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



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T200812201.01

FEDERAL AID PROJECT NO. NH-S014(12)

SR 1, SR 30 GRADE SEPARATED INTERSECTION

SUSSEX COUNTY

ADVERTISEMENT DATE: July 16, 2012

Completion Date 418 Calendar Days

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

Bids will be received in the Bidder's Room, Transportation Administration Center, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time August 21, 2012

Contract No.T200812201.01

Federal Aid Project No. NHS014(12)

**SR 1, SR 30 GRADE SEPARATED INTERSECTION
SUSSEX COUNTY**

LOCATION

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

DESCRIPTION

The improvements consist of furnishing all materials for SR1, SR30 GRADE SEPARATED INTERSECTION, and other incidental construction in accordance with the location, notes and details shown on the plans and as directed by the Engineer.

COMPLETION DATE

All work on this contract must be complete within 418 Calendar Days . The Contract Time includes an allowance for 66 Weather Days.

It is the Department's intent to issue a Notice to Proceed such that work starts on or about September 24, 2012.

ELECTRONIC BIDDING

This project incorporates a newer version of the electronic bidding system, Expedite 5.9a. The installation file and instructions are included in the CD package required for bidding.

BIDDERS MUST REQUEST A CD OF THE OFFICIAL PLANS AND SPECIFICATIONS FROM THE DEPARTMENT IN ORDER TO SUBMIT A BID.

PROSPECTIVE BIDDERS NOTE:

1. No retainage will be withheld on this contract.
2. The Department has adopted an External Complaint Procedure. The procedure can be viewed on our website at; <http://www.deldot.gov/information/business/>, or you may request a copy by calling (302) 760-2555.
3. **Proposed Trainee Plans are required.** The number of required programs is listed in the Training Special Provisions located in this contract's General Notices. The program must be submitted to the Department 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 the required certifications and/or an acceptable OJT Trainee Program within ten (10) Calendar Days of notification of apparent low bidder status shall create a rebuttable presumption that the bid is not responsive.

Bidders are referred to the Department's OJT Program Guidelines posted with this document.

4. Please note the Special Provision titled **Changes to Project Documents During Advertisement**. The Department is using an alternative method of providing bid documents for this contract.

**STATE OF DELAWARE
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
HOURL	Hour	N/A	h	Hour	HOURL
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 Specifications, the Special Provisions, notes on the Plans, this Bid Proposal, and any addenda thereto shall govern the work to be performed under this contract.

CLARIFICATIONS:

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

ATTESTING TO NON-COLLUSION:

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

QUANTITIES:

The quantities shown are for comparison of bids only. The Department may increase or decrease any quantity or quantities without penalty or change in the bid price.

REQUIREMENT BY DEPARTMENT OF LABOR FOR SWORN PAYROLL INFORMATION

Delaware Code, Title 29, Chapter 69, Section 6960, Paragraph

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

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

Contractor may contact: Department of Labor
Division of Industrial Affairs
4425 No. Market Street
Wilmington, DE 19802

Telephone (302) 761-8200

PREFERENCE FOR DELAWARE LABOR:

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

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

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."

For all contracts which are identified as Federal-aid projects by having a Federal-aid number inserted in the appropriate space on the cover sheet of the proposal, if there is a conflict between the above Section 6962 and Federal law ~~and~~ the requirements of the above Section 6962 shall not apply.

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."

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:

I. The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex 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 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.

ii. 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.

TO REPORT BID RIGGING ACTIVITIES:

CALL 1-800-424-9071

The U. S. Department of Transportation (DOT) operates the above 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.

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.

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 SUSSEX 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).

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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 ONE (1). 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 provided for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

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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 10 % 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 ten (10) 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 ten (10) 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 materialmen 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.

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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)

I. GENERAL

1. 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.
2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.
3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.
4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

Section I, paragraph 2;
Section IV, paragraphs 1, 2, 3, 4, and 7;
Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this

contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 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 DOL, or the contractor's employees or their representatives.

6. Selection of Labor: During the performance of this contract, the contractor shall not:

- a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or
- b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

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 and 41 CFR 60) 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 Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American 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 State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.
- b. The contractor will accept as his 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, preapprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO 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 minority group employees.

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 minority groups 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 minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group 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, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group 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 his 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 his avenues of appeal.

6. Training and Promotion:

- a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.
- 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. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.
- 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 minority group and women employees 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 his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. 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 best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
- b. The contractor will use best 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 SHA 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 minority and women 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 minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) 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 SHA.

8. 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.

- a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.
- b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal

opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. 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 completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

a. The records kept by the contractor shall document the following:

- (1) The number 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;
- (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
- (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. The contractors will submit an annual report to the SHA 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. If on-the job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such

certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. General:

a. All mechanics and laborers 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 (29 CFR 3) issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c)] the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) 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. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, 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 paragraphs 4 and 5 of this Section IV.

b. 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.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. Classification:

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

- (1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;
- (2) the additional classification is utilized in the area by the construction industry;
- (3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and
- (4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification 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 DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour 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.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional 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. Said 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

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. Payment of Fringe Benefits:

a. 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 or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a 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.

4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:

a. Apprentices:

(1) 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 DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/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 Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees 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 employee 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 listed in 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 or subcontractor 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-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) 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 journeyman-level 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 for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) 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 DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. 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.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level 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-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor 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. **Helpers:**

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under a approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. 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.

6. Withholding:

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor 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, as 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 SHA contracting officer 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.

7. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. Violation:

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her 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, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. Withholding for Unpaid Wages and Liquidated Damages:

The SHA shall upon its own action or upon written request of any authorized representative

of the DOL withhold, or cause to be withheld, from any monies 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 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof 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. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found 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 and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V, and that such information is

correct and complete;

(2) that such 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 the Regulations, 29 CFR 3;

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

e. 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 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, 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 SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions 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.

VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:

a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

VII. SUBLETTING OR ASSIGNING THE CONTRACT

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 State. 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).

- a. "Its own organization" shall be construed to include only workers employed and paid directly 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, assignee, or agent of the prime contractor.
 - 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 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 VII 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 SHA 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 SHA 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 SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY: ACCIDENT PREVENTION

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 SHA 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. 333).
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. 333).

IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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, the following notice 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:

NOTICE TO ALL PERSONNEL ENGAGED ON FEDERAL-AID HIGHWAY PROJECTS

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 not more than \$10,000 or imprisoned not more than 5 years or both."

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

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or more.)

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

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

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

1. Instructions for Certification - Primary Covered Transactions:

(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary 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 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 primary 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 department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary 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," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary 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 primary 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 Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. 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.

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.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Primary Covered Transactions

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement 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;
 - c. 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 1b of this certification; and
 - d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
2. Where the prospective primary 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 Covered Transactions:

(Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

- 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," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- 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.
- 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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the

Nonprocurement List.

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 Covered Transactions:

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 participation in this transaction 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.

* * * * *

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(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 his or her bid or proposal that he or she 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.

DIFFERING SITE CONDITIONS,

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

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

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

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

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

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

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

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

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

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

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

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

- (A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction or
- (B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract

quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

PREVAILING WAGES

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

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

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

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

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 15, 2012

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

CERTIFIED:

3/21/12

BY:

Francis J. Per
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

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

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

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

PROJECT: T200812201.01 SR 1, SR30 Grade Separated Intersection, Sussex County

FEDERAL DAVIS-BACON WAGE RATES 01/06/2012 DE12

Superseded General Decision Number: DE20100015

STATE: Delaware

Construction Type: Highway

COUNTY: Sussex County in Delaware

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels; building structures in rest area projects, and railroad construction; bascule, suspension and spandrel arch bridges; bridges designed for commercial navigation; bridges involving marine construction; other major bridges).

Modification Number Publication Date

0 01/06/2012

SUDE2010-003 03/15/2011

	Rates	Fringes
Bricklayer	14.51	
Carpenter	38.62	
Cement Mason/Concrete Finisher	23.29	
ELECTRICIAN		
Electrician	57.10	
Line Worker	54.05	
Ironworker	25.35	
Laborer	24.00	
Millwright	13.49	
Operator: Piledriver	26.95	
Painter	41.42	
Power Equipment Operator	26.31	
Truck Driver	19.96	

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)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

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:

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

CHANGES TO PROJECT DOCUMENTS DURING ADVERTISEMENT

1. PRINTED PLANS AND SPECIFICATIONS NOT AVAILABLE FROM DELDOT.

The Department is not providing printed plans or specifications for this project. Bidders must contact the Department in order to receive a CD that contains all bid documents. Bidders are able to use the CD to print the plans and specifications, or have them printed from the Website. While the plans and specifications are available on-line at DelDOT's Website, the Website bid documents are not authorized for submitting bids, and the Website documents are marked as such. To receive required bid Documents on a CD, contact:

Contract Administration
Delaware Department of Transportation
P.O. Box 778, Dover, DE 19903
e-mail: dot-ask@state.de.us
Phone: (302) 760-2030
FAX: (302) 739-2254

The Department is providing a printed set of plans and specifications available for viewing in the Bidder's Room, Transportation Administration Center, 800 Bay Road, Dover, Delaware, Monday through Friday excluding holidays from 8:00A.M. through 4:15 P.M..

2. QUESTIONS AND ANSWERS

All questions pertaining to this project are to be submitted to the following e-mail address:

dot-ask@state.de.us

Questions and Answers will be dated and posted periodically on Delaware's Bid Solicitation Directory Website located at: <http://www.bids.delaware.gov/>

The final Questions and Answers will be posted no later than the end of the day, two working days prior to the bid date.

All Questions and Answers posted by the Department on the above Website are included by reference and become part of the contract documents. The awarded bidder will receive a hard copy of the final posted Questions and Answers.

Potential bidders that do not have access to the internet may contact Jim Hoagland, Contract Services Administrator, by telephone at (302) 760-2036 to make other arrangements.

NOTE: There is space provided on the CERTIFICATION page to insert the Posted Date of the final Questions and Answers. The Final Posted Date is the latest Posted Date of the Questions and Answers one day prior to Bid Date. **This final Posted Date must be submitted on the Certification page or your bid will be considered Non-responsive** and not considered for award.

3. ADDENDA

The Department is not providing printed Addendums, if issued, for this project. **All addendums will be posted on the Department's Website, and are included by reference and become part of the contract documents.** It is the responsibility of the bidder to check the Website as needed. If there are Addendums issued, the final Addendum will be posted no later than the end of the day, two working days prior to the bid date.

NOTE: There is space provided on the CERTIFICATION page to insert each issued Addendum and the date you acknowledge receipt of the addendum. **Each Addendum number and date acknowledged must be submitted on the Certification page or your bid will be considered Non-responsive** and not considered for award.

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

MODIFICATIONS TO REQUIRED FEDERAL CONTRACT PROVISIONS

The following modifications to the enclosed REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS (located elsewhere in this document) are effective January 18, 2009. Modifications are shown below. Old language is shown crossed out, new language is shown underlined. The full text is not shown, only portions that were modified.

V. STATEMENTS AND PAYROLLS

2. Payrolls and Payroll Records:

b. The payroll records shall contain the name, ~~social security number~~, and ~~address~~ an individually identifying number for each employee (e.g., the last four digits of the employee's social security number) of each such employee . . .

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under ~~paragraph 2b of this Section V~~. 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). ~~This~~ The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. 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 FHWA, if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the FHWA the contractor, 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 sponsoring government agency (or the applicant, sponsor, or owner).

d.

(1) that the payroll for the payroll period contains the information required to be ~~maintained under paragraph 2b of this Section V~~ provided under Sec. 5.5(a)(3)(i) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

- end -

401502 - ASPHALT CEMENT COST ADJUSTMENT

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

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

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

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

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

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

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

The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price for the project will be \$615.00 per ton (\$677.92 per metric ton).

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

NOTE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Description:

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

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

Materials:

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

Asphalt Binder:

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

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

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

Recycled Materials:

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

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

Shingles:

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

Mineral Aggregate:

The mineral aggregate employed in the target gradation of the job mix formula (JMF) shall conform to

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

DESIGN ESAL'S (MILLIONS)	COARSE AGGREGATE ANGULARITY 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	10
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	

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.

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

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

TEST METHOD	SPECIFICATION LIMITS
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 – “Laboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.” RAP shall be assigned a value of 4.0. The Contractor shall supply all polish values to the Engineer upon request.

Mineral Filler:

The mineral filler shall conform to AASHTO M17.

Mixture Requirements:

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

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

sieve for the design aggregate structure shall comply with the Superpave control points and should avoid the restricted zone. Percentages shall be based on the washed gradation of the aggregate according to AASHTO T11.

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

Superpave Gyratory Compactive (SGC) Effort:

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

Superpave Gyratory Compactive (SGC) Effort:

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

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

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

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

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

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

Gradation Control Points:

The combined aggregates shall conform to the gradation requirement specified in the following table

when tested according to T-11 and T-27.

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

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

Gradation Classification:

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

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

Plant Production Tolerances:

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

Design Evaluation:

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

5.25 gal (20 liters) of the asphalt binder;
0.13 gal (0.5 liters) sample of liquid heat-stable anti-strip additive;
254 lb. (115 kg) of each coarse aggregate;
154 lb. (70 kg) of each intermediate and fine aggregate;
22 lb. (10 kg) of mineral filler; and
254 lb. (115 kg) of RAP, when applicable.

The proposed JMF shall include the following:

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

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

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

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

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

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

Construction.

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

Compaction:

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

Method of Measurement and Basis of Payment:

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

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

1/06/2010

401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE

.01 Description.

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

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

.02 Definitions.

- **Acceptable Quality Level (AQL):** That level of percent within limits (PWL) to which the Engineer will consider the work completely acceptable.
- **Acceptance Plan:** Factors that comprise the Engineer's determination of the degree of compliance with contract requirements and value of the product. These factors include the Engineer's sampling, testing, and inspection.
- **Delaware Asphalt Pavement Association (DAPA):** The organization representing the interests of hot-mix asphalt producers and Contractors. The Engineer has a copy of the DAPA officers' names and point(s) of contact.
- **Dispute Resolution:** The procedure used to resolve conflicts resulting from discrepancies between the Engineer's and the Contractor's results of sufficient magnitude to impact payment. The testing will take place at a location and time mutually agreeable by both the Engineer and the Contractor.
- **Full Depth Construction** – Construction of an adequate pavement box on a subgrade and subbase prepared by the contractor
- **Independent Assurance:** An unbiased and independent verification of the Quality Assurance system used, and the reliability of the test results obtained in regular sampling and testing activities. The results of Independent Assurance are not to be directly used as a basis of material acceptance.
- **Job Mix Formula (JMF)/Mixture Identification (ID):** The target values for individual aggregate size gradation percentages and the asphalt percentage, the sources of each of the component materials, the proposed proportions of component materials to be used to meet those target values, the asphalt proportion, and the mixing temperature. The Engineer will assign uniquely individual mixture identification for each JMF submitted and approved.
- **Lower Quality Index (QL):** The index reflecting the statistic related to the lower boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.
- **Mean:** A statistical measure of the central tendency – the average value.
- **Operational Day:** A day in which the Engineer has approved a lane closure for the Contractor to perform work within an approved MOT plan.
- **Percent Within Limits (PWL):** That amount of material or workmanship that has been determined, by statistical method, to be within the pre-established characteristic boundary(ies).
- **Qualified Laboratory:** A laboratory mutually agreed upon by both DAPA and the Engineer as having proper test equipment that has been calibrated in accordance to AASHTO.
- **Qualified Technician:** Personnel mutually agreed upon by both DAPA and the Engineer as having adequate training, experience, and abilities to perform the necessary testing. The minimum qualifications are either a recognized nationally accredited or certified Superpave testing certificate or been working in hot-mix asphalt testing for at least one year.
- **Quality Assurance (QA):** All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.
- **Quality Control (QC):** The sum total of the activities performed by the Contractor in order to assure that the product meets contract requirements.
- **Quality Control (QC) Plan:** The detailed description of the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties governed by the Specifications. The QC Plan must address the actions needed to keep the process in control, detect when the process is going out of control, and responses to correct the situation(s).
- **Quality Level Analysis:** A statistical procedure that provides a method for estimating the percentage of each lot or subplot of material, product, item of construction, or completed construction that may be expected to be within specified tolerances.

- **Standard Deviation:** A term used in statistics to indicate the value calculated from the square root of the difference between the individual measurements in a group and their average. Standard deviation is calculated by taking the square root of the sum of the squares of the differences of each of n values and the mean value, this sum first divided by (n-1).
- **Target Value:** The acceptable value for a controlling characteristic of a product. The JMF will establish each of these values for the material.
- **Test Methods:** Shall be AASHTO test methods. Copies of these test methods shall be available at each qualified laboratory.
- **Upper Quality Index (QU):** The index reflecting the statistic related to the upper boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.
- **Volumetric Properties:** Air voids, voids in mineral aggregates (VMA), voids filled with asphalt (VFA), and dust to effective asphalt.

.03 Equipment.

(a) Material Production Test Equipment.

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

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

- SUPERPAVE^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.

(b) Pavement Construction Test Equipment.

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

.04 Quality Control (QC) Plan.

(a) Material Production QC.

(1) Job Mix Formula – Material Production.

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

The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components, and within 0.1 percent for the other components) of each component to be used in order to produce workable hot-mix asphalt having the specified properties. For plant component

feed adjustments, RAP can be considered in the same manner as an individual aggregate component. The JMF target characteristic values include the mixing temperature range, core temperature range for gyrations, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.

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

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

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

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

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

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

Table 1 - Aggregate Gradation - JMF and Control Point Information										
Sieves to be addressed by JMF/Range values are percentages passing by weight										
Sieve Size mm (inch)	4.75 mm	4.75mm Range	9.5 mm	9.5mm Range	12.5 mm	12.5mm Range	19.0 mm	19.0mm Range	25.0 mm	25.0mm Range
37.5(1.5)	No		No		No		No		Yes	100
25.0(1.0)	No		No		No		Yes	100	Yes	90-100
19.0 (3/4)	No		No		Yes	100	Yes	90-100	Yes	20-90
12.5(1/2)	Yes	100	Yes	100	Yes	90-100	Yes	23-90	Yes	
9.5 (3/8)	Yes	95-100	Yes	90-100	Yes	28-90	Yes		Yes	
4.75(#4)	Yes	90-100	Yes	32-90	Yes		Yes		Yes	
2.36(#8)	Yes		Yes	32-67	Yes	28-58	Yes	23-49	Yes	19-45
(#16)	Yes	30-60	Yes		Yes		Yes		Yes	
(#30)	Yes		Yes		Yes		Yes		Yes	

Table 1 - Aggregate Gradation - JMF and Control Point Information

Sieves to be addressed by JMF/Range values are percentages passing by weight										
Sieve Size mm (inch)	4.75 mm	4.75mm Range	9.5 mm	9.5mm Range	12.5 mm	12.5mm Range	19.0 mm	19.0mm Range	25.0 mm	25.0mm Range
(#50)	Yes		Yes		Yes		Yes		Yes	
(#100)	Yes		Yes		Yes		Yes		Yes	
.075(#200)	Yes	6-12	Yes	2-10	Yes	2-10	Yes	2-8	Yes	1-7

(2) Process Control – Material Production.

