

STATE OF DELAWARE

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A CD FROM DELDOT
IN ORDER TO BID.



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201109002.01

FEDERAL AID PROJECT NO. IM-N056(042)

I-95 AND SR141 INTERCHANGE,
RAMPS G & F IMPROVEMENTS

NEW CASTLE COUNTY

ADVERTISEMENT DATE: August 24, 2015

COMPLETION TIME: 649 Calendar Days

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

Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time September 22, 2015

Contract No. T201109002.01
Federal Aid Project No. IM-N056(042)

I-95 AND SR141 INTERCHANGE, RAMPS G & F IMPROVEMENTS
NEW CASTLE COUNTY

GENERAL DESCRIPTION

LOCATION

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

DESCRIPTION

The improvements consist of furnishing all labor and materials for the I-95 and SR141 Interchange, ramps G & F improvements, and other incidental construction in accordance with the location, notes and details shown on the plans and as directed by the Engineer.

COMPLETION TIME

All work on this contract must be complete within 649 Calendar Days. The Contract Time includes an allowance for 101 Weather Days. It is the Department's intent to issue a Notice to Proceed such that work starts on or about January 15, 2016.

PROSPECTIVE BIDDERS NOTES:

1. BIDDERS MUST BE REGISTERED with DelDOT and request a CD of the official plans and specifications in order to submit a bid. Contact DelDOT at dot-ask@state.de.us, or (302) 760-2031.
2. QUESTIONS regarding this project are to be e-mailed to dot-ask@state.de.us no less than six business days prior to the proposal opening date in order to receive a response. Please include T201109002.01 in the subject line. Responses to inquiries are posted on-line at <http://www.bids.delaware.gov>.
3. This project incorporates the electronic bidding system **Expedite, version 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 on DelDOT's Website at: http://www.deldot.gov/information/business/bids/const_proj_bid_info.shtml.
4. Each proposal must be accompanied by a deposit of either surety bond or security for a sum equal to at least 10% of the bid.
5. No retainage will be withheld on this contract.
6. The Department's External Complaint Procedure can be viewed on DelDOT's Website at; <http://www.deldot.gov/information/business/>, or you may request a copy by calling (302) 760-2555.
7. **SPECIFICATIONS:** New Supplemental Specifications to the August 2001 Standard Specifications were issued November 24, 2014 and apply to this project. They can be [viewed here](#). The Department is currently updating the August 2001 Specifications for Road and Bridge Construction. Through this update, some Divisions were renumbered and some new ones were created and added. The **Specifications Note** document is for the use by the bidders to reference the new numbers to the past numbers used for bidding purposes on previous Department contracts.
8. **PLEASE NOTE** the requirements of special provision 'Changes to Project Documents During Advertisement' have moved to Supplemental Specifications, the special provision is no longer needed.
9. **PLEASE NOTE** federal requirements for the DBE program under [49CFR §26.53\(b\)\(3\)\(i\)\(B\)](#) have changed effective November 3, 2014. Submission of DBE participation information is now required from the lowest apparent bidder no later than seven (7) days after bid opening (*formerly 10 days*).
10. **BREAKOUT SHEETS MUST** be submitted either with your bid documents; or within seven (7) calendar days following the bid due date by the lowest apparent bidder. Refer to instructions adjacent to the Breakout Sheets in this document.
11. **PROPOSED TRAINEE PLANS** as required. Number of required programs is listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted within 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.

Failure of the apparent low bidder to present copies of an acceptable OJT Trainee Programs within ten (10) calendar days of notification of apparent low bidder status, shall create a rebuttable presumption that the bid is not responsive.

12. LIQUIDATED DAMAGES

The contract drawings and notes provide a sequence of construction for this contract.

FAILURE TO OPEN PROJECT TO UNRESTRICTED HIGHWAY TRAFFIC ON TIME

Interim Road User costs (RUC) for delays in opening lanes along both Northbound I95 and I295 will be enforced according to the below charts. The Interim Road User costs do not apply to the Pier Demo work.

Table 1

Northbound I-95			
(Monday through Friday)			
Contractor Penalties for Failure to Reopen Lanes			
Time All Lanes Reopened ("Verizon Time")	One Lane Closure	Two Lane Closure	Three Lane Closure
5:00 AM to 5:14 AM	No Penalty	No Penalty	No Penalty
5:15 AM to 5:29 AM	No Penalty	No Penalty	No Penalty
5:30 AM to 5:44 AM	No Penalty	No Penalty	\$1,000.00
5:45 AM to 5:59 AM	No Penalty	No Penalty	\$1,500.00
6:00 AM to 6:14 AM	No Penalty	\$1,000.00	\$3,500.00
6:15 AM to 6:29 AM	No Penalty	\$1,500.00	\$6,500.00
6:30 AM to 6:44 AM	No Penalty	\$2,500.00	\$9,500.00
6:45 AM to 6:59 AM	No Penalty	\$5,000.00	\$12,500.00
Not Open by 7:00 AM	\$4,000.00	\$8,000.00	\$16,000.00

The following penalties will be assessed for every half hour, or portion thereof, after 7:00 AM until 10:59 AM.

Number of Lanes Closed	Contractor Penalties for Failure to Reopen Lanes
One Lane Closed	\$1,000/30 Minutes
Two Lanes Closed	\$1,500/30 Minutes
Three Lanes Closed	\$2,000/30 Minutes

The above will be assessed for up to a total of \$36,000 per day.

Table 2

Northbound I-95			
(Saturday and Sunday)			
Contractor Penalties for Failure to Reopen Lanes			
Time All Lanes Reopened ("Verizon Time")	One Lane Closure	Two Lane Closure	Three Lane Closure
0 minutes to 14 minutes after scheduled opening	No Penalty	No Penalty	No Penalty
15 minutes to 29 minutes after scheduled opening	No Penalty	No Penalty	No Penalty
30 minutes to 44 minutes after scheduled opening	No Penalty	\$1,000.00	\$1,000.00
45 minutes to 59 minutes after scheduled opening	No Penalty	\$2,000.00	\$1,500.00
60 minutes to 74 minutes after scheduled opening	No Penalty	\$3,000.00	\$3,500.00
75 minutes to 89 minutes after scheduled opening	No Penalty	\$4,000.00	\$6,500.00
90 minutes to 104 minutes after scheduled opening	No Penalty	\$5,000.00	\$9,500.00
105 minutes to 119 minutes after scheduled opening	No Penalty	\$6,000.00	\$12,500.00
Not Open by 120 minutes after scheduled opening	No Penalty	\$8,000.00	\$16,000.00

The following penalties will be assessed for every half hour, or portion thereof, after 120 minutes.

Number of Lanes Closed	Contractor Penalties for Failure to Reopen Lanes
One Lane Closed	\$1,000/30 Minutes
Two Lanes Closed	\$1,500/30 Minutes
Three Lanes Closed	\$2,000/30 Minutes

The above will be assessed for up to a total of \$36,000 per day.

TABLE 3

Northbound I-295		
(Monday through Friday)		
Contractor Penalties for Failure to Reopen Lanes		
Time All Lanes Reopened ("Verizon Time")	One Lane Closure	Detour onto Ramp E/D2 Slip Lanes
5:00 AM to 5:14 AM	No Penalty	No Penalty
5:15 AM to 5:29 AM	No Penalty	No Penalty
5:30 AM to 5:44 AM	No Penalty	No Penalty
5:45 AM to 5:59 AM	No Penalty	No Penalty
6:00 AM to 6:14 AM	No Penalty	\$1,000.00
6:15 AM to 6:29 AM	No Penalty	\$1,500.00
6:30 AM to 6:44 AM	No Penalty	\$2,000.00
6:45 AM to 6:59 AM	No Penalty	\$2,500.00
Not Open by 7:00 AM	No Penalty	\$5,000.00

For every half hour, or portion thereof, after 7:00 AM, \$2,000 per half hour will be assessed for the detour onto Ramp E/D2 slip lanes for up to a total of \$25,000 per day. For every half hour, or portion thereof, after 11:00 AM, \$2,000 per half hour will be assessed for one lane closed for up to a total of \$25,000 per day.

TABLE 4

Northbound I-295		
(Saturday and Sunday)		
Contractor Penalties for Failure to Reopen Lanes		
Time All Lanes Reopened ("Verizon Time")	One Lane Closure	Detour onto Ramp E/D2 Slip Lanes
0 minutes to 14 minutes after scheduled opening	No Penalty	No Penalty
15 minutes to 29 minutes after scheduled opening	No Penalty	No Penalty
30 minutes to 44 minutes after scheduled opening	\$2,500.00	\$1,000.00
45 minutes to 59 minutes after scheduled opening	\$5,000.00	\$1,500.00
60 minutes to 74 minutes after scheduled opening	\$7,500.00	\$4,000.00
75 minutes to 89 minutes after scheduled opening	\$10,000.00	\$7,000.00
90 minutes to 104 minutes after scheduled opening	\$12,500.00	\$10,000.00
105 minutes to 119 minutes after scheduled opening	\$15,000.00	\$13,000.00
Not Open by 120 minutes after scheduled opening	\$20,000.00	\$16,000.00

For every half hour, or portion thereof, after 120 minutes, \$2,000 per half hour will be assessed for one lane closed and the detour onto Ramp E/D2 slip lanes for up to a total of \$24,000 per day.

A RUC of \$12,000.00/calendar day have been established for the closure of Ramp F.

A RUC of \$8,000.00/calendar day have been established for the closure of Ramp E.

A RUC of \$12,000.00/calendar day have been established for the closure of one lane on I-95 as part of the Pier Demo work for both Phases 1 and 2.

If all lanes are not reopened the RUC will be assessed based on the original lane closure setup until 7:00 AM or 120 minutes after the scheduled opening (Northbound I-95 and I-295 Saturday and Sunday conditions only). After 7:01 or 121 minutes after the scheduled opening, the RUC will be based on the number of lanes closed.

Examples of calculations for assessment of Road User Cost:

1. Failure to have all lanes to traffic open (Two Lane Closure) to I-95 Northbound until 6:35 AM on a Tuesday, local time:

Per Table 1 a RUC of \$2,500.00 will be assessed.

2. Three lanes closed as part of a three lane closure until 9:10 AM on a Thursday, local time.

Two lanes closed from 9:10 AM to 10:25 AM
 One lane closure from 10:25 AM to 11:05 AM
 All lanes open starting at 11:05 AM

Per Table 1:
7:00 AM through 7:01 AM = \$16,000.00;
7:02 AM through 7:29 AM = \$2,000.00;
7:30 AM through 7:59 AM = \$2,000.00;
8:00 AM through 8:29 AM = \$2,000.00;
8:30 AM through 8:59 AM = \$2,000.00;
9:00 AM through 9:29 AM = \$2,000.00;
9:30 AM through 9:59 AM = \$1,500.00;
10:00 AM through 10:29 AM = \$1,500.00;
10:30 AM through 10:59 AM = \$1,000.00;
11:00 AM through 11:29 AM = \$1,000.00;

A RUC of \$31,000.00 will be assessed.

3. Three lanes closed as part of a three lane closure until 6:15 AM on a Tuesday, local time.

Two lanes closed from 6:15 AM to 7:25 AM
One lane closure from 7:25 AM to 8:15 AM
All lanes open starting at 8:15 AM

Per Table 1:
7:00 AM through 7:01 AM = \$16,000.00;
7:02 AM through 7:29 AM = \$1,500.00;
7:30 AM through 7:59 AM = \$1,000.00;
8:00 AM through 8:29 AM = \$1,000.00;

A RUC of \$19,500.00 will be assessed.

Liquidated Damages of \$5,080/calendar day have been established for this project.

Both the Road User Costs and Liquidated Damages will be assessed for each calendar day over the established calendar days proposed in the bid when the contractor's work activities require lane width and shoulder width restrictions. There is no limit on the amount that can be assessed. Assessment of Road User Costs and/or Liquidated Damages will be made by change order.

Liquidated Damages will be assessed for each calendar day over the established calendar days proposed in the bid when the contractor's work activities do not require lane width or shoulder width restrictions. There is no limit on the amount that can be assessed. Assessment of Liquidated Damages will be made by change order.

The Engineer will be the sole approving authority as to when the project is complete after traffic is returned to the ultimate alignment and when the contractors work activities will permit highway traffic ultimate lane width and shoulder widths.

The Contractor is advised that in order to complete the project on or before the number of calendar days proposed in his bid, it may be necessary to provide multiple crews, work overtime and/or weekends and holidays.

Contract No.T201109002.01
CONSTRUCTION ITEMS UNITS OF MEASURE

English Code	English Description	Multiply By	Metric Code	Metric Description	Suggested CEC Metric Code
ACRE	Acre	0.4047	ha	Hectare	HECTARE
BAG	Bag	N/A	Bag	Bag	BAG
C.F.	Cubic Foot	0.02832	m ³	Cubic Meter	M3
C.Y.	Cubic Yard	0.7646	m ³	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 ³	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 ²	Square Meter	M2
S.Y.	Square Yard	0.8361	m ²	Square Meter	M2
SY-IN	Square Yard-Inch	0.8495	m ² -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 Standard 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.

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, sexual orientation or natural 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, sexual orientation 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.

SUBCONTRACTOR LICENSE: 29 DEL. C. §6967:

(c) Any contractor that enters a public works contract must provide to the agency to which it is contracting, within 30 days of entering such public works contract, copies of all occupational and business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the contractor entered the public works contract the occupational or business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

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.

CONFLICT WITH FEDERAL STATUTES OR REGULATIONS:

Delaware Code, Title 29, Chapter 69, Section 6904, Paragraph (a):

"If any provision of this subchapter conflicts or is inconsistent with any statute, rule or regulation of the federal government applicable to a project or activity, the cost of which is to be paid or reimbursed in whole or in part by the federal government, and due to such conflict or inconsistency the availability of federal funds may be jeopardized, such provision shall not apply to such project or activity."

FEDERAL LABOR AND EMPLOYMENT REQUIREMENTS

Federal Regulation 23 CFR § 635.117(b) Labor and employment, states:

"No procedures or requirement shall be imposed by any State which will operate to discriminate against the employment of labor from any other State, possession or territory of the United States, in the construction of a Federal-aid project."

CONVICT PRODUCED MATERIALS:

- (a) Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if such materials have been:
 - (1) Produced by convicts who are on parole, supervised release, or probation from a prison or
 - (2) Produced in a qualified prison facility and the cumulative annual production amount of such materials for use in Federal-aid highway construction does not exceed the amount of such materials produced in such facility for use in Federal-aid highway construction during the 12-month period ending July 1, 1987.
- (b) Qualified prison facility means any prison facility in which convicts, during the 12-month period ending July 1, 1987, produced materials for use in Federal-aid highway construction projects.

TO REPORT BID RIGGING ACTIVITIES:

The U. S. Department of Transportation (DOT) operates the below toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

TO REPORT BID RIGGING ACTIVITIES
CALL 1-800-424-9071

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation In
Each Trade

12.3% (New Castle County)
14.5% (Kent & Sussex Counties)

Goals for Female Participation In
Each Trade

6.9% (Entire State)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is NEW CASTLE County.

REV. 11-3-80

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Program Office or from the Federal procurement contracting offices. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontractors from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participating, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
 9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).
 10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
 11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
 12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Order of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
 13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
 14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate

of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

* * * * *

TRAINING SPECIAL PROVISIONS

This Training Special Provision supersedes subparagraph 7b of the Special Provision entitled "Specific Equal Employment Opportunity Responsibilities", (Attachment 1), and is in implementation of 23 U.S.C. 140(a). As part of the contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The contractor shall provide on-the-job training aimed at developing full journeyman in the type of trade or job classification involved.

The number of trainees to be trained under the special provision will be 3. In the event the contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year apprenticeship or training.

The number of trainees shall be distributed among the work classification on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing construction, the contractor shall submit to the Department of Highways and Transportation for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the contractor shall specify the starting time for training in each of the classifications. The contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeyman status is a primary objective of this Training Special Provision. Accordingly, the contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. The contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the contractor is in compliance with this Training Special Provision. This training commitment is not intended, and not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the contractor and approved by the Department of Highways and Transportation and the Federal Highway Administration. The Department of Highways and Transportation and the Federal Highway Administration shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment

obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work the classification covered by the program. It is the intention of these provisions that the training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some off-site training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the engineer, reimbursement will be made for training persons in excess of the number specified herein. This reimbursement will be made even though the contractor receives additional training program funds from other sources, provided such other sources does not specifically prohibit the contractor from receiving other reimbursement. Reimbursement for off-site training indicated above may only be made to the contractor where he does one or more of the following and the trainees are concurrently employed on a Federal-aid project; contributes to the cost of the training; provides the instruction of the trainee; or pays the trainee's wages during the off-site training period.

No payment shall be made to the contractor if either the failure to provide the required training, or the failure to hire the trainees as a journeyman, is caused by the contractor and evidences a lack of good faith on the part of the contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees be on board for the entire length of the contract. A contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Trainees will be paid a least 60 percent of the appropriate minimum journeymen's rate specified in the contract for the first half of the of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees is an approved existing program are enrolled as trainees on this project. In fact case, the appropriate rates approved by the Department of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this Training Special Provisions.

The contractor shall furnish the trainee a copy of the program he will follow in providing the training.

The contractor shall provide each trainee with a certification showing the type and length of training satisfactorily completed.

The contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

* * * * *

INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT & TRANSPORTATION EQUITY ACT

Recipients of Federal-aid highway funds authorized under Titles I (other than Part B) and V of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), or Titles I, III, and V of the Transportation Equity Act for the 21st Century (TEA-21) are required to comply with the regulations of 49 Code of Federal Regulations (CFR) Part 26 - Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM SPECIFICATION

The U.S. Department of Transportation (DOT) requires that the Delaware Department of Transportation continue the established Disadvantaged Business Enterprise (DBE) Program for participation in U.S. DOT programs and that the program follow the final rules as stated in 49 CFR Part 26 and the Department's approved DBE Program plan.

The following definitions apply to this subpart:

Disadvantaged Business Enterprise or DBE means a for-profit small business concern (1) that is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals; and, (2) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

DOT-assisted contract means any contract between a recipient and a contractor (at any tier) funded in whole or in part with DOT financial assistance, including letters of credit or loan guarantees, except a contract solely for the purchase of land.

Good Faith Efforts means efforts to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the program requirement.

Joint Venture means an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

Race-conscious measure or program is one that is focused specifically on assisting only DBEs, including women-owned DBEs.

Race-neutral measure or program is one that is, or can be, used to assist all small businesses. For the purposes of this part, race-neutral includes gender neutrality.

Small Business concern means, with respect to firms seeking to participate as DBEs in DOT-assisted contracts, a small business concern as defined pursuant to section 3 of the Small Business Act and Small Business Administration regulations implementing it (13 CFR part 121) that also does not exceed the cap on average annual gross receipts specified in 49 CFR §26.65(b).

Socially and economically disadvantaged individuals means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is - (1) any individual who a recipient finds to be a socially and economically disadvantaged individual on a case-by-case basis; (2) any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:

- (i) Black Americans which includes persons having origins in any of the Black racial groups of Africa;
- (ii) Hispanic Americans which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
- (iii) Native Americans which includes persons who are American Indians, Eskimos, Aluets, or Native Hawaiians;
- (iv) Asian-Pacific Americans which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong;
- (v) Subcontinent Asian Americans which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
- (vi) Women;
- (vii) Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.

DelDOT will establish specific goals for each particular DOT-assisted project which will be expressed as a percentage of the total dollar amount of contract bid. The specific contract goals for this contract are:

Disadvantaged Business Enterprise 4 % Percent

DelDOT continues to reserve the right to approve DBE subcontractors and all substitutions of DBE subcontractors prior to award and during the time of the contract.

Bidders are required to submit with their bids the completed DBE Program Assurance portion of the Certification document which will state the bidders intent of meeting the goals established for this contract; or in the instance where a contractor cannot meet the assigned DBE Goals for this contract, he/she shall at the time of bid submit documentation required to verify that he/she has made a Good Faith Effort to meet the DBE Goals. Guidance for submitting a Good Faith Effort is identified in the next section and in the DBE Program Plan. Further, the apparent low bidder must submit to DelDOT within seven (7) calendar days after

the bid opening, executed originals of each and every DBE subcontract to satisfy contract goals consistent with the DBE Program Assurance submitted as part of the bid package.

No contract work shall be performed by a DBE subcontractor until the executed DBE subcontract is approved in writing by DelDOT and the Department has issued the required Notice to Proceed. Any DBE subcontract relating to work to be performed pursuant to this contract, which is submitted to DelDOT for approval, must contain all DBE subcontractor information, the requirements contained in this contract, and must be fully executed by the contractor and DBE subcontractor.

Each contract between the prime contractor and each DBE subcontractor shall at the minimum include the following:

1. All pertinent provisions and requirements of the prime contract.
2. Description of the work to be performed by the DBE subcontractor.
3. The dollar value of each item of work to be completed by the DBE subcontractor and the bid price of each item of work to be completed by the DBE subcontractor.

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CRITICAL DBE REQUIREMENTS

A bid may be held to be non-responsive and not considered if the required DBE information is not provided. In addition, the bidder may lose its bidding capability on Department projects and such other sanctions as the Department may impose. It is critical that the bidder understands:

1. In the event that the bidder cannot meet the DBE goal as set forth in this specification, he/she shall at the time of bid submit to the Department that percentage of the DBE Goal that will be met, if any, on the written and notarized assurance made a part of this contract. The contractor shall also at the time of bid submit all documentation that the contractor wishes to have the Department consider in determining that the contractor made a Good Faith Effort to meet contract DBE Goals. The Department will not accept Good Faith Effort documentation other than on the scheduled date and time of the bid opening. However, the Department may ask for clarification of information submitted should the need arise.
2. A bid which does not contain either a completely executed DBE Program Assurance and/or Good Faith Effort documentation, where appropriate, shall be declared non-responsive and shall not be considered by the Department.
3. Failure of the apparent low bidder to present originals of all DBE subcontracts to substantiate the volume of work to be performed by DBE's as indicated in the bid within seven (7) calendar days after the bid opening shall create a rebuttable presumption that the bid is not responsive.
4. Bidders are advised that failure to meet DBE Goals during the term of the contract may subject them to Department sanctions as identified in the DBE Program Plan.
5. In the execution of this contract, the successful bidder agrees to comply with the following contract clauses:

Prompt Payment: The prime contractor/consultant receiving payments shall, within 30 days of receipt of any payment, file a statement with the Department on a form to be determined by the Department that all subcontractors furnishing labor or material have been paid the full sum due them at the stage of the contract, except any funds withheld under the terms of the contract as required by Chapter 8, Title 17 of the Delaware Code, annotated and as amended. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of DelDOT. This clause applies to both DBE and non-DBE subcontractors.

Retainage: The prime contractor agrees to return retainage to each subcontractor within 15 calendar days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of DelDOT. This clause covers both DBE and non-DBE subcontractors. As guidance, once a subcontractor has satisfactorily completed the physical work, and has given to the prime contractor a certified statement that all laborers, lower tier contractors, and material men who have furnished labor and materials to the subcontractor have been paid all monies due them, the prime contractor shall return retainage to the subcontractor within 15 calendar days.

6. In the execution of this contract, the successful bidder agrees to comply with the following contract assurance and will include this same language in each subcontractor contract:

"The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such remedy as the recipient deems appropriate." 49 CFR Section 26.13

7. In addition to this specification, bidders must comply with all provisions of the rules and regulations adopted by the U.S. Department of Transportation for DBE participation in U.S. DOT and DelDOT Programs (49 CFR Part 26) and the Delaware Department of Transportation Disadvantaged Business Enterprise Program Plan; each of which is hereby incorporated and made part of this specification. Bidders are also reminded that they must be responsible and responsive bidders in all other aspects aside from the DBE Program in order to be awarded the contract.
8. In accordance with 49 CFR 26.53(f)(1), DelDOT requires that a prime contractor not terminate a DBE subcontractor without prior written consent from the DelDOT Civil Rights Office. This includes, but is not limited to, instances in which a prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

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GUIDANCE FOR GOOD FAITH EFFORT

When the DBE Goals established for a contract by DelDOT are not met, the contractor shall demonstrate good faith efforts to meet the DBE contract goals. The contractor shall demonstrate that the efforts made were those that a contractor actively and aggressively seeking to meet the goals established by DelDOT would make, given all relevant circumstances. Evidence of this good faith effort will be submitted with the bid at the time of the bid opening.

The contractor is expected to demonstrate good faith efforts by actively and aggressively seeking out DBE participation in the project to the maximum extent, given all relevant circumstances. Following are the kinds of efforts that may be taken but are not deemed to be exclusive or exhaustive and DelDOT will consider other factors and types of efforts that may be relevant:

1. Efforts made to select portions of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the stated goal. Selection of portions of work are required to at least equal the goal for DBE utilization specified in this contract.
2. Written notification at least ten (10) calendar days prior to the opening of a bid soliciting DBE interest in participating in the contract as a subcontractor or supplier and for specific items of work.
3. Efforts made to obtain and negotiate with DBE firms for specific items of work:
 - a. Description of the means by which firms were solicited (i.e. by telephone, e-mail, written notice, advertisement).
 - b. The names, addresses, telephone numbers of DBE's contacted, the dates of initial contact; and whether initial solicitations of interest were followed-up by contacting the DBEs to determine with certainty whether the DBEs were interested.
 - c. A description of the information provided to DBE firms regarding the plans, specifications and estimated quantities for portions of the work to be performed.
 - d. A statement of why additional agreements with DBE's were not reached in order to meet the projected goal.
 - e. Listing of each DBE contacted but not contracted and the reasons for not entering a contract.
4. Efforts made to assist DBEs that need assistance in obtaining bonding, insurance, or lines of credit required by the contractor.
5. Reasons why certified DBEs are not available or not interested.
6. Efforts to effectively use the services of available disadvantaged community organizations; disadvantaged contractor's groups; local, state and federal DBE assistance offices; and other organizations that provide assistance in recruitment and placement of DBEs.

The following are examples of actions that may not be used as justification by the contractor for failure to meet DBE contract goals:

1. Failure to contract with a DBE solely because the DBE was unable to provide performance and/or payment bonds.
2. Rejection of a DBE bid or quotation based on price alone.

3. Rejection of a DBE because of its union or non-union status.
4. Failure to contract with a DBE because the contractor normally would perform all or most of the work in the contract.

Administrative reconsideration:

Within five (5) days of being informed by DelDOT that it is not responsive because it has not documented sufficient good faith efforts, a bidder may request administrative reconsideration. Bidder should make this request in writing to the following reconsideration official: Director of Administration, DelDOT, P. O. Box 778, Dover, Delaware 19903. The reconsideration official will not have played any role in the original determination that the bidder did not document sufficient good faith efforts.

As part of this reconsideration, the bidder will have the opportunity to provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so. The bidder will have the opportunity to meet in person with the reconsideration official, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. The final decision made by the reconsideration official will be communicated to the bidder in writing. The result of the reconsideration process is not administratively appealable to the U.S. Department of Transportation.

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REQUIRED CONTRACT PROVISIONS - FEDERAL-AID CONSTRUCTION CONTRACTS
(Exclusive of Appalachian Contracts)

FHWA-1273 -- Revised May 1, 2012 <http://www.fhwa.dot.gov/programadmin/contracts/1273/1273.docx>

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as

amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
 - a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.
 - b. The contractor will accept as its operating policy the following statement:
"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: 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, pre-apprenticeship, and/or on-the-job training."
2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.
3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
 - a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
 - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
 - c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

- d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
 - e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.
- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
 - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
 - c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.
5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
- a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
 - b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
 - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
 - d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.
6. Training and Promotion:
- a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.
 - b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

- c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
 - d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.
7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:
- a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.
 - b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
 - c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
 - d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.
8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
- a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
 - b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. Assurance Required by 49 CFR 26.13(b):
- a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.
 - b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.
 - a. The records kept by the contractor shall document the following:
 - (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
 - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;
 - b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

- a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
- (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (ii) The classification is utilized in the area by the construction industry; and
 - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

- a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..
- (2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
 - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without

rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

- a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.
3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

- a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
 - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
 - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
 - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
 - (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
 - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
 3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
 4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
 5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

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2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
 - (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
 - (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and
 - (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

* * * * *

APPENDICES TO THE TITLE VI ASSURANCE

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, (Federal Highway Administration (FHWA), or Federal Transit Authority (FTA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts and the Regulations, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA) to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA), as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA) may determine to be appropriate, including, but not limited to:
 - withholding payments to the contractor under the contract until the contractor complies;
 - and/or cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through five in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts and the Regulations . The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA) may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX E

During the performance of this contract, the contractor or consultant, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,(42 U.S.C. § 460

D), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);

Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;

The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);

Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 - 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;

The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 41123) (prohibits discrimination on the basis of race, color, national origin, and sex);

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs; policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

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.

REQUIREMENT BY DEPARTMENT OF LABOR FOR SWORN PAYROLL INFORMATION

Title 29 Del.C. §6960 stipulates;

(b) Every contract based upon these specifications shall contain a stipulation 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. The specifications shall further stipulate 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.

(c) Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll.

Bidders are specifically directed to note the Department of Labor's prevailing wage 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."

PREVAILING WAGE REQUIREMENTS

It is DelDOT's understanding that the Davis-Bacon Act is not a preemptive statute in the broad sense, and does not preempt or displace State of Delaware prevailing wage requirements.

When a contract for a project contains both Federal Davis-Bacon and State of Delaware prevailing wage standards because of concurrent Federal and State coverage, the employer's minimum wage obligations are determined by whichever standards are higher.

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

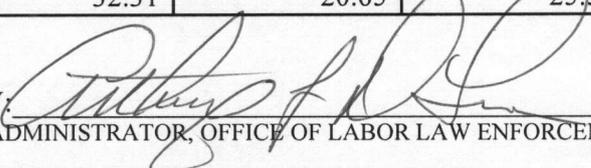
Mailing Address:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

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

PREVAILING WAGES FOR HIGHWAY CONSTRUCTION
EFFECTIVE MARCH 13, 2015 - AMENDED JULY 15, 2015

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
BRICKLAYERS	49.39	49.39	14.51
CARPENTERS	42.55	51.86	41.22
CEMENT FINISHERS	31.06	30.92	19.65
ELECTRICAL LINE WORKERS	22.50	22.50	21.25
ELECTRICIANS	63.60	63.60	63.60
IRON WORKERS	42.20	23.87	25.35
LABORERS	31.10	34.12	37.75
MILLWRIGHTS	16.11	15.63	13.49
PAINTERS	63.14	63.14	63.14
PILEDRIVERS	66.42	23.75	26.95
POWER EQUIPMENT OPERATORS	39.15	32.92	29.04
SHEET METAL WORKERS	22.75	20.31	18.40
TRUCK DRIVERS	32.31	20.65	25.55

CERTIFIED : 8/7/15

BY: 
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

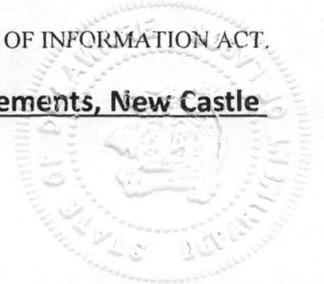
NOTE: THESE RATES ARE PROMULGATED AND ENFORCED PURSUANT TO THE PREVAILING WAGE REGULATIONS ADOPTED BY THE DEPARTMENT OF LABOR ON APRIL 3, 1992.

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

NON- REGISTERED APPRENTICES MUST BE PAID THE MECHANICS RATE.

THESE RATES ARE BRING PROVIDED IN ACCORDANCE WITH DELAWARE'S FREEDOM OF INFORMATION ACT.

Re: Contract # T201109002.01, I-95 and SR141 Interchange, Ramps G&F Improvements, New Castle County, DE



State: DELAWARE

Construction Type: HIGHWAY

COUNTY: New Castle County in Delaware

HIGHWAY CONSTRUCTION PROJECTS

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.10 (or the applicable wage rates listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	06/26/2015
1	08/14/2015

SUDE2015-002 04/23/2015

	Rates	Fringes
Bricklayer	49.39	
Carpenter	42.55	
Cement Mason/Concrete Finisher	31.06	
ELECTRICIAN		
Electrician	63.60	
Line Worker	22.50	
Ironworker	42.20	
Laborer	31.10	
Millwright	16.11	
Painter	63.14	
Power Equipment Operator:		
Piledriver	66.42	
Power Equipment Operator	39.15	
Sheet Metal Worker	22.75	
Truck Driver	32.31	

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of “identifiers” that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than “SU” or “UAVG” denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under an “SU” identifier indicated that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Contract No. T201109002.01

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

APPLICABILITY OF DAVIS-BACON LABOR STANDARD PROVISIONS TO FLAGGERS

The U.S. Department of Labor has established that the duties of flaggers working on contracts covered by the Davis-Bacon Act, are manual and physical in nature. Accordingly, all employees performing the work of flaggers on Davis-Bacon covered contracts shall be entitled to receive applicable prevailing wage rates.

* * * * *

ALL AGENCY MEMORANDUM NO. 130
U.S. DEPARTMENT OF LABOR
EMPLOYMENT STANDARDS ADMINISTRATION
WAGE AND HOUR DIVISION
WASHINGTON, DC 20210

GUIDELINES

HIGHWAY CONSTRUCTION

Highway projects include the construction, alteration, or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction.

EXAMPLES: Alleys, Base Courses, Bituminous treatments, Bridle Paths, Concrete pavement, Curbs, Excavation and embankment (for road construction), Fencing (highway), Grade crossing elimination (overpasses and underpasses), Guard rails on highway, Highway signs, Highway bridges (overpasses, underpasses, grade separation), Medians, Parking lots, Parkways, Resurfacing streets and highways, Roadbeds, Roadways, Runways, Shoulders, Stabilizing courses, Storm sewers incidental to road construction, Street paving, Surface courses, Taxiways, and Trails.

ANY QUESTIONS REGARDING THE APPLICATION OF THE GUIDELINES ABOVE TO A PARTICULAR PROJECT OR ANY DISPUTES REGARDING THE APPLICATION OF THE WAGE SCHEDULES ARE TO BE REFERRED TO THE WAGE AND HOUR DIVISION, U.S. DEPARTMENT OF LABOR FOR RESOLUTION, AND THE INSTRUCTIONS OF THE WAGE AND HOUR DIVISION ARE TO BE OBSERVED IN ALL INSTANCES.

* ALL AGENCY MEMORANDUM NO. 130
U.S. DEPARTMENT OF LABOR
EMPLOYMENT STANDARDS ADMINISTRATION
WAGE AND HOUR DIVISION
WASHINGTON, DC 20210

**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

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

NOTE:

PLEASE NOTE revised Supplemental Specifications to the August 2001 Standard Specifications were issued November 24, 2014 and apply to this project. They can be [viewed here](#) and at www.deldot.gov.

SPECIFICATIONS: The Department is currently updating the August 2001 Specifications for Road and Bridge Construction. Through this update, some Divisions were renumbered and some new ones were created and added. The *Specifications Note* document is for the use by the bidders to reference the new numbers to the past numbers used for bidding purposes on previous Department contracts.

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 link for the posting is http://www.deldot.gov/information/business/bids/asphalt_cement_english.shtml.

The Project Asphalt Cement Base Price will be the Delaware Posted Asphalt Cement Price in effect on the date of advertisement.

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 using the weight of eligible asphalt that is shown on the QA/QC pay sheets as a percentage for the delivered material.

If the mix was not inspected and no QA/QC pay sheet was generated, then the asphalt percentage will be obtained from the job mix formula for that mix ID.

The asphalt percentage eligible for cost adjustment shall only be the virgin asphalt cement added to the mix.

There shall be no separate payment per ton cost of asphalt cement. That cost shall be included in the various unit prices bid per 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 per ton for the project will be the Delaware Posted Asphalt Cement Price in effect on the date of project advertisement.

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 or more of hot-mix bid quantity in case of Sections 401, 402 and 403; and 15,000 gallons or more in case of Sections 304, 404 and 405.

5/05/15

207501 - SHEETING AND SHORING

Description:

This work consists of furnishing all materials, designing and constructing permanent sheeting and shoring in accordance with the notes on the Plans, this Special Provision and as directed by the Engineer.

Materials:

The type of sheeting and shoring to be constructed shall be selected by the Contractor, however, the design and construction shall be in accordance with the applicable requirements of Section 207 of the Standard Specifications.

Construction Methods:

The Contractor shall submit to the Department for approval, the sheeting and shoring design calculations, detailed layout, working drawings and construction methods, at least thirty (30) calendar days prior to initiating its construction. The entire submission shall be signed and sealed by a Professional Engineer registered in the State of Delaware prior to submitting to the Department.

Method of Measurement:

The quantity of permanent sheeting and shoring will not be measured.

Basis of Payment:

The quantity of sheeting and shoring permanent will be paid for at the Contract lump sum. Price and payment will constitute full compensation for furnishing and placing all materials, for design, submission of signed and sealed drawings, installation of permanent sheeting and shoring materials, any excavation in excess of that required for the structure as defined under Subsection 207 of the Standard Specifications, bailing, pumping and draining, for all labor, equipment, tools and incidentals required to complete the work.

2/12/14

211509 - REMOVAL OF SIGN STRUCTURES

Description:

This work is the removal and satisfactory disposal of the existing overhead sign structure and foundations.

Construction Methods:

The Contractor shall furnish all labor, materials and equipment necessary for and incidental to the complete demolition and removal of the sign structure as indicated on the Contract Drawings and in accordance to technical specifications. The existing concrete foundations shall be completely removed. The area shall be graded and seeded or sodded, as directed by the Engineer. Removal will also include reinforced bars, anchor bolts, and other related hardware. Satisfactorily dispose all materials removed from the site.

For the removal of the sign structure, if necessary, temporary lane closures will be permitted for a maximum of fifteen (15) minutes between the hours of 12 midnight and 5 A.M. Perform temporary lane closures of this work in accordance with the DE MUTCD latest edition and special provision 743000 – Maintenance of Traffic. Do not begin subsequent stoppage until flow of traffic from the previous stoppage has returned to normal.

Method of Measurement:

Payment for this item will be made on a lump sum basis wherein no measurement will be made. The number of sign structure removals will be based on the contract documents.

Basis of Payment:

The payment for this item shall be Lump Sum. Payment shall constitute full compensation for any maintenance and protection of traffic work, removing and disposing of the sign support structure, and existing foundations, including sheeting and shoring and excavation incidental to their removal; for grading and seeding or sodding of the existing foundation area; and for all labor, equipment, tools and incidentals required to complete the work. The removing and disposing of the existing signs will be paid by item 749500- Sign Panel.

3/10/14

211550 – DEMOLITION OF EXISTING BRIDGE
211551 – DISPOSAL OF STRUCTURAL STEEL
211552 – DISPOSAL OF STRUCTURAL CONCRETE

Description:

This work shall consist of the demolition, and disposal of the existing bridge materials over I-95 & I-295, designated as Delaware Department of Transportation Bridge Nos. 1-675 and 1-678, in accordance with the limits as indicated on the Plans, as specified in these Special Provisions and as may be directed by the Engineer.

Schedule Requirements:

The demolition of the existing bridge shall commence in accordance with the construction phasing indicated on the Plans. The Contractor may not initiate the mobilization of equipment for the demolition of the existing bridge until written authorization is granted by the Engineer.

Submittal Requirements:

Prior to beginning any demolition activities, the Contractor shall prepare a working drawing submittal of the proposed means and methods to demolish the existing bridge. This submittal shall include the following:

- (1) An itemized listing of the equipment proposed for the bridge removal and steel sheet pile installation.
- (2) The location and/or staging area(s) of major equipment including cranes and haul trucks.
- (3) The Contractor's detailed proposed methods for removal of the existing bridge by mechanical/machine means. The use of controlled demolition (i.e., explosive) techniques is prohibited for the removal of the existing bridge (or steel sheet pile and tieback wall). However, if the Contractor elects to pursue the use of controlled demolition, he will be responsible for obtaining all appropriate permits and/or approvals from the Department, US Army Corps of Engineers and the Delaware Department of Natural Resources and Environmental Control. **The Department makes no guarantees that the use of controlled demolition can be used for the demolition of the existing bridge.**
- (4) A schedule for the work including the duration of time. The schedule shall specifically address the start and duration of the demolition of all the piers.
- (5) Detail plans (and supporting calculations) of any sheeting and shoring required for the removal of the existing abutments or any other element. Any supporting calculations submitted as part of the demolition working drawing submittal shall be prepared by a Professional Engineer licensed in the State of Delaware with expertise in the design of excavation sheeting and shoring systems.
- (6) Proposed method(s) of disposal.

Materials:

None.

Construction Methods:

The demolition of the existing bridge shall be completed in accordance with the Contractor's approved working drawing submittal as noted herein.

The excavation and removal of the existing bridge approach embankment (including pavement, guardrails and the concrete and rip rap bridge slope protection) will be included under Item 211550 DEMOLITION OF EXISTING BRIDGE.

Areas excavated for the purposes of demolition shall be backfilled with material meeting the requirements of Borrow Type F back to the original ground line or the proposed ground line as stipulated on the Plans. Compaction shall meet the requirements of subsection 202.05 of the Specifications.

Method of Measurement:

The items Demolition of Existing Bridge will not be measured for payment.

Basis of Payment:

The item Demolition of Existing Bridge will be paid for at the Contract Lump Sum price. The payment will be full compensation for preparing, submitting and revising the required working drawings, furnishing and mobilizing the equipment necessary to complete the work as required, demolition and disposal of the existing bridge, and for all material, labor, equipment, tools, and incidentals necessary to complete the work in accordance with the Plans and these Special Provisions.

Payment for backfilling excavations with Borrow Type F will be incidental to the Demolition of Existing Bridge item.

4/7/15

302514 - MILLED HOT-MIX BASE COURSE

Description:

It is the intent of this Special Provision to qualify the use of milled hot-mix asphalt pavement material in lieu of graded aggregate as a base course. All requirements of Section 302 shall remain in effect except as modified below:

Materials:

The material used to construct milled hot-mix asphalt pavement base courses shall be uniformly graded with a maximum size of 1 1/2" (38 mm).

Subgrade Preparation:

The subgrade shall be properly constructed in accordance with Subsection 202.06. No base course material shall be placed until the subgrade has been approved by the Engineer.

Placement:

- a. *Equipment.* The milled material shall be spread uniformly by an approved spreading machine or box in such a manner that no segregation occurs. A conventional motor grader will not be approved for placement of milled material on mainline roadway sections.

Where it is not possible to use a spreading machine or box in patching or other tight areas, other approved methods can be used only in such manner that no segregation occurs. Compaction shall be uniformly attained by approved rollers or compactors. No milled materials shall be placed until approved equipment is on the Project site and is operational.

- b. *Spreading and Compacting.* Milled material shall be placed in successive layers. Each layer shall be placed in a level, uniform cross-section not to exceed 12" (300 mm) in depth, loose measurement, unless otherwise approved by the Engineer. The milled material shall be deposited and spread parallel to the centerline and the layer shall extend to the full width as shown on the Plans. The milled material shall be handled so that no segregation of fine or coarse particles occurs. No more than 1,000 cu (300 m) of material, as measured along the roadway centerline, shall be spread in advance of compaction operations. Each layer shall be properly compacted as specified, before starting the next layer.

Compaction or rolling shall be performed parallel to the roadway centerline starting at the edges and progressing toward the center. It shall continue until each layer is thoroughly and uniformly compacted to the full width as shown on the Plans.

The milled material shall be compacted by the following method: a sheepsfoot roller (minimal 50 ton static roller) shall make the required number of passes on the base material to achieve the target density followed by a back-drag by either a bulldozer or a motor grader. After the pavement base material has been placed, a 15 ton/1800 vpm (minimum) vibratory steel wheel roller shall compact the base material. Compaction will be measured per subsection *Performance* below. In small areas where the above noted equipment cannot be used, the contractor must request approval from the Department to place the millings with other equipment. The Department reserves the right to reject or approve the areas for placement of millings as determined by the Engineer.

After compaction, all voids in the surface of each layer will be filled with millings and compacted (with the vibratory steel wheel roller) until the layer of base material is well bonded and firm, as determined by the Engineer.

In no case shall vehicles be allowed to travel in a single track or to form ruts in the base course. If any sharp irregularities are formed in the subgrade or base course material, the affected area shall be scarified to a depth of 6" (150 mm) and compacted to conform to the requirements of Section 202 or this Section.

- c. *Performance.* Compaction of milled hot-mix asphalt pavement base courses will be monitored by measuring the in-place density using a nuclear density gauge and comparing it to a control strip target density. The mean base compaction shall be at least 98% of the control strip target density and sufficiently uniform that individual test results are at least 96% of the control strip target density, the base course represented by the test will be considered defective and the Contractor shall further compact the area. After further compaction, the original test site and one other randomly selected site within the area will be tested. The average of two test results will be included in the mean density for that day's placement.

To determine the control strip target density, a control strip with a minimum length of 300 (90 m) shall be constructed at the beginning of work on each pavement base. Each control strip is to remain in place and become a section of the completed roadway. A control strip shall have an area of at least 400 yd² (325 m²). For small areas, the Contractor may request to have a test strip waived. This request shall be submitted to the Engineer for review.

Upon completion of the rolling, the mean density of the control strip will be determined by averaging the results of ten nuclear density tests taken at randomly selected sites within the control strip. The mean density of the control strip shall be the target density for the remainder of the pavement base course which it represents. Compaction shall be expressed as a percentage of the target density.

The finished surface of the graded aggregate base course shall not vary from that required on the Plans by more than 1/2 (13 mm) when tested with a 10 (3.048 m) straightedge applied to the surface parallel to the centerline of the pavement and when tested with a template cut to the cross-section of the pavement. The actual thickness of the graded aggregate base course shall not be more than 1/2 (13 mm) less than the thickness shown on Plans. Those portions of completed base course not meeting these performance requirements shall be completely removed and replaced with proper material placed in accordance with this Section.

A straightedge meeting the approval of the Engineer shall be supplied by the Contractor at each placement operation. The straightedge shall be constructed of rigid materials that resist warping and bending.

Method of Measurement:

The quantity of milled hot-mix base course will be measured by the cubic yard (cubic meter) and will be paid for under Item 302007 - Graded Aggregate Base Course. The volume of cubic yards (cubic meters) will be measured as the number of square yards (square meters) of surface area of milled hot-mix base course, placed and accepted, multiplied by the depths shown on the Plans. If the depth of milled hot-mix base course, placed and accepted, is greater than the depth shown on the Plans, the Plan depth will be used to measure the quantity of payment.

If the limits of measurement for pay quantities for milled hot-mix base course are designated on the Plans, the quantity of milled hot-mix base course measured for payment will be the number of square yards (square meters) of surface area multiplied by the depth placed within the payment lines and grades shown on the Plans. If the limits are not designated on the Plans, or have been changed by the Engineer, in-place dimensions of the accepted milled hot-mix base course will be established. The computation of quantity will be made from cross-sections taken after the completion of work under this Section.

Materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer will not be measured for payment.

There will be no separate payment made for filling voids with millings as required under Placement subsection (b) *Spreading and Compaction*.

Basis of Payment:

Millings used for Base Course will be paid at the unit bid price for Item 302007 - Graded Aggregate Base Course, Type B. All costs to bring the millings into compliance with the requirements of 302514 are incidental to Item 302007. No payment will be made under this item 302514.

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Price and payment will constitute full compensation for hauling, stockpiling (includes any double handling of material), preparing the subgrade, placing and compacting the materials, and for all labor, equipment, tools and incidental required to complete the work.

No additional compensation will be made to the Contractor to crush, screen or otherwise modify the milled hot-mix base course to meet the necessary gradation.

No payment will be made for materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer.

10/31/05

401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE

.01 Description

This item shall govern the Quality Assurance Testing for supplying bituminous asphalt plant materials and constructing bituminous asphalt pavements and the calculation for incentives and disincentives for materials and construction. The Engineer will evaluate all materials and construction for acceptance. The procedures for acceptance are described in this Section. 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 bituminous asphalt. Payment to the Contractor for the bituminous asphalt item(s) will be based on the Contract price per ton and the pay adjustments described in this specification.

.02 Bituminous Concrete Production – Quality Acceptance

(a) Material Production - Tests and Evaluations.

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 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.

Supply and capture samples, as directed by the Engineer under the purview of the Engineer from delivery trucks before the trucks leave the production plant. Hand samples to the Engineer to be marked accordingly. 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. The Contractor may visually inspect the specified delivery load during sampling and elect to reject the load. If the contractor elects to reject the specified delivery truck, each subsequent load will be inspected until a visually acceptable load is produced for acceptance testing. All visually rejected loads shall not be sent to a Department project.

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. Samples not retrieved in accordance with the Contractor's QC plan will be deemed unacceptable and may be a basis for rejection of material produced. Parallel tests or dispute resolution tests will only be performed on material captured at the same time and location as the acceptance test sample. Parallel test samples or Dispute Resolution samples will be created by splitting a large sample or obtaining multiple samples that equally represent the material. The Engineer will perform all splitting and handling of material after it is obtained by the Contractor.

The Contractor may retain dispute resolution samples or perform parallel tests with the Engineer on any acceptance sample.

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 2000th 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 and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor
- AASHTO T166, Method C (Rapid Method) - Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface Dry Specimens
- AASHTO T308 - Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
- AASHTO T30 - Mechanical Analysis of Extracted Aggregate
- AASHTO T209 - Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)
- ASTM D7227 - Standard Practice for Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

(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 based on daily production.

Notify the Engineer of any locations within that road segment that may not be suitable to achieve minimum (93%) compaction due to existing conditions prior to paving the road segment. 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 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 **.02 Acceptance Plan (a) Material Production - B 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 1.0 feet from the newly placed longitudinal joint and 50 feet from a new transverse joint.

Cut one six (6) inch diameter core through the full lift depth at the exact location marked by the Engineer. Cores submitted that are not from the location designated by the Engineer will not be tested and will be paid at zero pay.

Notify the Engineer prior to starting paving operations with approximate 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 mark core locations within 24 hours of notification. 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.

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

Commence coring of the pavement after the pavement has cooled to a temperature of 140°F or less. Cut each core with care in order to prevent damaging the core. Damaged cores will not be tested. Label each core with contract number, date of construction, and number XX of XX upon removal from the roadway. Place cores in a 6-inch diameter plastic concrete cylinder mold or approved substitute for protection. Separate cores in the same cylinder mold with paper. Attach a completed QC test record for the represented area with the corresponding cores. The Engineer will also complete a test record for areas tested for the QA report and provide to Materials & Research. Deliver the cores to the Engineer for testing, processing, and report distribution at the end of each production day.

Repair core holes per Appendix A, Repairing Core Holes in Bituminous 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) – Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface Dry Specimens
- AASHTO T209 - Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt
- ASTM D7227 - Standard Practice for Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

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.

.03 Payment and Pay Adjustment Factors.

The Engineer will determine pay adjustments for the bituminous asphalt item(s) in accordance with this specification. The Engineer will determine a pay adjustment factor for the material produced and a pay adjustment factor for the pavement construction. Pay adjustments for material and construction will be calculated independently. When the pay adjustment calculation for either material or construction falls to zero payment per tables 4, 5, or 5a, the maximum pay adjustment for the other factor will not exceed 100.

Pay Adjustment factors will only be calculated on in place material. Removed material will not be used in payment adjustment calculations.

Material Production Pay Adjustments will be calculated based upon 70% of the contract unit price and calculated according to section .03(a) of this specification. Pavement construction Pay Adjustments will be calculated based upon 30% of the contract unit price and calculated according to section .03(b) of this specification.

(a) Material Production - Pay Adjustment.

Calculate the material pay adjustment by evaluating the production material based on the following parameters:

Table 2

Table 2 - Material Parameter Weight Factors		
Material Parameter	Single Test Tolerance (+/-)	Weight Factor
Asphalt Content	0.4	0.30
#8 Sieve (≥ 19.0 mm)	7.0	0.30
#8 Sieve (≤ 12.5 mm)	5.0	0.30
#200 Sieve (0.075mm Sieve)	2.0	0.30
Air Voids (4.0% Target)	2.0	0.10

Using the JMF target value, the single test tolerance (from Table 2), and the test values, the Engineer will use the following steps to determine the material pay adjustment factor for each lot of material:

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

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

$$QL = ((\text{mean value}) - (\text{JMF target}) + (\text{single test tolerance})) / (\text{standard deviation}).$$
4. For each parameter, locate the values for the Upper Payment Limit (PU) and the Lower Payment Limit (PL) from Table 3 - 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 2 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. When all properties of a single test are within the single test tolerance of Table 2, Pay Adjustment factors shall be determined by Column B. When any property of a single test is outside of the Single Test Tolerance parameters defined in Table 2, the Material Pay Adjustment factor shall be determined by Column C.

9. For each lot, determine the final material price adjustment:

Final Material Pay Adjustment =
 (Lot Quantity) x (Item Bid Price) x (Pay Adjustment Factor) x 70%. This final pay calculation will be paid to the cent.

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. When the PWL of any material parameter in Table 2 is below 60, the Engineer may require the removal and replacement of the material at no additional cost to the Department. Test results on removed material shall not be used in calculation of future PWL calculations for Mixture ID.

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 outside of the allowable single test tolerance for any Materials criteria in Table 2, 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. The pay factors for the out of tolerance sample lot will be calculated using column C of table 4.

If, during production, a QA sample test result does not meet the acceptable tolerances and the Contractors QC sample duplicates the QA sample test result, the Contractor can make an appropriate change to the mixture (within the JMF boundaries), and request to have that sample further isolated. After the Contractor has made appropriate changes, the Contractor will visually inspect each produced load. The first visually acceptable load will be sampled and 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.

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

Table 3 – 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
85	1.03	1.05	1.05	1.04	1.04	1.04	1.04
84	1.01	1.02	1.01	1.01	1.00	1.00	1.00
83	1.00	0.99	0.98	0.97	0.97	0.96	0.96
82	0.97	0.96	0.95	0.94	0.93	0.93	0.93
81	0.96	0.93	0.91	0.90	0.90	0.89	0.89
80	0.93	0.90	0.88	0.87	0.86	0.86	0.86
79	0.91	0.87	0.85	0.84	0.83	0.82	0.82
78	0.89	0.84	0.82	0.80	0.80	0.79	0.79
77	0.87	0.81	0.78	0.77	0.76	0.76	0.76
76	0.84	0.78	0.75	0.74	0.73	0.73	0.72
75	0.82	0.75	0.72	0.71	0.70	0.70	0.69
74	0.79	0.72	0.69	0.68	0.67	0.66	0.66
73	0.75	0.69	0.66	0.65	0.64	0.63	0.63
72	0.74	0.66	0.63	0.62	0.61	0.60	0.60
71	0.71	0.63	0.60	0.59	0.58	0.57	0.57
70	0.68	0.60	0.57	0.56	0.55	0.55	0.54
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

Table 4 - PWL Pay Adjustment Factors		
PWL	Pay Adjustment Factor (%) Column B	Pay Adjustment Factor (%) Column C
100	+5	0
99	+4	-1
98	+3	-2
97	+2	-3
96	+1	-4
95	0	-5
94	-1	-6

93	-2	-7
92	-3	-8
91	-4	-9
PWL<91	PWL - 100	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. .

1. Calculate the core bulk specific gravity values from the subplot tests values, to the nearest 0.001 unit. Obtain the Theoretical maximum Specific Gravity values from the corresponding laboratory subplot tests.
2. Calculate the Degree of Compaction:
Degree of Compaction =
((Core Bulk Specific Gravity) / (Theoretical Maximum Specific Gravity)) x 100% recorded to the nearest 0.1%.
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 and recorded to the nearest 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:
Construction Pay adjustment = (Lot Quantity) x (Bid Price) x (Pay Adjustment Factor) x 30%.

Degree of Compaction (%)	Range	Pay Adjustment Factor (%)
>= 97.0	>= 96.75	-100*
96.5	96.26 – 96.74	-5
96.0	95.75 – 96.25	-3
95.5	95.26 – 95.74	-2
95.0	94.75 – 95.25	0
94.5	94.26 – 94.74	0
94.0	93.75 – 94.25	1
93.5	93.26 – 93.74	3
93.0	92.75 – 93.25	5
92.5	92.26 – 92.74	3
92.0	91.75 – 92.25	0

91.5	91.26 – 91.74	0
91.0	90.75 – 91.25	-5
90.5	90.26 – 90.74	-15
90.0	89.75 – 90.25	-20
89.5	89.26 – 89.74	-25
89.0	88.75 – 89.25	-30
88.5	88.26 – 88.74	-50
≤ 88.0	≤ 88.25	-100*

* or remove and replace it at Engineer's discretion

Table 5A: Compaction Price Adjustment Other¹ Locations		
Degree of Compaction	Range	Pay Adjustment Factor (%)
≥ 97.0	≥ 96.75	-100*
96.5	96.26 – 96.74	-5
96.0	95.75 – 96.25	-3
95.5	95.26 – 95.74	-2
95.0	94.75 – 95.25	0
94.5	94.26 – 94.74	0
94.0	93.75 – 94.25	0
93.5	93.26 – 93.74	1
93.0	92.75 – 93.25	3
92.5	92.26 – 92.74	1
92.0	91.75 – 92.25	0
91.5	91.26 – 91.74	0
91.0	90.75 – 91.25	0
90.5	90.26 – 90.74	0
90.0	89.75 – 90.25	0
89.5	89.26 – 89.74	0
89.0	88.75 – 89.25	-1
88.5	88.26 – 88.74	-3
88.0	87.75 – 88.25	-5
87.5	87.26 – 87.74	-10
87.0	86.75 – 87.25	-15
86.5	86.26 – 86.74	-20
86.0	85.75 – 86.25	-25

85.5	85.26 – 85.74	-30
85.0	84.75 – 85.25	-40
84.5	84.26 – 84.74	-50
=< 84.0	=<84.25	-100*

* or remove and replace at Engineer's discretion

¹ 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.

.04 Dispute Resolution.

Disputes or questions about any test result shall be brought to the attention of the Contractor and the Engineer within two operational days of reported test results. 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.

Third party resolution testing can be performed at either 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 properly captured, labeled, and stored, as described in the second paragraph of the section of these specifications titled **.02 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. The Contractor may request up to two dispute resolution samples be tested per calendar year without charge. Any additional Dispute Resolution samples run at the Contractors request where the results substantiate the acceptance test result will be assessed a fee of \$125. Any additional Dispute Resolution samples that substantiate the Contractors test result will not be assessed the 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.

Appendix A - Repairing Core Holes in Bituminous Asphalt Pavement

Description.

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

Materials and Equipment.

The following material shall be available to complete this work:

- Patch Material - 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 - mechanical (electrical, pneumatic, or gasoline driven) tamping device with a flat, circular tamping face smaller than 6 inches in diameter. .

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 and compact with mechanical tamping device. 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 Bituminous 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:

Existing Material	Structural Coefficient
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:

Existing HMA	$2 * 0.32 = 0.64$
GABC	$7 * 0.14 = \underline{0.98}$
	1.62

For the Type C lift the calculation would be:

Newly Placed B	$2.25 * 0.4 = 0.90$
Existing HMA	$2 * 0.32 = 0.64$
GABC	$7 * 0.14 = \underline{0.98}$
	2.52

06/05/14

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, Carlson Safety Edge End Gate 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

or

Carlson Paving Products
18425 50th Ave. E
Tacoma, WA 98446
1-253-278-9426
www.carlsonpavingproducts.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.

10/15/2013

- 401800 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 64-22
(CARBONATE STONE)
- 401801 - BITUMINOUS CONCRETE, TYPE C, 160 GYRATIONS, PG 64-22 (CARBONATE
STONE)
- 401802 - BITUMINOUS CONCRETE, TYPE C, 205 GYRATIONS, PG 64-22 (CARBONATE
STONE)
- 401803 - BITUMINOUS CONCRETE, TYPE C, 115 GYRATIONS, PG 70-22 (CARBONATE
STONE)
- 401804 - BITUMINOUS CONCRETE, TYPE C, 160 GYRATIONS, PG 70-22 (CARBONATE
STONE)
- 401805 - BITUMINOUS CONCRETE, TYPE C, 205 GYRATIONS, PG 70-22 (CARBONATE
STONE)
- 401806 - BITUMINOUS CONCRETE, TYPE C, 115 GYRATIONS, PG 76-22 (CARBONATE
STONE)
- 401807 - BITUMINOUS CONCRETE, TYPE C, 160 GYRATIONS, PG 76-22 (CARBONATE
STONE)
- 401808 - BITUMINOUS CONCRETE, TYPE C, 205 GYRATIONS, PG 76-22 (CARBONATE
STONE)

- 401809 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 115 GYRATIONS, PG 64-22
- 401810 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22
- 401811 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 205 GYRATIONS, PG 64-22

- 401812 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 115 GYRATIONS, PG 70-22
- 401813 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 70-22
- 401814 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 205 GYRATIONS, PG 70-22

- 401815 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 115 GYRATIONS, PG 76-22
- 401816 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 76-22
- 401817 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 205 GYRATIONS, PG 76-22

- 401818 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE
COURSE, 115 GYRATIONS, PG 64-22
- 401819 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE
COURSE, 160 GYRATIONS, PG 64-22
- 401820 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE
COURSE, 205 GYRATIONS, PG 64-22
- 401821 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22,
PATCHING
- 401822 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22,
PATCHING
- 401823 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE
COURSE, 160 GYRATIONS, PG 64-22, PATCHING

- 401824 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG-64-22,
WEDGE
- 401825 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG-64-22,
WEDGE
- 401826 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 64-22,
(NON-CARBONATE STONE)
- 401827 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22,
(NON-CARBONATE STONE)
- 401828 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 64-22,
(NON-CARBONATE STONE)
- 401829 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 70-22,
(NON-CARBONATE STONE)
- 401830 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22,
(NON-CARBONATE STONE)
- 401831 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 70-22,
(NON-CARBONATE STONE)

- 401832 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)
- 401833 -BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)
- 401834 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)

- 401835 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 64-22
- 401836 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22
- 401837 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 70-22
- 401838 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22
- 401839 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 76-22
- 401840 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22

.01 Description:

This specification shall govern the production and construction of bituminous concrete pavement. 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.

