

# STATE OF DELAWARE

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THE PROPOSAL IN ORDER TO  
SUBMIT A BID.



## DEPARTMENT OF TRANSPORTATION

### BID PROPOSAL

for

## CONTRACT T201203201.01

CTF PROJECTS CENTRAL, FY 2012

KENT COUNTY

**ADVERTISEMENT DATE: July 23, 2012**

Completion Date 365 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 August 21, 2012



**Contract No.T201203201.01**

**CTF PROJECTS CENTRAL, FY 2012  
KENT COUNTY**

**LOCATION**

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

**DESCRIPTION**

The improvements consist of furnishing all materials for CTF PROJECTS CENTRAL, 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 365 Calendar Days .

It is the Department's intent to issue a Notice to Proceed such that work starts on or about September 21, 2012

**ELECTRONIC BIDDING**

**This project incorporates a newer version of the electronic bidding system, Expedite 5.9a.** Bidders wishing to use the electronic bidding option will find the installation file on the plan holders bid file disk. The installation file and instructions are also available at: [http://www.deldot.gov/information/business/bids/const\\_proj\\_bid\\_info.shtml](http://www.deldot.gov/information/business/bids/const_proj_bid_info.shtml).



**PROSPECTIVE BIDDERS NOTE:**

1. No retainage will be withheld on this contract.
2. 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.
3. Make note of the new version of Electronic Bidding software as noted above.

**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, 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.

### 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

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, 2012

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
BRICKLAYERS	45.63	45.63	14.51
CARPENTERS	49.06	49.06	39.22
CEMENT FINISHERS	30.40	26.13	23.29
ELECTRICAL LINE WORKERS	22.50	54.05	21.25
ELECTRICIANS	59.10	59.10	59.10
IRON WORKERS	42.20	22.98	25.35
LABORERS	30.23	26.66	29.03
MILLWRIGHTS	16.11	15.63	13.49
PAINTERS	56.07	56.07	56.07
PILEDRIVERS	59.23	23.75	26.95
POWER EQUIPMENT OPERATORS	41.41	27.54	26.43
SHEET METAL WORKERS	22.75	20.31	18.40
TRUCK DRIVERS	32.17	22.45	22.15

CERTIFIED:

*15/12*

BY:

*[Signature]*  
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: T201203201.01 CTF Projects Central, FY 2012, Kent 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 \$615.00 per ton (\$677.92 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 (δ)	T-315	1.00 - 2.00 kPa
RTFO DSR, G*/sin (δ)	T-315	2.20 - 5.00 kPa
PAV DSR, G*/sin (δ)	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</b> , AASHTO T96 Percent Loss, Maximum	40
<b>Soundness</b> , AASHTO T104 Percent Loss, Maximum for five cycles	20
<b>Deleterious Materials</b> , AASHTO T112 Percent, Maximum	10
<b>Moisture Sensitivity</b> , AASHTO T283 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
$\geq 30$	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)					VOIDS FILLED WITH ASPHALT (% - MINIMUM)
	$N_{INITIAL}$	$N_{DESIGN}$	$N_{MAX}$	NOMINAL MAX. AGGREGATE (MM)					
				25.0	19.0	9.5	12.5	4.75	
0.3 to < 3	$\leq 90.5$	96.0	$\leq 98.0$						65.0 - 78.0
3 to < 10	$\leq 89.0$			12.5	13.5	15.5	14.5	16.5	65.0 - 75.0 <sup>1</sup>
10 < 30									
$\geq 30$									

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 +/- 0.5% gyratory compaction curves where the percent of maximum specific gravity (% 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:

% 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 ( $\text{kg/m}^2$ ) 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

**Table 1 - Aggregate Gradation - JMF and Control Point Information**

<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	

**Table 1 - Aggregate Gradation - JMF and Control Point Information**

Sieves to be addressed by JMF/Range values are percentages passing by weight										
Sieve Size mm (inch)	4.75 mm	4.75mm Range	9.5 mm	9.5mm Range	12.5 mm	12.5mm Range	19.0 mm	19.0mm Range	25.0 mm	25.0mm Range
2.36(#8)	Yes		Yes	32-67	Yes	28-58	Yes	23-49	Yes	19-45
(#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):  
 $QU = ((JMF \text{ target}) + (\text{single test tolerance}) - (\text{mean value})) / (\text{standard deviation}).$
3. For each parameter, calculate the Lower Quality Index (QL):  
 $QL = ((\text{mean value}) - (JMF \text{ target}) + (\text{single test tolerance})) / (\text{standard deviation}).$
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 Contractor's 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.

**Table 2 – Quality Level Analysis by the Standard Deviation Method**

PU or PL	QU and QL for “n” Samples						
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9
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

<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>
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
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

<b>Table 5: Compaction Price Adjustment Highway Locations</b>	
<b>Degree of Compaction (%)</b>	<b>Pay Adjustment Factor (%)</b>
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
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.

7/28/11

## **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:

$$\begin{array}{rclcl}
 \text{Newly Placed B2.25} & * 0.4 & = & & 0.90 \\
 \text{Existing HMA} & 2 * 0.32 = & & & 0.64 \\
 \text{GABC} & 7 * 0.14 & = & & \underline{0.98} \\
 & & & & 2.52
 \end{array}$$

## **401752 – SAFETY EDGE FOR ROADWAY PAVEMENT**

### **Description:**

This work consists of the construction of safety edge(s) along bituminous concrete pavement or P.C.C. pavement in accordance with the details and notes on the Plans and as directed by the Engineer.

### **Construction Methods:**

The safety edge shall not be constructed adjacent to curb or in front of guardrail sections.

In bituminous concrete pavement sections, prior to the construction of the safety edge, the fill or in situ material at the edge of pavement shall be compacted so that it is level with the top of the pavement, prior to the final surface overlay.

