shall be accomplished with Temporary Roadway Material (TRM) unless an alternate method is specified in the Plans. All ruts and potholes shall be filled with TRM as soon as possible but no later than the end of each work day. Placement and Payment of TRM shall be completed in accordance with Section 402 of the Standard Specifications. If temporary elimination of a drop-off hazard cannot be accomplished, then the area should be properly marked and protected with temporary traffic control devices such as temporary barricades, warning signs, flashing lights, etc. as required by Section 6G.21 of the Delaware MUTCD.

All open trench excavation accessible by vehicular traffic must be backfilled prior to the end of each working day. Steel plates shall not be used except in emergency situations and only with prior written approval from the Engineer unless otherwise directed by the Plans.

The Contractor shall submit, at or prior to the preconstruction meeting, detailed drawings including but not limited to existing striping lengths, lane and shoulder widths, turn lane lengths, locations of stop bars, turn arrows, crosswalks and railroad crossings. The drawings shall depict the existing pavement markings for each project location. These drawings will be reviewed by the Department's Traffic Section to determine the need for modification(s) for compliance with the Delaware MUTCD. Temporary pavement markings, on the final pavement surface, shall match the Plan dimensions and layout or the approved drawings of the permanent markings in compliance with Section 3 of the Delaware MUTCD. All conflicting or errant striping shall be removed as directed by the Engineer in compliance with the specifications for Item 748530 (Removal of Pavement Striping).

At the end of each day's operation and before traffic is returned to unrestricted roadway use, temporary striping shall be utilized when the existing pavement is milled and hot mix will not be placed the same day or more than a single course of hot mix is to be placed or permanent roadway striping cannot be placed on the same day as the placement of the final course of hot mix. Placement of temporary striping shall receive prior approval from the Engineer and the contractor shall apply temporary pavement markings in accordance with the requirements of Section 748 of Delaware Standard specifications and the Delaware MUTCD. Payment for temporary pavement striping shall be made at the unit price bid for item 748 - Temporary Striping. Payment for final striping will be included in the applicable striping item.

The Contractor shall have temporary striping/delineating materials (such as raised markers, tape, and other approved materials) available at the job site for verification by the Department prior to starting the hot-mix paving operation on roads to be immediately opened to traffic. These materials shall be used by the Contractor for temporary markings if he/she fails to apply temporary marking paint, etc., as required by the Delaware MUTCD. No paving operations on roads to be immediately opened to traffic will be allowed unless such verification has been made for the availability of the materials at the job site.

**Certification:**

Temporary traffic control devices used on all highways open to the public in this State shall conform to the Delaware MUTCD. All devices shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350, the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration, and/or in accordance with the latest edition of the Manual for Assessing Safety Hardware (MASH), published by the American Association of State Highway and Transportation Officials (AASHTO).

The Contractor shall submit certification for temporary traffic control devices or vendors used specifically on this project at or prior to the pre-construction meeting.

Certification of compliance with NCHRP report 350 and/or MASH is required for the following categories of temporary traffic control devices:

**Category I** contains small and lightweight channelizing and delineating control devices which includes cones, tubular markers, flexible delineator post and drums, all without any accessories or attachments.

**Category II** includes temporary traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices which shall weigh 45 kg or less, include Type I, II and III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

**Category III** includes temporary traffic control devices that are expected to cause significant vehicular velocity changes to impacting vehicles. These devices which weigh more than 45 kg include temporary barrier, temporary impact attenuators, and truck-mounted attenuators.

**Category IV** includes portable or trailer-mounted devices such as arrow panels, variable message signs, temporary traffic signals and temporary area lighting.

For Category I devices, the manufacturer or Contractor may self-certify that the devices meet the NCHRP-350 and/or MASH criteria. The Contractor shall supply the Federal Highway Administration's NCHRP-350 and/or MASH acceptance letter for each type of device that falls under Category II and III devices.

**Basis of Payment:**

Payment will be made at the Lump Sum price for "Maintenance of Traffic", for which price and payment constitutes full compensation for all maintenance of traffic activities accepted by the Engineer, which shall include the cost of furnishing and relocating permanent and temporary traffic control signs, traffic cones or drums, submission of temporary traffic control plan(s), submission of existing pavement marking drawings, submission of all required certifications, labor, equipment and incidentals necessary to complete the item. Payment to furnish and maintain other temporary traffic control devices including but not limited to Portable P.C.C. Safety Barrier, Truck Mounted Attenuators, Portable Changeable Message Signs, Arrow Panels and Portable Light Assemblies will be made at the contract unit price for each item.