Payment for bituminous concrete shall be in accordance with item 401699. 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. Payment adjustment factors will be calculated in accordance with the latest version of item 401699.

Bituminous concrete may be produced by one or a combination of several technologies involving asphalt foaming processes and equipment or additives that facilitate the reduction of the temperature at which the mix can be placed and satisfactorily compacted thereby permitting the mix to be produced at reduced temperatures.

.02 Materials:

Use materials conforming to standard specifications 823.

Materials for 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. If the Contractor proposes to use a combination of materials that are not covered by this Specification, the mix design shall be submitted and reviewed by the Engineer 30 calendar days prior to use.

a) **Asphalt Binder:**

Meet the requirements of Superpave performance-grade asphalt binder, as referenced in the Plans, according to M 320¹, Table 1 and tested according to AASHTO R29 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 - 2.20 kPa ¹
RTFO DSR, G*/sin (δ)	T 315	>= 2.20 kPa
PAV DSR, G*/ sin (δ)	T 315	</=5000 kPa
BBR Creep Stiffness, S	T 313	</= 300.0 kPa
BBR m-value	T 313	>/=0.300

Note 1: The exception to M 320 is that the original DSR shall be 1.00 to 2.20 kPa

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

The highest low temperature grade virgin binder to be used is -22.

Depending on the level of Recycled materials used, the low temperature properties, per T 313, may be different than stated in M 320 or the previous table.

b) Recycled Materials:

RAP (Recycled Asphalt Pavement): Bituminous concrete pavement mechanically processed to a homogenous consistency to be recycled through the production plant for use in a new bituminous concrete mixture.

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.

c) Shingles:

RAS (Recycled Asphalt Shingles): Materials reclaimed from the shingle manufacturing process such as tabs, punch-outs, and damaged new shingles mechanically broken down with 100% passing the ½ in (12.5 mm) sieve. Shipping, handling, and shredding costs are incidental to the price of Superpave item.

Post-consumer shingles or used shingles are not acceptable. Fiberglass-backed and organic felt-backed shingles shall be kept separate. Both materials shall not be used in the same mixture at the same time. All shingles shall be free of all foreign material and moisture.

The use of Recycled Asphalt Shingles will be considered for 115 gyration mix designs upon demonstration by the producer of adequate blending of the binder verified by laboratory testing on plant produced material.

d) Mineral Aggregate:

Conform to Section 805 and the following criteria. These criteria apply to the combined aggregate blend.

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

¹Coarse Aggregate Angularity is tested according to ASTM D5821.

²Fine Aggregate Angularity is tested according to AASHTO TP-33.

³Clay Content is tested according to AASHTO T176.

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

⁵85/80 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
Toughness , AASHTO T96 Percent Loss, Maximum	40
Soundness , AASHTO T104 Percent Loss, Maximum for five cycles	20
Deleterious Materials , AASHTO T112 Percent, Maximum	10
Moisture Sensitivity , 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 B ALaboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.@ RAP shall be assigned a value of 5.0. The Contractor shall supply all polish values to the Engineer upon request.

e) **Mineral Filler:**

Conform to AASHTO M17.

f) **Warm Mix Additives:**

For any WMA technology requiring addition of any material by the producer during production, the following information will be submitted with the proposed JMF for review and approval at least 30 calendar days prior to production:

1. WMA technology and/or additive information.
2. WMA technology manufacturer’s recommendation for usage.
3. WMA technology target dosage rate and tolerance envelope. Support tolerance envelope with test data demonstrating acceptable mix production properties conforming to all sections of this specification.
4. WMA technology manufacturer’s material safety data sheets (MSDS).
5. Documentation of past WMA technology field application including points of contact.
6. Temperature ranges for mixing and compacting.
7. Laboratory test data, samples, and sources of all mix components, and asphalt binder viscosity-temperature relationships.

Follow the manufacturer’s recommendation for incorporating additives and WMA technologies into the mix. Comply with the manufacturer’s recommendation regarding receiving, storage, and delivery of additives.

If the producer performs blending of the WMA technology in their tank, a separate Quality Control plan shall be submitted by the producer to the Department for review and approval at least 30 calendar days prior to production.

g) **Anti-stripping additives**

Conform to standard specifications Section 829 and blend with the asphalt cement in accordance with this specification. Incorporate anti-stripping additives when the Tensile Strength Ratio (TSR) as determined in accordance with AASHTO T283 is less than 80 or when specified for use by the Engineer.

.03 Bituminous Concrete Production – Quality Control
(a) Process Control - Material Production Quality Control.

Submit through 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 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 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.
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Locations where samples will be obtained and the sampling techniques for each test
- 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 on 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 401644 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.

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
- Failure to perform materials testing per their approved QC Plan
- Deviating from AASHTO or DeLDOT testing procedures.
- Use of any material or the use of a JMF component in a proportion that exceeds the allowable tolerance as specified in section 04(a)(1) of this specification not listed in the JMF.
- Use of the wrong PG graded asphalt.
- Failure to take corrective action per action points in the Contractors approved QC plan.

The following steps will be taken for violations listed above:

1. First offence: Written notice of violation to the Contractor
2. Second offence: Written notice of violation and forfeiture of any bonus (material production or pavement construction) payment eligibility under 401699 section .03 for that production shift.
3. Third offence: Written notice of violation, forfeiture of bonus payment eligibility, and a 5% deduction of payment based upon contract unit price in addition to any calculated pay adjustment factors per 401699 Section 03.
4. Fourth offence: Written notice of violation, forfeiture of bonus payment eligibility, 50% deduction of payment based upon contract unit price in addition to any calculated payment adjustment factor per 401699 Section 03, and immediate suspension of the Contractor until corrective actions are taken. Corrective actions shall be submitted in writing to the Engineer for approval. The Engineer may request a meeting with the Contractor to discuss proposed changes prior to lifting suspension.

Violations of Contractor QC plans shall be kept on record for a period of 1 year from the date of violation at the Central Lab.

(b) Material Production Test Equipment.

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.

Facilities for the use of the Engineer and inspectors shall be a minimum of 600 square feet of floor space conditioned to maintain constant temperature of 77F with two windows and a door equipped with functional locks and latches, located such that plant activities are plainly visible from one window of the building. Work space shall be furnished with illumination, tables, chairs, desks, telephone, and water including drinking water, sanitary facilities, fuel, and power necessary to conduct all necessary tests.

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 suspend production. In the case of an equipment malfunction, the Engineer may elect to test the material at another qualified testing laboratory while waiting for repairs to equipment.

Maintain minimum calibration records for the referenced equipment:

- SUPERPAVE^R 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.

(c) Material Production Test Methods

- AASHTO T312 - Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor
- AASHTO T166, Method C (Rapid Method) - Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface Dry Specimens
- AASHTO T308 - Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
- AASHTO T30 - Mechanical Analysis of Extracted Aggregate
- AASHTO T209 - Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)
- ASTM D7227 - Standard Practice for Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

.04 Job Mix Formula (JMF)

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. Assign a unique identification number to each JMF.

a) Development of JMF

Gradation: Use the FHWA Superpave 0.45 Power Chart 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 bituminous concrete. Unless otherwise noted in the Plans, the Type C shall meet the 3/8" (9.5 mm) Nominal Maximum Aggregate Size. Type B bituminous concrete 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 Gyrotory Compactive (SGC) Effort:

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

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

DESIGN ESAL'S (MILLION)	REQUIRED DENSITY (% OF THEORETICAL MAXIMUM SPECIFIC GRAVITY)			VOIDS-IN-MINERAL AGGREGATE (% - MINIMUM) NOMINAL MAX. AGGREGATE (MM)					VOIDS FILLED WITH ASPHALT (%)	
	$N_{INITIAL}$	N_{DESIGN}	N_{MAX}							
				5.0	9.0	12.5	19.0	25.0		4.75
0.3 to < 3	90.5									65.0 - 78.0
3 to < 10										
10 to < 30			96							
≥ 30	89.0	90	98.0	2.5	3.5	5.5	4.5	6.5		65.0 - 75.0 ¹

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 \$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.

TABLE 1

SIEVE SIZE	Nominal Maximum Aggregates Size Control Points, Percent Passing									
	25.0 MM		19.0 MM		12.5 MM		9.5 MM		4.75 MM	
	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

Nominal Maximum Aggregates Size Control Points, Percent Passing										
SIEVE SIZE	25.0 MM		19.0 MM		12.5 MM		9.5 MM		4.75 MM	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
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	25.0	19.0	12.5	9.5 mm	4.5 mm
Aggregates Size	mm	mm	mm		
Primary Control Sieve	4.75	4.75	2.36	2.36	1.18
	mm	mm	mm	mm	mm
PCS Control Point	40	47	39	47	30-60

Plant Production Tolerances:

Volumetric Property	Superpave Criteria
Air Voids (V_a) at (%) N_m	2.0 (min)
Air Voids (V_a) at N_{design} (%)	6.0 (max)
Voids in Mineral Aggregate (VMA) at N_{design}	
25.0 mm Bituminous Concrete Base Course	-1.5
19.0 mm Type B Hot-Mix	+2.0
12.5 mm Type C Hot-Mix	
9.5 mm Type C Hot-Mix	
4.5 mm Type C Hot-Mix	

The proposed JMF shall include the following:

Submit for approval to the Engineer the following documentation on Pinepave mixture design software prior to starting production of a new mixture:

1. Job mix formula (JMF) design of the component materials and target characteristic values for each mixture proposed for use. 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 bituminous concrete meeting the specified properties. Recycled Asphalt Pavement (RAP) is one individual aggregate component regardless of fractionation size. Recycled Asphalt Shingles (RAS) is a separate component from RAP.
2. 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.
3. Plot of the design aggregate structure on the FHWA Superpave 0.45 power chart showing the maximum density line and Superpave control points.

4. 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 .
5. 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 (kg/m^2) at both N_d and N_m .
6. 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.
7. 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.

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.
8. Provide raw material of each JMF so NCAT Ignition Oven calibration correction numbers can be established for the Engineers and Contractors ovens. The Engineer shall provide an ignition oven correction number for each JMF.

.05 Approval of JMF

The Engineer will have up to three weeks once the JMF is submitted to review the submitted information.

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

a) Design Evaluation:

The Engineer may elect to evaluate the proposed JMF and suitability of all materials through laboratory trial batches. 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.

For more expeditious approval, the Contractor may undertake the following steps:

1. Submit the proper documentation on Pinepave mixture design software.
2. Produce the new mixture for a non-Department project. The Engineer will test the material, by taking three series per section 401800 03(c). The mixture will be approved by the Engineer for Department projects if the test results are within the specifications.

A new JMF is required when any of the following conditions occur:

- A change in the source of any of the aggregate component materials
- A change in the proportion of any aggregate component by more than 5.0%
- A change in the aggregate components resulting in a change in percent passing any sieve as identified in Table 1 by more than 5% of the JMF target.

- A change in the target AC content by more than 0.20% from the JMF target to maintain other Volumetric properties of the approved JMF.
- For any mixture that has a 20% or greater failure rate on any combined volumetric criteria.

Although a new JMF is not required, 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. This notification shall include the total change made from the approved JMF proportions, and the effective time of the change. The Engineer will reply to the proposed changes within one operational day and notify the Contractor of the effective date of the changes.

.06 Construction.

(a) Pavement Construction Test Equipment.

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

Weather Limitations.

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

The following table of ambient temperatures for various binder grades and lift thicknesses for placement with the following parameters:

	PG Binder		
			64-22
Lift Thickness (in)	76-22	70-22	
1.50	50F	45F	40F
2.00	40F	38F	35F
3.00	32F	32F	32F

- Minimum surface temperature of 32 degrees F AND
- Minimum production temperature of 275 degrees F AND
- Maximum wind speed of 8 miles per hour

Construction outside of these conditions with WMA technology will be at the discretion of the Engineer.

Compaction:

(b) Pavement Construction - Process Control.

Perform Quality Control of pavement compaction by testing in-place pavement density by the following methods.

- ASTM D2950 Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods; the use of other density gauges shall be as per the manufacturer’s recommendations.
- AASHTO T166, Method C (Rapid Method) Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface Dry Specimens
- ASTM D7227 - Standard Practice for Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

Cores may be cut on the first day of paving or once after the change of a JMF for gauge calibration. The number of cores obtained for calibration purposes shall not exceed the number of QA samples obtained by the Department for payment. The Contractor may use any method to select locations for the Quality Control calibration cores.

Repair all core holes in accordance with 401699 Appendix A.

Method of Measurement:

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

Basis of Payment:

All work completed under this item shall be considered for full payment and subsequently modified in accordance with the procedures enumerated under 401699.

Material production quality shall be evaluated per item 401699 - Quality Control/Quality Assurance of Bituminous Concrete .03 (a) Material Production - Tests and Evaluations.

Compaction quality shall be evaluated per Item 401699 - Quality Assurance of Bituminous Concrete .03 (b) Pavement Construction - Tests and Evaluations.

10/25/2013

406507 - CRACK SEALING

Description:

The work covered by these specifications consists of furnishing all labor, equipment, and materials necessary to perform all operations in connection with the cleaning and sealing of construction joints and random cracks in bituminous concrete surfaces with hot poured asphaltic materials.

Materials:

The sealant shall consist of selected blends of paving grade asphalt and vulcanized granulated crumb rubber. During heating in the melting unit, the asphalt and rubber must react to form a flexible adhesive compound, which when properly applied will effectively seal cracks in either asphalt or concrete pavements. The mixture shall be a blend of paving grade asphalt cement, 21% +/- 2% (by weight of mixture) recycled/reclaimed crumb rubber as shown below and other ingredients necessary to meet the following requirements.

The material furnished under these specifications shall have been tested and found acceptable as determined by the qualification tests in accordance with the requirements under these specifications. A certified copy of the test results shall be submitted to the Materials & Research Laboratory to show that the material is duly qualified.

Physical Requirements:

The specification for asphalt rubber sealants after reaction at 350 F (177 C) for one (1) hour shall be as follows:

Test:

Penetration, Cone, 77 F (25 C); .004 in (1/10 mm), .33 lb (150 g), 5 sec	70 maximum
Softening Point, F (C)	150 F (65.6 C) minimum
Resilience, 77 F (25 C); %	30% minimum
Ductility, 39.2 F (4 C); in (cm)	2.8 in (7 cm) minimum
Viscosity at 350 F (177 C); lb/ft-sec (C Poise), ASTM D3236	26.8 - 167.7 lb/ft-s (40 - 250 C Poise)
Unit Weight	8.5 lbs/gal (1.0 kg/l)
Coverage; 1/2" x 1/2" (13 mm x 13 mm) crack	11.0 lbs per 100 ft. (5.0 kg per 30 m)

Mixture Requirements:

The pour point of the mixture shall be at least 20 F (-6.7 C) lower than the safe heating temperature, which is the maximum temperature to which the material mixture may be heated without exceeding the permitted flow.

Asphalt Compatibility:

Requirements of ASTM D3405 shall be met by the sealant as tested in accordance with ASTM D3407.

Safety Precautions:

Asphalt rubber sealants must be non-toxic and contain no carcinogenic materials.

Crumb Rubber:

The recycled/reclaimed crumb rubber used in mixture shall meet the following requirements:

- A. Shall be produced from an ambient grinding process (crushes, tears, grinds, and/or abrades the used rubber at or above ordinary room temperature) which produces rubber particles with a very ragged, sponge-like surface. Cryogenically ground rubbers are prohibited.
- B. Shall contain recycled, vulcanized crumb rubber and/or reclaimed (devulcanized) rubber.
- C. Shall contain no more than a trace of fabric.
- D. Shall be free of wire and other contaminating materials, except that up to 4% calcium carbonate or talc may be included to prevent the rubber particles from sticking together.
- E. Shall have no rubber particles greater than 1/4 inch (6.4 mm) in length.

In addition to the certified copy of the test results, the Contractor shall provide a sample, 2 lbs. (.91 kg) minimum, of the sealant to the Department's Materials and Research Section for approval.

Construction Methods:

The equipment used for heating and applying the sealant shall meet the requirements of the sealant manufacturer. The kettle shall be an oil-jacketed double wall kettle equipped with an agitator and a 2 inch (50 mm) hot asphalt pump. The equipment shall have a pump for circulating the transfer oil bath and thermometers in both the oil bath and melting chamber. The equipment used for application of the sealant material shall be equipped with a volumetric measuring device to measure the quantity of sealant material applied. The wand applicator shall utilize metal tips. Plastic tips will not be allowed.

The sealant material shall be heated as recommended by the manufacturer.

All construction and random cracks with a crack width greater than 1/4 inch (6.4 mm) are to be sealed in accordance to these specifications. All construction and random cracks with a crack width less than 1/4 inch (6.4 mm) are not to be sealed.

No crack sealant shall be applied in wet cracks or when ambient temperature is below the temperature as recommended by the product manufacturer unless a heat lance is utilized to adequately dry the crack, and as directed by the engineer.

All cracks shall be cleaned of loose dirt and debris by using compressed air of at least 100 psi (7.03 kg/cm²), measured at the source, prior to sealing. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. Any vegetation shall be removed prior to sealing utilizing a motorized wire brush.

Fill joints and cracks in such a manner to provide a band of 2 inches (50 mm) to 4 inches (100 mm), centered over the joint. The thickness of the material shall be approximately 1/16 inch (1.6 mm) not to exceed 1/8 inch (3.2 mm) above the pavement surface. Material shall be leveled by means of a squeegee or a dish mounted on the delivery wand.

Method of Measurement:

The quantity of sealant material will be measured as the number of linear feet (meters) of sealant material applied which shall be checked immediately prior to application in order to determine the actual linear feet (meters) of cracks injected and accepted.

Basis of Payment:

The quantity of crack sealant material will be paid for at the Contract unit price per linear feet (meters). Price and payment will constitute full compensation for cleaning cracks/joints, for furnishing, heating, and applying crack sealant and for all labor, equipment, tools, and incidentals required to complete the work.

501511 - RUBBLIZING PORTLAND CEMENT CONCRETE PAVEMENT

Description:

This work consists of punching holes through the existing Portland Cement Concrete Pavement in accordance with the locations and details on the Plans and as directed by the Engineer.

Equipment:

The existing pavement shall be punched with a hydraulic hammer having a minimum tool diameter of 4 inches.

Construction Methods:

Holes shall be punched completely through the existing concrete slab using a hole pattern of 2 feet on center.

Where concrete pavement or other concrete appurtenances are to remain in place, a full-depth sawcut shall sever the existing pavement, joints, and reinforcement. For jointed pavements, this saw cut shall be at an existing joint. Punched pavement dislodged by construction traffic shall be repaired prior to the paving operation. The cost of repair shall be incidental to this item.

The hydraulic hammer shall be operated to avoid damaging the base and underlying structures. If damage occurs to the base or underlying structures it shall be repaired at the Contractor's expense.

Reinforcement shall be left in place except for that reinforcement exposed at the surface during punching holes or compaction, which shall be cut below the surface and removed. All joint sealant material, loose joint filler, expansion material, or other similar items shall be removed from the punched pavement.

All damage to drainage/utility pipes, conduits, valve boxes, manholes, or other fixtures, existing and proposed, resulting from the hole punching effort shall be repaired or replaced, as approved by the Engineer, at the Contractor's expense. The Contractor may adjust the hole punching pattern adjacent to fixtures or above pipes as directed by the Engineer.

Except at restricted crossover and ramp crossings, traffic shall not be allowed on the punched pavement prior to placement of the overlay course.

To ensure stability of the punched pavement, after compaction, a fully-legally loaded tandem axle dump truck shall be slowly run across the punched base. Any areas of weakness noticed by pumping, shall be removed and replaced with filler material.

Method of Measurement:

The quantity of P.C.C. pavement punched will be measured as the number of square yards of existing P.C.C. pavement punched and accepted.

Basis of Payment:

The quantity of P.C.C. pavement punched will be paid for at the Contract unit price per square yard. Price and payment will constitute full compensation for punching holes through the existing PCC pavement as described herein, for all labor, tools, materials, and necessary equipment to complete the work.

3/10/14

601502 - TEMPORARY PROTECTIVE SHIELD

Description:

This work consists of furnishing all materials and installing a temporary protective shield at the locations described and in conformance with the details and notes on the Plans, as described in these Special Provisions, and/or as directed by the Engineer.

Materials and Construction Methods:

In order to protect vehicular traffic against damage from falling material, debris, and other demolition operations, while superstructure concrete is being removed, the Contractor shall furnish and erect temporary protective structures under the work area and 5' (1.5 m) minimum beyond all sides of full depth concrete deck removed.

The Protective Structures shall meet with the following:

1. The shields shall be supplemented with such additional suitable enclosures of tarpaulins or wire mesh as may be necessary in order to insure against the dropping of materials, tools, equipment, and other objects below the level of the shield. Vertical temporary protective shields shall be erected to prevent debris from entering the roadway and to protect motorists in traveling lane(s) adjacent to the work area(s).
2. Broken concrete and other debris shall not be allowed to accumulate on the shields, but shall be removed promptly. The shields shall not be used for storing or stockpiling construction materials.
3. Timber shall have an allowable flexure stress of 11 MPa and the shield must be designed for 100 lb/sq. ft. (5 kPa) live load and 60 mph (100 km/hr) wind load.
4. All plywood shall be new and shall be not less than 3/4" (19 mm) thick.
5. Bolts, nuts, washers, structural steel, etc. shall conform to Section 601 of the Standard Specifications.
6. The shield shall be assembled by means of bolts and nails, all as approved by the Engineer.
7. The flooring and siding of the shield shall have no cracks or openings through which material particles may fall.
8. The Contractor shall submit shop drawings and design calculations for the shields, including erection plans, to the Engineer for approval, prior to the start of the work. The entire submittal shall be signed and sealed by a Professional Engineer registered in the State of Delaware prior to submitting to the Department.
9. All connections of the protective structures to the steel work of existing bridge shall be made by means of clamps or other approved devices. The drilling of holes in the existing steel work, or welding thereto, will not be permitted.
10. Unless otherwise noted on the Plans, the minimum under clearance over roadways (pavement and shoulder) shall be as follows:
 - 14.5' (4.42 m) for interstate and other controlled access highways
 - 14.0' (4.27 m) for all other roadwaysNo portion of the temporary shield (including connection devices) shall encroach on under clearances.
11. After protective shield has served its purpose, and approval has been given by the Engineer, the Contractor shall remove and dispose of the temporary protective shield away from the site to the satisfaction of the Engineer.

Method of Measurement:

The quantity of temporary protective shields will not be measured.

Basis of Payment:

The quantity of temporary protective shield will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for preparing and revising the required shop drawings, furnishing all materials and performing the work as detailed and noted on the Plans, for removal and disposal of the protective shield materials, and for all labor, tools, equipment, and incidentals necessary to complete the work.

2/12/14

602549 - FORM LINERS

Description:

This work consists of furnishing and placing form liners in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions as shown on the Plans or established by the Engineer.

Materials:

Form liners shall be used which will result in the finish (Georgetown Ashlar or similar) detailed in the Plans and approved by the Engineer. Samples shall be submitted by the Contractor for approval by the Engineer. Three manufacturers of form liners are Fitzgerald Formliners, 1500 East Chestnut Avenue, Santa Ana, CA 92701, Telephone: 714-547-6710; Dayton Superior, 1125 Byers Road, Miamisburg, OH 45342, Telephone: 800-745-3700; and Greenstreak Group, 3400 Tree Court Industrial Blvd., St. Louis, MO 63122, Telephone: 800-325-9504; names of the manufacturers are provided here for information purposes only.

Form oil shall be a nonstaining petroleum distillate free from water, asphaltic and other insoluble residue or equivalent product. The form oil shall be worked into all areas, especially pattern recesses.

Construction Methods:

A test pour shall be made at the site with the proposed form liners before the form liners are approved. The test pour shall subsequently be removed from the site. Test pours shall be made until approved by the Engineer. The test pour shall be, at a minimum, the width of a standard approved form liner, the height of a form liner and any border treatments as shown on the Plans, and six inches (150 mm) in depth, or as approved by the Engineer.

When using form liners, form designs for P.C.C. Masonry Abutments and Piers shall be sufficient to allow minimum 4-foot (1.2 m) on center "Snap-tie" or "Tyscrus" form supports, or approved equal. Wall form tie holes shall be placed in the high point of the mortar joints and the ties shall be so designed that all material in the device to a depth of at least 1 inch (25 mm) back of concrete face (bottom of joint) can be disengaged and removed without spalling and damaging the concrete.

Form liners shall be installed, prepared, stripped, handled or otherwise utilized in accordance with the manufacturer's recommendations, or as directed by the Engineer.

The concrete finish resulting from the form liners shall be cured, patched, or sealed as determined by the Engineer.

Concrete surfaces outside the form liners shall meet the requirements of Section 602.

Method of Measurement:

The quantity of form liners will be measured as the number of square feet (square meters) of form linear installed and accepted. Measurements will be made on the surface of the completed structure.

Basis of Payment:

The quantity of form liners will be paid for at the Contract unit price per square foot (square meter). Price and payment will constitute full compensation for furnishing all materials and for equipment, tools, labor, and incidentals necessary to complete the work as specified above or in the Plans.

The cost shall also include compensation for any additional concrete required to achieve the finish detailed in the Plans, additional concrete and steel reinforcing required for all test pours, additional form liners required for the test pour, and all equipment, tools, labor, and incidentals necessary to complete the work shall be included in the unit price bid.

3/10/14

602553 - MECHANICALLY STABILIZED EARTH WALLS, TYPE 1

Description:

The item shall consist of furnishing all materials, fabricating, and constructing mechanically stabilized earth walls to the lines and grades as shown on the Plans and as directed by the Engineer.

It is the intent of these specifications to provide a guide in the acceptance of a proprietary mechanically stabilized earth wall system. Acceptance of a proprietary mechanically stabilized earth wall system will be based on review and approval of design and specifications submitted by the Contractor for his chosen system. Deviations from these specifications must be approved by the Engineer.

The Contractor shall be required to submit Shop Drawings in accordance with the requirements of Section 105 of the Standard Specifications.

Materials:

1. Lightweight Backfill Material

A. Lightweight backfill shall be an approved rotary kiln material meeting the requirements of ASTM C 330. No by-products slags, cinders, or by-products of coal combustion will be permitted. Lightweight backfill shall be non-corrosive and shall have proven record of durability (magnesium sulfate) as determined in accordance with AASHTO T 104.

B. Lightweight backfill shall meet gradation limits of ASTM C136, as outlined below:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inches	100
3/4 in sieve	90 - 100
3/8 in sieve	10 - 50
No. 4 mesh sieve	0 - 30
No. 200 mesh sieve	Less than 3%

C. Density - The dry loose density shall be less than 60 pounds per cubic foot when tested in accordance with ASTM C 29.

Backfill not conforming to this specification shall not be used without the written consent of the Engineer.

The Contractor, or the supplier as his agent, shall furnish the Engineer a Certificate of Compliance certifying that the above materials comply with the applicable contract specifications. A copy of all test results performed by the Contractor or his supplier necessary to assure contract compliance shall also be furnished to the Engineer.

The frequency of sampling of select granular backfill necessary to assure gradation control throughout construction shall be as directed by the Engineer.

2. Concrete - Concrete shall be in accordance with Section 602 of the Delaware Standard Specifications.

A. Cast-in-place concrete above footing - DelDOT Class A ($f_c = 4500$ psi).

B. Leveling pad - DelDOT Class B ($f_c = 3000$ psi).

C. Face panels - DelDOT Class A ($f_c = 4500$ psi).

3. Reinforcing Mesh - The reinforcing mesh shall meet the requirement of ASTM A 185 (AASHTO M 55).

Galvanization - Galvanization shall meet the requirements of ASTM A 123.

4. Reinforcing Steel - Bar reinforcement shall be in accordance with Section 603 of the Delaware Standard Specifications and shall be ASTM A615 Grade 60 (AASHTO M31).

5. Embed loop - Embed loop shall be fabricated of cold drawn steel wire meeting the requirements of ASTM A 82 and welded in accordance with ASTM A 185. Loops shall be galvanized in accordance with ASTM 123.
6. Connector Bar - Connector Bar shall be fabricated of cold drawn steel wire meeting the requirements of ASTM A 82 and galvanized in accordance with ASTM 123.
7. Horizontal and Vertical/Inclined Joints - Geotextile filter fabric and adhesive for covering the rear side of the horizontal and vertical/inclined joints shall be approved by the Engineer.
8. Horizontal Joint - The material to be used in the horizontal joints between facing panels shall be polyethylene pads with a minimum density of 0.946 g/cm³ in accordance with ASTM D 1505.
9. Alignment Pin - 5/8" min. diameter, mild steel, round, and smooth bar galvanized to meet the requirements of ASTM A 123.
10. Tie Strip - Shop fabricated of hot rolled steel meeting the requirement of ASTM A 570, Grade 50. Galvanization shall meet ASTM A 123.
11. Reinforcing Strip - Hot rolled from bars to the required shape and dimensions physical and mechanical properties shall meet ASTM A 572, Grade 65. Galvanization shall meet ASTM A 123.
12. Fasteners - Bolts and nuts shall be 1/2" diameter hexagonal cap screw, high strength meeting ASTM A 325 (AASHTO M 164), mechanically galvanized. The coating shall meet the thickness, adherence and quality requirements of ASTM A 153 (AASHTO M 232).

Concrete Face Panels:

1. Testing & Inspection - All precast units shall be acceptable when compression test results indicate strength will meet 28 day specifications. Panels utilizing Type I or II cement will be considered acceptable for placement in the wall when 7 day initial strengths exceed 85% of the 28 day requirements. Panels utilizing Type III cement will be considered acceptable for placement in the wall prior to 28 days only when compressive strength test results indicate that the strength meets the 28 day specification.
2. Casting - The panels shall be cast on a flat area, the front face of the panel at the bottom, the back face at the upper part. Coil loop inserts, rebar, PVC pipe and lifting devices shall be set in place to the dimensions and tolerances shown on the drawings prior to casting. The PVC pipe shall be placed in a manner as to insure that it is not bent or bowed. Coil loop inserts shall be set on the rear face. The concrete in each unit shall be placed without interruption and shall be consolidated by the use of an approved vibrator, supplemented by hand tamping as may be necessary to force the concrete into the corners of the forms and prevent the formation of aggregate pockets, air bubbles or cleavage planes. Clear form oil of the same manufacturer shall be used throughout the casting operation.

All coil loop inserts shall be attached to the alignment templates using the bolts provided with the forms. The vertical and horizontal alignment of the coil loop inserts shall be 2 1/4" deep in the finished panel and be free of all concrete or debris, loose or otherwise. No concrete or other debris shall be on the interior surfaces of the coils of the coil loop inserts in the finished panels. Immediately after the alignment template is removed, duct tape shall be placed over the coil loop insert holes in order to prevent debris from entering the holes. This duct tape shall not be removed except by the crew that is assembling the wall. Care shall be taken to insure that the duct tape is not removed during shipping.

3. Curing - The units shall be cured for at least 72 hours. Any panel which does not reach specified strength within 28 days shall be rejected.
4. Removal of forms - The forms shall remain in place until they can be removed without damage to the unit.
5. Concrete Finish - Front - As specified by the Engineer.
Rear - Unformed surface, roughly screeded to eliminate open pockets of aggregate and surface distortions in excess of 1/4".

6. Tolerances -

- A. Panel dimensions shall be within 3/16" except that the lateral position of tie strips shall be within 1".
- B. Panel squareness shall not exceed 1/2" as determined by the difference between the two diagonals.
- C. Panel surface defects on smooth formed surfaces shall not exceed 1/8" per 5 foot length. Surface defects on textured - finished surfaces shall not exceed 5/16" per 5 foot length.

7. Compressive strength - Acceptance of the concrete panels with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of panels representing 40 panels or a single day's production, whichever is less.

During the production of the concrete panels, the manufacturer shall randomly sample the concrete in accordance with AASHTO T 141. A single compressive strength sample shall consist of a minimum of 4 cylinders randomly selected for every production lot. Cylinders for compressive strength tests shall be 6" x 12" prepared and tested in accordance with AASHTO T 23 and T 22, respectively. For every compressive strength sample, a minimum of 2 cylinders shall be cured in the same manner as the panels and tested at approximately 7 days. The average compressive strength of these cylinders, will determine the initial strength of the concrete. In addition, 2 cylinders shall be cured in accordance with AASHTO T 23 and tested at 28 days. The average compressive strength of these two cylinders, will determine the compressive strength of the production lot.

If the initial strength test results indicate a compressive strength in excess of 4500 psi, then these test results will be utilized as the compressive strength test results for that production lot and the requirement for testing at 28 days will be waived for that particular production lot.

Acceptance of a production lot will be made if the compressive strength test result is greater than or equal to 4500 pounds per square inch. If the compressive strength test result is less than 4500 pounds per square inch, the acceptance of the production lot will be based on its meeting the following acceptance criteria in its entirety:

- a. Ninety (90) percent of the compressive strength test results for the overall production shall exceed 4,670 pounds per square inch.
- b. The average of any six (6) consecutive compressive strength test results shall exceed 4,750 pounds per square inch.
- c. No individual compressive strength test result shall fall below 4,050 pounds per square inch.

If a production lot fails to meet the specified compressive strength requirements, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the panels of the production lot are acceptable. If the evidence consists of tests made on cores taken from the panels within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24.

8. Rejection

Units shall be subject to rejection because of failure to meet any of the requirements specified above. In addition, any or all of the following defects may be sufficient cause for rejection:

- A. Defects that indicate imperfect molding.
- B. Defects that indicate honeycombed or open texture concrete.
- C. Defects in the physical characteristics of the concrete, such as broken or chipped concrete.
- D. Stained form face, due to excessive form oil or others.
- E. Signs of aggregate segregation.
- F. Broken or cracked corners.

- G. Tie strips bent or damaged.
 - H. Lifting inserts not usable.
 - I. Exposed reinforcing steel.
 - J. Cracks at the PVC pipe or pin.
 - K. Panel thickness varying in excess of + 3/16" from that shown on the Plans.
9. Marking - The date of manufacture, the production lot number and the piece-mark shall be clearly scribed or painted with waterproof paint on the rear face of each panel.
10. Handling, Storage & Shipping - All units shall be handled, stored and shipped in a manner as to eliminate the danger of chipping, discoloration, cracks, fractures and excessive bending stresses. Panels in storage shall be supported on firm blocking to protect the exposed exterior finish.
11. Joints - The minimum width of the fabric sheets shall be:

Vertical/Inclined Joints	18"
Horizontal Joints	18"
All Laps in Fabric	4"

Construction Requirements:

1. Excavation and Backfill
- A. The foundation shall be graded level for a width equal to or exceeding the length of the reinforcing strips.
 - B. The foundation shall be compacted as directed by the Engineer prior to wall construction. Any foundation soils found to be unsuitable shall be removed and replaced, as directed by the Engineer.
 - C. The surrounding earth embankment shall be constructed simultaneously with the select granular backfill and compacted in lifts at the same elevation, meeting density requirements as stipulated in roadway special provisions.
2. Leveling Pad - At each panel foundation level, an unreinforced concrete leveling pad shall be provided as shown on the Plans. The leveling pad shall be cured a minimum of 12 hours before placement of wall panels. The concrete finish must be smooth and flat and not vary from the design elevation by more than 0.01"(+) and 0.02"(-).
3. Wall erection - Precast concrete panels shall be placed vertically with the aid of a light crane. Panels shall be handled by means of a lifting device set into the upper edge of the panels, and shall be placed in successive horizontal lifts in the sequence shown on the Plans as backfill placement proceeds. As backfill material is placed behind the panels, the panels shall be maintained in vertical position by means of temporary wooden wedges placed in the joint at the junction of the two adjacent panels on the external side of the wall. External bracing is required for the initial lift. Vertical plumbness tolerances and horizontal alignment tolerances shall not exceed 3/4" when measured along a 10' straight edge. The maximum allowable offset in any panel joint shall be 3/4". The overall vertical plumbness tolerance of the wall from top to bottom shall not exceed 1/2" per 10' of wall height.

Installation of reinforcing mesh/strips shall take place after backfill compaction is complete. Reinforcing mesh/strips shall be placed normal to the face of the wall, unless otherwise shown on the Plans or as directed by the Engineer.

Recesses at lifting devices in tops of topmost panels shall be grouted flush with an approved grout as directed by the Engineer except where there is a poured concrete coping or parapet.

4. Backfill Placement - Backfill Placement shall closely follow erection of each course of panels. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the facing panels. Any wall materials which become damaged or disturbed during

backfill placement shall be either removed and replaced at the Contractor's expense or corrected, as directed by the Engineer. Any misalignment or distortion of the wall facing panels due to placement of backfill outside the limits of this specification shall be corrected, as directed by Engineer.

Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T 99 method C or D (with oversize correction, as outlined in Note 7, AASHTO T 99).

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill material shall have a placement moisture content between optimum moisture content and two percentage points below optimum moisture content. Backfill material with a placement moisture content outside the range shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift. The optimum moisture content shall be determined in accordance with AASHTO T 99 method C or D (with oversize correction, as outlined in Note 7, AASHTO T 99).

The maximum lift thickness after compaction shall not exceed 8 inches. The contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

Compaction within 3'-0" of the backface of the wall facing shall be achieved by at least 3 passes of a lightweight mechanical tamper, roller or vibratory system. No soil density tests shall be taken within this area.

At the end of each day's operation, the contractor shall slope the last level of backfill away from the wall facing to rapidly direct runoff of rainwater away from the wall face. In addition, the contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

5. Concrete Barrier - Parapet shall be provided per DelDOT criteria.
6. Internal drainage shall be provided to prevent saturation of the reinforced backfill.

Design Criteria:

The MSE retaining walls shall be designed to provide the grade separation shown on the plans with a service life conforming to AASHTO LRFD Section 11.

The MSE wall system shall be designed in accordance with:

1. The manufacturer's requirements.
2. The requirements specified herein.
3. AASHTO LRFD Bridge Design Specifications, current edition.
4. AASHTO LRFD Bridge Construction Specifications, current edition.

The MSE wall design shall follow the general dimensions of the wall envelope shown on the plans. Base of footing elevation shall be as shown on the plans, or may be lower. All wall elements shall be within the right-of-way limits shown on the plans. The panels shall be placed so as not to interfere with drainage or other utilities, or other potential obstructions.

All appurtenances behind, in front of, under, mounted upon, or passing through the wall such as drainage structure, utilities, concrete parapet wall or other appurtenances shown on the plans shall be accounted for in the stability design of the wall.

Facing panels shall have tongue and groove, ship lap or similar approved connections along all joints, both vertical and horizontal. Where foundation conditions indicate large differential settlements, vertical full-height slip joints shall be provided. The shape of the panels shall be such that adjacent panels will have continuous, vertical joints, or as noted on the Plans.

The MSE walls shall be dimensioned so that the factored bearing pressure of the foundation soils, as noted on the plans, is not exceeded.

The design by the wall system supplier shall consider the stability of the wall as outlined below and in the Contract Documents:

- (a) Failure Plane - The theoretical failure plane within the reinforced soil mass shall be determined per LRFD Section 11 and be analyzed so that the soil stabilizing components extend sufficiently beyond the failure plane within the reinforced soil mass to stabilize the material. External loads which affect the internal stability such as those applied through piling, bridge footing, traffic, slope surcharge, hydrostatic, and seismic loads shall be accounted for in the design.
- (b) Internal Stability - Load and Resistance Factors - Evaluation of reinforcement pullout, reinforcement rupture and panel connection pullout or rupture shall be consistent with LRFD Section 11. Loads, load combination and load factors shall be as specified in LRFD Article 11. Resistance factors for internal design shall be consistent with LRFD Article 11. Maximum reinforcement loads shall be calculated using Simplified Method approach. Calculations for factored stresses and resistances shall be based upon assumed conditions at the end of the design life. The design life of steel reinforcements shall comply with LRFD Section 11.

Method of Measurement:

The area of Mechanically Stabilized Earth Walls to be paid for under this item shall be the number of square feet of wall surface area shown on the Plans complete in place and accepted.

Basis of Payment:

The payment for the item shall be made as measured above at the contract unit price per Square Foot bid for "Mechanically Stabilized Earth Walls", which price and payment shall constitute full compensation for excavation and for furnishing and fabricating all materials for the walls including concrete facing panels, reinforcing strips or mesh, tie strips, geotextiles, adhesives, fasteners, joint materials and incidentals. Payment shall include furnishing and placement of backfill material, concrete leveling pad and coping, all labor and materials required to prepare wall foundation, place the reinforcing strips or mesh, erect the concrete facing panels and construct the concrete coping to the lines and grades shown on the Plans.

3/10/14

602646 - SILICONE ACRYLIC CONCRETE SEALER

Description:

This work consists of surface preparation, furnishing all materials, and application of a silicone acrylic concrete sealer to any concrete surface. The work shall be performed as indicated on the Plans, in accordance with these Specifications, and as directed by the Engineer.

Materials:

The concrete sealer shall consist of methyl methacrylate-ethyl acrylate copolymer resins and toning pigments suspended in solution of all times by a chemical suspension agent and solvent. Laminar silicates, titanium dioxides, and inorganic oxides may be used for toning pigments. Use of vegetable or marine oils, paraffin materials, stearates or organic pigments in the formulation shall not be permitted.

The Sealer shall be opaque, non-film forming, and penetrating silicone acrylic compound. The sealer shall pass NCHRP 244 Series-2, salt spray resistance requirements. The materials must be local OTC-VOC compliant.

The Contractor shall provide Materials and Research Section one (1) quart sample from each batch of the silicone acrylic sealer compound supplied for chemical identification and testing.

The manufacturer shall supply a Materials Safety Data Sheet and a letter of certificate compliance of batch & lot of each shipment of the concrete sealer materials. The contractor shall also provide a manufacturer analysis report of the materials used with the specified batch shipped to the job site.

The color of the compound shall be off white (Federal Color #37925 of FED-STD-595B) and grey for all formed surfaces (Federal Color #36492 of FED-STD-595B) as specified on the Plans.

Surface Preparation:

All new concrete surfaces, texturing, saw cutting, repointing and grooving shall be completed before the surface is prepared for sealer. All concrete that is to be sealed shall be cured for at least 28 days after casting or for the length of time specified in the manufacturer's instruction, which ever is longer. After 28 days, concrete surface shall be lightly sand or shot blasted, followed by vacuum cleaning in accordance with ASTM D 4258 & SSPC-SP-13 requirement to completely remove any applied curing compound, and to make surface lightly rough for penetration of sealer.

For existing concrete, all previous sealers and paints, all salt, efflorescence, laitance, and other foreign matter, and all loose material shall be completely removed using one or a combination of different preparation methods as specified in ASTM D-4258 and SSPC-SP 13.

In addition, both new and existing concrete shall receive a high pressure (3000-5000 psi) water washing at a flow of more than 4 gallons per minute, with zero degree of rotary nozzle. The Contractor shall also allow the surface to dry for a minimum of 24 hours prior to the coating application after high-pressure washing. All surface preparation work shall be completed and approved by the Engineer before sealer the application can commence.

Construction Methods:

The sealer shall be used as supplied by the manufacturers without thinning or alteration unless specifically required in the manufacturer's instructions and verified by Engineer.

The silicone acrylic concrete sealer shall be applied to all exposed concrete surfaces as shown on the plans.

Concrete curing compounds, form release agents, and concrete hardeners may not be compatible with recommended coatings. Check for compatibility by applying a test patch of the recommended coating system, covering at least 20 to 30 square feet.

The concrete sealer material shall be applied using coverage rate and equipment in accordance with the manufacturer's recommendations.

A minimum of two coats shall be applied; all applications shall be performed under dry conditions with application-spread rate as recommended by the manufacturers.

The sealer shall be applied within the ambient temperature range as recommended by the manufacturer, when no rain is expected within a minimum of 12 hours following the application, and there are no high winds that would cause an improper application. If rain has preceded the application, the surface shall be allowed to dry at least 24 hours before waterproofing application begins.

Follow manufacturers recommendation for coating thickness. No drips, runs, or sags will be allowed during application. Natural bristle brush, roller, or spray can be used to perform the application. Follow manufacturers recommendation during application. No thinning of materials is permitted; all application procedures, and drying time between coats must be as per manufacturers recommendations.

The Contractor shall perform surface preparation and application of the concrete sealer material so as not to endanger any private and/or public property, pedestrians, workmen, and vehicles on, beneath or adjacent to the structure.

Method of Measurement:

The quantity of "Silicone Acrylic Concrete Sealer" will be measured by the square feet of area treated and accepted.

Basis of Payment:

The quantity of "Silicone Acrylic Concrete Sealer" will be paid for at the Contract unit price per square foot. Price and payment will constitute full compensation for furnishing all materials, furnishing and removing scaffolding as required, surface preparation, application of the concrete sealer material, disposal of discarded materials, and for all labor, tools, equipment, and all necessary incidentals to complete the work.

2/12/14

- 605510 - PREFABRICATED EXPANSION JOINT SYSTEM 2"**
- 605511 - PREFABRICATED EXPANSION JOINT SYSTEM 3"**
- 605512 - PREFABRICATED EXPANSION JOINT SYSTEM 4"**
- 605513 - PREFABRICATED EXPANSION JOINT SYSTEM 5"**
- 605647 - PREFABRICATED EXPANSION JOINT SYSTEM 1 ½"**
- 605730 - PREFABRICATED EXPANSION JOINT SYSTEM, 1"**

Description:

This work consists of furnishing of all materials and necessary labor to fabricate, assemble, construct and install prefabricated strip seal expansion joint systems of the size(s) specified on the Plans, including extrusions, neoprene strip seal, angles, studs, and sliding plates on roadway and/or sidewalks as specified on the Plans, in accordance with these Specifications.

Materials:

Steel members of the types, size and configurations shown on the plans shall conform to AASHTO M 270/M 270M Grade 36 (Grade 250) or Grade 50 (Grade 345) or Grade 50W (Grade 345W), unless specified otherwise on the Plans. All steel of the joint system shall be painted with the 3 coat urethane paint system with a minimum total thickness of 9 mils (225 µm), and all screws shall be stainless steel ASTM A276, Type 304.

The elastomeric material shall be 100% virgin Polychloroprene (Neoprene). The strip seal shall be an extruded neoprene material meeting the requirements of AASHTO M 220 modified to omit the recovery test. The elastomeric material shall have the following physical properties as determined by applicable ASTM tests:

<u>ASTM Standard</u>	<u>Physical Properties</u>	<u>Performance Requirements</u>
D2240 (Modified) D412	Hardness Tensile Strength	60±7 points, Durometer (Type A) 2000 psi (13.8 MPa), min. 250%, min.
D395 (Method B)	Ultimate Elongation Compressive Set 70 hr. @ 212 F (100 C).	40%, max.
D573	Compressive Set 212 F (100 C)	40%, max.
D1630 D1149	Abrasion Resistance Oxone Resistance 20 percent strain 300 pphm in air, 70h @ 140 F (60 C) (wiped) with toluene to remove surface contamination)	Index of 200 or greater Permissible No cracks
D471	Oil Swell, ASTM Oil #3, 70 h @ 212 F (100 C), Weight change	45%, max.
D2240	Low Temperature Stiffening max. 7 days @ 14 F (-10 C)	+15 points Durometer (Type A)

Construction Methods:

Installation of the prefabricated expansion joint system, to include strip seal, steel extrusion and application of adhesives, shall be in accordance with the manufacturer's written recommendations and instructions and as specified herein. Special tools for insertion of seals shall be provided by the manufacturer as may be required. The Contractor shall make arrangements for a technical representative of the

manufacturer to be available for advice and inspection during construction of strip seals to ensure satisfactory installation. The strip seal shall be furnished in one piece for the full length of the joint.

Welding shall conform to all applicable requirements of AWS D1.5, including qualifications of welders. Shop drawings and welding procedures must be submitted to the Bridge Engineer for approval prior to any fabrication. Welds at mitered joints in steel extrusions and between steel extrusions and plates and between studs and plates shall be tested by magnetic particle tests methods by a testing laboratory approved by the State. All welds, fabrication and testing will be visually inspected by the Department or its approved representative. The Contractor shall submit the manufacturer's certification for quality of materials and the result of welding inspection to the Engineer. Mill test reports must be supplied for all steel. Where, in the opinion of the Engineer, welds are defective, they shall be rewelded or repaired in a manner acceptable to the Engineer.

The installation procedure as described here, shall be adhered to unless modified by the Engineer.

The prefabricated sealing system shall be shop assembled as a unit including the neoprene strip seal, and preset prior to shipment, using prestressing bolts and adjustable temporary connections between positioning steel members. The opening of the joint shall be set at the width required for the seal at a temperature of 68 F (20 C).

The prefabricated joint assembly shall be positioned and attached to the structure by anchorages. Width adjustments shall be made at the discretion of the Engineer and manufacturer's representative. All movements due to shrinkage, creep, mid-slab deflections, and other factors shall be considered.

The prefabricated joint shall be set normal to the grade and the deck concrete slab graded to meet flush with the edge of the joint plates.

Before placing the deck slab, the anchorage attached to the abutment backwall, or adjacent steel or concrete stringers shall be released by loosening the bolts in the slotted anchorage connections. The prestressing bolts and adjustable temporary connections shall remain in place. After the deck slab has cured the width of joint shall be checked and again adjusted if necessary. The released anchorage shall be tightened, welded and the prestressing bolts and temporary connections removed. The backwall or deck on this side of the joint may then be poured after sealing the openings left by removal of prestressing bolts.

Method of Measurement:

The quantity of the specified size(s) prefabricated expansion joint system will be measured as the actual number of the linear feet (linear meters) furnished and installed, measured along the centerlines of the slab joints.

Basis of Payment:

The quantity of prefabricated expansion joint system will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for fabricating, furnishing, and installing all materials, labor, equipment and all else necessary therefor and incidental thereto.

Payment for erection angles and other components not specifically part of the prefabricated strip seal joint system shall be included in Prefabricated Expansion Joint System.

2/12/14

605525 - RELOCATING SIGN SUPPORT STRUCTURE

Description:

This work consists of removing, relocating and erecting an existing steel sign structure and sign panels, in accordance with the location, notes and details on the Plans and as directed by the Engineer. Such work shall include the concrete foundations, excavation and backfill and temporary shoring as required and shall include all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Materials and Construction Methods:

The steel sign structure shall be carefully dismantled and all members including bolts, nuts, and all related hardware shall be stored for reuse. Rusted bolts and nuts shall be replaced in kind and shall conform to the requirements of Section 605 of the Standard Specifications unless otherwise indicated on the plans. The existing steel sign structure shall be modified as required to conform to the geometry and details as shown on the Plans for the relocated structure. Also, welding, galvanizing and all work related to dismantling and erecting the support structure at new location shall conform to the applicable requirements of Section 605 unless otherwise indicated on the plans.

The Contractor shall obtain Engineer's approval of the field locations of the foundations before excavation is begun. Foundation shall be placed, wherever possible, on undisturbed material. A minimum period of fourteen (14) days shall elapse from the last concrete placement in foundation and pedestals to the beginning of erection of the sign structure. Concrete for foundation at the new location shall be class B and shall conform to the requirements of Section 602. Bar reinforcement shall conform to the requirements of Section 603 and shall be Grade 60. Bar reinforcement shall be protected with fusion bonded epoxy in accordance with AASHTO M284 (ASTM D3963). Steel anchor bolts, nuts and washers shall conform to the requirements of ASTM F1554 Grade 55 and shall be galvanized in accordance with AASHTO M 232.

Unless shown otherwise on the Plans the concrete foundation at the existing location shall be removed to a minimum depth of one foot from the ground surface and the area shall be graded and seeded. Removal will also include reinforcement bars, anchor bolts and other related hardware.

High strength steel bolts, nuts and washers for connections shall conform to the requirements of ASTM A325 and shall be hot dipped galvanized in accordance with ASTM A153.

Construct the tower base bearing areas of concrete pedestals, in a true and level position. Full bearing is required under bases.

Fully tighten anchor bolts by turning the nuts an additional 30 to 45 degrees. Progress by sequentially tightening the nuts on opposite side of the base plate (180 degrees apart).

All signs and miscellaneous attachments shall be installed within the same 8 hour period that the trusses are erected.

Method of Measurement:

The quantity of steel sign structures and foundations relocated and accepted will not be measured for payment, but shall be paid for on a lump sum basis for each steel sign structure.

Basis of Payment:

The quantity of steel sign structures and foundations relocated will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for relocating the support structure, for modifying the existing sign support structure to match the details shown on the Plans for the relocated structure, for

furnishing all materials such as concrete, anchor bolts, new hardware if required, for excavation and backfill in accordance with Section 207, installing and subsequent removal of temporary sheeting, if required, constructing the foundations to the line and grade shown on the Plans, disposal of the surplus materials, removal of the existing foundation, grading and seeding or of the existing area, for all labor, equipment, tools and incidentals necessary to complete the work. Backfilling in accordance with Section 210 and rock excavation in accordance with 206 are to be paid under separate item of this Contract.

2/10/10

605664 - STEEL SIGN STRUCTURES

Description:

This work shall consist of furnishing, fabricating, erecting the sign structures and installing foundations as shown on the plans. Such work shall include excavation, concrete foundations, sheeting and shoring, non-shrink grout, transportation and erection of the steel sign structure, furnishing steel sign structure and all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Materials:

All materials provided for the steel sign structures shall conform to the following:

- (a) Pipes - A STM A 53, Type S, Grade B .
- (b) Structural Angles, Plates, Bars, and Shapes - A STM A 36.
- (c) Anchor Bolts, nuts and washers - A ST M F1554, Grade 55.
- (d) U -Bolts - A STM A 307.
- (e) U -Bolt Nuts - A ST M A 307.
- (f) High Strength Bolts, Nuts and Washers - A ST M A 325.
- (g) Pre-Assembly of Field Connections.
- (h) All structural steel that is not stainless shall be hot-dipped galvanized in accordance with A STM A123.
- (i) Concrete for foundation shall be Class B Portland cement concrete ($f'c = 3,000$ psi at 28 days) and shall confirm to Standard specification section 812.

Construction Methods:

As indicated, as shown on the Standard Drawings and as follows:

- (a) General. Prepare and submit detailed shop drawings for review and acceptance. Drawings shall be stamped by a PE registered in the state of Delaware. Material and workmanship not previously inspected will be inspected on the work site. Remove rejected material from the work site. Satisfactorily restore the site to its original condition, as directed, including the disposal of excess or unsuitable material. Contractor to verify sign and structure clearances.
- (b) Foundations. Submit detailed shop drawings and computations, signed and sealed by a Professional Engineer registered in the State of Delaware for design of any temporary sheeting and shoring that is required for the excavation and installation of the sign structure foundations. Satisfactorily restore the site to its original condition, as directed, including the disposal of excess or unsuitable material.

Excavate and construct the foundations as indicated on the Plans. Construct the foundations using Class B Cement Concrete, as specified in the applicable parts of Section 602. Use anchor bolt templates provided by the sign structure fabricator to accurately set the tower base anchor bolts to the correct elevation and orientation. Securely brace the anchor bolts against displacement before and during concrete placement and curing. Verify the span length, footing location, and pedestal elevations of the sign structure foundation prior to installing the foundation. It is the Contractor's responsibility to install the foundations in the proper location and to the proper elevation.

After constructing the sign structure foundation, backfill the excavation around the foundation in accordance with Section 207.05.

Bearing Areas: Construct the tower base bearing areas of the concrete pedestals in a true and level position. Full bearing is required under all base plates. Place non-shrink grout and PVC drain tube after column is in place and leveled.

A minimum period of fourteen (14) days shall elapse from the last concrete placement in foundation and pedestals to the beginning of erection of the sign structure. Use templates to accurately set tower base anchor bolts to the correct elevation and alignment.

- (c) Pre-Assembly of Field Connections. Before galvanizing, preassemble field connections of chord trusses and chord sections to verify geometry and camber. If distortion occurs after galvanizing, re-verify.
- (d) Any damage to galvanizing that occurs during shipping, handling or erection shall be repaired with a liquid galvanizing repair. Such repair material shall be submitted to the Engineer for approval prior to use.
- (e) Fully tighten anchor bolts by turning the nuts an additional 30 to 45 degrees. Progress by sequentially tightening the nuts on opposite side of the base plate (180 degrees apart).
- (f) Compaction of the backfill shall be in accordance with Section 202 of the Standard Specifications.

Method of Measurement:

The number of Steel Sign Structures specified on the plans or as directed by the Engineer and constructed according to these specifications, complete in place and accepted, will not be measured for payment, but shall be paid for on a lump sum basis for each sign structure.

Basis of Payment:

The number of Steel Sign Structures, as determined above, shall be paid for at the contract lump sum price bid "Steel Sign Structure," which price and payment shall include Class B cement concrete, sheeting and shoring, excavation and construction of drill caisson and concrete foundation, transportation and erection of the steel sign structure, all galvanized structural steel, bolts, and all labor, materials, equipment and incidentals necessary to construct the sign structure. Backfilling in accordance with Section 210 and shall be paid under separate item of this Contract.

NOTE:

A breakout sheet attached to the Proposal to list the Steel Sign Structures under this item. The Contractor shall fill in a unit price for each item and the cost (unit price times the proposed quantity). The lump sum bid for Item 605664 - Steel Sign Structure shall be the sum of the cost for all items listed. The breakout sheet shall be attached to the Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

3/10/14

612501 - PVC PIPE, 4
612502 - PVC PIPE, 6
612503 - PVC PIPE, 8
612504 - PVC PIPE, 10
612505 - PVC PIPE, 12
612506 - PVC PIPE, 15
612507 - PVC PIPE, 18
612518 - PVC PIPE, 21

Description:

This work consists of furnishing and installing PVC pipe, including all fittings, in accordance with the locations, details, notes on the Plans and as directed by the Engineer. The PVC pipe shall be used for subsurface drainage or for serving as conduit as specified on the Contract Plans.

Materials and Construction Methods:

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D3034 Type PSM, and pipe shall be of SDR-35 or SDR-41 or SDR-42 for subsurface drainage pipe of the nominal size required by the Plans.

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D2466 PVC Pipe Fitting, Schedule 40 for conduit of the size required by the Plans.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements of Section 612 of the Standard Specifications, unless otherwise modified on the Plans. The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

Method of Measurement:

The quantity of PVC pipe will be measured as the actual number of linear feet (linear meters) of each size of pipe placed and accepted, measured from end to end of pipe, including structure wall thickness, but excluding structure interior.

Basis of Payment:

The quantity of PVC pipe will be paid for at the Contract unit price per linear foot (linear meter) for each size of pipe. Price and payment will constitute full compensation for furnishing, hauling, and installing pipe, for all cribbing or foundation treatment necessary to prevent settlement, for all shoring and sheeting, for the replacement of any pipe which is not true in alignment or which shows any settlement after laying, and for all material, labor, equipment, tools, and incidentals required to complete the work.

For pipe under 24 (600 mm) nominal inside diameter, the excavation, bedding, backfill and backfilling will be included in the price for this work. For pipe of nominal inside diameter 24 (600 mm and over), payment for excavation, bedding, backfill and backfilling will be in accordance with Section 208.

10/31/01

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

614589 - STEEL CASING PIPE, 10"
614602 - STEEL CASING PIPE, 16"
614603 - STEEL CASING PIPE, 20"
614605 - STEEL CASING PIPE, 12"
614660 - STEEL CASING PIPE, 24"
614661 - STEEL CASING PIPE, 26"
614662 - STEEL CASING PIPE, 28"
614663 - STEEL CASING PIPE, 32"
614678 - STEEL CASING PIPE, 14"
614744 - STEEL CASING PIPE, 18"
614746 - STEEL CASING PIPE, 48"
614777 - STEEL CASING PIPE, 6"
614778 - STEEL CASING PIPE, 8"
614783 - STEEL CASING PIPE, 30"
614825 - STEEL CASING PIPE, 36"

Description:

This work consists of furnishing all materials and encasing existing and/or proposed facilities such as water main pipe, sanitary sewer pipe, or telephone/electric/ITMS duct as applicable to the Contract with steel pipe of specified diameter in accordance with the details, notes on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Casing pipe shall be A-53 grade B black steel pipe with 3/8" (9 mm) wall thickness for pipes 30" (750 mm) diameter and less, and 1/2" (13 mm) wall thickness for pipes larger than 30" (750 mm) diameter, and shall conform to the requirements of API-5L, Grade B. Casing pipe shall be bituminous coated inside and outside, and joints shall be welded in accordance with requirements of AWWA C-206. After welding or cutting the pipe, the welded and cut section shall be recoated with bituminous material to the satisfaction of the Engineer or the Owner of the Utility.

The pipe/duct being encased shall be supported by treated lumber, or other device, sitting on the bottom of the casing pipe or other device as shown on the Plans and/or as directed by the Engineer. Space between the casing pipe and the pipe/duct being encased shall be closed with 12" (300 mm) thick Class B concrete at each end of the casing pipe or closed by an alternative method if shown on the Plans.

As shown on the Plans or as directed by the Engineer, a galvanized steel pipe of 1" (25 mm) diameter shall be installed through the concrete seal at the bottom of the down grade end of the casing pipe for draining the entrapped water.

Method Measurement:

The quantity of steel casing pipe will be measured as the actual number of linear feet (linear meters) of each size placed and accepted. Measurement will be made along the centerline from end to end of the steel casing pipe.

Basis of Payment:

The quantity of steel casing pipe will be paid for at the Contract unit price per linear foot (linear meter) for each size of casing pipe. Price and payment will constitute full compensation for furnishing all materials, welding, coating, closing the ends with concrete, galvanized steel pipe for drainage, backfill Borrow Type C, backfilling; and for all labor, equipment, tools and incidentals necessary to complete the work.

For pipe under 24" (600 mm), internal diameter, the excavation (excluding rock), backfill and backfilling shall be included in the price for this item unless otherwise excavation has been included in the pipe item being encased. For pipe of internal diameter 24" (600 mm) and over, payment for excavation and backfill shall be in accordance with Section 208. Furnishing of borrow type C for pipe with inside diameter of 24" (600 mm) and over will be paid for under Section 210.