In bituminous concrete pavement sections, the contractor shall attach a device to the screed of the paver unit that confines the material at the end of the gate and extrudes the asphalt material in such a way that results in a compacted wedge shape pavement edge of 32 degrees (+/- 2 degrees). Contact shall be maintained between the device and the road shoulder surface. The device shall be manufactured so that it can be easily adjusted to transition at cross roads, driveways and obstructions without stopping the paver unit. The device's shape shall constrain the asphalt and cause compaction, as well as increase the density of the extruded profile.

In bituminous concrete pavement sections, the Transtech Shoulder Wedge Maker, Advant-Edge or an approved equal shall be used to produce the safety edge. Contact information for these wedge shape compaction devices is listed below:

Transtech Systems, Inc.  
1594 State Street  
Schenectady, NY 12304  
1-800-724-6306  
[www.transtechsys.com](http://www.transtechsys.com)

or

Advant-Edge Paving Equipment, LLC  
33 Old Niskayuna Road  
Loudonville, NY 12211  
1-814-422-3343  
[www.advantedgepaving.com](http://www.advantedgepaving.com)

or an approved equal.

In P.C.C. pavement sections, the paver screed shall be modified to provide a chamfer at the end of the P.C.C. pavement in accordance with the details and notes on the Plans, or as directed by the Engineer.

### **Method of Measurement:**

Safety Edge will not be measured for payment.

### **Basis of Payment:**

The cost associated with the construction of safety edge(s), including but not limited to the wedge device, preparation and compaction of the fill or in situ material, and placement of the safety edge in accordance with the Plans and Details shall be incidental to the bituminous concrete pavement or P.C.C. pavement item being placed.

1/21/2011

## 612529 - PIPE VIDEO INSPECTION

### **Description:**

This work consists of the video inspection of the storm drain systems, and/or sanitary sewer systems (all pipe sizes included) in accordance with these Specifications, and the details and locations shown on the Plans and by the Engineer.

### **Construction Methods:**

The entire system(s) involved shall be numbered and then inspected by means of a closed-circuit television. The inspection will be done one section at a time in the presence of the Department's inspector. This work shall not be performed until just prior to the placement of the final pavement surface in case repairs need to be done. But, shall be done no sooner than thirty days from the date of pipe placement. The contractor shall correct any deficiencies in the existing and newly constructed pipe run at their expense.

The television camera used for the inspection shall be specifically designed and constructed for such inspection, capable of producing color video. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera shall be equipped with Pan and Tilt, capable of scanning 360° to view the entire joint. The camera, television monitor, and other components of the video system shall be capable of producing quality to the satisfaction of the Department. If unsatisfactory, the equipment shall be removed and replaced.

The condition of the entire pipe run shall be documented by moving the camera through the pipe in either direction. At each joint the camera shall stop and pan the entire circumference of the joint. Between joints, the camera shall move at a nominal speed of 10 to 15 feet (3 to 4.5 m) per minute never exceeding 30 feet (9 m) per minute. Manual winches, power winches, television cable and power rewinds or other devices shall not obstruct the camera view or interfere with proper documentation of the pipe condition.

The technician operating the camera shall be experienced and qualified in conducting video pipe inspections. The technician shall have the capability of controlling the movement of the television camera, adjusting the brightness of the built-in lighting system and focusing the television camera by remote control. The importance of accurate distance measurements is emphasized. A distance meter and location indicator shall appear on the monitor and video indicating the exact location of the camera in the pipe between (2) structures.

The view scanned by the television camera shall be transmitted to a color monitor of not less than 12 in. (300 mm), measured diagonally across the screen. The monitor shall be located such that the State inspector has full visual access.

### **Documentation:**

Television Inspection Logs: Typed reports shall be submitted to the Department for each location clearly showing the relation to the video meter at each problem point observed during inspection. In addition, other points of significance such as locations of catch basins, junction boxes, manholes, open joints, areas of settlement, misaligned pipe, unplugged lift holes, unusual conditions such as a change of pipe size or type within a run, roots, laterals, storm sewer connections, broken or spalled pipe, presence of scale or corrosion and other discernible features shall be recorded and a copy of such records shall be supplied to the Department.

For the purposes of documentation of a storm drain system, the following criteria shall be used to determine if a joint shall be considered an open joint:

ALL PIPE TYPES	MAXIMUM JOINT OPENING ALLOWED
12-36" (300 - 900 mm) ROUND	0.75" (19 mm)
42" (1050 mm) & LARGER	1.25" (32 mm)
ALL ELLIPTICAL	1.50" (38 mm)

DVD Recordings: The Contractor shall supply a minimum of two visual and audio recordings of the drainage and/or sanitary system that may be replayed. A minimum of one videos shall be submitted for each location but separate locations shall not be combined on the same DVD. Video recording playback shall be at the same speed that it was recorded. Good quality labeled DVDs in a hard plastic case shall be submitted and become the property of The Delaware Department of Transportation.

The report shall be submitted electronically in Excel format and list the Delaware State Plane NA D 83 Coordinates for each structure within the drainage system including catch basins, manholes and all inlet and outlet ends of pipes. This record shall be listed by structure number and record each structure's Northing and Easting coordinates along with street address. This Excel report is to be forwarded to the Department's NPDES electronically after review by the construction staff.

**Method of Measurement:**

The quantity of pipe video inspection will be measured by the linear feet (linear meter) as indicated on the video monitor and verified by the Engineer.

**Basis of Payment:**

The quantity of pipe video inspection will be paid for at the Contract unit price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing all materials and equipment, obtaining coordinate and elevations, typed reports, DVD recordings, safety equipment, correcting any deficiencies in the existing and newly constructed pipe run and for all labor, tools and incidentals necessary to complete the work.

3/11/2011

**612535 - CLEANING DRAINAGE PIPE, 15" - 24" DIA.**  
**612536 - CLEANING DRAINAGE PIPE, GREATER THAN 24" DIA.**

**Description:**

This work consists of cleaning existing drainage pipe. It is the intent that equipment and cleaning methods used to perform this work conform to Specification Guidelines prepared by the National Association of Sewer Service Companies (NASSCO) hereinafter referred to as the NASSCO Specifications.