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

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

- Using testing equipment that is knowingly out of calibration or is not working properly.
- Reporting false information such as test data, JMF information, or any info requested by DelDOT
- When the Contractor fails to comply to their approved QC Plan in reference to materials testing
- Substantial deviations to AASHTO or DelDOT procedures when running tests, sampling stockpiles, or testing hot mix.
- The use of any material not listed in the JMF.
- The use of the wrong PG graded asphalt.
- If samples fall within the Contractors action points in the QC Plan but the Contractor fails to take the corrective action in the approved QC Plan

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

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

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

- Production Plant – make, type, capacity, and location.
- Production Plant Calibration – components and schedule; address documentation.
- Personnel – include name and telephone number for the following individuals:

- Person responsible for quality control.
- Qualified technician(s) responsible for performing the inspection, sampling, and testing.
- Person who has the authority to make corrective actions on behalf of the Contractor.
- Testing Laboratory – state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.
- Locations where samples will be obtained and the sampling techniques for each test
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:
 - Mixture Temperature: each of the first five trucks, and each load that is sampled for QC or acceptance testing.
 - Gradation analysis of aggregate (and RAP) stockpiles – one washed gradations per week for each aggregate stockpile; RAP: five gradations and asphalt cement contents for dedicated stockpiles where new material is not being added; one gradation and asphalt cement content test per week for stockpiles where material is continually being added to the stockpile.
 - Gradation analysis of non-payment sieves
 - Dust to effective asphalt calculation
 - Moisture content analysis of aggregates – daily.
 - Gradation analysis of the combined aggregate cold feed – one per year per mixture.
 - Bulk specific gravity and absorption of blended material – one per year per mixture.
 - Ignition Oven calibration – one per year per mixture.
 - Hot-Bins: one per year per mixture.
 - Others, as appropriate.
- Procedures for reporting the results of inspection and tests (include schedule).
- Procedures for dealing with non-compliant material or work.
- Presentation of control charts. The Contractor shall plot the results of testing on individual control charts for each characteristic. The control charts shall be updated within one working day as test results for each subplot become available. The control charts shall be easily and readily accessible at the plant laboratory. The following parameters shall be plotted from the testing:
 - Asphalt cement content.
 - Volumetrics (air voids, voids in mineral aggregates [VMA])
 - Gradation values for the following sieves:
 - 4.75 mm (#4).
 - 2.36 mm (#8).
 - 0.075 mm (#200).
- Operational guidelines (trigger points) to address times when the following actions would be considered:
 - Increased frequency of sampling and testing.
 - Plant control/settings/operations change.
 - JMF adjustment.
 - JMF change (See Section .04(a)(1)).
 - Change in the source of the component materials.
 - Calibration of material production equipment (asphalt pump, belt feeders, etc.).
 - Rejection of material.

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

(b) Pavement Construction – Process Control.

The Contractor shall perform Quality Control of pavement compaction by testing in-place pavement with a density gauge or by testing cores extracted from the pavement. The use of the nuclear density gauge shall conform to ASTM D2950; the use of other density gauges shall be as per the manufacturer's recommendations and approved by the Engineer. The Contractor may use any method to select locations for the Quality Control.

.05 Acceptance Plan.**(a) Material Production – Tests and Evaluations.**

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

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

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

The Engineer will evaluate and accept the material on a lot basis. All the material within a lot shall have the same JMF (mixture ID). The lot size shall be targeted for 2000 tons or a maximum period of three days, whichever is reached first. If the 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 a mixture samples using a gyratory compactor.
- AASHTO T166, Method C (Rapid Method) – Bulk specific gravity of compacted samples.
- AASHTO T308 – Asphalt cement content.
- AASHTO T30 – Aggregate gradations, using samples from the asphalt cement content test.
- AASHTO T209 – Theoretical maximum specific gravity.
- ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method

(b) Pavement Construction – Tests and Evaluations.

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

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

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

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

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

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

Testing locations will be a minimum of 1.5 feet from the newly placed longitudinal joint and 50 feet from a new transverse joint. If the Contractor chooses to cut companion cores, they shall be located within one foot of the Engineers cores along the longitudinal direction and in-line with the Engineers cores in the longitudinal plane.

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

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

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

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

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

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

- AASHTO T166, Method C (Rapid Method) – to determine the bulk specific gravity of the cores.
- AASHTO T209 – to calculate the theoretical maximum specific gravity and the density of the non-compacted mixtures.
- ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method.

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

.06 Payment and Pay Adjustment Factors.

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

(a) Material Production – Pay Adjustment.

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

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

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

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

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

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

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

Final Pay Adjustment =

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

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

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

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

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

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

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

Table 2 – Quality Level Analysis by the Standard Deviation Method							
PU or PL	QU and QL for “n” Samples						
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9
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 3 - Material Parameter Weight Factors		
Material Parameter	Single Test Tolerance (+/-)	Weight Factor
Asphalt Content	0.4	0.30
#8 Sive (19 mm or >)	7.0	0.30
#8 Sieve (12.5 mm or <)	5.0	0.30
#200 Sieve (0.075 mm) Sieve	2.0	0.30
Air Voids (4.0% Target)	1.5	0.10

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

(b) Pavement Construction – Pay Adjustments.

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

- Degree of compaction of the in-place material

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

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

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

* or remove and replace it at Engineer's discretion

Table 5a: Compaction Price Adjustment Other¹ Locations	
Degree of Compaction (%)	Pay Adjustment Factor (%)
>96	-100*
95	-2
94	0
93	+3
92	0
91	0
90	0
89	-1

Table 5a: Compaction Price Adjustment Other¹ Locations	
Degree of Compaction (%)	Pay Adjustment Factor (%)
88	-5
87	-15
86	-25
85	-30
84	-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.

.07 Dispute Resolution.

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

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

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

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

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

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

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

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

7/28/11

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

Description.

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

Materials and Equipment.

The following material shall be available to complete this work:

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

The following equipment shall be available to complete this work:

- Sponge or other absorbent material – Used to extract water from the hole.
- Compaction Hammer – Shall be mechanical, with a flat, circular tamping face smaller than 6 inches in diameter. The tamping head shall be connected to an electrical, pneumatic, or gasoline driven tamping device.

Construction Method.

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

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

Performance Requirements.

The Engineer will judge the patch on the following basis:

- The patch shall be well compacted
- The patch surface shall match the grade of the surrounding roadway surface.

Basis of Payment.

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

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

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

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

Structural Number Calculations

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

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

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:

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

For the Type C lift the calculation would be:

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

401752 – SAFETY EDGE FOR ROADWAY PAVEMENT

Description:

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

Construction Methods:

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

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

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

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

Transtech Systems, Inc.
1594 State Street
Schenectady, NY 12304
1-800-724-6306
www.transtechsys.com

or

Advant-Edge Paving Equipment, LLC
33 Old Niskayuna Road
Loudonville, NY 12211
1-814-422-3343
www.advantedgepaving.com

or an approved equal.

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

Method of Measurement:

Safety Edge will not be measured for payment.

Basis of Payment:

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

1/21/2011

503001 - PATCHING P.C.C. PAVEMENT, 6' TO 15', TYPE A
503002 - PATCHING P.C.C. PAVEMENT, GREATER THAN 15' TO 100', TYPE B
503006 - DOWEL BARS

Section 503 of the Standard Specification is replaced with the following:

503.01 Description. This work consists of removing and disposing of existing Portland cement concrete pavement and replacing it with new Portland cement concrete pavement. The Engineer will designate the boundaries of each repair. This work is not intended for repairing newly constructed Portland cement concrete pavement or for repairing continuously reinforced concrete pavement. This work shall be completed after any planned partial depth patching. It shall also be completed before any diamond grinding, and before any overlay.

Materials

503.02 Portland Cement Concrete. Portland cement concrete shall conform to Class A, Section 812 and have a minimum compressive strength of 2000 psi in six hours as measured by Sure-Cure Mold test cylinders. The Sure-Cure Mold test cylinders and all associated equipment shall be provided by the Contractor. The concrete will be sampled and tested by the Engineer. The Engineer may also use the concrete maturity meter in accordance with AASHTO T325 to determine compressive strength.

This concrete shall also have material present in the mixture to mitigate alkali-silica reactivity (ASR) as per Section 812. The following parameters shall be adhered to by the contractor-submitted mix design for the Portland cement concrete:

CONCRETE PROPERTY	SPECIFICATION
Water/Cementitious Material Ratio	0.40 (Max.)
Air Content (%)	4 - 7
Slump*	2 - 5"
Synthetic Fibers **	1.5 lb/yd ³ min. or as per manufacturer's recommendation

*Slump may be increased up to 8" if a Type F Admixture is utilized. All admixtures utilized in the mixture shall be non-chloride based materials.

** Synthetic fibers shall be alkali resistant polypropylene, polyethylene, or nylon fibers with a minimum length of ½" and meet the requirements of ASTM C1116, Type III.

The Contractor, in order to accomplish 2000 psi compressive strength in six hours, shall establish actual combination of weights and proportion of admixtures as required by the field conditions, ambient temperature, humidity, and wind conditions. If the Contractor, due to unfavorable conditions, is unable to accomplish the desired strength in six hours, they may reschedule to the proper timing for performing the patching work.

503.03 Load Transfer Device. Dowel bars shall conform to AASHTO M 227/M 227M grade 65 (grade 450). The entire length of the dowel shall be pre-coated to conform to AASHTO M254. If the slab is less than 10" thick, the dowels shall be 18" long with a diameter of 1 ¼". If the slab is greater than or equal to 10" thick, the dowels shall be 20" long, with a diameter of 1 ½".

Load transfer assemblies shall be fabricated from corrosion-resistant, coated dowel bars conforming to AASHTO M254. Dowel support baskets shall conform to the requirements of Standard Construction Details or details in the Plans.

503.04 Grout. Epoxy grout, when used for anchoring the dowels in place, shall conform to AASHTO M235. Concrete grout, when used for anchoring the dowels in place, shall be non-shrink grout conforming to the Corps of Engineers "Specification for Non-Shrink Grout," CRD-C621. The maximum allowable expansion shall be 0.4 percent. The grout shall have a compressive strength no less than 3000 psi at 24 hours when

tested according to ASTM C109. The initial set shall be less than 60 minutes when tested under the Corps of Engineers "Method of Test for Time of Setting of Grout Mixtures," CRD-C82.

503.05 Joint Sealants. Hot-poured joint sealant shall conform to the requirements of AASHTO M301 or AASHTO M282.

503.06 Curing Materials. Curing materials shall be as follows:

- (1) *Liquid Membrane Compounds.* The material shall conform to the requirements of AASHTO M 148, for Type 2, Class A or B white-pigmented liquid curing compound.
- (2) *Polyethylene Sheeting.* Polyethylene sheeting shall conform to the requirements of AASHTO M 171.
- (3) *Waterproof Paper.* Waterproof paper shall conform to the requirements of AASHTO M 171.
- (4) *Water Cure.* The water shall conform to Section 803.

503.07 Insulating Blankets. Insulation blankets shall be a minimum of 2" thick of fiberglass, rock wool, or other approved commercial insulation material.

CONSTRUCTION METHODS

503.08 Patching Limits. The areas of old pavement to be patched will be indicated on the Plans, or identified by the Engineer.

The limits of the area where the pavement is to be removed and patched will be painted on the existing pavement by the Engineer.

Patches can be either Type 'A' or Type 'B'. A Type 'A' patch is 15' or less in length. A Type 'B' patch is greater than 15' and less than 100' in length and contains load transfer assemblies spaced at a maximum of 15'.

Pavement replacement greater than 100' in length shall be constructed under **Section 501 Portland Cement Concrete Pavement.**

503.09 Patching Pavement. The Engineer will designate the boundaries of the concrete patch. The ends of the patch shall either match or offset by at least 2' the existing joints, any cracks, or patch ends in the immediate adjacent lanes. Transverse boundaries of the concrete patch shall be at least 2' from the existing joint line.

Patch lengths shall be at least 6' and no more than 15' without a load-transfer device. The patch shall be the full width of the existing slab or as noted on the Plans. The patch depth shall be no less than the existing slab.

The entire perimeter of the patch that is adjacent to concrete shall be sawed full depth by a concrete saw equipped with a diamond blade or approved equal of sufficient size to cut the concrete slabs to the required depth along straight and plumb lines. All perimeter cuts shall be plumb and parallel to or normal to the centerline of the roadway. Cutting, removing, and replacing existing hot-mix overlays up to 8" on the concrete shall be considered incidental to this item. Any over cut into the remaining slabs shall be kept to a minimum and shall be sealed (incidental to the sealing of the patch if not overlaid; if overlay is planned, no sealing will be required.). Any existing tie-steel across the patch perimeter line shall be cut. The Contractor may make additional cuts (such as diagonal and slanted cuts) to facilitate the removal of the concrete within the patch boundaries. The additional cuts to facilitate removal shall be incidental to the saw cutting item and will not be measured or paid. Cutting shall not precede the removal operations by more than two days.

The concrete in the repair area shall be removed by the lift-out technique without damaging the remaining concrete slabs or disturbing the base and subgrade. The lift out technique involves drilling holes into the patch to insert lifting hooks, pins, or chains. Improper actions (such as dropping the removed slab on adjacent concrete pavement, damaging the pavement edge due to Contractors methods, or other actions deemed damaging by the Engineer) leading to slab damage, shall be repaired by the Contractor, by an approved method, at no cost to the Department.

When the lift-out technique is not feasible, concrete in the patch area shall be broken by an approved

mechanical pavement breaker or jackhammers and removed. The removal of the existing concrete and hot-mix overlay shall be executed with minimal disturbance to the remaining concrete or foundation. Any damage beyond the limits of the patch, caused by the improper actions of the Contractor shall be repaired to the satisfaction of the Engineer at no cost to the Department.

Where the patch is next to the shoulder and removal of the concrete results in a clean, uniform shoulder edge, the Engineer may allow the Contractor to use the shoulder edge as the form for the new concrete. Any portion of the shoulder pavement structure removed or disturbed by the patching operation shall be repaired in kind by the Contractor and the cost shall be incidental to the patching item(s). Saw cutting the joint between the concrete pavement and shoulder may assist in maintaining a clean, uniform shoulder edge. If the adjacent shoulder is concrete, the saw cut will be measured and paid for. If the adjacent shoulder is hot-mix asphalt, no measurement or payment will be made.

503.10 Patch Preparation. After removal of the concrete, the repair area shall be cleaned out with hand tools. Particular attention shall be given to existing longitudinal joint areas due to the possibility of loose concrete where the joint cracked away from the plumb line during the original construction. All vertical faces shall be cleaned of loose and deleterious material, prior to the placement of concrete.

Any base or subgrade that is unstable shall be removed to a maximum depth of 6" as directed by the Engineer. No new base material shall be placed; the excavated area will be filled with the concrete when the patch concrete is placed. The excavation is to be paid for under Item 212001 - Undercut, Excavation, Patching, with the replacement material to be concrete SY-IN paid for under Item 503503 - Patching Concrete.

After the old concrete is removed, the patch areas shall be protected from water intrusion when precipitation is forecast.

Dowels shall be placed to provide load transfer at mid-depth ± 1 " of the ends of the patch along the transverse joint at $12" \pm 1$ " on-center spacing, at least 6" from the slab edge. The dowel holes shall be drilled parallel to the profile and centerline of the pavement to an embedment depth of half the dowel bar length. The equipment for drilling holes in the face of the remaining concrete slabs must be capable of producing holes of proper size, depth, and angle. The drill must not crack or spall the remaining concrete. A drill support system shall be used to ensure proper hole alignment.

Dowel holes shall be drilled to a diameter of $1 \frac{3}{4}"$ for cementitious grout and $1 \frac{9}{16}"$ for epoxy grout. If the existing concrete breaks during drilling, cut away more concrete or relocate the hole to provide a solid support for the dowel. Fill any unused hole with cement grout or epoxy grout. Any damage caused by the Contractor's technique shall be repaired at no added cost to the Department.

The holes shall be blown clean with compressed air prior to placing the anchoring epoxy or grout material. The anchoring material shall be injected into the back of the hole to provide complete coverage around the dowels without any voids. The dowels, each with a grout retention disk, shall be inserted into the holes with a twisting motion and seated into place by tapping. The disk shall be flush to the face of the existing concrete. The dowels shall be solidly held in proper alignment before placement of the patch concrete.

Dowel placement and joint construction details for contraction joints within the patch area shall conform to the requirements of Standard Construction Details or details in the Plans.

The following are the allowable dowel translations and rotations: Vertical rotation - the difference in depth (vertical position) between the midpoint and the exposed end of the dowel; the allowable tolerance is $\frac{1}{4}"$ of vertical deviation from the true longitudinal axis of the pavement. Horizontal rotation - the difference in lateral position between the midpoint and the exposed end of the dowel; the allowable tolerance is $\frac{1}{4}"$ of horizontal deviation from the true longitudinal axis of the pavement. Longitudinal translation - the longitudinal distance between the exposed end of the dowel and the edge of the patch is 10" with an allowable tolerance of $\pm 1"$.

The dowels at the end of each patch will be paid for under Item 503006-Dowels.

Side forms may be required when the patch is adjacent to a hot mix shoulder and the shoulder is damaged during concrete removal.

Bonding of the transverse and longitudinal sides of the patch to the adjacent concrete slabs shall be prevented by an approved bond-breaking material such as a sheet of plastic over the vertical face or a light coating of a wax based curing compound covering the vertical face.

For existing composite pavements (hot-mix over concrete) that will not be overlaid, a 2" lift of hot-mix shall be placed over the concrete after the concrete has reached strength sufficient to allow opening to traffic.

503.11 Placing Concrete. Portland cement concrete shall be placed according to the requirements of Subsection 501.07. The concrete shall be deposited directly on the foundation and shall be uniformly distributed and spread over the entire foundation. Each patch area shall be cast in one continuous operation.

503.12 Consolidating and Finishing Concrete. The concrete shall be consolidated with an internal vibrator, particularly near the edges, corners, and around the dowels. The vibrator must be capable of visibly affecting the concrete from a distance of 1' from the vibrator head.

Except when a hot-mix surface is required or when an overlay will be placed, the surface of the patch concrete shall be struck off flush with the existing pavement. For patches up to 10' long, the screed shall be placed parallel to the centerline of the roadway. For longer patches, the screed may be placed perpendicular to the centerline of the roadway. The surface of the concrete patch shall be textured to match the surrounding pavement (tining, grooves, etc.), except when an overlay will be placed or diamond grinding will be performed.

The riding surface texture, profile, and cross section of the concrete patches shall meet the following requirements:

When the patch surface will be overlaid with Hot-Mix Asphalt as part of this Contract, the patch shall be broom finished or tined, with the texture applied in a direction perpendicular to the traffic flow. The profile and cross slope shall match the adjacent pavement surface. If the profile in the finished patch area contains excessive surface deviations, the patch is unacceptable. Excessive deviations are surface deviations greater than 1/8" from a reference line between points not greater than 10' apart along the direction of traffic.

When the patch surface will be part of the final surface of the roadway, the patch surface shall be finished to match the texture of the adjacent pavement. The patch surface cross section shall match the preceding and following pavement surfaces. The Engineer may test for excessive deviations with a straightedge, a California-type profilometer, or other surface measuring devices. When tested with a straightedge, excessive deviations are surface deviations greater than 1/8" from a reference line between points not greater than 10' apart along the direction of traffic. When tested with a profilograph, excessive deviations are surface deviations greater than 0.3" above or below a reference line between points not greater than 25' apart along the direction of traffic, when the pavement will not be diamond ground end-to-end after patching. When the pavement will be diamond ground end-to-end after patching, excessive deviations are defined as surface deviations greater than 0.4" above or below a reference line between points not greater than 25' apart along the direction of traffic and less than 0.3" after grinding. The Contractor shall correct unacceptable deviations in the patch areas before starting the end-to-end grinding.

503.13 Curing and Protecting. Curing shall conform to the requirements of Subsections 501.11 and 501.12 and the following:

The patch shall be cured and protected with either a liquid membrane curing compound and polyethylene sheeting or wet burlap and polyethylene sheeting.

When liquid membrane curing compound is used, it shall be applied uniformly upon completion of the patch texturing at a rate of 150 ft²/gallon and then covered with polyethylene sheeting.

When burlap/polyethylene sheeting is used, the patch shall be covered with a layer of wet burlap immediately after the concrete has achieved initial set, and the wet burlap shall be covered with a polyethylene sheet.