**NOTE**

If the Contractor does not complete the Contract work within the Contract completion time (including approved extension time), the Contractor shall be responsible for providing the necessary temporary traffic control devices that are required to complete any remaining work. The costs of such temporary traffic control shall be borne by the Contractor. No additional payment will be made to the Contractor to maintain traffic in accordance with the Delaware MUTCD, contract plans and specifications. Temporary traffic control items include, but not be limited to, warning lights, warning signs, barricades, plastic drums, P.C.C. safety barrier, flaggers, traffic officers, arrow panels, message boards, and portable impact attenuators.

3/24/2011



STATE OF DELAWARE  
**DEPARTMENT OF TRANSPORTATION**  
800 BAY ROAD  
P.O. Box 778  
DOVER, DELAWARE 19903

CAROLANN WICKS, P.E.  
SECRETARY

**UTILITY STATEMENT**

**STATE CONTRACT No. T201206701**

**Project I.D. No. 11-77777**

**Micro-Surfacing, Canal, FY 2012**

**NEW CASTLE COUNTY**

No utility relocation involvement is anticipated, should any conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utilities' existing facilities, the necessary relocation work shall be accomplished by the respective agencies, as directed by the District Engineer.

**General Notes**

1. The Contractor's attention is directed to Section 105.09 Utilities, Delaware Standard Specifications, August 2001. The Contractor shall contact Miss Utility (1-800-282-8555) two working days prior to any excavation. The Contractor is responsible for the support and protection of all utilities when excavating. The Contractor is responsible for ensuring proper clearances, including safety clearances, from overhead utilities for construction equipment. The Contractor is advised to check the site for access purposes for his equipment and, if necessary, make arrangements directly with the utility companies for field adjustments for adequate clearances.
2. It is understood and agreed that the Contractor has considered in his bid all permanent and temporary utility appurtenances in their present and relocated positions as shown on the plans or described in the Utility Statement or are readily discernible and that no additional compensation will be allowed for any delays, inconvenience, or damage due to any interference from the utility facilities and appurtenances or the operation of moving them, except that the Contractor may be granted an equitable extension of time.
3. Coordination and cooperation among the Utility Companies and the State's Contractors are of prime importance. Therefore, the Contractor is directed to contact the following Utility Company representatives with any questions regarding this work prior to submitting bids and work schedules. Proposed work schedules should reflect the Utility Companies' proposed relocations. The Utility Companies do not work on weekends or legal holidays.

**DIVISION OF TRANSPORTATION SOLUTIONS**

4-7-11

**DATE**

**UTILITY ENGINEER**







**STATE OF DELAWARE  
DEPARTMENT OF TRANSPORTATION  
PO BOX 778  
DOVER, DELAWARE 19903**

**CERTIFICATE OF RIGHT-OF-WAY STATUS**

**STATE PROJECT NO. T201206701**

**F.A.P. No. N/A for R/W**

**MICROSURFACING, CANAL FY 2012**

**NEW CASTLE COUNTY**

**Certificate of Right-of-Way Status – 100%**

**As required by 23CFR Part 635, all necessary right-of-way has been acquired in accordance with current State/Federal rules and regulations covering the acquisition of real property.**

This is to certify that all improvements are to remain within the existing right of way and the required electronic town agreement with the City of Middletown and Newark has been accepted.

**It is further certified that there were no individuals or families displaced by this project. Therefore the provisions of 49 CFR Part 24 is not applicable to the project.**

There are no improvements to be removed or demolished as part of this project.

**REAL ESTATE SECTION**

Carol V. O'Donoghue  
Assistant Chief, Real Estate

April 4, 2011





STATE OF DELAWARE  
**DEPARTMENT OF TRANSPORTATION**  
800 BAY ROAD  
P.O. Box 778  
DOVER, DELAWARE 19903

CAROLANN WICKS, P.E.  
SECRETARY

March 23, 2011

## **ENVIRONMENTAL REQUIREMENTS**

FOR

State Contract No. T201206701

Federal Aid No.: None

Contract Title: Micro-Surfacing, Canal, FY 2012

In accordance with the procedural provisions for implementing the National Environmental Policy Act of 1969, as amended, the referenced project has been processed through the Department's Environmental Review Procedures and has been classified as a Level D/ Class II Action.