2/18/14

614910 - STEEL CASING PIPE

Description:

This work consists of furnishing all materials and encasing existing and/or proposed facilities such as water main pipe, sanitary sewer pipe, or telephone/electric duct as applicable to the Contract with steel pipe of specified opening in accordance with the details, notes on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Casing pipe shall be A-53 grade B black steel pipe with 3/8" (9 mm) wall thickness for openings of 707 square inches and less, and 1/2" (13 mm) wall thickness for pipes larger than 707 square inches openings, and shall conform to the requirements of API-5L, Grade B. Casing pipe shall be bituminous coated inside and outside, and joints shall be welded in accordance with requirements of AWWA C-206. After welding or cutting the pipe, the welded and cut section shall be recoated with bituminous material to the satisfaction of the Engineer or the Owner of the Utility.

The pipe/duct being encased shall be supported by treated lumber, or other device, sitting on the bottom of the casing pipe or other device as shown on the Plans and/or as directed by the Engineer. Space between the casing pipe and the pipe/duct being encased shall be closed with 12" (300 mm) thick Class B concrete at each end of the casing pipe or closed by an alternative method if shown on the Plans.

As shown on the Plans or as directed by the Engineer, a galvanized steel pipe of 1" (25 mm) diameter shall be installed through the concrete seal at the bottom of the down grade end of the casing pipe for draining the entrapped water.

Method Measurement:

The quantity of steel casing pipe will be measured as the actual number of linear feet (linear meters) of each size placed and accepted. Measurement will be made along the centerline from end to end of the steel casing pipe.

Basis of Payment:

The quantity of steel casing pipe will be paid for at the Contract unit price per linear foot (linear meter) for each size of casing pipe. Price and payment will constitute full compensation for furnishing all materials, welding, coating, closing the ends with concrete, galvanized steel pipe for drainage, backfill Borrow Type C, backfilling; and for all labor, equipment, tools and incidentals necessary to complete the work.

For pipe under 452 square inches internal opening, the excavation (excluding rock), backfill and backfilling shall be included in the price for this item unless otherwise excavation has been included in the pipe item being encased. For pipe of internal opening 452 square inches and over, payment for excavation and backfill shall be in accordance with Section 208. Furnishing of borrow type C for pipe with inside opening of 452 square inches and over will be paid for under Section 210.

3/13/15

617515 - HEADWALL

Description:

This work consists of furnishing and placing a concrete drainage headwall as shown on the Plans.

Materials:

Materials shall conform to the requirements of Section 612, 812 and 824 of the Standard Specifications.

Construction Methods:

Concrete headwalls shall be placed in conformance with the details, dimensions, and notes as shown in the details found in the Plans and at the location shown on the Plans.

Method of Measurement and Basis of Payment:

The quantity of headwalls will be measured and paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing, hauling, and installing materials, including concrete and bar reinforcement; for excavating, backfilling, and compacting; for cribbing, shoring, and sheeting; and for all labor, equipment, tools, and incidentals required to complete the work.

619519 - DYNAMIC PILE TESTING BY CONTRACTOR

Description:

This item shall consist of furnishing all materials, equipment, access, and qualified personnel necessary to perform all high-strain dynamic testing and monitoring of driven piles at the locations designated on the Plans or as directed by the Engineer. The work shall also include analysis and report preparation in accordance with this Special Provision.

Note: This Special Provision replaces Special Provision 619500 - Dynamic Pile Testing By DelDOT.

Materials and Construction Methods:

All equipment, testing and reporting procedures shall be provided and performed in strict accordance with ASTM D4945 - *Standard Test Method for High-Strain Dynamic Testing of Piles*.

The Contractor shall engage the services of a specialty subcontractor experienced in high-strain dynamic monitoring of driven piles to perform dynamic testing and to evaluate and report results to the Department. The specialty subcontractor shall have at least five (5) years of documented experience in the performance and interpretation of dynamic pile testing. The subcontractor's field engineer or technician, who will be operating the instrumentation and collecting the data, shall have documented experience on at least ten (10) prior projects with similar pile requirements. The field engineer or technician responsible for operating the instrumentation shall be fully capable of understanding and interpreting the data being collected during driving. The specialty subcontractor for dynamic testing shall be selected by the Contractor and submitted for approval by the Engineer a minimum of 10 working days prior to the work beginning. Approval will be based on qualifications and applicable previous experience on other projects.

The Contractor shall provide DelDOT reasonable inspection access along the full length and circumference of all piles prepared for instrumentation attachment prior to the piles being lifted and located in the leads.

Dynamic monitoring instrumentation, including all gages and cables, shall not be installed on the pile until the pile has been lifted and aligned in the leads and the hammer and helmet have been properly set.

Anticipated pile splices shall be made prior to the start of driving so that no splices will be required during the dynamic testing.

The specialty subcontractor shall perform dynamic testing during the entire initial drive and restrike of all piles so designated on the Plans or as otherwise directed by the Engineer. The dynamic testing firm shall continuously monitor the tensile and compressive stresses during driving to ensure that the permissible stress limits provided by the Engineer are not exceeded during driving. Should the driving operation result in stresses that approach or exceed the permissible limits, the dynamic testing firm's equipment operator shall immediately have the hammer stroke reduced or the driving operation stopped in order to prevent pile damage. If non-axial driving is indicated by dynamic test measurements, pile driving shall be stopped immediately and the Contractor shall realign the driving system or take other corrective action, as necessary, before resuming driving.

If the top of pile is damaged or becomes deformed at any time during the dynamic testing of the piles, pile driving shall be stopped and the damaged area cut off in accordance with Section 619 of the Standard Specifications. The remaining pile section shall be properly prepared for gauge installation and inspected by the Department prior to the continuation of driving.

All dynamically tested piles shall be driven to an adequate depth to achieve the minimum tip elevation and the minimum initial driving resistance specified by the Engineer. Should the field data indicate the hammer system is not transferring to the pile the full energy anticipated at the end of initial drive, the Contractor shall

increase the hammer stroke and/or driving resistance until the minimum initial drive capacity is displayed on the dynamic testing apparatus. However, in no case, shall the permissible stress limits be exceeded.

The Contractor shall maintain a minimum distance of 1 foot (300 mm) between the pile monitoring gages and the ground surface, water surface, or pile template. If additional ground penetration is required, the driving shall be halted, the gages removed and the pile spliced before proceeding with additional driving and monitoring. Prior to splicing, the pile splice segment shall be properly prepared for gage installation in accordance with ASTM D4945 and made accessible to DelDOT for inspection. After the pile has been properly spliced and the hammer and leads have been reset, the gages shall be reattached to the new pile segment and the drive continued.

Restriking of all test piles, and certain production piles selected by the Engineer, shall be dynamically tested by the Contractor. The Contractor shall wait up to five (5) calendar days after the completion of initial driving before dynamically testing the restrike of any given pile, unless otherwise specified on the Plans or as directed by the Engineer.

Prior to restrike, the Contractor shall mark the pile in 1" (25 mm) increments for more accurate measurement of pile movement during restrike. The Department may elect to monitor the pile movement more precisely by utilizing a survey level. In such cases, the Contractor shall not proceed with the restrike prior to the Department obtaining its requested survey data. The maximum total number of hammer blows required during restrike will be 30 or the maximum total penetration will be 6" (150 mm), whichever occurs first.

All restrikes shall be performed using the same pile hammer, helmet, and compressed cushion material used to install the piles during initial driving. The pile hammer shall be fully warmed up and operated at full stroke, or as otherwise specified by the Engineer, during the pile restrike. The warm-up procedure shall consist of a minimum of 20 blows of the hammer at full stroke at locations other than the piles to be restruck.

If for any reason, the pile hammer malfunctions, the helmet fails, the cushioning materials fail, or any other component of the pile driving system does not function properly during the pile restrike, the Contractor shall wait up to five (5) calendar days and perform additional restrikes at no additional cost to the Department until the pile driving system operates properly through a complete continuous restrike procedure.

Reporting

The Dynamic Testing Consultant shall prepare a written report presenting the results of the test pile program in accordance with the requirements of ASTM D4945 including specific discussion of the pile capacity obtained from the dynamic testing, the performance of the hammer and driving system, driving stress levels, and pile integrity. The following data shall also be provided in the report for the full length of driving at intervals of not more than 10 hammer blows: bearing capacity from the Case Goble method, bearing capacity from at least one additional recognized method, input and reflection values of force and velocity, maximum transferred energy, maximum compressive stress, maximum tensile stress, blows per minute, values of upward and downward traveling force wave, ram stroke, pile penetration depth and corresponding blow sequence.

CAPWAP analyses shall be performed for all initial drives and restrikes of dynamically tested piles. A minimum of one (1) CAPWAP analysis shall be performed for a representative blow near the end of each initial drive and a minimum of two (2) representative blows shall be analyzed towards the beginning of the restrike. The Engineer may request, at no additional cost, an average of one additional CAPWAP analysis per initial drive or restrike at selected pile penetration depths.

Within three (3) working days of the completion of each dynamic test, the Contractor's specialty subcontractor shall submit to the Department a report meeting the requirements of this Special Provision that is signed and sealed by a Professional Engineer licensed in the State of Delaware. In addition to the raw data and ASTM D4945 requirements, the report shall include detailed results of the CAPWAP analyses including, but not limited to, all extrema tables; pile profile and pile model tables; simulated load test curves for the tip

and top of the pile; the soil parameters used in the analysis by matching the measured and computed values of forces, velocities, and displacements; and static resistance distribution along the length of the pile, in a format approved by the Engineer.

All raw data and computer analyses shall be made available in electronic format to the Department for additional analysis.

The Engineer shall furnish to the Contractor production pile driving criteria and recommended pile order lengths within three (3) working days of receiving complete and acceptable high-strain dynamic testing reports for all associated test piles within the subject pile group.

Method of Measurement:

The quantity of Dynamic Pile Testing By Contractor will be measured and paid on an Each basis upon receipt and acceptance of the associated dynamic testing report(s). Each initial drive and each restrike dynamically monitored by the Contractor shall be measured as separate units. In other words, one pile dynamically monitored during initial drive and restrike shall be measured as a quantity of two (2) Each.

Basis of Payment:

Payment for Dynamic Pile Testing By Contractor authorized and found acceptable by the Engineer will be made at the Contract unit price per Each for Item 619519. Price and Payment will constitute full compensation for furnishing tools, labor, specialty subcontractor, materials, equipment, analyses, reports, and incidental work required to perform high-strain dynamic pile testing during initial driving and restrikes including providing inspection access to the Department.

10/22/07

622513 - SHEET PILE WALL TIE-BACK SYSTEM

Description:

This work shall consist of furnishing and installing cantilever sheet pile wall, sheet pile wall tie-back system with steel waler, concrete deadman, support of excavation along Ramp F (I-95 N.B.) and W18x143 steel piles adjacent to proposed drain structures as shown on the plans and details, these specifications and/or as directed by the Engineer. The steel sheet piling shall conform to the sheeting design indicated on the plans with respect to type, size, tip elevations and tie rod spacing.

Materials:

Steel Sheet piling shall be manufactured steel conform to the requirements of ASTM A690 (weathering steel) with a yield strength of 50 KSI.

W18x143 Steel Piles shall conform to ASTM A572 Gr. 50.

Waler shall conform to ASTM A709 Grade 50W.

Concrete for deadman shall be Class B, 3,000 psi compressive strength conforming to Section 812.04.

Tie rod shall conform to the ASTM A722 and shall be hot-dip galvanized in accordance with ASTM A-153.

No. 57 stone shall conform to the requirements of Section 813.

Construction Methods:

Support of excavation shall be constructed in accordance with the applicable requirements of Section 207 of the Standard Specifications. The Contractor shall submit to the Department for approval, the support of excavation calculations, detailed layout, working drawings and construction methods, at least thirty (30) calendar days prior to initiating its construction. The entire submission shall be signed and sealed by a Professional Engineer registered in the State of Delaware prior to submitting to the Department.

The piling shall be driven in a manner that ensures perfect interlocking throughout the entire length of each pile and shall be cut off at, or driven to, the elevation shown on the Plans, or as directed. The piles shall be held in proper alignment during driving by assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose. All pile cutoff material shall become Contractor's property and shall be removed from the Project site.

Anytime the forward edge of the sheet pile wall is found to be out of correct alignment,

- a. The piling already assembled and partly driven shall be driven to the required depth.
- b. Taper piles shall then be driven to bring the forward edge into correct alignment before additional regular piling is assembled and driven. The maximum permissible taper in a single pile shall be 0.25 inch per foot of length.

Installation and construction of W18x143 steel piles shall be in accordance with the applicable requirements of Section 619 of the Standard Specifications.

Method of Measurement:

Payment for cantilever sheet pile wall, anchored sheet pile wall and W18x143 steel piles will not be measured but paid for at the contract lump sum price for "Sheet Pile Wall Tie-back System".

Basis of Payment:

The quantity for cantilever sheet pile wall, anchored sheet pile wall and W18x143 Steel Piles will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for furnishing, driving, cutting off sheet piling and W18x143 steel piles, and all incidental expenses including all materials, equipment, tools, and labor incidental thereto, furnishing material and labor for deadman, tie rods, tie rod testing and any excavation for the deadman, weep hole system behind the wall and incidentals required to complete the work.

No. 57 stone shall be paid separately under item 302012.

Borrow, Type C backfill material shall be paid separately under item 209003.

3/13/15

708512 - DRAINAGE INLET, SPECIAL I
708513 - DRAINAGE INLET, SPECIAL II
708514 - DRAINAGE INLET, SPECIAL III
708515 - DRAINAGE INLET, SPECIAL IV
708516 - DRAINAGE INLET, SPECIAL V
708517 - DRAINAGE INLET, SPECIAL VI
708518 - DRAINAGE INLET, SPECIAL VII

Description:

This work consists of furnishing all materials and constructing special drainage inlets (catch basins) in accordance with locations, notes, details on Plans and as directed by the Engineer.

Materials and Construction Methods:

Materials and construction methods for special drainage inlets shall conform to the applicable requirements of Section 708 of the Standard Specifications, and notes with details on the Plans.

Method of Measurement and Basis of Payment:

Measurement and payment for the special drainage inlets shall be made in accordance with the Subsections 708.15 and 708.16 of the Standard Specifications.

10/29/01

708519 - MODIFYING CATCH BASIN GRATES

Description:

This work consists of furnishing and installing risers in drainage inlet frames to adjust grate elevation to finished grade in accordance with locations, notes, details on Plans and as directed by the Engineer.

All adjustments to install risers are to be made prior to placing the surface course of warm-mix asphalt.

Materials and Construction Methods:

Materials and construction methods for special drainage inlets shall conform to the applicable requirements of Section 708 of the Standard Specifications, and notes with details on the Plans.

Risers shall be made by a single manufacturer chosen from the following, or approved equal and shall match the manufacturer of the inlet frame.

- East Jordan Co., P.O. Box 510, Middletown, DE 19709, (302) 378-1100,
www.ejco.com
- Neenah Foundry, 2121 Brooks Avenue, Neenah, WI 54956, (800) 558-5075,
www.neenahfoundry.com

Method of Measurement and Basis of Payment:

The quantity of risers will be measured as the actual number of each, installed and accepted. Measurement and payment for the special drainage inlets shall be made in accordance with the Subsections 708.15 and 708.16 of the Standard Specifications.

Basis of Payment:

The quantity of risers will be paid for at the Contract unit price for each riser. Price and payment will constitute full compensation for furnishing and placing the riser; and for all labor, equipment, tools and incidentals required to complete the work.

3/10/14

720512 - P.C.C. SAFETY BARRIER PERMANENT, DOUBLE FACE
720529 - P.C.C. SAFETY BARRIER PERMANENT, SINGLE FACE
720587 - P.C.C. SAFETY BARRIER PERMANENT, DOUBLE FACE, MODIFIED

Description:

This work consists of furnishing all materials and constructing 42 inch height, permanent Portland cement white concrete safety barrier in accordance with the locations, details, notes shown on the Plans, and/or as directed by the Engineer.

Materials:

Material shall conform to the requirements listed on the Plans, and as noted herein. Portland cement concrete shall be 4500 psi minimum and shall conform to the material requirements of Class A, Section 812, Portland Cement Concrete of the Standard Specifications with the following modifications:

Portland cement shall be White Cement. Fine Aggregate shall be white sand from a source approved by the Department.

Bar reinforcement shall be epoxy coated and meet the material requirements of section 824.02 of standard specification manual.

All Portland cement and white sand used for construction of all white concrete barriers on the project shall be from the same supplier for the entirety of the project. No changes or substitutions of suppliers will be allowed once construction of the white concrete on the project commences. The manufacturer of the white concrete for the project shall dedicate a hopper to the manufacture of the white concrete for this project to ensure no cross contamination with regular Portland cement or sand. The white concrete items shall be a blend of white cement and 50% slag cement.

Construction Methods:

Construction shall conform with the applicable subsections of Sections 602 and 603 of the Standard Specifications, and details shown on the Plans.

The Contractor shall have the option of constructing the permanent safety barriers by selecting Cast-In-Place or Slip-form methods. The Contractor shall submit his/her plans for the selected method to the Department's Materials and Research Section for approval. In case of selecting the Slip-form method, the Contractor shall be able to demonstrate his/her ability to successfully accomplish the item by his/her past involvement in doing such work. Slip-form plans shall show the sawing of 3" deep contraction joints at a maximum of 20-ft. intervals. The Contractor shall saw joint to ensure crack-free concrete. Any cracking due to the Contractor's operations will be repaired at no additional cost to the Department.

Method of Measurement:

The quantity of permanent Portland cement safety barrier will be measured by the linear foot along the toe of the barrier, installed in place and accepted.

Basis of Payment:

The quantity of Portland cement safety barrier will be paid for at the Contract unit price per linear foot for each type of barrier. Price and payment will constitute full compensation for all material, formwork, sawing of joints, reinforcement bars, and concrete all complete in place and accepted, for all labor, equipment, tools and incidentals necessary to complete the work. Payment for excavation and the P.C.C. footer portion of the barrier are included in this item.

3/10/14

720544 - REFLECTORS, WHITE, CONCRETE
720545 - REFLECTORS, YELLOW, CONCRETE

Description:

This work consists of furnishing and installing white and/or yellow reflectors on P.C.C. Safety Barrier or on concrete surfaces in accordance with the details and at the designated locations as shown on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

The reflector and related hardware shall be approved prior to its installation.

The reflector unit shall be installed to the P.C.C. Safety Barrier or to any other required concrete objects in accordance with the manufacturer's recommendations and/or notes on the Plans.

Method of Measurement:

The quantity of reflectors will be measured as the actual number of reflectors installed and accepted.

Basis of Payment:

The quantity of reflectors will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing the reflector, installing, labor, equipment, tools, and incidentals necessary to complete the work.

10/29/01

720585 - GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1 - 31
720586 - GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2 - 31
720588 - GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3 - 31

Description:

This work consists of furnishing and installing an impact attenuating guardrail end treatment in accordance with the locations, notes and details on the Plans, the Standard Construction Details, these Special Provisions, and as directed by the Engineer.

Materials:

The end treatment system shall meet the requirements of NCHRP Report No. 350 Test Level 3. The Guardrail End Treatment, Type 1 shall be designed for installation parallel to the roadway. The Guardrail End Treatment, Type 2 shall be designed for installation with the end flared back from the roadway. The Guardrail End Treatment, Type 3 shall be designed for installation where 2 runs of guardrail come together.

The entire end treatment shall be designed for quick and easy replacement after an impact.

Guardrail End Treatment Attenuator Type 1 shall have a minimum of 2 square feet (0.2 square meters) of yellow retroreflective material on the nose. Guardrail End Treatment Attenuator, Type 2 and Type 3 shall have a minimum of 3 square feet (0.3 square meters) of yellow retroreflective material on the nose.

The Contractor shall submit shop drawings, the manufacturer's certification, and the manufacturer's installation instructions to the Engineer. Installation cannot begin until these submissions have been approved by the Engineer.

Construction Methods:

The end treatment system shall be fabricated and installed in accordance with the manufacturer's recommendations and details shown on the Plans.

The end treatment system shall be installed so that there is no rigid object projecting more than 4 (100 mm) above ground level in that portion of the attenuator impacted and broken away by an errant vehicle. It is the intent that the errant vehicle not be snagged by an embedded component of the end treatment attenuator.

The grading between the edge of pavement and the end treatment shall be 10:1 or flatter for the length of the end treatment.

Reflectorized washers are not to be used on attenuators unless specified and/or approved by the manufacturer.

The Guardrail End Treatment Attenuator, Type 1 shall be installed with steel tubes and soil plates for the first 4 (min.) wood post. As an alternate, the first 4 (min.) post may be hinged, breakaway steel post if the manufacturer's specifications permit.

Unless otherwise noted on the Plans, the Guardrail End Treatment Attenuator, Type 1 shall be installed with a 50:1 taper beginning 50' (15 m) from the end of the end treatment.

Method of Measurement:

The quantity of guardrail end treatment attenuators will be measured as the number of each type fabricated, installed and accepted.

Note: All guardrail end treatment attenuators will be considered as 50 feet (15 meters) long. The 50' (15 m) length will begin at the center of the nose post and extend back along the attenuator and guardrail to which it is attached. Any guardrail within the 50' (15 m) length will be considered as part of the guardrail end treatment attenuator and not be measured separately. Measurement for the guardrail will begin 50' (15 m) from the center of the nose post of the attenuator.

Basis of Payment:

The quantity of guardrail end treatment attenuators will be paid for at the Contract unit price per each type of guardrail end treatment attenuator. Price and payment will constitute full compensation for furnishing all materials, fabrication and installation and for all materials, labor, equipment, tools and incidentals required to complete the work.

Note: When this item is completely installed, the Contractor may notify the Engineer and request acceptance. The Engineer will make an inspection of the installation and the Contractor shall correct any deficiencies. Once the corrective work is completed to the satisfaction of the Engineer, the installation will be accepted and the Contractor will be relieved from the responsibility for this item. If this item is damaged before the final acceptance of the project, and the damage is not the result of the Contractor's negligence, the Engineer will notify the Contractor to make repairs, and the Contractor will make repairs at the unit price bid (in the case of complete replacement) or at a negotiated price (in the case of partial replacement or repair). Damage caused by the Contractor shall be repaired at no cost to the Department.

4/7/11

720612 - IMPACT ATTENUATOR, SPECIAL

Description:

This work consists of furnishing and installing impact attenuator in accordance with the locations, notes and details on Plans, these Special Provisions, and as directed by the Engineer.

Materials:

The impact attenuator shall be a non-gating, redirectional device meeting the requirements of the NCHRP Report 350, Test Level 3. The configuration of the device shall be as specified (in published literature) by the manufacturer for the design speed indicated on the Plans. Dimensional requirements, if any, shall be as noted on the Plans.

Construction Methods:

Installation of the impact attenuator shall be accomplished by experienced workmen in accordance with the manufacturer's recommendations. The Contractor shall provide written certification that the impact attenuator has been properly installed.

Method of Measurement:

The quantity of Impact Attenuator, Special will be measured as the number installed and accepted.

Basis of Payment:

The quantity of impact attenuators will be paid for at the Contract unit price per each for "Impact Attenuator, Special", which price and payment shall constitute full compensation for all materials and hardware required for furnishing and installing the impact attenuator complete in place and accepted, certificate of compliance from the manufacturer, shop drawing showing the details of the attenuator being attached to the existing object for approval, for excavation, foundation, for all labor, equipment and incidentals necessary to complete the item.

NOTE:

When this item is completely installed, the Contractor may notify the Engineer and request acceptance. The Engineer will make an inspection of the installation and the Contractor shall correct any deficiencies. Once the corrective work is completed to the satisfaction of the Engineer, the installation will be accepted and the Contractor will be relieved from the responsibility for this item. If this item is damaged before the final acceptance of the project, and the damage is not the result of the Contractor's negligence, the Engineer will notify the Contractor to make repairs, and the Contractor will make repairs at the unit price bid (in the case of complete replacement or at a negotiated price (in the case of partial replacement or repair)). Damaged caused by the Contractor shall be repaired at no cost to the Department.

3/3/11

**720620 - FURNISH AND MAINTAIN PINNED PORTABLE P.C.C. SAFETY BARRIER,
SINGLE FACE**
**720636 - FURNISH AND MAINTAIN PINNED PORTABLE P.C.C. SAFETY BARRIER,
DOUBLE FACE**

Description:

This item shall consist of furnishing and placing Pinned Portable P.C.C. Safety Barrier, Single Face and Pinned Portable P.C.C. Safety Barrier, Double Face at the locations in accordance with the notes and details on the Plans and as directed by the Engineer. After the completion of the project, the safety barrier shall become the property of the Contractor and shall be removed from the project site.

General Requirements:

All barrier provided to satisfy this special provision shall be certified to be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by the USDOT Federal Highway Administration **Information:** Crash Tested Work Zone Traffic Control Devices.

The Contractor shall submit to the Engineer the Federal Highway Administration NCHRP-350 acceptance letter prior to acceptance.

On each project, the Contractor shall use only one type of barrier. All sections of barrier shall be of equal length and use the same type connector.

For DelDOT administered projects the certification shall be submitted to the Engineer prior to installation.

The Contractor shall also submit shop drawings to the Engineer for the pinned barrier prior to installation along with a certification that the pinning system provided has been tested and found acceptable in accordance with NCHRP Report 350.

The barriers shall be placed on the construction site at the location(s) shown on the Contract Plans, and as directed by the Engineer. The vertical surface of the barriers to be exposed to the moving traffic, shall be painted with white latex paint prior to the initial installation. The barriers shall be painted every six months after the initial placement if left at the same location and shall also be painted before the Winter shut down in the Fall. The barriers shall have slotted openings at the bottom for surface drainage.

Workmen or equipment movements shall not be allowed to traverse between the barricaded areas and the travel lanes, except as approved by the Engineer. However, after obtaining the approval, adequate number of flaggers shall be provided to safeguard workmen and traffic, in advance of, and at the point where the barrier is opened.

Warning lights, reflectors, and other traffic protective devices shall be placed in accordance with the DE MUTCD (Delaware Manual on Uniform Traffic Control Devices) (latest edition with all revisions made up to the date of Advertisement of this project) and as directed by the Engineer. Payment for these traffic protective devices shall be made under the applicable bid items elsewhere on this Contract.

The pinning of each barrier section shall consist of 4 - #5 bars of 2' 6" length spaced 3' apart. The bars shall be inserted through the toe of barrier along the traffic side. The top of bar shall be flush with the surface of this barrier. A minimum of 2' embedment of each bar into the ground is required.

Method of Measurement and Basis of Payment:

The measurement of the item shall be made along the centerline of the barrier as the number of linear feet (meters) and payment shall be made at the Contract unit price per linear foot (meter) bid for the item "Furnish and Maintain Pinned Portable P.C.C. Safety Barrier, Single Face" and "Furnish and Maintain Pinned Portable P.C.C. Safety Barrier, Double Face", which price and payment shall constitute full compensation for furnishing, placing, pinning, painting, and maintaining, for all labor, equipment, tools, and incidentals necessary to complete the work. Furnishing and Maintaining of Pinned Portable P.C.C. Barrier End Section, and/or Curved Sections if required and specified on the Plans, shall be treated as Item 720620 and 720636 for measurement and payment and other requirements.

Payment for all subsequent relocations after initial placement performed under this item shall be made under the item 720621 - Relocating Pinned Portable P.C.C. Safety Barriers of this Contract.

3/10/14

720621 - RELOCATING PINNED PORTABLE P.C.C. SAFETY BARRIER

Description:

This work consists of relocating the Pinned P.C.C. Safety Barrier at the job site to locations indicated on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

The relocations under this item shall be made once the initial placements of the Pinned P.C.C. Barriers are completed and accepted under the item(s) 720620 - Furnish and Maintain Pinned Portable P.C.C. Barrier, Single Face.

The relocation(s) may be made for temporary storage at job site for later use, or relocation(s) required by the Plans and/or as directed by the Engineer at the construction sites.

Holes created by pinned barrier in the newly constructed pavement shall be required to be filled with bituminous cold-mix meeting the requirements of Section 815 of the Standard Specifications.

The vertical surfaces of the barriers to be exposed to the moving traffic, shall be painted with white latex paint prior to each relocation. Also, the barriers shall be painted every six-months after relocation if left at the same location and shall be painted before the winter shut-down in the Fall.

Method of Measurement:

The quantity of pinned portable P.C.C. safety barrier relocated will be measure in linear feet (meters) of barrier relocated.

Basis of Payment:

The quantity of pinned portable P.C.C. safety barrier relocated will be paid for at the Contract unit price per linear foot (meter). Price and payment will constitute full compensation for relocating the pinned barriers, temporary storage at the job site, furnishing paint and painting, maintenance, for all labor, tools, equipment and necessary incidentals to complete the work. Cost associated with filling the holes in newly constructed pavement shall be incidental to the relocation.

3/10/14

720650 - SAFETY BARRIER GATE

Description:

This work consists of furnishing and installing a permanent safety barrier gate in accordance with the Plan notes and as directed by the Engineer in field. The safety barrier gate shall run longitudinal to traffic, consist of two steel transitions, two hinges and one section of barrier 14 feet to 16 feet long equipped with wheels and jacks. The barrier gate shall utilize connecting pins, which when removed, allow the barrier section to swing freely, be jacked up onto wheels and rolled into an open position away from traffic. No tools or special equipment shall be required to open and close the barrier section, the operation is performed by hand. The system, shall have been fully tested per the recommended criteria set forth in National Cooperative Highway Research Program (NCHRP), Report 350 and shall meet the requirements for Test Level 3 as a longitudinal re-directing barrier.

Working Drawings:

General - Submit an acceptable preliminary conceptual design within 14 total calendar days from award date to the Department. Furnish, at no expense to the Department, detailed design engineering calculations, construction drawings, and erection methods. Provide approved drawings using DelDOT drafting standards.

Include the following information on the drawings: type of system, location, length, height, and transition to mount to PCC barrier, gate hinge, connecting pins, jack handles, and quantities. Show complete layout plans and fabrication details, and step by step erection instructions.

Any fabrication done before acceptance of the drawings will be at the Contractor's risk.

All design information shown on the Contract Plans are conceptual. The proprietary safety barrier gate vendor takes full responsibility for the engineering theory and calculations and ensuring that all design assumptions are presented in their drawings and specifications.

Any delay in submission and acceptance of a proposed design will not extend the Contract time.

Experimental or demonstration-type design concepts; or products, structures, or elements not preapproved by the Department for general usage, will not be permitted in the alternate design.

Submit shop drawings to the Department for review and acceptance. The Department will in no way be responsible for work done without approved shop drawings.

Construction Methods:

Contractor shall install the safety barrier gate in project areas in accordance with the notes on Plans and/or as directed by the Engineer in the field.

Installation of the safety barrier gate shall be accomplished in accordance with the manufacturer's recommendations. The Contractor shall provide written certification from an authorized and certified factory representative that the installation has been inspected and approved. Such inspection shall be to insure that the safety barrier gate is crash-worthy according to the manufacturer's current specifications. Certification must be provided within 24 hours of the installation of the safety barrier gate.

Method of Measurement:

The number of safety barrier gate specified on the plans or as directed by the Engineer and constructed according to these specifications, complete in place and accepted, will not be measured for payment, but shall be paid for on a lump sum basis for each safety barrier gate.

Basis of Payment:

The quantity of safety barrier gate, as determined above, shall be paid at the contract lump sum price bid "Safety Barrier Gate". Price and payment will constitute full compensation for furnishing and installing the unit, including all labor, tools, equipment and necessary incidentals to complete the job.

8/7/14

727507 - BRIDGE SAFETY FENCE

Description:

The work consists of furnishing all materials and constructing bridge safety fence in accordance with these specifications, notes and details on the Plans and as directed by the Engineer.

Materials:

All material shall meet the applicable requirements of Section 727 and shall be as noted below unless shown otherwise on the Plans:

Fabric shall be #9 Gage (3.76 mm Dia.) having a 1" Diamond Mesh with top and bottom selvage to be knuckled. Fabric shall be a continuous across all joints (Aluminum Alloy 6061-T94).

All posts, braces, fittings and hardware shall be Aluminum Alloy 6061-T6, unless noted otherwise on the Plans.

All base plates shall be Aluminum Alloy 6061-T6. Aluminum surfaces placed in contact with concrete shall be given a heavy coat of Aluminum Pigmented Alkaline Resistant Bituminous Paint equal to Federal Specifications TT-C-001079a.

Material for anchor bolts shall be ASTM. A276, Type 302 or A36 Steel may be used for the embedded portion.

Construction Methods:

Construction methods shall conform to the applicable requirements of Section 727 of the Standard Specifications, notes and details on the Plans, and as described herein.

All longitudinal rails shall be parallel to the top of parapet. All posts shall be set normal to the top of parapet for roadway grades 6% or less; and for grades over 6% posts shall be set plumb.

The chain link fence shall be true to line, taut and shall comply with the best practice for fence construction of this type. Parts and rails shall be permanently positioned before fabric is placed. Any defects uncovered during the process of inspection of welds on base plates and/or poles and/or elsewhere shall be repaired or replaced at the sole expense of the Contractor.

Method of Measurement:

The quantity of bridge safety fence will be measured in linear (feet)meters along the line of the fence from end to end. Any anti-climb shields or other appurtenances shall not be measured for payment but shall be included in the linear meter cost of the bridge safety fence.

Basis of Payment:

The quantity of bridge safety fence will be paid for at the Contract unit price per linear foot(meter). Price and payment will constitute full compensation for furnishing and placing all materials including posts, rails, anti-climb shields, all accessories; for all labor, tools, equipment and necessary incidentals to complete the work.

2/12/14

737523 - PLANTINGS

737.01 Description.

This work consists of furnishing and planting specified plants, shrubs, and trees and the replacement and cultural care of the material.

MATERIALS.

737.02 Plant Material.

- a. *Quality.* All plants shall be true to type and nomenclature and typical of their species or variety. They shall have a normal habit of growth with well-developed branch systems and vigorous root systems. They shall be sound, healthy, and vigorous plants, free from defects, disfiguration, injury, disease of any kind, insect eggs, borers, and any infestation. All plants shall be nursery grown. They shall have been growing under similar climatic conditions to those of the locality of the Project for at least two years prior to planting. All plant material shall have been grown in a soil that is similar to this area and shall not have been grown in a muck type soil or other foreign type. It shall be the responsibility of the Contractor to inspect the plants before removal from the nursery where they have been grown to make sure that the plants meet these requirements. All plants shall be freshly dug, and no heeled-in or cold storage plants will be accepted, with the exception of plant material delivered prior to planting as outlined in Subsection 737.14.
- b. *Measurements.* All plants shall conform to all sizes and measurements specified in the Plant List. Plants that conform to the requirements specified in the Plant List but do not have a normal balance between height and spread will not be accepted. Where any requirement or exact measurement is omitted, the plants furnished shall be normal for the species and variety as listed in AAN's "USA Standards for Nursery Stock". Plants for use where symmetry is required shall be matched as close as possible. All plants shall be measured for height and spread with the branches in their normal position. The trunk diameter of all trees shall be taken 6" (150 mm) above the ground level for up to and including 4" (100 mm) diameter sizes, and 12" (300 mm) above the ground level for larger sizes. The height of the branches on the tree trunks need not be as specified if the required height can be obtained by pruning the lower branches without leaving unsightly scars and damaging the trunk. No pruning of branches for this effect shall be done before delivery to the site unless approved. Plants larger in size than specified may be used. Larger plants, when selected for use over that which is specified, shall be dug with an earth ball or root spread proportionate to the increased size. With plants smaller than specified, credit shall be offered to the Department for approval. The basis of a credit shall be the average wholesale value based on the difference between the specified size and the next smaller size. The average wholesale value shall be substantiated with written submissions in accordance with Subsection 737.02 (e).
- c. *Inspection.* The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by Federal, State, or other authorities to accompany shipment of plants. The Contractor shall furnish complete information as to the location of all plants which it intends to supply and use. The right is reserved to inspect, tag, and approve all plants at the source of supply. This inspection and tagging shall not in any way eliminate the right of rejection at the site. All plants must be inspected and approved before they are planted. Any plants placed without prior inspection at the site will be rejected at the discretion of the Engineer. The Plant materials shall be protected according to best horticultural practice while in transit in such a way as to prevent the drying or possible desiccation of plant tissue. All plant material arriving at the site with broken or loose balls, or dry or insufficiently developed roots, and plants which are weak or thin, damaged or defective, or which do not comply with the specifications, will not be accepted. The Engineer reserves the right to reject all stock that is found to be unsatisfactory. All plant material determined as unsatisfactory by the Engineer shall not be planted under any circumstances and shall be removed from the Project site by the close of the working day. Failure on the part of the Contractor to comply with any of the above procedures will require an immediate suspension of all work.

- d. *Nomenclature.* Plants shall conform to the nomenclature of "Standard Plant Names" as accepted by the American Joint Commission of Horticulture Nomenclature, 1942 Edition. Names of varieties not included shall conform to names accepted in nursery trade. Size and grading shall conform to those listed in AAN's "USA Standards for Nursery Stock". No substitution will be permitted except by written permission of the Engineer.
- e. *Availability.* The Engineer, after receiving written request from the Contractor for substitution, will verify and establish the non-availability of the specified plant and size to this satisfaction. Upon determining that a substitution is justified, the Contractor will be directed to provide certification in the form of five letters from five independent growers who list the specified plant form in their most current catalog, stating that the item in question is not available as specified.
- f. *Experience.* Under Special Condition No. 22 of the U.S. Army Corps of Engineers 404 Permit, it is stipulated that: *The mitigation and post-planting monitoring plans shall be developed and implemented by a firm with demonstrated expertise in wetland creation activities.*

Therefore, the firm that does the actual planting and seeding of the mitigation site shall possess a record of successful wetland woody and wetland herbaceous and seeding programs that have received final approval by the U.S. Army Corps of Engineers, or have on-site staff personnel who have managed successful wetland woody and herbaceous planting and seeding programs that have received final approval by the U.S. Army Corps of Engineers. At the request of the Department, information indicating compliance with this "Special Condition" shall be forwarded within 14 days.

737.03 Trees. Trees shall have straight trunks according to their habit of growth and shall be well branched and rooted. Shade trees of standard variety shall have a single leader and shall be branched at 6 to 8' (1.8 to 2.4 m) height unless otherwise directed.

737.04 Shrubs. Shrubs shall be well branched, with full and compact growth and have ample well branched root systems capable of sustaining vigorous plant growth.

- a. *Woody Shrub Cuttings* Cuttings shall be fresh 24" (600 mm) long stems of woody plants. Each cutting shall have a living terminal bud (end bud). Prior to installation, the cutting shall be kept cool and moist to prevent desiccation of the material. Degraded, rotting, or dried out material will not be accepted.

737.05 Ground Cover and Herbaceous Perennials.

Ground cover shall be one year old, container grown plants, unless otherwise approved or specified in the Contract documents and shall have been growing for at least six months in the size specified as verified by the Department's inspection representative.

Herbaceous plant material shall be at least six months old and shall have been growing for at least three months in the size specified unless otherwise detailed in the plans, and as verified by the Department's inspection representative.

737.06 Soil Mix.

- a. *Topsoil.* Planting topsoil shall consist of natural surface soil from well drained areas from which no topsoil has previously been stripped. The topsoil shall be free of subsoil, heavy clay, hard clods, weeds, roots, sticks, toxic substances, or any other extraneous material. The topsoil shall have a pH range of from 5.5 to 6.8 and contain not less than 2% nor more than 10% organic matter. The topsoil shall exhibit the following grading analysis:

<i>Sieve Size</i>	<i>Minimum Percent Passing</i>
2" (50 mm)	100
No. 4 (4.75 mm)	90
No. 10 (2.00 mm)	80

The Contractor shall take the necessary action to ensure that the topsoil meets the sieve analysis, acidity, and organic matter requirements. A certificate of analysis of soil samples shall be provided to the Engineer and approved prior to delivery of topsoil to the Project site.

b. *Peat Moss and Peat Humus.*

- i. *Peat Moss. Peat moss shall be from sphagnum peat bogs. All peat moss shall be shredded, not dusty, and free of twigs, stones, hard lumps, roots, or any other undesirable materials. All peat moss must be moistened before using, but not watered to a saturated or puddled, unworkable condition. Peat moss shall show an acid reaction of 3.5 to 5.5 pH. The Contractor shall provide written certification from the manufacturer that the peat moss was obtained from sphagnum peat bogs.*
- ii. *Peat Humus. Peat humus shall be a natural peat or peat humus from fresh water saturated areas, consisting of sedge, sphagnum, or reed peat and be of such physical condition that it passes through a 2" (12.5 mm) sieve. The humus shall be free from sticks, stones, roots, and other objectionable materials. Samples taken at the source of supply shall have the following analysis:*

<i>Acidity Range</i>	<i>4.0 to 7.5 pH</i>
<i>Minimum Water Absorbing Ability</i>	<i>200% by weight on oven-dry basis</i>
<i>Minimum Organic Content</i>	<i>60% when dried at 221 EF (105 EC)</i>

- c. *Composted leaf mulch free of wood, metallic substances, glass or other contaminates may be used in lieu of peat moss or peat humus.*

737.07 Fertilizer. Fertilizer shall be a 20-10-5 analysis or approved equal in accordance with the following minimum guaranteed analysis:

Total Nitrogen (N)	20.00%
Derived from urea-formaldehyde	
7.0% water soluble nitrogen	
13.0% water insoluble nitrogen	
Available Phosphoric Acid (P2O5)	10.00%
Derived from calcium phosphate	
Soluble Potash (K2O)	5.00%
Derived from potassium sulfate	
Combined Calcium (Ca)	2.60%
Derived from calcium phosphate	
Combined Sulfur (S)	1.60%
Derived from ferrous and potassium sulfates	
Iron (expressed as elemental Fe)	0.35%
Derived from ferrous sulfate	

The fertilizer shall be formulated in tablet form weighing a minimum of 20g per tablet.

The fertilizer shall conform to all State and Federal regulations. The Engineer will require the Contractor to furnish an affidavit from the vendor or a testing laboratory as to the available nutrients contained therein.

Fertilizer shall be furnished in new, clean, sealed, and properly labeled packages or containers. Fertilizer failing to meet the specified analysis may be used as determined by the Engineer, providing sufficient materials are applied to comply with the specified nutrients per unit of measure.

737.09 Mulch. Mulch shall be shredded hardwood bark or wood chips, or an approved equal as accepted by the Engineer. All mulching materials will be visually inspected by the Engineer prior to delivery at the planting site and shall conform to the following requirements:

- a. Shredded hardwood bark shall be from a deciduous hardwood source and be mechanically ground to a maximum size of 6" (150 mm). In addition, the bark shall be relatively free of bark fines dust and shall exclude all foreign and toxic substances.
- b. Wood chips must be stockpiled for at least one year prior to placement as verified by the Department's inspection representative and shall not contain leaves, twigs, wood shavings and sawdust, or any foreign or toxic substances. In addition, loose, non-pelletized fertilizer with analysis in accordance with Subsection 737.07 shall be applied at the rate of 0.5 lb/yd² (0.25 kg/ m²) prior to wood chip placement.

Only one of the above mulches will be selected and approved for use throughout the entire Project, and written certification for the above listed requirements of the mulch shall be submitted by the Contractor.

737.10 Stakes, Guys, and Related Materials. Staking and guying shall be as per the Standard Construction Details or alternate method approved by the Engineer.

- a. *Tree Stakes.* Hardwood stakes shall be at least 2" by 2" (50 by 50 mm) rough sawed to the length required. Stakes shall be free from knots, rot or other defects that impair strength.
- b. *Guying straps.* Guying straps shall be one and one-half to two inches (1.5-2.0") wide, of polymer or nylon construction, with grommets at both ends to accept wire or heavy twine.
- c. *Anchoring systems.* Anchors for guy wire shall be malleable iron or aluminum alloy with 3000 lb (13 kN) holding capacity designed to be inserted with a driving rod to a depth specified by the manufacturer. The anchor assembly shall be designed to turn, once located at the proper depth, at a right angle to the line of force applied. All manufacturers' recommendations shall be followed for installing ground anchoring systems.

737.11 Water. Conform to the requirements of Section 803.

CONSTRUCTION METHODS.

737.12 Planting Periods. Plant during the following planting period with the exceptions as noted:

Balled or Burlapped and Potted or Container Grown Plant Material:

March 1 to May 15; September 1 to November 30:

- (1) All planting of broadleaf evergreens during the fall season shall be completed by November 1.
- (2) All material planted from May 16 to August 31 must be treated with an approved antitranspirant in a manner recommended by the manufacturer, and written approval for moving plants within this period must first be obtained from the Engineer.
- (3) Woody Shrub Cuttings Install as dormant materials between October 30 and December 1 or between March 1 and April 1.

The above mentioned periods may be extended or reduced according to weather and soil conditions at the time and upon written request from the Contractor to the Engineer for approval. Planting outside the planting window does not relieve the contractor of his guarantee. The Engineer reserves the right to stop planting operations at any time.

The Contractor shall not plant when weather conditions are unfavorable for proper work or when the soil is in a frozen condition.

737.13 Soil Mixture. Soil mixtures for the various plantings shall consist of the following:

- a. *All Plants Except Ericaceous Material.* For each cubic yard (cubic meter) of baled peat moss, or approved equal, add from 43 to 54 yd³; (43 to 54 m³) of planting topsoil.
- b. *Ericaceous Plants.* For each cubic yard (cubic meter) of baled peat moss, or approved equal, add from 36 to 45 yd³; (36 to 45 m³) of planting topsoil. If peat humus is furnished in lieu of peat moss in the above mix, the mixture shall be based in the proportion of 1.8 yd³; (1.8 m³) of peat humus for each cubic yard (cubic meter) bale of peat moss specified for the above soil mix. Other approved equal materials shall be mixed according to manufacturer's printed recommendations which shall be submitted to the Engineer for written approval.

The above soil mixtures shall be mixed as specified in an area approved by the Engineer. No mix shall be prepared prior to notification of the Engineer at least 48 hours in advance of the mixing operation. Where ground covers or herbaceous perennials are specified, the soil mix may be mixed in place providing the existing topsoil conforms to the requirements of subsection 737.06.

The fertilizer as specified in accordance with Subsection 737.07 shall be placed according to the following requirements:

- a. *Balled and Burlapped, or Container Stock.* Position the plant in the hole, and backfill no higher than halfway up the root ball. Place the recommended number of tablets evenly around the perimeter of and immediately adjacent to the root ball. Complete the backfilling, tamping, and watering.
- b. *Small Ground Cover Plants and Herbaceous Perennials.* Position the plant in the hole, and backfill no higher than halfway up the root ball. Place the recommended number of tablets evenly around the perimeter of and immediately adjacent to the root ball. Complete the backfilling, tamping, and watering.
- c. *Trees.* Use one 20 g tablet for each 1/2" (13 mm) of tree trunk diameter based on size specified for planting.
- d. *Shrubs.* Use one 20 g tablet for each 12" (300 mm) of height or spread based on size specified for planting.
- e. *Ground Cover and Herbaceous Perennials.* Use one 20 g tablet for each plant.

No backfill shall be placed in any pit until the excavation has been inspected. Excess excavated material shall be removed from the Project site.

737.14 Digging and Handling. All precautions customary in good trade practice shall be taken in preparing plants for transplanting. Plants transplanted with workmanship that fails to meet the highest standards will be rejected. All balled and burlapped plants shall have firm, natural balls of earth of ample proportions and diameter not less than as specified in AAN's "USA Standards for Nursery Stock". Plants with cracked, broken, or crushed balls, which occur either before or during planting operations, will be rejected or shall be removed from the site immediately. All plants shall be handled so that roots are adequately protected and moist at all times. Material that cannot be planted immediately after delivery shall be adequately protected by covering with canvas, wet straw, burlap, moss, or other suitable material and kept covered until ready to be planted. Trees should not be planted with frozen earth balls. Containerized plant material shall be growing in the specified size container for at least six months and shall not display signs of being root bound or unnatural ratio of planting medium vs. root mass.

737.15 Location of Plants. Plants shall be located as indicated on the Plans, but may be shifted to avoid utilities subject to the approval of the Engineer. No excavation shall commence until locations are approved.

737.16 Planting. All trees and shrubs shall be planted in pits as detailed on the Standard Construction Details. Pits shall not be excavated with vertical sides. Pits shall be of such a depth that, when planted and settled, the crown of the plant shall bear the same relation to finished grade as it did to soil surface in its place of growth. With the approval of the Engineer, the Contractor may elect to plant wetland grown containerized shrubs on small mounds raised no more than 2" (50 mm) above the final grading elevation shown on the Plans.

Open plant pits shall not be allowed overnight in residential areas or in any location where it is determined by the Engineer to pose a potential hazard to pedestrians or traffic.

All backfill topsoil shall be covered with a waterproof material after mixing. Pits shall be backfilled with specified soil mix and compacted firmly under ball of roots to establish a firm foundation. Plants shall be set in the center of pits in a vertical position so that the crown of the plant is level with the finished grade after allowing for watering and settling of soil. The "Soil Mixture" shall be carefully and firmly worked and tamped under and around the base of the ball to fill all voids. When partially backfilled and compacted, the burlap and any wire baskets shall be removed from the sides and tops of the balls and cut away to prevent air pockets, but no burlap shall be pulled from under the balls. All burlap, wire baskets and other containers shall be removed from the jobsite at the end of the workday. The balance of the planting hole shall be filled with the planting mixture and a ring of earth shall be formed around the plant to produce a dish for watering. All plants shall be thoroughly watered immediately after planting as directed by the Engineer. This initial watering shall mean complete saturation of all backfill in the pits and beds during the same day of planting. Care shall be taken during all planting operations to ensure that no excavated material is dumped on any grassed area unless a suitable type of matting or protective underlay is used. The Contractor shall be responsible for all damage to any grassed, planted, or other landscaped area caused by its operations and shall repair any damage so caused in a manner satisfactory to the Engineer.

Ground cover and herbaceous perennial areas shall be prepared by rototilling to a minimum depth of 10" (250 mm). The mixing of peat moss, peat humus, or approved equal may be performed separately in order

to obtain the proportion of ground cover or herbaceous perennial soil mixture as specified. Beyond the minimum excavation as stated above for soil mixing, the root system of the plant shall determine the actual depth for individual plant excavation. Plants shall be backfilled with the soil mixture and compact firmly around roots. All areas shall have a smooth and uniform grade and a minimum of 2" (50 mm) of approved mulch.

- a. *Pruning.* All plants shall be pruned immediately after planting or transplanting to remove all injured or dead wood. All trees inspected and tagged at the nursery shall conform to AAN Standards, and any subsequent pruning by the Contractor shall in no way alter the natural habit or shape of the plant. All pruning shall be done with sharp tools by workers skilled in this operation. All cuts shall be made flush, leaving no stubs. On all cuts over 3/4" (19 mm) in diameter and bruises or scars on the bark, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as to preserve the branch bark ridge.
- b. *Watering.* Plants shall be watered on the same day as planting unless otherwise approved by the Engineer. Quantity of water per plant shall be as detailed in Section 737.17.
- c. *Mulching.* Trees and shrubs shall be mulched with at least a 4" (100 mm) cover of mulch. Mulch shall be placed the same day of planting, unless otherwise approved by the Engineer.
- d. *Wire baskets, nylon binding and treated burlap* shall be cut away and removed from the top half of the root ball.
- e. *Staking and Guying.* Unless approved by the Engineer, all staking and guying specified shall be completed the same day as planting and mulching.
- f. *Cleaning Up.* Throughout the course of planting, excess and waste materials shall be immediately removed from the site, seeded areas kept clean, and all precautions taken to avoid damage to existing structures, trees, shrubs, plants, and grass. When planting in an area that has been otherwise completed, the area shall, upon completion of the planting, be immediately and thoroughly cleared of all debris, rubbish, subsoil, and all waste materials removed from the site. All ground surfaces shall be raked smooth. All sodded areas disturbed as a result of construction shall be repaired by the Contractor.

737.17 Plant Establishment. 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.

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

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, guyed, watered, etc. as specified herein for new plant material.

The Contractor shall warrant all plant material against defects including death and unsatisfactory growth, except for defects resulting from incidents beyond the Contractor's control, such as vehicular impacts or vandalism. Submission of appropriate police reports or other approved evidence verifying the cause of the damage shall be required to relieve the Contractor of responsibility for replacement.

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

Contractor shall be required to water all major and minor trees, shrubs and all herbaceous beds bi-weekly during the period from June 15 through October 1. Watering, once initiated, shall continue without interruption until all plants on the project have been watered. Payment shall be per 1,000 gals of water applied and shall be based on the following schedule: Major trees-15 gals per tree, minor trees-10 gals per tree, shrubs-5 gals per shrub, perennials-10 gals per 100 square feet of planting bed. Water used for this item shall meet the requirements of Section 803 of the Standard Specifications. Tree watering bags, if utilized, shall be filled as a part of the watering operation; payment shall be as detailed herein. Tree watering bags shall remain the property of the contractor and shall be removed prior to final inspection.

737.18 Method of Measurement. The quantity of planting will not be measured.

737.19 Maintenance Bond. Upon Substantial Completion of the Work, the Contractor shall furnish to the Department a Maintenance Bond on the form provided by the Department for item 737523 - Planting. The Maintenance Bond shall meet the following requirements:

A sum equal to 100% of the value of all Planting Items paid to the Contractor, as detailed in the Breakout Sheet; All signatures are original signatures, in ink, and not mechanical reproductions or facsimiles of any kind; The Contractor is the named principle; Section 737.17 – Plant Establishment Work items associated with this section requires completion after substantial completion of the Project. The term of the Maintenance Bond will be for a period of one full growing season, as defined in the section, beyond the completion of permanent planting Work; and, Written by a Surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Delaware by the Delaware Department of Insurance.

737.20 Basis of Payment.

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, and guying; 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; 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. The quantity of watering will be paid for in accordance with the price bid for, "Watering," as detailed on the breakout sheet. Payment shall be by the M/Gal (1,000 gallons) of water applied at each watering operation.

The breakout sheet attached to the proposal shows all plant material and the anticipated amount of water proposed for this Contract. The Contractor shall fill in the per each unit price and the cost (unit price times the proposed quantity) for each item listed. The lump sum price bid for 737523 - Planting shall be the sum of the total cost for all species and sizes listed. The completed typewritten breakout sheet shall be attached to the bid proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract the furnishing and installing of one or more of the species and/or sizes listed and the right to add or subtract from the quantity of each species and size listed. The lump sum to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation to the Contractor if such additions and/or deletion are made. Watering item shall be paid separately for watering completed at the bid price indicated on the Breakout Sheet.

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.

On contracts where assessment of time is in working days, the Contractor will be charged working days while engaged in actual planting and directly related work such as plant pit excavation, staking, wrapping, and mulching. The Contractor will not be charged time for indirectly related work such as watering, weed control, pruning, and other responsibilities as described under Subsection 737.17

The cost to remove and replace plants that settle below or rise above the desired finished grades, or that die or are unhealthy as described in Subsection 737.17 shall be the responsibility of the Contractor.

8/19/2014

743542 - TEMPORARY QUEUE DETECTION SYSTEM

Description:

This work consists of furnishing, installing, programming, operating, maintaining, and removing all components of an Intelligent Transportation System (ITS) based Temporary Queue Detection System (QDS) meeting the requirements directed by the Engineer and described herein.

Functional Requirements:

The QDS shall collect real-time vehicular traffic data approaching the work zone through the deployment of ITS based devices. The system shall display information to the traveling public through contractor furnished portable Changeable Message Signs (CMS) temporarily placed in the field and permanent DelDOT owned Dynamic Message Signs (DMS) that exist in the field. Messages shall include: SLOWED TRAFFIC AHEAD, STOPPED TRAFFIC AHEAD, SEEK ALTERNATE ROUTE, and similar. Messages shall be based on the traffic data gathered and shall be chosen and displayed based on automated logic/control software with a manual override feature. Specific message display and message selection criteria will be confirmed by the Engineer after a meeting with the Contractor, Traffic Control Supervisor, and QDS provider personnel, as part of the QDS Plan development process.

System Requirements:

The following outlines the anticipated type and number of components of the QDS supplied by the contractor for bid purposes. The actual types and number of devices, as well as placement locations, will be confirmed by the Engineer after a meeting with the Contractor, Traffic Control Supervisor, and QDS provider personnel, as part of the QDS Plan development process.

- One (1) network-based (web-based) software management system with password protected web-site login for approved user access. The system shall provide appropriate traffic data storage and retrieval functions, message display decision logic, and user interface. The user interface shall allow personnel to view locations of all QDS devices, retrieve time and date referenced traffic data, view messages displayed on boards in real time, view and modify automated message decision logic, manually override messages displayed on boards, and produce historical reports for message displays with time and date stamp. The system should also be capable of providing an XML feed to DelDOT's TMC so that the traffic data gathered can be used to supplement information presented on the Interactive Traffic Maps found on www.deldot.gov.
- Ten (10) portable Changeable Message Signs (CMS) wirelessly linked to and controlled via a central computer base station and in compliance with DelDOT Item Number 743004. The number quoted above is for planning and estimation for bid purposes and is subject to change during the QDS Plan development process.
- Six (6) portable non-intrusive traffic data collection devices wirelessly linked to a central computer base station. The devices shall collect, at a minimum, individual vehicle speed, length, and headway information to provide accurate, real time, volume, average speed, and occupancy data. The devices shall be capable of collecting data across a minimum of five (5) lanes of traffic in congested conditions and lanes divided by standard concrete barrier. The devices should detect vehicle data on a lane-by-lane basis. Their sensors shall be of a type that is not degraded by fog, darkness, excessive dust, or road debris. The number quoted above is for planning and estimation for bid purposes and is subject to change during the QDS Plan development process.
- One (1) QDS technician trained in the system components by the provider who shall be placed on-site as part of the Contractor's traffic control personnel and available to maintain system components, maintain software decision logic and user interface, relocate and calibrate devices, troubleshoot malfunctions, and respond to emergency situations.
- Appropriate QDS training shall also be provided to DelDOT TMC and Traffic Safety personnel for the purpose of traffic data retrieval, system verification, manual override, and troubleshooting purposes.

Where items and operational responsibilities are necessary, but not explicitly listed above, to install and support a complete and operational system, the Contractor shall provide these items as if they were specified.

Queue Detection System (QDS) Implementation Plan:

Sixty (60) days prior to deployment of the QDS, the Engineer, Contractor, Traffic Control Supervisor, and QDS provider shall meet to draft a Queue Detection System Implementation Plan, based on the guidelines provided in the TMP. The Plan shall include, at a minimum, the following:

- Plan sheets showing proposed locations of all QDS field device locations during each phase of construction.
- Description of proposed traffic condition thresholds and corresponding messages to be displayed on each CMS in the field.
- The name and contact information of the on-site QDS manager.
- Detailed description of the proposed communication methods between QDS devices placed in the field, the central computer base station, and DelDOT's TMC.
- Troubleshooting/device malfunction procedures.
- If any, established periods of time when the system can be placed in "dark mode", when traffic data will still be collected via the detection devices but no messages will be displayed on the CMS devices placed in the field.
- The Contractor shall submit to the Engineer for approval a written and illustrated QDS Plan three (3) weeks prior to the mobilization of any component of the QDS system. The QDS Plan shall include the items required in this specification. The Contractor will not be allowed to start any construction activities that will affect traffic on the project until the QDS Plan is approved by the Engineer.

Approval of the QDS Plan by the Engineer is required prior to the placement of any QDS devices. Approval is conditional and will be predicated on satisfactory performance during construction. The Engineer reserves the right to require the Contractor to make changes in the QDS Plan and operations, at no additional cost to DelDOT, including removal of personnel, as necessary, to obtain the quality specified. The Contractor shall notify the Engineer in writing a minimum of seven (7) calendar days prior to any proposed changes in the QDS Plan. Proposed changes are subject to approval by the Engineer. After approval of the plan and implementation of components, the Engineer reserves the right to require the Contractor to amend the plan as a result of observed system functionality.

Materials and Qualifications:

At least 20 days prior to beginning installation, the Contractor shall submit to the Engineer for review and approval evidence that the Contractor or Subcontractor has successfully completed at least three (3) Queue Detection System projects similar in concept and scope to the proposed system. Include names, addresses, and telephone numbers of the owner's representatives for verification. Submittal shall include brochures and cut sheets on all units of the QDS system, with details of how and which communications systems were used, and proposed implementation/use of website and devices. Product acceptability will be based on component and device compliance with DelDOT Standard Specifications and Special Provisions and the functional/system requirements stated herein.

Schedule:

The QDS system shall be operable 24 hours per day, seven days per week, during all phases of project construction. The system shall be installed and subject to five (5) days of continuously successful testing before any lane closures are scheduled to take place. If malfunctions occur for a combined period of four (4) hours or more during the operational test, credit will not be given for that day and the five (5) day period shall reset, unless directed otherwise by the Engineer.

At the completion of the project, the Contractor shall remove all components of the QDS and retain ownership.

Transfer of Data:

The Contractor shall make all traffic and message board display data collected as part of the QDS available to DelDOT at the completion of the project in an electronic format.

Method of Measurement and Basis of Payment:

The method of measurement shall be lump sum and payment shall be made at the lump sum price bid for the item "Queue Detection System". Lump sum price shall include furnishing, installing, relocating, operating, maintaining, testing, monitoring, and removal of the QDS as well as any necessary licensing and communication costs and development of QDS Plan. Payment will be divided into the following payment schedule:

- 35% paid when all QDS equipment is delivered to the jobsite.
- 25% paid after completion of testing period.
- 20% paid after 30 calendar days of full system operations.
- 20% paid after project completion and equipment is fully removed from the project.

Penalties:

The Engineer shall notify the Contractor if any component of the QDS is not functioning properly at any time. Once the Contractor has been notified, the Contractor shall have four (4) hours to address the malfunction and repair the System to proper working order. If, after four (4) hours, the System is not functioning properly, a penalty of \$2,000 for each hour or portion thereof will be assessed to the Contractor.

The Contractor is responsible for keeping all QDS components in working order throughout construction. This includes damages to components that may result from vehicle crashes, vandalism, adverse weather, etc. In circumstances where devices in the field have been damaged by factors outside the control of the Contractor, such as those listed above, the Contractor will have 24 hours to repair or replace the device and restore proper functionality before the penalties stated above shall be enforced.