After the curing compound/polyethylene sheeting or burlap/polyethylene sheeting is applied, the patch shall be covered with an approved insulation blanket, and it shall remain in place until the concrete has achieved the design strength. Edges and seams in the insulation shall be secured to prevent penetration of the wind.

503.14 Joints. The transverse and longitudinal joints shall be formed or sawed as shown on the Standard Construction Details Transverse joints within the patch area shall be sawed at the proper time to assure proper cracking at the transverse crack. Cleaning and sealing of the joints with hot poured sealant material shall be completed within 5 days after concrete placement if no overlay is planned.

The non-repaired transverse joints on each side of the patched area shall also be cleaned and resealed. Joints shall be cleaned by mechanical wire brushing or by light sandblasting. Immediately prior to resealing, the joint groove shall receive a final cleaning with compressed air having a minimum pressure of 90 psi .

Repairs to damaged concrete or hot-mix shoulder shall be completed before the patch area is subjected to any traffic loading.

503.15 Defective Work. Concrete which fails to reach the full design strength in the specified 6-hours may be considered defective concrete based upon its structural adequacy.

If the concrete is determined to not be structurally adequate by the Engineer, it is considered defective and it shall be removed and replaced at no additional cost to the Department. If the concrete is determined to be structurally adequate by the Engineer and the concrete can remain in place, the Contractor may accept a prorated payment for the below-specified concrete as referenced below. If the Contractor does not wish to accept the prorated payment, the below-specified concrete shall be removed and replaced at no cost to the Department.

503.16 Method of Measurement. The quantity of Portland cement concrete pavement patch will be measured as the actual number of square yards of concrete patch placed and accepted. The width of measurement will be the full width from outside of the completed patches as constructed, measured parallel to the transverse saw cuts. The length will be the actual length measured parallel to the centerline of the pavement.

The quantity of dowel bars will be measured as the actual number of dowel bars installed and accepted at the ends of each patch. Dowel bars and support assemblies (load transfer assemblies) installed at internal joints in Type B Patches will not be measured but will be considered as incidental to the Contract price per square yard for Item 503002 - Patching P.C.C. Pavement, greater than 15' to 100', Type B.

503.17 Basis of Payment. The quantity of Portland cement concrete pavement patch will be paid for at the Contract unit price per square yard . Price and payment will constitute full compensation for furnishing, hauling, and placing all materials, including high-early strength concrete; load transfer assembly, and joint filler (where applicable).; for removing, and disposing of existing concrete; for preparing the foundation; for tooling, finishing, curing, sealing of over cuts in non-overlay areas, and protecting the new concrete; for disposing of excess material; and for all labor, equipment, tools, and incidentals required to complete the work. In addition, the price and applicable payment(s) will be based on Type A or Type B Patches.

Price Adjustment for Low Strength Concrete. Prorated payment for concrete as specified in Subsection 503.15 shall be calculated as shown in the following equation:

$$\text{Prorated Payment} = \frac{\text{Actual 6-hour Compressive Strength}}{\text{Specified 6-hour Compressive Strength}} \times (\text{Quantity of Concrete}^*) \times (\text{Bid Price}^{**})$$

* The quantity for which the low compressive strength results represent.

** Item bid price; not material cost.

NOTE:

If the Engineer directs the Contractor (in writing) to place Portland cement concrete which is in violation to any applicable Specifications, or if any other Department Specification is violated, this Prorated Payment will not be enforced.

The quantity of dowel bars will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for drilling holes, furnishing and installing grout and dowel bars with grout retention disk and for all labor, equipment, tools, and incidentals required to complete the work.

Saw cutting the perimeter of the patch that is adjacent to concrete (including shoulder if applicable) will be measured and paid for under item 762002 - Saw Cutting, Concrete, Full Depth. All other saw cutting,

including the joint between the concrete and hot-mix asphalt shoulder, will be incidental to the patching item(s).

Hot-pour sealant, if applicable, will be measure and paid for under item 503501 .

Any damage caused by the lift-out technique of the Contractor, shall be repaired by the Contractor at no cost to the Department.

10/4/06

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. Backfill Material

- A. The material shall have magnesium sulfate soundness loss of less than 30% after 4 cycles as determined by AASHTO T104.
- B. All backfill material shall be reasonably free from organic and deleterious materials. Do not use metallurgical slag.
- C. Granular backfill shall meet gradation limits of AASHTO T 27, as outlined below:

<u>Sieve Size</u>	<u>Percent Passing</u>
3 inches	100
3/4 in sieve	20 - 100
No. 40 mesh sieve	0 - 60
No. 200 mesh sieve	0 - 10

- D. The plasticity index (P.I.) as determined by AASHTO T 90 shall not exceed 6.
- E. The fraction finer than 15 microns as determined by AASHTO T 88 shall not exceed 15 percent.
- F. The material shall exhibit an angle of internal friction of not less than 34 degree as determined by the standard direct shear test in accordance with AASHTO T 236, on the portion finer than the #10 sieve and compacted to 95 percent of AASHTO T 99, method C or D (with oversize correction, as outlined in Note 7, AASHTO T 99) at optimum moisture content.
- G. Resistivity greater than 3000 ohm-cm.
- H. ph range between 5.0 and 10.0.
- I. Chlorides less than 200 ppm.
- J. Sulfates less than 1000 ppm.
- K. Sulfides less than 300 ppm.

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/cm^3 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 on plans
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 $\pm 3/16$ " 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:

1. Factor of Safety - Overturning = 2.0
2. Factor of Safety - Sliding = 1.5
3. Weight of Fill = 120 PCF
4. Equivalent Hydrostatic Pressure = 35 PSF

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.

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) or 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.

2/1/07

605501 - GROUND MOUNT BREAKAWAY TYPE SIGN SUPPORTS AND FOUNDATION**Description:**

This work consists of furnishing all materials and constructing ground mount breakaway type sign supports including foundations 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 (GR 345), or GR50W (GR 345W) as detailed on the plans. Steel posts shall be galvanized in accordance with the requirements of AASHTO M 111/M 111M.

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.

Breakaway Couplings shall be made from alloy steel which conforms to AISI 4340, 4130 or an equivalent material, and shall have 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 allow 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 boss which shall be made from the following materials:

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 boss 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.

Anchors shall be fabricated from 304 Stainless Steel for the threaded ferrule portion, and 1058 steel rod and coil for cage portion of anchor.

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 M 232/M 232M.

Construction Methods:

Shop Drawings. Shop 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, skids, 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.

For constructing the concrete foundation, the excavation shall be done by augering of suitable diameter as detailed on the Plans. The excavated material shall be disposed of and the area shall be properly graded.

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 ground mount breakaway type sign supports and foundations will not be measured.

Basis of Payment:

The quantity of ground mount breakaway sign supports and foundations will be paid for at the Contract lump sum. Price and payment will constitute full compensation for furnishing all materials and constructing the sign supports and foundations 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.

4/2/12

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.

10/29/01

605664 - STEEL SIGN STRUCTURES

Description:

This work shall consist of furnishing, fabricating and erecting the sign structures as shown on the plans. Such work shall include the steel sign structure, 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:

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

- (a) Pipes - ASTM A53, Type S, Grade B.
- (b) Structural Angles, Plates, Bars, and Shapes - ASTM A36.
- (c) Anchor Bolts, nuts and washers - ASTM F1554, Grade 55.
- (d) U-Bolts - ASTM A307.
- (e) U-Bolt Nuts - ASTM A307.
- (f) High Strength Bolts, Nuts and Washers - ASTM A325.
- (g) Concrete - Class B
- (h) Reinforcing Steel - ASTM A615, Grade 60, epoxy coated.
- (i) Pre-Assembly of Field Connections.
- (j) All structural steel that is not stainless shall be hot-dipped galvanized in accordance with ASTM A123.

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.** Excavate and construct the foundations. 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. Construct the foundations of Class B Cement Concrete, as specified in the applicable parts of Section 602. Use templates to accurately set tower base anchor bolts to the correct elevation and alignment. Securely brace the bolts against displacement before concrete is placed.

After constructing the concrete foundations, backfill the excavation around the foundation using acceptable material, in uniform loose layers, not exceeding 4 inches in depth. Compact by means of acceptable mechanical tampers to the required density.
- (c) **Bearing Areas.** Construct the tower base bearing areas of concrete pedestals, in a true and level position. Full bearing is required under bases.
- (d) **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.

- (e) 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.
- (f) 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).
- (g) Compaction of the backfill shall be in accordance with Section 202 of the Standard Specifications.
- (h) All signs and miscellaneous attachments shall be installed within the same 8-hour period that the trusses are erected when existing sign is being removed.

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 and foundations, as determined above, shall be paid for at the contract lump sum price bid "Steel Sign Structure," which price and payment shall include all excavation and backfill in accordance with Section 207, temporary shoring, concrete, reinforcing steel, galvanized structural steel, bolts, and all labor, materials, equipment and incidentals necessary to construct the sign structure and foundation. 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

612529 - PIPE VIDEO INSPECTION**Description:**

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

Construction Methods:

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

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

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

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

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

Documentation:

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

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

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

DVD Recordings: The Contractor shall supply a minimum of two visual and audio recordings of the

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

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

Method of Measurement:

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

Basis of Payment:

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

3/11/2011

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 restrrike 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

708563 - PERSONNEL GRATE FOR PIPE INLET

Description:

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

Materials:

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

Working drawings shall be submitted in accordance with Subsection 105.04.

Construction Methods:

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

Method of Measurement:

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

Basis of Payment:

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

Note:

The breakout sheet attached to the Bid Proposal shows all personnel grate for pipe inlets 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 size listed. The lump sum price bid for item 708563-Personnel Grate for Pipe Inlet shall be in the sum of the total cost for all sizes listed. The completed breakout sheet shall be attached to the Bid Proposal. Failure to submit the breakout sheet will result in the Bid Proposal as 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 sizes listed and the right to add or subtract from the quantity of each 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 deletions are made.

3/14/05

715500 - UNDERDRAIN OUTLET PIPE, 6"
715504 - UNDERDRAIN OUTLET PIPE, 8"

Description:

This work consists of furnishing and placing underdrain outlet pipe in accordance with the locations, notes and details shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

The materials and construction methods for underdrain outlet pipe shall conform to the applicable requirements of Section 715 of the Standard Specifications, except there shall be no requirements for filter fabric and Del. No. 8 stone around the pipe and the pipe shall not be perforated. The material for underdrain outlet pipe shall be the same as for perforated pipe underdrains.

The installed under drain outlet pipe shall be video inspected in accordance with Subsection 715.07 of the Standard Specifications.

Method of Measurement:

The quantity of underdrain outlet pipe will be measured from end to end in linear feet (linear meters) of pipe completed and accepted.

Basis of Payment:

The quantity of underdrain outlet pipe will be paid for at the Contract unit price per linear foot (linear meter) of the diameter as specified on the Plans. Price and payment will constitute full compensation for furnishing all materials, excavation and backfilling, connectors, bolts to block outlet opening to prevent small animals from entering, video inspection for all labor, tools, equipment and incidentals to complete the item.

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 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

720611 - FLEXIBLE DELINEATOR, PERMANENT

Description:

This work consists of supplying and placing tubular markers on the road surface to help channelize traffic.

Materials:

Tubular markers should be predominantly orange, other colors are acceptable depending on where they are being placed. They shall be not be less than 28" high (700 mm) and 2" wide (50 mm) facing road users. They shall be made of a material that can be struck without causing damage to the impacting vehicle. For nighttime use, tubular markers shall be retroreflectorized. Retroreflectorization of 28" (700 mm) or larger tubular markers shall be provided by two 3" (75 mm) wide white or yellow bands placed a maximum of 2" (50 mm) from the top with a maximum of 6" (150 mm) between the bands.

Construction Methods:

The Contractor shall remove all loose debris from road surface, the road surface must be dry. The tubular marker must be anchored to the pavement using a method that is approved by the product manufacturer. There are several different methods of anchoring tubular markers, the exact method used shall be at the discretion of the project coordinator.

Method of Measurement:

The quantity will not be measured.

Basis of Payment:

The payment for tubular markers will be incidental to Item 701011 - P.C.C. Curb Type 2.

3/5/12

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.

6/11/99

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

Description:

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

Materials:

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

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

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

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

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

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

Types of Soil Retention Blanket Mulch Application

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

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

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

Standard No. E-9 for rolled blankets under Types 1 through 5
Standard No. E-25 for blankets under Types 6 and 7

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

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

Method of Measurement:

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

Basis of Payment:

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

01/24/01

737523 - PLANTING

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

Subsection 737.07 Peat Moss and Peat Humus.

Add the following:

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

Subsection 737.10 Stakes, Guys, and Related Materials.

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

Subsection 737.16 Planting.

Delete paragraph (d).

Add the following:

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

Section 737.17 Plant Establishment.

Delete this subsection in its entirety and add the following:

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

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

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

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

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

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

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

Subsection 737.18 Method of Measurement.

Delete the paragraph in its entirety and insert the following:

The quantity of planting will not be measured.

Subsection 737.19 Basis of Payment.

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

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

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

5/11/05

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

745520 - SUPPLY OF 4" SCHEDULE 40 HDPE CONDUIT
745521 - SUPPLY OF 4" SDR-13.5 HDPE CONDUIT
745522 - SUPPLY OF 3" SCHEDULE 80 PVC CONDUIT
745523 - SUPPLY OF 4" SCHEDULE 40 PVC CONDUIT
745524 - SUPPLY OF 4" SCHEDULE 80 PVC CONDUIT
745525 - SUPPLY OF 4" GALVANIZED STEEL CONDUIT
745526 - SUPPLY OF 3" GALVANIZED STEEL CONDUIT
745527 - SUPPLY OF 2 1/2" GALVANIZED STEEL CONDUIT
745528 - SUPPLY OF 2" GALVANIZED STEEL CONDUIT
745529 - SUPPLY OF 1 1/2" GALVANIZED STEEL CONDUIT
745530 - SUPPLY OF 1" GALVANIZED STEEL CONDUIT
745531 - SUPPLY OF 3/4" GALVANIZED STEEL CONDUIT
745532 - SUPPLY OF 3" SCHEDULE 40 PVC CONDUIT
745533 - SUPPLY OF 2 1/2" SCHEDULE 40 PVC CONDUIT
745534 - SUPPLY OF 2" SCHEDULE 40 PVC CONDUIT
745535 - SUPPLY OF 1 1/2" SCHEDULE 40 PVC CONDUIT
745536 - SUPPLY OF 3/4" ALUMINUM RIGID CONDUIT
745537 - SUPPLY OF 3/4" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745538 - SUPPLY OF 1 1/2" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745539 - SUPPLY OF 2" NONMETALLIC POLE RISER SHIELD
745540 - SUPPLY OF 3" NONMETALLIC POLE RISER SHIELD
745541 - SUPPLY OF 4" NONMETALLIC POLE RISER SHIELD
745579 - SUPPLY OF 2 1/2" SCHEDULE 80 PVC CONDUIT

Description:

This work consists of supplying a conduit or shield, of the type required and as specified in the contract documents or as directed by the Engineer.

Materials:

All conduits shall be UL listed and nonmetallic pole risers shall be Rural Utility Service (RUS) listed.

4" (100 mm) high density polyethylene (HDPE) schedule 40, or SDR-13.5 smooth wall conduit with permanently pre-lubricated lining, meeting ASTM D247, ASTM D3035 and NEMA TC7 specifications.

4" (100 mm) through 1-1/2" (38 mm) schedule 40 or 4" (100 mm) through 3" (75 mm) schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

4" (100 mm) through 3/4" (19 mm) rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

3/4" (19 mm) aluminum rigid conduit meeting National Electric Code 2002, Article 344

3/4" (19 mm) and 1-1/2" (38 mm) liquidtight flexible metallic conduit meeting National Electric Code 2002, Article 350.

2" (50 mm), 3" (75 mm), and 4" (100 mm) nonmetallic pole riser shield with belled ends meeting NEMA TC-19 specifications.

In addition to any normal markings provided by the manufacturer, HDPE and PVC conduit shall have the following longitudinally printed on it in white letters: "DeDOT Traffic Fiber Optic Cable."

Method of Measurement:

The quantity of conduit or shield will be measured as the number of linear feet (meters) of conduit or shield supplied and accepted. The length of liquidtight flexible metallic conduit shall be measured including all fittings; no additional request for payment will be accepted based upon liquidtight fittings of 90-degrees, 45-degrees, straight, or swivel.

The length of any conduit that is reduced or divided (with a junction box or conduit body) shall be measured as part of the larger conduit. The nonmetallic pole riser shield length shall include any adapter required.

Basis of Payment:

The quantity of linear feet of conduit or shield will be paid for at the Contract unit price per linear foot (meter). Price and payment shall include full compensation for all materials and labor, and incidentals including fittings and bushings, necessary to complete the item.

07/14/2011

745542 - INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT - DIRECTIONAL BORE

745543 - INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT - OPEN CUT

745544 - INSTALLATION OF CONDUIT IN UNPAVED TRENCH

745545 - INSTALLATION OF CONDUIT ON WOOD POLE

745546 - INSTALLATION OF CONDUIT ON STRUCTURE

745547 - INSTALLATION OF ADDITIONAL CONDUITS IN TRENCH OR OPEN CUT PAVEMENT

745548 - INSTALLATION OF ADDITIONAL CONDUITS IN DIRECTIONAL BORE

Description:

This work consists of installing trade sized rigid galvanized, PVC or HDPE conduit with all necessary fittings, under existing pavement either by directional bore or open cut, in unpaved trench, on wood pole, or on structure other than bridge or overpass. Installation of additional conduit in trench or open cut pavement or in a directional bore shall also be covered under this item.

The structure can be sign structure, tower, building or other type of structure. Installation of conduit on a bridge, highway and railroad overpass is not included in this payment item, and shall be covered under other items of these specifications.

The Contractor shall be responsible for correcting any existing conduit which is disturbed during installation.

Materials:

Weatherhead for galvanized or PVC conduit.

Insulated grounding bushing with knockouts.

Condulets for conduit sizes.

Anchors.

One hole conduit hangers: Steel City Series 6H or 6H-B, Grainger Industrial Supply Item # 6XCXX,

Dale Electric Supply Co.- Conduit Hangers, Arlington Industries - Pipe Hangers Series 2000 or 2200,

Raco/Hubbell Inc. - Conduit Hangers or Approved Equal.

End caps.

LONG sweep sections for conduit sizes.

Construction Methods:

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 900 feet (275 m) for fiber optic conduit or no more than 300 feet (90 m) for copper conduit, or as directed by the Engineer. If bends are required during installation, they must be 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 (600 mm) and a maximum cover of 48 inches (1.2 m).

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 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 (600 mm) 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 (75 mm) inside a junction well. See Standard

Construction Details for typical methods of termination.

All underground conduits shall be marked in the ground with a warning tape. The marking tape shall be buried directly above the conduit run that it identifies, at a depth of approximately 12 inches (300 mm) below final grade. The tape identifying ALL conduits shall be at least 6 inches (150 mm) wide, and have a minimum thickness of 3 mils and 500 percent elongation.

The color of the 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 by 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 (5560 N) shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

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" (38 mm). The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch (25 mm). If it does, cement grout shall be pumped into the void.

Installation Of Conduit Under Existing Pavement - Open Cut:

Installation by cutting a slot in the existing pavement with masonry saw shall be used for conduits not less than 1-1/2" (38 mm) diameter. The Engineer must first approve all open cutting of roadways. The minimum size of open cut for a paved roadway shall be 18 inches (450 mm). The Contractor shall be responsible for the removal of all cut pavement and the replacement and correction of any damaged pavement once the conduit(s) are installed.

Installation Of Conduit In 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 either be removed by the use of an approved sod cutter and then replaced or 6 inches (150 mm) 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.