Due to the nature of the proposed construction activities, permits are not required for this project. However, the following construction requirements and special provisions have been developed to minimize and mitigate impact to the surrounding environs. These requirements by DelDOT not specified within the contract, but listed below, are the responsibility of the contractor and is subject to risk of shut down at the contractor's expense if not followed.

### GENERAL REQUIREMENTS:

1. All construction debris, excavated material, brush, rocks, and refuse incidental to such work shall be placed either on shore above the influence of flood waters or on some suitable dumping ground.
2. That effort shall be made to keep construction debris from entering adjacent waterways or wetlands. Any debris that enters those areas shall be removed immediately.
3. The disposal of trees, brush, and other debris in any stream corridor, wetland, surface water, or drainage area is prohibited.





CANNOT BE  
**BID PROPOSAL FORMS**  
USED FOR  
CONTRACT T201206701.01  
BIDDING



DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

PAGE: 1  
DATE:

CONTRACT ID: T201206701.01 PROJECT(S): T201206701

All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS

SECTION 0001 Category 0001

0010	401667 SUPERPAVE, BITUMINOUS CONCRETE BASECOURSE, 160 GYRATIONS, PG 64-22 PATCHING	TON	12720.000			
0020	403510 POLYMER-MODIFIED EMULSION MICRO-SURFACING	SY	343350.000			
0030	403511 POLYMER-MODIFIED EMULSION MICRO-SURFACING	TON	1808.000			
0040	406001 HOT-MIX PATCHING	SYIN	226400.000			
0050	503501 CRACK AND JOINT SEALING LESS THAN 3/4" WIDE	LF	216860.000			
0060	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	EADY	185.000			
0070	743050 FLAGGER, NEW CASTLE COUNTY, STATE	HOURL	3265.000	44.52000	145357.80	
0080	743062 FLAGGER, NEW CASTLE COUNTY, STATE, OVERTIME	HOURL	339.000	64.55000	21882.45	





DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

PAGE: 2  
DATE:

CONTRACT ID: T201206701.01 PROJECT(S): T201206701

All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0090	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	113.000 EADY				
0100	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	2770.500 SF				
0110	748019 TEMPORARY MARKINGS, PAINT, 4"	657038.000 LF				
0120	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	5741.960 SF				
0130	<del>748027 PERMANENT</del> PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 12"	525.000 LF				
0140	748506 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, 4"	369530.000 LF				
0150	762001 SAW CUTTING, HOT MIX	4857.000 LF				
0160	763000 INITIAL EXPENSE	LUMP	LUMP			
0170	763643 MAINTENANCE OF TRAFFIC, ALL INCLUSIVE	LUMP	LUMP			
	SECTION 0001 TOTAL					
	TOTAL BID					



## **SUBMISSIONS REQUIRED AT THE TIME OF BID**

1. Copy(ies) of the American Traffic Safety Services Association (ATSSA) Certification(s) when listed in the applicable plan notes
2. Standard Specification Section 110.08 Site Reviewer requires that the name and DNREC certification number of each Site Reviewer if required shall be submitted to the Department at the time of bid. The level of certification and number required are listed in the applicable plan notes.
3. Proposed Trainee Plans as required. Number of required programs is listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted with 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.

Note: Items 1. and 2. above require copies of the current certifications for those individuals proposed for use on this Contract

Failure of the apparent low bidder to present copies of the required certifications and/or an acceptable OJT Trainee Programs within ten (10) calendar days after the bid opening shall create a rebuttable presumption that the bid is not responsive.

CANNOT BE  
USED FOR  
BIDDING



## CERTIFICATION

Contract No. T201206701.01 \_

The undersigned bidder, \_\_\_\_\_ whose address is \_\_\_\_\_  
\_\_\_\_\_ and telephone number is \_\_\_\_\_  
\_\_\_\_\_ hereby certifies the following:

I/We have carefully examined the location of the proposed work, the proposed plans and specifications, and will be bound, upon award of this contract by the Department of Transportation, to execute in accordance with such award, a contract with necessary surety bond, of which contract this proposal and said plans and specifications shall be a part, to provide all necessary machinery, tools, labor and other means of construction, and to do all the work and to furnish all the materials necessary to perform and complete the said contract within the time and as required in accordance with the requirements of the Department of Transportation, and at the unit prices for the various items as listed on the preceding pages.