12/11/14

- 744500 - CONDUIT JUNCTION WELL, TYPE 6, PRECAST POLYMER CONCRETE
- 744506 - CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE
- 744507 - CONDUIT JUNCTION WELL, TYPE 8, PRECAST POLYMER CONCRETE
- 744508 - CONDUIT JUNCTION WELL, TYPE 9, PRECAST POLYMER CONCRETE
- 744509 - CONDUIT JUNCTION WELL, TYPE 10, PRECAST POLYMER CONCRETE
- 744520 - CONDUIT JUNCTION WELL, TYPE 1, PRECAST CONCRETE
- 744523 - CONDUIT JUNCTION WELL, TYPE 4, PRECAST CONCRETE
- 744524 - CONDUIT JUNCTION WELL, TYPE 5, PRECAST CONCRETE
- 744530 - CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/POLYMER LID-FRAME
- 744531 - CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/POLYMER LID-FRAME
- 744532 - CONDUIT JUNCTION WELL, TYPE 15, PRECAST CONCRETE/POLYMER LID-FRAME

Description:

This work consists of supplying, constructing and installing conduit junction wells as shown on the applicable Plan Sheets or Standard Construction details

Materials:

Concrete shall conform to Section 812, Class B of the Standard Specifications.

Castings shall conform to Section 708.05 of the Standard Specifications.

Frames and lids shall be in accordance with Sections 708 and 744 of the Standard Specifications.

All required hardware and wire for Bonding and Grounding as shown on the Standard Construction or applicable Plan details.

Types 6, 7, 8 and 10 are precast polymer concrete stackable boxes with no base.

Precast polymer concrete is reinforced by heavy-weave fiberglass with a compressive strength of 9,000-15,000 psi, impact energy of 30-72 ft. lbs. and a tensile strength of 800-1,100 psi. Precast polymer concrete should be tested according to the requirements of ASTM Method D-543, Section 7, Procedure 1 for chemical resistance.

All precast polymer concrete covers shall be the heavy-duty type with a design load of 15,000 lbs. over a 10" square. The coefficient of friction should be greater than 0.5. The precast polymer concrete cover logo shall bear the inscription "DelDOT" (Types 6, 8, and 10) or "DelDOT TRAFFIC FIBER OPTICS" (Type 7).

Types 11, 14, and 15 are precast polymer frame and lids installed on a precast concrete base. Precast polymer concrete frame and lids shall be the heavy-duty nonconductive type with a design load of 15,000 lbs. over a 10" square. The coefficient of friction should be greater than 0.5. The precast polymer concrete lid logo shall bear the inscription "DelDOT ELECTRIC"(Types 11, 14, and 15)

Construction Methods:

The conduit junction well shall conform to the dimensions shown on the Standard Construction or applicable Plan Details, or on the manufacturer's specifications and shall be built so as to ensure that the cast iron frame and lid or polymer concrete box and cover are set level with the surrounding surface when constructed within pavement, sidewalks, pedestrian curb ramps, etc., and set above grade and graded to drain away from the junction well when constructed in unpaved areas. More than one conduit may extend into

the well and shall conform to the dimensions shown on the applicable plan sheets or Standard Construction Details. A stone base shall be built for all types of junction wells. Grounding and bonding of the units shall be performed as shown on the plans or Standard Construction details.

Method of Measurement:

The quantity of junction wells shall be the actual number of conduit junction wells by type, that are supplied, constructed, complete in place, and accepted, including cast iron frames and lids with grounding lugs, precast polymer concrete frame and covers, or precast polymer concrete covers, stone base, bonding, grounding, and splicing if required. Frames and lids or precast polymer concrete covers must be installed prior to acceptance of this item.

Payment for all conduits extending into the junction well shall be included in the items for conduit installation.

The length of ALL conduits within a junction well shall conform to the Standard Construction or applicable Plan Details or as directed by Engineer. Payment for cutting existing conduit as directed by Engineer, where a junction well is replaced with a larger type of junction well is included in the bid price. The removal and replacement of cables within the conduits to be shortened shall be handled under other items of this contract.

Basis of Payment:

Payment for conduit junction wells as measured above shall be made at the Contract unit price per each junction well of the type indicated, completely installed and constructed, including excavation, backfilling, and stone base. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

2/29/12

744529 – P.C.C. BARRIER, JUNCTION WELL

Description:

This work consists of furnishing junction wells (located in P.C.C. Barrier sections) of the sizes and types shown on the plans.

Materials and Construction Methods:

Junction boxes (or pull boxes) shall be rated Nema 4X. The cover shall be of the same material as the box, fastened with stainless steel screws, and rain-tight.

Furnish grounding lugs that are UL listed and approved for copper wire. Use stainless steel for both inside and outside mechanical connections to the junction box.

Conduit knockouts shall be made in the junction box by an approved method. Each conduit entrance shall accommodate the nominal outside diameter of the conduit specified on the plans. All conduits are to be secured to the junction box using washers, locknuts, and bushings. A drain pipe with outlet to free air shall be installed in the junction box as detailed on the plans.

Method of Measurement:

The quantity of P.C.C. Barrier, Junction Well will be measured as the actual number of junction boxes of the size specified furnished and accepted under the terms of this Contract.

Basis of Payment:

The quantity of P.C.C. Barrier, Junction Well will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all materials, including box, cover, gasket, drain pipes, cover screws, grounding lugs, necessary fittings and hardware, and all incidentals to the satisfaction of the Engineer.

Installation of P.C.C. Barrier, Junction Well will be incidental to the pertinent concrete or barrier wall item.

9/7/06

- 745601 – FURNISH & INSTALL UP TO 3” FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT**
- 745602 - FURNISH & INSTALL UP TO 4” SCHEDULE 80 HDPE CONDUIT (BORE)**
- 745603 - FURNISH & INSTALL UP TO 4” SCHEDULE 80 PVC CONDUIT (OPEN CUT)**
- 745604 - FURNISH & INSTALL UP TO 4” SCHEDULE 80 PVC CONDUIT (TRENCH)**
- 745605 - FURNISH & INSTALL UP TO 4” SCHEDULE 80 PVC CONDUIT (ON STRUCTURE)**
- 745606 - FURNISH & INSTALL UP TO 4” GALVANIZED STEEL CONDUIT (TRENCH)**
- 745607 - FURNISH & INSTALL UP TO 4” GALVANIZED STEEL CONDUIT (BORE)**
- 745608 - FURNISH & INSTALL UP TO 4” GALVANIZED STEEL CONDUIT (OPEN CUT)**
- 745609 - FURNISH & INSTALL UP TO 4” GALVANIZED STEEL CONDUIT (ON STRUCTURE)**
- 745610 - FURNISH & INSTALL UP TO 4” NONMETALLIC POLE RISER SHIELD**

Description:

Furnish and install HDPE, PVC, or Galvanized steel conduits of any size less than or equal to 4 inches in diameter (3 inches or less for Flexible Metallic Liquidtight Conduit) as described below.

Materials:

All conduits shall be UL listed.

HDPE Conduit - 4" or less diameter, high density polyethylene (HDPE) schedule 80, smooth wall conduit with permanently pre-lubricated lining, meeting ASTM D2447, ASTM D3035 and NEMA TC7 specifications.

PVC Conduit - 4" or less diameter, schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

Galvanized Steel Conduit - 4" or less diameter, rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

Nonmetallic Pole Riser Shield – 4” diameter or less nonmetallic pole riser shield with belled ends meeting NEMA TC-19 specifications.

Flexible Metallic-Liquidtight Conduit – meets National Electric Code 2002, Article 350

Weatherhead for galvanized or PVC conduit – material shall match the adjoining conduit

Insulated grounding bushing with knockouts - meet or exceed UL 514 B

Condulets for conduit sizes - material shall match the adjoining conduit

End caps - material shall match the adjoining conduit

LONG sweep sections for conduit sizes - material shall match the adjoining conduit, and shall be manufactured 90 degree sweeping bends.

Construction Methods:

General Installation Requirements - The Department has the right to reject any installation method proposed for a given work site. PVC shall not be installed under existing pavement unless it is on a continuous roll or with the Engineer’s written approval.

Conduit installed underground shall be installed in a straight line between terminal points. In straight runs, junction well spacing shall be no more than 600 feet for fiber optic conduit or no more than 300 feet for copper in conduit, or as directed by the Engineer. If bends are required during installation, they must be manufactured sweeping bends. The Engineer will be consulted before any bends are installed to ensure that the proper arc is provided.

Conduit shall have a minimum cover as measured from the finished grade of 24 inches and a maximum cover of 48 inches.

The opening shall be filled half way with the cover material, and tamped down firmly before filling in the remainder of the opening. Additional lifts shall be used as required to install the metallic warning tape at the specified depth. All cover material shall be free of rocks, debris, vegetation or other deleterious material that may damage the conduit. An underground utility warning tape shall be installed as specified in this section and the remainder of the fill shall be added, tamping down the top layer.

Conduit not terminated to a base or in a junction well shall be terminated 2 feet beyond the edge of the pavement unless otherwise directed by the Engineer, and properly capped. Tape is NOT an approved method.

Conduit shall not extend more than 3 inches inside a junction well. See Standard Construction Details or applicable Plan Details for typical methods of termination.

All underground conduits shall be marked in the ground with a metallic warning tape. The marking tape shall be buried directly above the conduit run that it identifies, at a depth of approximately 12 inches below final grade. The tape identifying ALL conduits shall be at least 6 inches wide, and have a minimum thickness of 3 mils and 500 percent elongation.

The color of the metallic warning tape identifying fiber optic cable should be bright orange (preferably AULCC orange), and shall read "WARNING - OPTICAL CABLE" or other wording approved by the Engineer that conveys the same message. The color of the tape identifying all other cables shall be bright red, and shall read "WARNING —BURIED ELECTRIC BELOW" or other wording approved by the Engineer that conveys the same message.

Using conduit tools, rigid metallic conduit shall be cut, reamed, and threaded. The thread length shall be as necessary to ensure that the sections of conduits when screwed into a coupling and tightened correctly will butt together and the joint will be watertight. A three-piece threaded union, as approved by the Engineer, shall be used to join two threaded lengths of conduit in the case where a standard coupling will not work. A threaded union shall not be used in a conduit run that is to be driven. At no time is a threadless coupling or a split-bolt coupling to be used for direct buried conduit.

All lengths of HDPE conduit shall be connected with irreversible fusion couplings. Mechanical and removable couplings will not be accepted.

All lengths of PVC conduit shall be connected by one conduit end fitting inside the flared end of the other conduit section. If this is not possible, then a coupling may be used. Regardless of how connection is made, all joints shall be sealed with the appropriate epoxy to ensure that the two conduit pieces bond to one another to form a solid waterproof link. Using conduit tools, the conduit shall be cut and prepared. If approved by the Engineer, a coupler module may be used where conduit segments do not align properly to allow the flared end of one conduit segment to mate with the normal end of the other segment. Sealed end caps (with knockouts if empty) shall be placed on the ends of all conduits, after compressed air has been used to clear all foreign matter.

If not already pre-installed by the manufacturer, a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

All PVC and HDPE conduits shall have a continuous metallic trace wire installed for the entire length of the conduit run for all fiber installations.

Installation Of Conduit Under Existing Pavement, Directional Bore -

Directional bore shall be used for installation of conduits under existing pavement with a conduit diameter not less than 1-1/2". The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch. If it does, cement grout shall be pumped into the void. **Only HDPE and/or Galvanized Steel conduit may be installed by Directional Bore methods.**

Installation Of Conduit Under Existing Pavement, Open Cut -

Installation by sawcutting the full pavement depth and removing the existing pavement with an excavator or by hand methods, shall be used only for conduits not less than 1-1/2" diameter. The Engineer must first approve all open cutting of roadways. The width and length of open cut and patch restoration materials shall be as shown on the plan details. The Contractor shall be responsible for the removal of all cut pavement and surplus excavation, and for the replacement and correction of any damaged pavement outside the sawcut limits after the conduit(s) are installed. Asphalt pavement, concrete, base course, sawcutting, and/or borrow from an outside source as required to restore the roadway will be paid for separately under their respective bid items.

Installation Of Conduit Under Existing Pavement, Unpaved Trench -

Trenching or other approved method shall be used for installation of conduit in unpaved trench or under new pavement. Backfill in conduit trenches shall be compacted thoroughly as it is being placed. At the discretion of the Engineer, sod, that must be removed for the placement of conduit, shall be removed either by the use of an approved sod cutter and then replaced, or 6 inches of topsoil shall be placed and the surface seeded in accordance with Section 734001 - Seeding. In areas where new pavement is to be placed or in areas where total reconstruction is taking place, sodding or seeding may not be required by the Engineer.

Sodding and/or topsoil from an outside source if required will be paid for separately under their respective bid items. Seeding is considered incidental to the conduit item.

Installation Of Conduit On Structure -

Conduit installed on structure shall consist of placing conduits inside communication conduit hanger under Bridge No 678 and through steel casing in abutment walls as shown on bridge plan sheets.

Installation of Nonmetallic Riser Shield or Flexible Metallic Liquidtight Conduit -

Riser Shield and/or Flexible Metallic Liquidtight Conduit installed on wood poles, metal poles, structures, and/or mast arms shall be installed in a straight line. The conduit, when attached to poles, shall be attached with 2-hole straps spaced not more than 36 inches apart with the top-most strap being 12 inches from the weatherhead and the lower-most being 12 inches from the conduit. A weatherhead matching the diameter of the conduit shall be installed on the upper end of the conduit. A conduit of the same size as the conduit being installed, but not smaller than 2 inches shall be placed 48 inches above finished grade. Install two, 2-hole straps of the proper size, evenly spaced below the conduit. Nonmetallic pole risers (U-guard) shall be installed on poles to allow interduct to be connected directly to messenger cable. The underground conduit shall be as close to the base of the pole as possible. If the nonmetallic pole riser or metallic liquidtight conduit is not the same size as the conduit, an adapter shall be used at no additional cost to the Department.

The nonmetallic pole riser or metallic liquidtight conduit shall be attached to the pole with 1/4" x 1-1/2" galvanized lag bolts with washers. Lag bolts will be used every 36 inches on BOTH sides of the nonmetallic pole riser or liquidtight conduit, and in the top most and bottom most set of slots. Flexible metallic liquidtight conduit shown on the plans to be installed on mast arms or on metal structure shall also include stainless steel banding placed at a maximum of 5 feet intervals.

Method of Measurement:

The quantity of conduit or riser shield installed as specified, shall be measured as the number of linear feet of each conduit or riser shield installed as specified, complete in place, and accepted.

The length of each conduit installed under existing pavement by a directional bore or by open cutting the pavement shall be measured along the path of the bore or open cut, from the point that cannot be trenched to the point that trenching can resume.

The length of any conduit that is reduced or divided (with a junction well or conduit body) shall be measured as part of the larger conduit.

Basis of Payment:

The quantity of conduit or riser shield will be paid for at the Contract unit price per linear foot. Price and payment shall include full compensation for furnishing all conduit and/or riser shield materials, equipment, labor, and incidentals necessary to complete the item.

For conduit installed by Directional Bore, the linear foot payment also includes excavation and backfilling for Bore Equipment, placing the conduit, caps if required, and all other requirements and incidentals listed in the body of this specification.

For conduit installed by Open Cutting existing pavement, the linear foot payment also includes excavating, backfilling, placing the conduit, disposal of excess materials, and all other requirements and incidentals listed in the body of this specification.

For conduit installed in an Unpaved Trench, the linear foot payment also includes excavating, removal of sod if required, backfilling, placing the conduit, disposal of excess materials, replacing excavated on-site sod if required, seeding if required, and all other requirements and incidentals listed in the body of this specification. Sod and/or topsoil furnished from an outside source, will be paid for separately.

For conduit installed on a structure, the linear foot payment also includes placing the conduit inside communication conduit hanger under Bridge No 678 and through steel casing in abutment walls and all other requirements and incidentals listed in the body of this specification.

For riser shield or flexible metallic conduit installed on poles, mast arms, or structures the linear foot payment also includes furnishing and installing straps, weatherhead, conduit, lag bolts and washers, any other required mounting hardware, and all other requirements and incidentals listed in the body of this specification.

12/23/14

746507 – INSTALLATION OF STEEL POLE (LESS THAN 40’)
746528 - INSTALLATION OF STEEL POLE (EQUAL TO OR GREATER THAN 40’)
746697 - INSTALLATION OF WOOD POLE
746815 - INSTALLATION OF LUMINAIRE
746831 - INSTALLATION OF PEDESTAL POLE
**746928 – INSTALLATION OF STEEL MAST ARM POLE WITH SINGLE OR TWIN MAST
ARM UP TO 70’**
746942 - INSTALLATION OF LIGHTING POLE WITH ARM AND LUMINAIRE

Description:

This work consists of installing the specified type of pole on an existing pole base (or ground mounted for wood pole) in accordance with the locations, notes, and details on the Plans and as directed by the Engineer.

Materials:

Unless specified otherwise, the steel mast arm(s), steel pole, pedestal pole, wood pole, lighting pole, luminaire, and all necessary hardware shall be furnished by the Department. These materials can be obtained from the Department's Dover Sign Shop. The Contractor shall inform the Department two working days prior to picking up the pole, and other related hardware. Where pole installation is part of the work of relocating an existing pole on a project, the pole and related hardware shall be that which is removed from the existing pole site.

Construction Methods:

General -

Prior to erecting a pole, the Contractor shall be sure that there is a sufficient length of anchor bolt to permit the anchor bolt to extend at least flush with the top of the top nut when that nut is tightened in place. If this condition does not exist, the Contractor shall not erect the pole and shall notify and await instructions from the Engineer.

Connection of the mast arm(s) or other required assembly shall be performed by the Contractor according to his selected installation methods.

The Contractor shall make special note of any aerial utilities within the area and coordinate his work accordingly.

All conduit caps or knockouts are to be removed from the conduit, which extends from the pole base and grounding insulated bushings installed. A #6 Copper ground wire shall be installed between the 3/4" ground rod clamp and the grounding insulated bushings, and to the lug or stud in the metal pole or pedestal. On the multi-section steel camera poles, the #6 copper ground wire shall continue up to the top of the upper section of the pole from the grounding insulated bushing to a bonding lug attached to the camera mounting bolts. At no time shall the #6 wire be installed between the leveling nut and the pole.

Steel Mast Arm Pole or Steel Pole –

The steel pole shall be erected by a suitable hoisting device as approved by the Engineer. The Contractor shall insure that the hoisting device is rated for the weight and reach necessary. The Contractor shall use the equipment to raise the pole into position, place the pole on the anchor bolts, and shall hold the pole in place until the nuts have been installed and tightened on the anchor bolts in accordance with the applicable Plan sheets or Standard Construction Details.

On all steel pole installations a proper nut as shown on the plan details shall be used under the base of the pole and a proper nut shall be used above the base of the pole. Once the pole is set, the anchor bolt nuts shall be adjusted and tightened to properly position the pole as indicated on the applicable Plan sheets or Standard Construction Details. Once the pole is set in place, properly canted, and the nuts tightened, and the ground wire connected, the area between the base of the pole and the top of the foundation shall be formed and grouted as indicated on the applicable Plan sheets or Standard Construction Details. The anchor bolt covers and hand hole cover shall be placed on the pole after the pole has been erected in place.

Pedestal Pole -

The pedestal pole shall be erected by hand. Once the pedestal is set in place, properly plumbed, the nuts tightened, and the ground wire connected, the contractor shall place the hand hole cover on the pedestal.

Wood Pole –

This work consists of installing wood poles with a butt plate and #6 bare copper ground wire from the butt plate to the top of the pole. A ground rod may be used in place of the butt plate. The pole shall be located as shown on the Plans and as directed by the Engineer. The pole shall be erected in a hole at least 6 feet deep or the height of the pole divided by 6, whichever is larger. The hole shall be dug in such a manner as to preclude over-sizing the diameter.

Sufficient earth shall be placed in the hole to fill it completely and provide a ridge around the hole after it has been properly filled. During refill, the earth shall be placed in layers not to exceed one foot and shall be well tamped with a power tamper.

The pole shall be set vertically in all directions, unless otherwise specified.

Copper coated fasteners shall be placed not more than 3 feet apart on the ground wire.

The ground rod, if utilized, shall be driven vertically into the ground, shall extend 4 inches above ground level and shall be fastened to ground wire with ground clamp. Ground rods shall be a minimum of 10 feet in length. Butt plates and/or ground rods will be incidental to this bid item. The Ground Wire will be paid for under its respective item.

Lighting Pole with Arm and Luminaire –

This work consists of installing lighting poles, arms and luminaires on an existing base.

Electrical connection of the luminaire is also included. To make the connection, the Contractor shall furnish the following materials:

- Connector kits shall be of waterproof, molded synthetic rubber suitable for burial in the ground or exposure to sunlight. The cable connection shall be compression type, applied by means of a compression tool. Connectors shall be 600-volt, fabricated from high strength copper alloy, quick disconnect, in-line connectors, fused for ungrounded conductor and non-fused for neutral at each pole.
- #8 AWG wire
- Split bolt connectors
- Electrical tape

These materials, other than the #8 wire, are to be included in the price bid for this item. The wire will be paid under its respective item. The unit shall be attached to the existing service cable and tested. On wood poles, if the service cable is not available, a 5 foot tail shall be left at the pole end of the mast arm. On metal poles, the electrical connections and grounding of pole will be made in the base. If the service cable is not available, a 5 foot tail shall be left in the pole base.

Installation of the pole and arm shall be as specified under **Steel Mast Arm Pole** above.

Installation of Luminaire –

This item includes picking up the luminaire unit at the DelDOT sign shop, transporting it to the specified location and installing it on an existing pole to provide a fully functioning overhead light. The materials for connecting the luminaire (as listed above under “**Lighting Pole with Arm and Luminaire**”) are also to be furnished as part of this item. These materials, other than the #8 wire, are to be included in the price bid for this item. The wire will be paid under its respective item. The unit shall be attached to the existing service cable and tested. On wood poles, if the service cable is not available, a 5 foot tail shall be left at the pole end of the mast arm. On metal poles, the electrical connections and grounding of pole will be made in the base. If the service cable is not available, a 5 foot tail shall be left in the pole base.

Method of Measurement:

The quantity of poles will be measured on a per each basis as the number of poles installed as specified, complete and accepted under the applicable bid item listed above. “Installation of Luminaire” will also be paid on a per each basis if the unit is being installed as a replacement or on a previously installed existing pole.

Basis of Payment:

General - Price and payment per each pole type shall include full compensation for picking up the materials at the DelDOT Sign Shop, transporting and setting the poles, and for all labor, tools, equipment, and incidentals necessary to complete the item.

Steel Mast Arm Pole or Steel Pole – In addition to the general statement, note that #6 Ground Wire will be paid for separately under its respective item. Any required fasteners for the ground are considered incidental to the Steel Pole being installed.

Pedestal Pole – As noted in general above

Wood Pole – In addition to the general statement, payment includes excavating the hole, furnishing and installing the butt plate or ground rod, and furnishing and installing fasteners for the ground wire.

Lighting Pole with Arm and Luminaire – In addition to the general statement, payment includes furnishing the listed materials, connecting, and testing the luminaire to result in a fully functioning light pole assembly. #8 wire will be paid for separately under its respective item.

Installation of Luminaire – This item includes picking up a luminaire, furnishing the listed materials, transporting, installing, and testing each luminaire. The item will be used for payment only when the luminaire is being installed as a replacement and/or on a previously installed pole. Luminaires installed as part of an entire light pole assembly are included for payment under the item titled “**Lighting Pole with Arm and Luminaire**” (Item 746942).

2/29/12

746511 - CABLES, 1/#4 AWG
746512 - CABLES, 1/#6 AWG
746513 - CABLES, 1/#8 AWG
746514 - CABLES, 1/#10 AWG
746515 - INSULATED GROUND CABLE, 1/#6
746527 - CABLES, 1/#2 AWG
746543 - CABLES, 1/#9 AWG
746546 - CABLES, 1/#12 AWG
746564 - INSULATED GROUND CABLE, 1/#4
746565 - CABLES, 1/#3/0 AWG
746566 - CABLES, 1/#1 AWG
746567 - CABLES, 1/#1/0 AWG
746577 - INSULATED GROUND CABLE, 1/#8
746598 - INSULATED GROUND CABLE, 1/#2
746605 - INSULATED GROUND CABLE, 1/#10
746622 - CABLES, 1/#4/0 AWG
746658 - INSULATED GROUND CABLE, 1/#1/0
746690 - INSULATED GROUND CABLE 1/#12
746817 - CABLES, 1/#2/0 AWG
746861 - INSULATED GROUND CABLES, 1/350 KCMIL

Description:

This work consists of furnishing all cables of the size(s) required by the Contract in accordance with the notes and details shown on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

All wire(s) to be used in this contract shall be manufactured in conformance with the National Electrical Code, insulated for 600 volts, and be of the type USE and/or RHW.

Method of Measurement:

The quantity of cables will be measured as the number of linear feet (linear meters) of each size along the longitudinal axis of each cable.

Basis of Payment:

The quantity of cables will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing the cables.

No separate payment will be made for furnishing the connector kits with #10 AWG wiring of the type as indicated on the plan for the lighting standards as shall be included in the items for lighting standards.

9/09/2010

746519 - ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE

Description:

The work consists of furnishing and installing Aluminum Lighting Standard with Single Davit Arm in accordance with the details on the Plans, and/or as directed by the Engineer to make a functional street lighting system. The foundation, breakaway transformer base, davit arms and luminaires will be provided under other items in the contract.

Materials and Construction Methods:

All materials shall be of the best quality and free from all defects. No materials shall be installed until approved by the Engineer. Any material not specifically covered in these specifications shall be in accordance with accepted standards and as directed by the Engineer. Any materials deemed unsatisfactory by the Engineer, shall be replaced by the Contractor.

Lighting standards shall meet or exceed the requirements of the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" based on 90 mph (145 km/hr) wind loads, luminaire weight of 70 lb (32 kg) and luminaire projected area of 3 ft² (0.3m²). Computations confirming conformance with AASHTO Specifications, with the year of the edition specified, shall be submitted to the Delaware Department of Transportation.

All electrical materials shall conform to the requirements of the National Electrical Code of the national Fire Protection Association, and shall conform to all local and special laws and/or ordinances governing such installations. Where these requirements do not govern, and where not otherwise specified, electrical materials shall conform to the Standardization Rules of the Institute of Electrical and Electronic Engineers.

Shop drawings and catalog cuts for all electrical and related materials shall be submitted by the Contractor for approval.

The bolts are to be supplied by the Contractor. The bolts will be installed using a template, and set so that luminaire arm is perpendicular to the roadway.

Anchor bolts, nuts, couplings, washers, and cap screws shall be of carbon steel conforming to the requirements of ASTM A307, and hot-dip galvanized in accordance with AASHTO M 232/M 232M..

New aluminum lighting standards shall consist of a tapered aluminum shaft having a base welded to the lower end. The pole shaft, pole extensions, and davit arms shall each be spun from one piece of seamless tubing, the strut and arm plates shall be extruded, all of which conform to the requirements of ASTM B221 aluminum alloy 6063-T6. The shaft shall have no circumferential welds, except at the lower end joining the shaft to the base and shall conform to the dimensions listed in the chart below. The shaft shall contain an internal vibration dampening device positioned approximately 2/3 the height of the pole. The top of the lighting standard shaft shall be drilled for two 1/2" (13 mm) lockbolts to secure the davit bracket to the lighting standard shaft. If the pole is not placed on a transformer base, it will have one 3" x 5" (75 mm x 125 mm) handhole which after pole is set should face so that maintainer may view oncoming traffic.

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
30' (9 m)	10' (3.0 m)	10" (250 mm)	0.156" (3.96 mm)
	12' (3.6 m)	10" (250 mm)	0.156" (3.96 mm)
	15' (4.6 m)	10" (250 mm)	0.156" (3.96 mm)

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
	20' (6.1 m)	10" (250 mm)	0.156" (3.96 mm)
35' (10.5 m)	10' (3.0 m)	10" (250 mm)	0.156" (3.96 mm)
	12' (3.6 m)	10" (250 mm)	0.156" (3.96 mm)
	15' (4.6 m)	10" (250 mm)	0.156" (3.96 mm)
	20' (6.1 m)	10" (250 mm)	0.188" (4.78 mm)
40' (12 m)	10' (3.0 m)	10" (250 mm)	0.188" (4.78 mm)
	12' (3.6 m)	10" (250 mm)	0.188" (4.78 mm)
	15' (4.6 m)	10" (250 mm)	0.188" (4.78 mm)
	20' (6.1 m)	10" (250 mm)	0.219" (5.56 mm)
45' (13.5 m)	10' (3.0 m)	10" (250 mm)	0.188" (4.78 mm)
	12' (3.6 m)	10" (250 mm)	0.188" (4.78 mm)
	15' (4.6 m)	10" (250 mm)	0.188" (4.78 mm)
	20' (6.1 m)	10" (250 mm)	0.250" (6.35 mm)

Bracket arms shall be of the davit type consisting of an aluminum shaft having the outer diameter and wall thickness as listed in the table above. The davit arm shall be designed to slip over the top of the lighting standard shaft for a distance of at least 12" (300 mm). The luminaire end of the davit arm shall be fitted with a 2" (50 mm) NPS aluminum pipe not less than 6" (150 mm) long. The height of the lighting standards will be determined by the Contractor to provide a nominal mounting height as shown on the Plans. The length of the davit arm will be as shown on the Plans.

Each lighting standard shall be provided with a permanent tag which shall be 2" x 4" (50 mm by 100 mm) fabricated from clear anodized 1/16" (1.6 mm) thick aluminum. The edge shall be smooth and corners rounded and the tag shall be curved to fit the light standard shaft. Tags shall be secured to shafts by means of four (4) 1/8" (3 mm) diameter 18-8 stainless steel round head drive screws of self-tapping screws. The embossed identifying letters and/or numerals shall be not less than 3/4" (19 mm) high with stroke of not less than 3/16" (4.8 mm). Identifying letters and/or numerals shall be designated on the Plans.

Installations of Lighting Standards: Lighting Standards shall be installed and located in accordance with the Plans, to provide continuously aligned lighting.

The bracket arms shall be set perpendicular to the edge of the roadway unless otherwise ordered or specified. If necessary aluminum shims may be used to plumb the pole.

Method of Measurement:

The quantity of aluminum lighting standards with single davit arms of the size(s) specified will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of aluminum lighting standards with single davit arms will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials including concrete, labor, equipment, hardware, anchor bolts, washers, shims and nuts, and supply and installation of poles. This price will also include all miscellaneous hardware, connector kits, and wiring from the supply cables to the luminaire(s), labor, tools, equipment, and incidentals necessary to complete the work. Davit arms will be paid separately by Item Numbers 746888 – Aluminum Lighting Single Davit Arm (8’ Arm Spread), 746889 – Aluminum Lighting Single Davit Arm (12’ Arm Spread) & 746890 – Aluminum Lighting Single Davit Arm (15’ Arm Spread). Luminaires will be paid separately by Item Number 746594 – Luminaire (HPS), 250 Watts. Transformer Base will be paid separately by Item Number 746650 – Aluminum Transformer Base. Pole bases will be paid separately by Item Number 746852 – Pole Base, Type 6.

3/10/14

746538 - BRIDGE ELECTRICAL SYSTEM

Description:

This work consists of furnishing and installing rigid galvanized steel conduit, PVC conduit, fittings, junction boxes, PVC sleeves and caps as shown on the Plans, as specified herein, and/or as directed by the Engineer.

Materials:

Lighting - Galvanized Steel Conduit – 1” diameter, rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

Lighting /ITMS - Galvanized Steel Conduit – 2” diameter, rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

ITMS - PVC Conduit - 4" schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

RWIS (Road Weather Information System) Conduit – 1” diameter PVC Conduit, Schedule 80

Junction Boxes - shall meet ANSI Specifications, U.L. requirements and listed as raintight and shall accommodate the size and number of conduits shown on the Plans. Junction boxes/wells shall be galvanized steel alloy and constructed to the size indicated.

PVC Sleeves – 6” Schedule 80 with cap

Shop drawings and/or catalog cuts for the above listed materials shall be submitted to the Engineer for approval.

Construction Methods:

Prior to placing the concrete bridge deck, the Contractor shall install 1 only 6 inch PVC sleeves in the deck at the location of the weather sensor. Drill a hole in each sleeve to accept a 1 inch PVC conduit tied to the bottom of the top rebar mat. The 1 inch PVC conduit shall extend from the sleeve to a 9” x 9” x 6” junction box in the parapet face (from sleeve to the Junction Box). A pull wire shall also be installed to facilitate wire installation through the conduits by others. The top of each PVC sleeve shall be capped to avoid concrete intrusion and shall be clearly marked following deck concrete placement so that it can be avoided during deck grooving operations and easily located by the weather sensor installer. DelDOT’s Traffic Signal Construction manager (or representative) shall be contacted to review the RWIS conduit system set up prior to placing any deck concrete.

Prior to placing the Parapet Wall concrete, the Contractor shall extend the 1" inch PVC conduits for the RWIS system to the 9" x 9" x 6" Junction Box. 1 EA 2" Galvanized Steel conduit and 1 EA 4” PVC conduit for the ITMS system shall be installed from that Junction Box through the parapet, sweeping under the approach slab and exiting to the junction wells located outside the Bridge. In addition, 1 EA 2” Galvanized Steel conduit for the lighting system shall be installed in the parapet wall for the entire length of the structure. The 2" Galvanized Steel conduit for lighting shall also sweep out of the parapet, under the approach slab, and exit to junction wells located outside the Bridge at both ends of the structure. The 24" x12" x8" and 12" x10" x 8" Junction Boxes to access the ITMS (4" and 2" conduits) and lighting (2" conduit) systems respectively, shall be spaced as shown in the plans and at intervals not to exceed 300 feet. The 1" diameter galvanized conduit shall extend from the 12" x10" x 8" Junction boxes to the top of the parapet at the light locations. All conduits shall include a pull wire for future cable installation. Junction boxes in the bridge shall be positioned to avoid any fence posts and/or Guardrail to Bridge attachments and shall be flush with the front face of the parapet wall. Conduits exiting the structure shall be positioned to avoid all guardrail posts.

Prior to placing approach slab and/or sleeper slab concrete, all conduits exiting the bridge must be installed beneath the concrete including any necessary sweeps to properly enter the Junction Well outside of the structure.

Method of Measurement:

The quantity of bridge electrical system will not be measured.

Basis of Payment:

The quantity of bridge electrical system will be paid for at the lump sum bid price. Price and payment will constitute full compensation for furnishing and installing the required 1" and 2" rigid galvanized steel conduits and 4" PVC conduit within the parapet walls, extending to the Junction Well(s) located outside the structure; 1" PVC conduit, 6" PVC sleeves with caps, fittings, conduit sweeps, junction boxes in the parapet wall, pull wires within all conduits, and for all labor, equipment, tools, and incidentals required to complete the work. All wiring inside the conduits will be performed by others. Junction Wells located outside the structure will be paid for separately under their respective bid item.

2/12/14

746594 - LUMINAIRE (HPS) 250 WATT

Description:

This work consists of furnishing and installing 250 watt high pressure sodium fixtures on poles, in accordance with these specifications and as shown on the Plans.

Materials:

The complete luminaire shall be a 250 watt high pressure sodium type powered from a nominal 120 or 240 volt, 60 hertz source. The luminaire shall have a heavy-duty die-cast aluminum housing with an electrocoat gray finish and a hinged and removable door assembly with a heat/impact resistant glass prismatic lens. The luminaire shall be provided with internal two-inch slipfitter mounting and photocell control. The ballast shall be a multi-tap (120/208/240/277 volt) auto-regulating type, capable of starting and operating the lamp down to temperatures of 78 F (28 C). The optical assembly shall be sealed with a perimeter gasket and activated charcoal filter.

The fixture shall have medium, cutoff NEMA Type 3 distribution and shall be General Electric Catalog Number MSCL-25-S-0-M-2-G-MC3-C or approved equal.

Method of Measurement:

The quantity of 250 watt (HPS) luminaires will be measured as the actual number of luminaires provided complete in place and accepted.

Basis of Payment:

The quantity of 250 watt (HPS) luminaires will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, and for all labor, tools, equipment, and incidentals necessary to complete the item installation.

3/10/14

746650 - ALUMINUM TRANSFORMER BASE

Description:

This work consists of furnishing and installing aluminum transformer base, including furnishing all materials, in accordance with this specification, plans, project notes, drawing details, and as directed by the Engineer.

Materials:

The Transformer base shall be cast aluminum, with dimensions adhering to drawings details on the Plans.

Material installation requirements shall include all accessories necessary for transformer base installation, including anchor bolts and other hardware, in accordance with manufacturer's recommendations and AASHTO guidelines.

Materials to be supplied and installed shall include new lock washers, fasteners, and all other connection hardware requirements as necessary to connect the pole to the metal transformer base, and to connect the metal transformer base to the concrete pole base.

Construction Methods:

Transformer bases installed for support of light poles shall conform with breakaway requirements of most recent version of AASHTO Roadside Design Guide and all other applicable AASHTO publications. Before commencement of work, the Contractor shall submit documentation for approval by DelDOT showing the design for the transformer base meets the current AASHTO Breakaway Design requirements.

For breakaway installations, the light pole standard shall electrically disconnect from the supply wire at the foundation when struck by vehicle or other collisions.

Transformer bases shall conform to the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaire and Traffic Signals".

Method of Measurement:

The quantity of cast aluminum transformer bases shall be measured as the actual number of transformer bases furnished, installed and accepted.

Basis of Payment:

The quantity of cast aluminum transformer bases shall be paid at the Contract unit price per each transformer base furnished and installed. Price and payment shall constitute full compensation for, furnishing and installing transformer base, all bolts, connection hardware and other accessories required for installation. Price and payment shall constitute full compensation for and all materials, labor, equipment, tools and incidentals required to complete the work, and for removal and reinstallation of existing pole and mast arm.

02/01/09

746843 - POLE BASE, TYPE 1
746844 - POLE BASE, TYPE 2
746845 - POLE BASE, TYPE 2A
746846 - POLE BASE, TYPE 2B
746847 - POLE BASE, TYPE 3
746848 - POLE BASE, TYPE 3A
746849 - POLE BASE, TYPE 3B
746850 - POLE BASE, TYPE 4
746851 - POLE BASE, TYPE 5
746852 - POLE BASE, TYPE 6

Description:

This work consists of constructing and furnishing round or square pole bases Types 1, 2, 2A, 2B, 3, 3A, 3B, 4, 5, and 6 for poles in accordance with the Standard Construction Details and at locations as directed by the Engineer.

Materials:

The concrete for pole bases shall conform to Section 812, Class B.

Bar reinforcement shall meet the requirements of Section 603 Grade 60.

Ground rods shall be copper clad, approved by the Underwriter's Laboratory and be supplied with approved clamps for connecting the grounding conductor to the rod.

Conduit for sweeps shall meet the requirements for galvanized rigid steel conduit in Section 745.

Anchor bolts will be supplied by the same entity that supplies the poles. This is the case for all poles base types, with the exception of Type 4. For Type 4, drop-ins are used for breakaway and the Contractor will supply the anchor bolts for Type 4. The anchor bolts and nuts for Types 5 and 6 shall not be hot-dipped galvanized and these anchor bolts and nuts shall meet the requirements of AASHTO M 314. Anchor bolts shall have a minimum yield strength of 55,000 psi (380,000 kPa).

Construction Methods:

The bases shall conform to the dimensions as indicated on the Standard Construction Details. A ground rod shall be installed as shown. A minimum of 8 feet (2.5 m) of the ground rod must be driven into undisturbed soil.

If a utility or a right-of-way conflict is found when a Type 2 or Type 3 base is specified in the Plans, an alternate base of equivalent strength may be used as directed by the Engineer. A Type 2 base has two equivalents, namely Types 2A and 2B. A Type 3 base has two equivalents, namely Types 3A and 3B.

Though the contract calls for the use of a round pole base, the Contractor may use a square base at its discretion.

The end of the conduit sweeps in the ground shall be extended outside the concrete and any forms or sheeting by 12 inches (300 mm) and capped or connected to the existing conduit. If the conduit is to be capped underground for future use, it must be sealed with a galvanized threaded conduit plug. Tape is NOT an approved conduit plug. The location of the conduits shall be marked on the base with arrows drawn in the wet concrete within 6 inches (150 mm) of the outer edge.

Excavation for the pole bases may not exceed the dimension of the foundation by more than 12 inches (300 mm) in any one direction. If a form is used in the excavation more than 18 inches (450 mm) below the ground surface, it is necessary that the area between the form and excavation be filled with Borrow Type C and tamped on all sides in continuous, horizontal layers not to exceed 68 inches (200150 mm) in depth, loose measurement.

Where a pole base is to be placed in existing concrete pavement such as a sidewalk, the concrete shall be saw cut in a square pattern or removed to the nearest joint. In other pavement material, a round hole may be cut using an appropriate tool. Any damage to the existing pavement shall be repaired at the Contractor's expense and shall meet the approval of the Engineer. Any removal or replacement of any type of pavement under this item shall be an incidental cost to this item.

The bases shall be edged and have a broom finish.

Where water or highly unstable material is encountered during the excavation for the pole base, pole base sheeting may be required and the following steps shall apply:

1. The condition exists in the upper half of the excavation. Stop all work until the Bridge Design Section reviews the condition.
2. The condition exists below the upper half of the excavation:
 - a. For a proposed Type 4 Base, increase the depth to 4 feet (1.2 m).
 - b. For a proposed Type 5 Base, substitute a Type 1 Base.
 - c. For a proposed Type 1, 2, or 3 Pole Base, substitute a Type 3A Pole Base for all but a Type 3B Pole Base. The depth of the base shall be as determined in (e) below, or 9 feet (2.7 m), whichever is greater.
 - d. For a proposed Type 6 Pole Base, substitute a Type 2 Pole base and increase the depth in accordance with (e) below.
 - e. Determine the depth of the base, which would be in the unsatisfactory area. Multiply that depth by 0.7 and add the result to the original required depth of the base to obtain the final depth of the base. The reinforcing bars shall be extended using the required pattern to match the final depth in accordance with the requirements of Section 603.07 of the Standard Specifications.

Method of Measurement:

The quantity of pole bases will be measured as the actual number of bases constructed, complete in place and accepted. Concrete, excavation and backfilling around the base, ground rods, and the two conduit sweeps in the base are included in this item.

Furnishing Borrow Type C backfill material will be measured and paid for separately by the cubic yard (cubic meter).

Payment for any additional sweeps shall be paid for separately under the appropriate conduit items. The Contractor's use of square base rather than a specified round base shall not result in any additional cost to the Department.

Basis of Payment:

Borrow Type C will be paid for under Section 210. No payment for Borrow Type C backfill material placed outside of the vertical plans located 18" (450 mm) outside of the neat line perimeter of the vertical face of the pole base foundation.

Any increase in the vertical dimension required herein shall be paid for separately under Item 746614, Pole Base Extension; another item of this contract.

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The quantity of pole bases will be paid for at the Contract unit price for each pole base type. If an alternate pole base type is selected by the Engineer, payment will be the Contract unit price for the alternate selected. Price and payment will constitute full compensation for furnishing and placing all materials including concrete, ground rods, and a minimum of two conduit sweeps extending into the base; for excavating, backfilling and compacting around the base; for repairs to damaged existing pavement; for removal or replacement of pavement; and for all labor, equipment, tools, and incidentals required to complete the work.

3/1/12

746886 - REMOVAL OF METAL TRANSFORMER BASE

Description:

This work consists of removal and transport of metal transformer base (or metal anchor base), as directed by the Engineer, and in accordance with the Plans and Project Notes. The transformer base (or anchor base) must be detached and removed from existing concrete foundation. All connection hardware associated with the metal transformer base shall be removed and transported in tact, without damaging the hardware during removal process.

Materials:

The metal transformer base (or anchor base) shall be furnished by the Department. The metal transformer base shall be existing and presently mounted to concrete foundation.

Construction Methods:

Removal Methods:

The service cable shall be disconnected and the wires removed from the transformer base. The ground wire shall be disconnected.

The metal transformer base and all connection hardware shall be transported to one of the following locations as directed by the Engineer, or as shown on the Plans:

- 1) Transport to new position along roadway, to be staged for reinstallation. On-site staging area may not be available at proposed location of metal transformer base. Therefore, all costs for temporary staging at remote location, and multiple handling of material items shall be included in this pay item.

Or,

- 2) Transport to DelDOT Maintenance Facility located at 39 E. Regal Blvd, Newark, Delaware 19711. The material items shall remain the property of DelDOT,

Method of Measurement:

The quantity of transformer bases will be measured as the number of metal transformer bases removed and transported, including all connection hardware, in accordance with these specifications.

Basis of Payment:

The quantity of metal transformer bases will be paid for at the Contract unit price per each removed and transported, including all associated connection hardware. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

01/22/09

746887 - INSTALLATION OF METAL TRANSFORMER BASE

Description:

This work consists of installation of metal transformer base (or metal anchor base), as directed by the Engineer, and in accordance with the Plans and Project Notes.

Materials and Construction Methods:

The metal transformer base (or anchor base) shall be furnished by the Department.

All connection hardware required for installation of the metal transformer base shall be furnished and installed by the Contractor.

The metal transformer base (or anchor base) shall be connected to a concrete pole base as shown in drawing details for this Contract, and as approved by the Engineer. The electrical service cable shall be connected through the pole base and metal transformer base.

Method of Measurement:

The quantity of transformer bases will be measured as the number of metal transformer bases installed, including all connection hardware, in accordance with these specifications.

Basis of Payment:

The quantity of metal transformer bases will be paid for at the Contract unit price per each installed, including all associated connection hardware. Price and payment will constitute full compensation for all labor, equipment, tools, connection hardware, and incidentals required to complete the work.

01/22/09

746888 - ALUMINUM LIGHTING SINGLE DAVIT ARM, 8' ARM SPREAD
746889 - ALUMINUM LIGHTING SINGLE DAVIT ARM, 12' ARM SPREAD
746890 - ALUMINUM LIGHTING SINGLE DAVIT ARM, 15' ARM SPREAD

Description:

The work consists of furnishing and installing Aluminum Lighting Single Davit Arms in accordance with the Contract Details, as shown on the Plans, and/or as directed by the Engineer to make a functional roadway lighting system.

Materials and Construction Methods:

All materials shall be of the best quality and free from all defects. No materials shall be installed until approved by the Engineer. Any material not specifically covered in these specifications shall be in accordance with accepted standards and as directed by the Engineer. Any materials deemed unsatisfactory by the Engineer, shall be replaced by the Contractor.

Lighting davit arms, used in conjunction with lighting poles specified under separate special provisions in the Contract, shall meet or exceed the requirements of the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" based on wind loads applicable for New Castle County. Computations confirming conformance with latest edition of AASHTO Specifications, with the year of the edition specified, shall be submitted to the Delaware Department of Transportation for approval.

The davit arms shall each be spun from one piece of seamless tubing, the strut and arm plates shall be extruded, all of which conform to the requirements of ASTM B221 aluminum alloy 6063-T6.

Nominal Luminaire Mounting Height	Nominal Davit Arm Spread	Outer Diameter at bottom of davit arm **	Wall Thickness
30'			
	12'	6" (bottom)	0.188"
	15'	6" (bottom)	0.188"

Arms shall be of the davit type consisting of an aluminum shaft having the outer diameter and wall thickness as listed in the table above. The luminaire end of the davit arm shall be fitted with a 2" (50 mm) NPS aluminum pipe with nominal length of 8 inches.

Shop drawings and catalog cuts for all electrical and related materials shall be submitted to DelDOT for approval.

Nuts, couplings, washers, and cap screws shall be of carbon steel conforming to the requirements of ASTM A307, and hot-dip galvanized in accordance with AASHTO M 232/M 232M.

Method of Measurement:

The quantity of aluminum lighting single davit arms will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of aluminum lighting single davit arms will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and installing davit arm, including all materials, labor, equipment, washers, shims, nuts, and all other connection hardware necessary for the supply and installation of davit arm(s). The price will also include all miscellaneous hardware, labor, tools, equipment, and incidentals necessary to complete the work.

11/2/11

- 746906 - FURNISH & INSTALL 4-CONDUCTOR #18 AWG SHIELDED OPTICOM CABLE**
- 746907 - FURNISH & INSTALL 1-CONDUCTOR #2 AWG STRANDED COPPER**
- 746908 - FURNISH & INSTALL 1-CONDUCTOR #4 AWG STRANDED COPPER**
- 746909 - FURNISH & INSTALL 1-CONDUCTOR #6 AWG STRANDED COPPER**
- 746910 - FURNISH & INSTALL 1-CONDUCTOR #8 AWG STRANDED COPPER**
- 746911 - FURNISH & INSTALL 1-CONDUCTOR #10 AWG STRANDED COPPER**
- 746912 - FURNISH & INSTALL 1-CONDUCTOR #14 AWG STRANDED COPPER**
- 746913 - FURNISH & INSTALL 2-CONDUCTOR #14 AWG ALUMINUM SHIELDED COPPER**
- 746914 - FURNISH & INSTALL #6 BARE STRANDED COPPER GROUND**
- 746915 - FURNISH & INSTALL #8/2 WIRE UF W/GROUND**
- 746916 - FURNISH & INSTALL #8/3 WIRE UF W/GROUND**
- 746918 - FURNISH & INSTALL #2/0 AWG STRANDED COPPER**
- 746919 - FURNISH & INSTALL #4/0 AWG STRANDED COPPER**
- 746920 - FURNISH & INSTALL 14/4 TRAFFIC CONTROL CABLE**
- 746921 - FURNISH & INSTALL 14/9 TRAFFIC CONTROL CABLE**
- 746922 - FURNISH & INSTALL 14/16 TRAFFIC CONTROL CABLE**

Description:

The pay items listed above include furnishing, installing, and splicing if approved, the various types and sizes of cable in conduit, or overhead and lashed to a span wire. All conduit installation will be paid for under their respective items.

Materials:

Cable - All electrical cables shall be manufactured in conformance with the National Electrical Code, 600-Volt, UL approved.

1. Stranded or solid, single conductor copper cables shall be XLP Insulated; USE or RHW rated
2. Type UF cable shall include ground and the number and size of conductors as shown on the plans. Use cable conforming to ANSI/UL 493.
3. 14/4, 14/9, 14/16 AWG Solid copper conductor Traffic Signal cable shall conform to IMSA Specification Number 19-1. Provide wire size and number of conductors as shown on the plans or as directed by the Engineer. Additional material requirements for Traffic Signal Cables are as follow:
 - a. If requested, the Contractor shall provide independent test results to verify specification compliance. Costs of testing are incidental to the Cable item being supplied.
 - b. All cables shall be supplied on reels with each reel containing one continuous length of cable.
 - c. Color code to be used as established by IMSA Specifications. In addition to IMSA, DelDOT requires that individual tracers contrast with the base color to allow easy identification between each base color and the same base color plus tracer.

To test for sufficient color contrast, remove the sheath for a length of 6 inches. All filler material and tapes shall be removed for the same length. All conductors of the same base color will be placed side by side and all other conductors will be hidden. The conductors will be held against a white or ivory surface and viewed from a distance of 6 feet. The base color, tracer, and tracer color must be identified within a period of three seconds after being placed in position. The same test for contrast will also be made for base colors. If either the base color or tracer color test fails, the material will be rejected.
 - d. The tracer line width shall not exceed 3/20 inch when measured perpendicular to the edge of the line. Also, the total width of tracer lines on a conductor may not be equal to or greater than one-half the total circumference of the conductor.

4. Aluminum Shielded Cable shall be shielded two conductor controlled capacitance cable enclosed in an aluminized polyester shield within a polyethylene jacket, rated to 600 volts. The two conductors are AWG # 14 stranded copper. Cable shall meet IMSA 50-2. Referred to as "Home-run Cable".
5. Opticom Cable – must meet the manufacturer's recommended specifications

Splicing Materials –

1. Insulating (rubber) tape shall be of the self-bonding type and shall be 3M Company, Inc. (Cat. No. 130C, 2228); Plymouth Rubber (Cat. No. 2212); Permacel (Cat. No. 253, P280), or an approved equal.
2. Jacket (plastic) Tape shall be of the waterproof type and shall be 3M Company, Inc. (Cat. No. 33); Plymouth Rubber (Cat. No. 3117); Permacel (Cat. No. P29), or an approved equal.
3. For overhead traffic control cable splices:
Wire Nuts – Ideal 74B or 76B, 3M Highland H-33, or approved equal

Cable Installation

Installation in Conduit:

This work consists of installing various types, sizes, and number of communications or electrical cable(s) in existing conduits, which may or may not contain an existing communications or electrical cable(s) or wire(s). Conduits may be located underground, within mast arms, on wood poles, or on metal poles.

The number of cables to be pulled through each conduit will be as shown on the plans or as directed by the Engineer.

Construction Methods:

All cable must be transported by and unreeled from a cable trailer(s). The laying of reels on the ground and subsequent removal of wire or cable from this position is prohibited. Avoid damaging cable insulation when removing cable from drums or reels, or during installation of the cable.

Hand pulling methods are required for conduit sizes of 1-1/2" or less and are **preferred** for all other sizes. Dynamometer is recommended for use when pulling other than by hand.

Prior to installation, **written approval by the Engineer is required** for the use of any power-assisted methods of pulling communications or electrical cable(s) or wire(s) into conduit. A short piece of material that will part if the strain exceeds the amount specified below shall be used between the pulling grip and the pulling medium, unless industry standards require less:

150 lbs. for all pulls up through 12 pair communications cable; and
300 lbs. for all larger cables

Any and all cable(s) pulled into any conduit without the use of an acceptable pulling grip, Kellems or equal, and without the use of a strain release element or by using methods which may have or did result in pulling forces in excess of strain release material, or using methods which may have or did result in pulling forces in excess of those set forth herein or prescribed by industry standards are **unacceptable**.

Any and all unacceptable cable(s) shall be removed and replaced with new cable(s) using correct methods at no cost to the Department.

The installation of cable(s) in existing conduits shall be accomplished by pulling the cable(s) through the conduits. If required, pulling lubricant of the type recommended by the cable manufacturer will be used. The cable(s) shall be prepared for pulling by reeling them from their respective reels as they enter the conduit

or by taking sufficient length from the reel(s) to comprise the set to be pulled. Care shall be taken to avoid damaging insulation and to eliminate any twists or kinks and to marry the cables in a straight lay. Care shall also be taken to prevent entry of moisture into the cable at all times during installation. Cable ends will be sealed using rubber tape and painted with a sealing type of waterproof compound until final splices are made.

The cable(s) shall be hand fed into the conduit. When, in the opinion of the Engineer, additional radius is required to prevent damage to the cable(s) a sleeve shall be used. There shall be no additional payment made for sleeves or their use.

Underground cable runs shall be started at one terminal point and shall be continuous without splices to the final terminal point except for "Home Run Cable" to "Loop Detector Wire". Opticom cable shall not be spliced in any application.

Additional cable(s) shall be left and arranged in a neat and orderly manner as noted:

1. When pulled through junction wells, 6 feet of copper cable, supported on cable rack assemblies
2. At the control box and other splice locations, 6 feet of cable, neatly arranged and laced with cable ties

When cable already exists in a conduit, the Contractor shall ensure that the placement of a fish does not damage or entangle the existing wire or cable(s). The lead end of a fish shall contain a blunt terminal. Bending and/or taping the end of the fish shall not be satisfactory nor shall any termination which contains rough edges or any sort of hook that might engage an existing wire or cable when the fish is extracted.

Where two or more wires occupy the same conduit, they shall be drawn in together and kept parallel to each other by means of a pulling head. Phase legs shall be arranged circumferentially and in sequence around the neutral wires.

All conduit ends shall be duct sealed after cable installations.

Installation on Span Wire Overhead:

This work consists of installing electrical cable on an existing span wire.

Construction Methods:

All electrical cable must be transported by and unreeled from a cable trailer(s). The laying of reels on the ground and subsequent removal of wire or cable from this position is prohibited. Avoid damaging cable insulation when removing cable from drums or reels, or during installation of the cable.

The electrical cable will not be spliced at the top of the pole but will continue on to be taped onto the span wire. The electrical cable shall be oriented so water will not run along its length and run into the steel pole. The electrical cable shall be installed on the underside of the span wire with no crossover or wraps around the span wire. The electrical cable shall be pulled tight without any kinks and the jacket (plastic) tape wrapped tight around the span wire and electrical cable at least six wraps every twelve to fourteen inches.

At each signal head location, there will be a loop of signal cable 36 inches long.

Splicing:

Traffic Control Cable and Single Conductor Stranded Wire :

General – Traffic signal cable splicing shall only be made above ground in pole hand-holes, transformer bases or on span wire at the signal head. Underground traffic control cable splices (except between loop detector wire and "home-run" cable) or splices in between conduit runs are prohibited. After cables have been installed and pending permanent splicing, the end of each section of cable in the control box and at all splice locations shall be carefully sealed, using rubber tape, and painted with a sealing type of waterproof

compound. The circuit number of all cables and wires shall be identified by color coded tape attached to each of the cables and wires in the control box and at all splice locations. The color coded tape shall be secured to the cable or wire with nylon cable ties. Any splices found to be faulty within 90 days of installation shall be remade at the Contractor's expense. Insulation from each conductor to be spliced shall be removed to expose ½ inch of copper. Use of any tool or method which might nick the conductor is prohibited. Each conductor not being spliced shall be inspected and trimmed so that the conductor does not extend beyond the insulation. After each conductor to be spliced is connected, all conductors both used and not used shall be returned to their original configuration before the insulation was removed and then sealed as specified.

Individual cables shall not extend beyond the splice of the last signal head for each signal phase.

Shielded Opticom cable shall not be spliced.

Shielded Aluminum Cable ("Home-Run cable") may be spliced only with the loop detector wire in a junction well. No splicing of the "home-run cable" outside of this junction well is permitted.

Overhead - Conductors to be electrically connected shall be placed side by side with the exposed copper aligned. The copper shall then be twisted clockwise with pliers until a good mechanical connection shall be effected. A proper size wire nut shall be installed and hand tightened. If necessary to cover all the copper, minor trimming may be done. The copper splice shall be 5/16 inch long when trimmed. Care shall be taken to ensure that no insulation is caught up in the copper area of the splice. It is essential that the splice be kept dry. Therefore, care must be taken during taping and by placement of the completed splice to prevent water from entering the splice between or around the cables.

1. **Termination of cable (Butt Splice)** - The sheath of each cable shall be removed as necessary. When all conductors to be joined have been completed, the splice shall be prepared for taping. The cables shall be placed in a butt position and all wires and wire nuts shall be positioned to ensure that no shorts exist and that the splice area is reduced to as small a diameter as possible. Taping shall begin with rubber tape two inches over the intact sheath. Taping shall proceed toward the other cable overlapping half of the tape width until a point two inches on the other cable sheath has been reached. Taping shall then be repeated in the other direction starting one tape width wider than the previous wrap. Where necessary to cover all areas of the splice, overlapping shall be increased. Every area of the splice shall have rubber tape at least four layers (two fully overlapped passes) deep. The rubber tape shall be covered with plastic tape applied in the same fashion.
2. **Taps or Tee Splices** - The sheath of the through cable shall be removed for a distance of 8 inches centered on the point of splice. The sheath of the branch cable(s) shall be removed for a distance of 4 inches. The through cable conductors which are to be joined to the conductors of the branch cable(s) are to be separated out from the others and cut. No other conductors shall be cut for any purpose. Depending upon the need, the branch cable(s) may be placed beside one of the through cables and the splicing proceed or the through cable may be doubled back so that the parts of the through cable and the branch cable(s) are placed side by side. When all conductors to be joined have been completed, the splice shall be prepared for taping. The cables shall be placed in approximately their final position and an inspection for shorts shall be made. After all wire nuts and wires are properly positioned, taping shall begin on the through cable 2 inches from the end for the sheath. It shall proceed with 1/2 inch width overlap across the splice area and onto the other through sheath for a distance of 2 inches. The taping shall start at the end point and return back across the splice to the branch cable(s). It shall proceed along the branch cable(s) and onto the sheath for a distance of one inch. A return along the branch back to the main cable shall be made and the remaining part of the splice shall be taped continuing as before. Every area of the splice shall have rubber tape at least four layers (two fully overlapped passes) deep. The cables shall be placed in their final position and taped with two fully overlapped passes of plastic tape. Plastic tape need not cover the interior areas covered by the rubber tape. The splice shall be placed so that the branch cable(s) enters the splice from below to prevent water from flowing along the branch cable(s) into the splice area.

3. **Termination End of Cable** – Dead ended cables shall have 3” of sheath removed. Each individual cable shall be rubber taped then bundled and re-taped with vinyl tape and coated with waterproofing compound.

Method of Measurement:

The quantity of cable will be measured as the actual number of linear feet of cable furnished and pulled through conduits (underground, in mast arms, or on poles) or installed on a span wire in accordance with these specifications, complete in place, and accepted.

All required cable slack left at termination points or in junction wells shall be measured as part of this item.

Basis of Payment:

The quantity of cable furnished and pulled through all conduit (underground, in mast arms, or on poles) or furnished and installed on a span wire will be paid for at the Contract unit price per linear foot of the applicable pay item. Splice installations and all costs related to the splice shall be incidental to the linear foot payment of the cable being spliced. Price and payment will constitute full compensation for all labor, equipment, tools, materials, material testing, splicing, taping, and incidentals required to complete the work as specified above.

5/7/12

746926 – FURNISH & INSTALL ELECTRICAL UTILITY SERVICE EQUIPMENT 120/240

Description:

Electrical service equipment consists of the equipment necessary to connect a utility company service to a traffic control device cabinet, lighting control cabinet, traffic monitoring station cabinet, or other traffic control device cabinet. Provide electrical service equipment at the phasing and amperage specified in the Contract Documents. This work includes coordinating the connection with the local utility company.

Materials:

Meter Sockets:

Provide either ringed or ringless type meter sockets as required by the utility company. If a meter is not required, provide a ringless socket with suitable shunts and a metallic cover plate. Provide stainless steel hardware for attaching the meter socket to a cabinet, wood post, or other structure.