Installation Of Conduit On Wood Pole:

Conduit installed on wood pole shall be installed in a straight vertical line. The conduit shall be attached to the wood pole with 2 hole straps spaced not more than 36 inches (1 m) apart with the top-most strap being 12 inches (300 mm) from the weatherhead and the lower-most being 12 inches (300 mm) 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 (50 mm) shall be placed 48 inches (1.2 m) 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 wood 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 is not the same size as the conduit, an adapter shall be used at no additional cost to the Department. The nonmetallic pole riser shall be attached to the wood pole with 1/4" (6 mm) x 1-1/2" (38 mm) galvanized lag bolts with washers. Lag bolts will be used every 36 inches (1 m) on BOTH sides of the nonmetallic pole riser, and in the top most and bottom most set of slots.

Installation Of Conduit On Structure:

Conduit installed on structure shall consist of drilling anchors into concrete, brick, stone, steel or wood and mounting the conduit with the proper clamps or hangers. The conduit shall be attached to the structure by use of one-hole conduit hangers and approved anchors not more than 36 inches (1 m) apart. Any 90-degree turns in the conduit run shall be accomplished by placing the proper size and type sweeping bends for the application needed.

Installation Of Additional Conduit In Trench Or Open Cut Pavement:

In the case of slotted or trenched installations, the Contractor shall install additional conduits at the same time as the initial installation. The Engineer shall indicate the quantity of conduits to be installed during a build. Additional conduits may be stacked one on top of the other, side by side or in a matrix. The orientation shall be at the Contractor's discretion, but conduits shall not twist around one another or be allowed to deviate from straight line paths except in the case of bend installations. Conduits installed at the same time in the same trench or slot shall remain oriented the same in relation to one another throughout the conduit run.

Installation Of Additional Conduits In Directional Bore:

In the case of a directional bore that more than one conduit shall be installed, the Contractor shall, at the same time as the initial installation, install one (1) or more additional conduits. The Engineer shall indicate the quantity of conduits to be installed during a build. The additional conduits may be stacked one on top of the other, side by side or in a matrix. The orientation shall be at the Contractor's discretion, but conduits shall not twist around one another or be allowed to deviate from straight line paths except in the case of a gentle bend. Conduits installed at the same time, in the same bore shall remain oriented in the same relation to one another throughout the conduit run.

Method of Measurement:

The quantity of conduit installed as specified, shall be measured as the number of linear feet (meters) of conduit installed as specified, complete in place, and accepted.

The length of conduit installed under existing pavement by a directional bore shall be measured along the path of the bore from the point that cannot be trenched to the point that trenching can resume. The length of conduit installed by cutting a slot in the existing pavement, in unpaved trench or under new pavement, on wood pole, or on structure shall be measured along the conduit.

Basis of Payment:

The quantity of conduit will be paid for at the Contract unit price per linear foot (meter). Price and payment shall include full compensation for all materials and labor, topsoil and seed if needed, and incidentals necessary to complete the item.

6/6/11

746517 - ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE
746518 - ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 35' POLE
746519 - ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE
746520 - ALUMINUM LIGHTING STANDARD WITH DOUBLE DAVIT ARM, 30' POLE
746521 - ALUMINUM LIGHTING STANDARD WITH DOUBLE DAVIT ARM, 35' POLE
746522 - ALUMINUM LIGHTING STANDARD WITH DOUBLE DAVIT ARM, 40' POLE
746618 - ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 45' POLE

Description:

The work consists of furnishing and installing Aluminum Lighting Standard with Single Davit Arm and/or Aluminum Lighting Standard Pole with Double Davit Arms, breakaway transformer base or anchor base, luminaires, in accordance with the details on the Plans, and/or as directed by the Engineer to make a functional street lighting system. The foundation 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 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 4" x 8" handhole which after pole is set should face the roadway such that the maintainer can access it from the shoulder.

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
30'	10'	10" (Bottom)	0.188"
	12'	10" (Bottom)	0.188"
	15'	10" (Bottom)	0.188"
	20'	10" (Bottom)	0.219"
35'	10'	10" (Bottom)	0.188"
	12'	10" (Bottom)	0.188"
	15'	10" (Bottom)	0.188"
	20'	10" (Bottom)	0.219"
40'	10'	10" (Bottom) 6" (Top)	0.188"
	12'	10" (Bottom) 6" (Top)	0.188"
	15'	10" (Bottom) 6" (Top)	0.188"
	20'	10" (Bottom) 6" (Top)	0.219"
45'	10'	10" (Bottom) 6" (Top)	0.188"
	12'	10" (Bottom) 6" (Top)	0.188"
	15'	10" (Bottom) 6" (Top)	0.219"
	20'	10" (Bottom) 6" (Top)	0.250"

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 or 12' (3.6 m) if not specified elsewhere. Davit arm less than 10' (3.0 m) long shall not be used without written permission from the Chief Traffic Engineer.

Each lighting standard shall be provided with a permanent tag that shall be 2" x 4" and fabricated from clear, anodized 1/16" 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" 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" high with stroke width of not less than 3/16". Identifying letters and/or numerals shall be as designated on the Plans.

Transformer Base: Transformer bases shall be provided with all poles and shall conform to the latest edition

of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaire and Traffic Signals".

Before any work, begins the Contractor shall submit documents showing that the breakaway device meets the current AASHTO Breakaway Design.

For breakaway installations, the standard shall electrically disconnect from the supply wire at the foundation when knocked down by an errant vehicle or from some other cause.

Luminaire: Provide an HPS, roadway luminaire, with photo cell receptacle and shorting cap, multi-voltage ballast, light distribution pattern as specified on the plans, connector kit, and 1.25"–2" slipfitter.

Each luminaire shall include an HPS lamp of the wattage specified on the plans.

The luminaire shall have a die cast aluminum housing with an optical assembly and a removable door. The door shall have integral hinges for hands-free installation, relamping, and maintenance. Hinges shall be made from non-corrodible material.

The luminaire shall have a cutoff optical assembly that includes an aluminum reflector with a heat/impact-resistant tempered sag glass lens or acrylic or polycarbonate resin clear globe. Luminaires with flat lenses shall not be considered acceptable. The refractor door shall be tightly sealed with an appropriate gasket to make a dust-tight optical system. The latch for the refractor door shall be of sufficient size to enable easy handling and constructed of rust resistant materials. The latch shall produce an audible click when it is properly locked.

In order to provide for normal exchange of air between the inside and outside of the optical system, a ventilating channel shall be provided. The channel shall contain a charcoal filter which will prevent the entrance of flying insects and other small animal life forms, as well as provide a cleaning action on the air to remove smoke and dust particles.

The luminaire shall be of the multi-voltage ballast regulator type. The ballast shall be capable of maintaining the wattage of the HPS lamp throughout the life of the lamp. The ballast and the photoelectric control shall be suitable for operating the units of the wattage specified.

All major electrical components, including ballast, shall be mounted on the removable mounting door and connected to the fixture electrically through a quick disconnect plug. The luminaire shall employ solderless push-on type connectors for all wiring connections to facilitate the replacement of any component.

The luminaire shall be completely wired so that it shall require only the connection of the power supply cables to a terminal block for energizing the entire fixture.

The luminaire shall be equipped with a porcelain, corrosion resistant socket. The socket shall be easily adjustable to provide different light distributions; such adjustments shall be accomplished through adjusting not more than two screws within the optical assembly. The socket in this installation shall be preset to provide a distribution pattern as indicated on the Plans or type III distribution pattern if not indicated.

The luminaire shall have a 2 bolt slipfitter suitable for mounting on a 1.25"–2" mounting arm. A birdguard shall be provided with each luminaire. The luminaire shall be designed with a leveling pad and capable of being adjusted +/- 3 degrees for proper leveling.

The luminaire shall have a NEMA-approved decal attached to the housing, which shall be readily visible from the ground. The decal shall be yellow (to indicate HPS lamp) and shall indicate the lamp wattage.

All electrical materials shall conform to the applicable requirements of the National Electrical Code (NEC) of the National Fire Protection Association.

The luminaire shall be UL Listed.

The Contractor shall furnish and install identification decals on the luminaire housing that can be seen visually from the road. Lamp decals shall indicate the lamp wattage and type via standard identifying numbers and background color. For example, "25" on a yellow sticker indicates a 250 watt high pressure sodium lamp.

No luminaire shall be installed until the lamp socket position has been inspected and approved by the Engineer. All luminaires shall be adjusted up or down on the slipfitter to provide maximum light on the roadway to be lighted. The connections between the luminaire and service cable shall be made with a connector kit using #10 AWG single wire. Installation of the connector kit shall be in accordance with the manufacturer's recommendations.

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 or double 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 or double 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 labor, equipment, hardware, anchor bolts, washers, shims and nuts for the foundations, excavation and backfilling, supply and installation of the transformer base or anchor base, supply and installation of poles and davit arm(s), and supply and installation of the luminaires. 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.

1/20/12

746590 - GROUND RODS

Description:

This work consists of furnishing and installing ground rods, in accordance with these specifications and as shown on the Plans.

Materials:

Ground rods shall be 3/4-inch (19 mm) in diameter, 20 feet (6 m) long and shall be constructed of copper-clad steel.

Below-grade connections to ground rods shall be by exothermic weld. Above-grade connections shall be by suitable bolted ground connectors.

Construction Methods:

One ground rod shall be provided at each pole foundation, cast-in-place. One ground rod shall be provided at each junction well, with the top of the ground rod exposed at the bottom of the junction well. Four ground rods shall be provided at all lighting control panels and at any transformer pads, as shown on the grounding details in the contract drawings.

Method of Measurement:

The quantity of ground rods will be measured as the actual number of ground rods installed, complete in place and accepted.

Basis of Payment:

The quantity of ground rods, will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all materials, bolted ground connections, exothermic welds, and for all tools, labor and equipment necessary to complete the item installation.

8/31/01

746653 - ELECTRICAL TESTING

Description:

This work consists of furnishing all materials, equipment, tools, and labor necessary to perform electrical testing in accordance with these special provisions, notes and details on the plans, and as directed by the Engineer.

When this item is required to test a highway lighting system constructed as part of the Contract, the item shall also include a one year warranty of the highway lighting system. The highway lighting system is understood to include all items of work performed under this Contract to provide lighting of roadways, bikepaths, parking lots, signs, etc.

Construction Methods:

Ground Resistance Testing

The ground resistance shall be measured with a three-terminal, fall-of-potential, direct-reading, battery-powered earth tester with a 0.50 to 500 ohm scale or digital read-out. The 25 ohm reading shall be approximately at mid scale.

The test shall be performed according to the manufacturer's instructions and OSHA requirements. The test shall be performed when the soil is dry. The Contractor shall not add any chemical or salt solutions to any portion of the grounding system. All grounding rods and foundation grounds to be tested shall be installed a minimum of ten days prior to testing unless otherwise determined by the Engineer in the field.

Two auxiliary copper clad ground rods shall be driven into the ground at a minimum distance of 3 feet (one meter). The lateral spacing for each test rod shall be given in writing on the test report form and the spacing shall be approved by the Engineer.

Each ground rod or foundation ground shall be isolated with the bond wires disconnected when the test is being performed. The resistance to ground shall be 25 ohms or less.

Unless noted otherwise on the plans, there shall be two ground resistance tests performed under this item of work.

System Testing

Insulation from ground and roadway lighting circuits shall be tested as follows:

- (1) Insulation from Ground. All underground circuits shall be tested for resistance to ground with a megger both before and after the conduit and wiring have been buried and all ground rods have been installed and connected. No circuit shall measure less than 10 megohms to ground. Circuits that fail will be inspected, repaired, and retested.
- (2) Roadway Lighting Circuits. The Contractor shall connect field wiring to the load center terminals. The entire lighting system shall be energized for ten consecutive days for ten hours each day at the time directed by the Engineer prior to initial acceptance. Failures occurring during this test period shall be corrected. The Contractor shall repair or replace any equipment, components, or system that fails during this test. A retest shall be performed on the repaired portion at the Engineer's direction.

All tests shall be performed in the presence of the Engineer, and test results shall be written, dated, and given to the Engineer for approval.

Highway Lighting System Warranty:

The Contractor shall secure the manufacturer's warranties and/or guarantees on electrical and/or mechanical equipment. These warranties and/or guarantees shall be submitted to the Department upon final acceptance of the completed highway lighting system. In addition to the manufacturer's warranties and/or

guarantees, the Contractor shall warrant to the Department the complete, installed highway lighting system to be free of defects, as hereafter defined, for one calendar year beginning at the initial acceptance of the highway lighting system by the Department. The initial acceptance of the highway lighting system will occur upon the satisfactory correction of all deficiencies noted in the lighting system during the final inspection of the project.

The highway lighting system will be considered defective if any of the following conditions are discovered by visual inspection or by inspection with testing equipment within the warranty period:

1. Defective lamps or ballasts.
2. Failure to operate, in whole or in part.
3. Power wire grounding less than ten mega-ohms.
4. Shifts in pole/foundation alignment.
5. Short circuits or open circuits anywhere within the system.
6. Deterioration of finishes, plating, or paint not normal and customary in the environment in which the equipment is installed.
7. Settlement of trench backfill.
8. Defective fuses.
9. Defective or improperly installed splices.

These conditions listed shall not be considered all inclusive.

The highway lighting system is comprised of all Contract items for lighting, including but not limited to conduits, junction wells, cables, load centers, transformers, cabinet pads, pole bases, poles, high mast poles, light standards with and without davit arms, luminaires, sign lighting, service installations, and reworked/relocated existing lighting facilities.

There will be initial and periodic highway lighting system performance inspections after the Contractor has completed all the work. The initial inspection, to be conducted during the final construction inspection, will be to determine if the initial performance requirements are met. Periodic reviews will be conducted at monthly intervals through the warranty period to determine the sustained ability of the highway lighting system to meet the stated performance requirements.

The Department review team will be responsible for evaluating the highway lighting system within the project limits for both day and night acceptability considering all the possible defects listed above. If the highway lighting system is considered defective because of abnormal operation or deterioration (as listed above), the Department will require repair or replacement of the defective portion at its sole option.

All defective areas, which may include all highway lighting systems and components within the project limits, identified by the Department during initial or periodic inspections shall be repaired by the Contractor in accordance with this Section. All highway lighting system repair shall begin immediately following the notice to the Contractor of the lighting system defect unless weather limitations prevent the corrective work. The Department shall be given notification before the Contractor begins corrective work and shall be allowed full inspection of all operations and provided safe access to the areas being repaired.

If at any time during the warranty period, the highway lighting system or any portion thereof is rendered defective as a result of other than a manufacturing design or construction defect, the Department will repair, replace or revise said system at its sole option. The Contractor will not be held responsible for the cost to correct failures due to design defects in the highway lighting system.

Method of Measurement:

The quantity of electrical testing will not be measured.

Basis of Payment:

The quantity of testing will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for furnishing all testing equipment, including ground rods; performing the tests; preparing the reports; and for all labor, equipment, tools, and incidentals required to complete the work. For highway lighting systems, price and payment will also constitute full compensation for providing the warranties.

5/24/02

746720 - SUPPLY OF #2 THWN STRANDED COPPER
746721 - SUPPLY OF #4 THWN STRANDED COPPER
746722 - SUPPLY OF #6 THWN STRANDED COPPER
746723 - SUPPLY OF #8 THWN STRANDED COPPER
746724 - SUPPLY OF #10 THWN STRANDED COPPER
746725 - SUPPLY OF #14 THWN STRANDED COPPER
746726 - SUPPLY OF #6 BARE SOLID COPPER
746727 - SUPPLY OF 8/2 UF W/GROUND
746728 - SUPPLY OF 8/3 UF W/GROUND
746729 - SUPPLY OF #6 TRI-PLEX ALUMINUM SERVICE CABLE
746730 - SUPPLY OF #2 URD ALUMINUM SERVICE CABLE
746731 - SUPPLY OF 4/0 URD ALUMINUM SERVICE CABLE
746870 - SUPPLY OF #4 BARE SOLID COPPER
746880 - SUPPLY OF #12 THWN STRANDED COPPER
746900 - SUPPLY OF #2 BARE SOLID COPPER
746902 - SUPPLY OF #8 BARE SOLID COPPER

Description:

This work consists of supplying electrical cable, of the type required and as specified in the contract documents or as directed by the Engineer.

For the purpose of this item, the terms "electrical wire" and "electrical cable" are interchangeable.

Materials:

All electrical cables shall be 600-Volt UL approved.

Method of Measurement:

The quantity of electrical cable will be the number of linear feet (meters) of electrical cable, by size and type, supplied and accepted.

Basis of Payment:

The quantity of electrical cable will be paid for at the Contract unit price per linear foot (meter). Price and payment shall include full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the item.

01/15/03

746774 - SUPPLY AND INSTALLATION OF LOOP DETECTOR WIRE

Description:

This work consists of sawing a cut in existing pavement, furnishing and installing loop detector wire in the saw cut and sealing the saw cut with an approved sealer, in accordance with the Standard Details, these specifications, or as directed by the Engineer.

Materials:

The loop detector wire shall be a shielded four-conductor controlled capacitance cable with conductors twisted 6 turns per foot and enclosed in an aluminized polyester shield within a polyethylene jacket, rated to 600 volts. The interior of the cable is filled with a water blocking material. The four conductors are AWG # 18 stranded copper with color-coded polypropylene insulation. Color rotation is black, red, white, and green. The loop detector wire shall have an UV stable high-density polyethylene outer cover that is chemical resistant and waterproof with a wall thickness of 0.032 inches (0.8 mm). The cable shall have a temperature tolerance range of -65 to +176 degrees Fahrenheit (-54 to +80 degrees Celsius). Outside diameter of the cable is 0.25 inches (6 mm).

Flexible embedding sealer shall be a cold poured, resilient type epoxy joint sealer, Bondo P-606 or Duracote - D115 for concrete or asphalt pavement or E-Poxy Industry 36-1 for concrete or E-Poxy Industry 11-1 for asphalt pavement, or approved equal.

A sealer accelerant or retarder may be added at the discretion of the Contractor.

3/8" (10 mm) closed cell foam backer rod

Construction Methods:

The saw cut shall be 1/4" (6 mm) wide and 3" (76 mm) deep. It shall be cut in the directions and sizes specified on the Standard Details or as directed by the Engineer. Contractor shall remove sharp edges in the saw cut and round the corners.

The saw cut shall be blown out with compressed air to remove all dust, water and particles of loose material.

A 3/8" (10 mm) backer rod will be placed into the bottom of the saw cut. The loop detector wire will then be installed using blunt tools so as to prevent damage to the polyethylene outer cover. One end of a loop detector wire shall be tagged to indicate start ("S"). All loop detector wires shall be laid in saw cuts in a clockwise rotation beginning with "S". The Engineer may require a High Voltage Ground Test with a 500 VDC megger after the loop detector installation is complete and prior to sealing saw cuts. If the resistance to ground is less than 100 megohms, this work will be rejected. Loop detectors also should be checked for continuity between the four conductors with an ohm-meter. If there is any resistance between colors or there is an open flow from color to color, this work will be rejected.

A sealer and sealer accelerant or retarder (if necessary) shall be applied in accordance with the manufacturer's directions and protected from traffic until it has set. A minimum of 1 inch of sealer shall be installed on top of the loop detector wire.

Two loop detector wires shall be installed in a saw cut from the loop to the edge of the road. These two wires shall then extend from the end of the saw cut to a junction well (see Standard Details). Wires shall be parallel and taped every 12" (305 mm) to 18" (457 mm) from the end of the saw cut to a junction well. A conduit may need to be installed between the end of the saw cut and junction well as directed by the Engineer. In this case the loop detector wire shall be installed in the conduit.

The loop detector wire shall be continuous and without splices from the junction well, through the saw cuts and conduit (if any).