**Materials and Construction Methods:**

Water used for cleaning shall be safe for all downstream environments. The source for the cleaning water shall be approved by the Engineer.

Equipment and construction methods shall be in accordance with the requirements under Sewer Line Cleaning, High-Velocity Jet (Hydrocleaning) found in the NASSCO Specifications. Equipment shall be operated in accordance with the manufacturer's instructions. The cleaning operation shall consist of up to three passes of the hydrocleaning equipment. If three passes do not adequately clean the pipe, the Engineer may direct the Contractor to use other procedures covered by other item(s) of work.

Material removed during the pipe cleaning operation shall be disposed by the Contractor at a site approved by the Engineer.

**Method of Measurement:**

The quantity of drainage pipe cleaned will be measured as the actual number of linear feet (linear meters) of pipe cleaned and accepted measured from end to end.

**Basis of Payment:**

The quantity of pipe cleaned will be paid for at the Contract unit price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing equipment and water, disposing of removed material and for all labor, equipment, tools and incidentals to complete the work.

12/8/09

## **708563 - PERSONNEL GRATE FOR PIPE INLET**

### **Description:**

This work consists of furnishing all materials, fabricating, delivering and constructing personal grates for pipe inlets as shown on the details on the Plans, as directed by the Engineer and as required by these Special Provisions.

### **Materials:**

Materials shall conform to the requirements of Sections 603 and 612 and shall be galvanized in accordance with Subsection 826.07 including all rebar, hardware and fasteners as shown on the Plans.

Working drawings shall be submitted in accordance with Subsection 105.04.

### **Construction Methods:**

Personnel grates for pipe inlets shall be constructed based on the details shown on the Plans and at the size and locations shown on the Plans.

### **Method of Measurement:**

The quantity of personnel grate for pipe inlet will not be measured.

### **Basis of Payment:**

The quantity of personnel grate for pipe inlet will be paid for at the Contract unit price lump sum. Price and payment will constitute full compensation for furnishing, hauling and installing materials, including bar reinforcement; for excavating including removal and disposal of existing end sections, backfilling, and compacting; for cribbing, shoring, sheeting, coating, and paving; and for all labor, materials, equipment, tools, and incidentals required to complete the work. Design services for the personal grate for pipe inlet including the preparation and submittal of working drawings shall be incidental to this item.

6/7/2012

- 735531 - SOIL RETENTION BLANKET MULCH, TYPE 1**
- 735532 - SOIL RETENTION BLANKET MULCH, TYPE 2**
- 735533 - SOIL RETENTION BLANKET MULCH, TYPE 3**
- 735534 - SOIL RETENTION BLANKET MULCH, TYPE 4**
- 735535 - SOIL RETENTION BLANKET MULCH, TYPE 5**
- 735536 - SOIL RETENTION BLANKET MULCH, TYPE 6**
- 735537 - SOIL RETENTION BLANKET MULCH, TYPE 7**

**Description:**

This work consists of furnishing, placing and anchoring soil retention blanket mulch over seeded areas in accordance with notes and details on the Plans, these specifications and direction of the Engineer.

**Materials:**

The blanket mulch shall be one of the pre-approved products listed in the Approved Product List (APL) at the time of bid, for the type(s) of mulch required on the Plans.

Pre-approval procedures and the current APL may be obtained by writing to the Stormwater Engineer, Delaware Department of Transportation, P. O. Box 778, Dover, DE 19903 or calling (302) 760-2177 or viewing DelDOT's web page at **www.deldot.net/business**. The Contractor shall submit an 8" x 8" (200 mm x 200 mm) sample to the Stormwater Engineer to verify pre-approval. Also, the Contractor shall submit manufacturer's literature, including installation recommendations, to the Engineer.

The products on the APL have been used extensively on DelDOT projects with satisfactory results and/or have received satisfactory evaluations by the Texas Department of Transportation/Texas Transportation Institute (TxDOT/TTI).

Soil Retention Blanket Mulch, Types 1, 2, 3, 4 and 5, generally referred to as erosion control blankets (ECB), shall be composed entirely of 100% biodegradable material.

Soil Retention Blanket Mulch, Types 6 and 7, generally referred to as turf reinforcement mats (TRM), shall be composed of mostly non-degradable material.

In order for a product to be added to DelDOT's Approved Product List and be eligible for use in DelDOT's construction and maintenance works, the product must meet the above guidelines and receive a satisfactory evaluation by TxDOT/TTI. The Department will remove products from the APL when field performance is unsatisfactory.

**Types of Soil Retention Blanket Mulch Application**

- Type 1.** Sandy soils on slopes steeper than 3H:1V
- Type 2.** Sandy soils on slopes equal to or flatter than 3H:1V
- Type 3.** Top-soiled slopes steeper than 3H:1V
- Type 4.** Top-soiled slopes equal to or flatter than 3H:1V
- Type 5.** Top-soiled grass swale at maximum design shear stress less than or equal to 2 pounds per square foot (96 Pascals)
- Type 6.** Top-soiled grass swale at maximum design shear stress greater than 2 pounds per square foot (96 Pascals) and less than or equal to 6 pounds per square foot (287 Pascals)
- Type 7.** Top-soiled grass swale at maximum design shear stress greater than 6 pounds per square foot (287 Pascals) and less than or equal to 8 pounds per square foot (383 Pascals)

**Construction Methods.** The soil retention blanket mulch, shall be placed immediately after seeding operations have been completed or as approved by the Engineer, but in no case shall this period exceed 24 hours from the completion of the seeding operation. Prior to seeding and mulching, the area to be mulched shall be tracked, free of ruts, rocks or clods over 1 1/2 inches (40 millimeters) in maximum dimension and all sticks or other foreign materials which will prevent the close contact of the blanket with the soil. If as a result of rain, the prepared bed becomes crusted or eroded or if any eroded areas, ruts or depressions exist for any reason, the Contractor shall retrack and reseed the eroded areas.