Disconnect Switches:

Disconnect switches shall be NEMA standard KS 1-1990. The disconnect switch enclosure shall be Type 4 stainless steel, with external operating handle, enclosure cover interlock, and external switch mechanism handle with provisions for securing in both the ON and OFF positions by padlock. The switch mechanism shall be of heavy duty design with quick make, quick break type operations and visible blades.

The disconnect switch shall be fusible with integral fuse puller. Single phase disconnect switches shall have 2 poles with solid neutral and shall be rated at 240 Volts. Three phase disconnect switches shall have 3 poles with solid neutral and shall be rated at 600 Volts. The design of the neutral bar may be factory or field installable.

Construction Methods:

Utility Connection - Before any control equipment or material is ordered, arrange a meeting with the utility company representatives, Signal Construction Inspection representatives and the Engineer to establish a schedule for utility connections. Do not disconnect, de-energize, reconnect, tamper with, or otherwise handle any of the utility company's facilities. Make the utility service connection to the point of service supplied by the utility company. Make the necessary arrangements with the utility companies to ensure having needed utilities available at the time of turn on. Delays due to utility energization, connection, or disconnection will not be a basis for time extension. Report any difficulties in securing utility company services to the Engineer as soon as possible.

General Installation - Electrical Utility Service Equipment shall be installed per the standard construction or applicable plan details.

Measurement and Payment:

Electrical Utility Service Equipment will be measured and paid for at the Contract unit price per each at the phasing and amperage specified. The payment will be full compensation for the disconnect switch, meter socket, meter, shunts, cover plate, ground rods, wiring, conduit risers, elbows, conduit nipples and adapters, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Underground conduit will be measured and paid for separately under the applicable conduit item(s). Service lateral cable will be measured and paid for separately under the applicable cable item(s).

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Utility connection coordination with the utility company will not be measured, but the cost will be incidental to other pertinent items.

Utility company energizing, connection, and disconnection costs will be the responsibility of the Department.

2/29/12

746939 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE I

746940 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE II

746941 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE III

Description:

This work shall consist of pickup of DelDOT furnished materials, removal and/or returning of existing equipment, and maintenance of existing equipment as specified in the Contract Documents or as directed by the Engineer.

Materials:

Not applicable

Construction Methods:

Equipment Turn On - Notify the Engineer and Signal Construction Inspection representative at least 10 working days before completion of the project to allow DelDOT to install any additional traffic control device(s).

Notify the Engineer and Signal Construction Inspection representative five working days prior to the completion of the project to schedule a final inspection and turn-on.

Stakeout, with the Engineer and Signal Construction Inspection representative present, the proposed construction as indicated on the plan(s).

Pick-Up of Administration Furnished Materials - Notify the Signal Construction warehouse representative a minimum of 72 hours in advance of the anticipated pick up or delivery of materials. The Signal warehouse is located at:

14 Sign Shop Road
Dover, Delaware 19901
Signal Warehouse: Phone 302-760-2565

The Contractor shall be responsible for the transportation, labor, equipment, tools and incidentals necessary to obtain and load any DelDOT furnished materials.

Materials not furnished by DelDOT shall be furnished by the Contractor.

Removal and Disposal of Existing Material and Equipment - Removal of all structures as specified. Remove concrete foundations as specified. All holes caused by this removal shall be backfilled, compacted and restored to surrounding conditions.

Remove all existing abandoned junction wells or manholes shown on the plans, the holes shall be backfilled, compacted and restored to surrounding conditions. Cap and abandon conduit(s). The sidewalk where junction wells are removed shall be reconstructed to the nearest tooled joint or expansion joint.

Existing inductive loop detectors and magnetic detectors not shown on the plans shall be disconnected and or removed, all cables shall be removed from all conduit raceways, span wires, signal structures, junction wells and cabinets.

Remove any existing signalization cables within the intersections that have been disconnected or are unused. This includes removal from all conduit raceways, span wires, signal structures, junction wells and cabinets.

Dispose of all material not salvaged or returned. Non-galvanized green painted structures may contain lead and the contractor will be responsible for proper disposal of such material.

Storage of Materials - Materials shall be bundled, stored, and protected in conformance with the manufacturer's recommendations or as approved by the Engineer.

Return of Material to DelDOT – After their removal in the field, the following materials shall be returned to the DelDOT sign shop:

Traffic Signal Poles and Pedestrian Signal Poles, Pedestal Poles, Lighting Poles, Salvaged Cable, Controllers and Cabinet enclosures, Junction Well Frames and Lids, Signal Heads, Pedestrian Signal Heads, Opticom Detector Units, and Signs that were mounted on mast arms, poles, or structures.

Maintenance of Materials and Equipment - The maintaining agency will continue maintenance of any existing signals until the Contractor places new equipment into operation.

When the work requires adjustments to the traffic control devices to maintain the minimum DelDOT standards, the adjustments to the traffic control devices shall be made within 4 hours of verbal notification by the Engineer.

Existing signals shall remain in their original condition until the new signals have been completed, satisfactorily tested and its operation accepted by the Engineer.

Maintain all vehicular and pedestrian detectors in continuous operation. If any detector is damaged by the Contractor, it shall be replaced within 72 hours after notification by the Engineer.

All traffic signals and existing interconnect cable shall remain operational and actuated as specified in the Contract Documents. Plan the work to minimize interference with any existing traffic control device.

Measurement and Payment:

The Per Each payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work for a “Type I”, “Type II”, or “Type III” location as specified in the Contract Documents and defined below.

Equipment Turn On - Equipment Turn On will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

Pick-Up of Administration Furnished Materials - Pick-up of Administration furnished materials will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

Removal and Disposal of Existing Material and Equipment - Removal and disposal of concrete foundations, junction wells, structures, and all other specified equipment will be measured and paid for at the Contract Bid Item price for Remove and Dispose of Existing Materials Type I, II or III as follows:

Remove, and Dispose Type I -

Removal, return to DelDOT, and disposal of existing TCD material for minor signal modification, cables, junction wells, signal heads, signs and all other specified equipment. No concrete foundation removal is anticipated.

Remove and Dispose Type II -

Removal, return to DelDOT, and disposal of existing TCD material for signal modification, cables, junction wells, concrete foundations, structures, signal heads, signs and all other specified equipment. 2 to 4 concrete foundations and structures and/or cabinet removals are anticipated.

Remove and Dispose Type III -

Removal, return to DelDOT, and disposal of existing TCD material for full signal reconstruction, cables, junction wells, concrete foundations, structures, cabinets, signal heads, signs and all other specified equipment.

Maintenance of Existing Signal Equipment - Materials storage, cable sealing and handling, adjustments to maintain minimum DelDOT standards on existing signals made necessary by new signal or geometric modifications and Contractor repair of any damaged detector caused as a result of Contractor's error will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

3/1/12

747508 - LIGHTING CONTROL CABINET - 100A

Description:

This work consists of furnishing and installing a lighting cabinet and all necessary electrical equipment, as indicated on the Plans, Standard Construction details, or as directed by the Engineer.

Materials:

Cabinet

The service cabinets and doors shall have a minimum size of 44" wide by 48" tall by 25" deep (Type R).

The cabinets and doors shall be constructed from 5052-H32 sheet aluminum alloy with a thickness of 0.125". External welds shall be made by using Heliarc welding method, internal weld, may be made by the wire welding method. All welds shall be neatly formed and free of cracks, flow holes and otherwise irregularities.

The outside surface of the cabinet shall have a smooth uniform, natural aluminum finish. The cabinets shall have a sloped top to prevent accumulation of water on its top surface.

The enclosure door frame shall be double flanged out on all four sides. These flanges increase strength of opening and keep dust and liquids from dropping into enclosure when door is opened. The cabinet door shall be hinged on the right side when facing the cabinet and shall be a minimum 80% of the front surface area. The door shall be gasketed to satisfy requirements of NEMA 4X enclosure.

The door shall have a heavy gauge continuous hinge with 1/4" diameter stainless steel hinge pin. Hinge shall be secured with 1/4-20 stainless steel carriage bolts and stainless steel nylock nuts.

Cabinets shall be provided with a 5052-H32 aluminum alloy metal back panel of 0.125" minimum thickness. All mounting hardware shall be furnished. All internal hardware shall be either stainless steel or cadmium pressed steel Type II, Class I.

Cabinets finish shall be natural aluminum mill finish for Federal Specification QQA-250/8.

Panelboard

Panelboards for single phase service shall be rated for 240 volt, single phase three-wire operation. The panel board shall be UL listed and have a minimum of 100 amp rated main busses and main lugs only for 100A services. It shall have a minimum of 30 spaces for branch circuit breakers. It shall have a minimum 10,000 RMS symmetrical ampere short circuit rating for 120/240V services. It shall conform to Federal Specification W-P-115C, Type 1, Class 1.

A solidly bonded equipment ground bar and neutral bar shall be provided.

The panel board shall be mounted within its own enclosure. It shall be of dead front construction and be rated NEMA Type 1. Finish shall be gray baked enamel.

Branch Circuit Breakers

Provide circuit breakers of quantity and current rating as required by the plans for proper circuiting and provide two spare breakers of like current rating as the other lighting circuit breakers. Circuit breakers shall be UL listed and comply with NEMA Standards and Federal Specification W-C-375B. Circuit breakers shall be rated for 10 KAIC for 120/240 volt service.

Lighting Contactor, Photocell, Override Control & Lighting Arrestor

Provide a central lighting contactor. Lighting contactor shall be electrically held, two or three pole as required for the given service type. Contacts shall be rated for 200 amps at the given service voltage. Coil shall be rated for the same voltage as the light fixtures.

Provide a remote photoelectric light control (photocell) mounted on the side of the lighting control cabinet using an OLB conduit body. Photocell shall be a cadmium-sulphide type with fail-safe in the "on" position. It shall be enclosed in a weatherproof housing, not susceptible to distortion, discoloration, cracking or crazing. It shall be a plug-in, locking type for mounting in a receptacle meeting UL Specification 773. It shall be rated for 1800 VA for ballast type loads and used to energize a contactor. It shall be designed to operate at the required voltage and at -20 degrees F ambient temperature. It shall have a turn-off time delay to prevent false turn-off due to lightning, stray lighting or flashing lights.

Provide 600 volt-rated three position maintained contact selector switch (automatic-off-manual) for override of photocell control.

Provide a lighting arrestor rated for an operating voltage of 650V, rms, with a bracket for mounting on the control cabinet backboard.

Construction Methods:

Service conduit shall be installed in accordance with DelDOT standard specification and utility company requirements. It will be paid for separately under its respective unit bid price item.

Cabinets shall be installed on the concrete pad using the method of attachment as noted on the Plan details, Standard Construction details, or as directed by the Engineer.

Electrical equipment shall be installed as indicated on the plans.

Method of Measurement:

The quantity of lighting cabinets shall be the actual number of lighting cabinets furnished and installed, including the cabinet, all electrical equipment, photo electric cell, and incidentals, complete in place, operational and accepted.

Basis of Payment:

The quantity of lighting cabinets will be paid for at the Contract unit price per each at the phasing and amperage specified; Item 747508 for 100 Amp Service. Price and payment will constitute full compensation for furnishing and installing the cabinet, internal electrical materials, photocell, and for all labor, equipment, tools and incidentals necessary to complete the item. The cabinet base, conduits (except for sweeps included in the cabinet base), and required wiring shall be paid for separately under their respective bid items.

4/7/15

747514 - CABINET BASE TYPE F
747515 - CABINET BASE TYPE M
747516 - CABINET BASE TYPE P
747517 - CABINET BASE TYPE R

Description:

This work consists of constructing cabinet base Type F, M, P and R in accordance with the Standard Construction Details or applicable Plan Details and at locations as directed by plans or the Engineer.

Materials:

Class B Concrete
3/4" x 10' sectional copperclad steel ground rods
5/8" Zinc plated or Stainless Steel Drop-in Anchors manufactured by Hilti Systems, Concrete Fastening Systems, or approved equal
5/8" x 1-1/2" galvanized hex bolts
3/4" acorn type ground clamps
PVC conduit sweeps

Construction Methods:

The base shall conform to the dimensions as indicated in the cabinet base detail on the Standard Construction Details or applicable Plan Sheets. A concrete collar is only required when installed in earth areas or as directed by the engineer. Conduits entering the base must enter only in the designated area. A minimum distance of 1 inch shall be maintained between conduits and a minimum distance of 2 inches between conduits and the ground rods.

A minimum of 8 foot of the ground rods must be driven into undisturbed soil through the 2 inch PVC sleeve. The PVC sleeve shall be driven into the ground so that the top of the sleeve will be flush with the concrete when the base is poured.

Method of Measurement:

The quantity of cabinet bases will be measured as the number of bases constructed in accordance with these specifications, complete in place, and accepted.

All conduit sweeps extending into the cabinet base as shown on the Plans or Standard Details as applicable shall be included in the price for each cabinet base..

Basis of Payment:

The quantity of cabinet bases will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all concrete, ground rods, labor, equipment, tools, conduit sweeps, and incidentals required to complete the work as shown on the standard details or applicable plan sheets.

10/9/2012

748502 - RAISED/RECESSED PAVEMENT MARKER

Description:

This work consists of furnishing and installing raised/recessed pavement markers in accordance with the Plans and these specifications.

Materials:

The cast iron housing shall meet the requirements of ASTM A 536-84, Grade 72-45-84.

The reflectors shall meet the requirements of ASTM D 4383-03.

For installation on interstates, freeways, and principal arterials, the pavement marker shall have red reflectorized material on the back side (the side not facing the direction of traffic).

Epoxy shall meet the requirements of AASHTO M237, Type IV.

The followings models have been tested and approved by the Department and shall be used:

The followings models have been tested and approved by the Department and shall be used:

1. Ennis Paint - Stimsonite Model 101LPCR with Model C40 reflective pavement markers.
2. Ray-O-Lite Model 300 Snowplowable Marker with Model 2004 Reflector.
3. Or Approved Equal.

Construction Methods:

Pavement shall be saw cut to match the bottom contour of the marker housing using a saw and blade suitable for the pavement material being sawed. The depth of the cut slot must allow the housing to be set in epoxy, with leveling lugs resting on the pavement surface, so that the front edge of marker is at or below the surface of the pavement. Excessive saw cuts must be repaired to the satisfaction of the Engineer. When cutting is complete, the slot shall be cleaned as recommended by the manufacturer of the epoxy material. The epoxy and pavement marker will be installed in the prepared contour slot in the pavement per the manufacturer's recommendations.

Placement shall be in accordance with the DE MUTCD.

Method of Measurement:

The quantity of raised/recessed pavement markers will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of raised/recessed pavement markers will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, installation, saw-cutting, cleaning, disposal of discarded materials, for all labor, tools, equipment, all necessary incidentals associated with the item to complete the work.

07/26/2011

748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"
748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"
748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"
748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"
748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"
748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"
748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"
748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"
748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"
748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"
748549 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"
748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"
748559 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"
748568 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"
748569 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"

Description:

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

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

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

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

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

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

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

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

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO₂ (100% purity).

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

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

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

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

2. Physical Properties of Mixed Composition:

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

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

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

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

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

- c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a 20 \pm 1 mils (500 μ m) minimum wet film thickness, and immediately dressed with large reflective

glass spheres (Federal Spec. Type 4) at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

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

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

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

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

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

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

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

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

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

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

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

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,⁽¹⁾ the cylindrical tubes are placed in a vertical position on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly mixed in the proper proportions (A:B) and poured into the mold to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1" ± 0.002" (25 mm ± 0.05 mm).

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

B. Reflective Glass Spheres/Beads

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

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

The refractive index of the spheres shall be a minimum of 1.50 as determined by the liquid immersion method at 77 F (25 C). The silica content of the glass spheres shall not be less than 60%.

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

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

<u>M247 AASHTO Type 1 Glass Spheres</u>		
<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#20 (850μm)	0	100
#30 (600μm)	5-25	75-95
#50 (300μm)	40-65	15-35
#100 (150μm)	15-35	0-5
Pan	0-5	

<u>Type 4 Large Spheres</u>		
<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#10 (2000 μm)	0	100
#12 (1680 μm)	0-5	95-100
#14 (1410 μm)	5-20	80-95
#16 (1190 μm)	40-80	10-40
#18 (1000 μm)	10-40	0-5
#20 (850 μm)	0-5	0-2
Pan	0-2	

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

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansyl-chloride test.

C. Black Epoxy Contrast Markings

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

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

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

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

D. Black Aggregate

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

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

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

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

E. Packaging and Shipment

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

- a. Name of Product
- b. Lot Number
- c. Batch Number

- d. Test Number
- e. Date of Manufacture
- f. Date of expiration of acceptance (12 months from date of manufacture)
- g. The statement (as appropriate)
 - Part A - Contains Pigment & Epoxy Resin
 - Part B - Contains Catalyst
- h. Quantity
- i. Mixing proportions, Application Temperature and Instructions
- j. Safety Information
- k. Manufacturer's Name and Address

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

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

Epoxy Application Equipment:

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

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

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

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

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

1. The applicator shall provide individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy resin composition; for the storage of water; and for the storage of reflective glass spheres.
2. The applicator shall be equipped with heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application and for heating water to a temperature of approximately 140 °F (60 °C).
3. The glass spheres shall be gravity dropped upon 20 mils (500 um) of epoxy pavement markings to produce a wet-night-reflective pavement marking. The large spheres (Federal Spec. Type 4) shall be applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. This application rate and the following gradation shall conform to FHWA's FP-96: Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (pages 757-761 Type 3 and Type 4 Beads).

4. The applicator shall be equipped with metering devices or pressure gauges, on the proportioning pumps. Metering devices or pressure gauges shall be visible to the Engineer.
5. The applicator shall be equipped with all the necessary spray equipment, mixers, compressors, and other appurtenances to allow for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

Construction Details.

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

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

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

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

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

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

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

- C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the satisfaction of the Engineer. Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Reflectivity for epoxy resin paint.

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

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

White 450
Yellow 325

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

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

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

Method of Measurement:

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

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16" (75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

NOTE:

For information only:

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

1. POLY CARB, Inc.
33095 Bainbridge Road
Solon, Ohio 44139
Tel. 1-800-CALLMIX
2. IPS - Ennis Paint
P.O. Box 13582
Research Triangle Park, North Carolina 27709
Tel. 1-877-477-7623
3. Epoplex
One Park Avenue
Maple Shade, NJ 08052
Tel. 1-800-822-6920
4. Or an approved equal.

2/14/12

- 748512 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 6**
- 748513 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 12**
- 748514 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8**
- 748519 - RETROREFLECTIVE PREFORMED PATTERNED MARKING, 4**
- 748529 - RETROREFLECTIVE PREFORMED PATTERNED MARKING, SYMBOL/LEGEND**
- 748547 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 9"**
- 748556 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 16"**
- 748564 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 5"**
- 748565 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 10"**
- 748566 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 8"**
- 748567 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 13"**

Description:

This work shall consist of furnishing and installing retroreflective preformed patterned pavement marking in accordance with this provision and in conformance to the existing pavement markings or as established by the Engineer. The Contractor is required to have all subcontractors involved in the placement of these markings attend the pre-placement meeting along with the tape manufacturer representative and Department representatives to coordinate this operation. The subcontractor for pavement markings shall be approved by the Department prior to the preconstruction meeting.

Materials:

General: The preformed patterned markings shall consist of white or yellow films with clear microcrystalline ceramic beads incorporated to provide immediate and continuing retroreflection. The markings shall be suitable for application on new or existing P.C. Concrete or bituminous pavements with a pre-coated pressure sensitive adhesive.

The preformed marking material must be used prior to one year from date of manufacture. When not placed by inlaid method a surface preparation adhesive shall be used. The markings shall be capable of providing retroreflection during both wet and dry conditions.

The markings shall be highly durable retroreflective pliant polymer materials designed for longitudinal and word/symbol markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines. This film shall be manufactured without the use of lead chromate pigments or other similar, lead-containing chemicals.

Composition: The pavement marking shall consist of a mixture of high quality polymeric materials and pigments with glass beads distributed throughout the base cross-sectional area, with a reflective layer of microcrystalline ceramic beads bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 50% plus or minus 15% of the surface area raised and presenting a near vertical face, angled from 0 degrees to 60 degrees, to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles. The marking shall have a precoated pressure sensitive adhesive. The edges of the markings shall be clean cut and true.

Retroreflectance: The white and yellow markings shall have the initial expected retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions. The photometric quantity to be measured shall be coefficient of retroreflected luminance (R_L) and shall be expressed as millicandelas per square foot per foot-candle $[(\text{mcd ft}^{-2}) \text{ fc}^{-1}]$. The metric equivalent shall be expressed as millicandelas per square meter per lux $[(\text{mcd m}^{-2}) \text{ lx}^{-1}]$.

Retroreflectance values shall be measured under dry conditions in accordance with the testing procedures of ASTM D4061. Retroreflectance values shall be measured under wet conditions in accordance with ASTM E2176 or ASTM E2177. Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E2176. Wet retroreflectance values measured under a “condition of wetness” shall be in accordance with ASTM E2177.

Table 1		
Expected Initial R_L under dry, wet, and rainy conditions		
<u>White</u>	<u>Dry</u>	<u>Wet & Rainy</u>
Entrance Angle	88.76	88.76
Observation Angle	1.05	1.05
Retroreflected Luminance	500	250
R_L [(mcd m ⁻²) lx ⁻¹]		
<u>Yellow</u>	<u>Dry</u>	<u>Wet & Rainy</u>
Entrance Angle	88.76	88.76
Observation Angle	1.05	1.05
Retroreflected Luminance	300	250
R_L [(mcd m ⁻²) lx ⁻¹]		

Beads, Index of Refraction: All “dry-performing” microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. All “wet-performing” microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 2.30 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have a minimum index of refraction of 1.5 when tested by the liquid oil immersion method.

Beads, Acid Resistance: The beads shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7 cc of concentrated acid into 1000 cc of distilled water.

Color: The markings shall consist of white and/or yellow films with pigments selected and blended to conform to standard highway colors.

Skid Resistance: The patterned surface of the markings shall provide an initial average skid resistance value of 45 BPN when tested according to ASTM E 303.

Patchability: The pavement marking material shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

Thickness: The patterned material without adhesive shall have a minimum caliper of 0.065 inches (1.651mm) at the thickest portion of the patterned cross section and a minimum caliper of 0.020 inches (.508mm) at the thinnest portion of the cross section.

Tolerance: The Contractor will be responsible for applying these markings in a straight manner not exceeding 1/2 (12 mm) per 40 (12 m). Any markings exceeding the 1/2 (12 mm) tolerance will require the Contractor to make corrective action approved by the Engineer and the tape manufacturer representative at no extra cost to the Department.

Construction Methods:

The Contractor shall be certified, by the manufacturer, in the installation of the pavement marking material prior to the start of the markings. The Contractor shall install the pavement marking material in accordance with the manufacturer's published recommendations.

The manufacturer shall provide technical assistance as required to ensure successful installation of the markings. This shall include a representative on site for the start of the markings, training, product information, problem solving, etc.

Installation of the pavement markings shall be performed in a neat and workmanlike manner. The Contractor shall premark the pavement to ensure correct location of markings and such layout work shall be incidental to the price bid for the pavement marking items. The method for premarking should be as recommended by the manufacturer. A thin layer of paint as a premarking is not recommended. Particular care shall be taken to ensure that the leading edges of the markings are secured to the pavement.

General application rules:

- The Air and surface temperature shall be a minimum of 40 F.
- The pavement must be clean and dry. 24 hours of dry weather where no rain is expected.
- When not placed by inlaid method a surface preparation adhesive shall be used.
- Do not overlap tape - use butt splice.
- Do not apply tape on longitudinal seams or joints or cracks.
- Do not apply tape on deteriorating pavement surfaces.
- Existing markings must be 80% removed.

After application, the markings shall be immediately ready for use by traffic.

Inlay into Fresh Bituminous Concrete:

When markings are specified in the contract for newly paved asphalt concrete surfaces, they shall be applied before public traffic is allowed on the freshly paved surface - the pavement markings shall be inlaid in the fresh surface during final rolling of the mat, in accordance with the manufacturer's recommendations unless otherwise directed by Engineer.

The Contractor shall show how the pavement mats will be placed to avoid applying the tape on longitudinal seams or joints or cracks and maintain correct marking location.

The Contractor shall employ a sufficient number of workers to premark the pavement and install the markings such that all markings are inlaid into the hot pavement prior to the finish rolling. No paving shall be permitted unless the striping crew and materials are on the project site.

- * General procedure for inlay application on fresh asphalt surfaces:
- * Tape is applied after the compaction roller and before the finish roller using minimum water, slow speed and no vibration.
- * Tape shall be applied using equipment recommended by manufacturer
- * Tamping shall be done by the finish roller and in the same direction the tape was applied. A separate roller of a size approved by the tape manufacturer may be required to meet the manufacturer's requirements.
- * Roller shall use minimum speed to prevent wrinkling the tape.
- * Asphalt temperatures shall be between 180 F (66 C) and 120 F (49 C) when tape is applied.

NOTE: Even though the tape will stand these high temperatures the contractor is to use caution to assure the asphalt is firm enough to walk on above 140 F (60 C).

Placement on new P.C. Concrete Pavement:

When markings are specified in the contract for new P.C. concrete pavement surfaces they shall be applied after the concrete has adequately cured as determined by the Engineer and prior to opening to traffic.

1. When a membrane curing compound has been applied to the concrete surface, it shall be removed by sandblasting prior to applying the markings. Cost for such sandblasting shall be incidental to the price bid for the pavement marking item. The road shall be cleaned by sweeping and with high pressure air.
2. The manufacturer shall specify a primer/solvent for the pavement surface.
3. The tape shall be applied with an approved applicator.
4. The tape shall be tamped with a roller tamper cart with a minimum 200 lb (90 kg) load or by slowly (2-3 mph [3-5 km/hr]) driving over the tape with a vehicle tire. Do not twist or turn on the tape. A minimum of three passes back and forth over the tape will be required. All edges of the tape shall be thoroughly tamped.

Placement on Existing Pavement:

When markings are specified in the contract for existing pavement, the pavement surface shall be free of any existing markings.

1. The road shall be cleaned by sweeping and with high pressure air.

Steps 2 through 4 are the same as for new P.C. C. pavement.

Method of Measurement:

This work will be measured for payment by the number of linear feet (meters) of line or square foot (meter) of symbol/legend of Retroreflective Preformed Patterned Markings installed on the pavement and accepted in accordance with the plans.

Basis of Payment:

This work will be paid for at the contract unit price bid per linear foot (meter) of line or square meter of symbol/legend as measured for item "Retroreflective Preformed Patterned Markings" of the type specified. This price shall include cleaning and preparing the pavement surface, furnishing and placing all materials, for all labor, tools, equipment, maintenance bond and incidentals necessary to complete the work.

WARRANTY

The Contractor shall warrant to the Department that the installed retroreflective preformed patterned pavement markings are free of defects, as hereafter defined, for one calendar year beginning at the initial acceptance of the marking installation by the Department. The initial acceptance of the marking installation will occur upon the satisfactory correction of all deficiencies noted in the marking installation during the Final Inspection of the project. The markings shall show no fading, lifting, shrinking, tearing, rollback, distortion or chipping due to vehicular traffic or normal maintenance activities including snow plowing. Although some wear is expected, the markings shall remain intact and serviceable (as defined below) for no less than 95% of the total item quantities in the first year of installation.

The Contractor shall repair all defective areas identified by the Department after initial installation or during the Warranty Period. All repairs shall begin immediately following the notice to the Contractor unless weather limitations prevent the corrective work. Should the contractor not commence work within seventy-two hours, weather permitting, and pending severity, the Department reserves the right to remedy the condition and charge the contractor for the work. Any corrective work shall be as recommended by the manufacturer of the marking material and approved by the Department. The Department shall be given notification before the Contractor begins corrective work to allow for inspection of the operation. All costs associated with the repair work shall be the responsible of the contractor. These costs shall include, but are not limited to, removal, material, maintenance of traffic, etc.

Maintenance Bond:

Upon completion of the work, the Contractor shall submit to the Department a Maintenance Bond to insure the State of Delaware during the above Warranty periods. The Maintenance Bond shall meet the following requirements:

- a) A sum equal to 100% of the value of all Retroreflective Preformed Patterned Markings Items paid to the Contractor;
- b) All signatures are original signatures, in ink, and not mechanical reproductions or facsimiles of any kind;
- c) The Contractor is the named principle;
- d) The term of the bond is for one full year;
- e) The term of the Maintenance Bond will be for a period of one year beyond completion of Retroreflective Preformed Patterned Markings; and
- f) Written by a Surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Delaware by the Delaware Department of Insurance.

MANUFACTURER'S RESPONSIBILITY:

The following information is for use by DelDOT only. The Contractor will not be held responsible for the time frames listed in the chart below.

After satisfactory completion of the one-year warranty period, the contractor will be relieved of his responsibility and the Department shall work directly with the Manufacturer to guarantee the remainder of the warranty as specified below.

In addition, the pavement markings shall warrant the material to retain a minimum reflective value of 150 millicandelas per square foot (meter) per lux for the first year after initial acceptance.

- 1. All reflectance measurements shall be made on a clean, dry surface at a minimum temperature of 40 F (4 C).
- 2. All reflectance measurements shall be made using a "LTL 2000" retroreflectometer.
- 3. One year from initial installation acceptance all pavement marking material shall meet the minimum retained coefficient of dry retroreflection value of 125 millicandelas per foot squared per foot-candle (in accordance with ASTM E1710), and meet the minimum retained coefficient of wet retroreflection value of 75 millicandelas per foot squared per foot-candle (in accordance with ASTM E2177) for the following Warranty Periods.

Warranty Periods		
Application	Dry Retroreflectivity Warranty Period	Wet Retroreflectivity Warranty Period
Longitudinal Markings	4 years	2 years
Symbols and Legends	2 years	1 year

03/04/2011

Contract No. T201109002.01

748517 - BLACKOUT TAPE, 4"

748518 - BLACKOUT TAPE, 6"

748528 - BLACKOUT TAPE, 8"

748558 -BLACKOUT TAPE, 12"

Description:

This work consists of furnishing, installing and removal of blackout tape in accordance with the details and notes on the Plans and as directed by the Engineer.

Materials and Construction Methods:

The tape shall have a raised, patterned surface and shall obliterate the existing pavement markings. Preparation, application and removal shall be in conformance with the Plans and the manufacturer's recommendations. Any failure of the tape to remain in place or adequately mask the existing pavement markings shall be corrected at the Contractor's expense.

If any of the existing pavement markings are damaged or removed due to the removal of blackout tape, the Contractor shall restore these areas as directed by the Engineer and this work and material will be at the Contractor's expense.

It is the intent of this item of work to totally obliterate existing pavement markings. To accomplish this, it may be necessary to use a blackout tape width greater than the nominal width of the pavement striping i.e. use 6" (150 mm) blackout tape to cover a 4" (100 mm) strip.

Method of Measurement:

The quantity of blackout tape will be measured as the number of linear feet (meter) of blackout tape installed and accepted.

Basis of Payment:

The quantity of blackout tape will be paid for at the Contract unit price per linear Foot (meter) of the size specified. Price and payment will constitute full compensation for preparing the pavement surface, furnishing and placing all materials, and for all labor, tools, equipment and incidentals necessary to complete the work.

1/25/01

748525 - TEMPORARY MARKINGS, TAPE, 4"
748526 - TEMPORARY MARKINGS, TAPE, 6"
748527 - TEMPORARY MARKINGS, TAPE, WORDS/SYMBOLS
748570 - TEMPORARY MARKINGS, TAPE, 5"

Description:

This work shall consist of furnishing, installing, removing or obliterating pavement markings in work zones in accordance with this provision and in reasonably close conformity with the dimensions and lines shown on the plans or established by the Engineer.

Materials:

The markings shall consist of white or yellow retro reflective pavement marking on a conformable backing.

The quality of the pavement marking shall be such that the performance requirements for the marking shall be met.

The markings shall be precoated with a pressure sensitive adhesive and shall be capable of being adhered to Asphalt concrete or Portland cement concrete at temperatures as low as 50 F (10 C) in accordance with the manufacturer's recommendations. A surface preparation adhesive recommended by the manufacturer shall be used for all applications to improve initial and long term adhesion.

When stored in a cool dry area indoors, the materials shall be suitable for use for one year after the date of purchase.

Classification:

The removable retro reflective pavement marking tape must be designed and constructed in such a manner that it can be readily removed when the markings are no longer applicable. The tape shall be capable of performing for the duration of a normal construction season and shall then be capable of being removed intact or in large pieces. The tape shall be wet and dry reflective throughout its useful life. (A normal construction season is defined as the time after the last snowplowing in the spring and before the first snowplowing in the fall/winter. In non-snow removal locations, a normal construction season is limited to the calendar year at the time of installation.)

Requirements:

Composition

The removable, retro reflective pavement markings shall consist of a highly reflective white or yellow enclosed lens pavement marking with a thin, flexible, conformable backing which is precoated with a pressure sensitive adhesive.

Retro reflectance

The enclosed lens white and yellow pavement markings shall have the initial minimum retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions at 1.05 observation angle and 88.76 entrance angle. These angles represent a simulated driver viewing geometry at 30 meters distance. The photometric quantity to be measured shall be the coefficient of retroreflected luminance (R_L), and shall be expressed as millicandelas per square meter per lux $[(\text{mcd m}^{-2}) \text{ lx}^{-1}]$. The English equivalent shall be expressed as millicandelas per square foot per foot candle $[(\text{mcd ft}^{-2}) \text{ fc}^{-1}]$

Retroreflectance values shall be measured under dry conditions in accordance with ASTM D 4061. The angular aperture of both the photoreceptor and light projector shall be 6 minutes of arc. The reference center shall be the geometric center of the sample, and the reference axis shall be taken perpendicular to the test sample.

Values measured under wet conditions shall be measured in accordance with ASTM E 2176 or ASTM E 2177 using a portable retroreflectometer. Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E 2176. Wet retroreflectance values measured under a “condition of wetness” shall be in accordance with ASTM E 2177.

Visually, the reflective performance shall be similar whether the material is dry or wet.

Table 1: Minimum initial R_L under dry, wet and rainy conditions		
	White	Yellow
Entrance Angle	88.76	88.76
Observation Angle	1.05	1.05
Retroreflected Luminance	750	450
R_L [(mcd m^{-2}) lx^{-1}]		

Removability

The marking film shall be removable from Asphalt concrete and Portland cement concrete intact or in large pieces, at temperatures above freezing without the use of heat, solvents, grinding or blasting without permanently scarring the roadway surface.

Skid Resistance

The surface of the markings when new provides an average skid resistance value of 50 BPN when tested according to ASTM E 303.

Color

The x,y chromaticity co-ordinates for dry markings shall lie within the regions defined by the following corner points:

	1		2		3		4	
	x	y	x	y	x	y	x	y
White	0.355	0.355	0.305	0.305	0.285	0.325	0.335	0.375
Yellow	0.560	0.440	0.460	0.400	0.420	0.440	0.490	0.510

Daytime appearance¹

The appearance of the marking in daylight or under road lighting conditions can be determined by measuring the reflection in diffuse conditions. The luminance coefficient in diffuse illumination (Qd) is measured using a portable Qd reflectometer incorporating “30 meter” geometry. The Qd shall be greater than 130 [(mcd ft^{-2}) fc^{-1}] when newly applied.

Note: The luminance coefficient (Qd) under diffuse illumination represents the brightness of a road marking as seen by drivers of motorized vehicles in typical or average daylight or under road lighting conditions.

¹Reference CEN Standard EN 1436.

Construction Methods:

Pavement markings in work zones shall be placed in accordance with the following provisions:

At the end of each day's work, pavement markings shall be in place on each paving lift that is open to normal traffic flow. Materials requiring removal shall be specified above, and marking configurations shall be in accordance with the Manual on Uniform Traffic Control Devices.

The pavement markings shall be maintained and replaced by the Contractor without additional compensation until they have served their purpose, at which time the contractor will be required to remove them.

Pavement markings shall be applied to clean dry surfaces in accordance with the manufacturer's installation instructions or a method approved by the Engineer.

Method of Measurement:

Linear pavement markings will be measured in linear feet complete-in-place for the width specified.

Removal or obliteration of pavement markings in construction work zones will not be measured for payment, but shall be considered incidental to the work.

Basis of Payment:

Retro reflective pavement markings will be paid for at the contract unit price, which price shall be full compensation for cleaning and preparing the pavement surface, for furnishing and placing all materials, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Marking, Tape, linear	Linear Foot
Temporary Marking, Tape, words/symbol	Square foot

7/15/11

Contract No. T201109002.01
748530 - REMOVAL OF PAVEMENT STRIPING

Description:

This work consists of removing pavement markings of all kinds including paint, tape, etc., in accordance with this special provision, notes on Plans and/or as directed by the Engineer. The Contractor shall coordinate with the Engineer for maintaining traffic during the operation, prior to starting the work.

Materials and Construction Methods:

Paint and Epoxy Resins:

Shot/abrasive grit blasting or water blasting equipment shall be used for removal of markings from pavement surfaces.

Alkyd Thermoplastic:

In addition to the removal techniques discussed for paint and epoxy, grinding (erasing machines) equipment may also be used for removal of markings from pavement surfaces.

The removal operation shall be performed in a manner that will not damage the pavement surface.

The Contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such material to the roadside will not be permitted.

After removal of striping on bituminous concrete asphalt sealer shall be used to cover any exposed aggregate or embedded paint at no additional cost.

Method of Measurement:

The quantity of pavement striping removal will be measured as the number of square feet (meters) of pavement striping removed and accepted. The area of lines will be calculated by multiplying the nominal width of line times the length and the area of symbols will be as specified in Subsection 748.10 of the Standard Specifications.

Basis of Payment:

The quantity of pavement striping removal will be paid for at the Contract unit price per square foot (meter) for "Removal of Pavement Striping". Price and payment shall be full compensation for furnishing all materials, removing the pavement markings, disposing of the removed marking material, covering up the exposed aggregate, and for all labor, equipment, tools and incidentals necessary to complete the work.

Note:

There will be no measurement and payment for removal of pavement markings placed incorrectly by the Contractor.

5/21/2013

749500 - SIGN PANEL

Description:

This work consists of furnishing all materials, fabrication, and erection of new sheet aluminum or extruded aluminum sign panels, complete with demountable copy, connections to supports, and other incidentals as are shown on the Plans, or described in the special provisions.

The item shall also include removing and transporting of the existing sign panels before fabricating and erecting new sign panels, if such requirement is specified on the Plans.

Design:

Sign panels and their connections to supports shall be designed for applicable loadings and allowable stresses specified for supports. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions. No method of stiffening will be allowed which would require rivets, bolts, screws, or nuts perforating the message face. The Contractor shall submit detail drawings showing the details for fabrications of the panels and support connections for prior approval.

Sheet Aluminum:

Sign panel sections shall be fabricated of standard width, readily available, aluminum sheets not less than 3'-0" wide and not more than 5'-6" wide, except that not more than one sheet of 2'-0" minimum width will be permitted.

Sections 12' and under: Sign panel sections including those over 12' in height shall run from the top edge to the bottom edge of the sign face without horizontal joints in the aluminum sheets.

Sections 12' and Over: Sign panel sections over 12' in height shall be fabricated of two or more sheets with horizontal joints which butt and fasten securely together and may be disassembled for simplified handling and erection in the field. Each horizontal joint in sign panel sheets shall be located at point of contraflexure in the sign face.

Fasteners and Backing Strips: Sign panel sections shall be provided with suitable fastenings, as shown on the Plans, to permit easy attachment to the supporting frames and these fastenings shall be so designed as to carry the full design load with a factor of safety of 1.6 against the minimum yield stress of the materials.

Sign panel sections shall be provided with backing strips at the joints, held firmly in place to keep the abutting panel sections in proper alignment. All sign panel fastenings and backing strips, excepting the fastening of letters, symbols and border to the sign face, shall be applied without causing visible projections or indentations on the sign face. Each sign panel section shall be designed to engage and hang from two or more horizontal structural members of the supporting frame. The method of fastening to obtain secure close butt joints between panels may vary as recommended by the fabricator. Shop drawings will be required showing proposed method of attachment for approval of the Engineer.

Supporting Frame: The supporting sign frame shall consist of horizontal and vertical stringers as shown on the Plans. The horizontal members of the supporting sign frame shall be fabricated of new material in one piece. Where large signs necessitate splicing the stringers, such splices shall be located at points of contraflexure and shall be held to a minimum, but splice must develop full section of member.

Extruded Aluminum:

Extruded aluminum sign panels shall have demountable copy. After installation of the signs is completed, they will be inspected. If specular reflection is apparent on any sign, its positioning shall be adjusted by the Contractor, as directed by the Engineer.

Sign Panel Size: Sizes of sign panels having demountable copy have been based on the 3M Company spacing charts. All letters shall be placed in accordance with manufacturer's spacing charts. Overall horizontal and vertical dimensions shall be in 6" (150 mm) increments.

Materials:

The overhead sign sheeting shall be type 9 and all the ground sign sheeting shall be type 3 materials, reference 3M. The sign shall be wide angle, prismatic, retroreflective sheeting. The coefficients of retroreflection, R_A , shall not be less than the minimum values specified in the following table when tested in accordance with ASTM E 810 except that the angle of rotation shall be as specified:

Minimum Coefficient of Retroreflection R_A
(Candelas per lux per square meter)

TABLE 3 Type IX Sheeting ^A							
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue
0.1 ^A	-4	660	500	250	66	130	30
0.1 ^B	+30	370	280	140	37	74	17
0.2	-4	380	285	145	38	76	17
0.2	+30	215	162	82	22	43	10
0.5	-4	240	180	90	24	48	11
0.5	+30	135	100	50	14	27	6.0
1.0	-4	80	60	30	8.0	16	3.6
1.0	+30	45	34	17	4.5	9.0	2.0

^A Minimum Coefficient of Retroreflection (R_A) $cd \cdot lx^{-1} \cdot m^{-2}$

^B Values for 0.1 observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

The ground mounted sign sheeting shall meet or exceed the following values. The coefficients of Retroreflection shall be determined in accordance with ASTM E-810. This table contains “core” values as found in ASTM D 4956. The 0.1 observation angle is not required for this item.

TABLE 7 Type III Sheeting ^A								
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown
0.1 ^B	-4	300	200	120	54	54	24	14
0.1 ^B	+30	180	120	72	32	32	14	10
0.2	-4	250	170	100	45	45	20	12
0.2	+30	150	100	60	25	25	11	8.5
0.5	-4	95	62	30	15	15	7.5	5.0

TABLE 7 Type III Sheeting ^A								
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown
0.5	+30	65	45	25	10	10	5.0	3.5

^A Minimum Coefficient of Retroreflection(R_A) $cd/ft^2(cd \cdot lx^{-1} \cdot m^{-2})$

^B Values for 0.1 observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

WARRANTY

The sheeting manufacturer shall submit with each lot or shipment, a certification that states the material supplied will meet all the requirements listed herein.

Field Performance Requirements:

The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting during that period listed.

- 85% of values listed in Table 7 Type III after 10 years
- 80% of values listed in Table 3 Type IX after 12 years.

All measurements shall be made after sign cleaning according to sheeting manufacturer’s recommendations.

Sheeting Manufacturer’s Replacement Obligation:

Where it can be shown that retroreflective signs supplied and used according to the sheeting manufacturer’s recommendations, have not met the performance requirements of this specification the sheeting manufacturer shall cover restoration costs as follows for sheeting shown to be unsatisfactory during:

The entire 12 years (Type IX) and 8 years (Type III): the sheeting manufacturer will replace the sign in its entirety inclusive of the sign panel, sign sheeting, labor, and M.O.T required to restore the sign surface to its original effectiveness.

Sheet Aluminum:

Sign panels shall be of the aluminum sheet type conforming to ASTM Designation B209 (alloy 6061-T6 or 5052-H38). The minimum panel sheet thickness shall be 0.125”. Stringers or horizontal structural sign supporting members and vertical connections shall be fabricated of 6061-T6 or 6062-T6 ASTM B221 aluminum alloy. All sign panels shall be fully reflectorized unless otherwise indicated on the Plans.

Where aluminum studs welded to the sign sheet material are shown on the Plans, stud material shall be ASTM B316 aluminum alloy 1100-H18 welded to the sign sheets by the capacitor discharge method. All sign hardware shall be stainless steel or galvanized steel or 2024-T4 aluminum alloy ASTM B211 or ASTM B221. Hardware for attachment to overhead members shall be Type 304 passivated stainless steel, except that stainless steel lockwashers shall be Type 302 stainless steel alloy. Steelshapes for Connection to the sign support structure shall conform to the requirements of ASTM AASHTO M270 Grade 36 (Grade 250) and galvanized to the requirements of ASTM Designation A123.

Extruded Aluminum:

Extruded Aluminum Sign Panels and Edge Strip. Extruded aluminum sign panels and edge strip shall conform to B221, alloy 6063 T6.

Hardware: Hardware shall be clear anodized, conforming to one of the following: B209, alloy 2024 T4; B211, alloy 2024 T4, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

Sheet and Extruded Aluminum:

The front faces of the sign panels shall be degreased by one of the following methods:

1. Vapor degreasing by total immersion in a saturated vapor of trichlorethylene or perchloroethylene. Trademark printing shall be removed with lacquer thinner or by a controlled alkaline cleaning system.
2. Alkaline degreasing by total immersion in a tank containing alkaline solutions controlled and titrated to the solution manufacturer's specification. Rinse thoroughly with clean running water.

Immersion time shall depend upon the amount of grease or dirt present and the gage of the metal, and shall be sufficient to effect complete removal of all corrosion, white rust, and dirt.

Following degreasing, the front faces shall be etched by one of the following methods:

1. Acid etching in a 6 to 8 percent phosphoric acid solution at 100 °F (38 C), or proprietary acid etching solution. Rinse thoroughly with cold, then hot running water.
2. Alkaline etching in an approved alkaline etching material that is controlled by titration. The etching time, temperature, and concentration shall be as specified by the solution manufacturer. Smut shall be removed with an acidic chromium compound type solution as specified by the solution manufacturer, and shall be rinsed thoroughly with clean running water.

The surface etch shall provide a clean mat, or non-glare finish, suitable for the application of the retroreflective sheeting. This finish shall also be suitable for the uncovered reverse sides of the signs. Any protective film or coating applied to resulting from chemical action on the aluminum surface shall be light, tight, and free from all powdery residue.

As an alternate to the above etching systems, any one of the following metal preparation systems, employing a chemical conversions coating, may be used providing it complies fully with the recommendations and specifications furnished by the respective preparation manufacturer:

1. "Alodine" 1200 or 1200S, by Amchem Products, Inc.
2. "Bonderite" 723 with Process Specification No. 249, by Parker Rust Proof Company.
3. "Chromicoat", by Oakite Products, Inc.
4. Other approved system(s), producing a conversion coat meeting the requirements of Military Specification MIL-C-5541.

Alternate coats shall be light, tight, and free from any powdery residue. After degreasing and etching, the panels shall be dried by the use of forced, hot air.

Panels shall not be handled except by device or clean canvas gloves, from the time degreasing is started to the time of application of retroreflective sheeting, nor shall contaminants be permitted to come into contact with the panels during that period.

Construction Methods:

Sign Face Finishing: All retroreflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of retroreflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's recommendations. Retroreflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall be those of the publication titled "Standard Alphabets for Highways Signs" of the Federal Highway Administration.

The working drawings prepared by the Contractor shall clearly indicate the proposed spacing of the letters and the locations and arrangements of symbols and borders.

After the panel has been degreased and etched, the retroreflective sheeting shall be applied by a method described elsewhere in these Special Provisions.

No sheeting shall be applied when the temperature is less than 50 °F (10 °C).

Whenever it is necessary to construct the background of a sign face with two or more pieces of retroreflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of retroreflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of retroreflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of retroreflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between retroreflective sheeting sections shall either butt or overlap no more than 3/8" (9.5 mm). Horizontal joints between retroreflective sheeting sections shall not be allowed.

Sign Panel Erection: Signs shall be slip-sheeted, packed, and shipped in such manner as to ensure arrival at their respective places of erection in an undamaged condition. All signs arriving at the erection site(s) in a condition which in the opinion of the Engineer, renders them unsuitable for use, shall be removed and replaced by the Contractor at his sole expense. Sign Panels shall not be shipped for erection in such a manner that results in horizontal joints of the retroreflective sheeting.

It is not anticipated that there will be any sign panels which are required to be mounted whose messages will be inappropriate to the guiding of traffic at the time of sign erection. However, in the event that the Engineer determines that certain sign messages are inappropriate, the panels of such signs shall be covered by an opaque material, until such time as the sign messages become appropriate. The covering material and the manner of securing the material to the sign panel(s), shall meet with the approval of the Engineer. The Engineer will indicate to the Contractor which signs, if any, must be covered, and when to remove the covers.

Sign installation shall be performed as specified by the Engineer. Care shall be taken to prevent any damage to the sign panel, span wire, mast arm, over-highway structure, wood or metal pole, pedestal pole, ground mounted HIB, roadside I-beam structure, or any electrical cable attached to the span wire, or any lights attached to the sign panel.

Nylon washers shall be placed next to the sign face followed by a galvanized washer and bolt head. Sign installation on over-highway structure or roadside I-beam structure may require the sign to be assembled in panels. The sign may be made from several panels to make one complete sign.

Signs on roadside I-beam structures shall be installed at a minimum height of 7 feet (2.1 m) from the bottom of the sign to the near edge of pavement or sidewalk. If a secondary sign is mounted below another sign on a freeway or expressway, the major sign shall be installed with a minimum height of 8 feet (2.4 m) and the secondary sign shall be installed with a minimum height of 5 feet (1.5 m), measured vertically from the bottom of the sign to the elevation of the near edge of pavement.

Sign removal shall be performed as specified by the Engineer. Care shall be taken to prevent any damage to the sign panel, span wire, mast, any electrical wire attached to the span wire or any lights attached to the sign panel. If the panel has lights attached to the sign panel, the contractor will be required to disconnect the wiring prior to removing the sign panel. Removal of the wiring that operates the lights will be at the direction of the Engineer and paid for under other items of this specification. All materials removed shall be returned to the Department at the Dover Sign Shop.

Sign Covers: Sign covers shall be 10 ounce (280 g) cotton duck conforming to ASTM D-320, Army Duck, and dyed to a dark green approximating the green for sign backgrounds.

Identification Tags: The Contractor shall furnish and place identification tags or decals which state the Contract number, month and year of erection on the lower reverse side of the panel, near the point closest to the roadway shoulder.

Method of Measurement:

The quantity of sign panels will be measured as the actual number of square feet (meters) of front sign face surface area of all sign panels constructed, installed and accepted. The area will be computed from the maximum width and height dimensions of each sign panel, as shown on the Plans, or on the approved sign panel shop drawings, (verified by field measurements). The area for the existing overhead sign panel will be calculated in the same manner.

All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding of corners.

Basis of Payment:

The quantity of sign panel will be paid for at the Contract unit price per square foot (meter). Price and payment will constitute full compensation for furnishing, fabricating, and erecting sign panels complete in place and accepted, with retroreflective materials, copy, symbols, borders, connections to supports, degreasing, etching, covering and uncovering sign messages where necessary, and for all labor, materials, tools, equipment, and incidentals required to complete the item.

Unless otherwise indicated on the Plans, the cost of removing and transporting to the nearest highway maintenance yard the existing sign panels and accessories shall also be included under this item if such requirement is indicated on the Plans.

3/13/15

Contract No. T201109002.01
749506 - FURNISH SIGN PANEL

Description:

The item shall include furnishing all materials, fabrication of new temporary guide sign panels constructed of either flat sheet aluminum panels, OR extruded aluminum sign panels, as shown on the Plans, or as directed by the Traffic Engineer, complete with demountable copy and other incidentals shown on the Plans or as described in the special provisions.

Materials:

Aluminum Flat Sheet Panels: Sign panels shall be of aluminum sheet type conforming to ASTM Designation B209 (alloy 6061-T6 or 5052-H38). The minimum panel sheet thickness shall be 0.125 inches. Stringers or horizontal structural sign supporting members and vertical connections shall be fabricated of 6061-T6 or 6062-T6 ASTM B221 aluminum alloy. All sign panels shall be fully reflectorized, unless otherwise indicated on the Plans.

Where aluminum studs welded to the sign sheet material are shown on the Plans, stud material shall be ASTM B316 aluminum alloy 1100-H18 welded to the sign sheets by the capacitor discharge method. All sign hardware shall be stainless steel or galvanized steel or 2024-T4 aluminum alloy ASTM B211 or ASTM B221.

The front faces of the sign panels shall be degreased by one of the following methods:

1. Vapor degreasing total immersion in a saturated vapor of trichlorethylen Perchloroethylene. Trademark printing shall be removed with lacquer thinner or by a controlled alkaline cleaning system.
2. Alkaline degreasing by total immersion in a tank containing alkaline solutions controlled and titrated to the solution manufacturer's specification. Rinse thoroughly with clean running water.

Immersion time shall depend upon the amount of grease or dirt present and the gage of the metal, and shall be sufficient to effect complete removal of all corrosion, white rust, and dirt.

Following degreasing, the front faces shall be etched by one of the following methods:

1. Acid etching in a 6 to 8 percent phosphoric acid solution at 100 F., or proprietary acid etching solution. Rinse thoroughly with cold, then hot running water.
2. Alkaline etching in an approved alkaline etching material that is controlled by titration. The etching time, temperature, and concentration shall be as specified by the solution manufacturer. Smut shall be removed with an acidic chromium compound type solution as specified by the solution manufacturer, and shall be rinsed thoroughly with clean running water.

The surface etch shall provide a clean matte, or non-glare finish, suitable for the application of the reflective sheeting. This finish shall also be suitable for the uncovered reverse sides of the signs. Any protective film or coating applied to or resulting from chemical action on the aluminum surface shall be light, tight, and free from all powdery residues.

Design:

Sign panels shall be designed for applicable loading. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions. No method of stiffening will be allowed which would require rivets, bolts, screws, or nuts perforating the message face. The Contractor shall submit detail drawings showing the details for fabrications of the panels.

Sign panel sections shall be fabricated of standard width, readily available, aluminum sheets not less than 3'-0" wide and not more than 5'-6" wide, except that not more than one sheet of 2'-0" minimum width will be permitted.

Sections of 12 feet and Under: Sign panel sections, including those over 12 feet in height shall run from the top edge to the bottom edge of the sign face without horizontal joints in the aluminum sheets.

Sections 12 feet and Over: Sign panel sections over 12 feet in height shall be fabricated of two or more sheets with horizontal joints which butt and fasten securely together and may be disassembled for simplified handling and erection in the field. Each horizontal joint in sign panel sheets shall be located at point of contraflexure in the sign face.

Sign panel sections shall be provided with backing strips at the joints held firmly in place to keep the abutting panel sections in proper alignment. All sign panel fastenings and backing strips, excepting the fastening of letters, symbols and border to the sign face, shall be applied without causing visible projections or indentations of the sign face. Each sign panel section shall be designed to engage and hang from two or more horizontal structural members of the supporting frame. The method of fastening to obtain secure close butt joints between panels may vary as recommended by the fabricator. Shop drawings will be required showing proposed method of attachment for approval of the Engineer.

Supporting Frame: The supporting sign frame shall consist of horizontal and vertical stringers as shown on the plans. The horizontal members of the supporting sign frame shall be fabricated of new material in one piece. Where large signs necessitate splicing the stringers, such splices shall be located at points of contraflexure and shall be held to a minimum, but splice must develop full section of member.

Sign Panel Size: Sizes of sign panels having demountable copy have been based on the 3-M Company spacing charts. All letters shall be placed in accordance with manufacturer's spacing charts. Overall horizontal and vertical dimensions shall be six inch increments.

As an alternate to the above etching systems, any one of the following metal preparation systems, employing a chemical conversions coating, may be used providing it complies fully with the recommendations and specifications furnished by the respective preparation manufacturer:

1. "Alodine" 1200 or 1200S, by Amchem Products, Inc.
2. "Bonderite" 723 with Process Specification No. 249, by Parker Rust Proof Company.
3. "Chromicoat" by Oakite Products, Inc.
4. Other approved system(s), producing a conversion coat meeting the requirements of Military Specifications MIL-C-5541.

Alternate coats shall be light, tight, and free from any powdery residue. After degreasing and etching, the panels shall be dried by the use of forced, hot air. Panels shall not be handled except by device or clean canvas gloves, from the time degreasing is started to the time of application of reflective sheeting, nor shall contaminants be permitted to come into contact with the panels during that period.

Extruded Aluminum Sign Panels: Extruded aluminum sign panels and edge strips shall conform to B 221, alloy 6063 T6. (See Extruded Aluminum Detail Sheets SP-01 and SP-02.)

Hardware: Hardware shall be clear anodized, conforming to one of the following: ASTM B 209, alloy 2024 T4; B 211, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

Sheeting: The sign sheeting shall be wide angled, prismatic, retroreflective sheeting or approved equal. The coefficients of retroreflection, Ra, shall not be less than the minimum values specified in the following table when tested in accordance with ASTM E 810, except that the angle of rotation shall be as specified:

Contract No. T201109002.01
 Minimum Coefficient of Retroreflection Ra
 CD/fc/ft2 (cd-1x-1.m2)
 (0.2 Deg. Observation and -4 Deg. Entrance Angle)*

Sheeting Color	Minimum Coefficient of Retroreflection Diamond Grade
White	700
Yellow	470
Orange	280
Green	120
Red	120
Blue	58
Brown	N/A

* All measurements shall be made after sign cleaning according to sheeting manufacturer's recommendations

Construction Methods:

Sign Face Finishing: All reflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of reflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's recommendations. Reflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall conform to the Plans and the "Standard alphabets for Highway Signs" of the Federal Highway Administration.

The working drawings prepared by the Contractor shall clearly indicate the proposed spacing of the letters and the locations and arrangements of symbols and borders.

After the panel has been degreased and etched, the reflective sheeting shall be applied by a method described elsewhere in these Special Provisions.

No sheeting shall be applied when the temperature is less than 50 degrees F.

Whenever it is necessary to construct the background of a sign face with two or more pieces of reflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of reflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of reflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting, which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of reflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between reflective sheeting sections shall either butt or overlap no more than 3/8".

Transporting Sign Panel: Signs shall be slip-sheeted, packed, and shipped in such manner as to ensure arrival at their respective places of storage in an undamaged condition. All signs arriving at the storage site in a condition which in the opinion of the Engineer, renders them unsuitable for use, shall be removed and replaced by the Contractor at his sole expense.

Method of Measurement:

The square feet of sign panels for which payment will be made will be the total front surface area of all units of sign panel construction, actually approved, computed from the maximum width and height dimensions of each sign panel, as shown on the Plans, or on the approved sign panel shop drawings (verified by field measurements). All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding corners.

Basis of Payment:

Payment will be made for the quantity as determined above, measured in square feet, and paid for at the contract unit price per square feet bid for Furnish Sign Panel, which price and payment shall constitute full compensation for furnishing, fabricating, and delivering sign panels complete in place and accepted, with reflective materials, copy, symbols, borders, degreasing, etching, and for all labor, materials, tools, equipment, and incidentals required to complete the item.

3/10/14

749507 - INSTALL SIGN PANEL

Description:

The item shall include the installation of extruded sign panels on the skid for non-breakaway system temporary signing as illustrated on the plans and as directed by the Engineer complete and in place and accepted by the Engineer. The item shall include all labor, tools, equipment, including sign supporting hardware, and incidentals necessary to complete the item.

Materials:

All sign hardware shall be stainless steel, galvanized steel or 2024-T4 aluminum alloy ASTM B106 alloy 356-T6.

Construction Methods:

- A. **Installation Sequence** - Contractor is responsible for the installation of signs on the skid for non-breakaway system temporary signing.

Method of Measurement:

The quantity of sign panels installed will be measured in square feet of sign panel installed, complete and accepted.

Basis of Payment:

The quantity of sign panel will be paid for at the contract unit price per square foot. Price and payment shall constitute full compensation for pickup and site delivery of the sign panels, mounting hardware, and installing the sign panels on the skid for non-breakaway system temporary signing complete in place and accepted, maintaining, relocating temporary guide signs, and for all labor, materials, tools, equipment, and incidentals required to complete the item. The removal of the sign at the end of construction shall be incidental to Item 749507 – Install Sign Panel. The furnishing and relocation of the temporary skid shall be incidental to Item 743000 – Maintenance of Traffic.

3/10/14

749516 – REINFORCED CONCRETE SIGN FOUNDATION, W-6
749517 – REINFORCED CONCRETE SIGN FOUNDATION, W-8
749518 – REINFORCED CONCRETE SIGN FOUNDATION, W-10
749519 – REINFORCED CONCRETE SIGN FOUNDATION, W-12
749520 – REINFORCED CONCRETE SIGN FOUNDATION, W-14

Description:

This work consists of furnishing all material and installing sign foundations.

Materials:

Bar Reinforcement shall conform to the requirements of Subsection 603.02 of the Standard Specifications.

Portland Cement Concrete shall be Class B and shall conform to the requirements of Section 812 of the Standard Specifications.

Anchors shall be fabricated from 304 Stainless Steel for the threaded ferrule portion, and 1058 steel rod and coil for cage portion of anchor.

Nuts, Bolts and Cap Screws shall meet AASHTO M 164 (m 164M). All nuts, bolts and cap screws shall be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per AASHTO M232/M 232M.

Construction Methods:

The bases shall conform to the dimensions and details as indicated on the Plans.

Excavation for the foundation may not exceed the dimension of the foundation by more than 1 foot (300 mm) in any one direction. If a form is used in the excavation more than 18 inches (460 mm) below the ground surface, it is necessary that the excavation be filled and tamped on all sides in layers not to exceed 6 inches (150 mm).

The excavated material shall be disposed of and the area shall be properly graded. After grading, the area shall be returned to its original condition around the supports with mulching, seeding or other landscaping as necessary or as directed by the Engineer.

Anchor bolts shall be set to template for alignment and elevation and shall be secured in position to prevent displacement while concrete is being placed. The steel reinforcement and conduit elbows shall have been placed and secured before the placing of concrete.