Method of Measurement:

The quantity of loop detector wire to be measured under this item shall be the number of linear feet (meters) of saw cut in which loop detector wire is installed, sealed, tested, and accepted.

The additional loop detector wire needed beyond the saw cut to reach the junction well and sealer accelerant or retarder shall be incidental to this item and there shall be no separate measurement or payment. Any required conduit will be paid under a separate item.

Supply and installation of the conduit from the end of the saw cut to the junction well shall be covered under other items of this Contract. Installation of the loop detector wire in this conduit shall be incidental to this item and there shall be no separate measurement or payment.

Splicing of the loop detector wire to a lead-in cable in a junction well shall not be covered under this item and shall be paid separately under another item of this Contract.

Basis of Payment:

The quantity of detector wire supplied and installed will be paid for at the Contract unit price per linear foot (meter) of sawcut. Price and payment shall constitute full compensation for furnishing and placing all materials including loop detector wire, backer rod, sealer, labor, equipment, tools, and incidentals necessary to complete this item.

5/7/10

746776 - LOOP DETECTOR SPLICE

Description:

This work consists of splicing a loop detector wire to a loop detector lead-in cable ("home run").

Materials:

Soldering iron
Rosin core solder
3/16" (5 mm) heat shrink tubing
3M Scotchcast splicing kit #82 A-1; Duracast Inline Resin Splice Kit, P1; or Approved Equal
Vinyl tape – black, white, red, green, yellow, and blue

Construction Methods:

Each conductor to be spliced shall have sufficient wire jacket removed, with wire strippers or other approved tool, to expose 1/2 inch (13 mm) of the copper conductor. The use of any tool that might nick the conductor or cut a strand of wire is specifically prohibited.

Each conductor not to be spliced shall be inspected and trimmed as necessary to ensure that the copper conductor does not extend beyond the insulation.

When splicing a loop detector wire to a lead-in cable, the two ends of the loop detector wire forming one loop shall be spliced first. The method of splicing the two ends of the loop detector wire forming one loop is described below:

Splice the green, red and black conductors of start end ("S" or "In") of the loop detector wire to the white, green and red conductors of the finish end ("F" or "Out") of the same wire as follows:

- Green of "S" to White of "F"
- Red of "S" to Green of "F"
- Black of "S" to Red of "F"

A maximum of two loops shall be spliced to one loop detector lead in cable. The method of splicing two loops (Loop 1 and Loop 2) to a loop detector lead in cable is described below:

1. Splice Loop 1 "S" White to a lead in cable White and Loop 1 "F" Black to a lead in cable Black.
2. Splice Loop 2 "S" White to a lead in cable Green and Loop 2 "F" Black to a lead in cable Red.

Conductors to be soldered 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 is effected. The splice shall be coated with flux, heated with a soldering iron, and soldered in a manner, which minimizes insulation damage. After each soldered connection is completed, it shall be properly insulated with heat shrink tubing.

After the electrical and mechanical connection is completed and before the splicing kit is applied, a test shall be made by the Contractor to ensure that all circuits are complete. The splicing kit shall be installed as per manufacturer's instructions. A communication test will be performed at the cabinet by the Department technician after the splicing kit is applied. The Department will be notified of the test results. If the communication test fails the Contractor shall remake the splice at his own expense.

Each loop detector lead-in cable shall be identified with a distinctive band(s) at each end of the run. Additionally the loop "number" will be identified. Based upon direction of travel, the loop will be identified from left to right, closest to stop bar to furthest away, by a distinctive number of colored bands. System loops will also have a white band AFTER the color band. The following colors will be used as the distinctive band to denote direction of travel:

North Bound	---	RED
East Bound	---	GREEN
South Bound	---	YELLOW
West Bound	---	BLUE

If a splice is found to be faulty within 90 calendar days of installation, it shall be the Contractor's responsibility to remake the splice at his own expense.

Method of Measurement:

The quantity of splices shall be measured as the number of loop detectors connected to a lead-in cable in accordance with these specifications, complete in place, and accepted. Splicing the "S" end to the "F" end of the loop detector wire forming one loop shall not be considered a separate loop detector splice.

Basis of Payment:

The quantity of splices installed will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all materials, labor, equipment, tools, and incidentals required to complete the work.

3/5/12

746782 - INSTALLATION OF FIRST CABLE IN EXISTING EMPTY CONDUIT
746783 - INSTALLATION OF EACH ADDITIONAL CABLE IN EXISTING EMPTY CONDUIT
746784 - INSTALLATION OF FIRST CABLE IN CONDUIT W/ EXISTING WIRE OR CABLE
746785 - INSTALLATION OF EACH ADDITIONAL CABLE IN CONDUIT W/ EXISTING WIRE
OR CABLE

Description:

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).

The number of communications cables to be pulled through each conduit will be as shown on the plans or as directed by the Engineer.

Materials:

The Department will supply cable and wire or Contractor will supply under a separate pay item.

Construction Methods:

All electrical and communications 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" (38 mm) 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:

600 lbs. (2.7 kN) for non-connectorized outdoor fiber optic cable;
150 lbs. (670 N) for all pulls up through 12 pair communications cable; and
300 lbs. (1.3 kN) for all larger cables

Any and all cable(s) pulled into any conduit without the use of an acceptable pulling grip 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 as required 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.

Cable runs shall be started at one terminal point and shall be continuous without splices to the final terminal point. Cable(s) shall not be spliced in a junction well without prior written approval of the Engineer. 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 cable tags attached to each of the cables and wires in the control box and at all splice locations. The cable tags shall be secured to the cable or wire with nylon cable ties.

Additional cable(s) shall be left as noted:

1. When pulled through junction wells, 5 feet (1.5 m) of copper cable.
2. At the control box and other splice locations, 6 feet (1.8 m) of copper cable
3. At the termination of each run, as deemed necessary by Engineer.

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.

Method of Measurement:

The quantity of cable will be measured as the actual number of linear feet (meters) of cable pulled through a conduit in accordance with these specifications, complete in place, and accepted. The number of cables pulled through a conduit may exceed one. Each cable shall be measured separately.

All cable left at termination points or in junction wells shall be measured as part of this item only if the cable was actually pulled through the conduit as part of the installation procedure.

Basis of Payment:

The quantity of cable pulled through a conduit will be paid for at the Contract unit price per linear foot (meter). Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

Example calculation:

The total payment per linear foot (meter) shall be computed by adding together the bid price for each cable.

Three (3) cables installed in an empty conduit are paid as follows:

Initial Cable
Cable in Excess of One
Cable in Excess of One

Total price for pulling 3 cables

01/15/03

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.

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

747506 - CABINET BASE

Description:

This work consists of installing a Cabinet Base.

Materials:

Class B Concrete
2 – 3/4" (19 mm) x 10' (3 m) sectional copperclad steel ground rods
6 - 5/8" (16 mm) Hilti Drop-in Anchors, Concrete Fastening Systems, or approved equal
6 - 5/8" (16 mm) x 1-1/2" (38 mm) galvanized hex bolts
2 - 3/4" (19 mm) acorn type ground clamps
2 – 2" (50 mm) x 24" (610 mm) PVC conduit lengths

Construction Methods:

The base shall conform to the dimensions as indicated in the cabinet base detail on the Standard Construction Details. 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 (50 mm) between conduits and the ground rods.

A minimum of 8 foot (2.5 m) of the ground rods must be driven into undisturbed soil through the 2 inch (50 mm) 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.

Payment for all conduits extending into the cabinet base shall be included in the items for installation of conduit.

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 labor, equipment, tools, and incidentals required to complete the work.

12/21/2010

747509 - LIGHTING CONTROL CENTER – 200A

Description:

This work consists of furnishing and installing load center cabinet with concrete pad and all necessary conduits, underground facilities, equipment, and wiring as indicated on the Plans or as directed by the Engineer.

Materials:

The concrete shall conform to Section 812, Class B of the Standard Specifications.

Galvanized steel conduits and fittings shall be as specified under Section 745 of the Standard Specifications.

Meter pan for 277/480 volt, three phase, four wire service meeting the requirements of the utility company.

Ground rods shall be sectional, copper-clad $\frac{3}{4}$ " diameter by 10 feet long.

Service wire between the disconnect and the meter pan and between meter pan and the utility company shall be sized for 200 amp service (minimum) and meet utility company requirements.

Provide 3" rigid galvanized steel conduit from meter pan to nearest utility facility as indicated on plan or directed by the Engineer. Conduit will include mounting to the utility pole (service riser) and weather head. Installation is to meet utility company requirements.

Cabinet

The service cabinets shall be a "P" cabinet with a nominal size of 44" wide x 56" height x 27 1/2" deep.

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 $\frac{1}{4}$ " 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.

Disconnect Switches

NEMA standard KS 1-1990. 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. Three phase disconnect switches shall

have 3 poles with a solid neutral and shall be rated at 600 V. The design of the neutral bar may be factory or field installable. The disconnect switch shall have the same amperage rating as the electrical service equipment.

Panelboard

Panel boards shall be rated for 277/480 volt, three phase, four-wire operation. The panel board shall be UL listed and labeled. The panel board shall have a minimum of 200 amp rated main busses. It shall have a minimum of 30 spaces for branch circuit breakers. It shall have a minimum 22,000 RMS symmetrical ampere short circuit current rating. 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, current rating and number of poles as required by the plans for proper circuiting. 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. Circuit breakers shall be quick make, quick break, thermal magnetic, trip indicating and have common trip on all multiple breakers with internal tie mechanism. Circuit breakers shall be bolted to copper busses.

Lighting Contactor, Photocell and Override Control

Provide a central lighting contactor. Lighting contactor shall be 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 277 volts. Contactors shall be fully rated for all classes of load to 600V and shall have an interrupting rating of 600 percent of rated current.

Provide a remote photoelectric light control (photocell) mounted at the top of the closest light standard in the lighting system. 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 include pole mounting hardware and be a plug-in, locking type for mounting in a receptacle meeting UL Specification 773. It shall be rated of 1800 VA for ballast type loads and used to energize a contactor. It shall be designed to operate at 277 volts 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 a hand-off-automatic selector switch in the photocell circuit for manual override of photocell control.

Control Power Transformer

Control power transformers shall be the dry type, two windings, of the size and voltage ratings specified on the Plans.

Thermostat and Fans

A thermostatically controlled cooling fan shall be provided for all cabinets. The fan and thermostat shall be rated for 125 percent of capacity and shall be mounted at the top of the cabinet. Thermostats shall be the inline type, single pole, 120V, 10 amps with a minimum range of 40 to 80 F. The fan shall have a minimum rated capacity of 100 CFM air flow and a minimum rated design life of 100,000 hours. The thermostat shall be manually adjustable, within a 10 degree range, from 80 to 160 F.

Construction Methods:

Service conduit shall be installed in accordance with DelDOT standard specification and utility company requirements.

The concrete pad shall be a cast-in-place monolithic slab, conforming to the dimensions as indicated on the cabinet base detail on the Standard Construction Details. Concrete shall not be poured until the forming, position of conduits and grounding facilities are approved by the Engineer. Appropriate provisions shall be used to support conduit, grounding facilities and anchor bolts during concrete pouring and curing. All conduits shall be provided with temporary pipe caps during the placement of concrete. A minimum distance of 1" shall be maintained between conduits. Install 2" conduits to serve as sleeves for the ground rod. A minimum of 8 foot of the ground rods must be driving into undisturbed soil. The pad will include all conduits within the pad, grounding bushings on conduits coming out of top of pad, and anchor bolts as shown on the contract drawings, or as directed by the Engineer.

Forms shall not be removed from the concrete pad until twenty-four (24) hours after the concrete has been poured and the pad is to be kept moist for a period of seven (7) days after pouring. The concrete surface shall be level and have a broom finish.

All excavation material shall be stockpiled on the site until backfilling has been completed. Backfill may be placed after the first 24 hours and is to be accomplished in 6" layers, with each lift mechanically tamped. All excess material is to be removed and used elsewhere on the project as approved by the Engineer.

Cabinets shall be installed on the concrete pad using the method of attachment as noted on the Plan details, or as directed by the Engineer.

Electrical equipment shall be installed as indicated on the plans.

Method of Measurement:

The quantity of load centers be measured as the actual number of load centers furnished and installed, including cabinets, all equipment, conduit, wiring, concrete pad, and incidentals, complete in place, operational and accepted.

Basis of Payment:

The quantity of load centers will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and installing all materials for load center and concrete pad installation, excavation and backfilling for the service conduit and pad or footing, and for all labor, equipment, tools and incidentals necessary to complete the item.

1/20/12

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:

1. (Ennis Paint) Stimsonite - Avery Dennison Model 101LPCR Snow Plowable Marker.
2. Ray-O-Lite Model 300 Snow Plowable 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, hexavalent 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% TiO_2 (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 $73 \pm 5^\circ\text{F}$. ($23 \pm 3^\circ\text{C}$).

- a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20 ± 1 mils ($500 \mu\text{m}$) 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 ± 1 mils ($500 \mu\text{m}$) 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 ± 1 mils ($500 \mu\text{m}$) 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 $[0.125" \pm 0.010" (3.18 \pm 0.25 \text{ mm})$ thick]. Tests shall be conducted at an ambient temperature of $75 \pm 5^\circ\text{F} (24 \pm 3^\circ\text{C})$. 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 $[0.50 \text{ inch diameter by } 1.0 \text{ inch length } (12 \text{ mm diameter by } 25 \text{ mm length})]$. Tests shall be conducted at an ambient temperature of $75 \pm 5^\circ\text{F} (24 \pm 3^\circ\text{C})$.

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" \pm 0.002" (25 mm \pm 0.05 mm).

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

B. Reflective Glass Spheres/Beads

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

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

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

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

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

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

M247 AASHTO Type 1 Glass Spheres

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

Type 4 Large Spheres

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

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

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansyl-chloride test.

C. Black Epoxy Contrast Markings

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

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

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

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

D. Black Aggregate

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

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

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

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

E. Packaging and Shipment

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

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

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

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

Epoxy Application Equipment:

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

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

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

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

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

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

Construction Details.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Black epoxy contrast pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 µm) 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±1 mils (500 µm) 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±1 mils (500 µm) minimum line thickness as applicable.

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

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

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

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

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

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

3. Reflectivity for epoxy resin paint.

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

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

White 450
Yellow 325

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

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

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

Method of Measurement:

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

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 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.

9/15/11

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, burning or 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, approved flat black paint or 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.

01/09/06

749500 – SIGN PANEL
749578 - EXTRUDED SIGN PANEL GROUND MOUNTED TYPE III SHEETING (FEDERAL)

Description:

This work consists of furnishing all materials, fabrication, and erection of new 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 to be used for all federally funded projects.

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.

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 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. This table contains "core" values as found in ASTM D 4956. The 0.1 observation angle is not required for this item.

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) $\text{cd} \cdot \text{lx}^{-1} \cdot \text{m}^{-2}$

^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	2 5	11	8.5
0.5 °	-4 °	95	62	30	15	1 5	7.5	5.0
0.5 °	+30 °	65	45	25	10	1 0	5.0	3.5

^A Minimum Coefficient of Retroreflection(R_A) $\text{cd}/\text{fc}/\text{ft}^2(\text{cd}\cdot\text{lx}^{-1}\cdot\text{m}^{-2})$

^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.

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.

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 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). 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.

4/11/07

749503 - VARIABLE MESSAGE SIGN (VMS) SUPPORT STRUCTURES

Description:

This item shall consist of:

1. Constructing a Drilled Shaft foundation.
2. Furnishing, assembling and installing a Sign Support Structure.
3. Installing a Variable Message Sign (VMS) Board.
4. Furnishing, assembling and installing Guardrail with End Treatments and Reflectors for the Sign Support Structure.

This item shall be constructed and installed in accordance with; these special provisions, the locations, notes and details on the plans, and as directed by the Engineer. All labor, equipment, tools, and incidentals necessary to complete the items described above shall be provided by the Contractor and shall be incidental to the cost of this item in order to provide a satisfactorily working unit to the Department.

The Contractor shall also install and connect Department supplied power and communication cables between the VMS and the controller cabinet as required ensuring the VMS is operational. The Department shall supply the VMS board and controller cabinet. The cabinet foundation and power and communication to the cabinet shall be supplied by others.

Following completion of installation, the Department shall conduct a formal 7 day operational test. Upon satisfactory completion of this test, the Department shall issue its written approval and acceptance of the VMS sign. However, it should be understood that DelDOT's acceptance of the system does not constitute acceptance of the sign, which shall occur once the final paperwork is completed.

(a) Working Drawings

Shop drawings shall be submitted for the message board stand in accordance with Section 105.

Materials:

(a) VMS Board

The VMS Board along with controller, controller software, electronics and all power and communication cables shall be provided by the Department. Power and communication connections from the VMS Board to the Sign Support Structure to the cabinet will be provided by the Department. Any additional cabling or ducts required to connect the VMS sign to the controller cabinet shall be incidental to the cost of the overall VMS Support Structure.

(b) Steel Pipe

Steel pipe shall be certified by mill test report to meet ASTM Specification A 53, Type S, Grade B with the exception that AP15L, Grade B may be used when the specified wall thickness is greater than 1/2". Only Electrical Resistance Welded (ERW) manufactured single seam pipe is permitted. However, when the required pipe size is greater than 24", double seam pipe may be used. A mill test report must be provided, certified and signed by the pipe manufacturer, containing physical and chemical properties and the manufacturer process used to produce the pipe.

(c) Other Steel Components

Caps for the ends of chords and tops of post shall be steel conforming to ASTM A 36 (AASHTO M 183) and shall be hot dip galvanized in accordance with ASTM A 123 (AASHTO M 111) Specification.

All other steel shall conform to the requirements of ASTM A 36 (AASHTO M 183), Grade 36 or ASTM A 709 (AASHTO M 270), Grade 50. All steel shall meet the testing requirements for notch toughness (Charpy testing, zone #2) and requirements of Section 605 of standard specification.

(d) Fasteners

Chord splice assembly fasteners shall be high strength steel conforming to ASTM A 325 (AASHTO M 164) and shall be hot dip galvanized as per ASTM A 153, Class C as specified in plans.

All other fasteners shall be stainless steel conforming to ASTM A 320, Grade B8, Class 1 Specification or as specified in plans.

(e) Galvanizing (Zinc Coating)

After complete fabrication, each steel section shall be hot dip galvanized according to the requirements of ASTM Specification A 123 (AASHTO M 111). A single dip galvanizing process is preferred if size permits.

Apply hot-dip galvanized coating to iron and steel plates, pipe, tube, and structural shapes according to ASTM A 123.

Apply hot-dip galvanized coating to iron and steel hardware according to ASTM A 153. Repair hot dipped galvanized coating on iron and steel plates, pipe, tube, structural shapes, and hardware according to ASTM A 780.

(f) Electrical Conduit and Fittings

All conduits shall conform to the requirements of Section 745 of the Standard Specification.

(g) Concrete

Portland Cement Concrete for the drilled shaft and concrete grout pad shall conform to the requirements of Section 812, Portland Cement Concrete, of the Standard Specifications, Class B concrete.

(h) Reinforcement Steel

All reinforcement steel shall conform to the requirements of Section 603 and ASTM A 615 (AASHTO M 31), Grade 60 specification.

(i) Anchor Bolts, Nuts and Washer

Steel anchor bolts, nuts and washers shall conform to ASTM Specification F 1554, Grade 36. The anchor bolts shall be hot dip galvanized as per ASTM Specification A 153 (AASHTO M 232), Class C.

(j) Drilled Shaft Steel Casing

Use material as specified in ASTM A 252, Grade 2 (use smooth, non-corrugated steel pipe). Ensure that the casing is capable of withstanding handling and driving stresses and the pressures of the concrete and surrounding earth. Use a casing with an inside diameter that is at least as large as the indicated shaft size. The Contractor may increase the size of the casing to facilitate construction operations at no cost to the Department.