The foregoing quantities are considered to be approximate only and are given as the basis for comparison of bids. The Department of Transportation may increase or decrease the amount of any item or portion of the work as may be deemed necessary or expedient. Any such increase or decrease in the quantity for any item will not be regarded as a sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided in the contract.

Accompanying this proposal is a surety bond or a security of the bidder assigned to the Department of Transportation, for at least ten (10) percentum of total amount of the proposal, which deposit is to be forfeited as liquidated damages in case this proposal is accepted, and the undersigned shall fail to execute a contract with necessary bond, when required, for the performance of said contract with the Department of Transportation, under the conditions of this proposal, within twenty (20) days after date of official notice of the award of the contract as provided in the requirement and specifications hereto attached; otherwise said deposit is to be returned to the undersigned.

I/We are licensed, or have initiated the license application as required by Section 2502, Chapter 25, Title 30, of the Delaware Code.

By submission of this proposal, each bidder and each person signing on behalf of any bidder, certifies as to its own organization, under penalty of perjury, that to the best of each signer's knowledge and belief:

1. The prices in this proposal have been arrived at independently without collusion, consultation, communication, or Agreement with any other bidder or with any competitor for the purpose of restricting competition.
2. Unless required by law, the prices which have been quoted in this proposal have not been knowingly disclosed and will not knowingly be disclosed by the bidder, directly or indirectly, to any other bidder or competitor prior to the opening of proposals.
3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit or not to submit a proposal for the purpose of restricting competition.

I/We acknowledge receipt and incorporation of addenda to this proposal as follows:

No.	Date	No.	Date	No.	Date	No.	Date	No.	Date
-----	------	-----	------	-----	------	-----	------	-----	------

**(FAILURE TO ACKNOWLEDGE RECEIPT OF ALL ADDENDA WILL RESULT IN THE BID BEING DECLARED NON-RESPONSIVE.)**

Sealed and dated this \_\_\_\_\_ day of \_\_\_\_\_ in the year of our Lord two thousand and \_\_\_\_\_  
\_\_\_\_\_ ( 20\_\_ ).

\_\_\_\_\_  
Name of Bidder (Organization)

Corporate  
Seal

By:

\_\_\_\_\_  
Authorized Signature

Attest \_\_\_\_\_

\_\_\_\_\_  
Title

SWORN TO AND SUBSCRIBED BEFORE ME this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Notary  
Seal

\_\_\_\_\_  
Notary

## BID BOND

TO ACCOMPANY PROPOSAL  
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That: \_\_\_\_\_  
\_\_\_\_\_ of \_\_\_\_\_ in the County of \_\_\_\_\_ and State of \_\_\_\_\_  
\_\_\_\_\_ as **Principal**, and \_\_\_\_\_ of \_\_\_\_\_ in the  
County of \_\_\_\_\_ and State of \_\_\_\_\_ as **Surety**, legally authorized to do business in the State of  
Delaware ("**State**"), are held and firmly unto the **State** in the sum of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), or \_\_\_\_\_ percent not to exceed \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_) of amount of bid on Contract  
No. T201206701.01 , to be paid to the **State** for the use and benefit of its Department of Transportation  
("**DelDOT**") for which payment well and truly to be made, we do bind ourselves, our and each of our heirs,  
executors, administrators, and successors, jointly and severally for and in the whole firmly by these presents.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bounden **Principal**  
who has submitted to the **DelDOT** a certain proposal to enter into this contract for the furnishing of certain  
materiel and/or services within the **State**, shall be awarded this Contract, and if said **Principal** shall well and  
truly enter into and execute this Contract as may be required by the terms of this Contract and approved by  
the **DelDOT**, this Contract to be entered into within twenty days after the date of official notice of the award  
thereof in accordance with the terms of said proposal, then this obligation shall be void or else to be and  
remain in full force and virtue.

Sealed with \_\_\_\_\_ seal and dated this \_\_\_\_\_ day of \_\_\_\_\_ in the year of our Lord two thousand and  
\_\_\_\_\_ ( 20\_\_ ).

SEALED, AND DELIVERED IN THE  
presence of

\_\_\_\_\_  
Name of Bidder (Organization)

Corporate  
Seal

By: \_\_\_\_\_

Authorized Signature

Attest \_\_\_\_\_

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name of **Surety**

Witness: \_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_  
Title