Except for sprayed blanket mulch installation and anchorage of the soil retention blanket mulch shall be in accordance with notes and details in the Plans and the following DeDOT Standard Construction Details:

Standard No. E-9 for rolled blankets under Types 1 through 5

Standard No. E-25 for blankets under Types 6 and 7

Should the installation requirements of the manufacturer be more stringent than the above, the manufacturer's requirements shall govern.

Sprayed blanket mulches shall be applied as per the manufacturer's instructions and recommended rate. No application shall be permitted if rain is anticipated within 24 hours as determined by the Engineer.

**Method of Measurement:**

The quantity of soil retention blanket mulch will be measured in square yards (meters) of each type soil retention blanket mulch installed and accepted. Measurements for calculating the number of square yards (meters) will be made along the surface of the area covered. Overlaps of materials of any kind will not be measured.

**Basis of Payment:**

The quantity of soil retention blanket mulch will be paid for at the contract unit price per square yard (meter) per each type. Price and payment will constitute full compensation for furnishing and placing all materials; for all methods of anchorage and securement; for repairing any loose or raised pins or pegs or any loose, torn, or undermined fabric; and for all labor, equipment, tools, and incidentals required to complete the work.

01/24/01



## **737523 - PLANTING**

The requirements of Section 737 shall be followed except as modified below:

### **Subsection 737.07 Peat Moss and Peat Humus.**

Add the following:

- (c) Composed leaf mulch free of wood, metallic substances, glass or other contaminants may be used in lieu of peat moss or peat humus.

### **Subsection 737.10 Stakes, Guys, and Related Materials.**

Delete paragraphs (e),(f) and (h).

### **Subsection 737.16 Planting.**

Delete paragraph (d).

Add the following:

Wire baskets shall be cut away and removed from the top half of the root ball.

### **Section 737.17 Plant Establishment.**

Delete this subsection in its entirety and add the following:

The plant establishment period for all planting shall begin immediately after all planting and replacements (as specified under Section 737.16, Planting) are complete and acceptable to the Engineer. The plant establishment period will consist of one full growing season during which time the Contractor shall be responsible for all work necessary to keep the plants in a live and healthy condition. A growing season is defined as the period from May 1 through September 30. If the Contractor completes all planting (as specified under Planting) by May 1, the inspection will be held on or about October 1 of that year. In the event the Contractor does not complete all planting by May 1, the inspection will be held on or about October 1 of the following year. All replacement plant material determined to be necessary at the inspection must then be approved at the replacement plant source by October 15. At this time, the Engineer will direct the Contractor to replace those plants determined to be dead or unhealthy by December 1. The Contractor will notify the Engineer in writing that all replacement planting has been accomplished. The Engineer will conduct an inspection within 15 days after such notification to determine the acceptability of the replacements. If all replacements are determined satisfactory by the Engineer, the Contractor will be relieved of all further responsibility for care and replacement.

All planting areas shall be kept free of weeds and grass during the life of the Contract. The Contractor may utilize a pre- or post-emergent herbicide to control such grass and broadleaf weeds incidental to the cost of planting and be totally responsible for the proper use and placement of any such herbicide. As requested in writing by the Engineer, the Contractor shall be responsible to weed within all plant beds and within the saucer limits of individual plants, beginning 10 calendar days after the date of notification. The Contractor shall prune and apply insecticides or fungicides as required, repair or replace stakes and guy wires, tighten guy cable or wire and repair plant saucer washouts when and as specified by the Engineer.

Any plants that settle below or rise above the desired finished grades shall be reset at the proper grades. All replacements shall be plants of the same kind, size and quality as originally specified in the Contract and they shall be furnished, planted, mulched, geyed, watered, etc. as specified herein for new plant material.

If dead or unhealthy plants are discovered, they shall be removed within 10 calendar days and replaced with the next appropriate planting season.

The Contractor shall be responsible for all damage incurred to plant material, tree protection, wire or staking regardless of the cause.

The cost of the above described work shall be incidental to Section **737**, Planting.

The Contractor shall water all plants as required to sustain them in a healthy condition. The Contractor shall give 24 hours written notice to the Engineer prior to each watering.

**Subsection 737.18 Method of Measurement.**

Delete the paragraph in its entirety and insert the following:

The quantity of planting will not be measured.

**Subsection 737.19 Basis of Payment.**

Delete the first two paragraphs in their entirety and insert the following:

The quantity of planting will be paid for at the Contract lump sum. Price and payment will constitute full compensation for furnishing and placing all materials, including plants, soil mixes, and mulch; for protecting plants after digging and prior to planting; for staking, excavating plant pits, pruning, wrapping, and guying; for all watering until final acceptance, for the cultural care of the plants until the completion and acceptance of all landscape work; for disposing of excess and waste materials; for replacement planting; for cleanup; for repairs to plant material, tree protection, wire, or staking due to fire, theft, vehicular damage, or acts of vandalism; for repairs to damaged grassed, planted, or other landscaped area due to the Contractor's operations; for ensuring that topsoil meets the sieve analysis, acidity, and organic matter requirements; for applying sufficient materials to fertilizer that originally failed to meet the specified analysis; for using pre- or post-emergent herbicide to control grass and weeds; for the work outlined under Subsection 737.17; and for all labor, equipment, tools and incidentals required to complete the work.

Payment for the planting as described above may be processed if, in the opinion of the Engineer all work required, except that specified under Subsection 737.17 is satisfactorily completed. No partial payment will be made for any living plant until and unless planted in accordance with these specifications. No additional payment will be made for using plants larger than specified.

5/11/05

## **741501 - TREE TRIMMING**

### **Description:**

This work consists of pruning trees and disposing of the resulting trimmings in accordance with these specifications, notes and details on the Plans and as directed by the Engineer.