(k) Electrical Conduit and Fittings

All conduits shall conform to the requirements of Section 745 of the Standard Specification.

(l) Guardrail, End Treatments and Reflectors

Materials for Guardrail, Guardrail Posts, End Treatments and Reflectors shall conform to references and details as shown on the Contract Drawings and as specified in the Department's Standard Specifications.

Fabrication:

Ensure that the steel fabricating plant is certified under the AISC Quality Certification Program. Before fabrication, submit a copy of the proposed welding procedures to the Engineer for approval. Follow the approved welding procedures, and ensure that welders are qualified according to ANSI/AWS D1.1 or ANSI/AWS D1.2, as appropriate.

After fabrication and welding, hot-dip galvanize the steel assemblies as specified in “Galvanizing (Zinc Coating) Section”. After galvanizing, but before shipment to the Project, return the truss and posts to the fabricator for final shop assembly to verify camber, alignment, and contact of splice mating surfaces.

Shipping and Handling:

Notify the Engineer at least 3 days before shipping to the Project or galvanizer so that a final quality inspection can be performed. The Engineer will seal all materials approved for shipping and provide written approval to the fabricator.

Ensure that members are loaded, hauled, and unloaded so that they are not deformed or damaged. Store structural materials above the ground on platforms, skids, or other supports. Keep the structural materials free from accumulation of dirt, oil, acids, or other foreign matter.

Quality Control and Acceptance:

Notify the Engineer, in writing, 15 days in advance of beginning work at the fabrication shop, so that arrangements for inspection may be made.

Perform at least the minimum specified number of quality control inspections according to the applicable ANSI/ AASHTO/ AWS specification, and any other tests and inspections necessary to control the quality of the work. The Engineer will perform non-destructive testing quality assurance inspections following the non-destructive testing quality control (QC) inspection performed by the fabricator.

Ensure that all quality control inspectors are AWS Certified Welding Inspectors, qualified according to the provisions of AWS QC1.

Inspect and test according to ANSI/ AASHTO/ AWS D1.1 Welding Code and the following:

Perform magnetic particle testing at a frequency of 10 percent of the number of welds per unit. For cantilever sign support structures, perform magnetic particle testing at a frequency of 100 percent on all chord splice assembly welds and post base welds.

Before shipping, assemble the completed and accepted truss units in the shop and check the truss span for dimensions, straightness, alignment, and camber. Measure the camber with the truss units on their sides.

Construction Methods:

(a) Erection Plan

At least 15 days before erecting posts and trusses, submit a plan to the Engineer showing the proposed equipment to be used. Include calculations and lift points to maintain the truss assembly in plumb position during placement, detailed erection instructions and drawings of all structures, and the proposed scheme for traffic control during the erection of the posts and trusses. Ensure that the plan includes the method to install the VMS Board with any structural, electrical and communication attachments while the truss is being erected unless otherwise approved by the Engineer.

The Contractor shall plan his work so that only one lane at time will be closed during construction.

(b) Drilled Shaft

1. Installation Plan

Submit the installation plan. Do not begin constructing the drilled shaft until the Engineer approves the plan.

2. Location and Alignment

Construct the drilled shaft within 3 inches of plan position in the horizontal plane at the elevation of the top of the shaft. Ensure that the vertical alignment of a shaft excavation does not vary from the plan alignment by more than 1/8 inch per foot of depth.

3. Excavation Log

Maintain an excavation log during shaft excavation that includes the following:

- i. Description and approximate top and bottom elevation of each soil or rock material encountered during shaft excavation.
- ii. Elevations at which seepage or groundwater flow are encountered.
- iii. The type of tools used for the excavation.
- iv. Changes in the type of tools used for excavation.
- v. Ensure that discrepancies noted on the log by the Engineer are resolved by the end of each day. Provide 2 copies of the final log to the Engineer within 24 hours after a shaft excavation is completed and approved.
- vi. Reuse excavated material if possible.

4. Excavating

Use the appropriate method for constructing drilled shafts as follows:

- i. **Dry Method.** Only use the dry method where the groundwater level and soil conditions allow construction of the drilled shaft in a relatively dry excavation, and where the sides and bottom of the shaft may be visually inspected by the Engineer before placement of reinforcement and concrete. The dry method will consist of drilling the shaft excavation, removing any accumulated water and loose material from the excavation, placing the reinforcement cage, and concreting the shaft in less than 3 inches of water.
- ii. **Wet Method.** Construct drilled shafts using the wet method where dry excavation cannot be maintained. The wet method will consist of using water or slurry, to maintain stability of the drilled shaft perimeter while excavating to finished depth, placing the reinforcement cage, and concreting the shaft. The Contractor may use the static or circulation process of the wet method.

When the material encountered cannot be drilled using conventional earth drilling tools and equipment, provide rock drilling equipment necessary to construct the shaft excavation to the size and depth required. Obtain the Engineer's approval before switching from earth to rock drilling tools and equipment. Any form of blasting is prohibited.

The Department will require sidewall over-reaming between 1/2 and 3 inches when the sidewall of the hole has either softened due to excavation methods, swollen due to delays in concreting, or degraded because of slurry cake buildup.

The Contractor may over-ream with a grooving tool, over-reaming bucket, or other Engineer approved equipment. The Engineer will direct the thickness and extent of sidewall over-reaming.

Immediately remove drilling tools that are lost in the excavation.

5. Constructing Using Casings

Construct drilled shafts using casings where shown on the Plans or where the dry or wet construction methods are inadequate to prevent caving or excessive deformation of the hole. The Contractor may either place casings in a predrilled hole or advance casings through the ground by twisting, driving, or vibrating. When installing casings that are left in rock for the purpose of shielding voids, ensure that the predrilled hole is not more than 2 inches bigger than the casing inside diameter. When downsizing of permanent casing is required, do not overlap more than 6 feet of casing.

When casings are not shown on the Plans, but the Contractor believes that casings are necessary, the Contractor shall submit, in the installation plan, details of the proposed casing method (including casing lengths and diameters) and the proposed procedures of casing installation to the Engineer for review. If the Contractor

does not determine the need for casings until after work on the shafts has begun, the Contractor shall submit to the Engineer for review a revised installation plan proposing the casing installation method for review.

Ensure that casings are clean, round, straight, and free of weld breaks and holes that would allow passage of water or plastic concrete. With Engineer approval, the Contractor may provide casings larger in diameter than shown on the Plans.

- i. **Temporary Casings.** Casings are temporary unless shown as permanent casings on the Plans. Telescoping, pre-drilling with slurry, and over-reaming to beyond the outside diameter of the casing may be required to install casing.

Remove temporary casing before completing concrete placement in the drilled shaft. Before withdrawing the casing, ensure that the level of plastic concrete in the casing is at least 5 feet above either the hydrostatic water level in the formation or the level of drilling fluid in the annular space behind the casing, whichever is higher. As the casing is withdrawn, maintain an adequate level of concrete within the casing so that fluid trapped behind the casing is displaced upward and discharged at the ground surface without contaminating or displacing the shaft concrete.

If the Contractor removes a specified diameter or length of casing and substitutes a longer or larger diameter casing through caving soils, the Contractor shall stabilize the excavation using slurry or backfill before the new casing is installed.

If temporary casings become bound or fouled during shaft construction and cannot be practically removed, the Department will designate the drilled shaft defective. Submit working drawings for approval proposing corrective measures. Do not begin corrective measures until the Department approves the working drawings.

- ii. **Permanent Casing.** When not shown on the Plans, the Contractor may use permanent casing if approved by the Engineer. Ensure casings are continuous between the top and bottom elevations shown on the Plans. After installation is complete, cut off the permanent casing at the specified elevation.

After installing the casing, repair damage to coated surfaces of the casing exposed to the air by applying an organic zinc prime coat from the same manufacturer as the shop-applied inorganic zinc prime coat.

6. Removing Obstructions

Remove surface and subsurface obstructions at drilled shaft locations. The Contractor may need to use special procedures and tools when the drilled shaft excavation cannot be advanced using conventional augers fitted with soil or rock teeth, drilling buckets or under-reaming tools. Special procedures and tools may include: chisels, boulder breakers, core barrels, air tools, hand excavation, temporary casing, and increasing the hole diameter. Any form of blasting is prohibited.

7. Excavation Cleaning and Verification

Unless otherwise approved by the Engineer, ensure that at least 50 percent of the base of each shaft has less than 1/2 inch of sediment at the time of concrete placement. Ensure that the maximum depth of sediment or debris at any place on the base of the shaft does not exceed 1-1/2 inches.

In the presence of the Engineer, determine the cleanliness of the bottom of the shaft by the use of sounding. After final cleaning, determine the dimensions, depth, and alignment as directed by the Engineer.

8. Reinforcement Steel Cages and Conduits

Immediately after the shaft excavation has been inspected and approved, place the pre-assembled reinforcement steel cage, consisting of longitudinal and transverse bars, spirals, cage stiffeners, spacers, centralizers, and other necessary appurtenances into the drilled shaft hole. Remove internal stiffeners as the cage is placed in the drilled shaft hole. Install any conduits (as shown on the Contract Drawings) into the drilled shaft hole before placing concrete.

Use concrete spacers or other approved noncorrosive spacing devices at sufficient intervals near the bottom, and at intervals not exceeding 10 feet up the shaft, to ensure concentric spacing for the entire cage length. If the size of the spacers is not shown on the Plans, provide spacers that will create a minimum 3-inch annular space.

Provide cylindrical concrete supports to ensure that the bottom of the cage is maintained at the specified distance above the base.

9. Concrete Placement Time Limitations

Place concrete continuously from the bottom to the top elevation of the shaft.

Ensure that the concrete placement is completed within 2 hours. The Engineer may allow the concrete placement time to exceed 2 hours if the Contractor demonstrates that the slump of the concrete will not be less than 4 inches during the entire time of concrete placement.

10. Concrete Placement Methods

The Contractor may request 1 additional set of cylinders to be taken for determining strength for early removal. If additional cylinders are requested, notify the Engineer at least 24 hours before placing.

When using a concrete pump to place concrete for the drilled shaft, provide a standby pump that is immediately available if there is a pump failure.

Check the elevation of the top of the steel cage before, during, and after concrete placement. If the final upward displacement of the rebar cage exceeds 2 inches or if the downward displacement exceeds 6 inches per 20 feet of shaft length, the Engineer will reject the drilled shaft. Correct the shaft to the satisfaction of the Engineer.

Set anchor bolts into a template to maintain alignment and elevation. Secure in position to prevent displacement while placing concrete. Before placing the concrete, place reinforcement steel and conduit as specified in Section 812. Ensure that concrete placement complies with the limitations specified. Place concrete as specified. Cure concrete as specified.

- i. **Tremie Method.** Ensure that tremie tubes are of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. Ensure that the inside and outside surfaces of the tremie are clean and smooth to allow the flow of concrete during concrete placement and an unimpeded withdrawal of the tremie tube after concrete placement. Ensure that the tremie tube's inside diameter is at least 6 times the maximum size of aggregate used in the concrete mix. Do not use tremie tubes less than 10 inches in diameter. Ensure that the tremie tube thickness is adequate to prevent crimping or sharp bends. Do not use tremie tubes that have aluminum parts that will come in contact with concrete. Ensure that the tremie tube is watertight.

Do not begin placing concrete underwater until the tremie is placed to the shaft base elevation. The Contractor may use valves, bottom plates, or plugs to ensure concrete discharge begins within one tremie diameter of the base. Remove plugs from the excavation or construct them using a material that will not cause a defect in the shaft if not removed. Construct the discharge end of the tremie to allow the free radial flow of concrete during placement operations.

Ensure that the tremie tube discharge end is immersed at least 5 feet in concrete at all times after starting the flow of concrete. Maintain a continuous flow of the concrete at a positive pressure differential to prevent water or slurry intrusion into the shaft concrete.

If the tremie tube discharge end is removed from the plastic concrete and discharges concrete above the rising concrete level, the Engineer will consider the drilled shaft defective. To correct this defect, the Contractor may: remove the reinforcement cage and concrete, complete necessary sidewall removal directed by the Engineer, and replace the shaft; or, the Contractor may re-plug the tremie tube, recharge with concrete, and insert a minimum of 5 feet below the existing top level of concrete before continuing placing concrete.

- ii. **Pumped Method.** Ensure that pump lines have a minimum diameter of 4 inches and are constructed with watertight joints.

Ensure that the discharge end remains at least 5 feet below the surface of the plastic concrete. When lifting the pump line during concreting, temporarily reduce the line pressure until the discharge end has been repositioned at a higher level in the excavation.

Ensure that waste concrete overflows the full top circumference of the casing evenly. Waste concrete is the top 24 inches of the initial concrete placed, plus the height of additional volume of waste concrete deposited in the shaft where concrete placement was halted and restarted, plus any additional amount necessary to produce full strength, non-segregated concrete at the plan shaft top level. Continue placing concrete until the waste concrete is pushed upward and ejected completely out of the top of the casing and wasted; or, place an additional 24 inches of concrete above the planned shaft top level and allow to cure in place for removal later. Remove waste concrete at the top of the shaft to maintain a uniform appearance and to meet the specified dimensions of the shaft.

Do not channel or bleed off waste concrete using notches, holes, or cuts in the casing top. The Contractor may remove or pump out plastic concrete in the casing that is above the top elevation of the drilled shaft after ejecting waste concrete to the top elevation.

11. Approval

The Engineer may reject drilled shafts because of damage; incorrect location, misalignment, or failure to install the drilled shaft to the proper bearing stratum.

Do not place sign structure on drilled shaft until the concrete in the shaft reaches a minimum of 90 percent of the required 28-day compressive strength.

(c) Installing Electrical Materials

All electrical work shall be performed in accordance with the NEC, all applicable local codes, and any applicable sections of the Special Provisions.

Provide and install galvanized steel or PVC conduit ells in drilled shaft. Where this conduit is not to be extended to a junction box, terminate the lower end of each ell 3 feet from the face of the drilled shaft and 18 inches below grade, and cap with a standard galvanized steel or PVC pipe cap. The upper end of each ell shall project above the drilled shaft for a sufficient distance to terminate at the level of the bottom of the handhole in the sign support post or at a maximum of 2 inches below such level. Terminate the ell by ground bonding bushing (with closure disk in conduit not to be extended).

Where a cable passes through a hole or runs along a surface at any point on the complete assembly, ensure holes and surfaces are deburred and free of sharp edges or protuberances that may damage the cable.

(d) Erecting Posts, Trusses and Tower Structures

Straighten any deformed structural material before being laid out, punched, drilled, or otherwise worked on in the shop. The Engineer will reject structural material with sharp kinks or bends. Verify bolt alignment before erecting towers. Do not erect posts and tower shafts on the completed drilled shaft until approved by the Engineer. Install high-strength steel bolts as specified in plan.

1. Trusses

Connect the truss abutting chord splices according to Subsection 11.5.6 of the *AASHTO LRFD Bridge Construction Specifications*.

Provide 2 working platforms that allow the bolt assembly tightening from opposite sides of the structure. Provide 2 impact wrenches. Sequentially tighten by initiating and progressing the tightening of the bolts in a pattern whereby a 180-degree opposite side repetition is maintained. Sequentially tighten each bolt and nut to the same calibrated increment.

2. Posts

Clean and lubricate threads of anchor bolts and nuts before installing post. Ensure that the top of the concrete drilled shaft is free of dirt or other foreign materials. Install the top and bottom bolt assemblies as shown on the Plans.

After erecting the posts and tightening all nuts as outlined above, add a second nut to each anchor bolt and adjust snug tight. After installing the second nut, ensure all nuts are in a snug tight condition. Snug tight is defined as the tightness that exists when all surfaces on the joint are in firm contact with one another.

After installing and adjusting all nuts, pour concrete grout pad as shown on Contract Drawings.

(e) Installation of Guardrail, End Treatments and Reflectors

Methods and procedures for the installation of Guardrail, Guardrail Posts, End Treatments and Reflectors shall conform to references and details as shown on the Contract Drawings and as specified in the Department's Standard Specifications.

Basis of Payment:

Payment for the VMS sign structure support shall be made at the Contract unit price bid per Each which price and payment will constitute full compensation for furnishing all materials and fittings; for placing all materials including concrete, concrete grout pad, steel, steel reinforcements, fasteners, anchor bolts, nuts, washers, drilled shaft, guardrail, end treatments and reflectors; for galvanizing all specified structural components; for all concrete and steel; sign installation including power and communications wiring, for a minimum of two conduit sweeps extending into the drilled shaft and to the cabinet; for excavating for the drilled shaft; for any casings used for the drilled shaft, compacting around the drilled shaft, and disposing of surplus materials; for furnishing, assembling and installation of guardrail, end treatments and reflectors; and for all labor, equipment, tools, and incidentals necessary to provide a satisfactorily working unit to the Department.

1/31/08

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 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 DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

Method of Measurement:

The number of single sign installations or removals will be measured as the actual number of sign posts 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 DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

749688 - INSTALLATION OF 4" DIAMETER HOLE, LESS THAN OR EQUAL TO 6" IN DEPTH
749689 - INSTALLATION OF 4" DIAMETER HOLE, GREATER THAN 6" IN DEPTH

Description:

This work consists of boring a hole 4" in diameter averaging 6" in depth into bituminous concrete or P.C.C. surfaces for installing single or multiple sign posts at the locations indicated on the Plans or as directed by an Engineer.

Materials:

The Contractor shall provide the equipment necessary to bore a 4" hole into paved surfaces, while maintaining the stability of the surrounding paved or P.C.C. surfaces. The depth of the bored hole shall be to the top of the subbase material.

Construction Methods:

The holes shall be bored into pavement or P.C.C. islands, medians, or sidewalk using a mechanical hole borer for such work or other methods approved by the Engineer. The hole shall be 4" in diameter. Holes bigger or smaller than 4" shall be corrected at the Contractor's expense.

Method of Measurement:

The number of 4" holes in diameter bored will be measured as the actual number of holes bored and accepted.

Basis of Payment:

The quantity of holes bored as required above will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for boring holes at the required depth, and for all labor, equipment, tools, and incidentals required to complete the work.

Note:

The cost for installing holes and PVC sleeves for sign posts in newly constructed P.C.C. islands, medians, or sidewalks shall be incidental to the P.C.C. item.

3/23/09

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 DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

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 DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

759502 - FIELD OFFICE, SPECIAL I

Description:

This Field Office, Special II item is a field office complex the work of which consists of erecting, furnishing, equipping, maintaining, and removing one (1) double wide modular field office unit, its entrance, and its adjacent parking area and one (1) single wide modular field office unit, its entrance, and its adjacent parking area. These field office units may be situated in different locations. The Contractor shall submit a specific location layout drawing and construction details for each field office, its entrance, and its parking area for approval by the Engineer. Each field office and its parking area shall be for the exclusive use of Department Officials, Engineers, Consultants, and Inspectors.

Each field office structure shall be free of asbestos and/or other hazardous materials. Each field office, its entrance, 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 each field office, its entrance, and its parking area. The costs of obtaining such licenses and permits are to be incidental to the "Field Office, Special II" Item. Each field office shall be available for use by the Department continuously throughout the duration of the project.

Construction of and Equipment for the Field Offices:

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 and the single wide field office shall be new and have a minimum floor space of 600 square feet with minimum exterior dimensions of 50'-0" length by 12'-0" width. The floor to ceiling height of each field office shall be nominal 8'-0". The exterior walls, ceiling, and floor of each field office shall be insulated. Each 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 each field office by constructing a stair and deck platform with canopy at each exterior door. 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 each field office of at least 6000 square feet and having a minimum of 12 functional parking spaces striped for full size cars. An entrance shall be constructed to each field office from its point of access to its parking area as determined by its approved location layout drawing and construction details, the cost to be incidental to the "Field Office, Special II" Item. All weather pathways from the parking area to the entrances of each 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 entrance, the parking area, and the entrance pathways of each 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 II" Item.