Method of Measurement:

The quantity of sign foundations will be measured as the number of foundations for the specified size of beam constructed in accordance with these specifications, complete in place, and accepted.

Basis of Payment:

The quantity of sign foundations will be paid for at the contract unit price per each foundation of the type specified. Price and payment will constitute full compensation all materials and sign foundation installation complete in place and for all labor, equipment, tools, and incidentals required to complete the work. Payment will also include returning the area around the sign post to its original conditions by mulch, seeding or other landscaping necessary.

10/27/2009

- 749521 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6**
- 749522 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-8**
- 749523 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-10**
- 749524 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-12**
- 749525 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-14**
- 749563 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-4**

Description:

This work consists of furnishing all materials for ground mount breakaway type sign posts and breakaway assemblies to the job order site in conformance with the details and notes shown on the Plans, and as directed by the Engineer.

Materials:

Structural Steel shall meet the applicable requirements of Subsection 605.02 of the Standard Specifications and AASHTO M 270/M 270M, GR36 (GR250), GR50 (GR345), or GR50W (GR 345W) as detailed on the plans. Steel posts shall be galvanized in accordance with the requirements of AASHTO M 111/M 11M.

Breakaway Couplings shall be made from alloy steel which conforms to AISI 4340, 4130 or an equivalent material, and shall have a minimum tensile yield stress of 175,000 psi (1200 MPa). The Rockwell C hardness shall be 26 minimum. The couplings shall have tensile breaking strength ranges as noted below; and shall be of the type as shown on the Plans:

Type A	17,000 – 21,000 lb (75 – 93 kN)
Type B	47,000 – 57,000 lb (209 – 253 kN)

This steel shall conform to the requirements of the current ASTM designation A-370.

The couplings shall be clean, dry and free from any foreign material and shall be primed and coated with a suitable paint which shall be baked or fused with a polyurethane additive. The color of the coating shall be as follows:

Type A	Yellow
Type B	Red

Chipped areas on the coating surface shall be repaired. All threaded surfaces, after coating, shall be cleaned to all them to function properly.

Brackets shall be made from aluminum alloy 6061 T-6 or an equivalent material. Upper brackets shall incorporate the load concentrating member or bass which shall be made from the following material:

Type A	Aluminum alloy 6061 T-6 or equivalent as part of brackets
Type B	Stainless steel 416 or equivalent ASTM A582-Rockwell C35-C45

The type of bass shall be as shown on the Plans.

Location holes for the breakaway coupling shall be accurately positioned relative to the load concentrating member in accordance with the Engineer's requirements. All Brackets shall be permanently labeled with bracket number to reflect the hole positioning.

Hinge Plates shall be made from alloy steel which conforms to AISI 4340, 4130 or an equivalent material and shall have a minimum tensile yield stress of 90,000 psi (620 MPa). The hinge plates shall have tensile breaking strength ranges as follows:

HI-10	11,450 – 13,900 lb (50.9 – 61.8 kN)
HI-1	16,400 – 19,700 lb (72.9 – 87.6 kN)
HI-2	6,700 – 8,100 lb (29.8 – 36.0 kN)

Nuts, Bolts and Cap Screws shall meet AASHTO M 164 (m 164M). All nuts, bolts and cap screws shall be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per AASHTO M232/M 232M.

Construction Methods:

Working Drawings. Working drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Minor variations in details may be permitted; however, any major departure from the design will not be accepted.

Fabrications. Loading, transporting, unloading and erection of structural materials shall be done so that the metal will be kept clean and free from injury in handling.

Structural materials shall be stored above the ground upon platforms, skid or other supports and shall be kept free from accumulation of dirt, oil, acids or other foreign matter.

Structural material which has been deformed shall be straightened before being laid out, punched, drilled or otherwise worked upon in the shop. Sharp kinks or bends will be cause for rejection.

When sign support structures are subcontracted, the subcontract shall be in accordance with Subsection 108.01 of the Standard Specifications except that the value of the subcontract will be based on the value of the work for fabrication.

Repair Galvanizing. Galvanized areas damaged during shipping or erection shall be repaired by any of the three methods specified under ASTM A780. In all cases, the repair shall achieve the minimum coating thickness specified.

Erection. Material shall not be dropped, thrown or dragged over the ground. The Contractor shall supply detailed, written instructions and drawings for the erection of all sign structure components.

Method of Measurement:

The quantity of supplying ground mount breakaway type sign posts and breakaway assemblies will be measured as linear feet for the length and size of ground mount breakaway sign post furnished as specified and accepted.

Basis of Payment:

The quantity of supplying ground mount breakaway type sign posts and breakaway assemblies will be paid for at the Contract unit price per linear feet for the length and size of ground mount breakaway sign post specified. Price and payment will constitute full compensation for furnishing hinge plates, breakaway couplings, nuts, bolts and cap screws and all other materials for the sign posts and breakaway assemblies in accordance with the details and notes shown on the Plans, and as directed by the Engineer; and for all labor, equipment, tools and incidentals necessary to complete the work.

3/6/08

749550 - INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS
749551 -REMOVAL OF BREAKAWAY I-BEAM SIGN POSTS

Description:

This work consists of installing or removing breakaway I-beam sign posts and breakaway assemblies on sign bases previously installed or installed under other items in this contract.

Materials:

Steel I-beams and all mounting hardware to be used will be paid for under other items of this contract or may be furnished by the Department. The supply of the material will be designated in the job order. All I-beams will be cut to the correct length and marked for the area they are to be installed.

Construction Methods:

The I-beams are to be installed in a manner as not to damage the base that the I-beam is to be installed on and care taken to not interfere with overhead utility lines.

When re-installing an existing sign post and breakaway assemblies, removal of broken couplings and bolts in existing I-beams and removal of broken anchor bolts in existing bases shall be considered part of this item.

Where an existing sign has been knocked down, this item will pay for the repair of breakaway couplings and standing up the existing sign. No additional compensation will be made for removal or installation of sign unless a new sign is required.

In the removal of the I-beams, all hardware is to be returned to the Department at the Dover Sign Shop.

Method of Measurement:

The quantity of installation or removal of breakaway posts and breakaway assemblies will be measured as the number of breakaway posts and breakaway assemblies installed as specified, complete and in place, or removed and returned to the Department at the Dover Sign Shop.

Basis of Payment:

The quantity of installation or removal of breakaway posts and breakaway assemblies will be paid for at the contract unit price per each. Price and payment will constitute full compensations for all labor, equipment, tools, and incidentals required to complete the work.

10/26/05

749559 - SUPPLY OF JERSEY BARRIER MOUNTED I-BEAM

Description:

This work consists of furnishing all Jersey barrier mounted tubular steel 6"x4"x1/4" type sign posts in conformance with the details and notes shown on the Plans, and as directed by the Engineer. The supply and installation of breakaway support systems, hinge plates and couplings used with the TS-6"x4"x1/4" post shall be paid for under the applicable items.

Materials:

All prefabricated tubing shall conform to ASTM A500 grade C with Fy minimum – 50 KSI.

All miscellaneous plate material for base plates shall conform to ASTM A709 grade 50 with Fy minimum – 50 KSI.

Anchor bolts shall conform to ASTM A709 grade 50 with 50 KSI minimum yield strength and be hot-dipped galvanized. Welding to high strength anchor bolts will not be permitted.

All structural steel shall be hot-dipped galvanized in accordance with AASHTO M III (ASTM A-123).

Construction Methods:

Working Drawings. Working drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Minor variations in details may be permitted; however, any major departure from the design will not be accepted.

Fabrications. Loading, transporting, unloading and erection of structural materials shall be done so that the metal will be kept clean and free from injury in handling.

Structural materials shall be stored above the ground upon platforms, skid or other supports and shall be kept free from accumulation of dirt, oil, acids or other foreign matter.

Structural material which has been deformed shall be straightened before being laid out, punched, drilled or otherwise worked upon in the shop. Sharp kinks or bends will be cause for rejection.

When sign support structures are subcontracted, the subcontract shall be in accordance with Subsection 108.01 of the Standard Specifications except that the value of the subcontract will be based on the value of the work for fabrication.

Repair Galvanizing. Galvanized areas damaged during shipping or erection shall be repaired by any of the three methods specified under ASTM A780. In all cases, the repair shall achieve the minimum coating thickness specified.

Erection. Material shall not be dropped, thrown or dragged over the ground. The Contractor shall supply detailed, written instructions and drawings for the erection of all sign structure components.

Method of Measurement:

The quantity of furnishing the 6"x4"x1/4" tubular steel post will be measured as each for the barrier mounted sign post furnished as specified and accepted.

Basis of Payment:

The quantity of furnishing the 6"x4"x1/4" tubular steel post will be paid for at the Contract unit price per each tubular steel 6"x4"x1/4" sign post. Price and payment will constitute full compensation for furnishing the sign posts and in accordance with the details and notes shown on the Plans, and as directed by the Engineer; and for all labor, equipment, tools and incidentals necessary to complete the work.

3/10/14

749560 - INSTALLATION OF JERSEY BARRIER MOUNTED I-BEAM

Description:

This work consists of the installation of the Jersey barrier mounted 6"x4"x1/4" tubular steel post in conformance with the details and notes shown on the Plans, and as directed by the Engineer. This is inclusive of the mounting plates, hardware and necessary adhesives.

Materials:

All prefabricated tubing shall conform to ASTM A500 grade C with Fy minimum – 50 KSI. The 6"x4"x1/4" tubular steel post shall be furnished as per Item 749559 – Supply of Jersey Barrier Mounted I-Beam.

All miscellaneous plate material for base plates shall conform to ASTM A709 grade 50 with Fy minimum – 50 KSI.

Anchor bolts shall conform to ASTM A709 grade 50 with 50 KSI minimum yield strength and be hot-dipped galvanized. Welding to high strength anchor bolts will not be permitted.

All structural steel shall be hot-dipped galvanized in accordance with AASHTO M III (ASTM A-123).

The adhesive anchor bolt system shall be capable of providing the following unfactored load capacity simultaneously:

Tension = 4 kips/ BOLT MIN.
Shear = 0.7 kips/BOLT MIN.

Minimum number of bolts, diameter and embedment depths shown on the plans shall be maintained.

Construction Methods:

Working Drawings. Working drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Minor variations in details may be permitted; however, any major departure from the design will not be accepted.

Method of Measurement:

The quantity of installing the 6"x4"x1/4" tubular steel post will be measured per each as specified and accepted. The supply of the actual Jersey barrier mounted the 6"x4"x1/4" tubular steel post will be paid separately by Item # 749559.

Basis of Payment:

The quantity of installing the 6"x4"x1/4" tubular steel post will be paid for at the contract unit price per each. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required.

3/10/14

749561 - INSTALLATION OF SIGN ON JERSEY BARRIER MOUNTED I-BEAM
749562 - REMOVAL OF SIGN FROM JERSEY BARRIER MOUNTED I-BEAM

Description:

This item consists of installing or removing a sign on jersey barrier mounted posts. The sign may be mounted to existing supports or ones installed under this contract.

Materials:

All materials shall be either supplied by the Contractor or by the Department as indicated in the job order.

Construction Methods:

Sign installation shall be performed as specified by the Engineer.

Method of Measurement:

The quantity of installation or removal of signs will be measured by the square footage of the signs installed or removed as per these specifications, complete, in place and accepted or removed and returned to the Department at the Dover Sign Shop.

Basis of Payment:

The quantity of installation or removal of signs will be paid for at the contract unit price per square feet. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

3/10/14

749574 - SIGN PANEL, ADVANCED NOTICE SIGNS

Description:

This work consists of furnishing all materials, fabrication, and erection of new sheet aluminum sign panels, complete with demountable copy, connections to supports, and other incidentals as are shown on the plans, or described in the special provisions. The item also includes removing and disposing of sign panels following their use as directed by the Engineer. This item is to be used for the temporary special maintenance of traffic signs, as shown on the plans.

Design:

Sign panels and their connections to supports shall be designed for applicable loadings and allowable stresses specified for supports. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions.

Sheet Aluminum:

Sign panel sections shall be fabricated of standard width, readily available, aluminum sheets not less than 3'-0" wide and not more than 5'-6" wide, except that not more than one sheet of 2'-0" minimum width will be permitted.

Sections 12' and under: Sign panel sections including those over 12' in height shall run from the top edge to the bottom edge of the sign face without horizontal joints in the aluminum sheets.

Sections 12' and Over: Sign panel sections over 12' in height shall be fabricated of two or more sheets with horizontal joints which butt and fasten securely together and may be disassembled for simplified handling and erection in the field. Each horizontal joint in sign panel sheets shall be located at point of contraflexure in the sign face.

Fasteners and Backing Strips: Sign panel sections shall be provided with suitable fastenings, as shown on the Plans, to permit easy attachment to the supporting frames and these fastenings shall be so designed as to carry the full design load with a factor of safety of 1.6 against the minimum yield stress of the materials.

Sign panel sections shall be provided with backing strips at the joints, held firmly in place to keep the abutting panel sections in proper alignment. All sign panel fastenings and backing strips, excepting the fastening of letters, symbols and border to the sign face, shall be applied without causing visible projections or indentations on the sign face. Each sign panel section shall be designed to engage and hang from two or more horizontal structural members of the supporting frame. The method of fastening to obtain secure close butt joints between panels may vary as recommended by the fabricator. Shop drawings will be required showing proposed method of attachment for approval of the Engineer.

Supporting Frame: The supporting sign frame shall consist of horizontal and vertical stringers as shown on the Plans. The horizontal members of the supporting sign frame shall be fabricated of new material in one piece. Where large signs necessitate splicing the stringers, such splices shall be located at points of contraflexure and shall be held to a minimum, but splice must develop full section of member.

Materials:

All sign sheeting shall be type 3 material, reference 3M. The sign sheeting shall be wide angle, prismatic, retroreflective sheeting. The coefficients of retroreflection, Ra, shall not be less than the minimum values specified in the following table when tested in accordance with ASTM E 810 except that the angle of rotation shall be as specified:

Minimum Coefficient of Retroreflection R_A
(Candelas per lux per square meter)

Observation Angle°	Entrance Angle°	White	Yellow	Blue	Green
0.20	-4	430	350	20	45
0.33	-4	300	250	15	33
0.50	-4	250	200	10	25
1.00	-4	80	65	4	10
0.20	30	235	190	11	24
0.33	30	150	130	7	18
0.50	30	170	140	7	19
1.00	30	50	40	2.5	5
0.20	40*	150	125	6	15
0.33	40*	85	75	4	8
0.50	40*	35	30	1.5	3.5
1.00	40*	20	17	0.7	2.0

*To be measured at 90_ rotation

Sheet Aluminum:

Sign panels shall be of the aluminum sheet type conforming to ASTM Designation B209 (alloy 6061-T6 or 5052-H38). The minimum panel sheet thickness shall be 0.125". Stringers or horizontal structural sign supporting members and vertical connections shall be fabricated of 6061-T6 or 6062-T6 ASTM B221 aluminum alloy. All sign panels shall be fully reflectorized unless otherwise indicated on the Plans.

Where aluminum studs welded to the sign sheet material are shown on the Plans, stud material shall be ASTM B316 aluminum alloy 1100-H18 welded to the sign sheets by the capacitor discharge method. All sign hardware shall be stainless steel or galvanized steel or 2024-T4 aluminum alloy ASTM B211 or ASTM B221. Hardware for attachment to overhead members shall be Type 304 passivated stainless steel, except that stainless steel lockwashers shall be Type 302 stainless steel alloy. Steelshapes for Connection to the sign support structure shall conform to the requirements of ASTM AASHTO M270 Grade 36 (Grade 250) and galvanized to the requirements of ASTM Designation A123.

Sheet Aluminum:

The front faces of the sign panels shall be degreased by one of the following methods:

1. Vapor degreasing by total immersion in a saturated vapor of trichlorethylene or perchloroethylene. Trademark printing shall be removed with lacquer thinner or by a controlled alkaline cleaning system.
2. Alkaline degreasing by total immersion in a tank containing alkaline solutions controlled and titrated to the solution manufacturer's specification. Rinse thoroughly with clean running water.

Immersion time shall depend upon the amount of grease or dirt present and the gage of the metal, and shall be sufficient to effect complete removal of all corrosion, white rust, and dirt.

Following degreasing, the front faces shall be etched by one of the following methods:

1. Acid etching in a 6 to 8 percent phosphoric acid solution at 100°F, or proprietary acid etching solution. Rinse thoroughly with cold, then hot running water.
2. Alkaline etching in an approved alkaline etching material that is controlled by titration. The etching time, temperature, and concentration shall be as specified by the solution manufacturer. Smut shall be removed with an acidic chromium compound type solution as specified by the solution manufacturer, and shall be rinsed thoroughly with clean running water.

The surface etch shall provide a clean mat, or non-glare finish, suitable for the application of the retroreflective sheeting. This finish shall also be suitable for the uncovered reverse sides of the signs. Any protective film or coating applied to resulting from chemical action on the aluminum surface shall be light, tight, and free from all powdery residue.

As an alternate to the above etching systems, any one of the following metal preparation systems, employing a chemical conversions coating, may be used providing it complies fully with the recommendations and specifications furnished by the respective preparation manufacturer:

1. "Alodine" 1200 or 1200S, by Amchem Products, Inc.
2. "Bonderite" 723 with Process Specification No. 249, by Parker Rust Proof Company.
3. "Chromicoat", by Oakite Products, Inc.
4. Other approved system(s), producing a conversion coat meeting the requirements of Military Specification MIL-C-5541.

Alternate coats shall be light, tight, and free from any powdery residue.

After degreasing and etching, the panels shall be dried by the use of forced, hot air.

Panels shall not be handled except by device or clean canvas gloves, from the time degreasing is started to the time of application of retroreflective sheeting, nor shall contaminants be permitted to come into contact with the panels during that period.

Construction Methods:

Sign Face Finishing: All retroreflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of retroreflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's recommendations. Retroreflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall be those of the publication titled "Standard Alphabets for Highways Signs" of the Federal Highway Administration.

Working drawings shall be prepared by the Contractor which clearly indicate the proposed spacing of the letters and the locations and arrangements of symbols and borders.

After the panel has been degreased and etched, the retroreflective sheeting shall be applied by a method described elsewhere in these Special Provisions. No sheeting shall be applied when the temperature is less than 50°F.

Whenever it is necessary to construct the background of a sign face with two or more pieces of retroreflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of retroreflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of retroreflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of retroreflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between retroreflective sheeting sections shall either butt or overlap no more than 3/8". Horizontal joints between retroreflective sheeting sections shall not be allowed.

Sign Panel Erection: Signs shall be slip-sheeted, packed, and shipped in such manner as to ensure arrival at their respective places of erection in an undamaged condition. All signs arriving at the erection site(s) in a condition which in the opinion of the Engineer, renders them unsuitable for use, shall be removed and replaced by the Contractor at his sole expense. Sign Panels shall not be shipped for erection in such a manner that results in horizontal joints of the retroreflective sheeting.

It is not anticipated that there will be any sign panels which are required to be mounted whose messages will be inappropriate to the guiding of traffic at the time of sign erection. However, in the event that the Engineer determines that certain sign messages are inappropriate, the panels of such signs shall be covered by an opaque material, until such time as the sign messages become appropriate. The covering material and the manner of securing the material to the sign panel(s), shall meet with the approval of the Engineer. The Engineer will indicate to the Contractor which signs, if any, must be covered, and when to remove the covers.

Sign Covers: Sign covers shall be 10 ounce cotton duck conforming to ASTM D-320, Army Duck, and dyed to a dark green approximating the green for sign backgrounds.

Identification Tags: The Contractor shall furnish and place identification tags or decals which state the Contract number, month and year of erection on the lower reverse side of the panel, near the point closest to the roadway shoulder.

Sign posts and Temporary Sign Stands: Use only approved sign posts to permanently mount signs facing traffic when required for more than three consecutive calendar days;

- a. Install sign posts in accordance with the manufacturer's instructions;
- b. Temporary sign stands for signs facing traffic for a period longer than three calendar days may be used only in the following situations:
 - i. To avoid drilling through permanent concrete to ground mount signs placed on concrete islands in the median of a divided highway or other similar locations. Proper ballasting material is required;
 - ii. A documented utility conflict exists and field adjustments to the sign location cannot be made. Proper ballasting material is required. Provide documentation of the utility conflict to the Engineer prior to using temporary sign stands;
 - iii. Other unforeseen situations as approved by the Traffic Safety Section.

Method of Measurement:

The quantity of sign panels will be measured as the actual number of square feet (meters) of front sign face surface area of all sign panels construction, installed and accepted. The area will be computed from the maximum width and height dimensions of each sign panel, as shown on the Plans, or on the approved sign panel shop drawings, (verified by field measurements). All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding of corners.

Basis of Payment:

The quantity of sign panel will be paid for at the contract unit price per square foot (meter). Price and payment will constitute full compensation for furnishing, fabricating, and erecting sign panels complete in place and accepted, maintaining, relocating warning signs, and any temporary sign supports, with retroreflective materials, copy, symbols, borders, connections to supports, degreasing, etching, covering, uncovering, removing and disposing of sign panels where necessary, and for all labor, materials, tools, equipment, and incidentals required to complete the item. Furnishing of sign posts and temporary sign stands shall be included in the unit cost. During construction, sign panels may be required to be relocated. The cost to relocate and remove these sign panels shall be included in the unit cost.

3/10/14

749687 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST

Description:

This work consists of installing or removing traffic sign(s) on a single post or other type of pole at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 - Installation or Removal of Traffic Sign on Multiple Sign Posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project

Method of Measurement:

The number of single sign installations or removals will be measured as the actual number of signs installed or removed and accepted.

Basis of Payment:

The quantity of single sign post installations or removals will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed in accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

749690 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON MULTIPLE SIGN POSTS

Description:

This work consists of installing or removing traffic sign(s) on multiple sign posts at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in holes installed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than 48 inches shall be mounted on two (2) posts. Signs with a length greater than or equal to 78 inches shall be mounted on three (3) sign posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project..

Method of Measurement:

The number of sign installations or removals will be measured as the total square foot of the sign(s) installed or removed and accepted.

Basis of Payment:

The quantity of sign installations or removals will be paid for at the Contract unit price per square foot. Price and Payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

759502 - FIELD OFFICE, SPECIAL I

Description:

The field office work shall consist of furnishing, erecting, equipping, maintaining, and removing a doublewide modular office and adjacent parking area. Equivalent rented space may be substituted for the modular field office and its parking area as approved by the Engineer. Rented space may be no more than one mile from the project limits. The Contractor shall submit a specific location layout drawing and construction details for the proposed field office and its parking area for approval by the Engineer. The field office and parking area shall be for the exclusive use of Department Officials, Engineers, Designers, North Region Construction (NRC) Personnel, Consultants, and Inspectors.

The field office structure shall be free of asbestos and/or other hazardous materials. The field office and its parking area shall be constructed and installed in accordance with all applicable city, county, state, and federal codes. The Contractor shall be responsible for obtaining all required licenses and permits for installation and placement of the field office and its parking area. The costs of obtaining such licenses and permits to be incidental to the "Field Office, Special I" Item. The field office shall be available for use by the Department continuously throughout the duration of the project.

Construction and Equipment:

The double wide field office shall be new and have a minimum floor space of 1,200 square feet with minimum exterior dimensions of 50'-0" length by 24'-0" width. The floor to ceiling height shall be nominal 8'-0". The exterior walls, ceiling, and floor shall be insulated. The field office shall be of weather-proof construction, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, safely secured to its support if the support is an inground anchored foundation or otherwise by tie-downs to the ground, and fully skirted with rigid watertight covering overlapping the bottom of the exterior siding to the existing ground.

The Contractor shall provide entries to the field office by constructing a stair and deck platform with canopy at each exterior door. Each entry shall have an exterior light. These entries shall be fabricated using treated dimension lumber, be constructed with hand and safety railing, be designed to last the life of the Contract, and conform to the requirements of the Architectural Accessibility Board and other federal, state and local boards, bodies and/or courts having jurisdiction in the Contract limits.

The Contractor shall construct and maintain an all weather parking area adjacent to the office of at least 5000 square feet and having a minimum of 10 functional parking spaces striped for full size cars. Lighting of the parking area shall be provided. All weather pathways from the parking area to the entrances of the field office shall also be constructed and maintained. This parking area and entrance pathways shall have a minimum of 2" type "C" hot mix on top of minimum 6" graded aggregate subbase. Snow and/or ice shall be removed from the parking area and from the entrance pathways to the field office within 12 hours after each occurrence. Costs for furnishing, placing, and maintaining the aggregate base and hot mix, and for snow and/or ice removal, to be incidental to the Field Office, Special I" Item.

The ground area 30'-0" from around the perimeter of the field office to the field office shall be landscaped and maintained. If the earthen grounds do not have a stand of weed free grass, the surface of this area shall be loosened to a depth of 4" and a satisfactory seedbed shall be prepared free of debris and extraneous matter. The area shall be seeded to a healthy stand of grass or sodded, after which the area shall be watered, mowed, and trimmed a minimum of three times a month during the growing seasons. Cost for this landscaping and maintenance to be incidental to the "Field Office, Special I" Item.

The field office shall have full carpeting, kitchenette facilities, interior paneling, lighting, and plumbing fixtures. The field office shall have a minimum of two (2) exterior doors, each door having a passage and a deadbolt lock. These door locks shall be keyed alike and at least 2 complete sets of keys shall be supplied to

the Engineer's representatives. The exterior doors shall be insulated or have storm doors. The field office shall have a minimum of six (6) windows, each window having a minimum glass area of 1150 square inches and a horizontal mini-blind covering the full glass area. The windows shall be insulated or have storm windows. All windows shall be equipped with a locking device. All doors and windows shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at the field office. Each water connection shall have a 3/4" frost proof hose bib with vacuum breaker and shall include 100 linear feet of 5/8" minimum diameter reinforced, industrial or commercial grade, and soft rubber hose with spray nozzle per connection.

The field office shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

The field office shall have satisfactory lighting, electrical outlets, heating equipment, exhaust fan, and air-conditioning connected to an operational power source. Plan and drawing areas shall have individual fluorescent lights situated over their worktables. Replacement fluorescent lights shall be furnished as required. Electrical current, water, and any fuel for heating equipment shall be furnished and the cost of such shall be borne by the Contractor. Maintenance of the heating, exhaust fan, and air-conditioning equipment shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

The Contractor shall furnish and maintain two fire extinguishers and provide one lighted "Exit" sign for each exterior passage door. Fire extinguisher(s) may be chemical or dry powder and shall be UL Classification 10-B:C(min.) and shall be suitable for Types A:B:C fires. A commercial or industrial type first aid and safety kit suitable for project conditions and hazards (including snakebite) shall be provided and maintained to full capacity on a monthly basis.

The Contractor shall provide an alarm system for field office security with electronic, direct connection to a security service provider. The security system shall have interior motion, window, and entrance detectors and built in manual fire alarm. All windows of the field office shall be covered with steel bar grids as a deterrent to forced entry. The Contractor shall provide validated monitoring and service contracts for the length of the Contract. These contracts shall allow a Department authorized project person to deal directly with the security service provider to request service and/or repair.

The Contractor shall furnish and maintain an adequate supply of cold potable water, a minimum 23 cubic foot new refrigerator, and a minimum 900-watt new microwave oven. Maintenance of the potable water supply equipment, refrigerator, and microwave shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

Suitable indoor toilet facilities, conforming to the requirements of the State and Local Boards of Health or of other bodies or courts having jurisdiction in the area, shall be provided. Signs indicating the toilet facilities as being for Men, Women, or Unisex shall be placed on the door and an adequate positive locking system shall be provided on the inside of the doorway to insure privacy. The facility(s) shall be maintained by the Contractor to be clean and in good working condition and shall be stocked by the Contractor with adequate lavatory and sanitary supplies at all times during the period of the Contract.

The Contractor shall be responsible for performing or for making arrangements for all necessary telephone connections and for their maintenance; for providing a new telephone equipment system, for payment of all connections and the new telephone system equipment and its installation; and for final disconnection of the telephones.

The telephone system for the field office shall have a total of 6 lines consisting of 5 direct single lines with call forward busy feature and 1 dedicated facsimile line and have 8 key sets consisting of 1 master key set having privacy feature, and 6 six-button key sets having privacy feature (1 set which may be for wall mounting)

and 1 TLS or T1 circuit line for data transmission, all for the official and exclusive use of the Engineer and other representatives of the Department. Location of telephone lines and key sets shall be as directed by the Engineer. Arrangement shall be made to allow a Department authorized project person to deal directly with the telephone company to report outages and/or request repair. The Contractor shall arrange for the installation and initial setup of the specified telephone system including phone company provision of a termination point with smart-jack. Initial installation and setup costs shall be the responsibility of the Contractor as well. All subsequent monthly billings, after initial installation and setup, for the field office telephone system and the TLS or T1 circuit line shall be received and paid by the Contractor. A copy of each of these subsequent bills shall be forwarded to the Project Resident for reimbursement on the contract pay estimate and the reimbursement will be for the amount of the bill only and shall not include any additional mark-up or profit.

For all other utilities, the Contractor shall be responsible for performing or for making arrangements for all necessary utility connections and for their maintenance; for payment of all utility connections, installations, service fees and bills; and for final disconnection of utilities.

The field office interior shall be furnished by the Contractor. The Contractor shall provide new and maintain the following office furnishings, all which are to be approved by the Engineer prior to installation in the field office. Placement of these furnishings shall be as directed by the Engineer. These furnishings consist of 2 drafting tables with sufficient drawers for standard size plans either attached to the tables or in cabinet form each drafting table to have a fully adjustable ergonomic design spring back stool with five leg base having wheel casters, 6 full size office desks each with filing drawer and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 1 computer station with acoustical panels having minimum 60 NRC rating for privacy screen and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 1 large conference table for a minimum of 12 people with surrounding chairs with armrests, 2 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 1 work table, 1 supply cabinet, 2 rough plan racks, 2 legal size filing cabinets with 4 drawers, 2 legal size fire-resistant filing cabinets with lock and key with 4 drawers and meeting fire underwriters' approval for not less than one hour test, 2 stackable steel flat file cabinets for 43" by 32" size plan sheets each cabinet having 5 drawers with full suspension, rear hood, and hinged front depressor, 2 book shelves minimum 3'- 6" by 4'- 6", 3 vertical surface legal size three compartment pockets, 2 dry erase boards minimum 4' by 3' each with markers and erasers, and 2 cork bulletin boards minimum height 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

The Contractor shall also furnish new and maintain the following office equipment for the field office, all which are to be approved by the Engineer prior to installation. Location of the office equipment shall be as directed by the Engineer. The required equipment will enable the Department to synchronize project record keeping and office functions. The equipment shall be delivered in working and useable condition:

4 heavy-duty calculators having extra large 12-digit fluorescent display, full size keyboard with contoured keys, two-color ribbon printer, and AC powered;

1 Muratec MFX-2855D or Toshiba e-STUDIO 2330c or approved equal all-in-one copier which includes scanner, printer, and fax. Copier to have high speed wireless and network capability. Copier shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on a local network. Copier to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity with automatic stapling capacity;

1 compact plain paper copying machine and cabinet with stationary platen, bypass feeding, and dual loading cassette system with cassettes for letter, legal, and ledger size paper. Copy machine to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity, and 20 bin collator with automatic stapling capacity;

1 micro cassette recorder, having fast playback, voice-activated system, three-digit tape counter, silent auto-stop and pause, two tape speeds, one-touch and follow-up, built-in condenser microphone, cue and review, and rechargeable with combination battery charger/AC adapter;

1 telephone answering machine having all-digital recording, 14 minute message capacity, selectable message time, voice prompt assistance, day/time stamp, call screening, two-digit LED message indicator, toll saver, power failure memory back-up, and message interrupt from any station;

6 compact digital cameras with 10 megapixels or greater, maximum dimensions of 3" x 5" x 3, built in flash, autofocus, video mode LCD for review of images, LCD viewfinder acceptable, removable memory compatible with compact flash, or secure digital (SD) or secure digital high capacity (SDHC), ISO compatible with 100, 200, 400 standard of quality of better, and memory cards supported by camera of 8 GB or better;

1 Canon Vixia HF M300, Panasonic HDC SD60, Samsung HMX-R10 or approved equal digital video camera, 1080p, CMOS optical sensor, digital format H.264, digital photo mode, camcorder sensor resolution 3.2 mega-pixels or greater, SD memory expansion card for still images, connection type, HDMI, USB, component video/audio output;

1 video projector, DLP projector, resolution of 1280x720 or greater, 16.7 million colors, contrast ratios of minimum 2000:1 or greater, video inputs to include SVGA, HDMI, S-Video and RGB, component, video modes minimum 720p or greater;

1 heavy duty 3-hole punch with minimum 40 sheet capacity;

1 extra heavy duty stapler with anti-jam feature having capacity up to 200 sheets; and

1 comb binding machine with manual punching capacity of 10 sheets having a minimum binding capacity of 150 sheets.

Consumables as required to manage the business of the project for the field office shall be provided for all office equipment for the length of the Contract. These consumables shall be furnished on request and shall include but not be limited to paper, tapes, ribbons, various size plastic combs, rolls, toner, cleaning kits, microcassette tapes and batteries, answering machine cassettes, camera batteries and memory cards/sticks, DVD and CD R/RW media, printer ink cartridges, etc.

Maintenance of all office equipment shall be provided for by a validated service contract for the length of the Contract. This service contract shall allow a Department authorized project person to deal directly with the service organization to request repair.

Computer Requirements for the Field Office:

Included in the unit price bid per month for the Field Office on this project will be three (3) IBM compatible Microcomputer Systems both which will be furnished and maintained by the Contractor for use by the Engineer. The specified computer systems will synchronize the construction management functions of the Department to monitor, report, and perform the accounting of the project work. The computer systems and all their related equipment specified below shall be furnished new and remain the property of the Contractor at the conclusion of the Contract. A detailed listing of the proposed computer systems and all their related equipment to be provided by the Contractor shall be submitted for approval by the Engineer prior to furnishing the Microcomputer Systems. The Microcomputer Systems shall be Laptop Computer Systems each with docking station. Each of the three (3) Microcomputer Systems shall consist of:

Central Processing Unit (CPU) – Lap Top

Intel Core i5 or Core i7 series processor and wireless networking capability included,

Minimum 4.0 GB RAM with expansion capability to at least 8.0 GB, and

Microsoft "Windows® 7 Professional with 64 bit support operating system with latest updates;

Memory (Storage)

DVD+RW or Blue Ray BD-RE (rewritable) drive with support for DVD RW support capability, and 120GB hard drive minimum, integrated Ethernet 10/100. Included software shall support system and data backups with the DVD/Blue Ray device using double/dual layer DVD discs;

Monitor (LCD)

Monitor for docking station and docking station. 21" minimum diagonal visual area flat panel capable of multiple frequency color graphics, 1440x900(wide) or 1280x1024 or better resolution, 16.7 million display colors, 5 ms response time, D-Sub and DVI video input ports and

Laptop - shall have 15.4" diagonal display minimum;

Color Graphics Card

PCIe video card or integrated video;

Keyboard

Keyboard shall be ergonomic, enhanced layout minimum with keyboard interface cable;

Printer

Laser printer, color, capable of printing 8-1/2"x 11", 11"x17" and envelope, having wireless and hard line network connectivity, printers shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on a local network;

Software

The latest version programs for application management (operating system), word processing, spreadsheet, and anti-virus shall be provided with all user manuals. Upgrades, maintenance, and full technical support by the manufacturer shall be provided for the length of the Contract. The required software will enable the Department to synchronize accounting and record keeping functions between the project, District, and Department offices. A list of programs to be provided shall be submitted to the Engineer for approval. Software, other than for application management and anti-virus, is to be delivered unopened to the Department's administrative office. All software is to be compatible with and for use to run on "Windows® 7 Professional" or "Windows® XP Professional". The required applications software follows and is to be latest version unless noted:

collection - "Office 2010 Business Professional" with Word, Excel,

antivirus - "Norton™,

schedule - Primavera Project Planner® version 3.1 SP3 or latest,

replication - Adobe Acrobat X Suite Software w/Adobe Photoshop® CS5 suite, and

software - supporting creation of DVD +/- R/RW disks (supporting double layer media writing) and DVDR and DVDRW disks using DVDRW drive, for example: Ahead Nero, Roxio DVD/CD Creator, or some equivalent product. Note: software commonly included as part of the standard CDRW upgrade/standalone package is acceptable if included with the unit,

An electrical outlet with dedicated circuit for the main computer unit,

A wireless optical mouse with proper driving software having complete Microsoft emulation,

Necessary cables for proper operation,

24 bit Sound Blaster compatible PCI soundcard with quality desktop speakers,

A combination surge, spike, and noise protection device with receptacles for all peripherals (may be in combination with the UPS power supply),

A wrist rest suitable for use with the furnished keyboard, and

All cards, hardware, and operating, anti-virus, and equipment software to be fully installed and operational;

Related Equipment

Wireless networking hub/router, 802.11g or better with all associated hardware (adapters, cables, etc) and software to enable wireless networking for resource/equipment sharing among all office computers and printers, the cost of wireless and network connections and service to be incidental to the "Field Office, Special I" Item, and

An uninterruptible power supply (UPS) units for protection from power loss or fluctuation, minimum of 6 outlets, adequate to provide a minimum of 30 minutes backup power for an orderly shutdown of the computer system with software and connections for automatic system shutdown;

Maintenance and Service

Maintenance of all specified equipment and components shall be provided for by a validated service agreement for the length of the Contract. Maintenance (upgrades, replacement, and full technical support) for each software application shall be provided for by a validated maintenance agreement for the length of the Contract. These agreements shall allow an authorized project person to deal directly with the service organization to request repair or the maintenance organization to request assistance; and

Supplies

Consumables as required to manage the business of the project shall be provided for the Microcomputer Systems in the field office for the length of the Contract. These consumables shall be furnished on request and include but not be limited to memory cards/sticks compatible with provided digital cameras having 8 GB or greater capacity and compatible with provided computers, DVDR and DVDRW media compatible supporting operational minimum to maximum speed of the DVD/RW drive unit, cut sheet paper and labels compatible with the printers, hardware and screen cleaners, printer ink cartridges, and toner cartridges.

Maintenance of the field office including its entrance and adjacent parking area, for the time required, shall consist of maintenance and/or replacement of all provided items, security system, furniture and equipment, computer systems, providing lavatory supplies, providing trash containers and waste baskets, providing entrance mats at each door, providing replacement items for lighting fixtures, maintaining all utilities, providing satisfactory and sanitary janitorial and waste disposal services twice a week, providing cleanup of trash and debris on the parking lot and landscaped area once a week, and shall be included in the monthly unit cost.

The Contractor shall provide and deliver a current copy of all validated field office, equipment, and computer maintenance, service, assistance and/or monitoring agreements and/or contracts as mentioned hereinabove to the Department's administrative office on or before the first day the field office is ready for use.

Method of Measurement:

This item will not be measured but will be paid for on a monthly basis. Partial months will be paid at the rate of 0.033 months per day.

Basis of Payment:

The field office will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified, obtaining all licenses and permits, and furnishing of all materials, labor, tools, equipment and incidentals necessary to maintain the field office and its adjacent parking area and restore the field office area and adjacent parking area to match the original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install this field office or its parking area. One (1) unit of payment will constitute erecting, furnishing, equipping, maintaining, and removing the double wide field offices, its entrance and parking area.

Payment will be made only for the actual number of months that the office is acceptably provided by the Contractor.

Per Standard Specification subsection 108.02, the Engineer shall issue a Notice to Proceed and stipulate the date on or before which the Contractor is expected to begin work. The field office, its entrance, and parking area and all materials and equipment shall be ready for use at least seven calendar days prior to the date which the Contractor is expected to begin work as stipulated in the Notice to Proceed and before any construction operations begin. Contract time charges shall begin on the day work actually starts or on the date stipulated in the notice to proceed, whichever is earlier. There will be no delays in beginning the contract time charges due to delays in preparing the field office.

3/10/14

760507 - PROFILE MILLING, HOT-MIX
760508 - PROFILE MILLING, CONCRETE

Description:

This work consists of furnishing a pavement-milling machine or cold planer and planing the existing bituminous concrete pavement or P.C.C. Pavement at the locations and to the nominal depths shown on the Plans and/or as directed by the Engineer to obtain a smooth profile on the existing roadway surface. Unless otherwise noted on the Plans or specifications the Contractor shall reuse, salvage and/or dispose of the milled material.

Equipment:

The milling equipment shall be a commercially designed and manufactured milling machine capable of performing the work in a manner satisfactory to the Engineer. The machine shall be power-operated and self-propelled, shall have sufficient power, traction and stability to remove a thickness of material to a specified depth. In addition, the machine must accurately and automatically establish profile grades by referencing the existing pavement surface. This shall be accomplished by means of 1.) a ski of 30 (9 m) minimum length with an accuracy of ± 0.125 in 30 (3 mm in 9 m) or 2.) a minimum of three (3) ultra sonic, non-ground contacting sensors with an accuracy of ± 0.100 in 25 (2.5 mm in 7.5 m). If noted on the Plans, a profile grade shall be established independent of the existing pavement surface. In such case the machine shall be capable of following the independent grade line (e.g. string line). The machine shall have an automatic system for controlling grade elevation and cross slope. The machine shall also be equipped with a means to effectively control dust generated by the cutting operation.

Construction Methods:

The surface resulting from the planing operation shall be in accordance with notes and details on the Plans and shall be characterized by uniform, discontinuous longitudinal striations and shall not be gouged or torn. Imperfections exceeding 5/16" (8 mm) at any point along the surface as a result of missing teeth or faulty operation shall be removed by approved methods.

Before opening the milled surface to traffic, all loose material shall be removed from the surface with a power vacuum sweeper.

Whenever the milling operation causes water to pond or lay within the wheelpaths of the roadway the Contractor shall alleviate this problem by cutting bleeders into the shoulder or median to provide positive drainage. Cost for such work will be incidental to this item.

If the road is to remain open to traffic, longitudinal vertical drop-offs in excess of 2" (50 mm) at lane lines or at the centerline shall not be left overnight.

Transverse faces at the beginning and end of the milling operation existing at the end of a work period shall be tapered 20:1 or flatter in a manner approved by the Engineer to avoid a hazard for traffic.

Surface material that cannot be removed by cold planing equipment because of physical or geometrical restraints shall be removed by other methods acceptable to the Engineer.

If independent grade reference is required, it shall be designated in the Plans and/or Contract documents and elevations shall be provided by the Plans or at the direction of the Engineer.

If a severe bump exist in the pavement surface extra effort shall be taken at these locations to improve the profile. Manual changes to the cutter head may be needed at these locations to achieve this. It is the intent to remove bumps and irregularities in the pavement and produce a smooth milled surface for hot-mix resurfacing.

If the existing bituminous surface is over concrete the intent is to remove all of the existing bituminous material to the top of the concrete surface unless otherwise directed by the Plans or the Engineer.

If milling to remove open graded hot mix, the milling operation must remove all of the open graded hot mix from the roadway surface.

Method of Measurement:

The quantity of pavement milling will be measured as the number of square yards per inch (square meters per 25 mm) of depth as shown on the Plans or established by the Engineer. The nominal depth shown on the Plans and initially set on the milling machine, even though it will vary automatically during profiling, will be the depth measured and paid.

Basis of Payment:

The quantity of pavement milling will be paid for at the Contract unit price per square yard per inch (square meter per 25 mm) of depth. Price and payment will constitute full compensation for furnishing an accepted pavement-milling machine and operator, for removal and disposal of the milled material or delivery to a designated site, for transporting equipment, for all labor, tools equipment and incidentals necessary to complete the item.

5/02/02

763501 - CONSTRUCTION ENGINEERING

1) 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: Top and bottom pay limit elevations for all excavation bid items that are not field measured by Construction inspection personnel. The Contractor shall notify the Engineer when these pay limit elevations are ready and allow for a minimum of two calendar days for the Engineer to obtain the information.
- (c) Line and grade for extra work added on to the project plans.

2) 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 $[3\text{mm}+2\text{ppmxD}]$ 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 and Automatic Level 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 (DELDOT Construction Inspectors). 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. Choosing to use GPS technology does not give the contractor authority to use machine control.- Construction Engineering (GPS) Machine Control Grading shall only be used if noted in the General Notes in the plan set outlining the available files that will be provided to the Contractor and "the Release for delivery of documents in electronic form to a contractor" are signed by all parties prior to delivery of any electronic files. Only files designated in the General Notes shall be provided to the contractor. If machine control grading is allowed on the project see the "machine control" section of this specification. GPS technology and machine control technology shall not be used in the construction of bridges.

3) 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:

4) 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 verify the precision of given control points. Establishing plan coordinates and elevation 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 0.035 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 precision ratio shall have a minimum precision of 1:20,000 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 must 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 before and 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 or their designated representative, 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 utility relocations, which will be performed by others, after the Notice to Proceed has been given to the Contractor, 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.
- (h) Whenever the Engineer will be recording data for establishment of pay limits, the Contractor will be invited to obtain the data jointly with the Engineer's Survey Crew(s) in order to agree with the information. If the Contractor's representative is not able to obtain the same data, then the information obtained by the Engineer shall be considered the information to be used in computing the quantities in question.

5) 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, electronic files, and other records necessary to accomplish the work shall be made available to the Department in a neat and organized manner at any time 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. Copies of all notes must be furnished to the engineer at the completion of the project.

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 - traverse closure report.
- (e) Description of newly established benchmarks with location, elevation and closed loop survey field notes - bench closure report
- (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 borrows 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.

Machine Control Grading

This Section of the specification shall only be used if machine control is authorized for use on the project.

Description:

This specification contains the requirements for grading operations utilizing Global Positioning Systems (GPS).

Use of this procedure and equipment is intended for grading the subgrade surface; it is not intended for the use in constructing final surface grades.

The Contractor may use any manufacturer's GPS machine control equipment and system that results in achieving the grading requirements outlined in section 202 of the standard specifications. The Contractor shall convert the electronic data provided by the Department into the format required by their system. The Department will only provide the information outlined in this document and no additional electronic data will be provided.

The Contractor shall perform at least one 500 foot test section with the selected GPS system to demonstrate that the Contractor has the capabilities, knowledge, equipment, and experience to properly operate the system and meet acceptable tolerances. The engineer will evaluate and make the determination as to whether additional 500 foot test sections are required. If the Contractor fails to demonstrate this ability to the satisfaction of the Department, the Contractor shall construct the project using conventional surveying and staking methods.

Materials:

All equipment required to perform GPS machine control grading, including equipment needed by DeIDOT to verify the work, shall be provided by the Contractor and shall be able to generate end results that are in accordance with the requirements of Division 200 - EARTHWORK of the Standard Specifications.

Construction:

a. DeIDOT Responsibilities:

1. The Department will set initial vertical and horizontal control points in the field for the project as indicated in the contract documents, (plans set). If the Contractor needs to establish new control points they shall be traversed from existing control points and verified to be accurate by conventional surveying techniques.

2. The Department will provide the project specific localized coordinate system.
3. The Department will provide data in an electronic format to the Contractor as indicated in the General Notes.
 - a. The information provided shall not be considered a representation of actual conditions to be encountered during construction. Furnishing this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered including, but not limited to site visits, and basing the bid on information obtained from these investigations, and the professional interpretations and judgments of the Contractor. The Contractor shall assume the risk of error if the information is used for any purpose for which the information is not intended.
 - b. Any assumption the Contractor makes from this electronic information shall be at their risk. If the Contractor chooses to develop their own digital terrain model the Contractor shall be fully responsible for all cost, liability, accuracy and delays.
 - c. The Department will develop and provide electronic data to the Contractor for their use as part of the contract documents in a format as indicated in the General Notes. The Contractor shall independently ensure that the electronic data will function in their machine control grading system.
4. The Files that are provided were originally created with the computer software applications MicroStation (CADD software) and INROADS (civil engineering software). The data files will be provided in the native formats and other software formats described below. The contractor shall perform necessary conversion of the files for their selected grade control equipment. The Department will furnish the Contractor with the following electronic files:
 - a. CAD files
 - i. Inroads -Existing digital terrain model (.DTM)
 - ii. Inroads -Proposed digital terrain model (.DTM)
 - iii. Microstation -Proposed surface elements - triangles
 - b. Alignment Data Files:
 - i. ASCII Format
5. The Engineer shall perform spot checks of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure accurate results, the Engineer may order the Contractor to redo such work to the requirements of the contract documents, and in addition, may require the Contractor to use conventional surveying and staking, both at no additional cost to the Department.

B. Contractor's Responsibilities

1. The Contractor shall provide the Engineer with a GPS rover and Automatic Level, for use during the duration of the contract. At the end of the contract, the GPS rover and Automatic Level will be returned to the Contractor. The Contractor shall provide a total of 8 hours of formal training on the Contractor's GPS machine control system to the Engineer and up to three additional Department appointees per rover.
2. The Contractor shall review and apply the data provided by the Department to perform GPS machine control grading.

3. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to application of GPS machine control grading techniques. Grade elevation errors and associated corrections including quantity adjustments resulting from the contractor's use of GPS machine control shall be at no cost to the Department.
4. The Contractor shall convert the electronic data provided by the Department into a format compatible with their system.
5. The Contractor's manipulation of the electronic data provided by the Department shall be performed at their own risk.
6. The Contractor shall check and if necessary, recalibrate their GPS machine control system at the beginning of each workday in accordance with the manufacturer's recommendations, or more frequently as needed to meet the requirements of the project.
7. The Contractor shall meet the accuracy requirements as detailed in the Standard Specifications.
8. The Contractor shall establish secondary control points at appropriate intervals and at locations along the length of the project. These points shall be outside the project limits and/or where work is performed. These points shall be at intervals not to exceed 1000 feet. The horizontal position of these points shall be determined by conventional survey traverse and adjustments from the original baseline control points. The conventional traverse shall meet or exceed the Department's Standards. The elevation of these control points shall be established using differential leveling from the project benchmarks, forming a closed loop. A copy of all new control point information including closure report shall be provided and approved by the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the Department.
9. The Contractor shall provide stakes at all alignment control points, at every 500 foot stationing, and where required for coordination activities involving environmental agencies and utility companies at the Contractor's expense. Work that is done solely for utility companies and that is beyond the work performed under item 763501 - Construction shall follow and be paid for under item 763597 -Utility Construction Engineering.
10. The Contractor shall at a minimum set hubs at the top of finished grade at all hinge points on the cross section at 500 foot intervals on the main line and at least 4 cross sections on side roads and ramps as directed by the engineer or as shown on the plans. Placement of a minimum of 4 control points outside the limits of disturbance for the excavation of borrow pits, Stormwater Management Ponds, wetland mitigation sites etc. These control points shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.
11. The Contractor shall preserve all reference points and monuments that are identified and established by the Engineer for the project. If the Contractor fails to preserve these items the Contractor shall reestablish them at no additional cost to the Department.
12. The Contractor shall provide control points and conventional grades stakes at critical points such as, but not limited to, PC's, PT's, superelevation points, and other critical points required for the construction of drainage and roadway structures.
13. No less than 2 weeks before the scheduled preconstruction meeting, the Contractor shall submit to the Engineer for review a written machine control grading work plan which shall include the equipment type, control software manufacturer and version, and proposed location of the local GPS base station used for broadcasting differential correction data to rover units.

14. The Contractor shall follow the guidelines set forth in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" and follow a minimum of Second Order Class 1, (2-I) classification standards.

Automated equipment operations have a high reliance on accurate control networks from which to take measurements, establish positions, and verify locations and features. Therefore, a strong contract control network in the field which is the same or is strongly integrated with the project control used during the design of the contract is essential to the successful use of this technology with the proposed Digital Terrain Model (DTM). Consistent and well designed site calibration for all machine control operations (as described below under *Contract Control Plan*) are required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which horizontal and vertical control will be held for these operations. Continued incorporation of the Base Station(s) as identified in the Contract Control Plan is essential to maintaining the integrity of positional locations and elevations of features. The Contract Control Plan shall be submitted to the Department for review and approval by the Departments Survey Section 3 weeks prior to the start of any machine control work. The Contractor shall operate and maintain all elements of the Machine Grade Control continuously once the operations begin until otherwise approved by the Engineer.

Contract Control Plan:

The Contractor shall develop and submit a Contract Control Plan for all contracts which use Machine Control Grading. Contract control includes all primary and secondary horizontal and vertical control which will be used for the construction contract. Upon the Contractor's completion of the initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document (signed and sealed by the Delaware licensed Land Surveyor or Delaware Professional Engineer who oversees its preparation) for acceptance by the Engineer, which shall include the following:

1. A control network diagram of all existing horizontal and vertical control recovered in the field as contract control.
2. Include a summary of the calculated closures of the existing control network, and which control has been determined to have been disturbed or out of tolerance from its original positioning.
3. An explanation of which horizontal and vertical control points will be held for construction purposes. If necessary include all adjustments which may have been made to achieve required closures.
4. An explanation of what horizontal and vertical control (including base stations) was set to accomplish the required stakeout or automated machine operation. Include how the position of these new control points was determined.
5. Describe the proposed method and technique (technology and quality control) for utilizing the control to establish the existing and/or proposed feature location and to verify the completed feature location and/or measured quantity.
6. A listing of the horizontal and vertical datums to be used and the combined factor to be used to account for ellipsoidal reduction factor and grid scale factor.
7. If the Contractor chooses to use machine control as a method of measuring and controlling excavation, fill, material placement or grading operations as a method of measuring and controlling excavation, fill, material placement or grading operations, the Contractor Control Plan shall include the method by which the automated machine guidance system will initially be site calibrated to both the horizontal and vertical contract control, and shall describe the method and frequency of the calibration to ensure consistent positional results.
8. Issues with equipment including inconsistent satellite reception of signals to operate the GPS machine control system will not result in adjustment to the "Basis of Payment" for any construction items or be justification for granting contract time extension.

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.

3/27/15

763503 - TRAINEE

Description:

The item shall consist of providing training in the construction crafts in accordance with the requirements stated in the General Notices of this proposal under the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246).

Basis of Payment:

The payment for the item shall be made at a fixed rate of \$.80 per hour toward the hourly rate of the trainee.

5/2/02

763508 - PROJECT CONTROL SYSTEM DEVELOPMENT PLAN
763509 - CPM SCHEDULE UPDATES AND/OR REVISED UPDATES

Description:

The Project Control System will be utilized by the Department of Transportation to monitor and record work in progress and to coordinate and synchronize construction management functions. The Department will use Critical Path Method (CPM) scheduling to approve the Contractor's work schedule, review work progress, evaluate time extensions, identify problem areas, and recommend solutions to maintain the established work schedule. The Department will designate a Critical Path Method Administrator (CPMA) to oversee the Project Control System.

The Contractor shall designate a Critical Path Method Coordinator (CPMC) having proven experience in construction scheduling and in CPM concepts and scheduling. The CPMC shall be familiar with and have direct contact with both the Contractor's front office and field staff. The CPMC shall be knowledgeable of the status of all parts of the work throughout the length of the Contract in order to properly coordinate the Contractor's work schedule information and shall be available for consultation and preparation of documents on a daily basis. The Contractor shall submit qualifications for the CPMC to the CPMA for approval by the Engineer.

The CPMC shall submit a working drawing schedule, materials schedule, crew schedule; and shall prepare and provide the "look ahead", original, update, revised update, and final (as-built) update CPM work schedules, written CPM schedule narratives, and other CPM schedule information as required by the Project Control System Development Plan. The CPMC shall prepare and provide the Contractor's work schedule information, its updates, and/or revised updates by email as a single compressed database file in CPM format fully compatible with Windows® Primavera software. The database file shall be submitted in P6 .xer or P3 .prx format in the Primavera software as utilized by the CPMA for generation of the CPM schedules. Schedules prepared by the CPMC using higher version(s) of Primavera software shall not use version specific enhancements and shall be submitted insuring "true" conversion to the software version as used by the CPMA.

The CPM format shall be the Precedence Diagram Method with days as the Planning Unit and shall be based on Calendar Days. Schedules will be developed using every day as a workday. Schedules with calendars based in any manner on Working Days will not be allowed. Primavera software P6 format schedules must be submitted using only Project Calendars and not be submitted using Global Calendars. Primavera software P6 format schedules must use 24 hours as the "Total work hours/day" available per day for all calendars. The CPMA will receive the Contractor's CPM schedule databases for input to generate the CPM schedules. The generated CPM schedules are the Contractor's own work schedule and will be reviewed for approval by the Engineer. CPM schedules approved by the Engineer will have the word "shedule" in the center title block (layout name) of their graphic outputs and title line of their report outputs.

The scheduling of the construction is the responsibility of the Contractor. The Contractor is responsible to determine, by adequate planning, the most feasible order of work commensurate with the Contractor's abilities and the Contract Documents.

The Contractor's compliance with the Project Control System Development Plan and CPM Schedule Updates and/or Revised Updates, and the Engineer's approval of the generated Original CPM schedule, its updates and/or revised updates will be required before processing monthly estimates for payment.

It is not the intent of this specification that the Engineer by approving the CPM schedules agrees that it is reasonable in all respects or that the schedule, if followed, will result in timely completion of the Project. The Engineer's approval is based on a review of general conformity for compliance with the requirements of the Project Control System and on the items or time restrictions that the Department and/or the Engineer control. The Contractor is free to make assumptions regarding field conditions, estimated quantities, and/or subsurface

conditions. However the Engineer's concurrence with the Contractor's schedule based on these assumptions does not relieve the Contractor from making necessary revisions to his schedule should his assumptions fail to hold true. No time extension to the Contract due to assumptions made by the Contractor that do not hold true during construction will be considered by the Department. Discrepancies and/or changes initiated by the Department in proposed quantities or plans that cause an extension to the critical path will be considered by the CPMA. The Department's controls or time restrictions are identified hereinafter and in the Standard Specifications, Special Provisions, on the Contract Plans as plan notes, and elsewhere in the Contract Documents.

Development of the Project Control System (PCS):

The PCS development plan is as follows:

- (a) Within seven (7) calendar days after the date of an executed Contract a workshop meeting will be held with the Engineer, CPMA, Contractor, and CPMC. The CPMA will profile the basics and procedures of the Project Control System and discuss schedule model design at this meeting. Attendance is mandatory,

The Department's partially predetermined Coding Structure (CS) format having a maximum of seventeen (17) code classification levels will be used and will be furnished at the Workshop Meeting. The CS is a specific listing that illustrates the hierarchy of work needed for the project. The hierarchy is categorized into levels or classifications. The CS classifications organize activities into manageable groups through each level of the project, for example; locations, phasing (staging), landmark dates, roadway sections and bridge structures; footings, columns, and caps; contractor and subcontractor.

The CPMC shall assist in determining the breakdown and code title descriptions from south to north and west to east of the location code classification. Activity code values shall be perspicuous for each classification grouping. Additional activity code classifications and values as required by the Engineer from time to time shall be provided and added to the schedule database by the CPMC. The CPMC shall not alter the CS and shall properly code all activities with the approved CS activity code values for all code classifications including all railroad, waterway, and outside agency activities with approved code values, including classifications as added by the Engineer. Coding enables generation of organized reports and graphics that can summarize any level of the project schedule.

When the Department provides a format database for the Contract, it shall be used by the Contractor as the basis from which to develop their schedule. The CPMC may add, but not insert, code classifications in the format database;

- (b) Within fourteen (14) calendar days after the workshop meeting, the CPMC:
 - (1) Shall submit a working drawing schedule, using the Department's application format or other format as agreed to by the Engineer. This schedule shall also include all other items having content that requires approval to allow any portion of the work to commence or continue. This schedule shall be submitted to the CPMA for approval by the Engineer and shall contain all required working drawings and also include but not be limited to reinforcing bar lists, formwork drawings and calculations, construction procedures, borrow pit security and traffic plans, precast structures, wetland work plans, construction sequencing, load tests, and wave equation analyses. Working drawing information shall include the identification number, description, type, anticipated submittal date, time frame for preparation and review, approval needed by date, and a resubmittal process (if expected) for each listed item. This information shall also give factory leadtime and expected delivery date, if applicable, for each listed item.

The Contractor should be aware that the Department's time frame for review of working drawings and other submittals properly submitted or resubmitted in accordance with Standard Specification Subsection 105.04 will be thirty (30) calendar days duration unless mutually agreed to by the CPMC and CPMA; this 30 day duration supercedes the time frame of the

Subsection. If a working drawing or other submittal involves review by railroads, environmental agencies, municipalities, other states, federal agencies, or the U. S. Coast Guard the time frame for review will be sixty (60) calendar days unless mutually agreed to by the CPMC and CPMA. The time frame will begin on the date of receipt of the drawings by the reviewer and will end on the date of transmittal returning the drawings to the Contractor by the Department. No drawings will be accepted for review until an initial working drawing schedule has been accepted unless agreed to by the Engineer.

The working drawing schedule shall be updated and correlated with the activities of the "look ahead" and all other CPM schedules;

- (2) Shall submit a materials schedule using the Department's application format or other format as agreed to by the Engineer. This schedule shall be submitted to the CPMA for approval by the Engineer and shall contain all required materials, samples, and sources of supply. The materials schedule information shall include the identification number, description, generic or brand name, sample requirement, and manufacturer's and supplier's name, address, and phone number for each listed item. The schedule shall also give the anticipated submittal date, time frame for preparation and review, approval needed by date, factory leadtime, and expected delivery date, if applicable, for each listed item.

The materials schedule shall be updated and for materials having long factory leadtimes shall be correlated with the activities of the "look ahead" and all other CPM schedules;

- (3) Shall submit a crew schedule. This schedule shall be submitted to the CPMA for approval by the Engineer and shall be accompanied by a written narrative and shall contain all crews and their work plan.