### **Construction Method:**

Pruning shall be done in accordance with practices recommended by the International Society of Arboriculture in their publication Tree-Pruning Guidelines. (Edition current at time of advertisement).

The extent of the pruning shall be as noted and detailed on the Plans.

### **Method of Measurement:**

The quantity of trees trimmed will be measured as the actual number of tree acceptably trimmed.

### **Basis of Payment:**

The quantity of trees trimmed will be paid for at the Contract price per each tree. Price and payment will constitute full compensation for trimming, satisfactory disposal of trimmings, and for all labor, equipment, tools, and incidentals required to complete the work.

8/20/02

## **741503 – ROOT PRUNING**

### **Description:**

This work shall consist of supplying all materials, labor, equipment, and incidentals necessary for the root pruning of existing trees designated to remain on the Contract Documents.

### **Material Requirements:**

Backfill material shall be that which was removed during the root pruning process or other topsoil containing a high organic content.

An ISA (International Society of Arboriculture) Certified Arborist shall be on-site to perform or directly supervise the root pruning operations in conformance with accepted arboricultural practices.

A vibratory knife or other equipment and tools that conform to accepted arboricultural practices shall be utilized to perform root pruning operations.

### **Construction Methods:**

The Contractor shall contact “Miss Utility” or another approved service to identify and mark utilities in the rights-of-way and to ensure that those within the vicinity of trees designated to remain on the Contract Documents are clearly identified.

Prior to beginning operations, the Contractor shall coordinate a meeting on-site with the Engineer, Certified Arborist, and City of Newark representative to discuss conflicts that may affect operations. Areas to be root pruned shall be approved and marked in the field.

The Contractor shall notify the Engineer at least 10 days before beginning Operations.

A vibratory knife or other equipment and tools that conform to accepted arboricultural practices shall be utilized to perform root pruning operations.

Root pruning operations shall meet ANSI A300 standards for Tree Care Operations.

Cleanly cut tree roots to a depth of 24 in. along the approved line and immediately backfill trenches with excavated soil or other topsoil containing a high organic content.

Promptly remove, disperse, or dispose of wood debris and other waste materials as directed.

Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces, and sidewalks clean. Restore ruts and damaged turfgrass areas designated to remain by seeding as specified in the DelDOT Specifications.

Do not injure vegetation to be preserved. Injuries to bark, trunks, or limbs shall be repaired by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

Monetary compensation for damage or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

### **Method of Measurement:**

Tree Root Pruning will be measured as the actual number of linear feet of root pruning performed.

### **Basis of Payment:**

The quantity of Tree Root Pruning shall be paid for at the Contract unit price per linear foot. The payment will be full compensation for all labor, material, equipment, tools, and incidentals necessary to complete the work.

7/1/10

## **760502 - PAVEMENT MILLING, TAPER CUT**

### **Description:**

This work consists of furnishing a pavement milling machine and milling or planing the existing bituminous concrete pavement to the average depths and widths in accordance with the locations, notes on the Plans and as directed by the Engineer.

The pavement milling machine shall be one with a proven record for use in milling/planing hot-mix pavement. The Contractor shall reuse, salvage, or dispose of the milled material as indicated on the Plans.

### **Construction Methods:**

Milling and/or planing shall consist of one pass with a specified depth at one edge (face of the curb) and 0 depth at the other edge, or in cases where excessive crown is being removed, the required number of passes to mill a specified depth at the existing road centerline and 0 depth at the edges. The depth shall be as shown on the Plans or as directed by the Engineer.

### **Method of Measurement:**

The quantity of taper cut milling will be measured in square yards per inch of depth (square meters per 25 mm of depth). The average depth shall be determined by either measuring the actual depth removed at face of the curb and dividing by two or measuring the actual depth removed at road centerline and dividing by two, whichever case is applicable.

### **Basis of Payment:**

The quantity of taper cut milling will be paid for at the Contract unit price per square yard per inch of depth (square meter per 25 mm of depth). Price and payment will constitute full compensation for furnishing milling machine with operator and milling/planing the roadway, removal and disposal or salvaging the milled material and for transporting, as indicated on the Plans, for all labor, equipment, tools, and necessary incidentals to complete the work.

10/25/01

## **762500 - SAW CUTTING, HOT-MIX, HORIZONTAL**

### **Description:**

The work consists of furnishing all materials, labor, equipment, tools, and incidentals necessary to horizontally cut existing hot mix curb to reduce the vertical height of the curb. The Contractor shall mechanically saw cut the curb full width to produce a smooth horizontal undamaged surface. The cut shall be maintained at an even grade to produce a new uniform curb height as specified in the Plans or as directed by the Engineer.

When guardrail is present it is intended that the horizontal saw cutting be performed without need to remove any guardrail or post. Should such guardrail removal be required as a result of the Contractor's chosen means and methods for saw cutting, such guardrail removal and replacement shall be incidental to the linear foot price bid for Saw Cutting, Hot-Mix, Horizontal. Also any guardrail damaged as a result of the horizontal saw cutting of curb shall be repaired incidental to the saw cut item.

### **Method Measurement:**

The number of linear feet (meters) of Saw Cutting, Hot-Mix, Horizontal to be paid for under this item shall be the actual number of linear feet (meters) of sawing, complete and accepted, measured along cut end to end.

### **Basis of Payment:**

The number of linear feet (meters) of saw cutting measured as provided above shall be paid for at the contract unit price per linear foot (meter) bid for Saw Cutting, Hot-Mix, Horizontal which price and payment shall constitute full compensation for furnishing all materials, labor, equipment, tools, disposal of excess hot-mix curb, guardrail removal and replacement if necessary, and incidentals necessary to complete the item.

## **763501 - CONSTRUCTION ENGINEERING**

### **Description:**

This work consists of construction lay out including; stakes, lines and grades as specified below. Subsection 105.10 Construction Stakes, Lines and Grades of the Standard Specifications is voided.