The ground area 30'-0" from around the perimeter of each 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 is incidental to the "Field Office, Special II" Item.

Each field office shall have full carpeting, kitchenette facilities, and interior and exterior paneling, lighting, and plumbing fixtures. Each 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 and at least 2 complete sets of keys shall be supplied to the Engineer's representatives. The exterior doors of each field office shall be insulated or have storm doors. Each field office shall have a minimum of six (6) windows, each window having a minimum glass

area of 1,150 square inches and a horizontal mini-blind covering the full glass area. The windows of each field office shall be insulated or have storm windows, shall be equipped with a locking device, and shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at each 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, soft rubber hose per connection.

Each field office shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

Each field office shall have satisfactory lighting, electrical outlets, heating equipment, and 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 for each field office 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 of the field offices. Fire extinguisher(s) may be chemical or dry power 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 in each field office.

The Contractor shall provide an alarm system in each field office for security with electronic, direct connection to a security service provider. The security systems shall have interior motion, window, and entrance detectors and built in manual fire alarms. All windows of each 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 for each field office. 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 in each field office 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 for each field office. When separate facilities for men and women are not available or required, a sign with the wording "Rest Room" {letter heights of 1" minimum} shall be placed over the doorway 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.

For each field office the Contractor shall be responsible for performing or for making arrangements for all necessary telephone connections and/or 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 offices shall have a total of 9 lines consisting of 8 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 7 six-button key sets having privacy feature (1 set which may be for wall mounting), all for the official and exclusive use of the Engineer and other representatives of the Department. Location of telephone lines 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. Initial installation and setup costs shall be the responsibility of the Contractor as well. All subsequent monthly billings, after initial installation and setup, for each field office telephone system 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/or for their maintenance; for payment of all utility connections, installations, service fees and bills; and for final disconnection of utilities.

The field office interiors 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 complex. Placement of these furnishings shall be as directed by the Engineer. These furnishings consist of 4 drafting tables with sufficient drawers for standard size plans, either attached to the tables or in cabinet form, each drafting table to have an ergonomic design spring back stool with five leg base having wheel casters, 9 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, 4 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 1 work table, 1 supply cabinet, 1 or more clothes closets of ample size to meet inspection manpower requirements, 4 rough plan racks, 4 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" each, 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 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

For each field office, the Contractor shall also furnish new and maintain the following office equipment, all which are to be approved by the Engineer prior to installation. 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 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; and

2 digital cameras with minimum 1/2.7" 4.0 mega pixel, 3X optical / 6X precision digital zoom, 12-bit DXP A/D conversion, 2.5" 123K pixel LCD display, 5-mode program AE and each with dual media slots, SXGA/XGA/VGA image resolution, E-mail mode. Also intelligent flash with red-eye protection, MPEG movie mode, clip motion, light metering, TEXT mode (GIF), playback zoom and resize, white balance, lithium battery system and in-camera picture effects, memory stick (minimum 256MB) capability, and storage case.

Consumables as required to manage the business of the project for each 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, rolls, toner, cleaning kits, microcassette tapes and batteries, answering machine cassettes, camera batteries and memory sticks and/or discs, DVD and CD R/RW media, etc.

Maintenance of all office equipment in each field office 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 Each Field Office:

Each field office shall have two (2) IBM compatible Microcomputer Systems both which will be furnished and maintained by the Contractor for use by the Engineer, the cost to be incidental to the "Field Office, Special II" Item. 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, unless otherwise determined by the Engineer. In each field office both of the two (2) Microcomputer Systems shall consist of:

Central Processing Unit (CPU) – Lap Top

Pentium M processor, 740 (1.7 GHz) or better with integrated USB 2.0 and IEEE 1394 ports (firewire) and wireless networking included,

Minimum 1.0 GB RAM with expansion capability to at least 3.0 GB and clock/calendar card equivalent, and

Microsoft "Windows® XP Professional" operating system;

Memory (Storage)

CD/DVD +/- RW with double layer write capability, and 80GB hard drive minimum, integrated Ethernet 10/100, and internal modem. Included software shall support double layer media writing and automatic backup of data;

Monitor (Cathode Ray Tube)

Monitor for docking station and docking station - Super Video Graphics Adapter (SVGA) minimum. 19" minimum diagonal visual area flat panel with .26 dot pitch capable of multiple frequency 256 color graphics and at least 1024 pixel resolution. Swivel base with low radiation and eyestrain protection, brightness and contrast control and

Laptop - shall have 15.4" display minimum;

Color Graphics Card

Card must be SVGA AGP interface with 64 MB onboard video memory having maximum resolution of at least 1280x720 with at least 16 bit color and video control hardware and software;

Keyboard

Keyboard shall be ergonomic, enhanced layout minimum with keyboard interface cable;

Printers

2 HP Color LaserJet CP3525n or Xerox Phaser 6280 or approved equal color printers with high speed wireless and network capability. 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® XP Professional". The required applications software follows and is to be latest version unless noted:

spreadsheet - "Lotus 1-2-3®",
suite - "Microsoft® Office XP Professional",
tracking - "Expedition®",
antivirus - "Norton Systemworks™ 2004, 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;

Related Equipment

Wireless networking hub/router, 802.11g or better, (or other high speed internet access) with all associated hardware (adapters, cables, etc) and software to enable wireless networking (or other high speed internet access) and internet connection sharing for all office computers and printers,

An electrical outlet with dedicated circuit for the main computer unit,

An optical mouse with proper driving software having complete Microsoft emulation,

An internal 56/28.8/14.4 fax modem with MNP5 error checking and complete Hayes emulation having high-speed 14.4 fax capability and regular data transmission between 2400 and 56 baud, with the latest version proper driving software,

Necessary cables for proper operation,

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 shut down of the computer system with software and connections for automatic system shutdown,

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,

Cleaning kits for disk drives,

An anti-glare filter with grounding wire suitable for use with the furnished monitor, and

All cards, hardware, and operating, anti-virus, and equipment software to be fully installed and operational;

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, full technical support) for each software application shall be provided for by 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 each field office for the length of the Contract. These consumables shall be furnished on request and include but not be limited to 3-1/2" double sided high density micro floppy diskettes, compatible diskettes for provided digital cameras and memory stick media, 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, and toner cartridges.

Maintenance Requirements for Each Field Office:

Maintenance of each 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 vermin and pest control by professional exterminator(s), 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 for each field office 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 each 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 complex will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified and the furnishing of all materials, labor, tools, equipment and incidentals necessary to maintain each field office, their entrance, and their adjacent parking area and restore each field office area, entrance, and adjacent parking area to match their original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install these field offices, their entrances, and their parking areas. One (1) unit of payment will constitute erecting, furnishing, equipping, maintaining, and removing one (1) double wide field office and one (1) single wide field office and their entrances and parking areas.

Payment will be made only for the actual number of months that the field office complex is acceptably provided by the Contractor.

The field offices, their entrances, and their parking areas shall be ready for use not later than forty-five (45) calendar days after the date of the fully executed Contract and before construction operations begin.

1/19/10

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 $\pm 0.125"$ in 30' (3 mm in 9 m) or 2.) a minimum of three (3) ultra sonic, non-ground contacting sensors with an accuracy of $\pm 0.100"$ 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

Description:

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

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

The Engineer will only establish the following:

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

Equipment:

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

Engineering/Survey Staff:

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

Construction Methods:

Performance Requirements:

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

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

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

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

Submittals:

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

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

- (a) Proposed method of recording information in field books to ensure clarity and adequacy.
- (b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.
- (c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.
- (d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control.
- (e) Description of newly established benchmarks with location, elevation and closed loop survey field notes.

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

Method of Measurement:

The quantity of Construction Engineering will not be measured.

Basis of Payment:

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

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

8/29/07

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 set up and maintained 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. If this condition is not complied with the Contractor shall submit qualifications for a replacement 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 by email as a single compressed database file in CPM format fully compatible with the Windows® version of Primavera Project Planner® used by the Engineer for generation of the CPM schedules.

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. 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 "schedule" 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 Contract 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 have control. The Contractor is free to make assumptions regarding field conditions, estimated quantities, and/or subsurface conditions. However the Department'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 which is due to assumptions made by the Contractor and 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, and on the Contract Plans as plan notes.

Development of the Project Control System (PCS):

The PCS development plan is as follows:

- (a) Within seven (7) calendar days after the date of the fully 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 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. Issue of the Notice to Proceed is contingent upon receipt and acceptance of this schedule in accordance with Standard Specification Subsections 108.02 and 108.03; and
 - (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, 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 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, and 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. Preparation and leadtime (order, manufacture, and delivery time), shall be included as activities for each applicable working drawing item. 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 (having 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. Working drawing activities and leadtime activities not requiring submittal shall not be on the critical path of the Original CPM schedule.

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 all of this 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 logical connected and coded to reflect the crew performing the operation.

Surcharge durations 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 like project wide Maintenance of Traffic, Construction Engineering, or Temporary Erosion Control that by their nature are ongoing for long durations or the 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 statused 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 the project 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 Departments 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.

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, conditions require the Contractor to modify the work schedule, the Contractor chooses to make a significant change in the sequence of work, or 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 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.

The CPMC shall meet as needed with the CPMA at the Engineer's office within five (5) calendar days after revision is required, formal request for a revision, or the Contractor announces 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 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 next monthly estimate for payment will begin only after the Engineer's approval of the signed CPM schedule revised update.

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.

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. 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 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. 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.

10/28/2010



STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. Box 778
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SHAILEN P. BHATT
SECRETARY

UTILITY STATEMENT

Revised
February 23, 2012

STATE CONTRACT No. T200812201
F.A.P. No. NH-S014(12)
Project I.D. No. 04-00003
SR 1, SR30 Grade Separated Intersection
SUSSEX COUNTY

The following utility companies own and/ or maintain facilities within the project limits:

Comcast Cablevision of Delmarva, Inc.
City of Milford, Department of Public Works
Delmarva Power, Electric Distribution
Verizon Delaware LLC
Eastern Shore Natural Gas Co.

The following companies are required to complete proposed changes to their existing utility facilities as narrated, but are not limited to the following:

SR 1 Northbound Ramps "C" & "D"

- ❖ (Construction Phase One)
- ❖ (Sheets 16-21)

- **Delmarva Power, Electric Distribution**

DP&L owns and maintains three phase aerial appurtenances and utility poles on the NB shoulder of SR 1 within the State right of way. Beginning at pole 07/58 (@ sta. 25+50), and continuing unto pole 86/33, (situated beyond the construction limits) DPL will remove its aerial appurtenances and poles in the NB shoulder of SR , and install a three phase underground distribution shall as its replacement .

Note: Traffic will obtain electrical services for signal and ITMS 120/240 from DPL utility pole 127/43 which is situated on the northbound shoulder of SR 1 (@ / near tie-point 43).

- **Comcast Cablevision of Delmarva, Inc.**

Comcast maintains aerial facilities on DPL utility poles on the NB shoulder of SR1. Comcast will replace its aerial service with an underground installation within the State right of way of the NB shoulder of SR1 between sta. 25+00, and remove the existing aerial span and appurtenances thereafter.



- **Verizon Delaware LLC**

Verizon maintains two underground communication lines along the NB shoulder of SR1. A new underground facility shall be installed in the NB shoulder of SR 1 between station 12+00 and 42+00; it shall splice into relocated pedestal Yf68N near sta. 42+00, (of which an installation extends eastward) and continue northward beyond construction limits of SR 1's NB shoulder. The former underground line within said limits shall be abandoned in place.

Wilkins Road/ Cedar Neck Road (County Road 206)

- ❖ (Construction Phase Two)
- ❖ (Sheet 20, 26-29)

- **Delmarva Power, Electric Distribution**

DPL owns and maintains three phase aerial appurtenances, and utility poles on the left offset of Wilkins Road/Cedar Neck Road proposed construction alignment (i.e. west-bound shoulder of C.R.206).

DPL shall relocate its aerial poles and facilities 10ft rearward of the existing pole alignment between sta. 400+00 and 409+00 of the proposed construction alignment. The aerial span traverses the Wilkins Road and SR30 intersection, terminating at relocated pole 27/11 on the left offset of proposed sta. alignment 409+00 (situated behind the proposed guardrail as shown on plans). Thereafter, the DPL distribution line shall be continue underground within State right of way, on the left offset of Wilkins Road proposed alignment between sta. 409+00 unto pole 99/80, (at the left offset of sta.103+70, of the existing Wilkins Road alignment). The span shall continue aerielly thereafter unto & beyond the construction limits, with utility pole adjustments occurring as warranted for proposed clear zone compliance.

Note: Traffic will obtain electrical services for signal and ITMS 277/480 from DPL utility pole 99/80.

- **Comcast Cablevision of Delmarva, Inc.**

Comcast maintains aerial facilities on DPL utility poles within the noted section. Comcast shall follow suit of DPL's utility pole relocation between sta. 400+00 and 409+00. Comcast shall also install an underground facility beginning at relocated pole 27/11 unto pole 99/80. Afterwards the aerial span shall resume its occupation of DPL utility poles at pole # 99/80, and continue thereafter to a point beyond the construction limits.

Note: Comcast's *dip/installation shall be within the vicinity of abandoned pole #34/18 near station 409+50 of proposed alignment. A break-away pedestal shall be installed in the vicinity of abandoned pole 78/60 refer to sheet 20.

- **Verizon Delaware LLC**

Verizon maintains underground communication facilities along the left offset of Wilkens Road/Cedar Neck Road proposed construction alignment. Verizon shall install a new underground facility within State right of way between stations 402+00 and 406+90 (sheets 26,27), as a replacement of its existing underground facility. Verizon shall maintain its permanent foundation and pedestals on the left offset of the proposed construction alignment of Wilkens Road/ Cedar Neck Road (County Road 206) w/out disturbance by executed letter of the Utility Engineer.

A new installation shall extend from the permanent foundation and continue eastward underground along the left offset of C.R. 206, terminating at relocated pedestal Yf676/3 at sta. 108+20. From pedestal Yf676/3 a new installation shall occur and continue eastward w/n State right of way unto relocated pedestal Yf676/5 at sta. 429+50. Former underground facilities between sta. 406+90 unto 429+50 shall be abandoned in place.

SR 30 Cedar Creek Road & SR 30/SR1 Business Connector

- ❖ (Construction Phase Three)
- ❖ (Sheets 24, 25, & 27)

- **Delmarva Power, Electric Distribution**

DPL owns and maintains aerial appurtenances, and utility poles on the right & left offset of SR30/Cedar Creek Rd proposed construction alignment. Beginning at a pole situated on the right offset of sta. 901+00 and continuing unto a pole at sta. 917+10 (i.e poles # 63/65 unto #33/80), DPL shall replace its existing aerial facilities with single, and three phase underground installations, and remove its existing aerial appurtenances and poles thereafter. (Pole # 63/65 and 33/80 shall be converted to dip/riser poles.)

At pole 33/80 (right offset of sta. 917+10) the aerial span resumes, attaching to relocated pole 22/94 in the south-west leg of the SR30/Cedar Creek and Wilkins Road intersection; it thereafter traverses Wilkens Road unto relocated pole 15/01, (left offset of Wilkins Rd sta. 406+80).

Note: Increased grade elevations at SR30/Cedar Creek and Wilkins Rd intersection warrant DPL to install taller utility poles for compliance with overhead clearance regulations.

Aerial appurtenances and utility poles on the left offset of proposed alignment shall be adjusted as warranted to a new position behind the proposed clear-zone.

Note: Traffic will obtain electrical services for signal and ITMS 120/240 from DPL utility pole 15/01.

- **Comcast Cablevision of Delmarva, Inc.**

Comcast maintains aerial facilities on existing DPL utility poles on the right and left offset of SR30/Cedar Creek Rd proposed construction alignment. Comcast shall install an underground service line on the right offset of proposed alignment to replace existing aerial facilities on DPL utility poles between sta. 901+00 and 917+10. Comcast will resume its aerial span at DPL pole 33/80 (right offset of sta. 917+10), and traverses Cedar Creek Road unto relocated pole 22/94 (south-west leg of SR30/Cedar Creek and Wilkins Road intersection); the aerial span traverses Wilkens Road unto relocated pole 15/01, (left offset of Wilkins Rd sta. 406+80) and splices into an existing underground installation continuing northward beyond the construction limits.

Comcast shall follow suit of DPL's utility pole relocation on the left offset of proposed construction alignment.

- **Verizon Delaware LLC**

Verizon maintains aerial facilities on existing DPL utility poles on the NB shoulder of noted section, and two underground facilities in the SB shoulder of the same.

Verizon shall install an underground facility on the right offset of SR30/Cedar Creek Rd's proposed construction alignment, to replace existing aerial facilities on existing DPL utility poles between sta. 901+00 and 917+10.

Verizon will resume its aerial span at DPL pole 33/80 (right offset of sta. 917+10), and traverse Cedar Creek Road unto relocated pole 22/94 (south-west leg of SR30/Cedar Creek and Wilkins Road intersection); the aerial span traverses Wilkens Road unto relocated pole 15/01, (left offset of Wilkins Rd sta. 406+80) and splices into (the aforementioned pedestal on permanent foundation, which shall remain in place by executed letter from the Utility Engineer).

Verizon's dual under-ground installation in the southbound shoulder of SR30/Cedar Creek Rd shall remain undisturbed unless otherwise directed by the construction supervisor.

Note: Verizon maintains access to the underground lines from undisturbed pedestals.

- **Eastern Shore Natural Gas Co.**

ESNG maintains an underground gas main on the left offset of the construction alignment of SR 30 between station 909+00 and 924+00. The main is buried between 4ft-5ft and shall be adjusted as warranted during construction.

• **City of Milford, Department of Public Works**

City of Milford proposes to install a 12" water main along the NB shoulder of Wilkens Road within State right of way. The proposed installation begins at Hearthstone Manor and is expected to extend through the intersection at SR 30 along the proposed toe of fill for the overpass. The span shall be installed with directional bore methods beneath SR 1 to the eastern side and progress along the toe of fill along the proposed overpass. The City shall determine an installation date, and thereafter coordinate with the Department accordingly.

Note: All utility relocations for said utility companies shall occur in advance of construction.

All relocations/adjustments require 45 calendar days to complete upon initiation. All utility company's request a 30 day period of preparation upon receipt of Notice to Proceed. Field stake-outs, existing & proposed right-of-way markings, proposed road/bridge features, cuts and fills, and clearing and grubbing shall be provided as warranted.

General Notes

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

4. All utility companies shall perform proposed relocations/adjustments in conjunction with the appointed construction phases for the project. Relocations/adjustments are expected to take approximately 30 calendar days to complete upon receiving a minimum of 30 days advance notice prior to the anticipated relocation start date. Right-of-way and proposed work stakes outs clearing and grubbing, cuts and fills shall be provided by the Department forces as warranted.

Jason Woody	Eastern Shore Natural Gas	(302) 734-6710
Robert Weigner	Delmarva Power, Electric Dist.	(302) 934-3354
George Zang	Verizon Delaware Inc.	(302) 422-1480
Jim Spencer	Comcast Cable	(302) 786-6020
Bob Moore	City of Milford	(302) 422-6616

DIVISION OF TRANSPORTATION SOLUTIONS

2.23.2012
DATE


UTILITY COORDINATOR

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

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T200812201

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

SR 1, SR 30 UPGRADE SEPARATED INTERSECTION

SUSSEX COUNTY

Certificate of Right-of-Way Status – Stipulated

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

Please certify that all project rights of way are currently available in accordance with the project right-of-way plans except the following;

- Parcel 4-L Dillon 1-FEE
- Parcel 9-L Key Properties Group, LLC 1-FEE
- Parcel 13-L Legg 1-TCE
- Parcel 15-L Finney 1-FEE
- Parcel 18-L Diamond Land Management , LLC 1-PE
- Parcel 1-R Key Properties Group, LLC 2-FEE 1-TCE

It is further certified that there were four individual owners displaced by this project.