The crew schedule shall be updated and correlated with the activities of the "look ahead" and all other CPM schedules;

- (4) Shall prepare and provide a written narrative of the Contractor's work plan and an acceptable "look ahead" schedule database in CPM format. This schedule database shall reflect activities for the Contractor's overall work plan for the entire project detailing the "look ahead" period and shall be submitted to the CPMA for acceptance by the Engineer. The "look ahead" period shall be as determined by the Engineer. The "look ahead" schedule shall be maintained and updated until an Original CPM schedule is approved. The "look ahead" schedule shall also reflect the Sequence of Construction in the plans unless otherwise approved by the Engineer. This "look ahead" schedule, its updates and/or revised updates shall also be incorporated into the Original CPM schedule database. Per Standard Specification subsection 108.02, the Engineer shall issue a Notice to Proceed and stipulate the date on or before which the Contractor is expected to begin work. Acceptance of the "look ahead" schedule shall be achieved at least seven calendar days prior to the date which the Contractor is expected to begin work as stipulated in the Notice to Proceed and before any construction operations begin. Contract time charges shall begin on the day work actually starts or on the date stipulated in the notice to proceed, whichever is earlier. There will be no delays in beginning the contract time charges due to delays in preparing an acceptable 'look ahead' schedule.

- (5) Shall begin meeting with the CPMA at their office every third business day to prepare and provide a written narrative of the Contractor's work plan and a CPM schedule database until a useable, logical draft of the full CPM schedule network, responsive to the project requirements and correlated with the required schedules has been developed as determined by the Engineer. The CPMA will generate an initial CPM schedule from the CPMC's logical draft CPM schedule database for review by the Engineer. This initial schedule shall reflect the Sequence of Construction in the plans unless otherwise approved by the Engineer. This initial CPM schedule database, if acceptable, may be used to fulfill the Contractor's "look ahead" schedule requirements;

- (c) If the initial CPM schedule is not acceptable to the Engineer, the CPMC shall continue to meet with the CPMA on every third business day and prepare and provide the Contractor's written narrative and CPM schedule database as necessary until a generated CPM schedule is acceptable to the Engineer; and
- (d) Within twenty-eight (28) calendar days after the workshop meeting, an initial CPM schedule must be generated having the requirements for the Engineer's approval. This schedule shall reflect a clear understanding of the Contractor's work plan, be adequate to determine the Department's staffing requirements, have correct physical logic, incorporate construction and traffic phases, identify any Contract specific milestones, and display clarity of presentation for review and processing. Upon approval the CPMA will furnish the Contractor a graphic and report output of this CPM schedule. This CPM schedule, or Original CPM schedule, is the Contractor's own work schedule and the Contractor's responsibility to maintain.

The ending (cut-off) day for each monthly estimate period shall be proposed by the Contractor subject to Department approval. In the event of a conflict, the Engineer will have the authority to establish the ending day.

Processing of monthly estimates for payment will begin or continue only if the Contractor is in compliance as determined by the Engineer with the PCS Development Plan.

Any information required by the Engineer for analysis of the CPM schedules, their updates and/or revised updates; clarification of charts and other schedules; and evaluation of proposed changes or change orders shall be prepared and provided by the CPMC. A graphic and report copy of the current approved CPM schedule, its updates and/or revised updates shall be on display at the field office of both the Department and the Contractor.

CPM schedule information and requirements:

The CPMC shall prepare and provide the Contractor's work schedule information in the form of work step and restraint activities:

- (a) Work step activities are single step construction elements,
- (b) Restraint activities are not construction elements but affect the start of other activities.

When setting forth work steps and restraints the breakdown on these activities shall address the following factors:

Work Step factors affecting the duration and/or sequence of activities;

1. Work at locations done at different times or requiring different crews,
2. Work requiring different materials,
3. Work requiring different crew or craft requirements,
4. Work requiring different equipment,
5. Work requiring different responsibility (subcontractors),
6. Structural work having distinct subdivisions,
7. Labor and equipment resource availability,
8. Work as reflected in the Contractor's estimating or accounting breakdown,
9. Work as reflected in the state's breakdown for bidding or payment,
10. Public, private, and/or Contractor utility work and limiting or outage schedules of public and/or private utility organizations, and
11. Maintenance of traffic.

Restraint factors affecting the start of other activities;

1. Preparation of working drawing and materials submittals,
2. Approval, return, and/or resubmittal of working drawings and materials,

3. Specialized material testing,
4. Long lead purchases - material and equipment availability,
5. Material and equipment fabrication time,
6. Testing of special equipment and in place testing,
7. Delivery of unusual shipment or scarce material,
8. Dependency on completion of utility work,
9. Dependency on the Department's approval of issues involving public, private, and/or other governmental agencies,
10. Dependency on completion of part or all of another Department contract or construction of other organizations, whether contiguous or not,
11. Protection and restoration of property, forest protection, special traffic controls, erosion control and water pollution, environmental controls and suspensions, safety, and foreseeable archeological and/or historical evidence delays,
12. Procurement of permits, and
13. Conditions as set forth in Standard Specification Subsection 107.01.

Activities must be identified by a name, symbol, and coding, and shall have duration, sequence, responsibility, and resources.

Activity names or titles shall be descriptive and be single identifiable work steps or restraints. A sample breakdown list of activity titles may be furnished to the Contractor by the Engineer on request. Activities shall be selected, as a minimum, on a structure by structure and/or section by section basis where relevant and have further breakdown into secondary components. Activities shall be inclusive and representative of the Contract work. Activity symbols, or ID's, shall be unique and systematic.

Activity codes shall have classifications and values. The approved CS will determine activity code classifications and values. The CPMC shall identify activities using these classifications and code values. Additional activity codes as required by the Engineer shall be provided by the CPMC.

Activity durations, or Original Durations, shall be reasonable and representative of the scope of the activity. If durations are considered excessive or insufficient, the industry standard will be used. Original Durations may not exceed thirty (30) calendar days unless approved by the Engineer. Durations of activities shall be determined by using productivity rates based on calendar days, not work days. Original Durations of activities may not be less than two (2) calendar days unless agreed to by the CPMA. The use of calendar day productivity rates in CPM scheduling allows for customary days during the work week that the Contractor does not work and for normal weather delays. Productivity rates used to establish durations shall reflect the time periods when work can be scheduled and exclude the non-work period of the activity's calendar. Activity calendars allow activities to be scheduled only when allowed by the nature of or restraints on the work. Calendars shall not exclude weekends, holidays, or other times the Contractor does not work.

All activities shall be identified by entry of their appropriate Calendar. A minimum of fourteen (14) shall be used and the first fourteen (14) shall be ordered and entitled as follows: 1) Full schedule, 2) Environmental, 3) Winter Condition, 4) Concrete Work, 5) Concrete Work Winter, 6) Concrete Deck, 7) Concrete Paving, 8) GABC, 9) Asphalt Base, 10) Asphalt Surface, 11) SMA, 12) Night Paving Asphalt Base, 13) Night Paving Asphalt Surface, 14) Night Paving SMA. Calendar non-work periods shall reflect the average Delaware weather history of and the environmental regulations for the location of the Contract work. The Contractor may perform work during its calendar non-work period when favorable weather allows the work to be performed without compromising its specification and at no cost to the Department. When the Department provides a format database from which to develop the CPM schedule, the Contractor shall not modify the Calendars in the format database unless approved by the Engineer. The non-work periods of the calendars follow:

CALENDAR	NON-WORK PERIOD
1) Full schedule,	N/A
2) Environmental:	Varies: project specific,

- | | |
|-----------------------------------|--|
| 3) Winter Condition: | December 1 thru March 15, |
| 4) Concrete Work | December 1 thru March 15, |
| 5) Concrete Work Winter: | N/A (Protection provided at no cost to the Department) |
| 6) Concrete Deck: | November 15 thru March 31, |
| 7) Concrete Paving: | December 1 thru March 15, |
| 8) GABC: | November 15 thru March 15, |
| 9) Asphalt Base: | November 15 thru March 15, |
| 10) Asphalt Surface: | November 15 thru March 15, |
| 11) SMA: | November 15 thru March 31, |
| 12) Night Paving Asphalt Base: | October 15 thru April 30, |
| 13) Night Paving Asphalt Surface: | October 15 thru April 30, and |
| 14) Night Paving SMA: | October 15 thru April 30. |

Activity durations are based on Calendar Days and shall reflect all time necessary to complete an activities work and its requisites. The Contractor shall include in their original schedule narrative their work day to calendar day conversion factors with a discussion of how these factors were determined. When scheduling using multiple resources each resource unit shall have a corresponding activity. All time to complete the activity shall include as a minimum all Contractor unscheduled work days, all Contractor holidays, and allowance for normal weather delays, except for software generated calendars. Inclement weather and failure of a contractor and their subcontractors to provide sufficient resources are not means to recover costs or time due to delay.

Activity sequence shall be typical of proficient scheduling practice. The sequence must be logical and representative of the Contractor's order of the work. Successors and predecessors determine the job logic or activity sequence. Successors are activities that follow an activity. Predecessors are activities that precede an activity. A given activity cannot start until all predecessors have been completed. The Precedence Diagram Method (PDM) shall be used. The PDM places the activities on nodes and the dependencies between them are defined by arrows. Only finish to start dependency relationships (links) shall be used; lag times may not be used unless approved by the CPMA. The Department reserves the right to request a resequencing of activities to effect competent scheduling practice and realistic job logic.

Activities shall be sequenced to reflect resource apportionment. When one crew (resource) is being utilized to perform all of many similar activities, these activities must be linked together in some sequence to reflect that one crew is performing the work. Additionally, when several crews are performing similar activities, these activities must have separate linked sequences equal to the number of crews performing the work. Activities shall be logically connected and coded to reflect the crew (resource) performing the operation. A summary list of crews, their crew codes, and their operation(s) shall be included with each schedule submission unless unchanged. Resource loading will not be required unless otherwise directed by the Engineer. If resource loading is directed, payment will be incidental to the Item "763509 – CPM Schedule Updates and/or Revised Updates".

Activity responsibility shall be identified for each activity except those performed by the Contractor, if requested by the Engineer. Subcontractors, DBE's, utilities, performers of other contracts, and performers of adjoining work on other advertised contracts shall be identified by coding when responsibility for an activity is requested.

Activity resource loading shall be required only if the Contractor demonstrates the inability to maintain the CPM schedule. In this event, the Engineer shall have the authority to require resource information for all activities affecting project completion. Resource information includes manpower, equipment, materials, and/or services and has cost and has a range and amount of availability. Lack of sufficient resources will not be considered cause to extend durations when preparing the CPM schedule. By bidding to contract the work, the Contractor has ensured that sufficient resources are available or will be available in a suitable time frame to perform the work within the Contract Time, even if a resequencing of activities requires an activity or activities to shorten their Remaining Duration. In the event the Contractor demonstrates the inability to maintain the CPM schedule, the Engineer may require the Contractor to increase the number of shifts, begin overtime operations, work extra days including weekends and holidays, supplement construction plant and equipment, or all or any

of the foregoing as a step to improve the Contractor's work progress all without additional cost to the Department.

Work activities shall as a minimum be representative of all construction work for each operation, each phase (stage), and each location.

Working drawings shall be included as activities. These activities, preparation, approval, and leadtime (order, manufacture, and delivery time), shall be included in the schedule for each applicable working drawing item. Working drawing activities shall not be on the critical path of the Original CPM schedule. A separate activity shall be used to begin the submittals of working drawings. Time extension(s) will not be considered when submittal activity(s) affects the critical path except for owner caused delay as recognized by the Engineer. If working drawings require resubmittal(s), activities for their preparation and activities for their approval (including the Department's review time) shall be included in the next CPM schedule update database. Time extension will not be considered when resubmittal activity(s) affects the critical path except for owner caused delay as recognized by the Engineer.

Materials having long leadtime and/or manufacture time or that are difficult to acquire and/or fabricate shall have materials approval and leadtime activities included in the schedule for each applicable material item. A separate activity shall be used to begin the submittal of these materials. These material approval and leadtime activities shall not be on the critical path of the Original CPM schedule.

Administrative milestones shall be included as activities. Each milestone of the bidding through first chargeable day process shall be an activity.

Utility work shall be included as activities and shall be identified accordingly. Each utility item on the plans or listed in the Contract's Utility Statement shall be an activity. The activity description shall indicate the utility company and include the number of each listed item or be numbered according to the item's order in the Utility Statement. A separate activity shall be used to begin utility work. Utility activities shall not be impactful on the Original CPM schedule unless authorized by the Engineer.

Agency agreements and/or arrangements and other submittals for approval shall be included as activities. A separate activity shall be used to begin the agency items and other submittals for approval.

The effect of other Department contracts or construction of other organizations on the completion of part or the entire Contract shall be included as activities. A separate activity shall be used to begin these items.

Phasing (staging) shall be included as activities. These activities shall be correlated with the sequence or suggested sequence of construction on the plans and/or in the specifications. A separate start and finish milestone activity shall be used to start and to complete each phase.

When multiple crews are performing an operation or a string of operations, each crew shall be logically connected and coded to reflect the crew performing the operation.

Surcharge durations, quarantine periods, and special testing, if applicable, shall also be included as activities. Sufficient duration times for these activities will be allowed as per the plans and specifications or as agreed to by the Engineer.

Activity types must be either "task", "start milestone", or finish milestone. "Hammock" type activities may be allowed as agreed to by the Engineer. If the Department requires resource loading, "task" activities may be converted to "independent" type as agreed to by the Engineer.

Date constraints, float and duration constraints, and/or flags for activities will not be allowed. Milestones that do not constrain the schedule shall be allowed as agreed to by the Engineer when unique or unusual events cause a restraint to the Contractor's work schedule. The use of "Start No Earlier Than" (SNET) and "Zero Free Float" (ZFF) constraints for activities may be allowed for the purpose of schedule clarity or definitude if acceptable to the CPMA.

Total Float is defined as the difference between the current schedule finish date and the Contract Completion Date that is entered by constraint ("Project must finish by:" date) in the schedule.

Free float is defined as the amount of time between when an activity "can finish" (the early finish) and when an activity "must finish" (the late finish). Free float is float shared with all other activities and is defined as the amount of time an activity can be delayed without affecting the critical path of the schedule. It shall be understood by the Contractor and the Department that free float is a shared commodity, not for the exclusive use or financial benefit of either party. Either party has the full use of the free float until it is depleted.

The critical path is defined as the series of activities in a CPM schedule network that has the longest path in time. The submitted activity sequence and durations must generate a CPM schedule having only one (1) critical path; a schedule with multiple or near multiple critical paths will not be allowed. Work such as project wide Maintenance of Traffic, Construction Engineering, or Temporary Erosion Control that by their nature are ongoing for long durations or the total duration of the project and are basically complementary to other activities, shall be divided and condensed into "establish" and "conclude" activities to prevent this type of work from being the major portion of the critical path or its entirety.

The Project Start Date, or initial Data Date, of the Original CPM schedule shall be the first chargeable day of work. The first schedule activity related to productive work shall be entitled "First Chargeable Day" and shall be a start milestone. Nonproductive work and administrative activities may begin and/or end prior to the Project Start Date and shall be stated as such in the Original CPM Schedule. The submitted activity sequence and durations must generate an Original CPM schedule using all the Contract Time and a critical path having zero total float. An early completion schedule will not be allowed. The Contractor's original schedule shall reflect the use of the entire Contract Time. The schedule ending date that uses all the Contract Time in the Original CPM schedule will be the original Contract Completion Date. This Contract Completion Date shall be fixed (Project must finish by:) in the Original CPM schedule and shall remain unchanged unless a time extension is awarded.

The Contractor's Original CPM schedule shall allocate the work over the entire Contract Time. The Contractor shall not anticipate early completion in bid preparation and shall distribute all time-driven and/or time-dependent costs uniformly over every day of the Contract Time when preparing the bid. No early completion schedules will be accepted.

After the Original CPM schedule utilizing all the allocated Contract Time has been approved, job conditions or logic changes may occur which require revision to the schedule. Only an update may be revised. These revised updates must be reflective of the Contractor's actual intent in constructing the project. The revision may cause the project completion date to be earlier than the completion date of the current approved schedule. This is acceptable to the Department; but no claims will be considered for time-driven and/or time-dependent costs (such as delay and/or extended overhead expense) which are a result of not meeting this new project "early finish" date. Consideration for these costs would occur only for approved extensions that force actual project completion past the originally advertised Contract Time including authorized time extension(s). However, no credits for non-expended overhead will be requested should a Contractor successfully achieve completion of the project prior to the use of all the Contract Time.

If an activity is delayed, the contractor must demonstrate the inability to perform other critical or near critical work to receive consideration for an extension of Contract Time.

CPM schedule databases shall be calculated using the relevant Data Date prior to submittal to the CPMA. The Data Date of CPM schedule updates and revised updates shall be the next day after the end of the update period. Schedule calculations of CPM databases shall be based on retained logic, contiguous durations, and total float as finish float.

Activity Log (memo) information is allowed, but must be factual; shall be removed, if redundant; and shall not be masked, but indicated for printing to output reports. Punctuation is not required for activity and Activity Log information unless necessary for clarity.

Statusing or contract progress of activities for updates is the entering of Actual Start dates, Suspend Date(s), Resume Date(s), Actual Finish dates, and changes in Remaining Durations to the database. An activity's Original Duration may not be changed. An activity that begins (has an Actual Start Date) must have its Remaining Duration reduced by at least 1 day.

Activity Suspend and/or Resume Dates shall be added to the activity record and the factual reasons for the cause shall be added to the respective activity Log. If an activity is suspended again it shall be curtailed and assigned an Actual Finish Date equal to the latest suspension date, and a new activity (portion 2) comprising the balance of remaining duration shall be created and inserted in succession; both activities shall indicate by log comment the facts causing this condition.

Log statusing shall be used when an activity has out-of-sequence progress and no Actual Finish Date. Out-of-sequence progress occurs when any previous predecessor of an activity has no Actual Finish date. Log statusing is the entering of the Actual Start date to the Activity Log of the database in the Department's format. These entries are not to be masked, but indicated for printing to output reports. Changes in Remaining Durations shall be entered to the database but not the Activity Log. When progress is no longer out-of-sequence or all previous predecessors of the activity have Actual Finish dates, the activity's Actual Start shall be taken out of log status and entered to the database. Log statusing provides schedule output that prevents graphic distortion of schedule activities and preserves the design sequence of the CPM schedule plan. The Engineer shall have the authority to require a revision of the CPM schedule because of out-of-sequence progress. A suspended activity that requires log statusing shall be treated in the same manner as though it was suspended again.

Each original, update, and revised update schedule database and subsequent draft submitted for approval shall have a unique and manifest Project Name and shall be uniquely identified by entry (Number/Version) in the schedule database.

Corrections are defined as entries to the database that rectify coding and activity identification errors. Corrections shall be identified by written narrative and/or as agreed to by the CPMA. Exception(s) taken in PCS or other Department correspondence shall be complied with in the subsequent update and/or a revised update of the CPM schedule.

Written narratives shall be included with each submission of initial or revised update databases. The narratives must conceptualize work plans, modifications, and/or corrections but may be summary unless otherwise directed by the Engineer. These narratives shall describe where and the crews and order of what is to be done; narratives that are a listing of the work will not be acceptable. The Department will only accept schedule databases that reflect the work plans, modifications, and/or corrections reflected by their respective written narratives.

Inaccurate and/or faulty databases of any CPM schedule update and/or revised update will be unacceptable and shall be summarily corrected and resubmitted. Resubmittals shall be labeled "2nd Draft", "3rd Draft", etc. as appropriate and identified by entry (Number/Version) in the schedule database.

Any activity(s) or activity information that is necessary to generate a CPM schedule acceptable to the Engineer and/or schedule information that is requested by the Engineer shall be prepared and provided by the CPMC.

The CPMA will generate the CPM schedule network reflecting the Contractor's scheduling information. Upon approval of the Original CPM schedule and subsequent CPM schedule updates and/or revised updates, the CPMA will furnish the Contractor graphic and report outputs of these schedules. These CPM schedules are the Contractor's own work schedule and the Contractor's responsibility to maintain.

Monthly CPM Schedule Updates:

The CPMC shall meet with the Contractor and Resident Engineer and prepare the required work schedule progress information (status reports) to update the CPM schedule. This information shall be submitted on status forms provided by the Department that are generated from the Original Schedule and thereafter from

the previous CPM schedule update or revised update(s). This update information shall reflect the current state of completed project work. The update information shall include all activities on which work was performed and/or there was progress during the update period and shall include as a minimum their actual start dates, suspend dates, and resume dates; and the estimated remaining durations or actual finish dates. The update information shall be as agreed to and signed-off and dated by the Resident Engineer and the CPMC. The CPMC shall use the signed-off and dated information to status and/or log status the update database.

The Contractor shall submit the CPM schedule database update and a copy of the signed off update information within five (5) calendar days after the end of each monthly update period. The database and signed off information must match. The CPMA will generate a CPM schedule update reflecting the Contractor's update information. The five (5) calendar day submittal period will enable the Department to discuss current schedule information at the monthly progress meeting held the following week. The CPMC shall prepare and the Contractor shall submit supplemental CPM schedule updates as directed by the Engineer.

Processing of the monthly estimates for payment will begin or continue only if the Contractor is in compliance with the CPM Schedule and/or Revised Update requirements.

If the critical path of the generated CPM schedule update has less than minus ten (-10) calendar days of total float the CPM schedule update shall be revised.

Upon approval of the CPM schedule update, the CPMA will furnish the Contractor a graphic and report output of this update. This CPM schedule update is the Contractor's own updated work schedule and the Contractor's responsibility to maintain.

CPM Schedule Revised Updates:

The CPM schedule shall be revised if the critical path has less than minus ten (-10) calendar days of total float, if conditions require the Contractor to modify the work schedule. If the Contractor chooses to make a significant change in the sequence of work, or if the Department requests the schedule to reflect the current state of the work and/or the Contractor's acknowledged work plans. The revised update shall reflect the Contractor's current order of work and shall include new and/or previous activities affected by the change and shall include a written narrative of these changes. Revision as required by this Specification or as requested by the Department does not constitute acceleration unless agreed to by the Engineer. Revisions shall be identified as the revised update of the current approved CPM schedule update. Revisions are to be singular in modification and not lumped together in the same revised update unless otherwise directed by the Engineer. Additional revision(s) of the same update is therefore acceptable. The Department reserves the right to request a resequencing of activities to effect a completion date within the Project Time at no additional cost to the Department.

The CPMC shall meet as needed with the CPMA at the Engineer's office within five (5) calendar days after a revision is required, after a formal request for revision, or after the Contractor announces an intent to submit a revision. The purpose of the meetings shall be to prepare the Contractor's revised update CPM schedule database and its written narrative of changes. These meetings shall continue until a useable, logical draft of the revised update CPM schedule network, responsive to the modification requirements, has been developed that will generate a workable, CPM schedule revised update having a completion date using all or within the Contract Time or that allowable by this specification. The submitted CPM schedule database revised update must reflect its written narrative. Revised updates inconsistent with their written narratives will not be acceptable. The CPMA will generate the CPM schedule revised update reflecting the Contractor's new information. The reports generated by the CPM schedule revised update shall be used to prepare the update information for the next CPM schedule update.

Reduction of activity durations will not be considered acceptable criteria for revision to bring the project back on schedule unless activity quantities have been reduced or the Contractor provides a narrative describing how their means and methods to construct the work shall change and/or their resource allocation to perform the work shall increase.

For activities using like resources, modification of activity relationships to be concurrent (run parallel) with each other will not be considered acceptable criteria for revision to bring the project back on schedule unless the Contractor provides a narrative describing how their crews and/or resource allocation to perform the work shall increase.

A CPM revised update having the requirements for the Engineer's approval must be completed before preparation of the next CPM schedule update.

Processing of the monthly estimates for payment will begin or continue only if the Contractor is in compliance with the CPM Schedule and/or Revised Update requirements.

Upon approval of the CPM schedule revised update, the CPMA will furnish the Contractor a graphic and report output of this revised update. This CPM schedule revision is the Contractor's own revised work schedule and the Contractor's responsibility to maintain.

In the event that the Contractor fails to maintain his CPM schedule in a satisfactory manner, the Engineer reserves the right to enforce the provisions as set forth in Standard Specification Subsection 108.10 Default of Contract.

Change Orders and adjustment of completion time:

A Change Order will only be considered for extension of Contract Time when the modified critical path shows requirement of additional time because of the added activity or activities and/or there is justifiable delay as recognized and determined by the Engineer. For any change order that affects the schedule, the Department reserves the right to request a resequencing of activities to effect a completion date within the Project Time.

If the CPM schedule has been updated and/or revised and positive total float has been created, no additional time will be given for added activity(s) unless the modified critical path shows requirement of additional time and/or there is justifiable delay as recognized and determined by the Engineer. Compensation for additional overhead costs will not be considered until all of the original Contract Time has been utilized. The Engineer reserves the right to "bank" (postpone the award of) approved time extensions if the project is ahead of schedule.

If a change order represents issues for which the effect on contract time can be readily determined, then any time adjustment will be agreed upon by the CPMC and CPMA prior to final execution of the change order. Determination of time adjustment will be based on the effect of the issue on the CPM schedule, the current approved CPM schedule update or approved CPM revised update, and the Department's Time Evaluation Worksheet (TEW) submitted by the Contractor.

However, if the issues represented by the change order require further analysis and review in order to accurately and fairly evaluate the effect on contract time, then the change order contract time assessment block may be marked "not considered at this time". This will be done in order to not delay payment to the contractor for completed work included on a particular change order while the time analysis is being performed. In these cases, final resolution of any time related issues would be made as soon as all required information is received and analyzed by the Department and the Contractor.

After signature by all parties, the change order is considered approved, and work activities and any time modifications as shown on the approved TEW that affect the CPM schedule shall be reflected in the next CPM schedule update or revised update and be documented by written narrative. Only activities on the approved TEW may be included as activity(s) in schedule databases. Updates reflecting change order(s) that are inconsistent with their change order narratives will not be acceptable. No change orders will be processed until their effect on the CPM schedule has been determined, unless otherwise approved by the Engineer. A change order may not be included in a monthly estimate for payment unless approved by the Department on or before the cutoff date of the estimate. All official time extensions will be granted by letters from the applicable District Construction Engineer or his/her designated representative.

Issues involving potential time extensions must be addressed in the CPM schedule update period in which they occur or they cannot be considered. If the Contractor proposes a change to the Contract work, any time the Contractor spends in discussion and preparation, and any time the Department requires for review in the approval or disapproval process for this proposed change to the Contract work will not be considered for granting of additional contract time. It is the obligation of the Contractor to complete the project on time according to the original contract documents including current approved changes notwithstanding any change submitted for approval that may or not be accepted. The Contractor is obligated to prosecute the work at any time according to the Contract Documents in covenant at that time.

If an allowance for weather days has been included in the Completion Date section at the beginning of the Contract Special Provisions, these days shall be identified as Contract Weather Days. The following definitions regarding weather days will be utilized:

Weather day - Any Calendar Day (including weekends and Holidays) on which a weather event prohibits Contract work on critical path activities. Events include, but are not limited to rain, snow, or extreme temperatures.

Lost day - Any Calendar Day (including weekends and Holidays) on which residual effects from a weather event prohibit Contract work on critical path activities. Examples include, but are not limited to, wet conditions from a previous rain event, snow cover, or frozen ground.

Extensions of Contract Time for weather will not be considered until the total of weather days and lost days as defined above exceed the number of Contract Weather Days as listed in the Completion Date section at the beginning of the Contract Special Provisions. The Contractor and the Department will record and agree on weather days and lost days. A day will be considered a weather or lost day if it prevents progress of the current or next work activity on the critical path of the schedule, unless it occurs during a calendar non-work period of the current or next work activity on the critical path of the schedule in which case the day will not be counted as a weather day or lost day. A day will not be considered a weather or lost day unless it was a scheduled work day. Weekends and holidays will also be excluded from consideration for weather and lost days during calendar non-work periods.

When the total of weather days and lost days recorded in the field exceed the advertised Contract Weather Days, the Contractor will be awarded a day for each day weather or conditions due to previous weather events prevent progress of the current or next work activity on the critical path of the schedule. When weather affects an activity not on the critical path and the activity becomes the critical path, the allowable days of time extension will be only for the days the activity was on the critical path. The Contractor and the Department will record and agree on these weather and lost days. Inability to prosecute work not shown as activities in progress on the most recent CPM schedule will not be considered when determining an extension of Contract Time. The Engineer will have the final decision as to the number of calendar days the Contractor's work was limited to because of weather.

Final (As Built) CPM Schedule Update:

The CPMC shall meet with the Contractor and Resident Engineer and prepare the required as-built work schedule information and corrective work schedule information to finalize the CPM schedule. The progress reports generated by the previous CPM schedule update or revised update will be used to prepare this update information. This final update information shall reflect the final state of the project work. The final update information shall include all activities on which work was performed and/or corrections since the last update period and shall include as a minimum the activity ID and title, the actual start and finish dates, and the actual completion date. The final update information shall also include any revisions and change orders not previously included in the CPM schedule. These correction, revision, and change order modifications shall be reflected by a final update written narrative. The final update information will be as agreed to and signed off by the Resident Engineer and the CPMC. The CPMC will use the signed off information to status the CPM schedule database to prepare the final update schedule.

The Contractor shall submit the final CPM schedule database and a copy of the signed off final update information within five (5) calendar days after formal request for this update. The database and signed off information must match. The CPMA will generate a final CPM schedule update reflecting the Contractor's new information. Upon approval of the final CPM schedule update, the CPMA will furnish the Contractor graphic and report outputs of this final update.

The CPMC shall submit two (2) signed copies of the final CPM schedule update to the CPMA. Processing of the final estimate for payment will begin only after these signed copies are received. This final (as built) CPM schedule is the Contractor's final work schedule.

Method of Measurement:

The Project Control System will be portioned into two (2) items. The item, "Project Control System Development Plan", will be bid price lump sum. The item, "CPM Schedule Updates and/or Revised Updates", will be unit bid price per each approved update.

Basis of Payment:

The item, "763508 - Project Control System Development Plan", will be paid for at the Contract lump sum bid price, on the next monthly estimate after completion of the requirements of the Project Control System Development Plan, which includes approval of the Original CPM schedule.

The item, "763509 - CPM Schedule Updates and/or Revised Updates", will be paid for at the Contract unit bid price per each approved CPM schedule update and the final CPM schedule update. Revised updates are incidental to this item, except that each revised update(s) requested by the Department for purposes of incorporating Plan Revisions will be paid as one (1) approved CPM schedule update.

3/10/14

763626 - DIESEL FUEL COST PRICE ADJUSTMENT

I. Description: This section defines the criteria for payments to the Contractor to reflect increases or decreases in the cost of diesel fuel consumed in the performance of applicable construction work. To have the Diesel Fuel Cost Price Adjustment provisions apply to this project, a properly completed Diesel Fuel Cost Price Adjustment Option form must be submitted to the Department with the Bidder's bid proposal. If a properly completed Diesel Fuel Cost Price Adjustment Option form is not provided by the bidder, the Department will consider the option to apply the Diesel Fuel Cost Price Adjustment provisions for the project to be declined. No further opportunity to elect Diesel Fuel Cost Price Adjustment for the project will be made available.

a. General. These price adjustment provisions apply to contract items in the contract schedule of prices as grouped by category. Specific pay items to be adjusted are attached as an appendix to this Special Provision. General category descriptions and the fuel usage factors which are applicable to each are as follows:

1. Categories

- 1.a. Category A:** Earthwork. The combined total of the applicable item plan quantities must exceed 5,000 CY.
- 1.b. Category B:** Subbase and Aggregate Base Courses. The combined total of the applicable item plan quantities must exceed 500 tons.
- 1.c. Category C:** Flexible Bases and Pavements. The combined total of the applicable item plan quantities must exceed 500 tons.
- 1.d. Category D:** Rigid Bases and Pavements. The combined total of the applicable item plan quantities must exceed 5,000 CY.
- 1.e. Category E:** Structures. Contract items will be based upon the total square foot price for each structure including any associated items of work, i.e. items not grouped under Categories A thru D.

2. Diesel Fuel Usage Factors – ENGLISH UNITS

Category	Factor	Units
A – Earthwork	0.34	Gallons per CY
B – Subbase and Aggregate Base Courses	0.62	Gallons per ton
C – Flexible Bases & Pavements	2.98	Gallons per ton
D – Rigid Bases & Pavements	0.98	Gallons per CY
E – Structures	8.00	Gallons per \$1,000 of work performed

3. Quantity Conversion Factors – ENGLISH UNITS

Category	Conversion	Factor
B	SY to ton	90 lbs/Inch of depth/SY
C	SY to ton	112.5 lbs/Inch of depth/SY
D	SY to CY	Inches of depth/36

II. The posted index price will be the monthly price most recent data published by the U.S. Department of Energy, U.S. Energy Information Administration. The source information for the posted price for Central Atlantic (PADD 1B) No 2 Diesel Ultra Low Sulfur (0-15 ppm) Retail Prices (Dollars per Gallon) may be viewed at the following website:

http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2DXL0_PTE_R1Y_DPG&f=M

The release date for the U.S. Department of Energy, U.S. Energy Information Administration average price data occurs the first Monday of the following month, i.e. October prices are released the first Monday of November and used as the November Price Index.

The price index, FB, is the index price posted by the Department, determined as specified above, on the project advertisement date.

PRICE INDEX (FB) FOR DIESEL FUEL

PER GALLON (PER LITER) = \$ ~CEMENT PRICE 72~

The price index, FP, will be the index price posted by the Department, determined as specified above, for the month during which the Notice to Proceed (NTP) is issued, and every 90 calendar days thereafter.

III. Price Adjustment Criteria and Conditions. The following criteria and conditions will be considered in determining a price adjustment for diesel fuel cost fluctuations.

a. Price Adjustment Calculation. When the ratio FP/FB is calculated to be less than 0.95 or calculated to be greater than 1.05, the Department will adjust unit bid price prices in accordance with the following formula:

$$AUP = (FP-FB)(F)+(UBP)$$

where:

AUP = Adjusted Unit Price

FP = Fuel Price Index for the month in which prices are adjusted for applicable construction work.

FB = Fuel Price Index in the Bid Proposal

F = Diesel Fuel Usage Factor

UBP = Unit Bid Price specified in the Contractor's Bid Proposal

b. Payment of Adjusted Unit Prices. The unit bid prices of work items affected by the fuel escalation will be adjusted by work order, either up or down, at Notice to Proceed and every 90 Calendar Days thereafter.

c. Expiration of Contract Time. If the Contractor exceeds the authorized allotted completion time, the adjusted item prices on the last authorized allotted work day shall be the prices used during the time liquidated damages are assessed. However, if the posted price for diesel fuel goes down, the item prices shall be adjusted downward accordingly

d. Final Quantities. Upon completion of the work and determination of final pay quantities, an adjusting work order will be prepared to reconcile any difference between estimated quantities previously paid and the final quantities. In this situation, the value for FP used in the price adjustment formula will be the average of all FP's previously used for computing price adjustments.

- e. Inspection of Records. The Department reserves the right to inspect the records of the prime contractor and its subcontractors and material suppliers to ascertain actual pricing and cost information for the diesel fuel used in the performance of applicable items of work.
- f. Extra Work. When applicable items of work, as specified herein, are added to the contract as Extra Work in accordance with the provisions of Section 110.03, no price adjustment will be made for fluctuations in the cost of diesel fuel consumed in the performance of the extra work, unless otherwise approved by the Engineer. The current price for diesel fuel is to be used when preparing required backup data for extra work to be performed at a negotiated price. For extra work performed on force account basis, reimbursement for material and equipment along with specified overhead and profit markups will be considered to include full compensation for the current cost of diesel fuel.
- g. Subcontractors. Any Price Increases or Price Rebates that are calculated based on items of work performed by subcontractors will be added to or deducted from payments due to the Contractor in the appropriate pay period. The Contractor shall then accurately record on the appropriate CN-91 or CN-103 form the additions or deductions into adjusted contract value. The Contractor shall make payment to the subcontractor(s) who actually performed the work in accordance with DelCode Title 17, Chapter 8.

11/10/11

Appendix---Item 763626 Diesel Fuel Cost Adjustment

Contract: T201109002.01 - I-95 AND SR141 INTERCHANGE, RAMPS G & F IMPROVEMENTS

	<u>Item No./s</u>
Category A: Earthwork Excavation & Embankment, Borrow (total qty must exceed 5000 CY)	202000, 207000, 208000, 209002, 209511, 209512
Category B: Subbase and Agg. GABC, PTB, Soil Cement Base (total qty must exceed 500 T)	302007, 304501, 304502, 608000
Category C: Flexible Bases and Pavements Warm Mix Asphalts (total qty must exceed 500 T)	401801, 401810, 401819
Category D: Rigid Bases and Pavements Concrete, P.C.C. Patching (total qty must exceed 5000 CY)	501006
Structures	602001, 602002, 602003, 602004, 602006, 602007, 602013, 602014, 602015, 602017, 602018, 602019, 602522, 602556, 602772, 603000, 604000, 605001, 605500, 605510, 605511, 605512, 605581, 605639, 618062, 618065, 618081, 618091, 619042, 619045, 619061, 619067, 619501, 619502, 619519, 619539, 623003
Category E: Bridges, Large P.C.C. Structures	

763632 - REMOVAL OF RAISED PAVEMENT MARKER

Description:

This work consists of removing and disposing of raised pavement markers at locations noted on the Plans and filling in the void with patching material.

Materials:

A cementitious, rapid setting, semi-leveling mortar mix with a gel state consistency shall be used for filling in the voids.

The rapid setting mortar mix shall have a 4-6 minute working time and reach a minimum compressive strength of 3,000 psi within 60 minutes.

The material shall be approved by the Engineer prior to placement.

Construction Methods:

The Contractor shall remove raised pavement markers minimizing damage to the existing pavement. The Contractor may use a back hoe or hand tool to remove the raised pavement marker. The method of removal of the raised pavement marker shall be approved by the Engineer.

Immediately after removing the raised pavement marker, the Contractor shall remove all loose debris from the void, dry the void, and fill the void with the approved patching material. The patching material shall be mixed and placed according to the manufacturer's recommendations. The Contractor shall maintain patches as directed by the engineer during construction until asphalt surface course overlay is installed.

Method of Measurement:

The quantity of removal of raised pavement markers will be measured as the actual number of each pavement marker removed.

Basis of Payment:

The quantity of removal of pavement markers will be paid for at the Contract unit price of each. Price and payment will constitute full compensation for all labor, equipment, tools, patching materials, maintaining patches, disposal of the pavement markers, and incidentals required to complete the work.

5/08/13

763652 - CLASS 1 TOW TRUCK

Description:

This work is furnishing and operating on a stand-by basis, one extended cab tow truck to remove disabled vehicles, vehicles involved in accidents, and small non-hazardous debris, on SR 141, I-95, and I-295 within the project limits. The tow truck shall be available and positioned on site, at a location determined by the Engineer, whenever a multi-lane roadway within the project limits is reduced to a single lane. This service is to be provided during short-term and long-term traffic control phases and will continue until the completion and removal of the final traffic control phase, unless otherwise directed.

Materials:

TOW TRUCKS: Provide one extended cab tow truck on site during the referenced hours of operation. Make one spare "back-up" extended cab tow truck available for the project, as specified. The back-up tow truck is to meet all requirements and is to contain all equipment required for the extended cab tow truck, when on duty.

The tow truck's base of operations must be within a 10 mile radius of the project limits.

GENERAL REQUIREMENTS: The following are the MINIMUM requirements for genuine parts, accessories, equipment, and safety features, and are to be considered standard, whether mentioned or not.

STANDARDS, CODES, RULES, REGULATIONS: Each tow truck, including the back-up tow truck, is to conform to the Delaware Motor Vehicle Code.

Each tow truck, including back-up tow truck, is to comply with all current applicable Federal Motor Vehicle Safety Standards, Federal and Delaware Exhaust Emission and Noise Standards, Environmental Protection Agency (EPA), and Occupational Safety and Health Administration (OSHA) requirements, with appropriate decals stating compliance.

The tow trucks are to conform to the latest codes, standards and practices of the following professional organizations:

- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- American Society for Testing and Materials (ASTM)
- American Trucking Association (ATA)
- American Welding Society (AWS)
- Battery Council International (BCI)
- British Standards Institute (BSI): Limits & Fits
- International Standards Organization (ISO)
- Industrial Fastener Institute (IFI)
- National Truck Equipment Association (NTEA)
- Society of Automotive Engineers (SAE)
- Steel Structure Painting Council (SSPC)
- Truck Body Equipment Association, Inc. (TBEA)

Each tow truck is to be certified for 16,500 lbs. (7484 kg) Gross Vehicle Weight Rating (GVWR), minimum. Identify the GVWR in cab or on door as the final complete certification label (minimum rating).

Furnish and identify by decal in cab or on door Gross Combined Weight Rating (GCWR) to indicate the approved weight which can be towed.

Each tow truck, including back-up tow truck, is to bear the latest applicable Delaware Official Inspection Sticker as required for permanent license plates by Delaware State Inspection Laws.

The truck and wheel hoist is to be of the design and type for a one-man operation of short distance towing.

VEHICLE COMPONENTS: Alarm-backup: Ref: ECCO 450, Shock Mounted

Chassis: 16,500 lbs. (7484 kg) GVWR manufacturer's rating, minimum, certified in cab or on door. Front bumper; push type extending full width with a guard extending the height and width of front grill. The bumper is to be rubber faced.

Light Bar and Arrow: Light Bar meeting the requirements of and in accordance with Delaware Code. Provide an arrow panel, approved for use in Delaware, 36" high by 72" wide, minimum, with a raise lower mechanism, and a control box-mounted in cab within reach of the operator. The control box is to incorporate lights to signify the arrow panel mode. The arrow panel is to be capable of displaying a left arrow, right arrow, double arrow and four-corner caution.

Safety: Provide a fire extinguisher rechargeable with a vehicle mount. Mount fire extinguisher in cab for easy and quick access.

WHEEL LIFT AND BOOM: As per manufacturer's specifications, and as follows:

Boom Structural Rating (Crane)

Fully retracted 35.58 kn. at 30 degree elevation

Fully extended 8.9 kn. at 30 degree elevation

Wheel Lift: Provide wheel lift system with (3) functions:

Provide a wheel lift that can hydraulically raise and lower

Extend and retract

Tilt function independently or simultaneously

The tilt function provides means of engaging standard "L Arms" to the towed vehicle either on uneven terrain or in mud and snow conditions. The retracting wheel-lift boom in combination with tilt feature allows the towed vehicle to be retracted close to the tow truck for better weight distribution.

CONTROLS: Provide controls on both sides of the body. Design controls to operate independently or simultaneously. Variable speed of all functions is controlled by the handle movement. Provide the following:

Single cable winch hydraulic, with wheel lift and boom, and body on truck chassis

Tow sling with chains

Wrecker special light bar

Upper and lower work lights

Cable tensioner on winch

Switch Panel

Throttle Control (Manual or Electric)

Push Bumper

Engine Driven Pump

EQUIPMENT: Equip each tow truck at the Contractor's expense with the following items.

One cellular phone (complete with on-line cellular phone service)

Scanner

CB radio

Fuses – (Highway Flares) – 36 minutes

Pen and paper

Clipboard

Emergency phone numbers

Vests – two

Hard hat

SUPPLIERS: Class 1 Tow Truck Services shall be provided by: B&F Towing, 449 Old Airport Road, New Castle, DE, 19720 (Phone 302-328-4146); First State Towing, 424 Old Airport Road, New Castle, DE 19720 (Phone 302-994-9244); or approved equal.

Construction Methods:

SERVICES TO BE PROVIDED: The Tow Truck Operator (TTO) is to be position on-site during the designated hours of operation. The TTO shall assist motorists whose vehicles have suffered mechanical failure or have been involved in minor accidents. The TTO is responsible for clearing the highway of automobiles, motorcycles, small trucks (vehicles with gross weight of 20,000 lbs. (9071.8 kg) or less and small, nonhazardous debris.

These incidents are those that are encountered in the normal course of patrolling SR 141, I-95, I-295 or those called out by the DelDOT Transportation Management Center (TMC), Troop 6 of the Delaware State Police, Town of Newport Police, or by the Engineer.

Where no apparent physical injury is evident, the TTO is to request drivers to drive or be pushed or towed to a drop off location to open the lane to traffic. The TTO is to remove the vehicles from the highway to a drop off location after driver's consent or when directed by the police. Should the TTO encounter a major incident, their primary duty is to immediately inform the police and DelDOT TMC and to protect the incident scene by the use of their vehicle combined with the use of the highway flares, and truck-mounted arrow board. Where there is apparent physical injury call 911 and report known accident details and request assistance. A major incident contains any one of the following items:

A Fatality

An Injury

A load that is hazardous as identified by a placard or cannot be identified as being nonhazardous

A disabled vehicle of 20,000 lbs. (9071.8 kg) or more, or badly damaged vehicles(s), that cannot be pushed or towed by the tow truck. In this instance, the TTO is to make arrangements to secure a Class 2 tow truck or a ramp truck to remove this type of vehicle (s) as appropriate.

Debris or large spilled loads that are impossible for the TTO to remove.

WHERE APPARENT PHYSICAL INJURY OR DRIVER INTOXICATION IS EVIDENT OR SUSPECTED, DO NOT MOVE VEHICLES INVOLVED IN AN ACCIDENT UNTIL SO DIRECTED BY POLICE.

Do not follow directions or requests by vehicle operators or occupants. Contact police immediately. Remain at the scene prepared to assist police.

Accident Vehicles: Under no circumstances is the TTO to attempt a repair to an accident vehicle in order to make it mobile. For example, the TTO is not to use pry bars or winch cables to pull fenders away from tires, change tires damaged as a result of an accident, or remove/repair any body parts. All accident vehicles of non-reported accidents will be removed as promptly as possible to the nearest designated drop-off location.

Unattended Vehicle: If the TTO encounters any unattended vehicle that is interfering with the normal movement of traffic (such as blocking a lane or a partial lane of traffic) or constitutes a safety hazard, the TTO is to immediately contact the DeLDOT TMC and wait to receive police approval to remove the unattended vehicle to a drop-off area or other place of safety. Unattended vehicles not interfering with traffic nor posing a safety hazard are also to be reported to the DeLDOT TMC by the TTO, but no further action will be necessary by the TTO unless directed to do so by the Engineer or police.

Assistance to Law Enforcement Officers: There may be some instances where TTO may be requested to lend assistance to Law Enforcement Officers. TTO is to follow the instructions of the officer at the scene of any incident. The instructions of the officer on the scene override and supersede any conflicting obligations or duties of the contractor or the TTO set forth herein.

During its contracted hours of operation, the tow truck is to be exclusively dedicated to the needs of this Project and may not be removed from the site for any reason other than the towing of a vehicle to a drop-off area, or replenishment of expendable items such as fire extinguishers. Temporary removal of the tow truck from the site for those reasons is not to exceed 10 minutes. The towing vehicle shall be fully fueled at the start of each shift so as not to require refueling during the shift.

General Requirements: At the beginning of each service call, or upon finding any disabled vehicles, the TTO is to notify the DeLDOT TMC of location, model, color and plate number of disabled vehicle. At the end of each service call, the TTO is to notify the DeLDOT TMC and fill out an incident information form and submit to the TCC on a weekly basis.

Prepare this form and submit it for DeLDOT TMC approval prior to beginning this service. Obtain and keep adequate supply of forms through the life of the Contract.

No compensation of any type (tips, etc.) can be accepted by the TTO from the motorist. Failure to adhere to this requirement will result in an immediate dismissal of the TTO.

The TTO, when necessary, is to place the appropriate temporary traffic control devices from the tow truck to protect the incident site.

The TTO, unless so directed differently by a law enforcement officer, is to follow normal traffic laws.

The tow trucks are to continuously patrol the project limits or are to be stationed at location(s), as directed by the TCC.

Do not tow any vehicle without vehicle operator's approval or police direction. Do not tow any vehicle involved in an accident until so directed by police.

Transport individuals to the field office to use phone when TTO's mobile phone is inoperable.

Be responsible for any damage caused by services performed under this item.

Notify the DelDOT's TMC of all disabled vehicle incidents and accidents as soon as possible.

Have the tow truck at the site of the disabled vehicle within 10 minutes of knowing that a tow truck is required.

Two-Way Communications and Cellular-Phone Service: The TTO is to maintain two-way communications with DelDOT's TMC and the Engineer using a cellular phone. Cellular phone is to be provided by the Contractor. The cellular phone is to include a phone unit, maintenance, and all service charges for tow truck.

All costs associated with the cellular phone service are incidental to the Class 1 Tow Truck item. It is anticipated that the majority of the communication effort will be via the cellular phone. The communication effort is a critical element of these services.

A brief summary of these communication elements is as follows:

TTO informs DelDOT's TMC of a major incident.

TTO to call for assistance at the request of the motorist.

TTO to communicate with and take orders only from the Engineer, state, or local police.

Notifying DelDOT's TMC of an unattended vehicle.

Dispatching of tow truck to an incident.

TTO requests the need of Class 2 Tow Truck.

Motorist requests the service of a tow truck or other assistance.

Motorist requests the service of another tow truck.

Informing the state police, local police, and the Engineer of any incident involving a tow truck.

When the need arises to use the cellular phone to summon assistance for the motorist, each disabled motorist will be limited to one local (as defined by the cellular phone service area) three minute call (a busy signal, voice mail or answering machine or a does not answer, does not qualify as a call).

Use of the cellular phone for any other purpose than communicating with the police, the Engineer, DelDOT's TMC or summoning assistance for the motorist, is strictly prohibited. Violation of this requirement is grounds for immediate dismissal of the TTO.

The Contractor, at the request of the Engineer, is to submit to the Engineer copies of the monthly cellular phone service bills showing the telephone numbers of all calls made and all calls received.

Disabled vehicles discovered on SR 141, I-95, or I-295 with the operator present or incidents identified by the DelDOT TMC, just at the end of a shift period or discovered by the TTO while returning to the Contractor's location, are to be handled in a normal response manner even if this means staying out beyond the normal end of the shift period.

When a disabled vehicle is found, the TTO is not to drive past a disabled vehicle when the operator is present.

The TTO is to immediately contact the DelDOT TMC.

The TTOs daily log, incident information form, will be used to document this event.

Disabled vehicles discovered on SR 141, I-95, or I-295 without the operator present, just at the end of shift period or discovered by the TTO while returning to the Contractor's location are to be immediately reported to the TMC.

If the disabled vehicle poses no hazard then no further action by the TTO is necessary.

SERVICE PATROL AREAS: The tow truck will patrol both directions of SR 141, I-95, or I-295 within the limits of the "Begin Construction" sign and the "End Construction" sign.

The detection of damaged or disabled vehicles will be primarily via the DelDOT TMC, police, or by TTO. However, TTO will also be dispatched via two-way radio or cellular phone to an incident location by the police, DelDOT TMC, or the Engineer.

The tow truck will remain in the assigned area and only enter into another area to give assistance only at the direction of the TCC.

DROP-OFF LOCATION: DelDOT will designate a location within the project area to be known as the "drop-off location". The TTO is to tow or push the vehicle, and transport the vehicle occupants to the drop-off location. The motorists can request to call a specified towing firm ("personal request"), or to call a relative/ friend to assist them from that location.

Should it be impossible to transport the vehicle occupants to a safe area where they can wait for assistance, the TTO is to immediately call the DelDOT TMC to inform them of this and the TTO is to wait with the disabled vehicle and its occupants until the police arrive.

Contracted companies (The "Contractor") and/ or their employees/ drivers are not allowed to accept gratuities, perform secondary towing service from the designated drop site, recommend secondary tows, or recommend repair/body shops.

SECONDARY TOWS: If the motorist does not request a specified towing service, repair facility, or other business or individual to assist him/her at the drop-off-location, the police defers to the towing service/AAA system that is utilized in the area.

The contracted tow truck company may not receive a call for a secondary tow from the drop-off location even if the company participates on the AAA list and would ordinarily be "next up" on the rotation. The contracted tow truck company would be eligible for AAA tows again at the conclusion of the hours of operation.

If the motorist has to be given the names of another tow company, this information is to be supplied by the police or the Engineer in a list format as a handout. TTO may provide such a list to the motorists. The towing company supplying the tow trucks and the TTO is prohibited from conducting any type of secondary tows.

The TTO is also prohibited from giving out the names or recommending any repair/body shop establishments.

Violations of any portion of this section are grounds for immediate dismissal of the TTO.

HOURS OF OPERATION: The tow truck shall be available and positioned on site, at a location determined by the Engineer, each weekday between the hours of 6:00 AM to 9:00 AM and again 4:00 PM to 7:00 PM. This service is to be provided during long-term traffic control phases 2 thru 5 and will continue until the completion and removal of the final traffic control phase, unless otherwise directed.

The TTO is to anticipate being stationed on site or patrolling the area during all types of inclement weather unless instructed not to do so by the Engineer.

STARTING OF TOWING SERVICE: Provide tow truck and all their equipment, and qualified TTOs starting at the time that long-term traffic control (i.e. Construction Phase 2) is established, unless otherwise directed by the Engineer.

Obtain the Engineer's approval of the following items 30 days before the start of the towing service:

Insurance Requirements

Incident Information Forms

Tow Trucks and all Equipment

TTOs' Names and Credentials

TTOs' Training Program

The Engineer will inform the Contractor of the date and time he is to begin the Towing Service.

DAMAGE COMPLAINTS: Upon receiving a damage complaint from a motorist assisted by the Contractor, that the Contractor damaged their vehicle while lending assistance, notify the Engineer regarding the nature of the damage complaint and its disposition.

The Contractor is to reply to the motorist by telephone within 24 hours of receiving the damage complaint notification. If necessary, send either its authorized representative, or its insurance company representative to inspect the vehicle and complete an incident report within 48 hours after receiving the damage complaint. If the investigation shows that damage to the vehicle could have been caused by the Contractor, negotiate in good faith to try and resolve the issue and shall report to the Engineer the result of the negotiations.

Resolve all complaints within a reasonable period of time after being received. All repair costs resulting from these damage complaints are the responsibility of the Contractor.

ACCIDENTS INVOLVING TOW TRUCK: Should any tow truck become involved in any type of accident, the following procedures shall be followed:

The TTO, if he/she are able, will immediately inform the police and the DelDOT TMC of the exact nature of the accident and request necessary assistance (ambulance, tow truck) from the police including the presence of a police officer to investigate the accident and prepare an accident report (required by law for a reportable accident).

If the accident is non-reportable (vehicles can be moved, no injuries, no fatalities), all vehicles should be removed from SR 141, I-95, I-295, and its ramps as soon as possible. If not, the accident scene should be protected by signs, cones and flares as may be necessary.

The TTO will follow normal driver procedures and adhere to current Delaware laws and regulations regarding post-accident procedures, including but not limited to, the exchange of driver information (names, addresses, phone number, insurance information) and never flee the site of the accident.

The TTO may only resume the patrol of his/her area when the above requirements have been satisfied and:

- The police have prepared a written accident report or have instructed the TTO that they are unable to do so (applies to nonreportable accidents only).
- The tow truck is in a condition to resume patrolling.
- The TTO is physically able to resume patrolling.
- Approval has been given by the Engineer to resume patrolling.

Should either the tow truck and/or the TTO be unable to resume their patrol area, Contractor must have the "Back-up" tow truck and a fully qualified TTO ready to cover the project area on the next regularly scheduled shift.

Repairs to damaged tow truck(s) must be made as quickly as possible.

Every accident involving the tow truck will be reviewed by a committee consisting of a representative of the Contractor, the Engineer and if applicable the police.

The main purpose of this review effort will be to insure that the tow trucks are operated in the safest manner possible. Should it be determined by the committee that the accident in question could have been avoided by the TTO, then the TTO may be subject to the following disciplinary actions:

First Avoidable Accident - Letter of Reprimand

Second Avoidable Accident - 1 Week Suspension

Third Avoidable Accident - 1 Month Suspension

Fourth Avoidable Accident – Termination

All cases will be reviewed on their own merit including the severity of each accident.

THE TOW TRUCK: Provide confirmation that the tow trucks conform to all the specifications specified. Provide a tow truck plus a "back-up" tow truck.

Prior to the commencement of service, the Engineer will inspect each vehicle designated for the Project to ensure that it meets or exceeds safety requirements. Succeeding inspections will occur periodically as required by the Engineer.

Any unsafe or poorly maintained vehicle(s) are to be removed from service or repaired as directed.

Provide a "back-up" tow truck to complete the shifts of the tow truck removed from service. The Contractor is to have the "back-up" tow truck available for service at all times.

All tow trucks are required to have a current Delaware Vehicle Registration Card and are required to meet Delaware Vehicle Insurance requirements.

TOW TRUCK EQUIPMENT: Each tow truck is to be equipped at the Contractor's expense as specified.

PRE-OPERATION INSPECTION: Prepare and print inspection/inventory sheet. The TTO is required to complete a preoperation inspection of the vehicle as well as inventory all the tow truck equipment called for, prior to the start of each shift. An inspection/inventory sheet is to be completed prior to the start of each shift, and is to be kept on file by the Contractor, and is to be made available to the Engineer upon demand. Any item missing is to be replaced before the start of the shift. The Engineer reserves the right to be present at any and all preoperating inspections and to prohibit the commencement of any tow truck duty if the equipment in the tow truck is not in conformance with specifications.

VEHICLE IDENTIFICATION: Furnish and install, on both sides of the tow trucks, a magnetically attached sign or approved equal, to all tow trucks used on this project. Attach the signs to the vehicle in a prominent position. Maintain signs in a suitable condition as directed.

Size of signs for tow trucks is to be a minimum 18" high by 30" wide with 3" letters. Signs' legend to be orange background with black letters. Signs' lettering is to read as follows:
Towing Service Provided FREE By DelDOT

FUEL: Supply, at the Contractor's cost, all items required for the operation of the tow truck including but not limited to fuel, oil, antifreeze, lubricants, etc.

"BACK-UP" TOW TRUCK: The Contractor will be required to have one spare "back-up" tow truck available for the Project. The "back-up" tow truck is to meet all specifications and is to contain all the equipment called for. The "back-up" tow truck is to be on site within 20 minutes of the time a permanently dedicated tow truck is taken out of service for any reason.

VEHICLE MAINTENANCE AND STORAGE: All tow trucks (including the "Back-Up" tow truck) when not on duty are to be stored at the Contractor's location in a secure area or at another area. The tow truck is to patrol the assigned area, or is to be stationed at agreed location(s), respond to communication dispatches for service, and use DelDOT's identified designated drop-off location. The Engineer will inspect all tow trucks, including spares; prior to the service start date. Keep on file at the Engineer's Office and the Contractor's Office all documentation of the tow truck identification number and successful completion of the inspection. Tow truck maintenance is to be performed during off-duty hours by the Contractor at his expense. The Contractor may remove the tow trucks from the site or from their storage area during off-duty hours for maintenance, repairs and replenishment of supplies.

EMPLOYEES/DRIVERS/OPERATORS

General: All TTOs are required to have a safe driving record, and medical certification. TTOs are to be 18 years of age or older. Potential TTOs will be subject to driving record and criminal background checks by the Department. Potential TTOs are to be sufficiently experienced in the tasks of tow truck operations to provide safe and proper service and are to be capable of demonstrating their operating abilities prior to beginning their first day of work. Additionally, the TTOs are expected to exercise reasonable judgment in carrying out their duties.

LICENSE REQUIRED: All TTOs are to have a current Delaware Class C Driver's License.

SPECIAL TRAINING AND KNOWLEDGE: All TTOs including back-up operators/drivers, are to complete a special Expressway Service Patrol Training Program put together and taught by a training organization, such as WreckMaster, approved by the DE Towing Association, and approved by the Engineer. The course is to include education on the details of the Expressway Service Patrol Program, minor vehicle repair, customer service, and roadside service safety. No driver will be allowed to begin duty without attending this mandatory training class.

At the end of each 12-month period from the notice to proceed, the Contractor is to prepare and conduct, at its own cost, an 8-hour refresher-training course (during off-duty hours) for all TTOs. The training program and refresher course are to insure that the TTO is fully knowledgeable in the following areas:

- DelDOT Work Zone Safety Standards and Traffic Control
- Tow Truck Operator Manual
- Proper Tow Truck Maintenance
- All Towing Safety Procedures
- Driver Vehicle Daily Inspection report must be in truck with the driver Tow Truck Preventive Maintenance Procedures
- Proper Tow Truck and Equipment Pre-Operation Inspection Procedure
- Lubrication Procedures
- Control/Gauges
- Proper Start Up
- Use of Transmission
- Backing Procedures
- Over the Road Techniques
- Proper Shutdown
- Air Tank Drain
- Proper Setting of Brakes
- Cleaning of Equipment
- Post Inspection of Tow Truck and Equipment
- Proper Connection of Towed Vehicle

Equipment Being Towed
Securing Towed Vehicle
Emergency Warning Lights
Towing of Vehicle
Parking of Towed Vehicle
Securing Towing Device
American Red Cross (or equivalent) First Aid

Knowledge of the geographic area of Delaware in general and of the Project area in particular is required. This is to include such items as names of interchanges and local roads and directions to major landmarks and attractions.

Uniform and Other TTOs Equipment: Provide at least two uniforms to all the TTOs, keep uniforms clean, and immediately replace if they become torn or stained. The uniform is to consist of a jump suit with reflectorized tape on the front and back or a Contractor submitted uniform. This uniform is only be worn while on duty or while traveling to and from the assigned area. The Contractor is also to supply the TTO with protective shoes or boots, jackets, reflectorized rain gear and hard hats.

Supply each TTO with a photo identification card which contains only their names and current photo with no reference to any private tow company. This card is to be prominently displayed on their uniform.

Driving and/or Working Under the Influence of Drugs or Alcohol: Use of alcohol or illegal drugs is grounds for immediate dismissal of the TTO by the Engineer. The Contractor is then responsible for finding a replacement TTO by the beginning of the next TTO shift.

TTO BEHAVIOR: TTOs will be considered as representatives of the Department and their appearance and behavior in front of the general public is to be impeccable. Violations of proper behavior and etiquette will not be tolerated.

Such violations are listed as follows:

- Poor grooming, poor personal hygiene
- Dirty, torn or worn uniforms
- Sleeping during normal working hours
- Unsafe acts or violations of traffic laws
- Leaving motorists in unsafe areas, such as in a median divisor or alone on a narrow shoulder without another tow truck or police vehicle present
- Foul language or inappropriate hand gestures
- Yelling or being rude to motorists
- Falsifying information orally or in written form
- Damaging a motorist's vehicle due to careless act
- Insubordination
- Demeaning the Department of the Towing Service Program
- Arriving to patrol area late or leaving patrol area early.