Based on contract plans and information provided by the Engineer, the Contractor shall stake out right-of-way and easements lines, limits of construction and wetlands, slopes, profile grades, drainage system, centerline or offset lines, benchmarks, structure working points and any additional points to complete the project.

The Engineer will only establish the following:

- (a) Original and final cross-sections for borrow pits.
- (b) Final cross-sections for all excavation items.
- (c) Line and grade for extra work added on to the project plans.

### **Equipment:**

The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [3mm+2ppmxD] and an angle accuracy of up to 2.0 arc seconds or 0.6 milligons. If the Contractor chooses to use GPS technology in construction stakeout, the Contractor shall provide the Engineer with a GPS rover for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees. At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer.

### **Engineering/Survey Staff:**

The Contractor shall provide and have available for the project an adequate engineering staff that is competent and experienced to set lines and grades needed to construct the project. The engineering personnel required to perform the work outlined herein shall have experience and ability compatible with the magnitude and scope of the project. Additionally, the Contractor shall employ an engineer or surveyor licensed in the State of Delaware to be responsible for the quality and accuracy of the work done by the engineering staff. When individuals or firms other than the Contractor perform any professional services under this item, that work shall not be subject to the subcontracting requirements of Subsection 108.01 of the Standard Specifications. The Contractor shall assume full responsibility for any errors and/or omissions in the work of the engineering staff described herein. If construction errors are caused due to erroneous work done under Construction Engineering the Contractor accepts full responsibility, no matter when the error is discovered. Consideration will not be given for any extension of contract time or additional compensation due to delays, corrective work, or additional work that may result from faulty and erroneous construction stakeout, surveying, and engineering required by this specification.

### **Construction Methods:**

#### **Performance Requirements:**

- (a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to check the accuracy of given control points. Establishing plan coordinates and elevations marks for culverts, slopes, subbase, subsurface drains, paving, subgrade, retaining walls, and any other stakes required for control lines and grades; and setting vertical control elevations, such as footings, caps, bridge seats and deck screed. The Contractor shall be responsible for the

preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed 0.05 ft times [Square root of number of miles in the level run] (0.01 m times [square root of number of kilometers]). The Horizontal Control accuracy ratio shall not exceed an error of closure of 1 foot per 20,000 feet (1 meter per 20,000 meters or 1:20,000) of distance traversed prior to adjustment.

- (b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the profiles and typical sections provided in the plans shall calculate proposed grades at the edge of pavement or verify information shown on Grades and Geometric sheets.
- (c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor shall immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.
- (d) The Contractor shall establish the working points, centerlines of bearings on bridge abutments and on piers, mark the location of anchor bolts to be installed, check the elevation of bearing surfaces after they are ground and set anchor bolts at their exact elevation and alignment as per Contract Plans. Before completion of the fabrication of beams for bridge superstructures, the Contractor shall verify by accurate field measurements the locations both vertically and horizontally of all bearings and shall assume full responsibility for fabricated beams fitting and bearing as constructed. After beam erection and concurrently with the Department project surveyors, the Contractor shall survey top of beam elevations at a maximum of 10-ft (3.0-meter) stations and compute screed grades. These shall be submitted to the Engineer for review and approval before the stay in place forms are set. Construction stakes and other reference control marks shall be set at sufficiently frequent intervals to assure that all components of the structure are constructed in accordance with the lines and grades shown on the plans. The Contractor will be responsible for all structure alignment control, grade control and all necessary calculations to establish and set these controls.
- (e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution. All stakes for advanced utility relocation, which will be performed by others, shall be paid for under item 763597 – Utility Construction Engineering.
- (f) The Contractor shall be responsible for the staking of all sidewalk and curb ramp grades in accordance with the plans and the Departments Standard Construction Details. The Contractor shall review the stakeout with the Engineer prior to construction. The Engineer must approve any deviation from plans, Department Standard Construction Details and Specifications in writing. The Contractor shall be responsible for any corrective actions resulting from problems created by adjustments if they fail to obtain such approval.
- (g) If wetland areas are involved and specifically defined on the Plans the following shall apply:
  - i. It is the intent of these provisions to alert the Contractor, that he/she shall not damage or destroy wetland areas, which exist beyond the construction



limits. These provisions will be strictly enforced and the Contractor shall advise his/her personnel and those of any Subcontractor of the importance of these provisions.

- ii. All clearing operations and delineation of wetlands areas shall be performed in accordance with these Special Provisions. Before any clearing operation commences the Contractor shall demarcate wetlands at the Limits of Construction throughout the entire project as shown on the Plans labeled as Limits of Construction or Wetland Delineation to the satisfaction of the Engineer.
- iii. The material to be used for flagging the limits of construction shall be orange vinyl material with the wording "Wetland Boundary" printed thereon. In wooded areas, the flagging shall be tied on the trees, at approximate 20-foot (6.1 meter) intervals through wetland areas. In open field and yard areas that have been identified as wetlands, 3 foot (one meter) wooden grade stakes shall be driven into the ground at approximate 20 foot (6.1 meter) intervals and tied with the flagging.
- iv. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall reflag the area at no cost to the Department. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.
- v. At the completion of construction, the Contractor shall remove all stakes and flagging.
- vi. The Contractor shall be responsible for any damages to wetlands located beyond the construction limits, which occurs from his/her operations during the life of the Contract. The Contractor shall restore all temporarily disturbed wetland areas to their preconstruction conditions. This includes restoring bank elevations, streambed and wetland surface contours and wetlands vegetation disturbed or destroyed. The expense for this restoration shall be borne solely by the Contractor.

### **Submittals:**

All computations necessary to establish the exact position of all work from the control points shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be made available to the Department in a neat and organized manner at anytime as directed by the Engineer. The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and any necessary correction to the work shall be made as soon as possible. The Contractor shall furnish the Engineer with such assistance as may be required for checking all lines, grades, and measurements established by the Contractor and necessary for the execution of the work. Such checking by the Engineer shall not relieve the Contractor of his/her responsibility for the accuracy or completeness of the work.