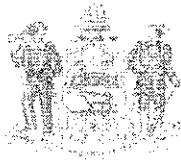
Therefore, the provisions of 49 CFR Part 24 are applicable to the project. Two of the displaced owners have moved to Decent Safe and Sanitary replacement dwellings, the third dwelling was an unoccupied investment property, and the fourth dwelling has completed negotiations and is going to settlement. Additionally, two displacement dwellings were demolished; the third displacement dwelling was sold at auction and being moved, and the fourth has not been settled.

It is anticipated clear right-of-way will be obtained by February 29, 2012. This Cert will be updated every two weeks until clear.

REAL ESTATE SECTION

**Cleon L. Cauley, Sr.
Deputy Director, Planning**

February 6, 2012



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

CHARLES P. BHATT
SECRETARY

January 6, 2012

ENVIRONMENTAL REQUIREMENTS

FOR
SR 1, SR 30, Grade Separated Intersection

State Contract No. 28-122-01

Federal Aid No.: NH-S014(12)

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 to result from construction of the proposed action (per 23 CFR 771.117 d(3)) and the following special provisions have been developed to mitigate and/or minimize these impacts.

PERMIT REQUIREMENTS:

The construction work that will occur that involves a vehicular grade separated interchange at SR 1 and SR 30 and other access improvements of traffic in Sussex County, Delaware does not require permit approval. However, the following requirement and special provisions have been developed and are the responsibility of the contractor and is subject to risk of shut down 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 such 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. The effort shall be made to keep construction debris 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. If routine maintenance of worker equipment and heavy machinery is necessary during the construction period, refuse material 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. Harmful chemical wash water applied to clean equipment or machinery shall be discouraged. If undertaken, the residue water and/or material must be collected or contained such that it will be disposed of properly. By no means, shall it 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 will be the contractor's responsibility, expense, & effort to ensure that workers also follow these requirements. As part of the restrictions, please note the timetables reflected in the contract for the in-stream/water work for endangered species protection.
9. That the fill material shall be free of oil and grease, debris, wood, general refuse, plaster and other pollutants, and shall contain no broken asphalt.

CULTURAL RESOURCE REQUIREMENTS:

1. The contractor will submit to the District, the location(s) of permanent disposal sites to be used for the disposition of clean wasted materials resulting from the construction contract. The contractor will submit a the Preconstruction meeting, a location map and a plot plan (sketch or diagram) of

where on the property clean wasted material is to be placed. The limits of the site(s) will be physically staked or surveyed on the property. The District will submit the contractor's disposal site location(s) to the State Historic Preservation Office for approval.

The SHPO will determine if a cultural resource survey is required before the site can be approved. If additional survey work is required, it will be the contractor's responsibility to hire a qualified professional to assess the site(s) for the presence or absence of cultural resources (i.e. historic or prehistoric archeological sites). The contractor's consultant will be responsible for producing documentation of the survey results for submission to the SHPO.

If the contractor proposes the use of disposal sites outside the State of Delaware, the contractor must provide written approval from the State Historic Preservation Office of each respective state.

A project's disposal operation will not commence until the SHPO has notified the DelDOT District office that the site location(s) is approved for use.

The use of the disposal site will not result in discharge of materials into the U.S. Army Corps of Engineer or DNREC jurisdictional wetlands or waters. It is the responsibility of the contractor to provide any site surveys or wetland delineations needed to preclude wetland encroachment.

The contractor will be responsible for all sediment and erosion control measures and subsequent approvals required for the disposal site(s) operations.

It is the contractor's responsibility to obtain all other appropriate Federal, State, or local approvals required by law for use of the disposal site(s).

2. Due to various resource waters/wetlands, natural areas, archaeological sensitivity, the contractor's access beyond the Limits of Construction (LOC) identified on plan sheets 23, 24 is strictly prohibited. Any changes and access to the LOC in this area must be coordinated with DelDOT Environmental Studies (Attention: David Clarke). The contractor shall only be permitted to access equipment and workers through this LOC area and will not encroach or utilize adjacent areas upon the lots designated as 8R or lands of Hall (tax id 3-30-11.00-6.00). Furthermore, a silt fence or construction safety fence will be provided, installed, and maintained by the contractor and along the limits of construction (LOC) in this specified area to remind and prohibit contractor and any assigned workers from any access or use of the adjacent land areas. Along the edge of the LOC, the fence will be delineated and extend along the west end of Cedar Creek Road between stations 900+00 to 907+50. The fence will follow the LOC east along both sides of Ramp A and B's (page 23) and extend east to terminate at station 508+50 on the north and 630+00 on the south. Please contact David S. Clarke (DelDOT Archaeologist) at (302) 760-

2271, prior to construction to confirm the limits and to ensure that the fence is adequately constructed and fenced off at part of this contract and prior to other construction activities. During the duration of this contract, DelDOT Environmental Staff will inspect the fence and area to ensure that staging, temporary, use, occupancy, or access has not be violated. Should restoration and/or environmental work efforts take place because of breach in access and LOC controls, the contractor will be held accountable and liable for any damages.

CANNOT BE
BID PROPOSAL FORMS
CONTRACT T200812201.01
FEDERAL AID PROJECT NHS014(12)
BIDDING

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

SECTION 0001 PROJECT ITEM NUMBERS

0010	201000 CLEARING AND GRUBBING	LUMP	LUMP		
0020	202000 EXCAVATION AND EMBANKMENT	98608.000 CY			
0030	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	150.000 CY			
0040	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	629.000 CY			
0050	209001 BORROW, TYPE A	15390.000 CY			
0060	209003 BORROW, TYPE C	3548.000 CY			
0070	209006 BORROW, TYPE F	19396.000 CY			
0080	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	91.000 CY			
0090	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP	LUMP		

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			DOLLARS	CTS	DOLLARS	CTS
0100	212000 UNDERCUT EXCAVATION	417.000 CY				
0110	212001 UNDERCUT EXCAVATION, PATCHING	55.000 CY				
0120	250000 SEDIMENT REMOVAL	2253.000 CY				
0130	251000 SILT FENCE	20568.000 LF				
0140	252002 INLET SEDIMENT CONTROL, AT GRADE INLET	9.000 EACH				
0150	254000 STONE CHECK DAM	185.000 TON				
0160	255000 SEDIMENT TRAP	41.000 CY				
0170	261000 TEMPORARY SLOPE DRAIN, 12"	500.000 LF				
0180	268000 STABILIZED CONSTRUCTION ENTRANCE	111.000 TON				
0190	302007 GRADED AGGREGATE BASE COURSE, TYPE B	11349.000 CY				

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			DOLLARS	CTS	DOLLARS	CTS
0200	302008 GRADED AGGREGATE BASE COURSE, TYPE B, PATCHING	37.000 CY				
0210	401654 SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 70-22	8004.000 TON				
0220	401663 SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	15405.000 TON				
0230	401665 SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22, PATCHING	30.000 TON				
0240	401667 SUPERPAVE, BITUMINOUS CONCRETE BASECOURSE, 160 GYRATIONS, PG 64-22 PATCHING	62.000 TON				
0250	401708 SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)	10413.000 TON				
0260	503001 PATCHING P.C.C. PAVEMENT, 6' TO 15', TYPE A	36.000 SY				
0270	503006 DOWEL BARS	80.000 EACH				
0280	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	30.000 CY				

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			DOLLARS	CTS	DOLLARS	CTS
0290	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	52.000 CY				
0300	602009 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS A	102.000 CY				
0310	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	330.000 CY				
0320	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	95.000 CY				
0330	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	43.000 CY				
0340	602553 MECHANICALLY STABILIZED EARTH WALLS, WALL 1	3200.000 SF				
0350	602646 SILICONE ACRYLIC CONCRETE SEALER	6760.000 SF				
0360	604000 BAR REINFORCEMENT, EPOXY COATED	140126.000 LB				
0370	605501 GROUND MOUNT BREAKAWAY TYPE SIGN SUPPORTS AND FOUNDATION	LUMP	LUMP			

DELAWARE DEPARTMENT OF TRANSPORTATION
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0380	605647 PREFABRICATED EXPANSION JOINT SYSTEM, 1 1/2"	95.000 LF				
0390	605664 STEEL SIGN STRUCTURE	LUMP	LUMP			
0400	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	135.000 TON				
0410	612021 REINFORCED CONCRETE PIPE, 15", CLASS IV	1263.000 LF				
0420	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	436.000 LF				
0430	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	489.000 LF				
0440	612034 REINFORCED CONCRETE PIPE, 36", CLASS IV	107.000 LF				
0450	612205 REINFORCED CONCRETE ELLIPTICAL PIPE, 19"X30", CLASS IV	192.000 LF				
0460	612210 REINFORCED CONCRETE ELLIPTICAL PIPE, 22"X34", CLASS IV	108.000 LF				
0470	612216 REINFORCED CONCRETE ELLIPTICAL PIPE, 14"X23", CLASS IV	865.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0480	612529 PIPE VIDEO INSPECTION	3460.000 LF				
0490	617002 REINFORCED CONCRETE FLARED END SECTION, 15"	1.000 EACH				
0500	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	5.000 EACH				
0510	617005 REINFORCED CONCRETE FLARED END SECTION, 24"	6.000 EACH				
0520	617009 REINFORCED CONCRETE FLARED END SECTION, 36"	1.000 EACH				
0530	617164 REINFORCED CONCRETE FLARED END SECTION, 19" X 30"	6.000 EACH				
0540	617165 REINFORCED CONCRETE FLARED END SECTION, 14" X 23"	4.000 EACH				
0550	617176 REINFORCED CONCRETE FLARED END SECTION, 22" X 34"	2.000 EACH				
0560	618042 FURNISH CAST-IN-PLACE CONCRETE PILES, 16"	1620.000 LF				
0570	618047 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 16"	415.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0580	619022 INSTALL CAST-IN-PLACE CONCRETE PILES, 16"	1620.000 LF				
0590	619026 INSTALL CAST-IN-PLACE CONCRETE TEST PILES, 16"	415.000 LF				
0600	619519 DYNAMIC PILE TESTING BY CONTRACTOR	6.000 EACH				
0610	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
0620	701011 PORTLAND CEMENT CONCRETE CURB, TYPE 2	3783.000 LF				
0630	701012 PORTLAND CEMENT CONCRETE CURB, TYPE 1-4	1428.000 LF				
0640	705002 P.C.C. SIDEWALK, 6"	656.000 SF				
0650	707005 UNDERDRAIN OUTLET	65.000 EACH				
0660	708051 DRAINAGE INLET, 34" X 24"	9.000 EACH				
0670	708053 DRAINAGE INLET, 48" X 48"	1.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0680	708059 DRAINAGE INLET, 72" X 72"	1.000 EACH				
0690	708563 PERSONAL GRATE FOR PIPE INLET	LUMP	LUMP			
0700	712020 RIPRAP, R-4	683.000 TON				
0710	713002 GEOTEXTILES, SEPARATION	42972.000 SY				
0720	713003 GEOTEXTILES, RIPRAP	1985.000 SY				
0730	715001 PERFORATED PIPE UNDERDRAINS, 6"	23249.000 LF				
0740	715500 UNDERDRAIN OUTLET PIPE, 6"	1105.000 LF				
0750	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	1806.000 LF				
0760	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	10.000 EACH				
0770	720588 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3-31	2.000 EACH				

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			DOLLARS	CTS	DOLLARS	CTS
0780	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	4.000 EACH				
0790	727014 CONSTRUCTION SAFETY FENCE	7780.000 LF				
0800	727015 MONUMENTS	9.000 EACH				
0810	727507 BRIDGE SAFETY FENCE	414.000 LF				
0820	732002 TOPSOIL, 6" DEPTH	15796.000 SY				
0830	733002 TOPSOILING, 6" DEPTH	114223.000 SY				
0840	734013 PERMANENT GRASS SEEDING, DRY GROUND	130019.000 SY				
0850	734017 TEMPORARY GRASS SEEDING, DRY GROUND	21554.000 SY				
0860	735535 SOIL RETENTION BLANKET MULCH, TYPE 5	11745.000 SY				
0870	737523 PLANTING	LUMP	LUMP			

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			DOLLARS	CTS	DOLLARS	CTS
0880	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
0890	743003 ARROWPANELS, TYPE C	281.000 EADY				
0900	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	531.000 EADY				
0910	743005 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY	1136.000 EADY				
0920	743006 PLASTIC DRUMS	18087.000 EADY				
0930	743007 TRAFFIC OFFICERS	3492.000 HOUR	75.00000		261900.00	
0940	743008 REFLECTOR PANELS	92.000 EACH				
0950	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	604.000 EADY				
0960	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	4595.000 LF				
0970	743016 RELOCATION PORATBLE SAFETY BARRIER	3490.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0980	743020 INSTALL PORTABLE IMPACT ATTENUATOR	6.000 EACH				
0990	743021 FURNISH PORTABLE IMPACT ATTENUATOR	6.000 EACH				
1000	743022 RELOCATE PORTABLE IMPACT ATTENUATOR	6.000 EACH				
1010	743023 TEMPORARY BARRICADES, TYPE III	15356.000 LFDY				
1020	743024 TEMPORARY WARNING SIGNS AND PLAQUES	32175.000 EADY				
1030	743052 FLAGGER, SUSSEX COUNTY, STATE	1800.000 HOUR	50.80000		91440.00	
1040	743064 FLAGGER, SUSSEX COUNTY, STATE, OVERTIME	450.000 HOUR	73.66000		33147.00	
1050	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	10.000 EACH				
1060	744520 CONDUIT JUNCTION WELL, TYPE 1, PRECAST CONCRETE	67.000 EACH				
1070	744523 CONDUIT JUNCTION WELL, TYPE 4, PRECAST CONCRETE	28.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1080	745521 SUPPLY OF 4" SDR-13.5 HDPE CONDUIT	1000.000 LF				
1090	745524 SUPPLY OF 4" SCHEDULE 80 PVC CONDUIT	9080.000 LF				
1100	745525 SUPPLY OF 4" GALVANIZED STEEL CONDUIT	28.000 LF				
1110	745526 SUPPLY OF 3" GALVANIZED STEEL CONDUIT	12623.000 LF				
1120	745527 SUPPLY OF 2 1/2" GALVANIZED STEEL CONDUIT	816.000 LF				
1130	745528 SUPPLY OF 2" GALVANIZED STEEL CONDUIT	5285.000 LF				
1140	745529 SUPPLY OF 1 1/2" GALVANIZED STEEL CONDUIT	195.000 LF				
1150	745542 INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT-DIRECTIONAL BORE	2992.000 LF				
1160	745544 INSTALLATION OF CONDUIT IN UNPAVED TRENCH	22648.000 LF				
1170	745546 INSTALLATION OF CONDUIT ON STRUCTURE	80.000 LF				

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			DOLLARS	CTS	DOLLARS	CTS
1180	745547 INSTALLATION OF ADDITIONAL CONDUITS IN TRENCH OR OPEN CUT PAVEMENT	1462.000 LF				
1190	745548 INSTALLATION OF ADDITIONAL CONDUITS IN DIRECTIONAL BORE	460.000 LF				
1200	746517 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE	18.000 EACH				
1210	746519 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE	23.000 EACH				
1220	746590 FURNISH & INSTALL GROUND ROD	163.000 EACH				
1230	746653 ELECTRICAL TESTING	LUMP	LUMP			
1240	746720 SUPPLY OF #2 THWN STRANDED COPPER	78.000 LF				
1250	746721 SUPPLY OF #4 THWN STRANDED COPPER	18853.000 LF				
1260	746722 SUPPLY OF #6 THWN STRANDED COPPER	8830.000 LF				
1270	746723 SUPPLY OF #8 THWN STRANDED COPPER	14256.000 LF				

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1280	746731 SUPPLY OF 4/0 URD ALUMINUM SERVICE CABLE	312.000 LF				
1290	746774 SUPPLY AND INSTALLATION OF LOOP DETECTOR WIRE	700.000 LF				
1300	746776 LOOP DETECTOR SPLICE	8.000 EACH				
1310	746782 INSTALLATION OF FIRST CABLE IN EXISTING EMPTY CONDUIT	8929.000 LF				
1320	746783 INSTALLATION OF EACH ADDITIONAL CABLE IN EXISTING EMPTY CONDUIT	33400.000 LF				
1330	746847 POLE BASE, TYPE 3	4.000 EACH				
1340	746852 POLE BASE, TYPE 6	47.000 EACH				
1350	747506 CABINET BASE	3.000 EACH				
1360	747509 LIGHTING CONTROL CENTER - 200A, 277/480V	1.000 EACH				
1370	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	756.000 SF				

DELAWARE DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

PAGE: 15
DATE:

CONTRACT ID: T200812201.01 PROJECT(S): NH-S014(12)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1380	748020 TEMPORARY MARKINGS, PAINT, 6"	64880.000 LF				
1390	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	67.000 SF				
1400	748027 PERMANENT PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 12"	155.000 LF				
1410	748502 RAISED/RECESSED PAVEMENT MARKER	269.000 EACH				
1420	748530 REMOVAL OF PAVEMENT STRIPING	34096.000 SF				
1430	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	66637.000 LF				
1440	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	4120.000 LF				
1450	749500 SIGN PANEL	528.000 SF				
1460	749503 VARIABLE MESSAGE SIGN (VMS) SUPPORT STRUCTURES	1.000 EACH				

DELAWARE DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

PAGE: 16
DATE:

CONTRACT ID: T200812201.01 PROJECT(S): NH-S014(12)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1470	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	EACH 180.000				
1480	749688 INSTALLATION OF 4" DIAMETER HOLE, LESS THAN OR EQUAL TO 6" DEPTH	EACH 9.000				
1490	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	SF 708.000				
1500	759502 FIELD OFFICE, SPECIAL I	EAMO 22.000				
1510	760016 RUMBLE STRIPS, HOT-MIX	LF 14740.000				
1520	760507 PROFILE MILLING, HOT-MIX	SYIN 82608.000				
1530	762001 SAW CUTTING, HOT MIX	LF 10077.000				
1540	762002 SAW CUTTING, CONCRETE, FULL DEPTH	LF 3650.000				
1550	763000 INITIAL EXPENSE	LUMP	LUMP			
1560	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			

DELAWARE DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

PAGE: 17
DATE:

CONTRACT ID: T200812201.01 PROJECT(S): NH-S014(12)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1570	763503 TRAINEE	1080.000	0.80000		864.00	
		HOURL				
1580	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			
1590	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	22.000				
		EAMO				
	SECTION 0001 TOTAL					
	TOTAL BID					

CANNOT BE
USED FOR
BIDDING

CANNOT BE

BREAKOUT SHEETS

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

BIDDING

CANNOT BE

SECTION 1			BREAKOUT SHEET - 1		CONTRACT NO. T200812201	
ITEM 708563 - PERSONNEL GRATE FOR PIPE INLET						
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT	
1	1	EA	14" x 23"	\$	\$	
2	2	EA	24"	\$	\$	
TOTAL ITEM 708563 - PERSONNEL GRATE FOR PIPE INLET \$						
(LUMP SUM BID PRICE FOR ITEM 708563)						

BIDDING

"ATTENTION"

TO BIDDERS

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

CERTIFICATION

Contract No. T200812201.01
Federal Aid Project No. NH-S014(12)

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

=====

FAILURE TO ACKNOWLEDGE RECEIPT OF ALL ADDENDA AND FINAL QUESTIONS AND ANSWERS WILL RESULT IN THE BID BEING DECLARED NON-RESPONSIVE.

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.
T200812201.01, 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