Although each case will be weighed on its own merits, violation of any of the above items by the TTO will be dealt with as follows:

First offense: Written reprimand

Second offense: 1 Week suspension

Third offense: 1 Month suspension

Fourth offense: Termination

Multiple and continual violations by more than one TTO may result in more severe penalties.

These violations are not intended to be an exhaustive list. The Engineer reserves the right to characterize any unsatisfactory action as a violation and subject to the above actions.

RECORD KEEPING/REPORTING/AUDITS: The TTOs are required to call the DeIDOT TMC at the beginning and end of each shift, when on break and leaving the assigned patrol area, and are required to complete a daily log which documents beginning and ending shift times, vehicles assisted, type of assistance rendered, any time he/she left the Project site, and total mileage for the day.

These records are to be made available upon request of the Engineer and/or the TMC, or his authorized representatives to inspect and audit.

DISPOSITION OF TOW TRUCKS AFTER THE REQUIRED COMPLETION DATE

At the completion of the contract requirements for this item, the magnets used on the doors of the tow vehicles shall be turned over to DeIDOT TMC.

Method of Measurement:

The quantity of "Class 1 Tow Truck" will be measured as the actual number of hours for which the tow truck was in-service for the project, in accordance with specific timelines outlined above.

Basis of Payment:

The quantity of "Class 1 Tow Truck" will be paid for at the Contract unit price per Hour. Price and payment shall be full compensation for furnishing all labor, materials, and equipment; assistance to motorists and delivery of vehicles to the designated drop-off location; for all tools, equipment, labor, and all necessary incidentals to complete the work.

3/13/15

763653 - CLASS 2 TOW TRUCK

Description:

This work is furnishing and operating a “Class 2” tow truck, ramp truck and/or similar towing vehicle on a per call basis when Construction Phase 1 through 2 traffic restrictions are in full effect on SR 141, I-95, I-295, or as directed. The “Class 2” tow truck or ramp truck must be available 24 hours per day.

Equipment:

Provide the following vehicles for removal of disabled vehicles when directed.

Class 2 Tow Truck - For Buses (including DART), large trucks and semi-trailer rigs.

Ramp Truck - Flat bed truck with winch for wreck removal.

SUPPLIERS: Class 1 Tow Truck Services shall be provided by: B&F Towing, 449 Old Airport Road, New Castle, DE, 19720 (Phone 302-328-4146); First State Towing, 424 Old Airport Road, new Castle, DE 19720 (Phone 302-994-9244); or approved equal.

NOTE – SUPPLIER OF CLASS 2 TOW TRUCK SERVICE MUST BE THE SAME AS THE PROVIDER OF CLASS 1 TOW TRUCK SERVICES.

Construction Methods:

Upon notification that a disabled vehicle requires removal and operator approval is obtained or removal is directed by police, and it is determined that the Class 1 tow truck service is not suited for the vehicle in question, contact the approved tow truck service and order removal with the required type of towing vehicle (s). Do not tow any vehicle without vehicle operator approval or police direction. Inform the vehicle operator that the tow to the “Drop-Off Location” is provided at no cost.

Respond by being en route to the site within 10 minutes of notification with the required type of towing vehicle(s).

Be courteous to operators or occupants of vehicles at all times.

Tow vehicles requiring repair or wrecked vehicles to the DelDOT designated “Drop-Off Location”. Do not transport vehicle beyond this point.

Remove vehicles requiring repairs or wrecked vehicles utilizing a ramp truck when towing is not advisable. Tow vehicles requiring repair or wrecked vehicles to the DelDOT designated “Drop-Off Location”. Do not transport vehicle beyond this point.

Tow abandoned vehicles and vehicles involved in accidents where the operator is no longer available to the DelDOT designated “Drop-Off Location”.

Do not tow vehicles which were involved in an accident until so directed by police.

Refer motorists to the Class 1 Tow Truck operator for phone service or transportation assistance.

Be responsible for any damage caused by towing operations.

Sign-in with the Class 1 Tow Truck operator in all cases when answering a call for record purposes.

Method of Measurement:

The quantity of “Class 2 Tow Truck” will be measured as the number of service calls placed and completed.

Basis of Payment:

The quantity of “Class 2 Tow Truck” will be paid for at the Contract unit price per Each service call. Price and payment shall be full compensation for furnishing all labor, materials, and equipment; assistance to motorists and delivery of vehicles to the designated drop-off location; for all tools, equipment, labor, and all necessary incidentals to complete the work.

3/13/15

763655 - STEEL COST PRICE ADJUSTMENT

.01 Description: The Department will adjust monthly progress payments up or down as appropriate for cost changes in steel used on specific items of work identified in the contract in accordance with this provision.

The following steel items will be eligible for consideration under this provision:

1. structural steel (rolled beams, plate girders, diaphragms, plate bearings, etc.);
2. reinforcing steel (plain & epoxy coated);
3. overhead sign structures;
4. guardrail, posts;
5. standard sign or lighting supports;
6. railing;
7. steel encasement pipe;
8. steel piles (end bearing or friction);
9. steel strand (used for pre-tensioned or post-tensioned finished elements); and
10. sheet piles.

Inventoried materials from the listing of eligible items and fasteners of any kind are specifically excluded for consideration. Fasteners include but are not limited to, bolt, nuts, washers, rivets, and welding rods.

The requirements of this provision shall apply only to material cost changes that occur between the date of bid opening and the date the material is shipped to the fabricator. To be eligible for this price adjustment, the Contractor is required to place purchase order(s) for eligible steel items for price adjustment identified in the contract within 30 days after final execution of the contract by the Department. All items eligible must be submitted and used on the project for any item to be eligible for adjustment.

For steel items to be eligible for adjustment, once shipped to the fabricator, the items shall be specifically stored, labeled, or tagged, recognizable by color marking, and identifiable by project for inspection and audit verification.

This provision allows for price adjustment for embedded steel used for pre-tensioned or post-tensioned precast components where furnishing steel is included in the unit price of the finished bid item. Steel used for post-tensioned or pre-tensioned elements shall be evaluated for price adjustment in the same manner as other steel material eligible under the requirements of this provision except that adjustment shall only apply to the tonnage or poundage of steel strand used in the pre-tensioned or post-tensioned element.

This provision shall only apply to material cost changes of steel that occur between the date of bid opening and the date the material is shipped to the Contractor, subcontractor or supplier/fabricator placing the steel into the finished component.

Submit material price quotes, bid papers, or other documentation satisfactory to the Department within 15 days after the date of the Award letter for the bid items the Contractor is requesting a steel price adjustment. This documentation shall support the completion of the form establishing the average price per pound for the eligible steel bid item. The Contractor must use the format as shown with this provision; no other format for presenting this information will be permitted. Certification is required that all items of documentation are original and were used in the computation of the amount bid for the represented eligible pay items for the month bids were opened. The documentation will be used to support the base line material price ("Base Price") of the steel item only. No adjustment will be made for changes in other components of the contract unit bid price, including, but not limited to, fabrication, shipping, storage, handling, and erection.

Failure to submit specifically required information such as purchase order, price data, bill of lading, material information or other requested information as noted herein will result in the Contractor not being eligible for price adjustment of steel items.

Price adjustment of each qualifying item under consideration will be subject to the following condition:

There must be an increase or decrease in the cost of eligible steel materials in excess of 10% up to a maximum of 60% from the Base Price when compared with the latest published price index (“Price Index”) in effect at the time material is shipped to the fabricator.

The Price Index the Department is using is based on The U.S. Department of Labor, Bureau of Labor Statistics, Producers Price Index (PPI) which measures the average price change over time of the specific steel eligible item from the perspective of the seller of goods. The specific PPI to be used to adjust the price for the eligible steel items is shown in the table below. **Please note:** The PPI is subject to revision four months after original publication, therefore, price adjustments and payments will not be made until the index numbers are finalized.

The following table indicates the PPI steel category index items and the corresponding I.D. numbers to which the steel items will be compared:

Steel Item	Bureau of Labor Statistics PPI Series I. D. Number WPU#
Reinforcing steel (plain & epoxy coated) Steel Strand (Pre-tensioning & Post-tensioning)	WPU101704 (http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101704)
Plate girders & rolled beams (Standard & High strength, diaphragms, plate bearings, etc.) Steel piling (H-pile, pipe piles & sheet piles)	Average of WPU1017 & WPU101 (http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU1017&data_tool=XGtable) & (http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU101&data_tool=XGtable)
Steel encasement pipe Overhead sign structures, posts, poles, guardrail, sign or lighting supports, & railing	WPU101706 (http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101706)
Guardrail	Average of WPU1017 & WPU101707 (http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU1017&data_tool=XGtable) & (http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101707)

The price adjustment will be determined by computing the percentage of change in index value beyond 10% above or below the index on the bid date to the index value on the date the steel material is shipped to the fabricator (Please see included sample examples). Weights and date of shipment must be documented by a bill of lading provided to the Department. The final price adjustment dollar value will be determined by multiplying this percent increase or decrease in the index (after 10%) by the represented quantity of steel shipped by the Base Price per pound subject to the limitations herein.

$A = B \times P \times Q$	
Where:	
A =	Steel price adjustment in lump sum dollars
B =	Average weighted price of steel submitted with bid on project in \$/lb
P =	Adjusted percentage change in PPI average from shipping date to bid date minus 10% (0.10) threshold
Q =	Total quantity of steel in pounds shipped to fabricator for the specific project

Delays to the work caused by steel shortages may be justification for a contract time extension but will not constitute grounds for claims for standby equipment, extended office overhead, or other costs associated with such delays.

The need for application of the adjustments herein to extra work will be determined by the Engineer on an individual basis and, if appropriate, will be specified on the Change Order.

This price adjustment is capped at 60%. This means the maximum "P" value for increase or decrease that can be used in the above equation is 50% (60%-10% threshold).

Calculations for price adjustment will be shown separate from the monthly progress estimate and will not be included in the total cost of work for determination of progress or for extension of contract time.

Any apparent attempt to unbalance bids in favor of items subject to price adjustment may result in rejection of the bid proposal.

.02 Method of Measurement:

Price increase/decrease will be computed as follows:

Sample Calculation of a Price Adjustment (increase)			
Project bid on	Tuesday, April 28, 2009		
Project has structural steel in the amount of:		450,000	Lbs
Orders placed in timely manner and according to contract.			
Contractor's F.O.B. supplier price for the structural steel in bid:		\$ 0.28	/lb
Adjusted** BLS Producers Price Index most recently published average at time of bid:			157.0
** final change after 4 months			
All steel shipped to fabricator in same month,	October-09		
Adjusted BLS Producers Price Index (PPI) most recently published average for month of			173.7
October:			
Adjustment formula is $A = B \times P \times Q$			
Where:	A =	Steel price adjustment in lump sum dollars	

B =	\$ 0.28	Average weighted price of steel submitted with bid on project in \$/lb = \$0.28
P =	0.0064	Adjusted percentage change in PPI average from shipping date to bid date minus 10% threshold = $(173.7-157.0)/157.0 - 0.10 = 0.0064$
Q =	450,000	Total quantity of steel shipped to fabricator in October 2004 for this project in lb = 450,000 lb
A =	\$ 802.55	$0.28 \times 0.0064 \times 450,000$
A =	\$ 802.55	Lump Sum adjustment paid to Contractor

Sample Calculation of a Price Adjustment (decrease)		
Project bid on April 27, 2009.		
Project has structural steel.	450,000	Lbs
Orders placed in timely manner and according to contract.		
Contractor's F.O.B. supplier price for the structural steel in bid:	\$ 0.28	/lb
Adjusted** BLS Producers Price Index most recently published average at time of bid:		173.7
** final change after 4 months		
All steel shipped to fabricator in same month, October 2009.		October-09
Adjusted BLS Producers Price Index (PPI) most recently published average for month of October:		157.0
Adjustment formula is $A = B \times P \times Q$		
Where:	A =	Steel price adjustment in lump sum dollars
	B = \$ 0.28	Average weighted price of steel submitted with bid on project in \$/lb = \$0.28
	P = -0.0039	Adjusted percentage change in PPI average from shipping date to bid date minus 10% threshold = $(173.7- 157.0)/157.0 - 0.10 = - 0.0039$
	Q = 450,000	Total quantity of steel shipped to fabricator in October 2009 for this project in lb = 450,000 lb
	A = \$ (486.01)	$0.28 \times 0.0039 \times 450,000$
	A = \$ (486.01)	Lump Sum credit from Contractor

.03 Basis of Payment: The price adjustments will be made as a lump sum payment for eligible steel products placed and accepted.

905500 - SUPER SILT FENCE

Description:

This work consists of furnishing, installing, constructing, maintaining, and ultimately removing super silt filter fences as a temporary measure to control sedimentation within the limits of construction. Super silt fence shall be constructed as shown on the details in the Plans, at the locations shown on the Plans, and as directed by the Engineer.

Materials:

General. All materials shall be approved prior to use by the Department's Materials and Research Section.

Chain Link Fence. The construction requirements for the placement of the chain link fence shall be as specified in **SECTION 727 FENCES AND GATES** with the following exceptions:

(a) Concrete footings (727.07), Top Rail, Tension Wire, Horizontal Braces shall not be used.

Fasteners. Aluminized steel tie wires long enough to securely attach the fabric to the posts.

Seed. Seed shall conform to the requirements of Section 908.

Mulch. Mulch shall conform to the requirements of Section 908.

Geotextile. Geotextile shall conform to the requirements of Section 827. It shall be a minimum of 36" (900 mm) wide.

Construction Methods:

Construction of Super Silt Fence.

The Contractor shall excavate the trench along the upstream side of the post line as shown on Standard Construction Detail, Super Silt Fence. Posts shall be installed on the Downstream edge of the trench, along the established fence line. The geotextile shall be fastened to the upstream side of the chain link. The geotextile and chain link must extend a minimum of 33" above the ground. The chain link fabric and geotextile shall be embedded 8 inches into the excavated trench. The trench shall be backfilled and compacted over the chain link and geotextile to prevent water from flowing under the chain link and geotextile.

The super silt fence shall not be constructed across a ditch, or swale, or area of concentrated flow. On slopes, the terminal ends of super silt fence shall be turned upslope a sufficient distance to eliminate flow around the ends of the super silt fence. All geotextile damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer.

Maintenance of Super Silt Fence.

Throughout the Project construction period, the super silt fence shall be maintained by removing trapped sediment. The Contractor shall clean the geotextile of trapped sediment by tapping the geotextile when dry. No trash shall be allowed to accumulate to the height of the fence. Any geotextile that does not function due to clogging or deterioration shall be replaced.

Sediment Removal.

After every heavy rainfall, the Contractor shall check for excessive buildups of sediment which must be removed so that the super silt fence can continue to function as intended. Remove accumulated sediment when it reaches 50% of the height of the super silt fence.

Removal of Super Silt Fence.

The super silt fence shall be removed when the Engineer determines that it is no longer required. The super silt fence and all materials incidental to the super silt fence construction shall be removed. All areas affected by the construction of the super silt fence shall be restored to the original or plan contours and stabilized with seed and mulch.

Method of Measurement:

The quantity of super silt fence will be measured as the actual number of linear feet (linear meters) of super silt fence placed and accepted.

Basis of Payment:

The quantity of super silt fence will be paid for at the Contract unit price per linear foot (linear meter) for each type of fence. Price and payment will constitute full compensation for furnishing all materials; for excavating and backfilling associated with the construction of the super silt fence; for maintaining the super silt fence during the Project construction period; sediment removal, for removing the super silt fence with all related hardware after completion of the Project; for restoring the site; for seeding and mulching; and for all labor, equipment, tools and incidentals required to complete the work. No payment will be made for any replacement of or repairs to the super silt fence damaged prior to installation, during installation, or during the life of the Contract. No payment will be made for the replacement of the super silt fence.

11/18/2014

PS&E UTILITY STATEMENT

3/4/15

State Contract No. T201109002 I-95 and SR 141 Interchange, Ramps G & F Improvements New Castle County

The following utility companies maintain facilities within the project limits:

Artesian Water Company
Delmarva Power – Electric Distribution
Delmarva Power – Gas Distribution
Verizon of DE

The following is a breakdown of the utilities involved, adjustments and/or relocations as required (all stations, offsets, lengths and calendar days are approximate):

Artesian Water Company

The Artesian Water Company maintains the following facilities within the project limits:

1. A 16" Cast Iron pipe running along the westerly side of existing NB SR 141 beginning at Sta. 1070+00 to approximately Sta. 1075+00. The line then bends 90 degrees and continues west to approximately offset left 80', and then bends 90 degrees and continues north crossing perpendicularly under NB I-95 and I-295 in a 60" casing and continues along the westerly side of existing NB SR 141 until approximate Sta. 1090+00 offset left.

The Artesian Water Company proposed the following adjustments and/or relocations to its existing facilities.

Action Item	Start Station	Finish Station	Offset	Action	M.O.T. Phase	Type C Borrow (cu.yd.)	Estimated Duration (days)
1	1075+10	1075+10	L,80'	Refurbish existing concrete vault and replace existing 16-in sleeve, valve, 16x24 reducer, 24x4 tee and 4-in blow-off assembly.	1	0	10
2	1075+00	1077+75	L,80'	Slip line existing 24-in CIP with new 20-in HDPE	1	0	5
3	1069+86	1070+18	L,34'	Tie into the existing 16-in CIP at Sta. 1069+86 and install 36-ft of new 16-in DIP and water valve to Sta. 1070+00	1	13	2
4	1070+18	1074+60	L, 25'-35'	Install 440-ft of new 16-in DIP with locking gaskets in top bench of proposed embankment along west side of northbound SR 141 from Sta. 1070+18 to 1074+60.	1	0	5

Action Item	Start Station	Finish Station	Offset	Action	M.O.T. Phase	Type C Borrow (cu.yd.)	Estimated Duration (days)
5	1074+60	1075+10	L, 35'-80'	Install 72-ft of new 16-in DIP and (2) 90° bends down the proposed embankment and into the existing concrete vault on west side of northbound SR 141 from Sta. 1074+60 to 1075+10.	1	12	2
6	1077+74	1078+50 and 3010+00	L, 40'-80'	Install 106-ft of new 16-in DIP and (2) 90° bends at Sta. 1078+50, down the proposed embankment and into the existing concrete casing on west side of northbound SR 141 at Sta. 1077+74.	1	26	2
7	3010+00	3014+82	L, 30'	Install 462-ft of new 16-in DIP with locking gaskets in top bench of proposed embankment along west side of northbound SR 141 from Sta. 3010+00 to 3014+82.	1	0	5
8	3014+82	3014+82 And 1083+50	L, 30' R, 35'	Install 68-ft of new 16-in DIP in 40-ft of 24-in steel casing from Sta. 3014+82, under Ramp F and to the west side of northbound SR 141 at Sta. 1083+50. The 24-in steel casing pipe will be installed by the State's General Contractor while installing Drainage Pipe-105.	1	32	5
9	1083+50	1090+50	L, 30'	Install 705-ft of new 16-in DIP with locking gaskets in top bench of proposed embankment along west side of northbound SR 141 from Sta. 1083+50 to 1090+50.	1	0	7
10	1090+50	1090+63	L, 30'	Install 106-ft of new 16-in DIP and (2) 90° bends at Sta. 1090+50, down the proposed embankment and into the existing concrete casing on the west side of northbound SR 141 at Sta. 1091+23.	1	26	2
*11	1090+63	1093+27	L, 75'	Slip line existing 24-in CIP with new 20-in HDPE	1	0	5
*12	1093+27	1093+27	L, 75'	Refurbish existing concrete vault and replace existing 16-in sleeve, valve, 16x24 reducer, 24x4 tee and 4-in blow-off assembly.	1	0	10
*13	1068+25	1091+23	L, 30'	Fill existing water mains taken out of service and under pavement with flowable fill	1	0	5

*Additional Maintenance of Traffic associated with Action Items 11-13 to be provided by Artesian Water Company.

The Artesian Water Company will complete these changes. These relocations/adjustments are expected to take approximately 65 calendar days to complete after the Company has been given a minimum 42 calendar days advance notice that work shall begin and the right-of-way and proposed work has been laid out by the State's contractor, and clearing has been completed. All work stated above will take place in during Phase 1 of the state highway project. Artesian Water Company's construction schedule is based upon the open-cutting of Ramp F. Existing main will be taken out of service after the new main is installed and activated. Existing mains being abandoned under pavement will be filled with flowable fill. Abandonment will take place after the relocation work is completed.

Delmarva Power - Electric Distribution

Delmarva Power maintains aerial and underground facilities within the limits of this project.

No relocations are anticipated as part of this project. A new 120/240 V power connection will be established for the lighting system from existing Delmarva Power pole #47085/41643 on Southbound SR 141 at Sta. 1167+19 offset left 55'. If DelDOT does not have enough room on pole to bring their cables up the pole, then a new shorter pole may be installed by DelDOT and Delmarva Power will provide an aerial service drop from existing utility pole #47085/41643 to DelDOT's pole. In the event the shorter pole needs to be installed by DelDOT, the pole shall not be placed in a wetland.

For exact location of electric facilities, please contact Miss Utility at (800) 282-8555.

16 Del. C. § 7405B requires notification to and mutually agreeable measures from the public utility from any person intending to carry on any function, activity, work or operation within dangerous proximity of any high voltage overhead lines. All contractors/other utilities must also maintain a distance of 10'-0" from all energized lines.

Location of service is in front of Basin Substation which also has aerial Transmission lines in vicinity. (Ray Rouault, Matt Savage)

Delmarva Power - Gas Distribution

The Delmarva Power – Gas Distribution Company maintains the following facilities within the project limits:

1. An 8" steel line running along the westerly side of NB SR 141 underneath the roadway beginning at Sta. 1070+00 to approximately Sta. 1075+50 at which point the line passes through the southerly abutment wall and begins hanging from the deck of existing Bridge No. 675 and continues north until approximate Sta. 1077+75. The line then passes through the northerly abutment wall of Bridge No. 675, and continues under the westerly side of the roadway until approximate Sta. 1084+75.

The Delmarva Power – Gas Distribution Company proposes the following adjustments and/or relocations to its existing facilities

1. Due to the phasing of the project, demolition and reconstruction of Bridge No .675, a permanent and temporary relocation will be necessary.
 - A. The permanent relocation of the existing line will be an 8" steel relocated line that will begin at the tie-in into the existing line at Sta. 1074+78 offset left 6', outside the southerly approach slab of the new structure for Bridge No. 675. The line will continue in a northerly direction hanging from the new beams of the structure Bridge No. 675, between girders 4 and 5 until tying into existing facilities at Sta. 1078+30 offset left 6', outside the new northerly approach slab. The line will be

encased by a 12” steel casing from Sta. 1074+85 to Sta. 1075+25 offset left 6’, and from Sta. 1077+78 to Sta. 1078+18 offset left 6’.

- B. The temporary relocation will occur during Phase 1 construction during which time the deck, approach slabs, and beams will be removed. The relocation will be made by tying into the existing line on each end of Bridge No. 675. The southerly relocation will be at Sta. 1074+76 offset left 7’ with a 90 degree bend, continuing the line to 1074+80 offset right 16’, the line will then bend 90 degrees and go through the existing Abutment wall between girders 3 and 4 and tie-into the existing main at Sta. 1075+13 offset right 16’. The northerly relocation will take place by tying-into the existing line at Sta. 1077+80 offset right 15’, continuing the line through the existing Abutment Wall to Sta. 1078+21 offset right 17’, the line will then bend 90 degrees and tie-into the existing main at Sta. 1078+22 offset left, 5’. After the completion of Phase 1 construction, the permanent condition can be installed before switching to Phase 2 construction.
- C. Extended outages of the existing gas main are not permitted between October 1st and April 30th. Tie-ins into the existing main must be coordinated with Delmarva Power – Gas at least twenty-one days in advance of the work.

The Delmarva Power – Gas Distribution Company will complete these changes. The relocations/adjustments in 1.A. are expected to take approximately 60 calendar days, and in Phase 1.B. to take approximately 60 calendar days to complete after the Company has been given a minimum 30 calendar days advance notice that work shall begin and the right-of-way and proposed work has been laid out by the State’s contractor.

Verizon of DE

The Verizon of DE Company maintains the following facilities within the project limits:

- 1. An underground conduit line along the easterly side of SB SR 141 throughout the project limits. The conduit hangs from the deck of existing Bridge No. 678. The existing conduit hanging from the bridge has been tested, and has tested positive for asbestos.

The Verizon of DE Company proposed the following adjustments and/or relocations to its existing facilities:

- 2. In advance of this contract Verizon will have their own contractor core the existing manholes and stub out the conduit approximately 3’ at approx. Sta. 1174+85, offset right and Sta. 1179+99, offset right to allow for the future installation of the proposed conduits into the vaults. Verizon anticipates 3 days of construction at each manhole utilizing a single lane closure during off peak hours. Temporary roadway material will be placed in the excavated areas with a thicker section being placed in the travel lanes.
- 3. Prior to Phase 1 construction, the state’s contractor utilizing single lane off peak closures will install the conduits from the existing vaults at Sta. 1174+85, offset right and Sta. 1179+99, offset right into the Phase 1 work zone. Phase 1 maintenance of traffic then can be placed including the temporary PCC barrier.

4. During Phase 1, the remaining conduits will be installed by the states contractor, including under Bridge No. 678 between girders 3 and 4. The state's contractor will provide and install the hangers and steel casing for the new Verizon line under the bridge and Verizon will reimburse DelDOT as necessary for these items. The configuration of the conduits will be one (1) row of four (4)-4" conduits through the abutment walls and under the bridge. Once the conduits leave either abutment wall, they may return to a two (2) x two (2) square configuration with a minimum depth of 36" below the surface.
5. Upon the completion of the conduit installation during Phase 1, Verizon will have its approved contractor verify the conduit run is acceptable, pull the interduct cables, setup, and splice the copper and fiber lines at the existing vaults during off peak hours. Verizon estimates 28 nights to complete the splicing. Additionally to complete the splicing Verizon will need to complete splicing at the existing manhole at approx. Sta. 1168+50 right just south of the Airport Road intersection. The states certified asbestos abatement contractor will remove the existing asbestos conduits from Bridge No. 678, this work will require 14 calendar days. DelDOT will invoice Verizon for this work.
 - a. **Lane closures for work on SB SR 141 shall only be from 8PM-5AM Sunday night through Friday morning. All lanes must be reopened by 5AM. Please see DelDOT's Maintenance of Traffic specification for holidays and special events during which lanes may not be closed.**

General Notes

1. If utility work is being performed in advance of the project, all bidders are to determine the extent of completion of the advanced utility work, and predicate their bid prices on the extent of utility work completed and anticipated to be completed prior to the start of construction.
2. The Utility Company's forces will perform any additional relocations/adjustments that may be necessary during construction of the project. The time to complete any additional relocations/adjustments will depend upon the nature of the work, the required advance notice to the Utility Company, the need for the State's Contractor to stake out the right of way or proposed work, and any work that needs to be done by the State's Contractor in advance of the utility relocation/adjustment.
3. The contractor's attention is directed to Section 105.09 Utilities, Delaware Standard Specifications, August 2001. The Contractor shall contact Miss Utility (1-800-282-8555) two working days prior to any excavation. The Contractor is responsible for the support and protection of all utilities when excavating. The Contractor is responsible for ensuring proper clearances, including safety clearances, from overhead utilities for construction equipment. The contractor is advised to check the site for access purposes for his equipment and, if necessary, make arrangements directly with utility companies for field adjustments for adequate clearances.
4. It is understood and agreed that the contractor has considered in his bid all permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans or described in the utility statement and/or are readily discernible and that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by him/her

to any interference from the utility facilities and appurtenances or the operation of moving the, except that the contractor may be granted an equitable extension of time.

5. The State's Contractor is responsible for rough grading as required by the roadway construction prior to the utility companies placing their proposed facilities unless indicated on the plans and/or outlined elsewhere in these specifications.
6. The Contractor shall follow all requirements of the Delaware Code, Title 26, Chapter 8. Underground Utility Damage Prevention And Safety. Chapter 8 includes, among other requirements, Section 806. Duties of Excavators which contains the requirement for the Contractor to excavate prudently and carefully and to take all reasonable steps necessary to properly protect, support and backfill underground utility lines. This protection shall include, but may not be limited to, hand digging within the limits of the planned excavation or demolition, starting 2 feet of either side of the extremities of the underground utility line for other than parallel type excavations and at reasonable distances along the line of excavation for parallel type excavations.
7. The Contractor shall note that the Delaware Code, Chapter 74B, Section 7405B requires notification to and mutually agreeable measures from the public utility for any person intending to carry on any function, activity work or operation within dangerous proximity of any high voltage overhead lines.
8. As outlined in Chapter 3 of the DelDOT Utilities Manual, utilities are responsible for obtaining all required permits from municipal, State and federal government agencies and railroads. This includes but is not limited to water quality permits/DNREC Water Quality Certification, DNREC Subaqueous Lands/Wetlands permits, DNREC Coastal Zone Consistency Certification, County Floodplain permits (New Castle County only), U.S. Coast Guard permits, US Army Corps 404 permits, sediment and erosion permits, and railroad crossing permits.
9. Utility companies are required to restore any areas disturbed in conjunction with their relocation work. If an area is disturbed by a utility company and is not properly restored, the Department may have the highway contractor perform the necessary restoration. Any additional costs incurred as a result will be forwarded to the utility company.

T201109002 I-95 AND SR 141 INTERCHANGE, RAMPS G & F IMPROVEMENTS

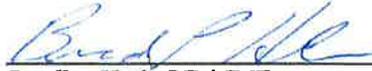
CONSTRUCTION SCHEDULE

UTILITY ACTIVITY	Feb-2015	Mar-2015	Apr-2015	May-2015	Jun-2015	Jul-2015	Aug-2015	Sep-2015	Oct-2015	Nov-2015	Dec-2015	Jan-2016	Feb-2016	Mar-2016	Apr-2016	May-2016	Jun-2016	Jul-2016	Aug-2016	Sep-2016	Oct-2016	Nov-2016	Dec-2016	
Artesian Water Company											█													
Delmarva Power - Electric Distribution								█																
Delmarva Power - Gas Distribution								█		█														
Verizon of DE																								
States' Certified Asbestos Contractor																								

NOTE: Coordination and cooperation among the utilities and the State's Contractor are of prime importance, therefore, the Contractor is directed to contact the following Utility Representatives with any questions in regard to this work prior to submitting bids and work schedules. Proposed work schedules should reflect the Utility Companies' proposed relocations.

NAME	COMPANY	PHONE
Carmen Hunter	Artesian Water Company	302-453-7153
Angel Collazo	Delmarva Power - Electric	302-454-4370
Ted Waugh	Delmarva Power - Gas	302-429-3706
George Zang	Verizon of DE	302-422-1238

Prepared and Recommended by:


Bradley Herb, PE / JMT

3/4/15
DATE

Approved as to form by:


Utilities Section, DelDOT

3/4/15
DATE

cc. DelDOT Utilities Engineer

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

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T201109002

F.A.P. NO. N/A for R/W

I-95 AND SR 141 INTERCHANGE RAMPS G & F

NEW CASTLE COUNTY

Certificate of Right-of-Way Status – 100%

Level 1

As required by 23 CFR, Part 635, and other pertinent Federal and State regulations or laws, the following certifications are hereby made in reference to this highway project:

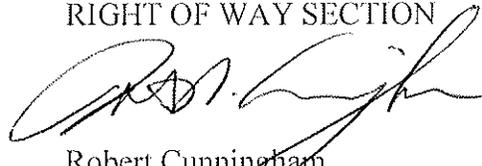
All project construction or work shall be performed within existing rights of way and permanent easements; and,

All necessary real property interests, including control of access rights when pertinent, were acquired as part of previous highway projects, and include legal and physical possession; and,

This project does not cause any persons to be displaced as defined in 49 CFR, Part 24; and,

The State has the right to remove, salvage, or demolish any improvements or personal property that may be located within project limits; and,

RIGHT OF WAY SECTION



Robert Cunningham
Chief, Right of Way

September 16, 2014



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

JENNIFER COHAN
SECRETARY

July 13, 2015

STIPULATED

ENVIRONMENTAL REQUIREMENTS

FOR

State Contract No. T201109002

Federal Aid No.: IM-N056(042)

Contract Title: I-95 and SR 141 Interchange, Ramps G&F Improvements

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. As such, a Categorical Exclusion has been prepared to evaluate potential adverse impacts resulting from construction of the proposed project (per 23 CFR 771.117 d (1) and (3)), and the following special provisions have been developed to mitigate and/or minimize these impacts.

PERMIT REQUIREMENTS:

The construction work that will occur as part of the I-95 and SR 141 Interchange, Ramps G & F Improvement projects, New Castle County, Delaware requires permit approval from the agencies listed below. It is the responsibility of the contracting agency -- the Delaware Department of Transportation, Division of Transportation Solutions -- to obtain the necessary permits to ensure that the contractor complies with the requirements and conditions established by the regulatory agencies. The permit coordination for this project is ongoing. Written authorization from the permitting agencies is required and paperwork for on-site posting is anticipated. As such, the construction work that will occur as part of the I-95 and SR 141 Interchange, Ramps G & F Improvement projects, New Castle County, Delaware is authorized under the permits/exemptions listed below:

REQUIRED PERMITS AND APPROVAL STATUS:

- U.S. Army Corps of Engineers (COE) - Two (2) - Nationwide Permit (NWP) #23's with a Preconstruction Notification (PCN) - **both pending**
- Delaware Department of Natural Resources and Environmental Control (DNREC) – Wetlands and Subaqueous Lands Section - Wetlands Permit - **pending**
- New Castle County Department of Land Use – Floodplain Permit
 - – per letter dated 8/27/14, the proposed work is not within a regulatory floodway and NCC application meets the standards of NCC's Flood Ordinance and **a permit is not required**
 - Floodplain permit is required for the Peterson Mitigation Site – **pending**

SPECIFIC REQUIREMENTS:

Compliance with all requirements of the permits is the responsibility of the contractor, who will follow all special conditions or requirements as stated within those permits. The contractor will be subject to penalties, fines, and the risk of shut down as mandated by laws governing permitting agencies if such conditions and requirements are violated or ignored. Therefore, all special conditions, general requirements, and/or other required provisions specified within the permits must be followed. Those obligations are indicated or listed within the permit package, which can be obtained from the DelDOT Contract Administration Office.

Additional requirements by DelDOT not specified within the permits, but listed below, are also the responsibility of the contractor. Noncompliance with these requirements may result in shut down of the project at the contractor's expense.

1. The contractor shall employ measures during construction to prevent spills of fuels or lubricants. If a spill should occur, efforts shall be undertaken to prevent its entry into wetlands, aquatic, or drainage areas. Any spills entering wetlands, aquatic, or drainage areas shall be removed immediately. The Division of Water Resources (DNREC), Wetlands & Aquatic Protection Branch, 302-739-4691, shall be notified of any spill(s) within six (6) hours of their occurrence. That office will determine the effectiveness of spill and contamination removal and specify remediation efforts as necessary.
2. All construction debris, excavated material, brush, rocks, and refuse incidental to the work shall be placed either on shore above the influence of flood waters or on some suitable disposal site approved by the department.
3. The disposal of trees, brush, and other debris in any stream corridor, wetland surface water or any drainage ditch is prohibited.
4. There shall be no stockpiling of construction materials or temporary fills in wetlands or subaqueous lands unless otherwise specified on project plans and approved by permitting agencies that govern them. It is the contractor's responsibility to coordinate and secure those additional permits/amendments in deviating from the plan.

5. Construction debris shall be kept from entering adjacent waterways, wetlands, ground cover, or drainage areas. Any debris that enters these areas shall be removed immediately. Netting, mats, or establishing confined work areas in stages may be necessary to address these issues.
6. Refuse material resulting from routine maintenance of worker equipment and heavy machinery is prohibited from being disposed or deposited onto or into the ground. All used oils and filters must be recycled or disposed of properly.
7. Use of harmful chemical wash water to clean equipment or machinery is discouraged. If undertaken, the residue water and/or material must be collected or contained such that it will be disposed of properly. It shall not be deposited or disposed of in waterways, streams, wetlands, or drainage areas.
8. The contractor shall follow all requirements as indicated in the Environmental Compliance Sheet. It is the contractor's responsibility to ensure that workers also follow this requirement. As part of the restrictions, please note the timetables reflected in the contract for the in-stream/water work for endangered species protection.
9. Fill material shall be free of oil and grease, debris, wood, general refuse, plaster and other pollutants, and shall contain no broken asphalt.

ENVIRONMENTAL COMPLIANCE SHEET:

The contractor shall pay special attention to specific construction requirements as indicated in the Environmental Compliance Sheets (sheets 209-228).

1. Please note the environmental requirement as indicated in Note 3 on sheet 210 (EC-02), regarding Cultural Resource Issues.
2. Specifically, please note the environmental requirements as indicated on sheet 210 (EC-02) in:
 - Note 4 for Protection of Resources
 - Note 5 for Plantings
 - Note 6 for Mitigation
3. DelDOT Environmental Studies Section (302) 760-2264 must be notified if there are any changes to the project methods, footprint, materials, or designs, to allow the Department to coordinate with the appropriate resource agencies (COE, DNREC, NCC, and SHPO), for approval.



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

SHAILEN P. BHATT
 SECRETARY

RAILROAD STATEMENT

For

State Contract No.: T201109002

Federal Aid No.: IM-N056(042)

Project Title: I-95 and SR141 Interchange, Ramps G & F Improvements

The following railroad companies maintain facilities within the contract limits:

- | | |
|--|---|
| <input type="checkbox"/> Amtrak | <input type="checkbox"/> Maryland & Delaware |
| <input type="checkbox"/> CSX | <input type="checkbox"/> Norfolk Southern |
| <input type="checkbox"/> Delaware Coast Line | <input type="checkbox"/> Wilmington & Western |
| <input type="checkbox"/> East Penn | <input checked="" type="checkbox"/> None |

In accordance with 23 CFR 635, herein is the railroad statement of coordination (check one):

- No Railroad involvement.

- Railroad Agreement unnecessary but railroad flagging required. The contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

- Railroad Agreement required. The necessary railroad agreement, attached, is complete and fully executed. Railroad related work to be undertaken and completed as required for proper coordination with physical construction schedules. The Contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

Approved As To Form:



 Robert A. Perrine
 DelDOT Railroad Program Manager

12/22/2014

 DATE

BID PROPOSAL FORMS

CONTRACT T201109002.01

FEDERAL AID PROJECT IM-N056(042)

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS CTS	BID AMOUNT DOLLARS CTS
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SECTION 0001 ROADWAY

0010	201000 CLEARING AND GRUBBING	LUMP	LUMP	
0020	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	2100.000		
		CY		
0030	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	4754.000		
		CY		
0040	208001 FLOWABLE FILL	12.000		
		CY		
0050	209001 BORROW, TYPE A	15179.000		
		CY		
0060	209003 BORROW, TYPE C	4996.000		
		CY		
0070	209006 BORROW, TYPE F	75286.000		
		CY		
0080	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP	LUMP	
0090	211509 REMOVAL OF SIGN STRUCTURES	LUMP	LUMP	

CANNOT BE USED FOR BIDDING

DELAWARE DEPARTMENT OF TRANSPORTATION
 SCHEDULE OF ITEMS

PAGE: 2
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0100	302007 GRADED AGGREGATE BASE COURSE, TYPE B	7962.000 CY				
0110	302008 GRADED AGGREGATE BASE COURSE, TYPE B, PATCHING	485.000 CY				
0120	302012 DELAWARE NO. 57 STONE	11372.000 TON				
0130	401813 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 70-22	4606.000 TON				
0140	401816 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 76-22	1789.000 TON				
0150	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	15847.000 TON				
0160	401821 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, PATCHING	337.000 TON				
0170	401822 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22, PATCHING	326.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0180	401823 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22, PATCHING	1062.000				
0190	401824 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, WEDGE	102.000				
0200	401825 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22, WEDGE	288.000				
0210	401830 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22 (NON-CARBONATE STONE)	9616.000				
0220	401833 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)	1694.000				
0230	406001 BITUMINOUS CONCRETE PATCHING	10000.000				
		SYIN				
0240	406507 CRACK SEALING	1564.000				
		LF				
0250	501511 RUBBLIZING PORTLAND CEMENT CONCRETE PAVEMENT	2626.000				
		SY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0260	602011 PORTLAND CEMENT CONCRETE MASONRY, SUBSTRUCTURE, CLASS A	30.000 CY				
0270	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	518.000 CY				
0280	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	174.000 CY				
0290	602553 MECHANICALLY STABILIZED EARTH WALLS, WALL 1	350.000 SF				
0300	602646 SILICONE ACRYLIC CONCRETE SEALER	14000.000 SF				
0310	604000 BAR REINFORCEMENT, EPOXY COATED	144000.000 LB				
0320	605525 RELOCATE SIGN SUPPORT STRUCTURE	LUMP			LUMP	
0330	605664 STEEL SIGN STRUCTURE	LUMP			LUMP	
0340	612002 REINFORCED CONCRETE PIPE, 15", CLASS III	2789.000 LF				
0350	612003 REINFORCED CONCRETE PIPE, 18", CLASS III	699.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0360	612005 REINFORCED CONCRETE PIPE, 24", CLASS III	32.000 LF				
0370	612021 REINFORCED CONCRETE PIPE, 15", CLASS IV	522.000 LF				
0380	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	126.000 LF				
0390	612032 REINFORCED CONCRETE PIPE, 15", CLASS V	286.000 LF				
0400	612535 CLEANING DRAINAGE PIPE, 15"-24" DIA	122.000 LF				
0410	614660 STEEL CASING PIPE, 24"	46.000 LF				
0420	614777 STEEL CASING PIPE, 6"	1004.000 LF				
0430	617515 HEADWALL	10.000 EACH				
0440	622513 SHEET PILE WALL TIE-BACK SYSTEM	LUMP	LUMP			
0450	701013 PORTLAND CEMENT CONCRETE CURB, TYPE 1-2	1691.000 LF				

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			DOLLARS	CTS	DOLLARS	CTS
0460	701018 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-2	2539.000 LF				
0470	701019 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-4	5852.000 LF				
0480	701032 CURB OPENING, 4' OPENING	18.000 EACH				
0490	708051 DRAINAGE INLET, 34" X 24"	28.000 EACH				
0500	708052 DRAINAGE INLET, 48" X 30"	19.000 EACH				
0510	708057 DRAINAGE INLET, 72" X 24"	1.000 EACH				
0520	708058 DRAINAGE INLET, 72" X 48"	8.000 EACH				
0530	708060 REPLACE DRAINAGE INLET GRATE(S)	7.000 EACH				
0540	708512 DRAINAGE INLET, SPECIAL I	11.000 EACH				
0550	708519 MODIFYING CATCH BASIN GRATES	36.000 EACH				

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DELAWARE DEPARTMENT OF TRANSPORTATION
 SCHEDULE OF ITEMS

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0560	710001 ADJUSTING AND REPAIRING EXISTING DRAINAGE INLET	7.000 EACH				
0570	712005 RIPRAP, R-4	1671.000 SY				
0580	713001 GEOTEXTILES, STABILIZATION	5478.000 SY				
0590	713003 GEOTEXTILES, RIPRAP	465.000 SY				
0600	716000 CONVERTING EXISTING DRAINAGE INLET TO JUNCTION BOX	1.000 EACH				
0610	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	14328.000 LF				
0620	720055 CURVED GUARDRAIL SECTION	113.000 LF				
0630	720529 P.C.C. SAFETY BARRIER PERMANENT, SINGLE FACE	2872.000 LF				
0640	720544 REFLECTORS, WHITE, CONCRETE	26.000 EACH				
0650	720545 REFLECTORS, YELLOW, CONCRETE	33.000 EACH				

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0660	720585 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1-31	10.000 EACH		
0670	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	2.000 EACH		
0680	720587 P.C.C. SAFETY BARRIER PERMANENT, DOUBLE FACE, MODIFIED	508.000 LF		
0690	720612 IMPACT ATTENUATOR, SPECIAL	6.000 EACH		
0700	720620 FURNISH AND MAINTAIN PORTABLE P.C.C. PINNED SAFETY BARRIER, SINGLE FACED	4269.000 LF		
0710	720621 RELOCATING PINNED PORTABLE P.C.C. SAFETY BARRIER	6012.000 LF		
0720	720650 SAFETY BARRIER GATE	LUMP	LUMP	
0730	725001 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 31)	8.000 EACH		
0740	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	8.000 EACH		
0750	726001 END ANCHORAGE 31	11.000 EACH		

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0760	727012 VEHICULAR GATES	2.000 EACH				
0770	737523 PLANTINGS	LUMP	LUMP			
0780	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
0790	743003 ARROWPANELS, TYPE C	240.000 EADY				
0800	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	1880.000 EADY				
0810	743005 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY	255.000 EADY				
0820	743006 PLASTIC DRUMS	279200.000 EADY				
0830	743007 TRAFFIC OFFICERS	2010.000 HOUR	75.00000		150750.00	
0840	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	980.000 EADY				
0850	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	11802.000 LF				

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			DOLLARS	CTS	DOLLARS	CTS
0860	743016 RELOCATION PORATBLE SAFETY BARRIER	26344.000 LF				
0870	743023 TEMPORARY BARRICADES, TYPE III	106385.000 LFDY				
0880	743024 TEMPORARY WARNING SIGNS AND PLAQUES	118820.000 EADY				
0890	743025 INSTALL TEMPORARY IMPACT ATTENUATOR	25.000 EACH				
0900	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	25.000 EACH				
0910	743030 RELOCATE TEMPORARY IMPACT ATTENUATOR	54.000 EACH				
0920	743031 ATSSA CERTIFIED TRAFFIC CONTROL SUPERVISOR	6815.000 HOUR				
0930	743056 FLAGGER, NEW CASTLE COUNTY, FEDERAL	13650.000 HOUR				
0940	743065 FLAGGER, NEW CASTLE COUNTY, FEDERAL, OVERTIME	1400.000 HOUR				
0950	743542 TEMPORARY QUEUE DETECTION SYSTEM	LUMP	LUMP			

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			DOLLARS	CTS	DOLLARS	CTS
0960	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	9.000 EACH				
0970	744529 P.C.C. BARRIER JUNCTION WELL	35.000 EACH				
0980	744530 CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	47.000 EACH				
0990	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	22.000 EACH				
1000	745601 FURNISH & INSTALL UP TO 3" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT	1122.000 LF				
1010	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	295.000 LF				
1020	745603 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)	1496.000 LF				
1030	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	9600.000 LF				
1040	745606 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)	3756.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1050	745607 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (BORE)	126.000 LF				
1060	745608 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (OPEN CUT)	226.000 LF				
1070	746519 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE	29.000 EACH				
1080	746566 CABLES, 1/#1 AWG	9650.000 LF				
1090	746594 LUMINAIRE (HPS), 250 WATT	29.000 EACH				
1100	746650 ALUMINUM TRANSFORMER BASE	22.000 EACH				
1110	746847 POLE BASE, TYPE 3	6.000 EACH				
1120	746852 POLE BASE, TYPE 6	23.000 EACH				
1130	746886 REMOVAL OF METAL TRANSFORMER BASE	8.000 EACH				
1140	746887 INSTALLATION OF METAL TRANSFORMER BASE	22.000 EACH				

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1150	746888 ALUMINUM LIGHTING SINGLE DAVIT ARM, 8' ARM SPREAD	2.000 EACH		
1160	746889 ALUMINUM LIGHTING SINGLE DAVIT ARM, 12' ARM SPREAD	7.000 EACH		
1170	746890 ALUMINUM LIGHTING SINGLE DAVIT ARM, 15' ARM SPREAD	20.000 EACH		
1180	746907 FURNISH & INSTALL 1-CONDUCTOR #2 AWG STRANDED COPPER	6650.000 LF		
1190	746909 FURNISH & INSTALL 1-CONDUCTOR #6 AWG STRANDED COPPER	16850.000 LF		
1200	746919 FURNISH & INSTALL #4/0 AWG STRANDED COPPER	1600.000 LF		
1210	746926 FURNISH & INSTALL ELECTRICAL UTILITY SERVICE EQUIPMENT 120/240	1.000 EACH		
1220	746941 TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL & MAINTENANCE, TYPE III	2.000 EACH		
1230	746942 INSTALLATION OF LIGHTING POLE, WITH ARM AND LUMINAIRE	29.000 EACH		
1240	747508 LIGHTING CONTROL CENTER - 100 A	1.000 EACH		

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			DOLLARS	CTS	DOLLARS	CTS
1250	747516 CABINET BASE, TYPE P	2.000 EACH				
1260	747517 CABINET BASE, TYPE R	1.000 EACH				
1270	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	405.000 SF				
1280	748019 TEMPORARY MARKINGS, PAINT, 4"	438780.000 LF				
1290	748020 TEMPORARY MARKINGS, PAINT, 6"	389190.000 LF				
1300	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	3030.000 SF				
1310	748027 PERMANENT PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 12"	380.000 LF				
1320	748502 RAISED/RECESSED PAVEMENT MARKER	724.000 EACH				
1330	748525 TEMPORARY MARKINGS, TAPE, 4"	12885.000 LF				
1340	748530 REMOVAL OF PAVEMENT STRIPING	10410.000 SF				

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			DOLLARS	CTS	DOLLARS	CTS
1350	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	52880.000				
1360	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	6625.000				
1370	748557 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"	565.000				
1380	748558 BLACKOUT TAPE, 12"	7880.000				
1390	748566 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8"	145.000				
1400	748567 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 13"	210.000				
1410	748568 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"	47190.000				
1420	749500 SIGN PANEL	9345.000				
1430	749506 FURNISH SIGN PANEL	480.000				
1440	749507 INSTALL SIGN PANEL	795.000				

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			DOLLARS	CTS	DOLLARS	CTS
1450	749516 REINFORCED CONCRETE SIGN FOUNDATION, W-6	EACH	12.000			
1460	749521 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6	LF	181.000			
1470	749550 INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS	EACH	12.000			
1480	749551 REMOVAL OF BREAKAWAY I-BEAM SIGN POSTS	EACH	4.000			
1490	749559 SUPPLY OF JERSEY BARRIER MOUNTED I-BEAM	EACH	8.000			
1500	749560 INSTALLATION OF JERSEY BARRIER MOUNTED I-BEAM	EACH	8.000			
1510	749561 INSTALLATION OF SIGN ON JERSEY BARRIER MOUNTED I-BEAM	SF	86.000			
1520	749574 SIGN PANEL, ADVANCE NOTICE SIGNS	SF	1470.000			
1530	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	EACH	176.000			
1540	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	SF	1306.000			

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			DOLLARS	CTS	DOLLARS	CTS
1550	758000 REMOVAL OF EXISTING PORTLAND CEMENT CONCRETE PAVEMENT, CURB, SIDEWALK, ETC.	10955.000 SY				
1560	759502 FIELD OFFICE, SPECIAL I	29.000 EAMO				
1570	760016 RUMBLE STRIPS, HOT-MIX	15698.000 LF				
1580	760507 PROFILE MILLING, BITUMINOUS CONCRETE	125776.000 SYIN				
1590	762001 SAW CUTTING, BITUMINOUS CONCRETE	7529.000 LF				
1600	762002 SAW CUTTING, CONCRETE, FULL DEPTH	3172.000 LF				
1610	763000 INITIAL EXPENSE	LUMP	LUMP			
1620	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
1630	763503 TRAINEE	1305.000 HOUR	0.80000		1044.00	
1640	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			

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1650	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	29.000 EAMO		
1660	763632 REMOVAL OF RAISED PAVEMENT MARKER	250.000 EACH		
1670	763652 CLASS I TOW TRUCK	1100.000 HOUR		
1680	763653 CLASS 2 TOW TRUCK	5.000 EACH		
1690	905001 SILT FENCE	2500.000 LF		
1700	905005 INLET SEDIMENT CONTROL, CURB INLET	75.000 EACH		
1710	905500 SUPER SILT FENCE	11800.000 LF		
1720	907013 TEMPORARY SLOPE DRAIN, 18"	1131.000 LF		
1730	908004 TOPSOIL, 6" DEPTH	50153.000 SY		
1740	908014 PERMANENT GRASS SEEDING, DRY GROUND	50153.000 SY		

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1750	908020 EROSION CONTROL BLANKET MULCH	58679.000 SY		
1760	908023 STABILIZED CONSTRUCTION ENTRANCE	240.000 TON		
SECTION 0001 TOTAL				

SECTION 0002 FIXED QUANTITY

1770	202000 EXCAVATION AND EMBANKMENT	44614.000 CY		
SECTION 0002 TOTAL				

SECTION 0003 BRIDGE 1-675

1780	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	3416.000 CY		
1790	207501 SHEETING AND SHORING	LUMP	LUMP	
1800	209003 BORROW, TYPE C	2608.000 CY		

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1810	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	3636.000 CY				
1820	211550 DEMOLITION OF EXISTING BRIDGE	LUMP	LUMP			
1830	601502 TEMPORARY PROTECTIVE SHIELD	LUMP	LUMP			
1840	602003 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS A	369.000 CY				
1850	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	235.000 CY				
1860	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	93.000 CY				
1870	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	640.000 CY				
1880	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	313.000 CY				
1890	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	640.000 CY				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1900	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	83.000 CY				
1910	602549 FORM LINERS	3725.000 SF				
1920	602646 SILICONE ACRYLIC CONCRETE SEALER	6701.000 SF				
1930	604000 BAR REINFORCEMENT, EPOXY COATED	371000.000 LB				
1940	605002 STEEL STRUCTURES	LUMP	LUMP			
1950	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	183.000 LF				
1960	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	110.000 TON				
1970	612501 PVC PIPE, 4"	24.000 LF				
1980	614605 STEEL CASING PIPE, 12"	90.000 LF				
1990	618060 STEEL H PILES, HP 12 X 53	19620.000 LF				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2000	618063 STEEL H TEST PILES, HP 12 X 53	500.000 LF				
2010	619040 INSTALL STEEL H PILES, HP 12 X 53	19620.000 LF				
2020	619043 INSTALL STEEL H TEST PILES, HP 12 X 53	500.000 LF				
2030	619519 DYNAMIC PILE TESTING BY CONTRACTOR	10.000 EACH				
2040	712005 RIPRAP, R-4	340.000 SY				
2050	713002 GEOTEXTILES, SEPARATION	340.000 SY				
2060	715000 PERFORATED PIPE UNDERDRAINS, 4"	312.000 LF				
2070	727507 BRIDGE SAFETY FENCE	639.000 LF				
2080	743013 FURNISH PORTABLE PCC STRUCTURE MOUNTED SAFETY BARRIER	375.000 LF				
2090	743014 RELOCATING PORTABLE PCC STRUCTURE MOUNTED SAFETY BARRIER	375.000 LF				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS CTS	BID AMOUNT DOLLARS CTS
2100	746538 BRIDGE ELECTRICAL SYSTEM	LUMP	LUMP	
2110	760017 RUMBLE STRIPS, CONCRETE	640.000 LF		
SECTION 0003 TOTAL				

SECTION 0004 BRIDGE 1-678

2120	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	3217.000 CY		
2130	207501 SHEETING AND SHORING	LUMP	LUMP	
2140	209003 BORROW, TYPE C	1185.000 CY		
2150	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	3711.000 CY		
2160	211550 DEMOLITION OF EXISTING BRIDGE	LUMP	LUMP	
2170	302012 DELAWARE NO. 57 STONE	910.000 TON		

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2180	601502 TEMPORARY PROTECTIVE SHIELD	LUMP	LUMP			
2190	602001 PORTLAND CEMENT CONCRETE MASONRY, CLASS A	24.000 CY				
2200	602003 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS A	244.000 CY				
2210	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	128.000 CY				
2220	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	83.000 CY				
2230	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	518.000 CY				
2240	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	197.000 CY				
2250	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	300.000 CY				
2260	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	78.000 CY				
2270	602549 FORM LINERS	2930.000 SF				

CANNOT BE
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 BIDDING

CONTRACT ID: T201109002.01 PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2280	602646 SILICONE ACRYLIC CONCRETE SEALER	2666.000				
		SF				
2290	604000 BAR REINFORCEMENT, EPOXY COATED	288899.000				
		LB				
2300	605002 STEEL STRUCTURES					
		LUMP		LUMP		
2310	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	151.000				
		LF				
2320	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	66.000				
		TON				
2330	612501 PVC PIPE, 4"	24.000				
		LF				
2340	614910 STEEL CASING PIPE	12.000				
		LF				
2350	618060 STEEL H PILES, HP 12 X 53	10350.000				
		LF				
2360	618063 STEEL H TEST PILES, HP 12 X 53	468.000				
		LF				
2370	619040 INSTALL STEEL H PILES, HP 12 X 53	10350.000				
		LF				

CANNOT BE
 USED FOR
 BIDDING

CONTRACT ID: T201109002.01

PROJECT(S): IM-N056(042)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2380	619043 INSTALL STEEL H TEST PILES, HP 12 X 53	468.000 LF				
2390	619519 DYNAMIC PILE TESTING BY CONTRACTOR	6.000 EACH				
2400	712005 RIPRAP, R-4	551.000 SY				
2410	713002 GEOTEXTILES, SEPARATION	794.000 SY				
2420	715000 PERFORATED PIPE UNDERDRAINS, 4"	227.000 LF				
2430	727507 BRIDGE SAFETY FENCE	598.000 LF				
2440	743013 FURNISH PORTABLE PCC STRUCTURE MOUNTED SAFETY BARRIER	325.000 LF				
2450	743014 RELOCATING PORTABLE PCC STRUCTURE MOUNTED SAFETY BARRIER	325.000 LF				
2460	745605 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (ON STRUCTURE)	1080.000 LF				
2470	760017 RUMBLE STRIPS, CONCRETE	600.000 LF				
	SECTION 0004 TOTAL					
	TOTAL BID					

CANNOT BE USED FOR BIDDING

Diesel Fuel Cost Price Adjustment Option

The Bidder is required to submit this form with his/her Bid Proposal at the time of bid opening. When this form is not provided by the Bidder at the time of Bid, the Option-OUT will be automatically selected and no further option is available to the Contractor and no Diesel Fuel Cost Adjustments will be made.

OPTION-IN

Checking here selects the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

OPTION-OUT

Checking here declines the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

The undersigned hereby certifies that he/she is authorized to make this Option on behalf of the bidder in compliance with the special provision 763626 - Diesel Fuel Cost Price Adjustment.

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

BREAKOUT SHEET INSTRUCTIONS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T201109002.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER
MUST APPEAR ON THE ENVELOPE.

BREAKOUT SHEET - 1
ITEM 605664 - STEEL SIGN STRUCTURES

CONTRACT NO. T201109002

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Sign Structure SO 1-130	\$ _____	\$ _____
2	1	EA	Sign Structure SC 1-133	\$ _____	\$ _____
3	1	EA	Sign Structure SO 1-133	\$ _____	\$ _____
4	1	EA	Sign Structure SO 1-135	\$ _____	\$ _____
5	1	EA	Sign Structure SC 1-131	\$ _____	\$ _____
6	1	EA	Sign Structure SO 1-132	\$ _____	\$ _____
7	1	EA	Sign Structure SC 1-054	\$ _____	\$ _____
8	1	EA	Sign Structure SC 1-132	\$ _____	\$ _____
				\$ _____	
				(LUMP SUM BID PRICE FOR ITEM 605664)	

**BREAKOUT SHEET - 2
ITEM 737523 - PLANTINGS**

CONTRACT NO. T201109002

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	132	EA	Red Chokeberry Shrub, 2' - 2.5', BB/CONT.	\$	\$
2	133	EA	Shiny Sumac Shrub, 2' - 2.5', BB/CONT.	\$	\$
				\$	
(LUMP SUM BID PRICE FOR ITEM 737523)					

CANNOT BE
USED FOR
BIDDING

"ATTENTION" TO BIDDERS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T201109002.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER
MUST APPEAR ON THE ENVELOPE.

CERTIFICATION

Contract No. T201109002.01
Federal Aid Project No. IM-N056(042)

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.

Bidder's Certification Statement [US DOT Suspension and Debarment Regulation (49 CFR 29)]:

NOTICE: All contractors who hold prime contracts (Federal Aid) with DelDOT are advised that the prime contractor and subcontractors are required to submit to DelDOT a signed and notary attested copy of the Bidder Certification Statement for each and every subcontract that will be utilized by the prime contractor. This Certification **must** be filed with DelDOT prior to written approval being granted for each and every subcontractor. Copies of the Certification Form are available from the appropriate District Construction Office.

Under penalty of perjury under the laws of the United States, that I/We, or any person associated therewith in the capacity of (owner, partner, director, officer, principal, investigator, project director, manager, auditor, or any position involving the administration federal funds):

- a. am/are not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any federal agency;
- b. have not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past 3 years;
- c. do not have a proposed debarment pending; and,
- d. have not been indicted, convicted, or had a civil judgement rendered against (it) by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted, indicate below to whom it applies, initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

(Insert Exceptions)

DBE Program Assurance:

NOTICE: In accordance with 49 CFR Part 26 the undersigned, a legally authorized representative of the bidder listed below, must complete this assurance.

By its signature affixed hereto, assures the Department that it will attain DBE participation as indicated:

Disadvantaged Business Enterprise _____ percent (blank to be filled in by bidder)

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 person signing on behalf of the 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								
-----	------	-----	------	-----	------	-----	------	-----	------

BIDDERS MUST ACKNOWLEDGE RECEIPT OF ALL ADDENDA

MUST INSERT DATE OF FINAL QUESTIONS AND ANSWERS ON WEBSITE: _____



Sealed and dated this _____ day of _____ in the year of our Lord two thousand _____ (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. T201109002.01, to be paid to the **State** for the use and benefit of its Department of Transportation
("**DelDOT**") for which payment well and truly to be made, we do bind ourselves, our and each of our heirs,
executors, administrators, and successors, jointly and severally for and in the whole firmly by these presents.

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

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

SEALED, AND DELIVERED IN THE
presence of

Name of Bidder (Organization)

Corporate
Seal

By: _____
Authorized Signature

Attest _____
Title

Name of **Surety**

Witness: _____ By: _____
Title