The Contractor shall submit any of the following at the Engineer's request:

- (a) Proposed method of recording information in field books to ensure clarity and adequacy.
- (b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.
- (c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.

- (d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control.
- (e) Description of newly established benchmarks with location, elevation and closed loop survey field notes.
- (f) All updated electronic and manuscript survey records.
- (g) Stakeout plan for each structure and culvert.
- (h) Computations for buildups over beams, screed grades and overhang form elevations.
- (i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.
- (j) Any proposed plan alteration to rectify a construction stakeout error, including design calculations, narrative and sealed drawings.
- (k) Baseline for each borrow pit location.
- (l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.
- (m) Copies of cut sheets.

**Method of Measurement:**

The quantity of Construction Engineering will not be measured.

**Basis of Payment:**

Payment will be made at the Lump Sum price bid for the item "Construction Engineering". The price bid shall include the cost of furnishing all labor, equipment, instruments, stakes and other material necessary to satisfactorily complete the work as herein described under this item for all roads and structures that are a part of the contract. Adjustment in payment will be made for the deletion or addition of work not shown in the contract documents.

Monthly payment will be made under this item in proportion to the amount of work done as determined by the Engineer.

8/29/07

## **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.

Travel lane and ramp closings on multilane highways and Interstates shall not be permitted during the following holiday periods:

- December 24 through December 27 (Christmas Day)
- December 31 through January 3 (New Years Day)
- Friday prior to Easter through Easter Sunday
- Thursday prior to Memorial Day through the Tuesday following Memorial Day
- Dover International Speedway Race Weekends (Thursday prior to the race event through the day after the race event)
- July 3 through July 5 (Independence Day)
- Thursday prior to Labor Day through the Tuesday following Labor Day
- Wednesday prior to Thanksgiving Day through the Monday following Thanksgiving Day

Additional time restrictions may apply as noted in the project plans or as directed by the Engineer. Any requests to waive any restrictions must be made in writing to the Engineer for review and approval. A copy of the request shall be provided to the District Safety Officer for review.

**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.

A breakout sheet is attached to the Proposal that lists the locations for Maintenance of Traffic. The Contractor shall specify a cost for each location. The lump sum price for Item 763643 shall be the sum of the cost for all locations listed. The completed breakout sheet shall be attached to the Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in it being declared non responsive and rejected.

The Department reserves the right to delete from the Contract one or more of the locations listed and the lump sum price to be paid will be reduced in accordance with the Contractor's cost listed for that/those location(s). There will be no extra compensation to the Contractor if such deletion is made

6/21/2011







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

SHAILEN P. BHATT  
SECRETARY

April 27, 2012

**ENVIRONMENTAL REQUIREMENTS**

FOR

State Contract No. T201203201

Federal Aid No.: None

Contract Title: CTF Projects Central, 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 DeIDOT 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.



**BID PROPOSAL FORMS**  
CONTRACT T201203201.01  
**CANNOT BE USED FOR BIDDING**



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

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	201000 CLEARING AND GRUBBING	LUMP		LUMP		
0020	202000 EXCAVATION AND EMBANKMENT	CY	315.000			
0030	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	CY	805.000			
0040	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	CY	800.000			
0050	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP		LUMP		
0060	211004 REMOVAL OF STRUCTURES AND OBSTRUCTIONS (PIPE)	LF	220.000			
0070	302005 GRADED AGGREGATE BASE COURSE, TYPE B	TON	40.000			
0080	302006 GRADED AGGREGATE BASE COURSE, TYPE B, PATCHING	TON	80.000			
0090	302007 GRADED AGGREGATE BASE COURSE, TYPE B	CY	15.000			

CANNOT BE USED FOR BIDDING



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0100	302012 DELAWARE NO. 57 STONE	250.000 TON				
0110	401644 SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 64-22 (CARBONATE STONE)	500.000 TON				
0120	401645 SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22 (CARBONATE STONE)	10.000 TON				
0130	401648 SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 64-22	40.000 TON				
0140	401651 SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 70-22 (CARBONATE STONE)	300.000 TON				
0150	401654 SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 70-22	50.000 TON				
0160	401665 SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22, PATCHING	50.000 TON				
0170	401666 SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 64-22, PATCHING	50.000 TON				
0180	406001 HOT-MIX PATCHING	1037.000 SYIN				

CANNOT BE USED FOR BIDDING





CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0190	602016 PORTLAND CEMENT CONCRETE MASONRY, CLASS C	1325.000 CY				
0200	612002 REINFORCED CONCRETE PIPE, 15", CLASS III	80.000 LF				
0210	612003 REINFORCED CONCRETE PIPE, 18", CLASS III	480.000 LF				
0220	612007 REINFORCED CONCRETE PIPE, 30", CLASS III	200.000 LF				
0230	612202 REINFORCED CONCRETE ELLIPTICAL PIPE, 24"X38", CLASS III	200.000 LF				
0240	612529 PIPE VIDEO INSPECTION	544.000 LF				
0250	612535 CLEANING DRAINAGE PIPE, 15"-24" DIA	500.000 LF				
0260	612536 CLEANING DRAINAGE PIPE, GREATER THAN 24" DIA	350.000 LF				
0270	614002 GALVANIZED CORRUGATED STEEL PIPE, 15", 16 GAGE, 2 2/3" X 1/2" CORRUGATION	20.000 LF				
0280	617002 REINFORCED CONCRETE FLARED END SECTION, 15"	2.000 EACH				

CANNOT BE  
USED FOR  
BIDDING



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0290	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	EACH 1.000				
0300	617007 REINFORCED CONCRETE FLARED END SECTION, 30"	EACH 3.000				
0310	701021 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 2	LF 250.000				
0320	701022 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-8	LF 120.000				
0330	705001 P.C.C. SIDEWALK, 4"	SF 1200.000				
0340	705002 P.C.C. SIDEWALK, 6"	SF 360.000				
0350	705007 SIDEWALK SURFACE DETECTABLE WARNING SYSTEM	SF 120.000				
0360	705008 CURB RAMP, TYPE 1	SF 400.000				
0370	708045 LAWN INLET	EACH 1.000				
0380	708053 DRAINAGE INLET, 48" X 48"	EACH 1.000				

CANNOT BE USED FOR BIDDING



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0390	708059 DRAINAGE INLET, 72" X 72"	EACH 1.000				
0400	708114 MANHOLE, 66" X 48"	EACH 1.000				
0410	708563 PERSONAL GRATE FOR PIPE INLET	LUMP	LUMP			
0420	710001 ADJUSTING AND REPAIRING EXISTING DRAINAGE INLET	EACH 14.000				
0430	710002 ADJUSTING AND REPAIRING EXISTING MANHOLE	EACH 8.000				
0440	712005 RIPRAP, R-4	SY 25.000				
0450	713003 GEOTEXTILES, RIPRAP	SY 25.000				
0460	714003 DITCHING	LF 150.000				
0470	732000 TOPSOIL, 4" DEPTH	SY 550.000				
0480	732003 TOPSOIL, 12" DEPTH	SY 15.000				
0490	732004 TOPSOIL (TON)	TON 250.000				

CANNOT BE USED FOR BIDDING



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0500	734013 PERMANENT GRASS SEEDING, DRY GROUND	450.000 SY				
0510	734016 PERMANENT GRASS SEEDING, SUBDIVISION	240.000 SY				
0520	735533 SOIL RETENTION BLANKET MULCH, TYPE 3	225.000 SY				
0530	735534 SOIL RETENTION BLANKET MULCH, TYPE 4	265.000 SY				
0540	737523 PLANTING	LUMP	LUMP			
0550	741002 TREE REMOVAL 11" TO 14.9"	1.000 EACH				
0560	741003 TREE REMOVAL 15" TO 18.9"	2.000 EACH				
0570	741501 TREE TRIMMING	24.000 EACH				
0580	741503 ROOT PRUNING	720.000 LF				
0590	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	12.000 EADY				

CANNOT BE  
USED FOR  
BIDDING





CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0600	743007 TRAFFIC OFFICERS	180.000 HOUR	75.00000		13500.00	
0610	743051 FLAGGER, KENT COUNTY, STATE	1100.000 HOUR	46.66000		51326.00	
0620	743063 FLAGGER, KENT COUNTY, STATE, OVERTIME	140.000 HOUR	67.66000		9472.40	
0630	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	23.500 SF				
0640	756000 SAND	12.000 TON				
0650	758000 REMOVAL OF EXISTING PORTLAND CEMENTCONCRETE PAVEMENT, CURB, SIDEWALK, ETC.	75.000 SY				
0660	760000 PAVEMENT - MILLING, HOT-MIX	1250.000 SYIN				
0670	760502 PAVEMENT MILLING, TAPER CUT	1100.000 SYIN				
0680	762001 SAW CUTTING, HOT MIX	495.000 LF				
0690	762002 SAW CUTTING, CONCRETE, FULL DEPTH	30.000 LF				

CANNOT BE  
USED FOR  
BIDDING



CONTRACT ID: T201203201.01 PROJECT(S): T201203201

All figures must be typewritten.

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

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0700	762003 SAW CUTTING, CONCRETE, VARIABLE DEPTH	24.000 LF				
0710	762500 SAW CUTTING, HOT-MIX, HORIZONTAL	42.000 LF				
0720	763000 INITIAL EXPENSE	LUMP		LUMP		
0730	763501 CONSTRUCTION ENGINEERING	LUMP		LUMP		
0740	763643 MAINTENANCE OF TRAFFIC, ALL INCLUSIVE	LUMP		LUMP		
	SECTION 0001 TOTAL					
	TOTAL BID					

CANNOT BE  
 USED FOR  
 BIDDING



# CANNOT BE BREAKOUT SHEETS

THE FOLLOWING SHEETS MUST BE COMPLETED AND RETURNED WITH THE PROPOSAL AT THE TIME OF BID. FAILURE TO COMPLETE THE BREAKOUT SHEETS AS REQUIRED WILL RESULT IN THE BID BEING DECLARED NON-RESPONSIVE AND WILL NOT BE CONSIDERED. BREAKOUT SHEETS MUST BE COMPLETED REGARDLESS OF WHETHER BIDDING BY ELECTRONIC MEANS OR TYPEWRITTEN HARD COPY.

# BIDDING



SECTION 1		BREAKOUT SHEET - 1				CONTRACT NO. T201203201	
ITEM 763643 - Maintenance of Traffic, All Inclusive							
Location No.	Location Description	Qty of Possible Locations	Working Hours	Primary MOT Case Set-ups	UOM	UNIT PRICE	AMOUNT
1	Work on the shoulders	2	Daytime	TA-3	EA	\$	\$
2	Lane Closure on two-lane road, using flaggers	20	Daytime	TA-10	EA	\$	\$
3	Stationary lane closure on a divided highway	2	Daytime	TA-33	EA	\$	\$
TOTAL ITEM 763643 - Maintenance of Traffic, All Inclusive \$ _____ (LUMP SUM BID PRICE FOR ITEM 763643)							

CANNOT BE  
 USED FOR  
 BIDDING





# "ATTENTION" TO BIDDERS

This Bid Proposal includes breakout sheets. The breakout sheets **MUST ACCOMPANY** the bid proposal at the time of bid. Failure to return completed breakout sheets **WILL RESULT** in the bid proposal being declared non-responsive and **REJECTED** as irregular.



**CERTIFICATION**

Contract No.   T201203201.01  

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. T201203201.01, to be paid to the **State** for the use and benefit of its Department of Transportation  
("**DeIDOT**") 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 **DeIDOT** 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 **DeIDOT**, 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